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# Solar Street Smart Solution

## BEIJING EPSOLAR  TECHNOLOGY CO.,LTD

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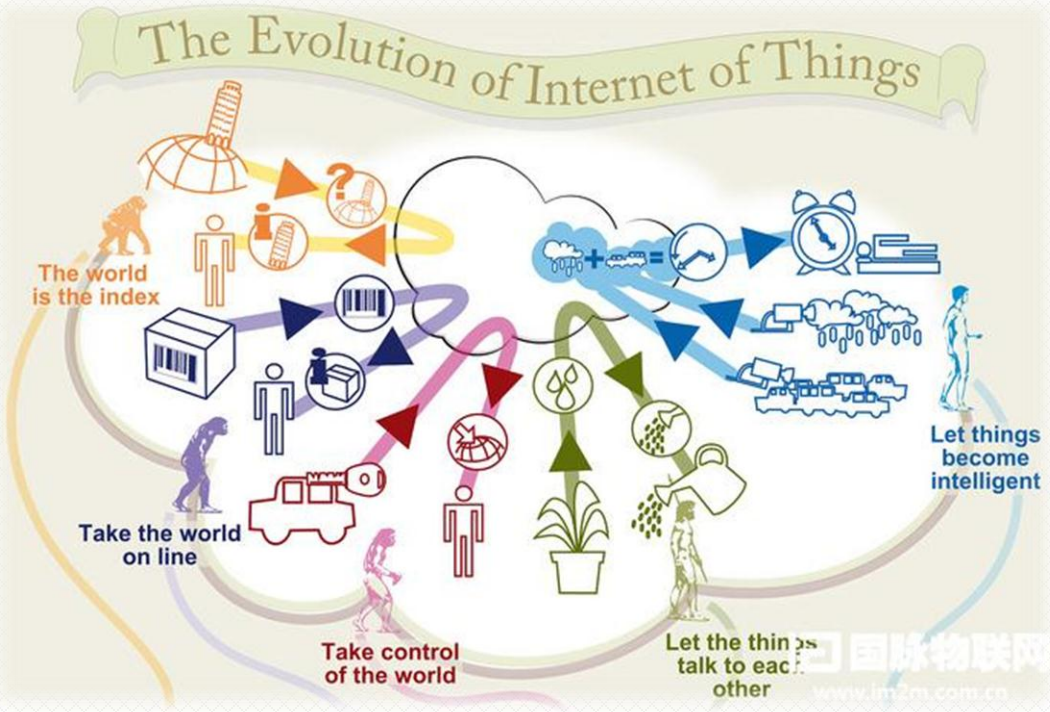
# The Advantage Of Solar Street Light Internet Of Things

## Internet Of Things Development

Internet of things is high integration and comprehensive application of new generation information network technology, is important direction and driving force of a new round of industrial revolution, which is of great significance to creation new economic growth point, promotion transformation and updating of industrial structure, and efficiency and level improvement of social management and public service.




## Solar Street Light Internet Of Things

Solar street light internet of Things is integration of green lighting industry and popular Internet of Things Technology. It changes solar street light traditional onsite management mode, improves maintenance efficiency and achieves intelligent remote control for each street light. In a word, it will be a inevitable trend of social development.

# The Advantage Of Solar Street Light Internet Of Things

## Disadvantages of Traditional solar street lamp

- Independent light, not able to be central controlled
- Difficult to inspect
- Charging in daytime, long time for charging troubleshooting at night.
- No running data record
- The fault is difficult to locate
- Many times the site、high labor costs

# The Advantage Of Solar Street Light Internet Of Things

## The application for internet of solar street lamp

### imitate scene 1、data statistics、data analysis for energy conservation and emissions reduction

Project KWH statistics- in various patterns show

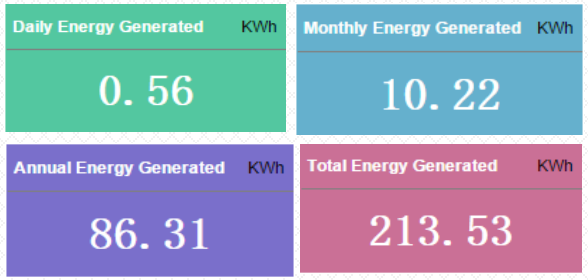
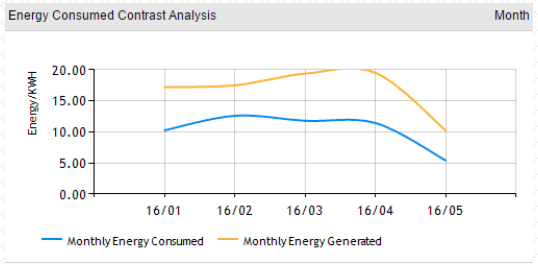
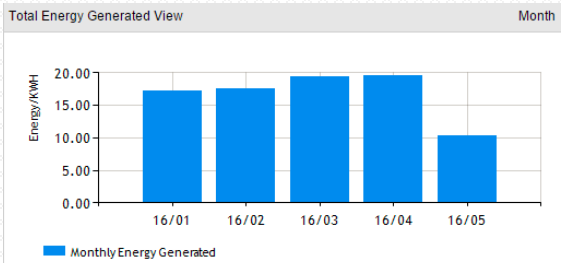


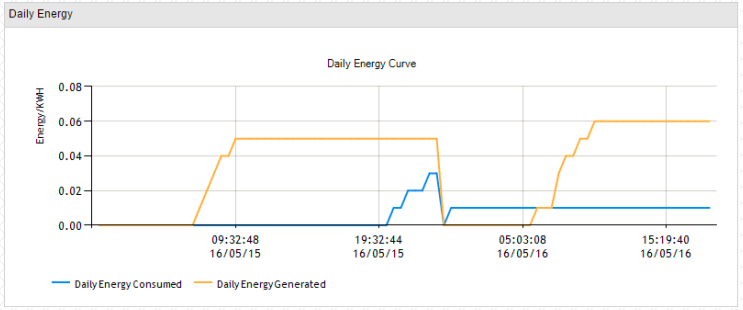

Figure pattern

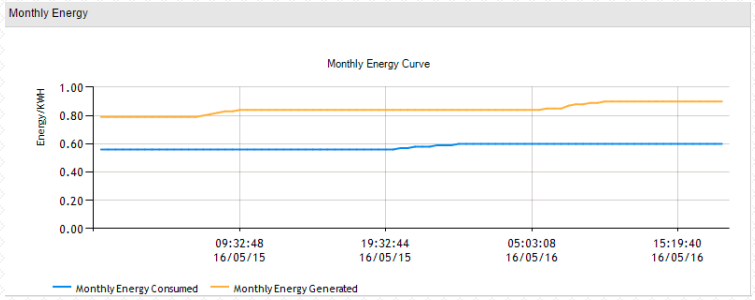


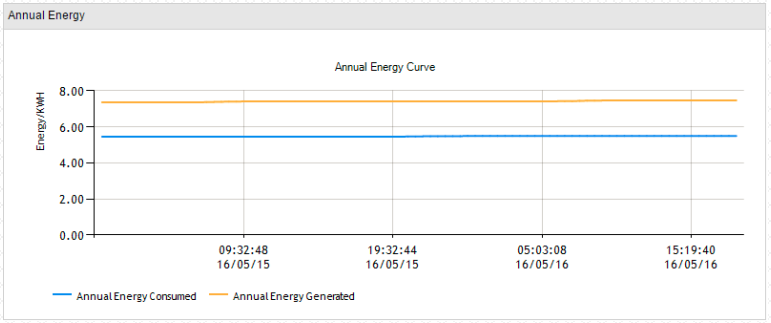

Curve pattern

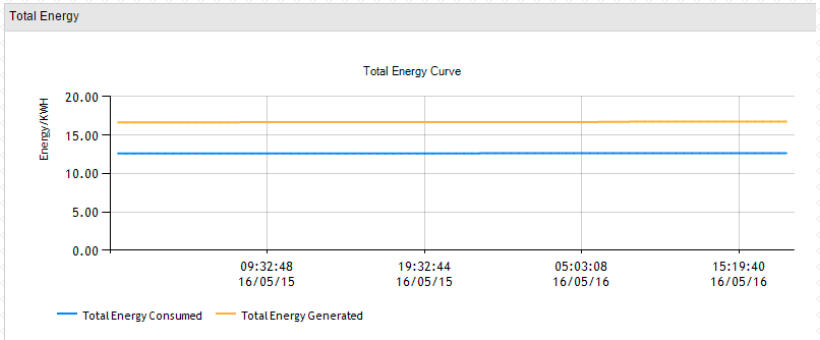



Histogram pattern




date、month、year、
total data curve
pattern

# The Advantage Of Solar Street Light Internet Of Things

## The application for internet of solar street lamp

imitate scene 2、Unify turn on/off lights, dimming control

### 1 Unify control

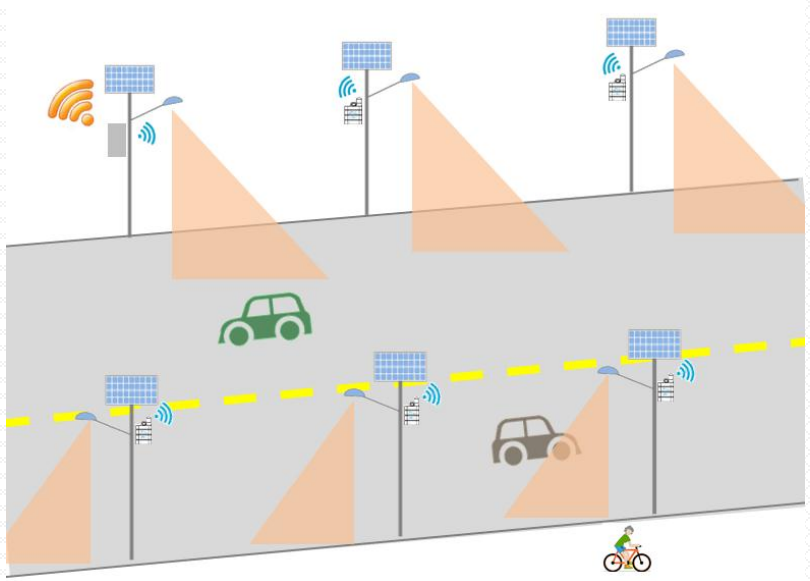
Turn on/off all the lights in any time ;

### 2 Intelligent dimming

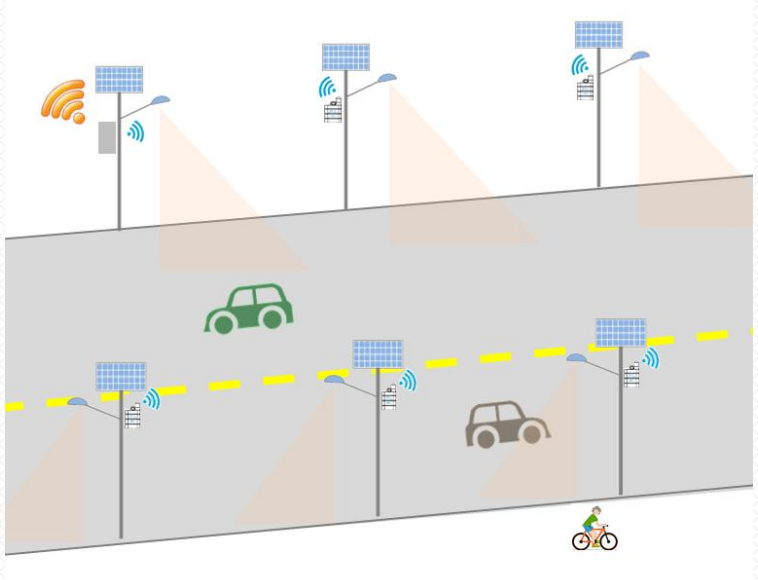
Dim all the lights intelligently according to weather

### 3 Individual dimming scheme

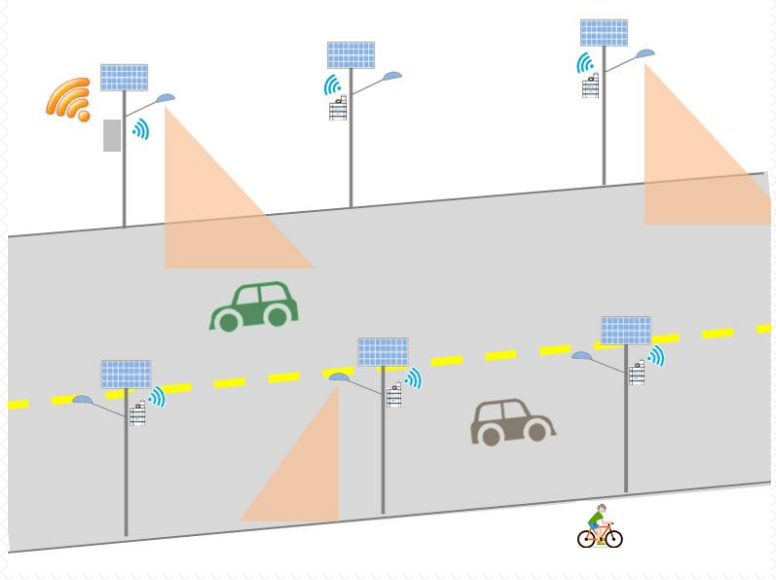
Self-set dimming scheme，
eg： lights on/off alternately;



Unify control



Intelligent dimming



Alternately on/off

# The Advantage Of Solar Street Light Internet Of Things

## Application for solar IOT street lamp

### Simulation Scenarios 3、use for special time and place


**1 Special time and holiday**

Special Lighting control strategy can be setting up . Realize the distinctive lighting design during holiday or somewhere high foot traffic

**2 Special events and emergency**

Linkage with other systems, strengthen the illumination brightness at the accident location

**3 Special district**

Certain district illuminating brightness real-time assignment

# The Advantage Of Solar Street Light Internet Of Things

## Application for solar IOT street lamp

## Simulation Scenarios 4、Emergency response for bad weather

### Emergency response for bad weather

Traditional solar street light control the lamp on/off by voltage of solar panel .

Can not  provide illumination flexible and timely in rainstorm weather, lead to road safety rick.

Epsolar’s IOT street light project . manage the street lamp expediently, control the lamp on at any time when necessary

Improve  road rick in bad weather . improve the citizens' satisfaction

# The Advantage of Solar Street Light Internet of Things

## The practical application of Solar Street Light Internet of Things

### Example 5、 Fault accurate alarm

Detect the charging and discharging error

onsite maintence

Recovery, street light turns on


Automatically send alarm information


Prepare accessories and arrange maintence according to alarm information

# The Application place Of Solar Street Light Internet Of Things

## Wide Applications- only GPRS needed

Superhighway

Country highway

Country roads

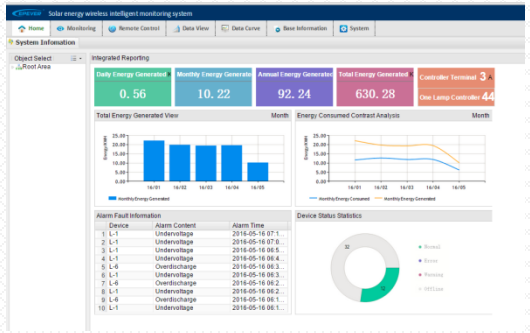
Residengtial garden

City highway

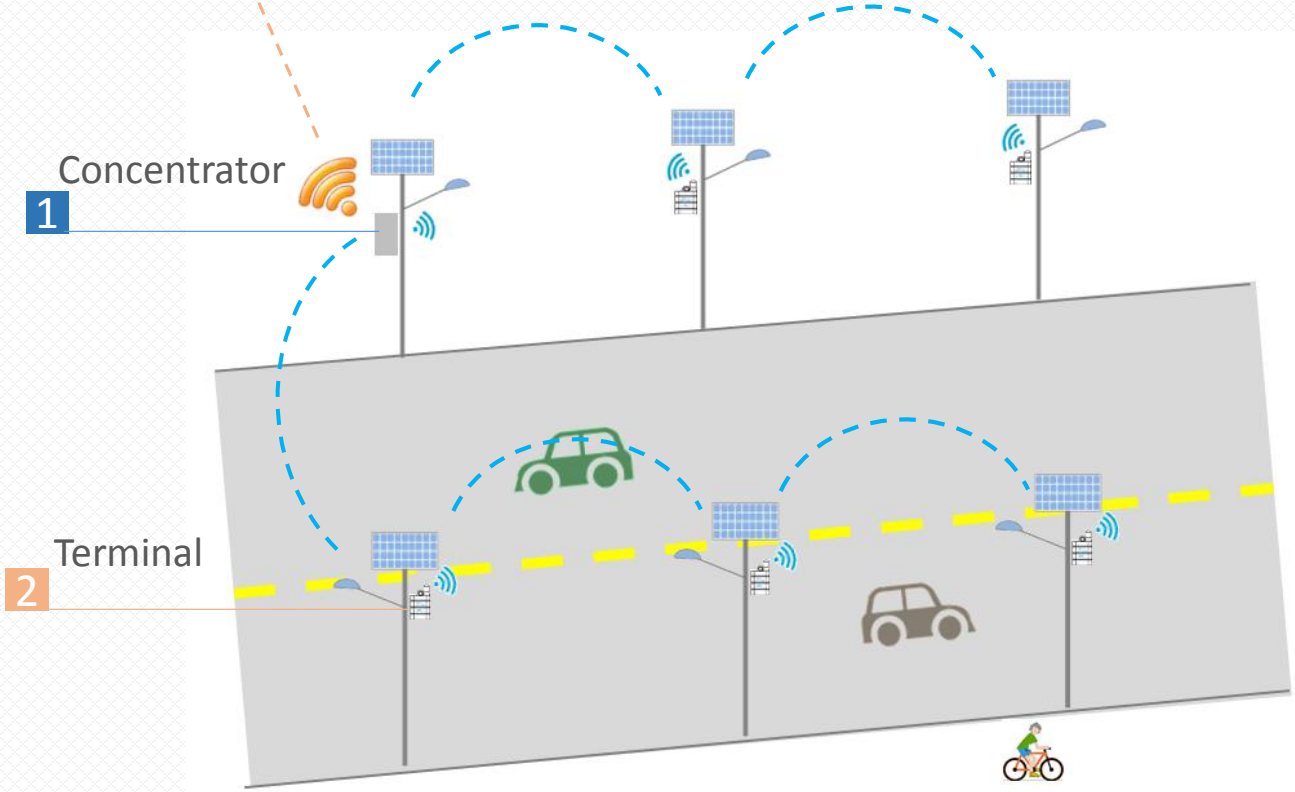
Park scenic spot

# OVERVIEW

3 Server



4 Monitor system




## IOT SOLUTION FOR SOLAR STREE LIGHT

- 433M wireless communication, Ad-hoc network, strong penetrability

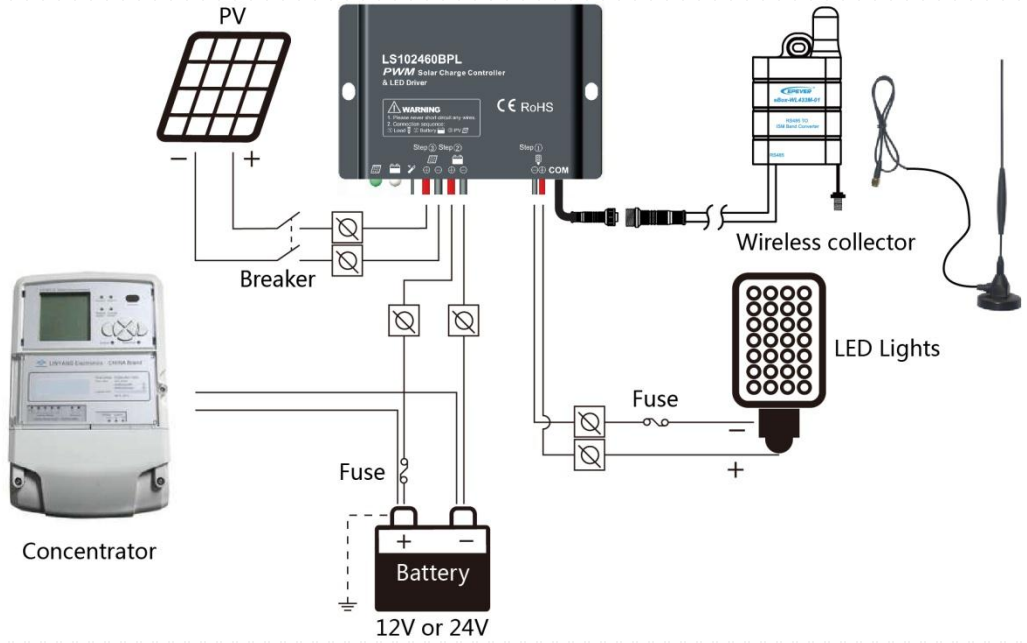
  Upward communication : GPRS

  Downward communication: 433M

- Charge controller with 5V power supply for communication module, no need for additional power
- Industrial grade communication module, for outdoor use
- Multi timer load mode and 0-100% dimmer programmable for each lamp

# MAIN PARTS

## SOLAR CHARGE CONTROLLER




### Several series charge controller

PWM：
LS-BPL: controller with built in LED driver
LS-BP: charge controller without driver

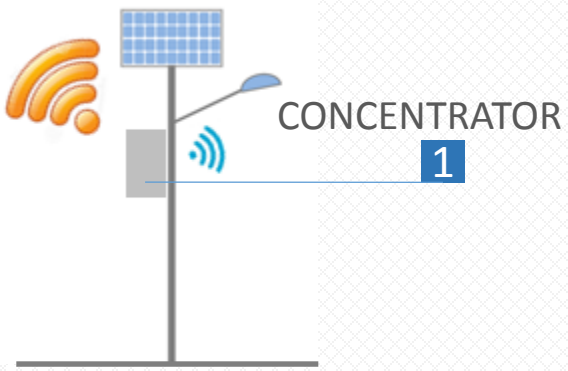
MPPT：
TRACER-BPL :controller with built in LED driver
TRACER-BP: charge controller without driver

### Controller features

RS485 port；
with DC 5V power supply;
IP65 class;
wide temperature range -25℃—+55℃

# MAIN PARTS

## CONCENTRATOR





CONCENTRATOR

### CONCENTRATOR FEATURES

Rated voltage： DC 9-36VDC Average consumption： ≤3W

Upward communication mode: GPRS (GSM/EDGE850/900/1800/1900MHZ)

Downward communication mode： 433MHz

Parameter configuration interface： RS485 and SMS

Communication distance： max line-of-sight transmission distance 800m

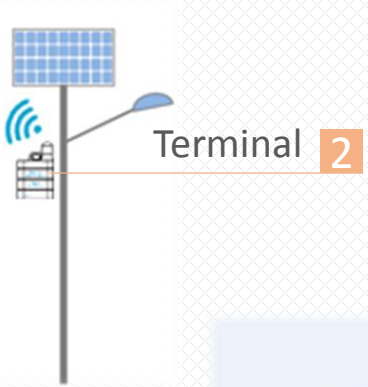
Nodes management：≤200 nodes

Operating temp.：-30~75℃

Relay and self operation function

# MAIN PARTS

## TERMIANLS





Terminals

### TERMINALS FEATURES

Upward communication mode： default 433MHz，470/868/915MHz selectable

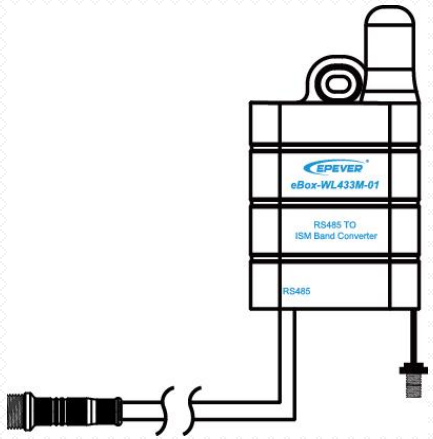
Downward communication mode： RS485

Average consumption：<=0.3W

Rated voltage：DC5V

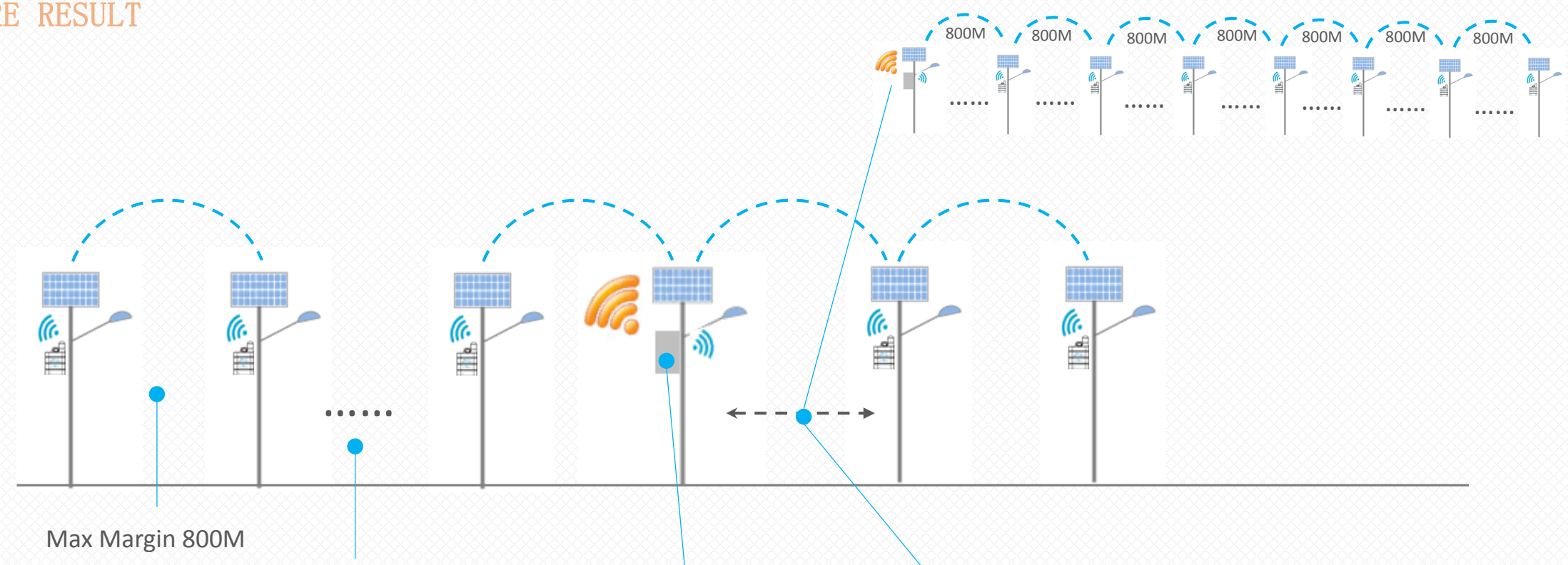
Communication distance： max line-of-sight transmission distance 800m

Operating temp.：-20~70℃



# COMMUNICATION DISTANCE

MEASURE RESULT



# INTRODUCTION ON 433M COMMUNCIATION

## 433M FEATURES

Strong signal, long distance, and low attenuation

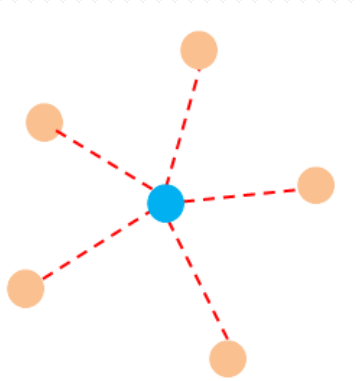
One concentrator control 200 nodes max

Controller node routing support  max 7 hopping

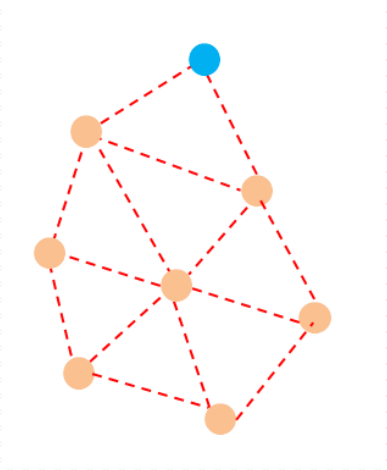
Automatic network build up and frequency hoping , avoid dead point

Net self maintenance

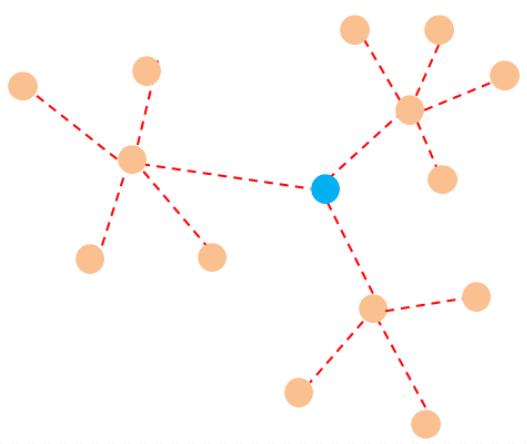
Unicast or broadcast



Star type



Net type



Tree type

concentrator

terminal

# Monitoring interface-main interface

## 1 Information

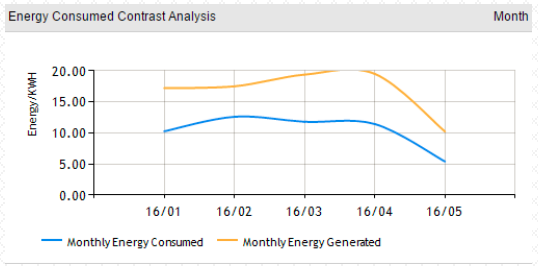
| | |
|---|---|
| Controller Terminal | 75 A |
| One Lamp Controller | 103 A |

Clear data

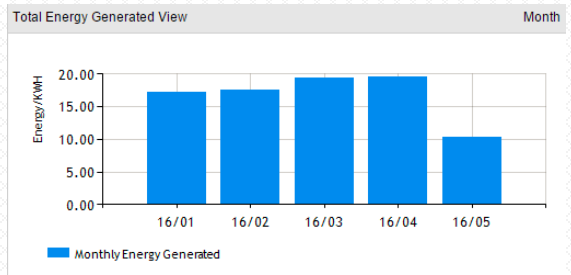
## 2 Power counting-forms show

| Daily Energy Generated KWh | Monthly Energy Generated KWh |
|---|---|
| 0. 56 | 10. 22 |
| **Annual Energy Generated KWh** | **Total Energy Generated KWh** |
| 86. 31 | 213. 53 |

Number pattern




Curve pattern




Histogram pattern

## 3 Street light status overview

Alarm Fault Information

| | Device | Alarm Content | Alarm Time |
|---|---|---|---|
| 1 | L-1 | Undervoltage | 2016-05-16 07:10:05 |
| 2 | L-1 | Undervoltage | 2016-05-16 07:01:47 |
| 3 | L-1 | Undervoltage | 2016-05-16 06:50:08 |
| 4 | L-1 | Undervoltage | 2016-05-16 06:40:05 |
| 5 | L-6 | Overdischarge | 2016-05-16 06:32:09 |
| 6 | L-1 | Undervoltage | 2016-05-16 06:31:38 |
| 7 | L-6 | Overdischarge | 2016-05-16 06:20:48 |
| 8 | L-1 | Undervoltage | 2016-05-16 06:20:05 |
| 9 | L-6 | Overdischarge | 2016-05-16 06:10:37 |
| 10 | L-1 | Undervoltage | 2016-05-16 06:10:06 |

Table list

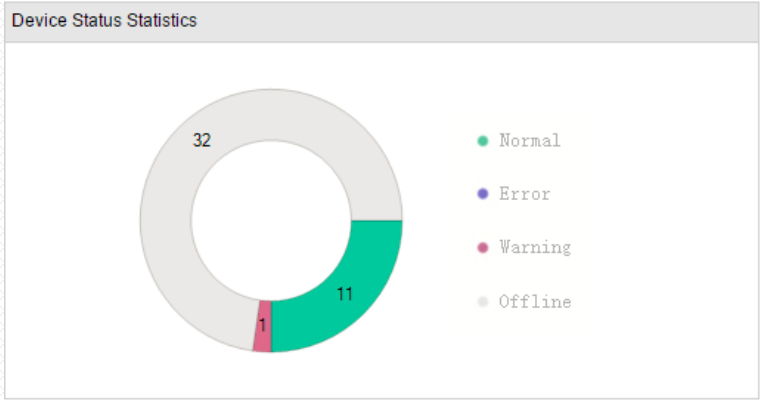



Diagram overview

# Monitoring interface

remote monitoring 、global list、global map、individually light、three mode is optional

## 1 Global list

Data Displaying | All | Search

| | Area | Collector | Connected | Device | Current Status | Energy Gener... | Energy Cons... | StorageBattery SOC | ArrayVol | ArrayCur | ChargeDe |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 昌平县城--振超路 | EPEVER5555 | ✔ | L-1 | Light Off | 22.33 | 7.35 | 100.00 | 37.47 | 0.11 | 3.50 |
| 2 | 昌平县城--振超路 | EPEVER5555 | ✔ | L-2 | Light Off | 12.01 | 7.32 | 100.00 | 37.96 | 0.03 | 0.00 |
| 3 | 昌平县城--振超路 | EPEVER5555 | ✔ | L-3 | Light Off | 23.71 | 16.51 | 100.00 | 36.98 | 0.06 | 2.00 |
| 4 | 昌平县城--振超路 | EPEVER5555 | ✔ | L-4 | Light Off | 24.58 | 17.47 | 100.00 | 37.53 | 0.03 | 0.00 |
| 5 | 昌平县城--振超路 | EPEVER5555 | ✔ | L-5 | Light Off | 21.72 | 16.15 | 100.00 | 38.09 | 0.05 | 0.57 |
| 6 | 昌平县城--振超路 | EPEVER5555 | ✔ | L-6 | Light Off | 24.90 | 17.12 | 100.00 | 38.19 | 0.07 | 2.63 |
| 7 | 昌平县城--振超路 | EPEVER5555 | ✔ | L-7 | Light Off | 21.33 | 14.79 | 100.00 | 38.43 | 0.04 | 0.00 |
| 8 | 昌平县城--振超路 | EPEVER5555 | ✔ | L-8 | Light Off | 23.11 | 17.74 | 99.00 | 38.08 | 0.00 | 0.00 |
| 9 | 昌平县城--振超路 | EPEVER5555 | ✔ | L-9 | Light Off | 16.77 | 12.65 | 100.00 | 38.20 | 0.00 | 0.00 |
| 10 | 昌平县城--振超路 | EPEVER5555 | ✔ | L-10 | Light Off | 23.07 | 17.48 | 100.00 | 37.70 | 0.08 | 1.22 |

## 2 Global map


## 3 Individually light

**Battery Information**

| | |
|---|---|
| Battery Volt.(V): | 27.38 |
| Battery Current(A): | 0 |
| Max Voltage(V): | 28.45 |
| Min Voltage(V): | 25.2 |
| Battery Temp.(℃): | 31.73 |
| Battery SOC(%): | 100 |
| Charge Status: | FloatCharge |
| Battery Status: | Normal |

**DC Load Information**

| | |
|---|---|
| Load Voltage(V): | 0 |
| Load Current(A): | 0 |
| Load Power(W): | 0 |
| Load Status: | Off |

**Array Information**

| | |
|---|---|
| Array Volt.(V): | 38.41 |
| Array Current(A): | 0 |
| Array Power(W): | 0 |
| Array Status: | Input |

# Monitoring interface

**remote monitoring 、global list、global map、individually light、three mode is optional**

## 4 Individually light

Five types information on the same display： PV、Battery、Load、Controller、power counting

**Array Information**

| | |
|---|---|
| Array Volt.(V): | 38.41 |
| Array Current(A): | 0 |
| Array Power(W): | 0 |
| Array Status: | Input |

**Battery Information**

| | |
|---|---|
| Battery Volt.(V): | 27.38 |
| Battery Current(A): | 0 |
| Max Voltage(V): | 28.45 |
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| Charge Status: | FloatCharge |
| Battery Status: | Normal |

**DC Load Information**

| | |
|---|---|
| Load Voltage(V): | 0 |
| Load Current(A): | 0 |
| Load Power(W): | 0 |
| Load Status: | Off |

**Device Information**

| | |
|---|---|
| Device Temp.(℃): | 36.48 |
| Device Status: | Normal |

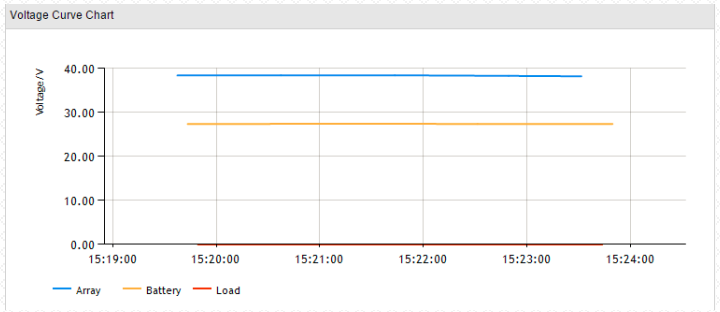
**Energy Generated(kWh)**

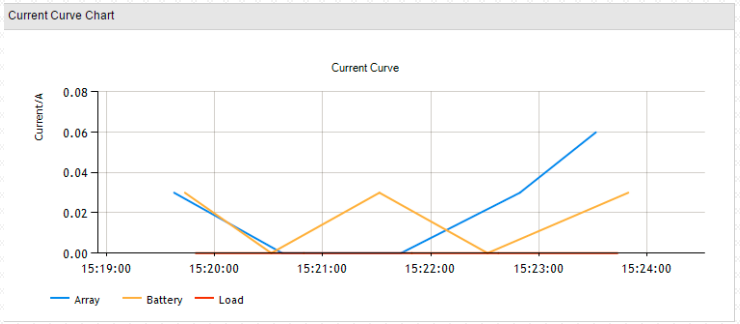
| | |
|---|---|
| Daily: | 0.06 |
| Monthly: | 0.9 |
| Annual: | 7.48 |
| Total: | 16.77 |

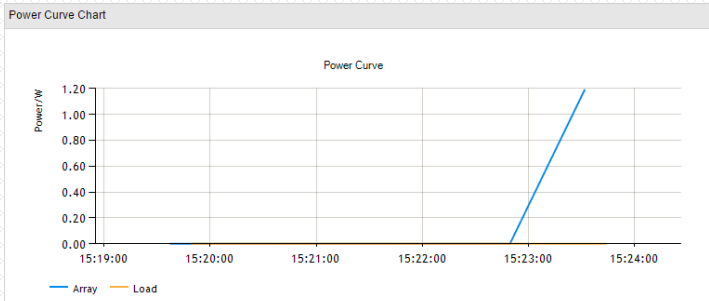
**Energy Consumed(kWh)**

| | |
|---|---|
| Daily: | 0.01 |
| Monthly: | 0.6 |
| Annual: | 5.5 |
| Total: | 12.65 |

View in real time for graph of three electrical parameters：voltage、current、power



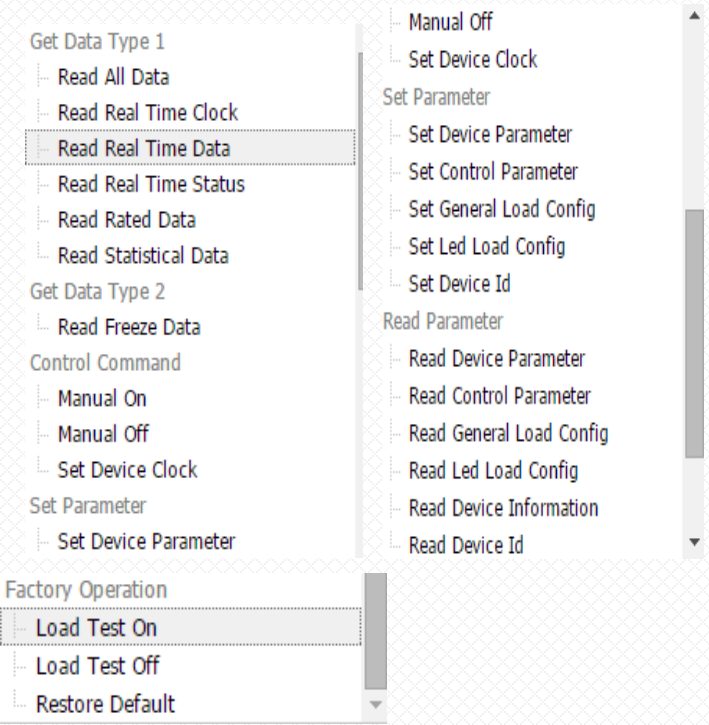



# Monitoring interface

## remote control

1 Rich content of control instruction to meet various locations




2 Log information-query by period

Data Search | Search

From Date: 2016-05-01 End Date: 2016-05-16 Collector Name:

Min Duration: Max Duration: Remark:

Data Displaying

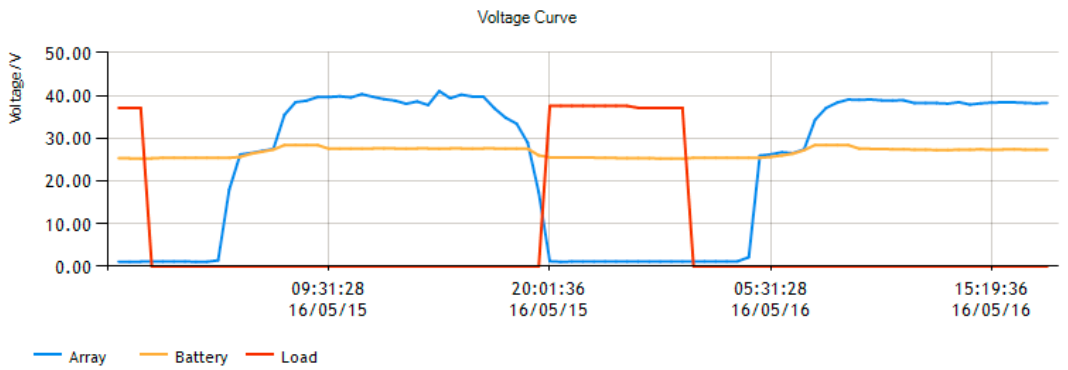
| | Area | Collector | Channel No | Offline Time | Duration | Remark |
|---|---|---|---|---|---|---|
| 1 | 昌平县城--振超路 | EPEVER5555 | 5555 | 2016-05-13 01:12:00 | 402 | 5555 117.136.38.229:45215 连接失败，客户端已掉线 |
| 2 | 昌平县城--振超路 | EPEVER5555 | 5555 | 2016-05-12 17:12:00 | 1647 | 5555 117.136.38.9:9567 连接失败，客户端已掉线 |
| 3 | 昌平县城--振超路 | EPEVER5555 | 5555 | 2016-05-11 13:32:00 | 2965 | 5555 117.136.38.159:41632 连接失败，客户端已掉线 |
| 4 | 昌平县城--振超路 | EPEVER5555 | 5555 | 2016-05-09 10:52:00 | 823 | 5555 117.136.38.72:62215 连接失败，客户端已掉线 |
| 5 | 昌平县城--振超路 | EPEVER5555 | 5555 | 2016-05-07 13:32:00 | 1162 | 5555 117.136.38.134:39355 连接失败，客户端已掉线 |
| 6 | 昌平县城--振超路 | EPEVER5555 | 5555 | 2016-05-06 17:20:00 | 178 | 5555 117.136.38.145:32091 连接失败，客户端已掉线 |
| 7 | 昌平县城--振超路 | EPEVER5555 | 5555 | 2016-05-06 13:10:00 | 727 | 5555 117.136.38.134:37310 连接失败，客户端已掉线 |
| 8 | 昌平县城--振超路 | EPEVER5555 | 5555 | 2016-05-05 23:42:00 | 14 | 5555 117.136.38.151:3906 连接失败，客户端已掉线 |
| 9 | 昌平县城--振超路 | EPEVER5555 | 5555 | 2016-05-05 11:04:00 | 4036 | 5555 117.136.38.150:35449 连接失败，客户端已掉线 |

# Monitoring interface

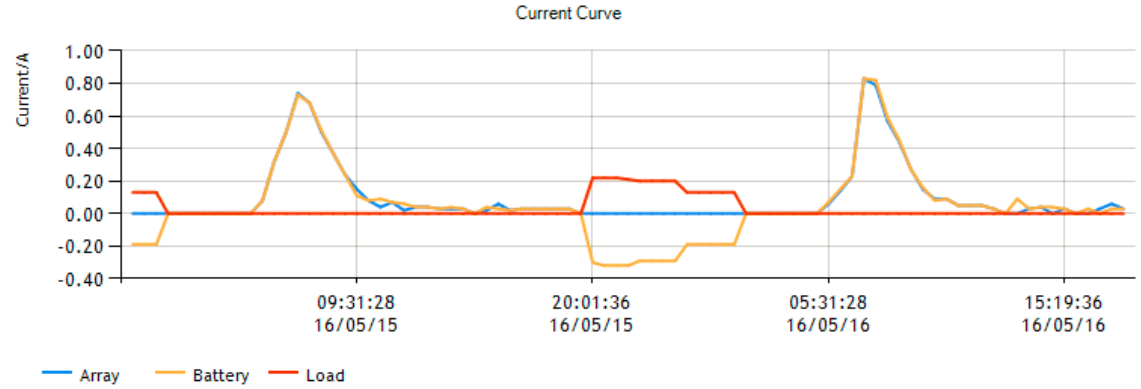
## Data report

1 Single lamp voltage、current、power curve

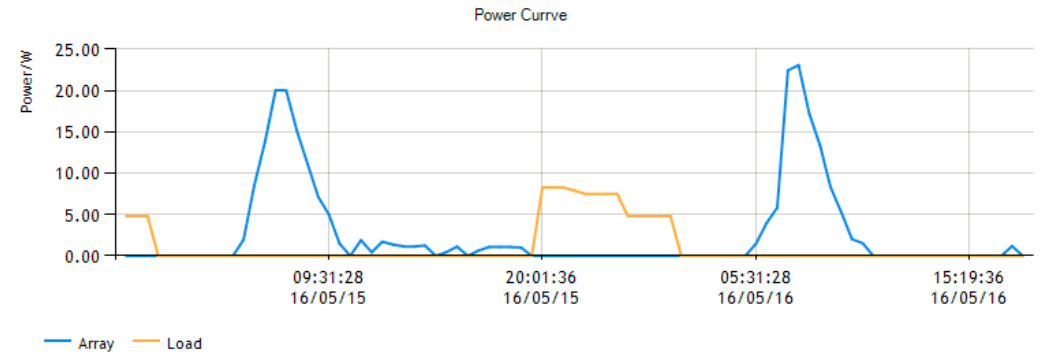
Voltage Curve




Crrent Curve




Power Curve



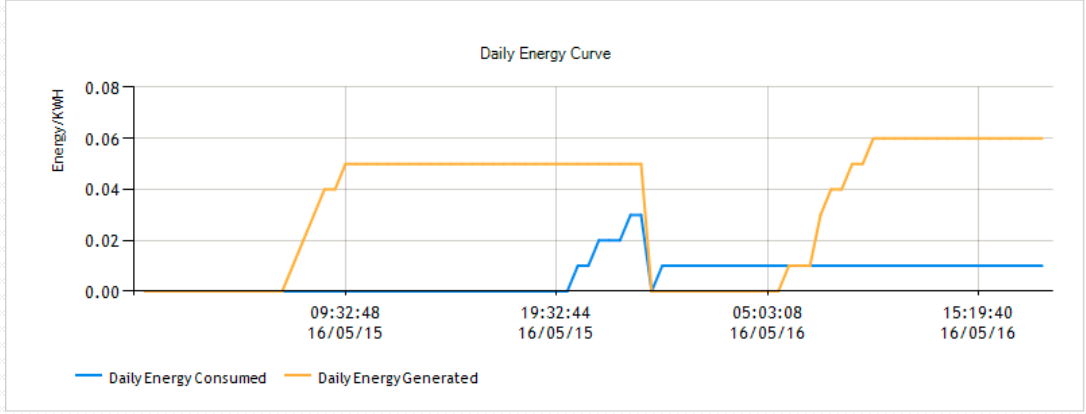

Engineers can grasp the project running data for each street lamp at any time;
The data can be enquires anytime according to the time period, simple and efficient, easy to operate.

# Monitoring interface

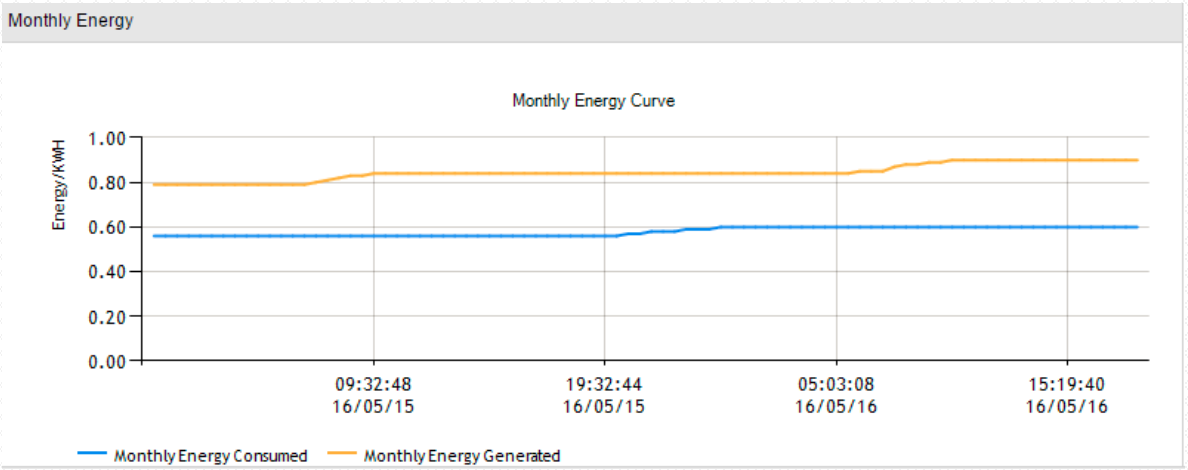
## interface-**Data report**

2 date、month、year、total、energy consumption statistics curve

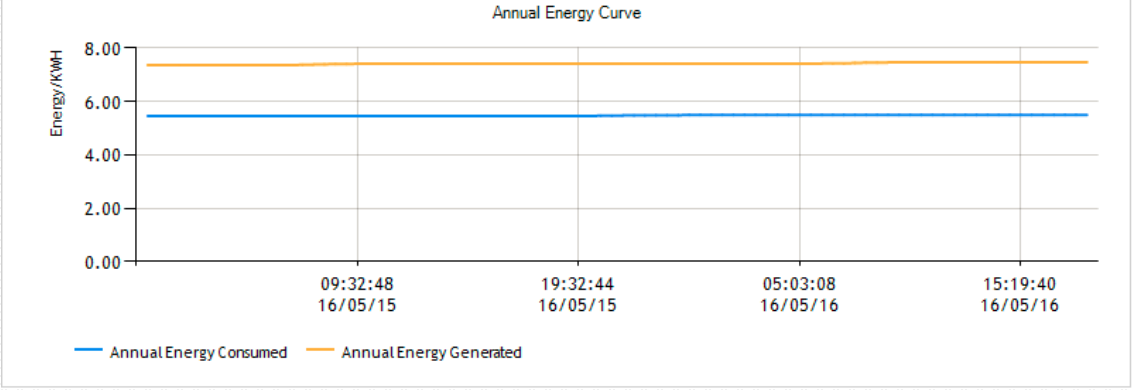
Daily Energy



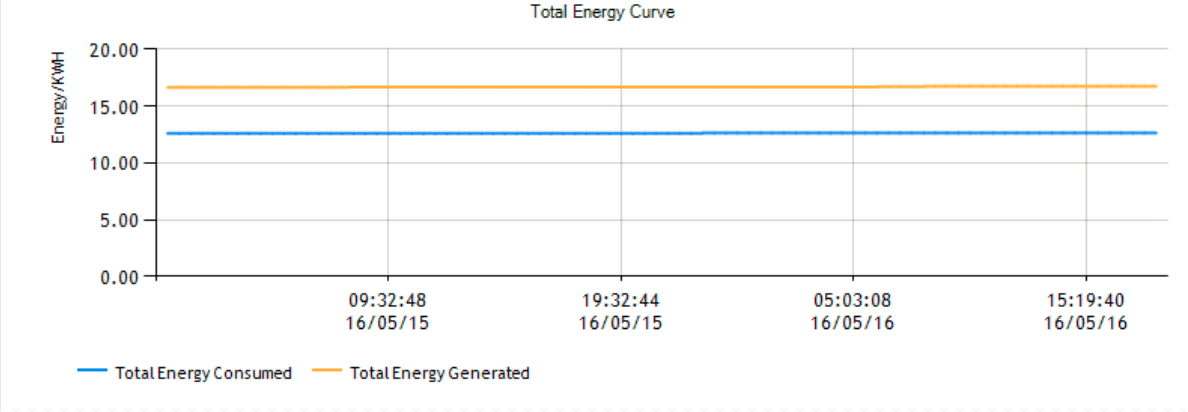

Monthly Energy




Annual Energy




Total Energy



# Monitoring interface

## Monitoring Interface-Data Report

3 Status inquiry for different Timer

Status for PV、Battery、Load、solar charge controller；
charging status .,listed exact status info for different time

Data Search | Search

From Date: 2016-05-15 00:00

End Date: 2016-05-16 23:59

Data Displaying

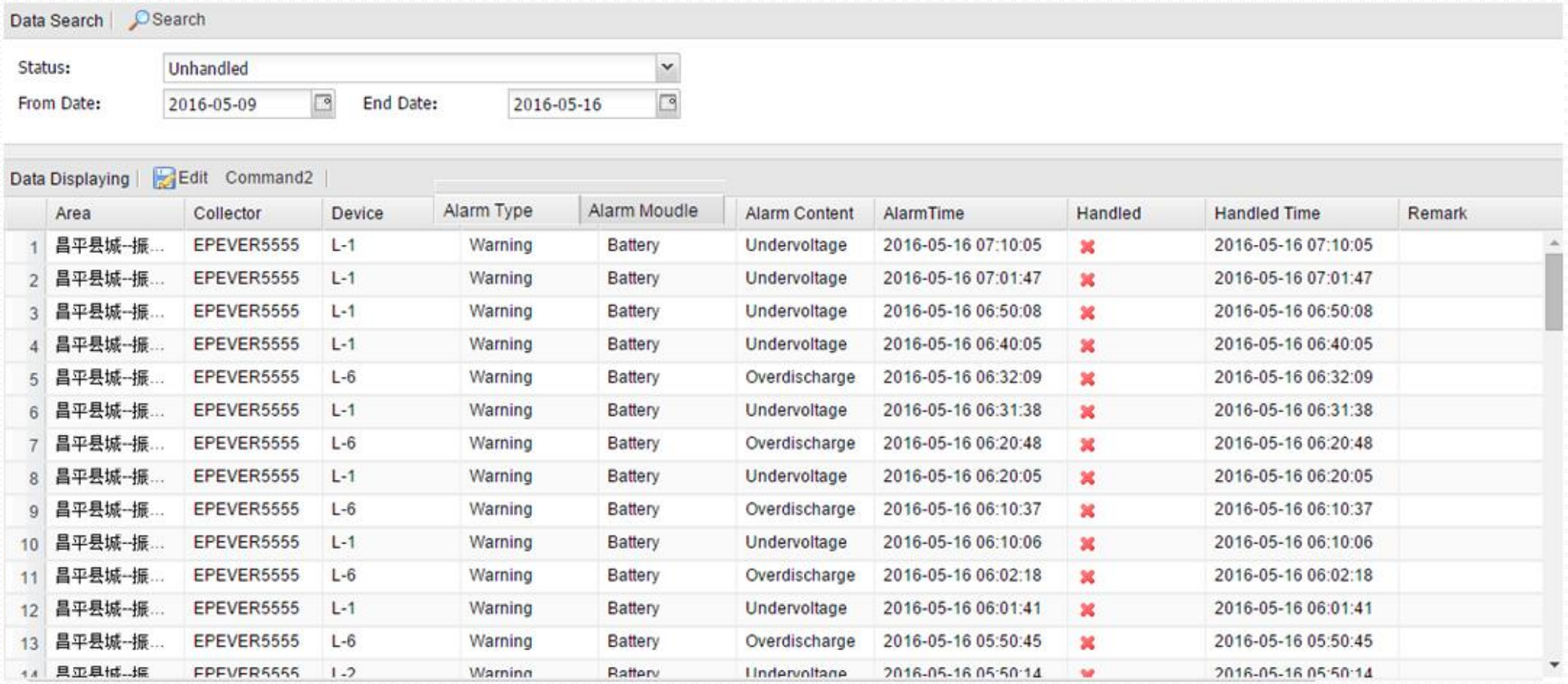
| | Id | Name | Save Time | Device Status | Array Status | Charging Status | Load Status | Battery Status |
|---|---|---|---|---|---|---|---|---|
| 1 | 377310 | L-10 | 2016/5/16 15:32:26 | Normal | Input | FloatCharge | Off | Normal |
| 2 | 377309 | L-9 | 2016/5/16 15:32:20 | Normal | Input | FloatCharge | Off | Normal |
| 3 | 377308 | L-8 | 2016/5/16 15:32:15 | Normal | Input | FloatCharge | Off | Normal |
| 4 | 377307 | L-7 | 2016/5/16 15:32:11 | Normal | Input | FloatCharge | Off | Normal |
| 5 | 377306 | L-6 | 2016/5/16 15:32:07 | Normal | Input | FloatCharge | Off | Normal |
| 6 | 377305 | L-5 | 2016/5/16 15:32:02 | Normal | Input | FloatCharge | Off | Normal |
| 7 | 377304 | L-4 | 2016/5/16 15:31:57 | Normal | Input | FloatCharge | Off | Normal |
| 8 | 377303 | L-3 | 2016/5/16 15:31:52 | Normal | Input | FloatCharge | Off | Normal |
| 9 | 377302 | L-2 | 2016/5/16 15:31:48 | Normal | Input | FloatCharge | Off | Normal |
| 10 | 377301 | L-1 | 2016/5/16 15:31:42 | Normal | Input | FloatCharge | Off | Normal |
| 11 | 377267 | L-9 | 2016/5/16 15:24:42 | Normal | Input | FloatCharge | Off | Normal |
| 12 | 377266 | L-9 | 2016/5/16 15:23:44 | Normal | Input | FloatCharge | Off | Normal |
| 13 | 377265 | L-9 | 2016/5/16 15:22:43 | Normal | Input | FloatCharge | Off | Normal |
| 14 | 377264 | L-9 | 2016/5/16 15:21:45 | Normal | Input | FloatCharge | Off | Normal |
| 15 | 377262 | L-10 | 2016/5/16 15:21:03 | Normal | Input | FloatCharge | Off | Normal |
| 16 | 377260 | L-9 | 2016/5/16 15:20:58 | Normal | Input | FloatCharge | Off | Normal |

# Monitoring interface

## Monitoring Interface-Data Report

4 Alarm history management，
Inquired by timer

When System operation is abnormal, indicator on and send out alarm information. Prompt the project manager ,Arrange screening ,eliminate the alarm.
。



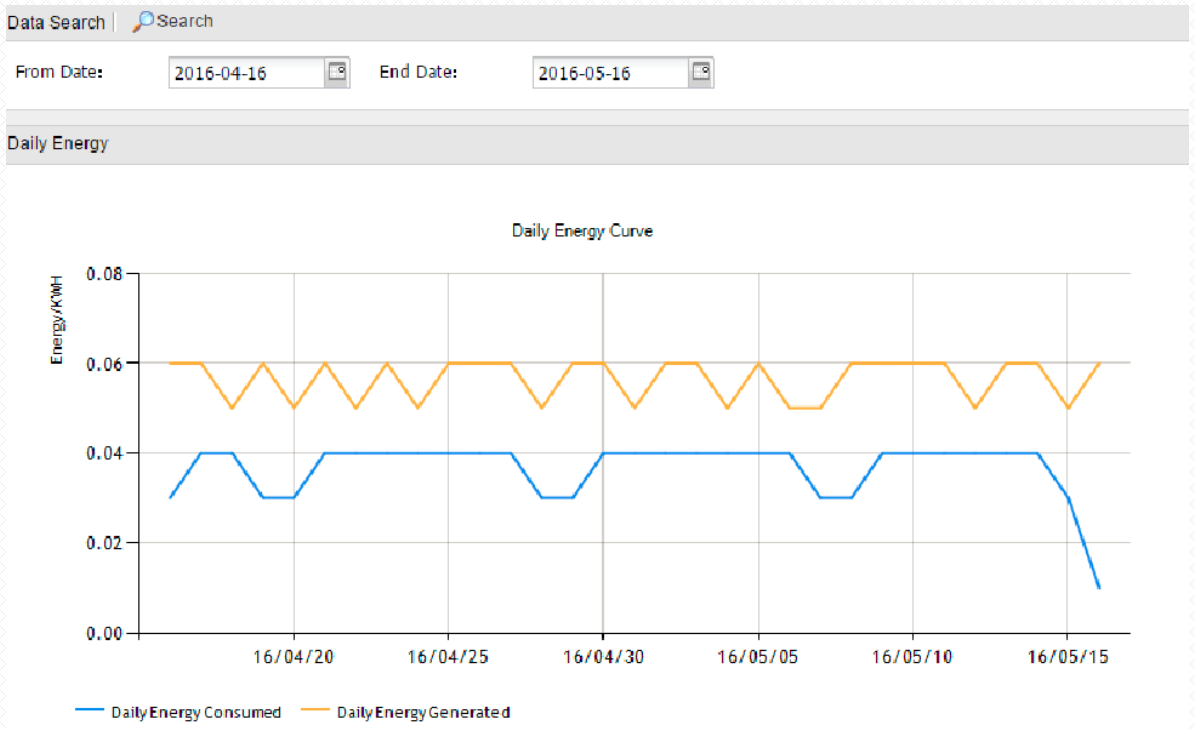

| | Area | Collector | Device | Alarm Type | Alarm Moudle | Alarm Content | AlarmTime | Handled | Handled Time | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 昌平县城--振... | EPEVER5555 | L-1 | Warning | Battery | Undervoltage | 2016-05-16 07:10:05 | ✖ | 2016-05-16 07:10:05 | |
| 2 | 昌平县城--振... | EPEVER5555 | L-1 | Warning | Battery | Undervoltage | 2016-05-16 07:01:47 | ✖ | 2016-05-16 07:01:47 | |
| 3 | 昌平县城--振... | EPEVER5555 | L-1 | Warning | Battery | Undervoltage | 2016-05-16 06:50:08 | ✖ | 2016-05-16 06:50:08 | |
| 4 | 昌平县城--振... | EPEVER5555 | L-1 | Warning | Battery | Undervoltage | 2016-05-16 06:40:05 | ✖ | 2016-05-16 06:40:05 | |
| 5 | 昌平县城--振... | EPEVER5555 | L-6 | Warning | Battery | Overdischarge | 2016-05-16 06:32:09 | ✖ | 2016-05-16 06:32:09 | |
| 6 | 昌平县城--振... | EPEVER5555 | L-1 | Warning | Battery | Undervoltage | 2016-05-16 06:31:38 | ✖ | 2016-05-16 06:31:38 | |
| 7 | 昌平县城--振... | EPEVER5555 | L-6 | Warning | Battery | Overdischarge | 2016-05-16 06:20:48 | ✖ | 2016-05-16 06:20:48 | |
| 8 | 昌平县城--振... | EPEVER5555 | L-1 | Warning | Battery | Undervoltage | 2016-05-16 06:20:05 | ✖ | 2016-05-16 06:20:05 | |
| 9 | 昌平县城--振... | EPEVER5555 | L-6 | Warning | Battery | Overdischarge | 2016-05-16 06:10:37 | ✖ | 2016-05-16 06:10:37 | |
| 10 | 昌平县城--振... | EPEVER5555 | L-1 | Warning | Battery | Undervoltage | 2016-05-16 06:10:06 | ✖ | 2016-05-16 06:10:06 | |
| 11 | 昌平县城--振... | EPEVER5555 | L-6 | Warning | Battery | Overdischarge | 2016-05-16 06:02:18 | ✖ | 2016-05-16 06:02:18 | |
| 12 | 昌平县城--振... | EPEVER5555 | L-1 | Warning | Battery | Undervoltage | 2016-05-16 06:01:41 | ✖ | 2016-05-16 06:01:41 | |
| 13 | 昌平县城--振... | EPEVER5555 | L-6 | Warning | Battery | Overdischarge | 2016-05-16 05:50:45 | ✖ | 2016-05-16 05:50:45 | |
| 14 | 昌平县城--振... | EPEVER5555 | L-2 | Warning | Battery | Undervoltage | 2016-05-16 05:50:14 | ✖ | 2016-05-16 05:50:14 | |

# Monitoring Interface

## Data -Analysis

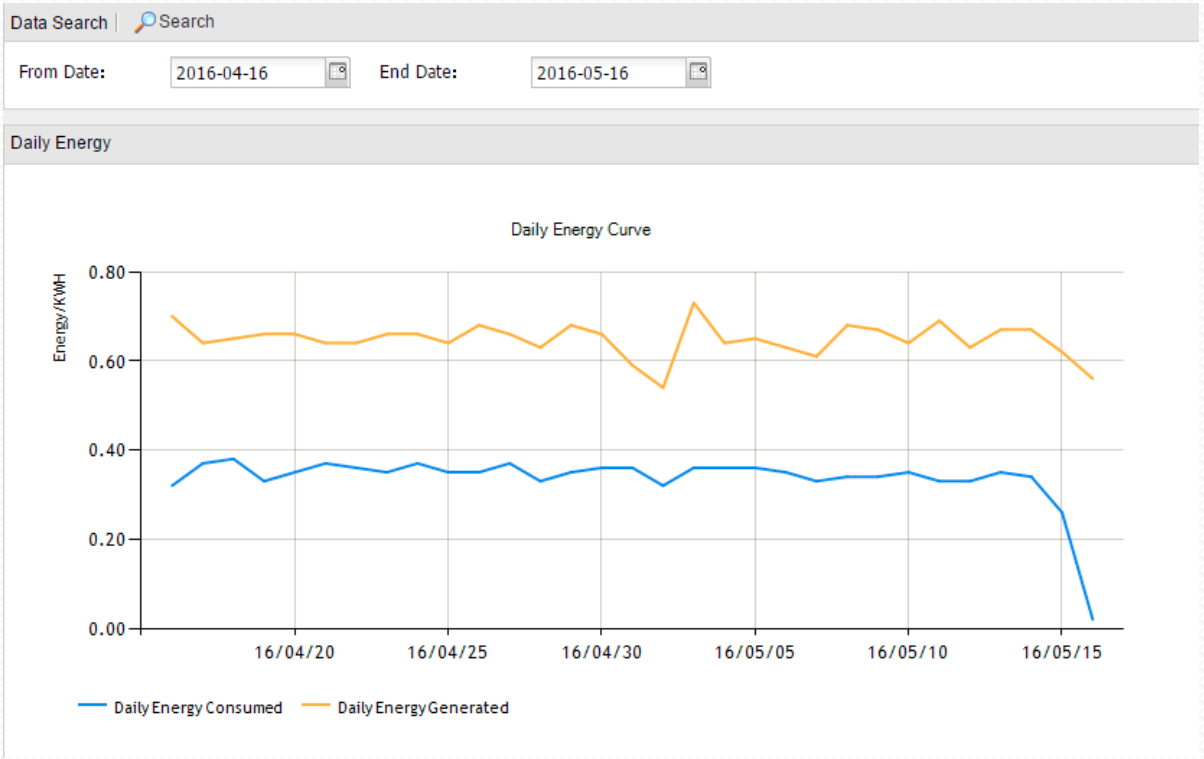
1 Single lamp date analysis， contrast of Charge and discharge amount

Support query according to time




2 conceptual data analysis， contrast of Charge and discharge amount

Support query according to time



# Monitoring Interface

## Basic Information

### Installation of the project

Data Search | Search

Device Name: Module Address:

Data Displaying | Add Edit Delete Delete by Collector Up Down Sort |

| | Id | Area | Collector | Name | Current St... | Device Id | Module Addresses | Product Family | Product Code |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 16 | 昌平县城--振超路 | EPEVER5555 | L-1 | Light Off | 1 | 000009240049 | LS-BPL | LS1024BPL |
| 2 | 17 | 昌平县城--振超路 | EPEVER5555 | L-2 | Light Off | 2 | 000009240131 | LS-BPL | 0002 |
| 3 | 18 | 昌平县城--振超路 | EPEVER5555 | L-3 | Light Off | 3 | 000009240005 | LS-BPL | 003 |
| 4 | 19 | 昌平县城--振超路 | EPEVER5555 | L-4 | Light Off | 4 | 000009240134 | LS-BPL | 004 |
| 5 | 20 | 昌平县城--振超路 | EPEVER5555 | L-5 | Light Off | 5 | 000009240015 | LS-BPL | 005 |
| 6 | 22 | 昌平县城--振超路 | EPEVER5555 | L-6 | Light Off | 7 | 000009240093 | LS-BPL | 007 |
| 7 | 25 | 昌平县城--振超路 | EPEVER5555 | L-7 | Light Off | 10 | 000009240041 | LS-BPL | 010 |
| 8 | 26 | 昌平县城--振超路 | EPEVER5555 | L-8 | Light Off | 11 | 000009240115 | LS-BPL | 011 |
| 9 | 27 | 昌平县城--振超路 | EPEVER5555 | L-9 | Light Off | 12 | 000009240099 | LS-BPL | 012 |
| 10 | 28 | 昌平县城--振超路 | EPEVER5555 | L-10 | Light Off | 13 | 000009240030 | LS-BPL | 013 |
| 11 | 24 | 客户演示 | EPEVER5403 | 昌L-9 | Offline | 9 | 000009240003 | LS-BPL | 009 |
| 12 | 23 | 客户演示 | EPEVER5403 | 昌L-8 | Offline | 8 | 000009240012 | LS-BPL | 008 |
| 13 | 21 | 客户演示 | EPEVER5403 | 昌L-6 | Offline | 6 | 000009240016 | LS-BPL | 006 |
| 14 | 15 | 客户演示 | EPEVER5403 | H-1 | Offline | 22 | 000009240120 | Tracer-BPL | 111 |

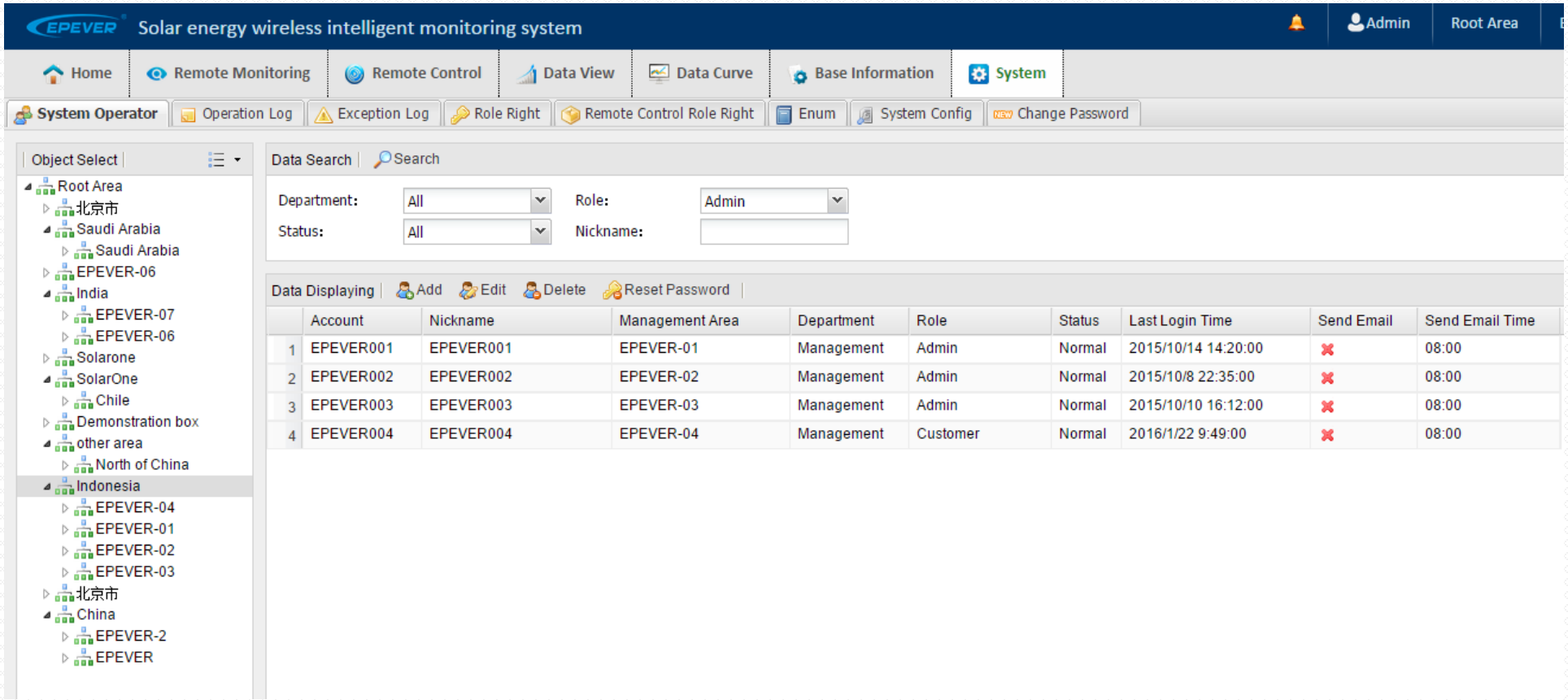
Configuration information
For engineers

# Monitoring Interface

## System Info

Back-stage management-
Administrator Interface


According to the demand, set, distribute ,manage different permissions account and password



# THANKS