IDC30E DC Charger

Load Management

SUNGROW

Version 1.0 EN

1. Introduction

This document describes the Load Management functions of IDC30E.

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2. Intorduction to DLM and ALM

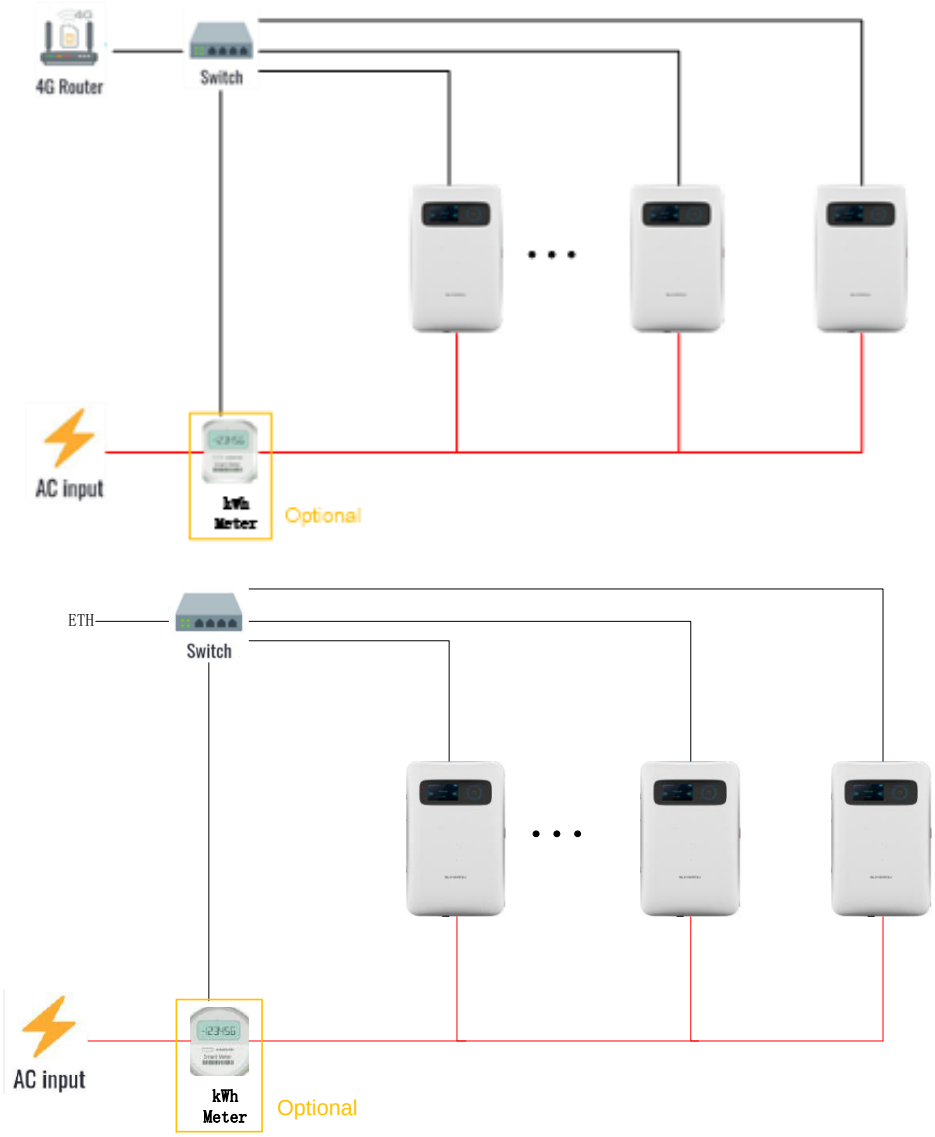
2.1. Introduction to DLM and ALM

Effective Electric Vehicle Charging infrastructure hinges on load management strategies. These technology-driven approaches optimize electrical power distribution during charging sessions, maximizing resource efficiency while minimizing strain on the grid. Load management systems achieve this by scheduling charging sessions for off-peak hours, dynamically adjusting power based on real-time grid conditions, and even incorporating user preferences within the framework of grid stability.

Additionally, these systems can integrate with renewable energy sources, minimizing reliance on fossil fuels by scheduling charging during periods of high renewable energy availability. Remote monitoring and control capabilities further enhance efficiency by allowing operators to optimize their EV charging infrastructure, reducing maintenance costs. Ultimately, load management plays a vital role in promoting sustainable transportation solutions and fostering a more resilient electrical grid, paving the way for a future where EVC infrastructure seamlessly integrates with the power grid for environmental and economic benefits.

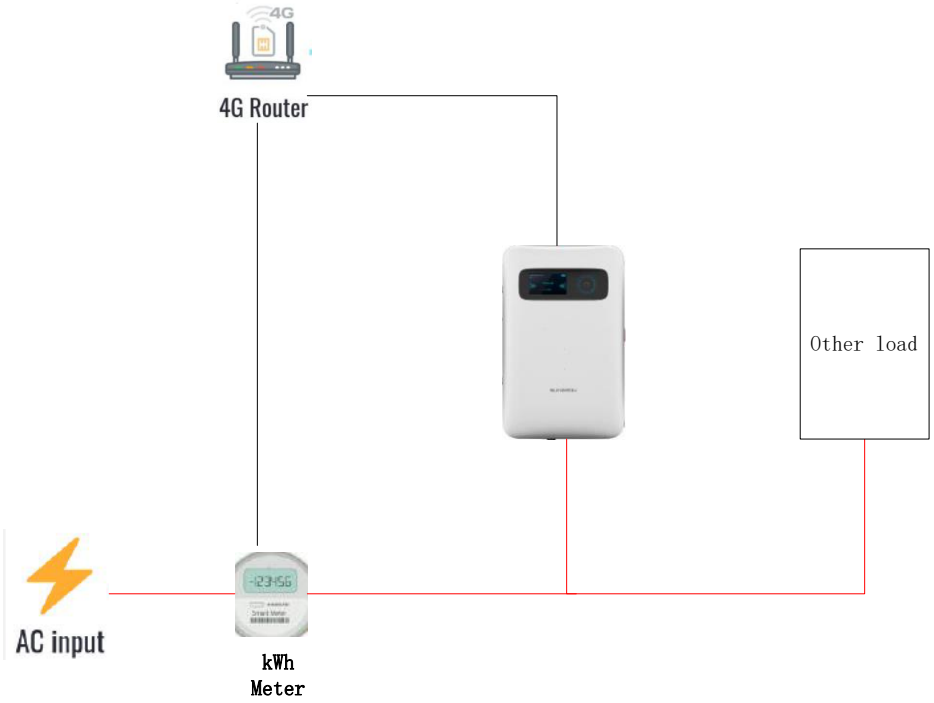
The Dynamic Load Management (DLM) function incorporates power management capabilities for the entire charging station. This feature allows for the adjustment of charging power for each charger based on the real-time power limit of the charging station and the current load conditions. The primary goal is to prevent the overall station from operating under overload conditions. There can be up to 20 IDC30E chargers installed in one network.

Each charger within the station can establish a network connection through a wired method within a local area network. The AC meter is linked to the local area network using a network cable. Additionally, the OCPP platform supports connectivity via a 4G router or an external network cable. The specific networking diagram is illustrated below:



Note: The networking method above requires ensuring that the network segment connected to the network is not on 192.168.1. X, otherwise networking will not be possible.

The Adaptive Load Management (ALM) function for a single charger entails dynamically managing charging power based on real-time factors such as grid capacity, charger capabilities, and user requirements. This adaptive approach ensures efficient charging operations while preventing grid overload and maintaining safety standards.



The specific application scenarios are as follows:

Configuring AC Meter:

When an AC meter is configured, real-time power data collected by the meter is utilized. This data is then compared with the overall station's limited power. The available power is subsequently allocated to each charger accordingly.

Note: When there's a single charger in the system, the AC meter can be set up to enable the ALM function. It's essential for the meter to be configured specifically for the ALM scenario.

No AC Meter Configuration:

In scenarios where no AC meter is configured, designed for instances with only pure charger loads, each charger communicates with the host. The objective is to obtain the current power data of all chargers. Subsequently, the current total power is calculated in comparison with the limit power of the entire station. The available power is then computed and allocated to each charger based on the calculations.

2.2. Introduction to Each Function

2.2.1. Election Function

Multiple chargers are connected to a local area network, and DLM control instructions are initiated by the host. Therefore, the system is equipped

with an election function to designate a primary host. The chosen host communicates with the meter and executes the DLM algorithm. In the event of a failure in host communication, an automatic re-election process is triggered. A new host is established to seamlessly assume control over the DLM function. This ensures continuous and reliable DLM operation even in the face of host failures.

A system with a single charger can be configured for the Adaptive Load Management (ALM) function through the on-screen interface. In this configuration, no election function is required, the charger actively communicates with the meter and executes the ALM algorithm.

3. Installation Instructions

Following these guidelines ensures an efficient and correctly configured installation of the communication distribution box, charger, and energy meter components.

3.1. Installation and Wiring

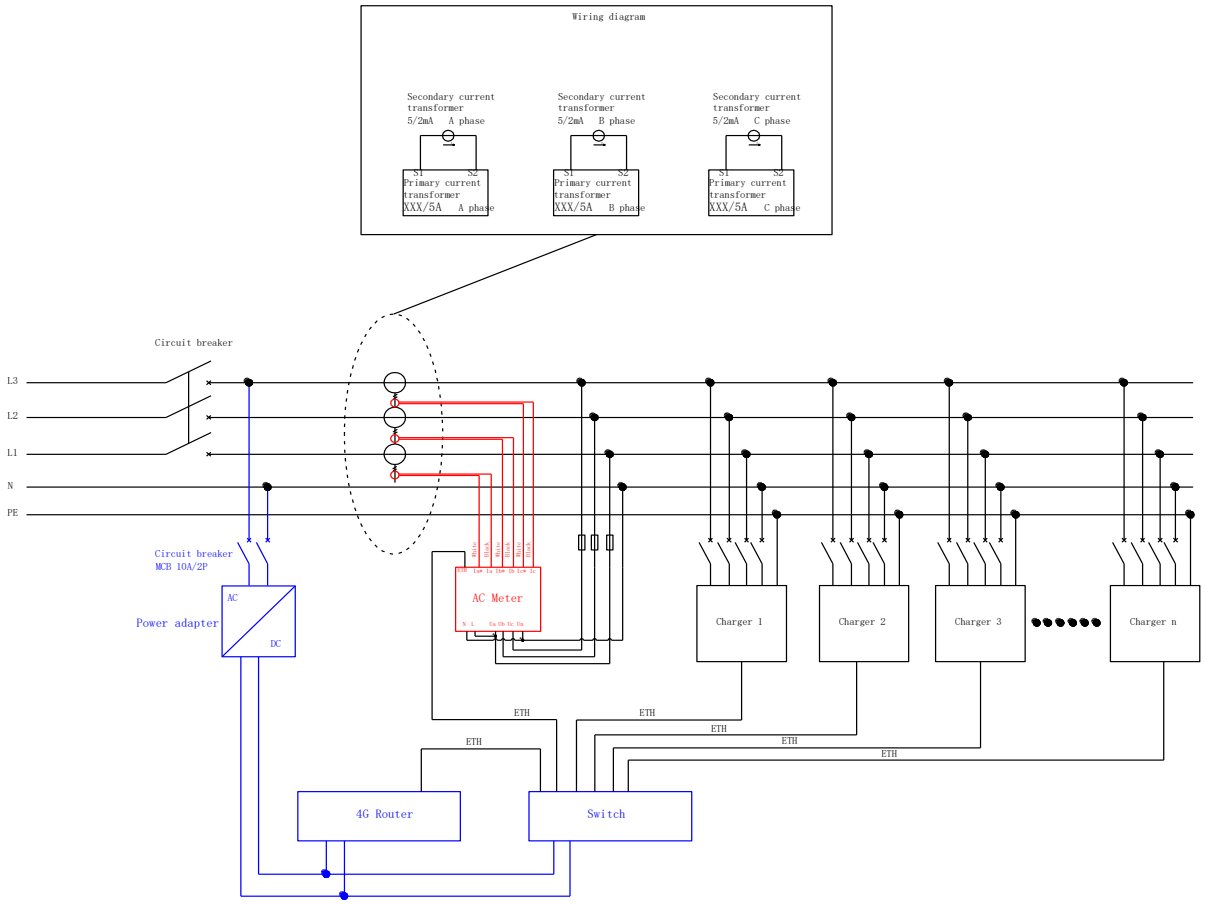
Note: The communication distribution box (switch and router mounted box) should be installed as close as possible to the charger and energy meter. They are connected through network cables, and the wiring distance should not exceed 100m.

System Wiring Diagram:

1) The blue section in the image represents the provided communication distribution box. The internal wiring has been pre-configured, and only an AC230V single-phase power supply needs to be connected to the distribution box.

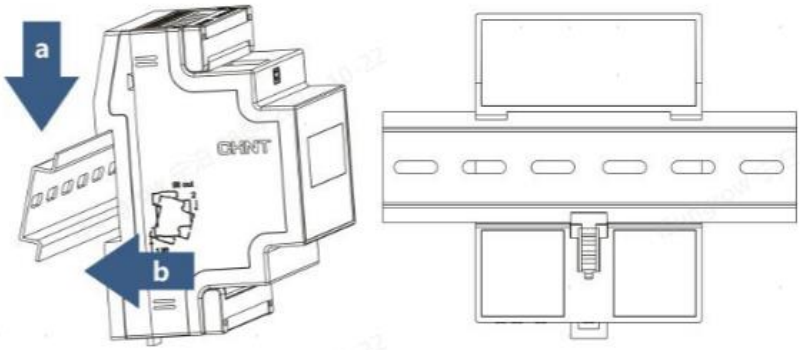
2) The red section in the image represents the supplied electric energy meter and current transformer. These components should be installed at the lower end where capacity limitation is required.*

Note: The primary side current of the matching transformer is 5A. Therefore, a 5A current transformer should be present on the client's power distribution side. The current transformer matching the electric meter is installed on the secondary side of the client's current transformer.



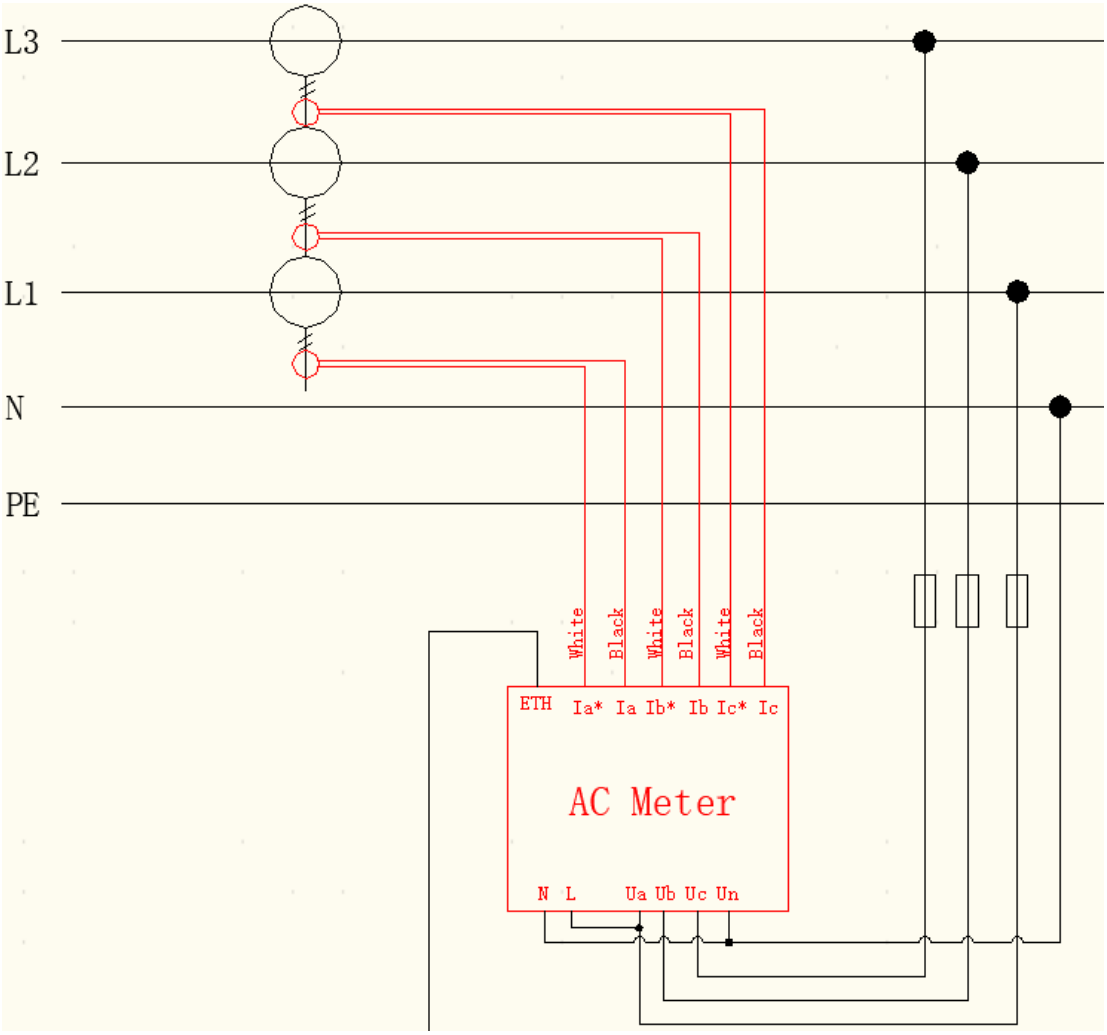
Installation of electric energy meter: The electric energy meter can be installed in the power distribution cabinet using guide rail installation.

1. Install the Smart Power Sensor on the standard guide rail of DIN 35mm.
2. Press the Smart Power Sensor downwards onto the guide rail, then push it in place along the guide rail.

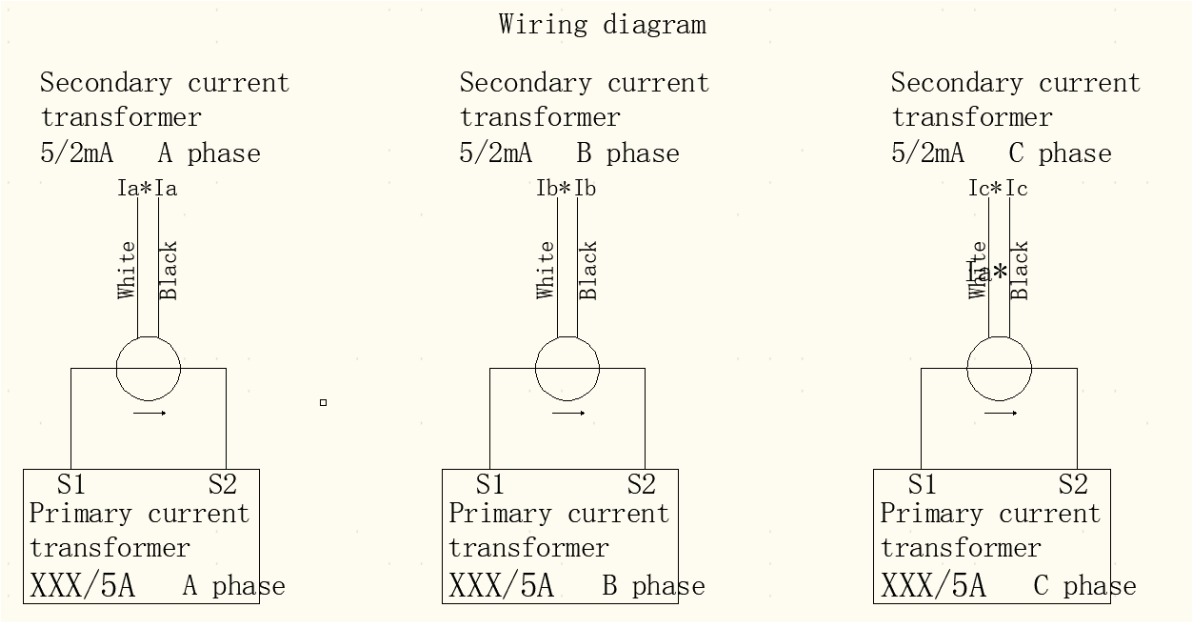


Detailed wiring is as follows:

The secondary wire of the current transformer in the power distribution system passes through the secondary current transformer matched with the energy meter.



Note: The secondary transformer transmission direction and cable color are as follows:



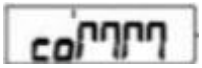
Note: Sungrow reminds customers that they need to purchase separately the current transformer, router (supporting 4G/3G/2G networks, with at least 100Mbps ports), and switch (with at least 100Mbps ports) as these are not included in the system.

Network connection: Connect the LAN ports of all chargers and the LAN port of the energy meter to the switch of the communication distribution box through network cables.

3.2. Meter Settings

CT Setting:

Firstly, calculate the CT value based on the transformer ratio, considering a secondary current value of 5A in the distribution cabinet. For instance, if the transformer ratio is 200/5, the CT value is 40. Press the SET key to enter the setting mode, and the

screen will be displayed. Press the SET key again to proceed. Enter the password "701" and press SET to enter the setting mode. Turn the  page to general settings, press the SET key to enter, scroll down to

, press SET to proceed, set to 40 (calculated based on the transformer ratio), press ESC to exit and save. The CT value is now successfully set.

Note: Please contact Sungrow to purchase the meter.

3.3. Load Management Parameter Settings

Upon powering on the charger, access the factory mode. In the “DLM” setting interface for each charger, follow these steps:

1. Load Management Mode Selection:

The system offers three load management modes: Disabled, Adaptive Load Management (ALM), and Dynamic Load Management (DLM).

- Disabled: Deactivates load management. This is the default setting.
- Adaptive Load Management (ALM): Use this mode if:

You have only one charger and one meter in the network.

Load management is necessary.

- Dynamic Load Management (DLM): Use this mode if:

You have two or more chargers in the network.

Load management is necessary.

2. Charger Specification :

The configuration process depends on the selected load management mode:

ALM: In this mode, the system automatically detects the single charger, so you cannot change the "Amount of chargers" field (it's set to 1).

DLM: Enter the total number of chargers in the "Amount of chargers" field. Assign a unique number (1, 2, 3, ...) to each charger. Specify a unique "Connector name" for each charger, ensuring no names are repeated for clarity. Example:

Amount of chargers: 3

Connector names:

- Charger 1: 1
- Charger 2: 2
- Charger 3: 3

3. Select the distribution strategy:

- Strategy 1: Evenly divided.

When a vehicle enters the charging queue, the DLM system recalculates the available power and redistributes it across all active chargers, ensuring equitable power distribution. If the allocated power surpasses the demand of the vehicle, the surplus power is reclaimed and evenly redistributed to other chargers with pending demand.

- Strategy 2: First come, first served.

The charging system prioritizes vehicles based on their entry time into the charging queue, ensuring that all chargers can provide at least the minimum power. The specified preceding power level determines this minimum power output.

In ALM mode, the system automatically allocates available power to the single connected charger, eliminating the need for strategy selection.

4. Meter Configuration:

Configure the AC meter availability based on whether an electric energy meter is installed. DLM meter configuration is optional, while ALM requires a meter setup for communication and power management with a single charger.

5. Setting Max Offline Power:

This setting limits the power a charger can deliver when disconnected from the DLM or ALM system (offline mode). It's crucial to ensure the combined Max Offline Power of

all chargers doesn't exceed the total available power for charging after accounting for other building loads.

Imagine your charger's total power capacity is P0, and the maximum power used by other loads is P1. This leaves P2 = P0 - P1 as the available power for charging stations. When setting the Max Offline Power (P3) for each charger, make sure the sum of all P3 values remains less than or equal to P2 (P3 ≤ P2). If P3 exceeds P2, a situation could arise where other loads are at full power and all chargers are operating in offline mode at their maximum capacity. This would exceed the charger's total available power, potentially causing an overload.

6. Setting Preceding Power:

The Preceding Power defines the minimum power guaranteed to each charger under the "first-come-first-served" strategy. This ensures all connected stations receive some power when they initiate charging. However, it's crucial to ensure the combined Preceding Power of all stations doesn't exceed the available power for charging after accounting for other building loads.

Similar to setting Max Offline Power, imagine your station's total power capacity is P0, and the maximum power used by other electrical equipment is P1. This leaves P2 (P0 - P1) as the available power for chargers. When setting the Preceding Power (P4) for each station, make sure the sum of all P4 values remains less than or equal to P2 (P4 ≤ P2). If P4 exceeds P2, a scenario could occur where other building loads are at full power and all connected chargers start charging at their Preceding Power. This would exceed the station's total available power, potentially causing an overload.

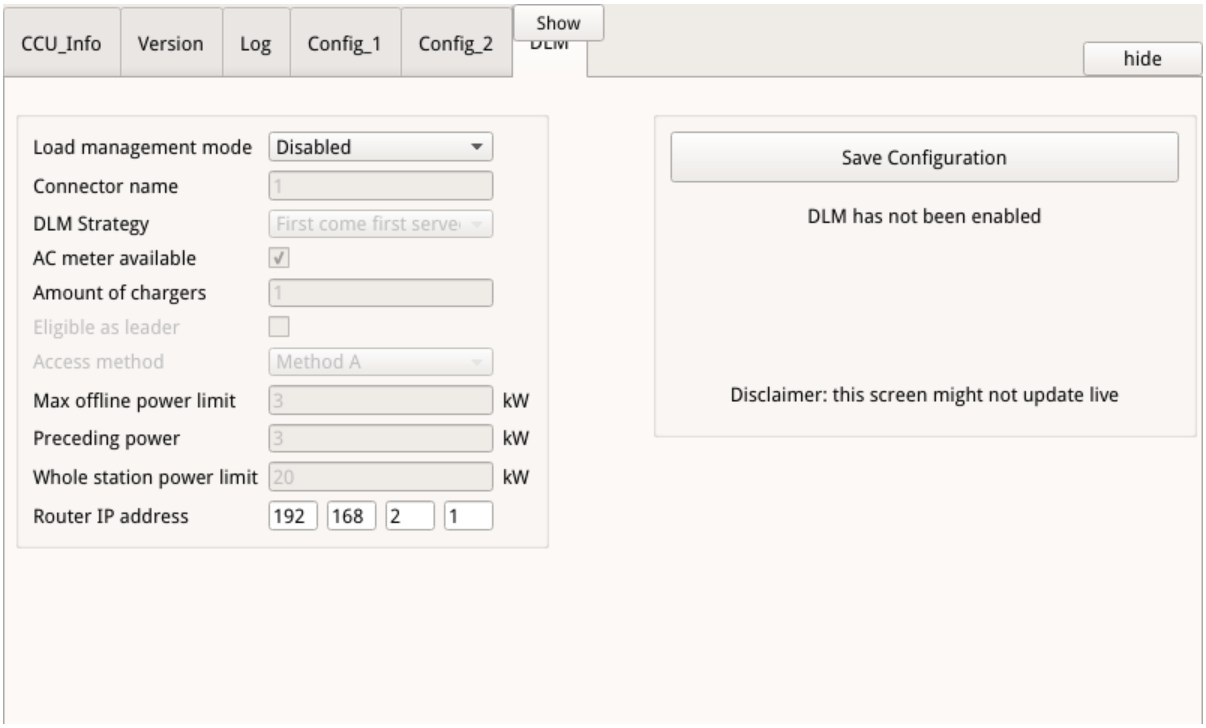
7. Understanding Whole Station Power:

Whole Station Power refers to the total electrical capacity your load management system needs to control. It depends on whether you've configured an AC meter:

- AC meter configured: When an AC meter is integrated with the system, Whole Station Power reflects the total power available to all loads, including chargers and other electrical equipment connected behind the AC meter.
- AC meter not configured: In the absence of an AC meter, Whole Station Power simply represents the combined power ratings of all chargers participating in the DLM system.

Knowing Whole Station Power is crucial for setting appropriate power limits within the load management system. It ensures that the system doesn't allocate more power than the charger can safely handle, preventing potential overloads. The system considers the total power available for all connected loads, not just chargers. This allows for more precise load management, ensuring enough power remains for essential building functions while optimizing charging for electric vehicles.

8. Set the Router IP address.



9. Restart the Charger

After configuring the above information, click "Save Configuration" to save your settings. After the setting is completed, power off and restart all chargers.