HXET-100
DATA CONCENTRATOR
Focus on creating value for clients
HXET100 intelligent data concentrator is an important part of AMI system, it connects data collector with master station and performs task setting, data collection, data transmission and data storage, meter management, GPRS information task execution and RF network management. The upper communication between concentrator and master station adopts GPRS/PSTN/Ethernet technology; the Downlink communication between concentrator and data collector adopts PLC/RF/RS485 communication. Besides, the local communication for concentrator is available via the RS232 port.

### Highlights
- Clip connection design for the power line
- ESAM encryption of hardware
- Three phase connection indication
- Local software upgrading by USB disk
- Module cover open detection
- One button of hardware restart under module cover

### Features
- **IEC protocol compliance**
  - The data transmission is in accordance with DLMS/COSEM and IEC60870-5-102 protocol.
- **Convenient maintenance**
  - By adopting highly Intelligent design, the concentrator can automatically perform comprehensive setting operation that greatly simplifies the manual operation. Once the meter serial No. (Communication address) is added, the concentrator will detect the meter automatically.
  - Equipped with IrDA communication port, the handheld unit is enabled to configure the Concentrator locally.
• Self diagnosis is available to report the running status or failure of the Concentrator.
• Remote parameter setting.

- **Reliability**
  • The MTBF (mean time between failures) \( \geq 100,000 \) hours;

- **Perfect hardware design**
  • The perfect hardware design guarantees high Anti-EMC capability; also, the abnormal weather condition such as low or high temperature or high relative humidity will not affect Collector’s normal working of the. In addition, three Stage Surge Protection is used to avoid damage from lightning.

### Standard compliance

<table>
<thead>
<tr>
<th>ISO</th>
<th>International Organization for Standardization</th>
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<tbody>
<tr>
<td>IEC</td>
<td>International Electricity Committee</td>
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<tr>
<td>IEEE</td>
<td>Institute of Electrical &amp; Electronic Engineers</td>
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<tr>
<td>IEC 60870-5-102</td>
<td>Telecontrol equipment and systems - Part 5: Transmission protocols - Section 102: Companion standard for the transmission of integrated totals in electric power systems</td>
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<tr>
<td>IEC62056-46</td>
<td>Electricity metering – Data exchange for meter reading, tariff and load control – Part 47: Data link layer using HDLC protocol</td>
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<tr>
<td>IEC 61000-4</td>
<td>Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields</td>
</tr>
<tr>
<td>EIA709.1</td>
<td>A Standard, Control Network Protocol Specification, ANSI/EIA, Arlington, USA; April 1999</td>
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<tr>
<td>EIA709.2</td>
<td>A Standard, Control Network Protocol Specification, ANSI/EIA, Arlington, USA; April 1999</td>
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<td>IEEE 802.15.4</td>
<td>Electricity metering – Data exchange for meter reading, tariff and load control – Part 61:OBIS Object identification system</td>
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</tbody>
</table>

### Technical Features

- **Electrical parameter:**
  • Single phase or Three phase AC power supply:
  • Voltage: \( 220V \pm 20\% \) (virtual value)  Frequency: \( 50Hz \pm 10\% \);
  • Power consumption (AC220V): <10W、15VA

- **Data storage period after power-off**
  • Serial memory card is adopted for storage data, and data retention period >10 years during power-off.

- **Communication interface**
  • Up link communication
    The upper communication between concentrator and master station employs Ethernet/GPRS/PSTN/WiFi technology. The communication modules are designed as independent module. Data concentrator can use different modules without any changes. Following is the optional communication for user to apply according to the actual situation.
    - Wired network TCP-Client technology (Ethernet communication module): fiber-optic, special line and broadband
    - TCP-Server technology (Ethernet communication module): fiber-optic, special line and broadband
    - PSTN technology: PSTN
    - Wireless network TCP-client technology (GPRS/ Ethernet communication module): GPRS, Ethernet, WiFi(external WiFi Unit)
1) Ethernet module
Use RJ45 crystal head that connect with the concentrator.
The Ethernet module supports TCP/IP and UDP communication and supports external WiFi communication Unit or BPL communication Unit.

2) PSTN module
Use Phoenix Contact terminals.
The MODEM support standard AT&T command set.

3) GPRS module

Use wireless solution. Main characteristics as follows:
- Frequency range: 850,900,1800 and 1900MHz
- Module comply with standards: R&TTE、FCC、GCF and PTCRB.
- SIM card changeable after opening baffle
- Antenna can be internal or external.
- Operation mode: 850、900、1800 and 1900 MHz:
- Support GRPS Class10/Class B;
- Support GSM phase2/2+;
- Control: AT direct command
- Output power: EGSM 850、900、2W; GSM1800、GSM1900、1W;
- Audio data transmission
- Based on Microsoft® Windows Mobile™ flat,(Smart phones and Pocket PCs):
- PBCCH technology;
- Rated voltage: 3.3~4.8V
- Weight:5.5g

• Down link communication

1) PLC Communication(PLC and RF only one can be choice)
The PRIME module in concentrator adopts OFDM modulation scheme basing on CENELEC-A (3-95kHz) frequency band of FCC band. It has 97 subcarrier frequency points which enables the average transmission rate to 70kbps. And the maximum transmission rate of original data is 130kbps. The forward error correction data interleaving function is available to eliminate the noise during communication. Communication stability is also strengthened.
The PRIME module is compliant with the following standards:
- PRIME-Spec_v1.36
- EN 50065-1
- EN IEC 50065-7
- IEC 61334-4-1
- IEC 61334-4-511
- IEC 61334-4-512
- prEN/TS 52056-8-4
- IEEE STD 802-2001

2) RF communication(PLC and RF only one can be choice)
The RF (Zigbee) Communication between concentrator and collector is employing low voltage power technology.
State-of art EM250 chip adopted
Stable and reliable EMBER protocol stack embedded
Wider communication range and higher network reliability

Technical Specifications:
General Features:
- Zigbee Chip: EM250
- Operating Temperature: -40℃ ~ 85℃

**Electrical Features:**
- Operating Voltage: 3.3V
- TX Current: 186mA
- RX Current: 42mA
- Power-down Current: 0.82A

**RF (Zigbee) Features:**
- Operating Frequency: 2.4GHz
- Number of Channels: 16
- Data Rate: 250kbps
- Output Power: 100mW (-6dBm to +20dBm), 20mW
- RF Receive Sensitivity: -103dBm
- Typical Transmit Range: 2km (line of sight)
- Antenna Interface: MMCX/SMA/PCB

➢ Local maintenance
  • Regarding the local maintenance (data reading, concentrator programming) for concentrator, there are two ways available:
    - PS/2 RS232 serial port

➢ Battery
  - SAFT lithium battery
  - Voltage 3.6V
  - Capacity 1.2Ah
  - Continuous working life without power > 10 years.

➢ Real time Clock
  • Built-in Real time Clock is possible by using Epson RX8025 chip, the clock accuracy can be assured among ±0.5s/d by embedded temperature chip, which will measures the internal temperature and performs temperature compensation according to the real temperature error curve of the clock.
  • Time synchronization between master station and concentrator can decrease the clock error to ±2s/d. The process of time synchronization as follows:
  1) DAQ sends Time Read Command to concentrator and its reply waiting time is 3 seconds.
     - If no replay is received in 3 seconds, the DAQ will resend the Command.
     - If continuously 10 times command sending are with no reply in due time, the DAQ will stop sending.
  2) DAQ will firstly calculate clock error \( \Delta T \) between concentrator and GPS clock.
     - If \( \Delta T < 3 \) seconds, DAQ will not take time synchronization;
     - If \( \Delta T \geq 3 \) seconds, DAQ will send time synchronization command to concentrator, whose clock will be adjusted by \( \Delta T + T1/2 \).
     - The valid time for time synchronization is 10 minutes. If exceed 10 minutes, the time synchronization command will be invalid.
     - In addition, the concentrator will report clock error automatically if time difference between clock of meter and concentrator exceeds allowed error.

■ Main Functionalities

➢ Data collection function
  1) Periodically read instantaneous data from meter in due interval, which is configurable for several types
of meter:
- Three phase public transformer rated meter: the interval is configurable among 5 minutes to 1 day.
- Single or three phase direct connection meter: the interval is configurable among 5 minutes to 1 day.

2) Daily read meter billing data, the reading starting time is configurable
3) Monthly read meter billing data, the reading starting time is configurable
4) Data transmission channel for DAQ and meters
5) Meter rendered offline due to communication failure or any other reason will be recorded and the corresponding report can be generated

➢ Data storage
- Setup all data storage according to task mode, item of data storage can be free to combine if required.
  Capacity of data storage is not less than 4M.
- Single phase meter: 1024pcs.
  Data storage period: 60 days for curve of daily data, 6 months for monthly billing data.
  Last 1024 events can be recorded in the concentrator.
- Three phase direct connection meter: 200pcs.
  Data storage period: 60 days for curve of daily data, 6 months for monthly billing data.
  Last 1024 events can be recorded in the concentrator.
- Public transformer meter: 1pc.
  Data storage period: 60 days for curve of daily data, 6 months for monthly billing data.
  Last 100 events can be recorded in the concentrator.

➢ Collectable data quantities
- Data collected and saved from MV/LV feeder meter.
  1) Energy measured (E.M.): Import/Export active per tariff E.M.; Import/Export reactive per tariff E.M.; 4-Quadrant reactive E.M.
  2) Instantaneous energy: per phase voltage, per phase current, total/per phase active power, total/per phase reactive power, total/per phase power factor.
  3) Load profile: import/export active average demand, import/export reactive average demand.
  4) Import/export active/reactive maximum demand.
  5) Last month Import/export active/reactive maximum demand
  6) Last month billing
  7) Meter event record
- Data collected and saved from LV single phase customer meter
  1) Energy measured (E.M.): Import/Export active per tariff E.M.;
  2) Daily billing: Import/Export active per tariff E.M.;
  3) Last month billing data: Import/Export active per tariff E.M.
  4) Meter event record
- Up-link data item collected by Communication Server

Public transformer meter:
Below parameters can be saved in the meter and displayed in Curve.
  2) Instantaneous quantities: per phase voltage, per phase current, total/per phase active/reactive power, total/per phase power factor.
  3) Load profile: import/export active/reactive average demand.
  4) Last two months maximum demand: import/export active/reactive total demand
  5) Last month billing data: Import/Export active tariff E.M.; Import/Export reactive tariff E.M.; 4-Quadrant reactive general E.M.
6) Last 100 events can be recorded in the concentrator.

**Single phase meter**

1) Daily billing of Energy Measured (E.M.): import active per tariff E.M.
2) Last month billing of E.M.
3) Latest 1024 events can be recorded in the concentrator.

- **Remote parameter configuration**
- **Remote parameter configuration is as follows:**
  1) communication parameter configuration
  2) concentrator parameter configuration
  3) meter parameter configuration
  4) Alarm auto report configuration
  5) Remote upgrade

- **Communication with Communication Server remotely**
  - The concentrator will auto upload data or receive the data collection command from the master station and answer to master station.
  - The meter data load curve will be uploaded in due intervals.

 1) **Public transformer rated meter**
    - Supported by TCP-Client mode
    - Data upload interval configurable among 15 minutes ~ 1 day.
    - Energy measured
    - instantaneous measured
    - average demand measured
    - Monthly maximum demand (MD)
    - Last month MD with time stamp
    - Last month billing data

 2) **Single phase meter**
    - Supported by TCP-Client mode
    - Data upload interval configurable among 1 hour ~ 1 month.

 3) **Event report**
    - Supported by TCP-Client mode

 4) **Answering**
    - The concentrator will answer once there is request from master station.
    - Data recall command
    - Historical data collection command
    - Energy Measured curve upload command
    - Data collection command
    - Meter data upload command

- **Remote control**
  - The master station, via the concentrator, can perform remote meter power on / off control. The concentrator will download the list of meters to be powered off from the Master station. Then the list of successful switched off meters will be reported to the master station.

- **Monitoring on important user**
  - Important client can be monitored specially. Up to 20 meters can be configured as key client. And the last 30 days energy hour intervals will be saved.

- **Data collection omitting and Data recall**
  - Once there is data collection omitting, there will be an alarm reported from concentrator to master station. When the Uplink communication is via GPRS, the concentrator will auto report the alarm; alternately, PSTN
is used, the concentrator will report the alarm during data collection.
The Concentrator can recall data that has not been successfully read in due interval.

- **Local data reading**
  - HHU can read energy data locally through infrared port.

- **Self-diagnosis and event record**
  - The concentrator can perform Self-check automatically, and record the abnormity of records and generate alarms accordingly.

- **Security**
  - The concentrator can prevent unauthorized person to configure parameter. Concentrator can record last 100 events (abnormal alarm etc.)
  - 3 security level management is used for access protection.
    - Level 1: super administrator, can perform all operation and create and manage the second level administrator and the third level operator.
    - Level 2: administrator can perform all read and write operation.
    - Level 3: operator, read-only.
  - Concentrator can judge and refuse the command from unauthorized website.

- **Load control**
  - The Concentrator can receive load control commands from the master station, and send control commands for the meter by PLC.
  - There are 3 modes for concentrator application:
    1) Remote connection/disconnection
    2) Load control.
    3) Capacity control(load limit).

- **Dimension diagram**

### Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voltage</strong></td>
<td>3×220V/380V</td>
</tr>
<tr>
<td></td>
<td>0.8Un...1.2Un</td>
</tr>
<tr>
<td></td>
<td>Frequency: 45-55Hz</td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td>Up-Link:</td>
</tr>
<tr>
<td></td>
<td>1 PSTN or GSM or GPRS or Ethernet</td>
</tr>
<tr>
<td></td>
<td>Down-Link:</td>
</tr>
<tr>
<td></td>
<td>1 PLC Communication</td>
</tr>
<tr>
<td></td>
<td>Frequency Range: 3-95kHz</td>
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<tr>
<td></td>
<td>Speed: 130kbps max</td>
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<td></td>
<td>2 RS485 and 1 RS232 Communication</td>
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</tbody>
</table>
| Protocol | Down-Link: DLMS/COSEM HDLC  
|          | Up-Link: IEC60870-5-102, Other Protocol |
| Storage memory | 256M. Storage 1024 Meters 30 minutes energy load profile. |
| Clock accuracy | Accuracy (internal) +30 sec/month  
|          | Accuracy maintained by Master Station Software; |
| Temperature | Operating: -35°C…+75°C |
| Protection class | IP56 (IEC 60529) |
| EMC Standard | EN60950;  
|          | IEC61000-3-8; |