Low Voltage System

MNS iPDU (Intelligent Power Distribution Unit)

Technical Info
Based on the MNS® series of low-voltage power distribution unit, MNS iPDU is a compact power distribution unit designed by ABB in order to supply and distribute power for sensitive loads in computer room and data center. PDU is consisted of power distribution, surge protection, computer-level grounding, isolation and complete electricity monitoring and management system.

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- User benefits
- **Product features**
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  - Mechanical characteristics
  - Electrical characteristics
    - Incoming circuit breaker
    - Branch power distribution system
    - Surge suppressor
    - Isolation transformer
    - EMPDU intelligent power monitoring and management system
- Technical specification
- Configuration solution
- **ABB Ability iPMS intelligent distribution management system**
  - ABB Ability data center infrastructure management platform
  - ABB Ability iPMS intelligent distribution management system
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Customer Value

Highly safe
• The safety of operation and maintenance personnel is the first consideration of ABB.
• The branch circuit breaker is connected in the SMISSLINE TP modular bus system, allowing plugging and unplugging of electrical devices and elements without load, and eliminating the risk of electric shock.
• The SMISSLINE TP modular bus system can prevent any direct touch (IPXXB). More specifically, this system remains fully touch proof when any device is to be plugged or unplugged, eliminating any risk of personal injury from switching and fault arcs.

Easy to expand
• A successful data center must be expandable to flexibly adapt to the service variation.
• ABB’s MNS i PDU solution enables the data center operator to install new cabinet power supply safely without power interruption.
• The standard top and bottom wire-in options are available to meet the demands of raised and non-raised flooring applications respectively.

Highly reliable
• All critical devices are periodically monitored and maintained, and 80% of unexpected power interruption can be prevented.
• ABB’s data center offerings and systems are such designed as to ensure a continuous and reliable operation, enabling less faults and lower maintenance cost.
• The ABB’s globalized MNS® platform for low-voltage system provides a highly reliable and maintenance-free mechanical design construction.
• The branch circuit breaker is adjustable among phases L1, L2 and L3, so that the phase balance can be achieved without power interruption.
• The data center operator can know the power consumption intuitively and use the obtained information for analysis, charging and maintenance scheduling.
• The energy utilization visualization feature enables the operator to know if the power is efficiently unitized, and if more devices can be supported.
• Spares are easily available.
• ABB’s globalized production and service center guarantees professional and quick after-sales service.

Easy to maintain
• This ABB plug & unplug solution allows for easy and quick replacement of critical elements.
• The power interruption warning feature is able to prevent most of unscheduled breakdown through the optimized measurement (i.e. A real-time and continuous monitoring makes preventive maintenance possible).
• All the plug-in output devices can be replaced in a safe, quick and easy way, reducing the Mean Time To Repair (MTTR) of components.
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User Benefits

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MNS i PDU combines with static transfer system (STS), load bus synchronization (LBS) device and uninterrupted power supply system (UPS) to create a premium integrated solution.

• Complete series of high-quality ABB component solutions
• Reliable intelligent EMPDU monitoring system
• Advanced hot swap branch distribution system - S400 series
• Economical & practical busbar branch distribution system - S200 series
• Optional isolation transformer
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- Reliable Intelligent EMPDU monitoring system
- Advanced hot swap branch distribution system - S400 series
- Economical & practical busbar branch distribution system - S200 series
- Optional isolation transformer
Product Features

Cabinet Materials
- The cabinet framework is constructed of high-quality steel sheets coated with Al-Zn alloy, and all metal structures have been subjected to corrosion prevention treatment.
- Some parts of cabinet body surface are constructed of cold-rolled sheets, and all the internal partitions are high-quality steel sheets coated with Al-Zn alloy.

Cabinet structure
- PDU enclosures are available in various dimensions which guarantee ample selection possibilities for the data center applications.
- Double front door design with mesh front door options for direct observation of the operating condition of the devices, the hole rate >60%.
- Removable rear and side panels design makes it easier for maintenance and service, providing rear and side access in addition to front access.
- Fully enclosed with internal segregation, partitions make cabling and wiring arrangement flexible.
- Matte panel surface is electro-statically coated with epoxy powder.

Electrical characteristics

Incoming circuit breaker
Tmax circuit breaker featuring higher performance and optimized sizing can be equipped with shunt release to enable emergency power supply disconnection onsite for data center or computer rooms. Complete series of breakers can be equipped with electronic (PR221DS) or thermo-magnetic (TMD/TMA) releases for various requirements of intelligent power distribution systems.

Tmax circuit breakers can be fixed onto mounting plate or plug-in onto DIN rail (except TJ). Easy snapping onto the DIN rail design makes it easier for replacing the devices.

Hot swap branch distribution system_S400 series (see Fig.01)
The next-generation Smisssline TP system, featuring new and safer design, simpler operation and more convenient connection, delivers the highest safety and reliability. The cost-effective product saves numerous time and cost in system installation and maintenance.

Safe-busbar touch proof
The Smisssline TP modular bus system itself has been designed to prevent touching any live components, and thus any finger touch are absolutely safe when you plug or unplug an electrical device (IPXXB).

This means that Smisssline TP can keep operation and maintenance personnel away from switching arc and fault arc, free the operation personnel from the binding of PPEs, and also make installation, operation and system expansion more safe, fast and efficient.

Easy to use: Hot swap Adjustable phase Phase indication (See Fig. 02)
The power supply flows into the protection through a pawl, and the provision of a plastic guide carrier intensifies the protection to pawl. Besides, the pawl can be moved with one hand only.

The phase can be adjusted quickly, making load balancing easy and convenient. The visual indication window will display the switch phase in an intuitive way.
Product Features

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**Busbar branch distribution system, S200**
(see Fig. 01)
This system features a compact power distribution structure, clear phase sequence identification and easy installation and replacement of elements, substantially reducing the installation space demand of PDU in the plant room.

**Busbar branch distribution system, S200 MCB series** (see fig. 02)
- Bi-directional cylindrical lifting terminal design
- Unique snap-on design make it easier to remove or replace different phase of the products without needing to take out devices next to it.
- Shoulder protuberance at the upper and lower end is removed to reduce height of product from 90 to 85mm. This increases wiring space for incoming and outgoing lines.
- The arc extinguishing system will cut off the short-circuit current immediately, well limiting the let-through energy I2t and the peak current.

**Surge suppressor** (see fig. 03)
- Leading trigger-type spark gap technology
- The maximum discharge current options: 20kA, 40kA, 70kA, 100kA and 120kA(8/20μs)
- TOV(temporary over voltage)characteristics
- Common/differential mode protection
- Safe reserve protection indicator window (Ima x 70 k A and above)
- Remote-end alarm remote signal contact TS
- Aging/degrading thermal release

**Isolation transformer** (see fig. 04)
Main purpose of using isolation transformer in data center projects:
- Regenerate the system ground level and provide safe grounding system
- Improved anti-electric shock capability of system
- Isolation protection of UPS and loads in data centers

**EMPDU: Intelligent power supply monitoring and management solution**
The modular EMPDU consists of main frame and LCD display modules that are independent of one another. This simplifies the installation and configuration process.

EMPDU employs a distributed bus structure based on the multi-CPU parallel process system. CPU exchanges information with various acquisition units through internal bus.

**Requirements:**
- Withstanding capacity of harmonic disturbance and filtering (K coefficient)
- High Temperature withstand and insulation level (H class and above)
- Surge current suppressing capability during main breaker closing (6 – 8 times In)
- High common mode level and noise attenuation constant (double shielding)

EMPDU can accommodate a CPU plug-in module and 8 plug-in acquisition modules, which consists of three types:
- Feeder simulate monitor module to monitor current of 32 feeders
- Feeder digital monitor module to monitor switch status of 32 feeders
- Incoming monitor module
- “Feeder simulate monitor module” and “Feeder digital monitor module” that can be configured is six in total. Amongst, their respective number is uncontrolled. Two Incoming monitor module can be configured at most.
- CPU module includes RS485 communication, relay output, local maintenance terminal, display interface and Ethernet interface option.
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Monitoring function
• Measurement of incoming & outgoing line circuit electric parameters

Warning function
• Incoming line current out-of-threshold warning, incoming line grounding current out-of-threshold warning
• Incoming line under-voltage, over-voltage, open-phase, over-frequency and underfrequency warning
• Feeder line current out-of-threshold warning

Communication
• One remote RS485 bus interface, one local maintenance interface RS232 and one optional Ethernet interface (supporting SNMP protocol)

Local display
• 7-inch LCD touch screen

Monitoring Technical Indicators
- Voltage: Wire-in precision ±0.5degree
- Current: Wire-in precision ±0.1degree, Feeder precision ±0.5degree (5.5A~80A)
- Power Factor: Wire-in precision ±1degree
- Active Power: Wire-in precision ±1degree
- Reactive Power: Wire-in precision ±1degree
- Apparent Power: Wire-in precision ±1degree
- Frequency: Wire-in precision ±0.02Hz
- Harmonic Precision: Wire-in precision ±1degree
- Switching Signal Acquisition: Incoming line and feeder line Switch de-bounce time: 60ms, SOE resolution ratio: 2ms
PRODUCT FEATURES

MNS i PDU (INTELLIGENT POWER DISTRIBUTION UNIT) TECHNICAL INFO

Monitoring Technical Indicators
- Voltage
  - Wire-in precision: 0.5degree
- Current
  - Wire-in precision: 0.5degree
  - Feeder precision: 0.5degree (0.5A~80A)
- Power Factor
  - Wire-in precision: 1degree
- Active Power
  - Wire-in precision: 1degree
- Reactive Power
  - Wire-in precision: 1degree
- Apparent Power
  - Wire-in precision: 1degree
- Frequency
  - Wire-in precision: 0.02Hz
- Harmonic Precision
  - Wire-in precision: 1degree
- Switching Signal Acquisition
  - Incoming line and feeder line Switch de-bounce time: 80ms.
  - SOE resolution ratio: 2ms

Monitoring function
- Measurement of incoming & outgoing line circuit electric parameters

Warning function
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Event logging
- Record threshold-crossing alarm and switching conditions variation SOE (sequence of event)
- Store up to 256 SOE records
- Self diagnosis including communication and acquisition board operating conditions
- Self-recovery
### Technical specification

#### Standards

- Type-tested switchgear assemblies (TTA): GB 7251.12-2013

#### Electrical parameters

- **Rated voltages**
  - Rated insulation voltage $U_i$: 500V 3~
  - Rated operating voltage $U_e$: 400V 3~
  - Rated impulse withstand voltage $U_{imp}$: 8kV

- **Overvoltage category**: III
- **Degree of pollution**: 3

- **Rated currents**
  - Rated current $I_e$: 250A, 400A
  - Rated short-time withstand current $I_{cw}$: 10kA

- **Degrees of protection**: IP20-IP42

#### Environmental parameters

- **Ambient temperature**: -5℃ ~ +40℃
  - Relative humidity: Not more than 50%RH at the maximum temperature of +40℃. Higher humidity is allowed at lower temperature. For instance, it may be up to 90%RH at +20℃.

- **Relative humidity**: ≤2000m
- **Miscellaneous**
  - Non-dusty environment with no strong vibration or shock

#### Structural feature

- **Dimensions** (mm)
  - Extras widths (W): 600, 1000, 1200
  - Extras heights (H): 2000 (2200)
  - Extras depths (D): 1000 (1100, 1200)

- **Surface protection**
  - Internal frame: Zinc or Alu-zinc coated
  - Mounting plate: Zinc or Alu-zinc coated
  - Enclosure: Electro-statically coated with epoxy powder RAL9004 (signal black)

#### Configuration solution

<table>
<thead>
<tr>
<th>Configuration solution</th>
<th>Isolation transformer</th>
<th>$x$</th>
<th>$\sqrt{}$</th>
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<tbody>
<tr>
<td></td>
<td>Depth (mm)</td>
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<table>
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<th>Width (mm)</th>
<th>Depth (mm)</th>
<th>The maximum number of branch loops</th>
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<td>1000</td>
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<tr>
<td>2</td>
<td>200</td>
<td>600</td>
<td>1000</td>
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- Type-tested switchgear assemblies (TTA)

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  - Rated insulation voltage Ui: 500V 3~
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  - Rated impulse withstand voltage Uimp: 8kV
- Overvoltage category: III
- Degree of pollution: 3
- Rated frequency: 50Hz - 60Hz

**Environmental parameters**
- Ambient temperature: -5℃ ~ +40℃
- Relative humidity: Not more than 50%RH at the maximum temperature of +40℃. Higher humidity is allowed at lower temperature. For instance, it may be up to 90%RH at +20℃.
- Atmospheric pressure: ≤100kPa
- Miscellaneous: Non-dusty environment with no strong vibration or shock

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<td>1</td>
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<td>2</td>
<td>200</td>
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**ABB Ability data center infrastructure management system**

ABB's Ability is a DCIM (Data Center Infrastructure Management) platform software specially designed for data centers. It enables:

- Integrated management: integrated surveillance and management of electrical devices, A/C and IT core equipment;
- Visualization: the application of industrial-grade acquisition equipment and high-performance information integration & attribute-based navigation technology enables real-time, fast and intuitive visualization of comprehensive information;
- Maintenance decision support: the integration of professional sub-modules to cooperate with corresponding professional applications of data center enables an objective and accurate information integration and assessment, thus providing correct decision support for the operation and maintenance manager.

ABB's Ability is such designed to deploy different professional sub-modules including:

- Intelligent distribution management system - iPMS;
- Energy management system - EMS;
- Infrastructure management system - BMS;
- Asset management system - AMS Equipment management based on the goal of intelligent equipment maintenance, including IT asset management;
- Capacity management system - CMS Dynamic display of plant room electricity energy and temperature cloud charts based on 3D model, enabling the operation and maintenance personnel to know the potential capability of plant room infrastructure effectively.
The iPMS Intelligent distribution management system is mainly intended to realize:

- real-time and transparent display of electric parameters and the equipment operating state assessment information integrated according to judgment criteria;
- highly automated control and operation.

The deployment and operation of iPMS will bring users the following benefits:

- The automated operation shortens the switchgear transfer time, improves success rate and reduces the UPS battery power supply voltage;
- It assists in maintenance judgment, helping to realize active preventive maintenance of power distribution system.

The Intelligent distribution management system mainly consists of the following three parts:

1. Monitoring device and high-performance data acquisition controller
   - It runs data interface and real-time data acquisition service program;
   - Its runs dynamic power distribution real-time monitoring state chart display, warning event, history trend and energy consumption calculation service programs;

2. Power distribution management server
   - It assists in maintenance judgment, helping to realize active preventive maintenance of power distribution system.

3. Client interface
   - It runs real-time client operation display interface, and provides real-time warning and confirmation as well as report output.

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**ABB Ability iPMS Intelligent distribution management system**

The iPMS Intelligent distribution management system is one of the standard sub-modules of Ability.

The iPMS Intelligent distribution management system is mainly composed of the following devices:

- Medium voltage switchgear (utility input main switch);
- Diesel genset and its power distribution equipment;
- Transformer;
- Low-voltage switchgear;
- UPS & its battery pack;
- ATS power transfer device;
- PDU (array cabinet, IT main equipment rack power distribution).

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   - It runs real-time client operation display interface, and provides real-time warning and confirmation as well as report output.
Main functions of iPMS intelligent distribution management system

(1) Dynamic and intuitive monitoring chart interface (see Fig. 01)

iPMS provides professional electric SLDs, intuitively reflecting the switch operating state and the overall safety of electrical system.

The system supports chart display mode switching (see Fig. 02).

(2) Special electric cabinet control panel

It realizes equipment remote parameter integration, and iPMS control. By applying the object-based programming idea, each object is tailed with a dedicated operation and monitoring panel.

(3) Real-time & professional warning display and management

The warning management includes:
- Multi-media warning and event display;
- Warning and event notice;
- Warning and event filing.

(4) Accurate and intuitive energy consumption calculation

iPMS performs data acquisition and calculates the basic energy consumption data of data center in real time, providing good real-time data basis for DCIM energy efficiency management sub-module.

Energy consumption calculation covers:
- Electric energy inputted to mains;
- Electric energy applied to cooling device;
- Electric energy consumed by IT equipment;
- PUE calculation.

Besides, this function also performs preliminary statistical analysis, for example,
- Calculation of average PUE for a certain period;
- Intuitive display of proportion of main PUE parameters by radar charts.
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- Warning and event filing.

(4) Accurate and intuitive energy consumption calculation of power distribution system

iPMS performs data acquisition and calculates the basic energy consumption data of data center in real time, providing good real-time data basis for DCIM energy efficiency management sub-module.

Energy consumption calculation covers:
- Electric energy inputted to mains;
- Electric energy applied to cooling device;
- Electric energy consumed by IT equipment;
- PUE calculation.

Besides, this function also performs preliminary statistical analysis, for example,
- Calculation of average PUE for a certain period;
- Intuitive display of proportion of main PUE parameters by radar charts.
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Low Voltage System

MNS iPDU (Intelligent Power Distribution Unit)

Technical Info