CLEVER

EMS *Environment Monitoring System*

▲ **CABINET CENTERED MANAGEMENT**
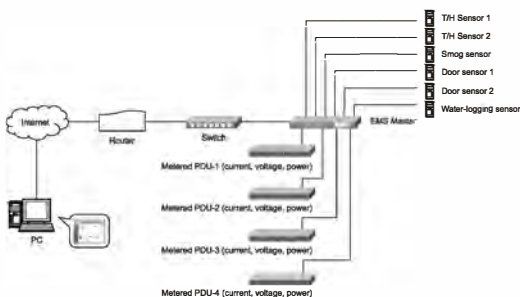
▲ **REMOTE MONITOR**

▲ **NO POWER FAILURE**

EMS

ENVIRONMENT MONITORING SYSTEM

DESIGNATED MODULARIZED AND MULTI-FUNCTIONAL
POWER DISTRIBUTION UNIT FOR CABINET

CATALOGUE

▲ **CABINET CENTERED MANAGEMENT**

▲ **REMOTE MONITOR**

▲ **NO POWER FAILURE**

1. EMS Introduction

EMS is the world-advanced environment monitoring system originally developed by CLEVER. This system has advanced technology, excellent performance, strong functions, and is safe and reliable. Governor can timely monitor the micro environment of the cabinet through LAN or WAN.

EMS - Environment Monitoring System is a kind of intelligent remote monitoring system that combines the software technique of embedded system whole solution, long-distance monitoring technique based on SNMP, network node technique of sensors, power distribution technique and modularized structure technique and other advanced techniques to timely monitor the micro environment in one or several cabinets.
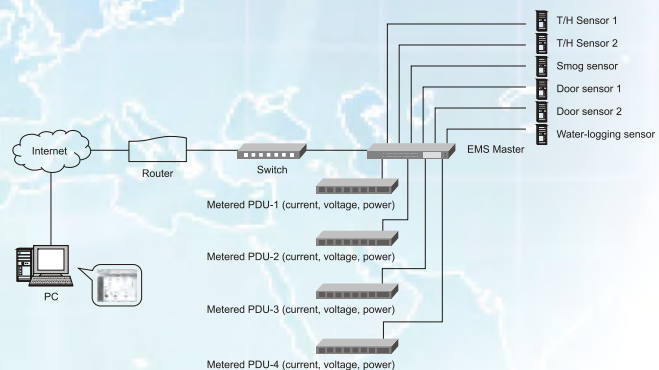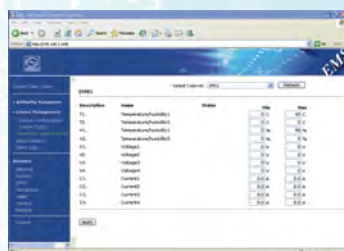
2. Creative concept

CLEVER bring forward the concept of "three levers of the remote power monitor":

A. product centered

B. cabinet centered

C. room centered

This new concept fully shows the advanced technology and a fruit of the remote monitoring system centered on cabinet, and breaks a new ground for the development of power distribution and environment monitor.

3. Introduction of EMS

Composition of EMS: master, slave, HUB and Metered PDU.
Technical: remote monitoring system center on one cabinet.
Cabinet unit: one cabinet as a unit.
Basic configuration in a cabinet: Maximum 4 Metered PDU, 2 T/H sensor, 2 door sensor, 1 smog sensor and 1 water-logging sensor.
Micro environment of cabinet: input voltage, load current and power consumption of Metered PDU; temperature, humidity, door, smog and water-logging state in cabinet.
Main applications: EMS can be widely used to data centers, telecom, finance, electric power, network system, information processing and other fields for remote monitoring.

4. Main functions of EMS

① Through INTERNET, EMS can timely monitor the input voltage, load current and power consumption of all the Metered PDU in one or several cabinets; and temperature/humidity, smog, door and water-logging states around the cabinets.
② Daisy-chain: Trough HUB, one EMS master can daisy-chain 11 EMS slaves at most.
③ When overload appears, limited range exceeded or some other abnormal situation appears, EMS will send alarming signal.
④ Alarming information of EMS can be saved and inquired by log record.
⑤ Can classify and set the use's right. User can manager one or several cabinets according to the rights awarded.

5. Technical characteristics

① EMS Adopt the software technique of embedded system whole solution, long-distance monitoring technique based on SNMP, network node technique of sensors, power distribution technique and modularized structure technique and other advanced techniques to timely monitor the microenvironment in one or several cabinets.
② EMS solved a safety problem which governors concern: neither unit with remote monitoring function goes wrong will affect the power output.

6. Technical innovation

① Introduce the concept of "cabinet centered remote environment monitoring system" which provides a complete set of solution for the machine room construction of the medium and small customers.

② No power failure for Metered PDU. In normal system operation, neither EMS master, slave, HUB nor the functional modules of Metered PDU (voltage, current or power consumption module) going wrong will affect the power output of the Metered PDU. This solved the problem which customers concern mostly: no power failure of the equipment in cabinets.

③ The voltage, current and power consumption module of Metered PDU are all removable. When one module needs to repair or replace, not need to cut down the power of Metered PDU and open it, just need to replace the failure one with a new one.

④ Safe and reliable
Timely monitor the cabinet environment state and changes. When something goes wrong, governor can adopt effective methods to handle that ensures the normal working of the power and equipments and reach the purpose of system safety.

⑤ Convenient management
EMS Can set the use's right. The basic management is one cabinet. Users can manage one or several cabinets according the rights awarded.

⑥ High performance, low price: for several cabinets' daisy-chain, customer need only one EMS master, others can use EMS slave. In this way, EMS saves cost for customers.



7. Technical parameters

Monitoring functions

Main function	Performance parameter	
Monitoring function	Metered PDU	input voltage
		load current
		power consumption
	Temperature	state of temperature sensor 1
		state of temperature sensor 2
	Humidity	state of humidity sensor 1
		state of humidity sensor 2
	Cabinet door	state of door sensor 1
		state of door sensor 2
	state of smog sensor	
	state of water-logging sensor	
Power measure	automatically record the power consumption	

Alarming function

| Main function	Performance parameter
Threshold setting	Threshold of total load current of Metered PDU
	Threshold of input voltage of Metered PDU
	Threshold of temperature inside the cabinet
	Threshold of humidity inside the cabinet
System automatic alarm	When total load current of Metered PDU exceeds the threshold value
	When input voltage of Metered PDU exceeds the threshold value
	When the power input of Metered PDU goes wrong
	When the temperature exceeds the threshold value
	When the humidity exceeds the threshold value
	When cabinet door is opened
	When smog appears
	When water-logging appears
	When EMS master system goes wrong
Alarming method	The indicator on master system controlling panel flashes and the buzzer alarms
	The indicator on Web interface flashes and the buzzer in PC alarms
	Automatically send alarming information to system administrator*
	SNMP send alarming information
	Inform system administrator by short message*

System functions

Main function	Performance parameter
Daisy-chain	Support daisy-chain and radial connection, can connect 11 pieces slave at most (12 including master)
Log record	Record alarming information which can be inquired and printed out
User management	Set user's right
Accessing method	Web, accessing through IE
	SNPM, through standard network working station
	Telnet, SSH, through command-line console
System support	Multi-user operating system, support software upgrade
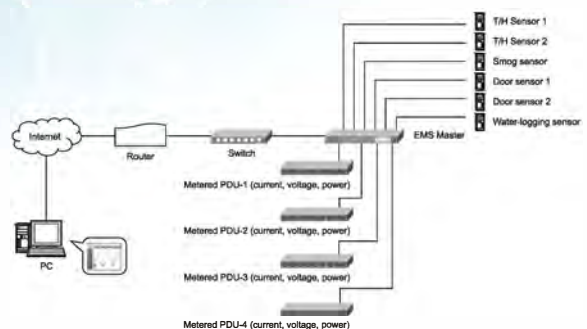
8. Composition introduction of EMS

8.1. Master

The EMS master can be applied alone. Through internet, EMS can timely monitor the micro environment of one cabinet from long distance.
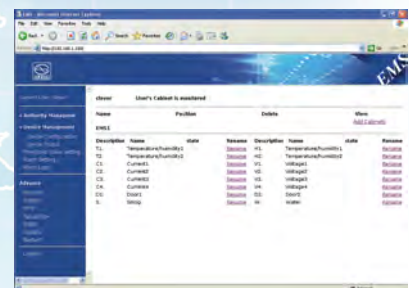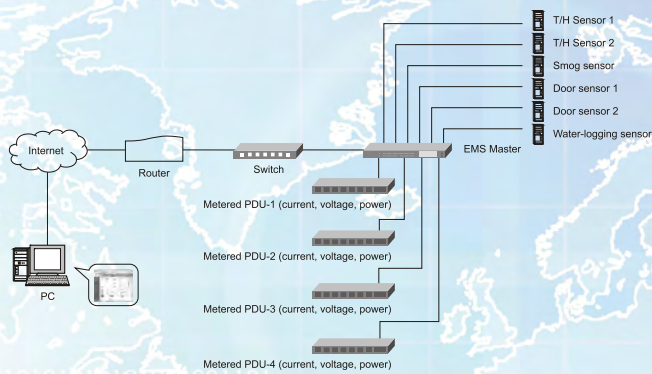
Input/output characteristics of the master

Item	Performance parameter	
Power input	Rated input voltage	110/220VAC 50/60 Hz
	Input standard	IEC320 C14×1
	Cable length	3M
Signal input	Metered PDU port	RJ45×4
Daisy-chain port	LINK	RJ45×2
Upgrade port	PORT	RJ45×1
Network port	Internet	RJ45×1
Sensor port	Temperature/Humidity sensor port	RJ11×2
	Door sensor port	RJ11×2
	Smog sensor port	RJ11×1
	Water-logging sensor port	RJ11×1
Dimension	L×W×H	482.6×131.8×44.4mm
Mounting method	Horizontal installation	1U
Case color	Color	black

EMS master (front)

EMS master (back)

8.2. Slave

A. EMS slave collects all the environment signals of a cabinet.

B. The same with EMS master, one EMS slave can connect 4 Metered PDU, 2 T/H sensor, 2 door sensor, 1 smog sensor and 1 water sensor.

C. EMS slave cannot be applied alone; it can only be used when connected with the Master through HUB.

D. EMS slave is passive device which supply power through master.
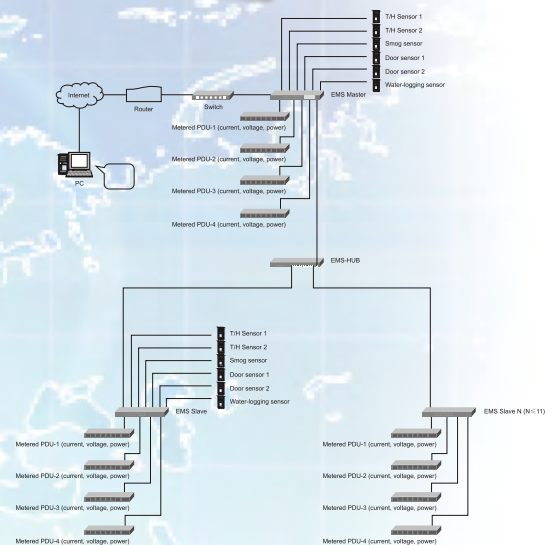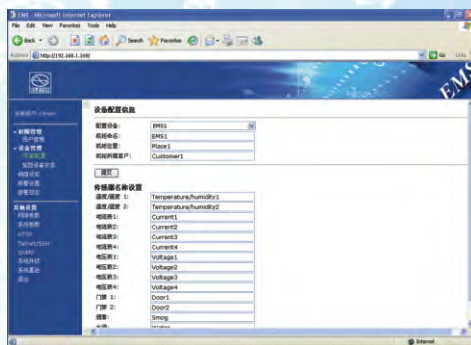
Input/output characteristics of the Slave

| Item	Performance parameter	
Signal input	Metered PDU port	RJ45×4
Daisy-chain port	LINK	RJ45×1
Upgrade port	PORT	RJ45×1
Sensor port	Temperature/Humidity sensor port	RJ11×2
	Door sensor port	RJ11×2
	Smog sensor port	RJ11×1
	Water-logging sensor port	RJ11×1
Dimension	L×W×H	482.6×131.8×44.4mm
Mounting method	Horizontal installation	1U
Case color	Color	Black

EMS slave (front)

EMS slave (back)

8.3. HUB

A. CLEVER-HUB is a passive HUB with multi-port which is specially used for the daisy-chain of CLEVER EMS, NPM or CPDU.

B. Through RJ45, CLEVER-HUB connects the salves and masters of EMS, NPM or CPDU.

C. Characteristics:

Based on the passive HUB technique, EMS-HUB has one LINK port and 12 transfer port. It can connect 1 Master and 11 Slave, and ensure neither defective Slave will affect the communication of other Slaves with the Master.

D. EMS-HUB has indicators which clearly show the connection states.

E. Application:

EMS-HUB can be applied to CLEVER EMS, NPM and CPDU products.
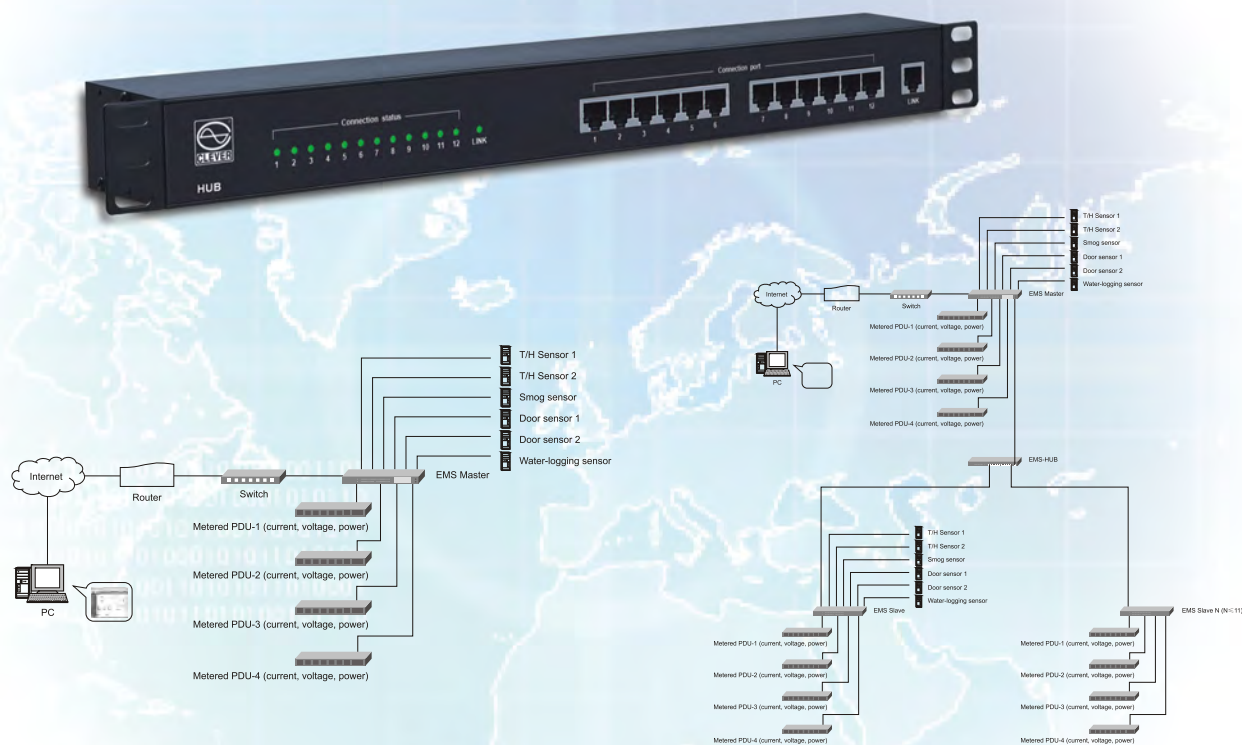
Specifications and technical parameter

Function		Technical parameters
Product type		Passive HUB
LINK port		RJ45×1
Transfer port		RJ45×12
Connecting state	LINK port	LED×1, green
	Transfer port	LED×12, green
Working environment		-20℃~70℃
Dimension		L×W×H=482.6×68×44.4mm
Mounting method		Horizontal installation, 1U
Case color		Black

8.4. MPD functional module

- **Feature:**
  Hot Swappable, replaceable structure ensures Metered PDU system operation with no power failure;

- **Instruction:**
  MPD functional module is the latest meter developed by CLEVER, with hot-swappable, replaceable, multi-functional, patented strengths which is divided into two types: intelligent MPD with RS485 port and advanced MPD to be equipped with basic PDU.
  Intelligent MPD includes SAVM (current/voltage display and data collection function module) and SAVPEM (current/voltage/power/energy display and data collection function module). It solves the problem which customer concerns mostly: during system operation, when data collection or display function needs to be repaired or replaced, the power output is not allowed to be affected. So Metered PDU can realize the purpose of no power failure.

- **Application:**
  Intelligent MPD functional module is applicable to Metered PDU of EMS system.
  Advanced MPD functional module is applicable to basic PDU.

- **Main function:**
  SAVM-current/voltage display and data collection function module can display the load current, input voltage through LED, RJ 45 port can output the signal of load current, input voltage of Metered PDU.
  SAVPEM-current/voltage/power/energy display and data collection function module can display the load current, input voltage, load power and energy consumption through LCD, RJ 45 port can output the signal of load current, input voltage, load power can energy consumption of Metered PDU.

Final apperance subject to the real object.

EMS

Current/voltage/power/energy performance parameters

Performace	Parameter	
Input	Rating voltage	110/220VAC 50/60/Hz
Port	RS485	1 RJ45 port
Display	Operation state	1 LED indicator
	Current/voltage/power/energy	LCD display
	Load current	Full scale: 32A Accuracy: ±1%＋1 Resolution:100mA
	Input voltage	Full scale: 255V Accuracy: ±1%＋3 Resolution: 1V
	Power	Resolution：0.1kW
	Energy	Round/kWh：1000imp/kWh Level: 1 Resolution: 0.1kWh
Controlling button	BUTTON	Switch over display information (for 3 phase)
Module outlook	Dimension	L×W×H= 110×41×56mm
	Color	Black
Working environment	Temperature	0℃~55℃
	Relative humidity	10~90%

SAVPEM functional module

● **Products Specifications:**

Module Name	Module Code	Display	Part. No.		Display and data collection function
			Frontal installation	Inverse installation	
SAVM	A	LED	SAVMX	SAVMY	Load current, input voltage
SAVPEM	A	LCD	SAVPEMX	SAVPEMY	Load current, input voltage, load power and energy consumption

● **Technical Feature:**

Intelligent MPD functional module adopts hot swappable, replaceable technique and product structure, when MPD functional module needs to repair or replace, no need to cut down the power of Metered PDU or open it, just replace the failure one with a new one. This feature ensures the safe, reliable and uninterruptible operation of system；

● **Technical innovation:**

With hot swappable structure, MPD functional module can solve the problem which customer concerns mostly: during system operation, when data collection or display function needs to be repaired or replaced, the power output is not allowed to be affected. So Metered PDU can realize the purpose of no power failure.

Final apperance subject to the real object.

10

- **Clever Metered PDU Part Number Explanation**

  Clever Metered PDU's part number is made up of 17 letters and figures which can be divided into 9 parts.

  I. Metered PDU series code: 7 (3 letters and 4 figures) ;
  II. Outlet standard: 2 (1 letter and 1 figures) ;
  III. Outlet quantity: 2 figures;
  IV. Power input style: 1 letter;
  V. Bracket installation: 1 letter;
  VI. Cable(cord) with plug: 1 letter;
  VII. Control function: 1 letter;
  VIII. Protection function: 1 letter;
  IX. Case color: 1 letter.

  For example:

  MPD2230 C1 - 08 A H C N A B

  MPD2230: Metered PDU series
  C1: socket & standard
  08: outlet quantity
  A: power input style

  B: case color
  A: protecting function
  N: controlling function
  C: cable & plug
  H: Mounting bracket

- **Socket type:**

IEC320 C13	IEC320 C19	NEMA 5-15R	NEMA 5-20R	AS/NZS 3112	AS/NZS 3112	NBR14136	NBR14136	GB1002	GB1002	GB2099.3

SR 107-2-D1	SR 107-2-D1	NF C61-314	DIN49440	ITALY UNIVERSAL	INDIA SOCKET	BS1363(90°)	BS1363(45°)	BS1363(135°)	GST18	IEC60309

- **There are 5 series for CLEVER Metered PDU products**

1. MPD2220 series   Product size: L×W×H=X*×44.4×62mm (1.4U)

427

62

44.4

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2. MPD2230 series   Product size: L×W×H=X*×68×44.4mm (1U)

430

68

44.4

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3. MPD2241 series   Product size: L×W×H=X*×44×66mm (1.5U)

427

66

44

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4. MPD2250 series   Product size: L×W×H=X*×44.4×44.4mm (square 1U)

430

44.4

44.4

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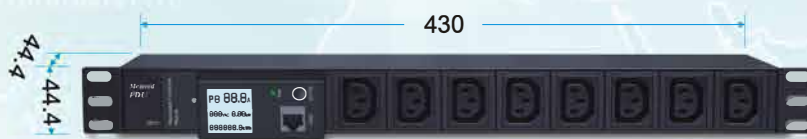
5. MPD2290 series   Product size: L×W×H=X*×116×44.4mm (double side PDU)

430

44.4

116

● **Specification of Metered PDU**

Horizontal installation

Drawing 001

Drawing 002
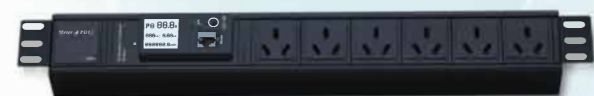
Drawing 003

Drawing 004

Drawing 005

Drawing 006

Drawing 007

Drawing 008

Drawing 009

Drawing 010

Vertical installation

Drawing 011
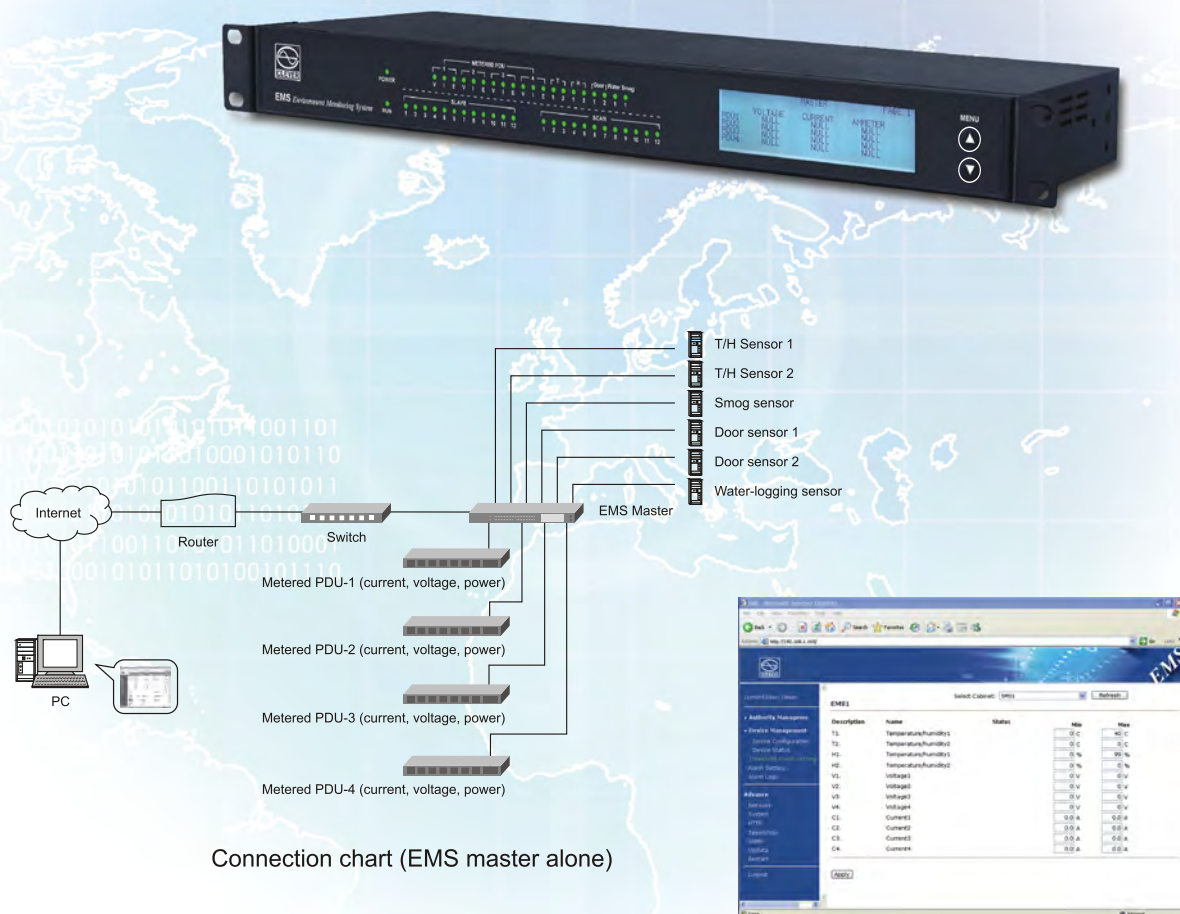
Drawing 012

Drawing 013

Drawing 014

Drawing 015

Drawing 016

9. Application of EMS

9.1. Single application

A. EMS master can be applied alone. Through INTERNET, it can timely monitor the micro environment of one cabinet from long distance.

B. Through INTERNET, EMS master can timely monitor the input voltage, load current, power consumption of the Metered PDU (4 at most) and the temperature, humidity, door, smog and water-logging states of the cabinet.

C. When overload appears, limited range exceeded or some other abnormal situation appears, EMS will send alarming signal.

D. Operation and alarming information of EMS can be saved and inquired by log record.

E. Can set the use's right. User can manage according to the rights awarded.

T/H Sensor 1
T/H Sensor 2
Smog sensor
Door sensor 1
Door sensor 2
Water-logging sensor

EMS Master

Internet
Router
Switch

PC

Metered PDU-1 (current, voltage, power)
Metered PDU-2 (current, voltage, power)
Metered PDU-3 (current, voltage, power)
Metered PDU-4 (current, voltage, power)

Connection chart (EMS master alone)

9.2. Daisy-chain application:

A. One master, several slaves, one HUB and several Metered PDU can form an EMS system which can timely monitor the microenvironment of Max. 12 cabinets at most through INTERNET from long distance.

B. The equipment type and quantity connected by EMS Slave is the same with that of the Master.

C. EMS master can daisy-chain 11 slaves at most through HUB.

D. Through INTERNET, EMS master can timely monitor the input voltage, load current, power consumption of the Metered PDU, temperature/humidity, smog, door and water-logging state of at most 12 cabinets.

E. When overload appears, limited range exceeded or some other abnormal situation appears, EMS will send alarming signal.

F. Alarming information of EMS can be saved and inquired by log record.

G. Can classify and set the use's right. User can manager one or several cabinets according to the rights awarded.

Connection chart (EMS master & slave)