AcuDC 300 Series
EV Charging Meter
Users Manual

ACCUENERGY

Legal Notice

Please read this manual carefully before installation, operation, and maintenance of the AcuDC 300 series EV Charging meter.

The information contained in this document is believed to be accurate at the time of publication, however, Accuenergy assumes no responsibility for any errors which may appear here and reserves the right to make changes without prior notice as part of continuing improvements. Please ask the local representative for the latest product specifications before ordering.

Safety Notice

ELECTRIC SHOCK DANGER SAFETY WARNING

Please read this document carefully before the installation, operation, and maintenance of the AcuDC 300 meter.

If the equipment is used in a manner not specified by Accuenergy, the protection provided by the equipment may be impaired.

Prior to installation, maintenance or repair, the equipment must be de-energized and grounded. All maintenance work must be performed by a qualified professional who have received formal training and have experience with high voltage and current devices.

Accuenergy is not be responsible or liable for any damages or injuries caused by improper meter installation and/or operation.

NOTE: THERE IS NO REQUIRED PREVENTIVE MAINTENANCE OR INSPECTION NECESSARY FOR SAFETY. HOWEVER, ANY REPAIR OR MAINTENANCE SHOULD BE PERFORMED BY THE FACTORY.

DISCONNECT DEVICE: The following part serves as the designated disconnect device for this equipment.

A SWITCH OR CIRCUIT-BREAKER MUST BE INCLUDED IN THE INSTALLATION.

THE SWITCH MUST BE IN CLOSE PROXIMITY TO THE EQUIPMENT AND WITHIN EASY REACH OF THE OPERATOR. THE SWITCH SHALL BE MARKED AS THE DISCONNECTING DEVICE FOR THE EQUIPMENT.

Important Symbols

The following symbols can be found either in this document or on the AcuDC 300 meter.

	**Electrical Shock Hazard:** Contains information about procedures which must be followed to prevent the risk of electric shock and danger that can result in personal injury or death.
	**Safety Warning:** Contains information about circumstances which if not considered may result in personal injury or death.
	**Double Insulation:** Indicates the device is double insulated and does not require to be connected to an electrical earthing.
ALERT	Indicating the operation may lead to device malfunction or potential data loss.
NOTE	An advance notice to provide additional information before an action is taken by the user.

Table of Contents

Chapter 1: Introduction

1.1 AcuDC 300 Overview

The AcuDC 300 EV Charging meter is specially designed for integration with electric vehicle (EV) fast charging stations. With revenue-grade accuracy that exceeds IEC 62053-41:2021 Class 0.5 & EN50470-4 Class C compliance standards along with a cable loss compensation feature, to ensure precise measurement for billing purposes. The EV Charging meter is rated at 0.2% accuracy on current measurements and 0.1% accuracy for voltage measurements. The configurable data loggers stores information in real time to nonvolatile memory, while the electronic seal function secures data integrity and deters tampering. The AcuDC 300 is the ideal solution for ensuring accurate energy metering in EV charging infrastructures.

1.2 Key Features

High Accuracy Measurement

AcuDC 300 is IEC 62053-41:2021 Class 0.5 & EN50470-4 Class C compliant, delivering precise measurements for revenue-grade billing applications. Current measurements are measured with the use of DC shunts at an accuracy level of 0.2% between -650A to 650A, as well as direct connection for voltage measurements at 0.1% accuracy from 60V to 1000V, covering the entire range of operation for most DC fast charging stations.

Cable Loss Compensation

Resistance in the cable may lead to energy loss in the form of heat, especially for high-current DC fast chargers. The CLC is able to adjust for the loss when energy received by the EV is less than the energy produced. The AcuDC 300 cable loss compensation calculates the loss based on real-time current, voltage, and cable resistance to ensure more accurate billing data.

Electronic Metrology Seal

The electronic seal function secures important settings configurations and data from unauthorized tampering. The seal function can be activated and deactivated by toggling the AcuDC 300 seal switch located under the protective front casing, enhancing the EV Charging meter's security. The AcuDC 300 is sealed by default.

Data Logging

AcuDC 300 allows real-time metering data to be stored onto non-volatile memory ensuring information will be preserved even when the meter is powered off. The DC meter includes four configurable data loggers, and each can be programmed independently to record different

parameters. Each data record is timestamped, allowing for precise tracking to pinpoint the exact moment each record was logged.

Compact & Flexible

The AcuDC 300 meter is 125mm in length, 69mm in width, and 125mm in height, making it a compact device that can easily fit inside an EV charging station. The meter conforms to a standard 35mm DIN rail mount for a simplified installation process.

1.3 Function List

The AcuDC 300 provides powerful data collection and processing functions. In addition to measuring various standard basic parameters, the AcuDC 300 can perform advanced demand metering, max/min statistic recording, energy accumulation, and data logging. A complete list of AcuDC 300 functions is shown in Table 1-1.

Table 1-1 AcuDC 300 Function List

Function		Parameter
Real-Time Measuring	Basic	Voltage Measured Voltage Compensated Voltage Current Power Ripple Factor U Ripple Factor I
	Demand	Demand I Demand P
Real-Time Energy	Energy	Import Energy Export Energy Net Energy Total Energy
	Charge	Import Energy Export Energy Net Energy Total Energy
Max/Min with Timestamps		Max Demand I Max Demand P Max Voltage, Min Voltage Max Current, Min Current Max Power, Min Power Max Ripple Factor U, Min Ripple Factor U Max Ripple Factor I, Min Ripple Factor I

Function		Parameter
Data Logging	Data Log 1 Data Log 2 Data Log 3	Measured Voltage (float) Compensated Voltage (float) Current (int), (float) Power (int), (float) Ripple Factor U (int), (float) Ripple Factor I (int), (float) Demand Current Import (int), (float) Demand Current Export (int), (float) Demand Power Import (int), (float) Demand Power Export (int), (float) Import Energy (double) Export Energy (double) Net Energy (double) Total Energy (double) Import Charge (double) Export Charge (double) Net Charge (double) Total Charge (double)
Trend Logging for Max/Min/Average	Data Log 4	Measured Voltage (float) Compensated Voltage (float) Current (float) Power (float) Ripple Factor U (float) Ripple Factor I (float) Demand Current Import (float) Demand Current Export (float) Demand Power Import (float) Demand Power Export (float)
Time	Device Run-Time	Hours
	Device Load-Time	Hours
	Device Clock	Year-Month-Date Hours: Minutes: Seconds, Weekdays

Chapter 2: Hardware Installation

AcuDC 300 EV Charging Meter Safety Considerations Before Installation

The installation must be performed by a qualified professional who has received formal training and have experience with high voltage and current devices. Appropriate safety wear is mandatory to ensure safe installation.

Caution must be taken before working on voltage and current channels, including cables and terminal blocks.

Do not supply input voltage above the rated maximum limit of the meter and devices connected to it. Before energizing the meter, please refer to the meter's label and specifications.

Do not perform high voltage tests or insulation experiments to output, input, or communication terminals.

Use dry cloth to wipe the meter if necessary.

An unsuitable environment may affect the measurement accuracy, system function, cause hardware damage, or even lead to safety hazards.

Before installation, make sure the application meets the requirements from specification, including:

Power Supply	9-36V
Voltage Input	0-1000
Current Input	±650A
Transient Voltage	Overvoltage Category II
Altitude	0 to 2000m
Pollution	Degree 2
Operating & Storage Temperature Range	–35°C to 70°C (–31°F to 158°F)
Relative Humidity Range	0% to 95%

2.1 Appearance and Dimensions

The AcuDC 300 has an LED display located on the front and a DIN rail mounted on the rear. The following figures provide the front view and side view of AcuDC 300.

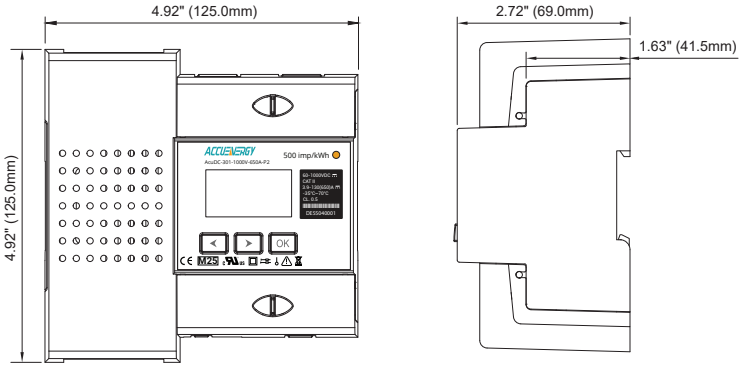


Figure 2-1 AcuDC 300 Front and Side View Diagram

The parts of the AcuDC 300 are listed in the table below and illustrated in Figure 2-2.

Table 2-1 AcuDC 300 Part Name and Description

Part Name	Description
1) Front Casing	Transparent front meter casing with accessible display and controls
2) Pulse LED Indicator	LED light to indicate energy pulse signal.
3) Current Input Terminal	Built-in shunt used in direct connection.
4) Seal Switch	Enable and disable the seal status.
5) RS485 Terminal	Modbus RS485 communication port.
6) LCD screen	Backlight screen.
7) Navigation Key	Three keys to navigate through the screen and configure settings.
8) Power Supply Terminal	Control power input.
9) Voltage Input Terminal	Used for voltage input.
10) DIN Rail	Used on a 35mm DIN rail mount.
11) Ethernet Port	Single RJ45 Ethernet Connector

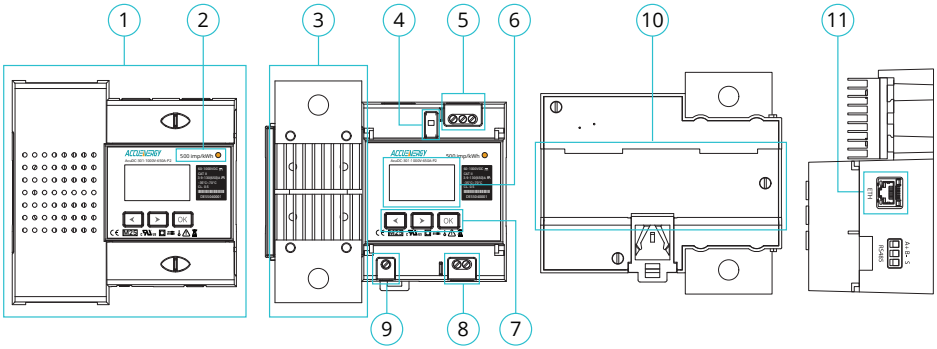


Figure 2-2 AcuDC 300 Part Identification Diagram

2.2 Din Rail Mount Installation

The following instructions below describes how to mount the AcuDC 300 meter onto a standard 35mm (1.38in) DIN rail.

Installation Steps

1. From the back of the AcuDC 300, simultaneously and carefully pull down the clip lock as shown in ① of Figure 2-3.
2. Position the AcuDC 300 so its back is facing the DIN rail. Place the AcuDC 300 two upper mounting brackets over the top of the DIN rail groove. Fit the AcuDC 300 onto the DIN rail as illustrated in ② of Figure 2-3.

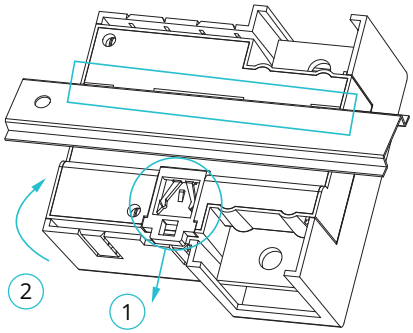


Figure 2-3 AcuDC 300 Installation on DIN Rail

3. Release the clip lock back up ③ to secure the AcuDC 300 onto the DIN rail, as illustrated in Figure 2-4.

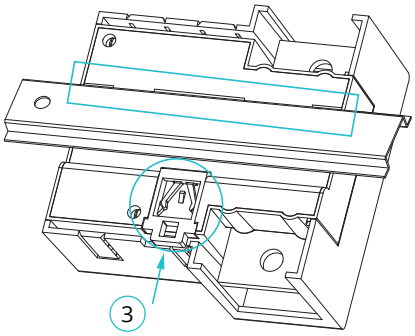


Figure 2-4 Insert Clip Lock to Secure the AcuDC 300

2.3 Wiring Configuration

2.3.1 Power Requirement

Connect the auxiliary power supply (9-36VDC) from the power adapter to the DC Power Port (+, -). Ensure that a 9-36V Class 1 power adapter is used for the meter. The maximum current consumption is 0.3A at 9VDC.

NOTE: The 9-36VDC power supply unit is sold separately. Accuenergy recommends using the AcuLink-RIK-PSU.

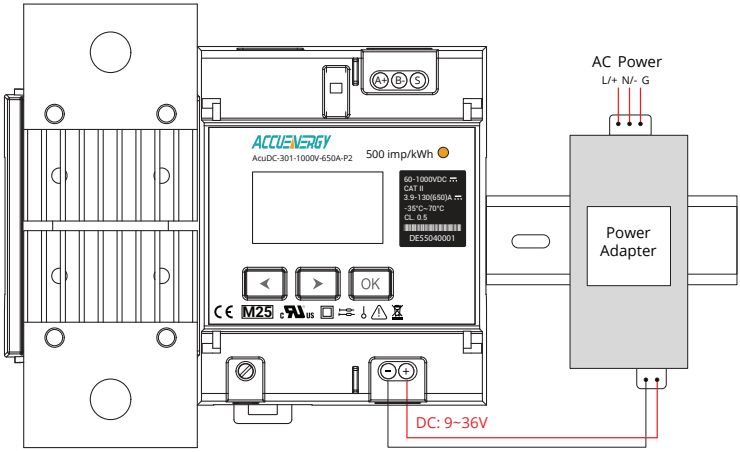


Figure 2-5 AcuDC 300 Power Supply Wiring

2.3.2 Voltage Input Wiring

AcuDC 300 supports voltage signals up to 1000Vdc OVCII.

A fuse (typical 1A/1500Vdc) should be used in the voltage input loop.

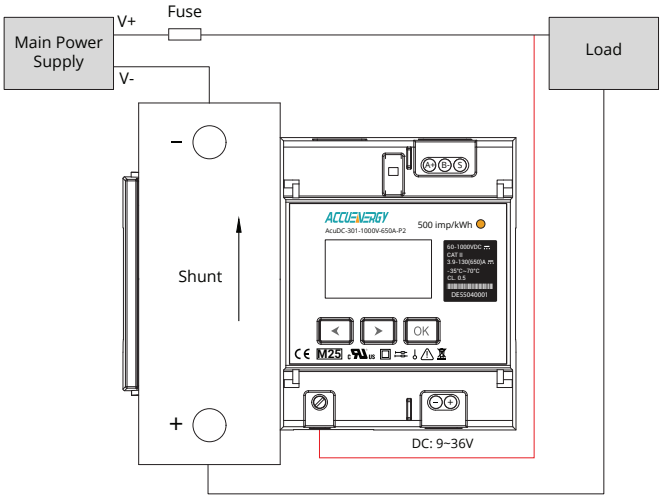


Figure 2-6 AcuDC 300 Voltage Wiring

2.3.3 Current Input Wiring

The AcuDC 300 series meter features a built-in shunt for direct DC current measurements up to 650A. It supports a single current input channel.

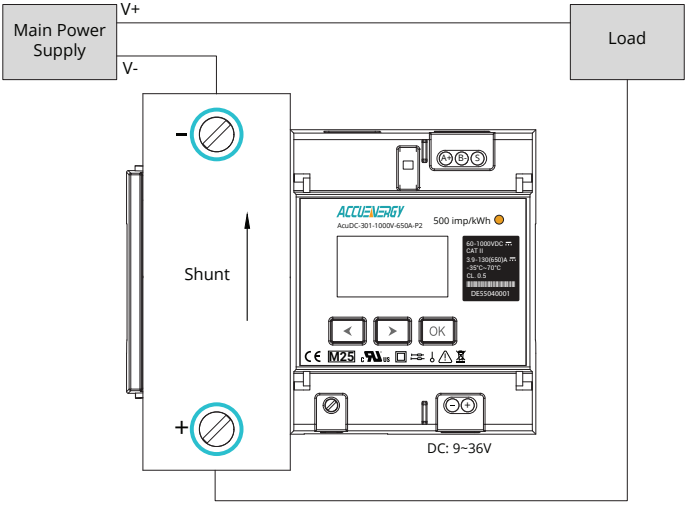


Figure 2-7 AcuDC 300 Current Wiring

2.3.4 Communication

2.3.4.1 RS485

AcuDC 300 supports serial RS485 communication via Modbus RTU. The terminals are denoted as A+, B- and S.

- A+ is the positive differential terminal.
- B- is the negative differential terminal.
- S is used for a shield connection.

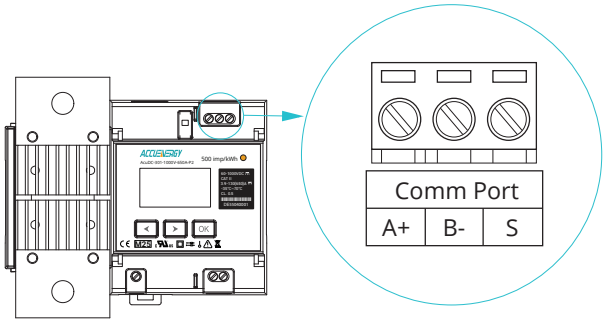


Figure 2-8 Communication Port

The maximum distance of the cable should not exceed 1200m. A shorter cable should be used if more devices are connected to the same communication link or when using a higher baud rate.

In instances where the master device is equipped with an RS232 port, an RS232-to-RS485 converter is required to connect to the AcuDC 300 RS485 interface.

To improve communication quality:

- A high-quality shielded twisted pair cable with a gauge of 22 AWG needs to be used.
- Pay attention to "single-point earthing". This means that there is only one side for the shield to be connected to the ground in a communication link.
- Topology with a "T" type connection should be avoided. No new branches except from the starting point.
- Keep communication cables away from sources of electrical noise to reduce interference.
- When several devices are connected in daisy chain to the same communication line, a termination resistor (typical value 120-300Ω, 0.25W) should be used at the end of the circuit (the last device of the chain) to end the communication line.

2.3.4.2 Ethernet

The AcuDC 300 includes a single RJ45 connector to physically access the Ethernet network. It is recommended to use a CAT 5 cable. The mechanical and electrical characteristics of the connector are consistent with the requirements of IEC 60603-7.

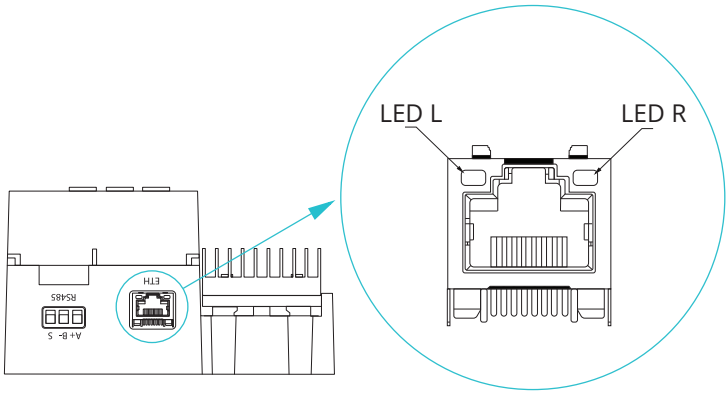


Figure 2-9 AcuDC 300 RJ45 Connector

Table 2-2 Ethernet Pin Index Chart

Pin number	Name	Description
1	TX+	Transmit Data +
2	TX-	Transmit Data -
3	RX+	Receive Data +
4	n/c	Not Connected
5	n/c	Not Connected
6	RX-	Receive Data -
7	n/c	Not Connected
8	n/c	Not Connected

LED_L (Yellow): Displays the speed status. When the LED is on, it indicates a transmission speed of 100Mpbs. When the LED is off, it represents a speed of 10Mbps.

LED_R (Green): Displays the link and activity status. When the LED is on, it indicates the Ethernet port is establishing a connection. A blinking LED indicates there is data transmission activity.

2.3.5 Wiring and Terminal Characteristic Chart

Use a 3 x 0.5mm (DIN 5264) screwdriver to connect and disconnect the wires. Copper wires with the following specifications shall be used for wiring:

Table 2-3 Wiring and Terminal Characteristic Chart

Terminal Name	Functions	Terminal Type	Wire/ Terminals/ Accessories Range	Terminal Cross Section	Screw Torque	Temperature Rating
+, -	DC Power Port	Plated Welding Type	22AWG ~ 18AWG	2.5mm^2	0.5N.m	105°C
V+	Voltage Input Port	Plated Welding Type	16AWG ~ 14AWG	2.5mm^2	0.5N.m	105°C

I+, I-	Current Input Wires	Stripped Wires with Terminal		Min. 380mm²	User should ensure the shunt is connected.	105°C
	Terminal	Terminals of the Stripped Wires		Min: 1100mm² (Contacted Area)		
	Terminal Fitting	Screw and Gasket	Screw Diameter: 9.4 ~ 10.3mm The inner diameter of the gasket must be larger than 10.5mm & the outer diameter is larger than 30mm.			
RS485 A+, B-, S	RS485 Communication Port	Plated Welding Type	22AWG ~ 18AWG	2.5mm²	0.4N.m	105°C
ETH	Ethernet Communication Port	Standard 10/100 Mbit/s Cable			Not Defined	105°C

2.4 Metrology Seal Function

The AcuDC 300 supports a metrology sealing feature where the meter can be electronically sealed to prevent any tampering of its settings or readings. The seal function can only be enabled and disabled by toggling the physical seal switch on the AcuDC 300 EV Charging meter. It cannot be modified from the AcuDC 300 display screen or Acuview 2 software. The Modbus register address for the seal status can be found later in the manual in Chapter 5.

The unlock icon and the locked icon indicate the seal status on AcuDC 300 screen. When the AcuDC 300 is sealed, some functions and certain parameters will be blocked. These reading parameters will still be accessible from the AcuDC 300 display screen or by Modbus. However, they cannot be changed or modified.

NOTE: The AcuDC 300 is sealed by default.

Table 2-4 System Parameters Settings Blocked in Sealed Status

Parameters	Screen Page	Meter Display Keys	Modbus Communication
RS485 Baud Rate	P01		
RS485 Parity	P02		
Modbus Slave ID	P03		
Modbus RTU Enable	P04		
Modbus TCP Enable	P05		
Modbus TCP Port	P06		
Demand Method	P07	√	√
Demand Window	P08	√	√
Demand Update Period	P09	√	√
Energy Pulse Parameter	P10	√	√
Energy Pulse Constant	P11	√	√
Backlight Off Delay	P12		
Cable Loss Comp	P13	√	√
Cable Resist	P14	√	√
Clear Energy	P15	√	√
Clear Charge	P16	√	√
Clear Demand	P17	√	√
Clear Max/Min	P18		
Clear Run Time	P19		
Clear Load Time	P20		
Clear Data Log 1	P21		
Clear Data Log 2	P22		
Clear Data Log 3	P23		
Clear Data Log 4	P24		
Factory Reset	P25	√	√
Date & Time	P26		
Meter Password	P27		

Chapter 3: Meter Display Screen & Parameter Settings

This chapter explains how to operate the AcuDC 300 to view real-time metering data and set parameters using the display screen and navigation keys.

3.1 Display Panel and Navigation Keys

The AcuDC 300 features an LCD screen and three navigation keys in the front. From left to right, there are the **Left** < , **Right** > , and **OK** OK keys.

Figure 3-1 AcuDC 300 Front View

The AcuDC 300's menu structure is illustrated in Figure 3-2.

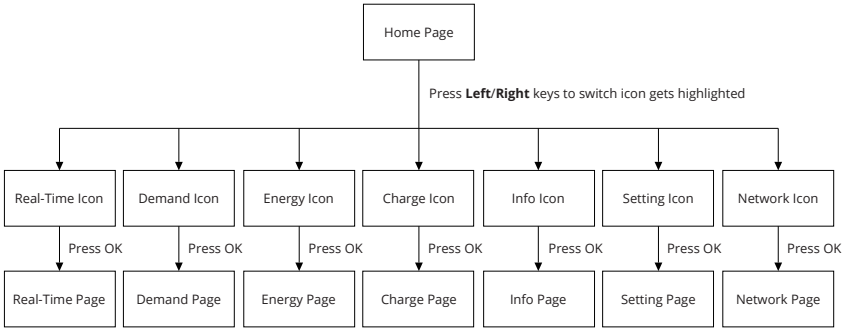


Figure 3-2 Navigation Structure of AcuDC 300 Display Screen

3.1.1 Home Screen

Figure 3-1 I/O Module Dimensions

Table 3-1 I/O Module Description

SN	Number	Description
1	 **R** Real-Time Screen	Press the **Left** or **Right** keys to select the **R** icon on the Home screen. Press **OK** key to navigate to the Real-Time screen. Real-Time screen has four subscreens: • Voltage • Current • Power • Ripple Factor
2	 **D** Demand Screen	Press the **Left** or **Right** keys to select the **D** icon on the Home screen. Press **OK** key to navigate to the Demand screen. Real-Time screen has two subscreens: • I Demand • P Demand
3	 **E** Energy Screen	Press the **Left** or **Right** keys to select the **E** icon on the Home screen. Press **OK** key to navigate to the Energy screen. Energy screen has two subscreens: • E-IMP & E-EXP • E-NET & E-TOTAL
4	 **C** Charge Screen	Press **Left** or **Right** keys to select the **C** icon on the Home screen. Press **OK** key to navigate to the Charge screen. Charge screen has two subscreens: • C-IMP & C-EXP • C-NET & C-TOTAL

SN	Number	Description
5	 **INFO** Info Screen	Press **Left** or **Right** keys to select the **INFO** icon on the Home screen. Press **OK** key to navigate to the Info screen. Info screen has ten subscreens: • Manufacturer • Model • Hardware Version • Firmware Version & Release Date • S/N (Serial Number) • MAC Address • Date & Time • Run Time • Load Time • Seal Status
6	 **SET** Settings Screen	Press **Left** or **Right** keys to select the **SET** icon on the Home screen. Press **OK** key to navigate to the **Settings** screen. **NOTE:** Password verification is required to access this screen. Setting screen has 27 subscreens: • P01 RS485 Baud Rate • P02 RS485 Parity • P03 Modbus Slave ID • P04 Modbus RTU Enable • P05 Modbus TCP Enable • P06 Modbus TCP Port • P07 Demand Method • P08 Demand Window • P09 Demand Update Period • P10 Energy Pulse Parameter • P11 Energy Pulse Constant • P12 Backlight Off Delay • P13 Cable Loss Compensation • P14 Cable Resistance • P15 Clear Energy • P16 Clear Charge • P17 Clear Demand • P18 Clear Max/Min • P19 Clear Run Time • P20 Clear Load Time • P21 Clear Data Log 1 • P22 Clear Data Log 2 • P23 Clear Data Log 3 • P24 Clear Data Log 4 • P25 Factory Reset • P26 Date & Time • P27 Meter Password

SN	Number	Description
7	 **NET** Network Screen	Press **Left** or **Right** keys to select the **NET** icon on the Home screen. Press **OK** key to navigate to the Network screen. **NOTE:** Password verification is required to access this screen. Network screen has seven sub-screens: • P01 DHCP • P02 IP Address • P03 Subnet Mask • P04 Gateway • P05 DNS 1 • P06 DNS 2 • P07 Reset Network

NOTE: Pressing both the **Left** and **Right** keys simultaneously on any screen will return to the previous menu, while pressing the **OK** key will navigate to the selected screen.

NOTE: The Seal icon indicates that the meter is electronically sealed, and the following settings cannot be modified:

- P10 Energy Pulse Parameter
- P11 Energy Pulse Constant
- P13 Cable Loss Compensation
- P14 Cable Resist
- P15 Clear Energy
- P16 Clear Charge
- P17 Clear Demand
- P25 Factory Reset
- Firmware update
- Calibration

3.2 Real-Time Screen

The AcuDC 300 screen features real-time parameters that provide instantaneous insights into the metering system's performance, including voltage, current, power, and ripple factor. For comprehensive information on real-time parameters, please refer to Chapter 4.2.

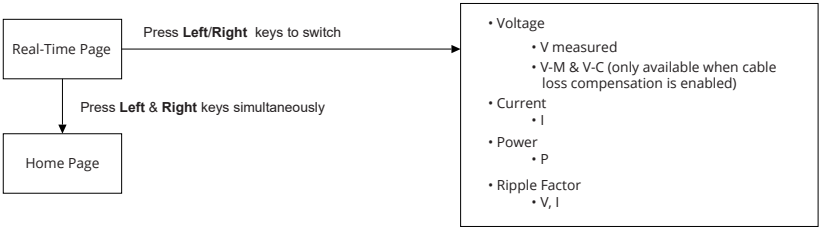


Figure 3-4 Real-time Display Screen Structure

Navigate to the 

icon on the home screen and press **OK** to enter the Real-Time screen.

3.2.1 Voltage Subscreen

Environment

The voltage readings will be the first subscreen to appear when entering the Real-Time screen. Press either the **Left** or **Right** key to navigate to other subscreens. To return to the previous screen press the **Left** and **Right** keys simultaneously.

VOLTAGE:		
V	0.000	V
V - M	0.000	V
V - C	0.000	V

Figure 3-5 Real-Time Voltage Subscreen

The Voltage subscreen displays three parameters: real-time voltage (V), voltage measured (V-M), and voltage compensated (V-C).

V-M and V-C will only be available when cable loss compensation is activated. V-M is the voltage level measured by the meter without considering the cable losses. V-C is the voltage reading after applying the cable loss compensation algorithm.

3.2.2 Current Subscreen

To access the current readings from the Real-Time screen, press either the **Left** or **Right** key to navigate to the Current subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

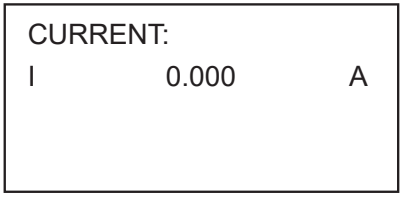


Figure 3-6 Current Subscreen

3.2.3 Power Subscreen

To access the power readings from the Real-Time screen, press either the **Left** or **Right** key to navigate to the Power subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

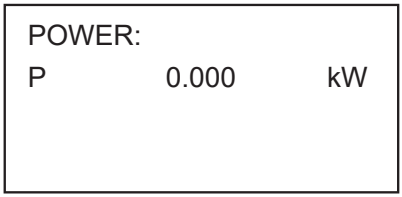


Figure 3-7 Power Subscreen

3.2.4 Ripple Factor Subscreen

To access the ripple factor readings from the Real-Time screen, press either the **Left** or **Right** key to navigate to the Ripple Factor subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

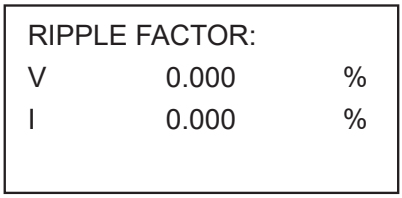


Figure 3-8 Ripple Factor Subscreen

Ripple factor measures how smooth the DC output is after rectification. Higher ripple factor indicates more AC components and less effective rectification, while lower ripple factor indicates smoother and more stable DC output.

3.3 Demand Screen

The AcuDC 300 features demand readings of the system which can be accessed from the display screen. It includes the imported/exported current demand and power demand readings. For comprehensive information on demand parameters, please refer to Chapter 4.3.

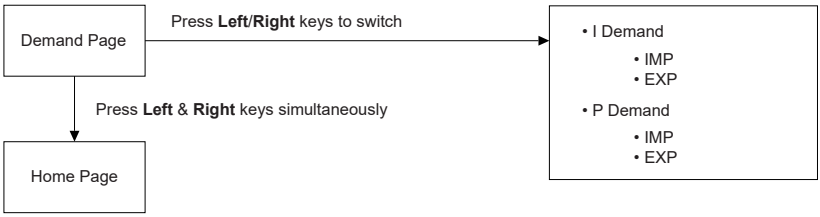


Figure 3-9 Demand Screen Sequence

Navigate to the  icon on the home screen and press **OK** to enter the Demand screen.

3.3.1 Current (I) Demand Subscreen

To access the current (I) demand readings from the Demand screen, press either the **Left** or **Right** key to navigate to the I Demand subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

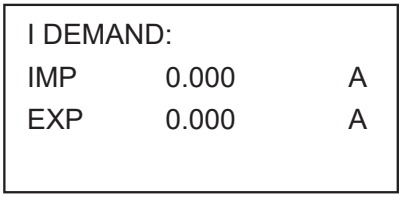


Figure 3-10 Import/Export Current Demand Subscreen

AcuDC 300 measures import (IMP) and export (EXP) current demand, where import current demand refers to the current flowing into the facility from the grid, and export current demand refers to the current flowing out of the facility into the grid.

3.3.2 Power (P) Demand Subscreen

To access the power (P) demand readings from the Demand screen, press either the **Left** or **Right** key to navigate to the P Demand subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

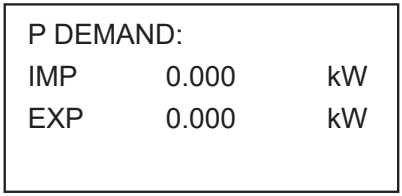


Figure 3-11 Import/Export Power Demand Subscreen

AcuDC 300 measures import (IMP) and export (EXP) power demand, where import power demand refers to the power drawn from the grid and into the facility, and export power demand refers to the power flowing out of the facility and back into the grid.

3.4 Energy Screen

The AcuDC 300 features Energy readings of the system which can be accessed from the display screen. It includes imported/exported energy and the net/total energy readings. For comprehensive information on Energy parameters, please refer to Chapter 4.4.

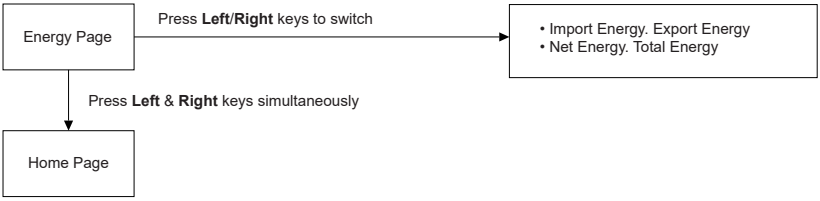


Figure 3-12 Energy Screen Sequence

Navigate to the  icon on the home screen and press **OK** to enter the Energy screen.

3.4.1 Import/Export Energy Subscreen

To access the import energy and export energy readings from the Energy screen, press either the **Left** or **Right** key to navigate to the Import/Export Energy subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

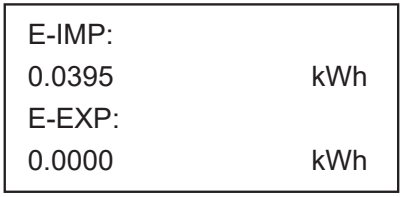


Figure 3-13 Import/Export Energy Subscreen

AcuDC 300 measures import (E-IMP) and export (E-EXP) energy, where import energy refers to the energy consumed (power flowing into the facility from the grid), and export energy refers to the energy generated (power flowing from the facility back to the grid).

3.4.2 Net/Total Energy Subscreen

To access the net energy and total energy readings from the Energy screen, press either the **Left** or **Right** key to navigate to the Net/Total Energy subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

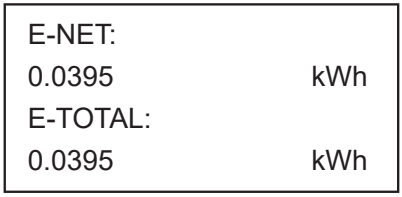


Figure 3-14 Net & Total Energy Subscreen

Net energy (E-NET) is the difference between the energy imported and exported over a specific period, while total energy (E-TOTAL) is the sum of imported and exported energy over a specific period.

3.5 Electrical Charge Screen

The AcuDC 300 features electrical charge readings of the system which can be accessed from the display screen. It includes imported/exported electrical charge and the net/total electrical charge readings. For comprehensive information on Charge parameters, please refer to Chapter 4.4.

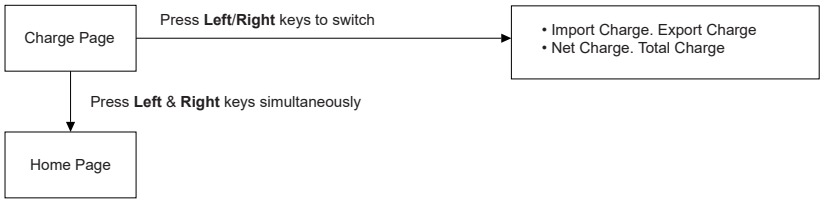


Figure 3-15 Electrical Charge Screen Sequence

Navigate to the C icon on the home screen and press **OK** to enter the Electrical Charge screen.

3.5.1 Import/Export Charge Subscreen

To access the import/export charge readings from the Charge screen, press either the **Left** or **Right** key to navigate to the Import/Export Charge subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

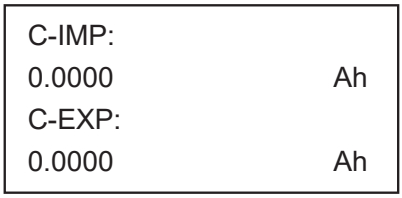


Figure 3-16 Import/Export Charge Subscreen

Import charge (C-IMP) refers to the electric charges while power is flowing to the facility from the grid, and export charge (C-EXP) refers to the electric charges while power is flowing out from the facility back to the grid.

3.5.2 Net/Total Charge Subscreen

To access the net energy and total energy readings from the Energy screen, press either the **Left** or **Right** key to navigate to the Net/Total Charge subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

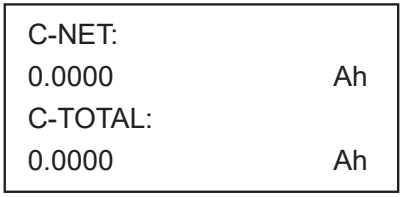


Figure 3-17 Net and Total Charge Subscreen

Net charge (C-NET) is the difference between the electric charges imported and exported over a specific period, while total charge (C-TOTAL) is the sum of imported and exported electric charges over a specific period.

3.6 Information Screen

The AcuDC 300 Info screen contains details about the device and can be accessed directly from the display screen. It includes details about the manufacturer, model, hardware version, firmware release and other info. For more details on the information screen, please refer to Chapter 4.6.9.

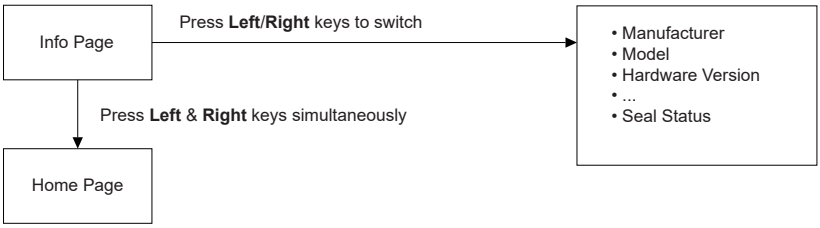


Figure 3-18 Info Screen Sequence

Navigate to the 

icon on the home screen and press **OK** to enter the Information screen.

3.6.1 Manufacturer Subscreen

To access the manufacturer information from the Info screen, press either the **Left** or **Right** key to navigate to the Manufacturer subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

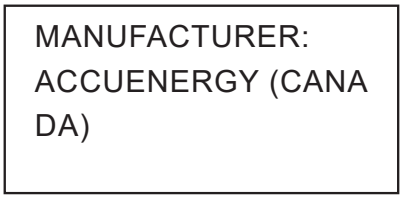


Figure 3-19 Manufacturer Info Subscreen

3.6.2 Model Subscreen

To access the model details from the Info screen, press either the **Left** or **Right** key to navigate to the Model subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

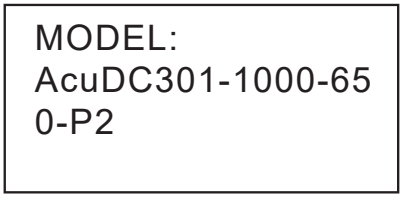


Figure 3-20 Model Info Subscreen

3.6.3 Hardware Version Subscreen

To access the hardware version details from the Info screen, press either the **Left** or **Right** key to navigate to the Hardware Version subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

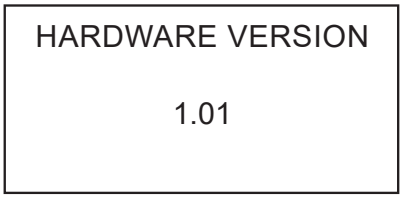


Figure 3-21 Hardware Version Info Subscreen

3.6.4 Firmware Version Subscreen

To access the firmware version details from the Info screen, press either the **Left** or **Right** key to navigate to the Firmware Version subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

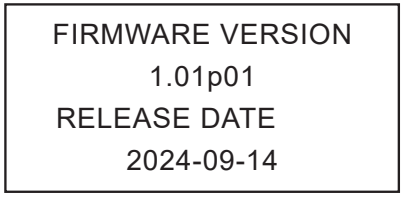


Figure 3-22 Firmware Version Info Subscreen

3.6.5 Serial Number Subscreen

To access the serial number (S/N) information from the Info screen, press either the **Left** or **Right** key to navigate to the S/N subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

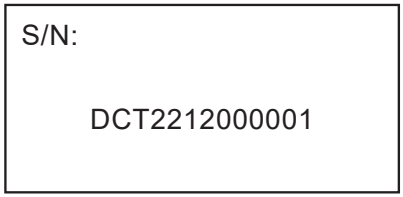


Figure 3-23 Serial Number Subscreen

3.6.6 MAC Address Subscreen

To access the MAC address details from the Info screen, press either the **Left** or **Right** key to navigate to the MAC Address subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

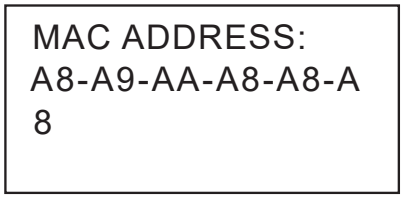


Figure 3-24 MAC Address Subscreen

3.6.7 Date & Time Subscreen

To access the date and time information from the Info screen, press either the **Left** or **Right** key to navigate to the Date & Time subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

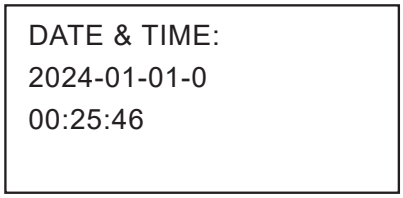


Figure 3-25 Date & Time Info Subscreen

3.6.8 Run Time Subscreen

The run time is how long the meter has been running since it was first powered up.

To access the run time readings from the Info screen, press either the **Left** or **Right** key to navigate to the Run Time subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

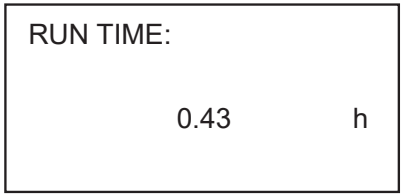


Figure 3-26 Run Time Subscreen

3.6.9 Load Time Subscreen

To access the load time readings from the Info screen, press either the **Left** or **Right** key to navigate to the Load Time subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

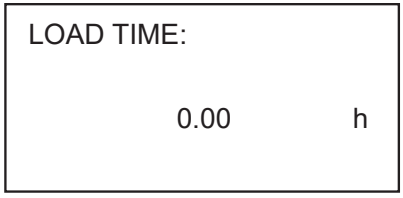


Figure 3-27 Load Time Subscreen

3.6.10 Seal Status Subscreen

The load run time is how long the meter and been running with an active load connected to it.

To access the seal status from the Info screen, press either the **Left** or **Right** key to navigate to the Seal Status subscreen. To return to the previous screen press the **Left** and **Right** keys simultaneously.

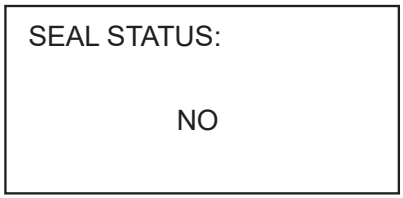


Figure 3-28 Seal Status Subscreen

3.7 Meter Settings Screen

The AcuDC 300 DC meter settings can be accessed from the display screen. It includes the communication, demand, energy, cable loss, clear, reset, and other configurable settings. For comprehensive information on system settings, please refer to Chapter 4.6.

If the seal status is enabled, certain settings and functions cannot be configured or modified, see Chapter 2.4 for more details.

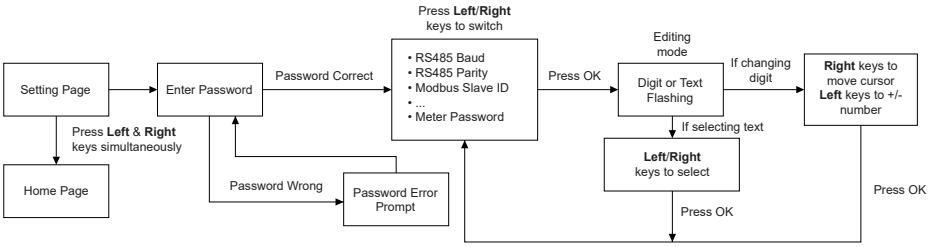


Figure 3-29 Setting Screen Sequence

Navigate to the SET icon on the home screen and press **OK** to enter the Meter Settings screen. Before accessing the AcuDC 300 Meter Settings screen, the user will be prompted to enter a four-digit password to prevent unauthorized access.

To enter the password, start by pressing the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to navigate to the next adjacent digit. Continue until the

numbers of all four digits have been selected. Push the **OK** key to confirm the password input.

By default, the AcuDC 300 password is set to **0000**. The following figure shows the password input screen.

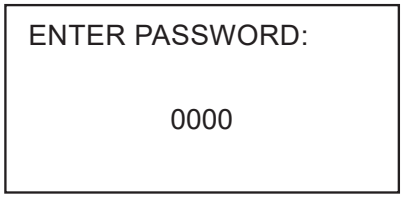


Figure 3-30 Password Input Screen

After entering the Meter Settings screen, the user can use the **Left** and **Right** keys to navigate through different subscreens.

3.7.1 Communication Settings

Baud Rate

The default baud rate for the AcuDC 300 is 19,200 bits per second. Users can change the baud rate (bps) to one of the following options: 2,400, 4800, 9,600, 19,200, 38,400, 57,600, 76,800, or 115,200.

The user can press the **OK** key to start changing the baud rate. Use the **Left** and **Right** key to cycle through the baud rate options until the desired number is displayed. Push the **OK** key again to confirm selection.

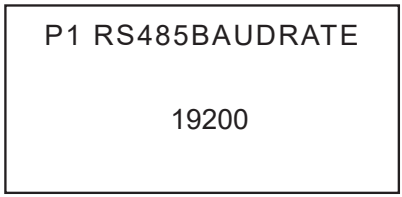


Figure 3-31 RS485 BPS Subscreen

RS485 Parity

The default RS485 parity for the AcuDC 300 is set to None1. Users can change the parity type to one of the following options: None1, None2, Odd, or Even.

The user can press the **OK** key to change the RS485 parity. Use the **Left** and **Right** keys to cycle through parity options. Push the **OK** key to confirm the selection.

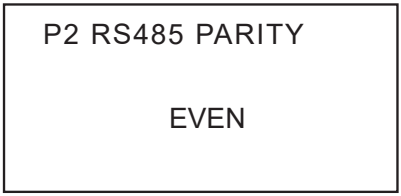


Figure 3-32 RS485 Parity Subscreen

Modbus Slave ID

The Modbus slave ID can be set within the range from 001 to 247. The default slave ID is 001.

Press the **OK** key to change the Modbus slave ID, press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until the numbers of all three digits have been selected. Push the **OK** key to confirm the input.

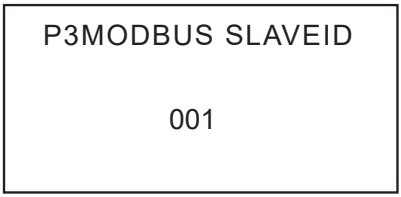


Figure 3-33 Modbus Slave ID Subscreen

Modbus RTU Enable Mode

To toggle the Modbus RTU on or off, the user can press the **OK** key to change the setting. Use the **Left** and **Right** keys to switch between the Enable and Disable options. Push the **OK** key to confirm selection. By default, the Modbus RTU is enabled.

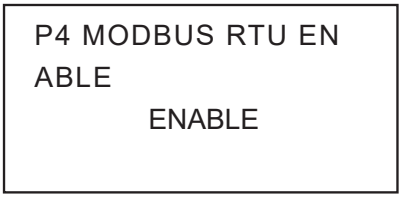


Figure 3-34 Modbus RTU Subscreen

Modbus TCP Enable Mode

To toggle the Modbus TCP on or off, the user can press the **OK** key to change the setting. Use the **Left** and **Right** keys to switch between the Enable and Disable options. Push the **OK** key to confirm the selection. By default, the Modbus TCP is enabled.

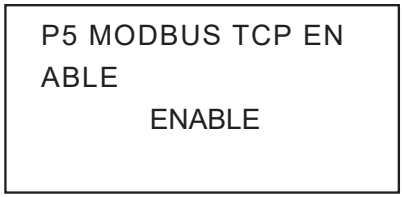


Figure 3-35 Modbus TCP Subscreen

Modbus TCP Port

AcuDC 300 allows users to configure the TCP port number with a range from 00001 to 65534. By default, the port number is 00502.

Press the **OK** key to change the Modbus TCP port, press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until the numbers of all five digits have been selected. Push the **OK** key to confirm the input.

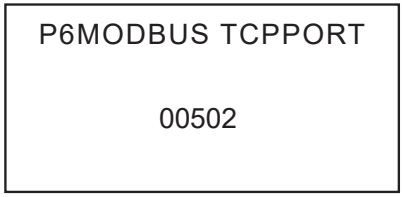


Figure 3-36 Modbus TCP Port Subscreen

3.7.2 Demand Settings

Demand Method

To toggle the Demand Method options, the user can press the **Right** key to switch between the Sliding and Fixed options. Push the **OK** key to confirm selection. By default, the Demand Method is Sliding.

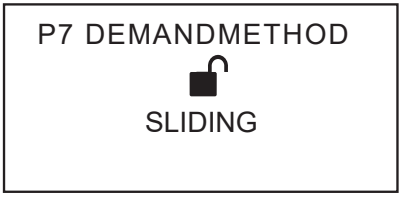


Figure 3-37 Demand Method Subscreen

Sliding window and fixed window are two different ways to calculate demand. The sliding window method requires two parameters, the demand window time and the demand update period. For example, if the demand window time is set to 15 min and the demand update period is set to 1 min, the meter will calculate the average demand for the past 15 min, and update the demand value every 1 min. Note that the demand update period must be set to less than or equal to the demand window time.

The fixed window method only requires the demand update time. The meter divides the total time into fixed, non-overlapping intervals based on the demand update time, and average demand will be calculated within those intervals independently.

Demand Window Time

Push the **OK** key to change the Demand Window Time, and press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until the numbers of all two digits have been selected. Push the **OK** key to confirm the input. The demand window time range can be set between 01 to 30 minutes. By default, the demand window time is set to 15 minutes.

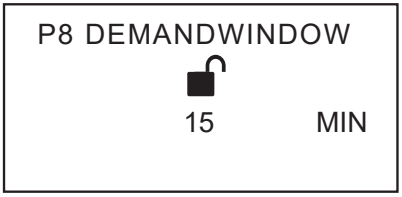


Figure 3-38 Demand Window Time Method Subscreen

Demand Update Period

Push the **OK** key to change the Demand Update Period, and press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until the numbers of all two digits have been selected. Push the **OK** key to confirm

the input. The demand update period range can be set between 01 to 30 minutes. By default, the demand update period is set to 1 minute.

Updating the demand update period will have no effect when demand method is set to Fixed.

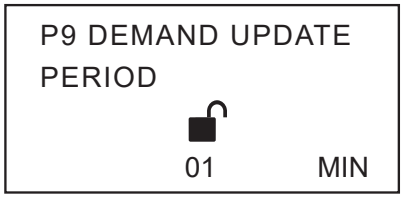


Figure 3-39 Demand Update Period Subscreen

3.7.3 Energy Settings

Energy Pulse Parameter

Energy pulse is an electrical signal sent from the meter to represent a fixed amount of energy consumed. The more energy consumed, the more pulses will be sent. AcuDC 300 can emit pulses according to the Import Energy, Export Energy, Net Energy and Total Energy. By default, the energy pulse is set to None.

Push the **OK** key to change the Energy Pulse Parameter, the user can then press the **Left** and **Right** keys to cycle through the energy pulse options. Push the **OK** key to confirm selection.

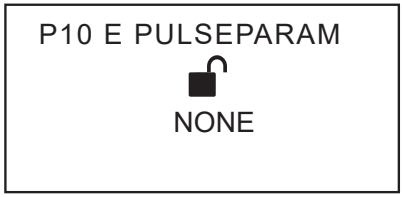


Figure 3-40 Energy Pulse Parameter Subscreen

Energy Pulse Constant

The Energy Pulse Constant configures how many pulses will be sent per kWh of energy consumed.

Push the **OK** key to change the Energy Pulse Constant, press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until the numbers of the digits have been selected. Push the **OK** key to confirm the input. The energy pulse constant range can be set between 0.1 to 100000.000 imp/kWh. By default, the demand update period is set to 1 imp/kWh.

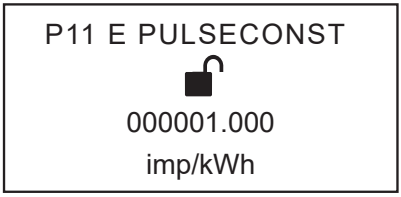


Figure 3-41 Energy Pulse Constant Subscreen

3.7.4 Other Settings

Backlit Off Delay

The Backlit Off Delay setting determines how long the display backlight remains on when the meter is inactive before automatically diming the display.

Press the **OK** key to change the Backlit Off Delay, press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until the numbers of all three digits have been selected. Push the **OK** key to confirm the input. The backlit off delay range can be set between 001 to 030 minutes. By default, the demand update period is set to 001 minute.

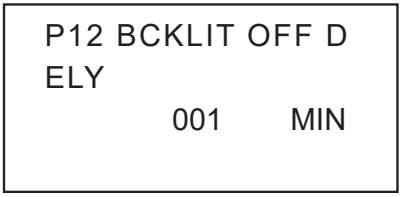


Figure 3-42 Backlight OFF Delay Subscreen

3.7.5 Cable Loss Settings

Cable Loss Compensation

Cable resistance can lead to inaccuracies in energy measurements, as a portion of the energy will be dissipated as heat. For billing applications such as EV charging stations, it is important to ensure the customer is only billed for the amount that is delivered. The AcuDC 300 compensates for cable losses using its resistance, ensuring accurate and reliable measurements.

To toggle the Cable Loss Compensation on or off, the user can press the **Right** key to switch between the Enable and Disable options. Push the **OK** key to confirm selection. By default, the cable loss compensation is set to Disable.

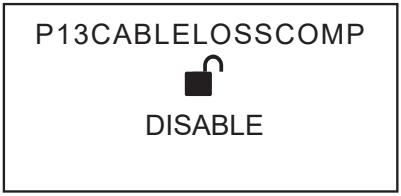


Figure 3-43 Cable Loss Compensation Subscreen

Cable Resistance

The cable resistance can be set within a range of 0.0000 to 6.5535 Ω, with the default value set to 0 Ω.

To change the cable resistance, press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until the numbers of all the digits have been selected. Push the **OK** key to confirm the input.

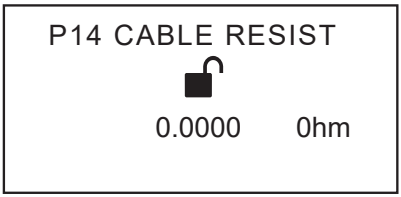


Figure 3-44 Cable Resistance Setting Subscreen

3.7.6 Clear and Reset Function

Clear Energy

The Clear Energy setting allows the user to remove all energy data from the AcuDC 300 DC meter. The user can press the **Left** and **Right** keys to switch between the Yes and No options. Select Yes to delete all energy data. Push the **OK** key to confirm selection.

ALERT: All energy data will be permanently removed from the AcuDC 300 DC meter.

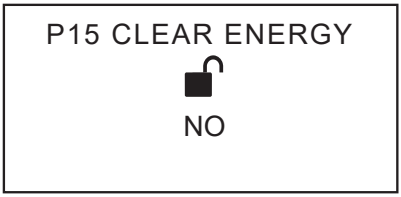


Figure 3-45 Clear Energy Subscreen

Clear Electrical Charge

The Clear Electrical Charge setting allows the user to remove all charge data from the AcuDC 300 DC meter. The user can press the **Left** and **Right** keys to switch between the Yes and No options. Select Yes to delete all charge data. Push the **OK** key to confirm selection.

ALERT: All electrical charge data will be permanently removed from the AcuDC 300 DC meter.

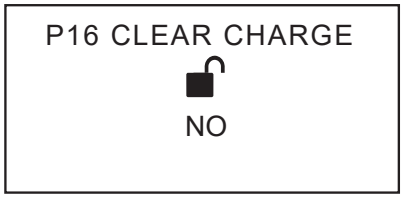


Figure 3-46 Clear Charge Subscreen

Clear Demand

The Clear Demand setting allows the user to remove all demand data from the AcuDC 300 DC meter. The user can press the **Left** and **Right** keys to switch between the Yes and No options. Select Yes to delete all demand data. Push the **OK** key to confirm selection.

ALERT: All demand data will be permanently removed from the AcuDC 300 DC meter.

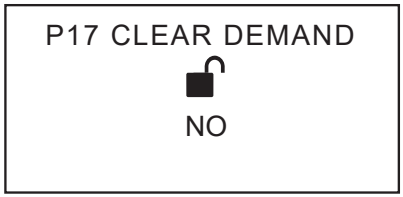


Figure 3-47 Clear Demand Subscreen

Clear Max/Min

The Clear Max/Min setting allows the user to remove all maximum and minimum data from the AcuDC 300 DC meter. The user can press the **Left** and **Right** keys to switch between the Yes and No options. Select Yes to delete all max/min data. Push the OK key to confirm selection.

ALERT: All maximum and minimum data will be permanently removed from the AcuDC 300 DC meter.

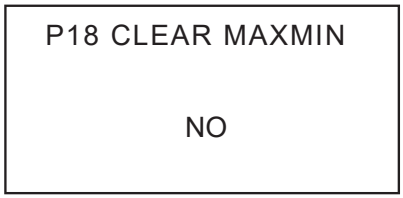


Figure 3-48 Clear Max/Min Subscreen

Clear Runtime

The Clear Runtime setting allows the user to remove all runtime data from the AcuDC 300 DC meter. The user can press the **Left** and **Right** keys to switch between the Yes and No options. Select Yes to delete all run time data. Push the **OK** key to confirm selection.

ALERT: All run time data will be permanently removed from the AcuDC 300 DC meter.

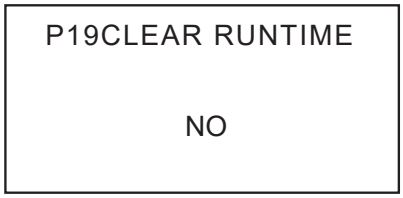


Figure 3-49 Clear Runtime Subscreen

Clear Load Time

The Clear Load Time setting allows the user to remove all load time data from the AcuDC 300 DC meter. The user can press the **Left** and **Right** keys to switch between the Yes and No options. Select Yes to delete all load time data. Push the **OK** key to confirm selection.

ALERT: All load time data will be permanently removed from the AcuDC 300 DC meter.

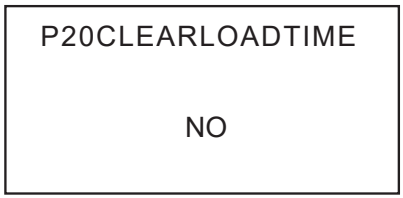


Figure 3-50 Clear Load Time Subscreen

Clear Data Logger 1

The Clear Data Logger 1 setting allows the user to remove all stored information from the AcuDC 300 DC meter data logger 1. The user can press the **Left** and **Right** keys to switch between the Yes and No options. Select Yes to delete all data logger 1 data. Push the **OK** key to confirm selection.

ALERT: All stored data from data logger 1 will be permanently removed from the AcuDC 300 DC meter.

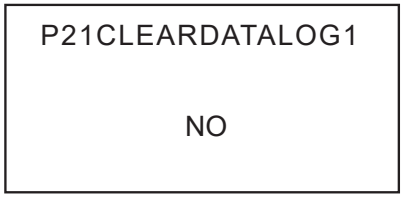


Figure 3-51 Clear Data Logger 1 Subscreen

Clear Data Logger 2

The Clear Data Logger 2 setting allows the user to remove all stored information from the AcuDC 300 DC meter data logger 2. The user can press the **Left** and **Right** keys to switch between the Yes and No options. Select Yes to delete all data logger 2 data. Push the **OK** key to confirm selection.

ALERT: All stored data from data logger 2 will be permanently removed from the AcuDC 300 DC meter.

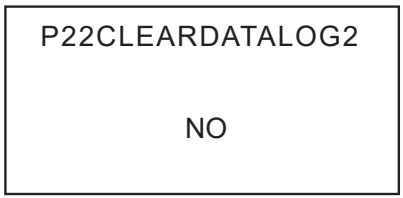


Figure 3-52 Clear Data Logger 2 Subscreen

Clear Data Logger 3

The Clear Data Logger 3 setting allows the user to remove all stored information from the AcuDC 300 DC meter data logger 3. The user can press the **Left** and **Right** keys to switch between the Yes and No options. Select Yes to delete all data logger 3 data. Push the **OK** key to confirm selection.

ALERT: All stored data from data logger 3 will be permanently removed from the AcuDC 300 DC meter.

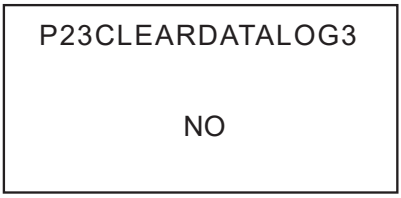


Figure 3-53 Clear Data Logger 3 Subscreen

Clear Data Logger 4

The Clear Data Logger 4 setting allows the user to remove all stored information from the AcuDC 300 DC meter data logger 4. The user can press the **Left** and **Right** keys to switch between the Yes and No options. Select Yes to delete all data logger 4 data. Push the **OK** key to confirm selection.

ALERT: All stored data from data logger 4 will be permanently removed from the AcuDC 300 DC meter.

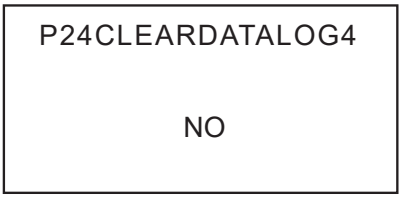


Figure 3-54 Clear Data Logger 4 Subscreen

Factory Reset

The Factory Reset setting allows the user to reset the AcuDC 300 DC meter back to its original default factory settings. The user can press the **Left** and **Right** keys to switch between the Yes and No options. Select Yes to factory reset the AcuDC 300 DC meter. Push the **OK** key to confirm selection.

ALERT: All custom settings will be reset to its factory default and all stored data will be permanently removed from the AcuDC 300 DC meter.

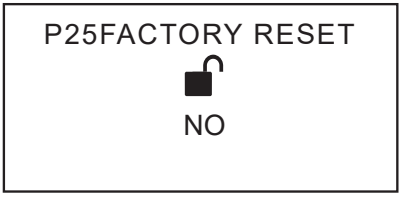


Figure 3-55 Factory Reset Subscreen

Date & Time

Press the **OK** key to change the Meter Date & Time, press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until the numbers of all date and time digits have been selected. Push the **OK** key to confirm the input.

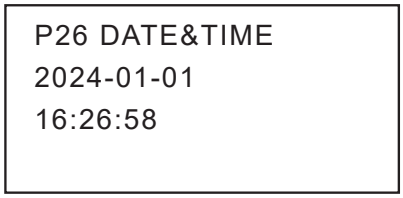


Figure 3-56 Date & Time Setting Subscreen

Reset Password

The Reset Password setting allows the user to set the AcuDC 300 DC meter password to their desired value. Press the **OK** key to change the password, press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until the numbers of all digits have been selected. Push the **OK** key to confirm the input. Password can also be reset using Acuview 2, refer to Chapter 4.6.5.

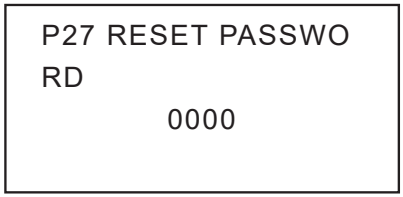


Figure 3-57 AcuDC 300 Reset Password Subscreen

3.8 Network Settings Screen

The AcuDC 300 DC network settings can be accessed from the display screen. It includes the DHCP, IP address, subnet mask, gateway, DNS1, DNS2, and the reset network configuration settings. For comprehensive information on network settings, please refer to Chapter 4.6.1.

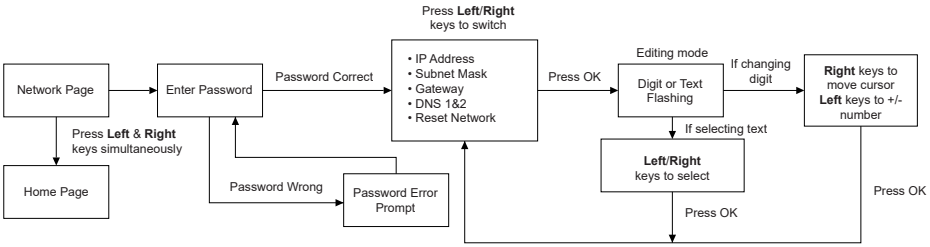


Figure 3-58 Network Setting Screen Sequence

Navigate to the NET icon on the home screen and press **OK** to enter the Network Settings screen.

Before accessing the AcuDC 300 Network Settings screen, the user will be prompted to enter a four-digit password to prevent unauthorized access. See section 3.7 on how to enter the password using the navigation key.

3.8.1 DHCP Subscreen

Press the **OK** key to change the DHCP setting, the user can press the **Left** and **Right** key to switch between the Auto and Manual options. Push the **OK** key to confirm selection. When set to Auto, the meter will automatically assign an IP address. By default, the DHCP is set to Manual.

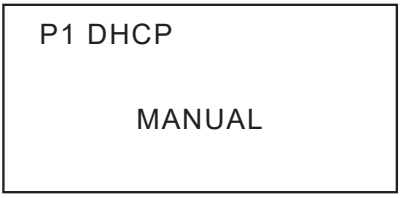


Figure 3-59 DHCP Setting Subscreen

3.8.2 IP Address Subscreen

Push the **OK** key to change the IP address, press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until all digits have been selected. Push the **OK** key to confirm the input. By default, the IP address is set to 192.168.1.254.

Figure 3-60 IP Address Configuration

3.8.3 Subnet Mask Subscreen

Push the **OK** key to change the Subnet Mask, press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until all digits have been selected. Push the **OK** key to confirm the input. By default, the Subnet Mask is set to 255.255.255.000.

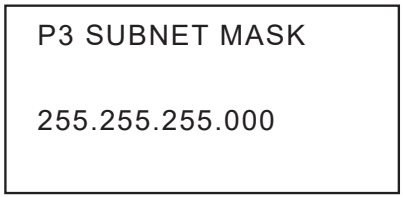


Figure 3-61 Subnet Mask Configuration

3.8.4 Gateway Subscreen

Push the **OK** key to change the Gateway, press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until all digits have been selected. Push the **OK** key to confirm the input. By default, the gateway is set to 192.168.001.001.

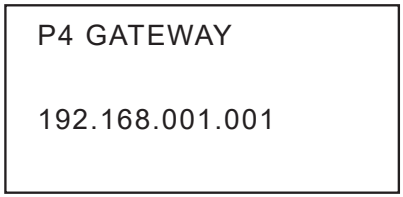


Figure 3-62 Gateway Configuration

3.8.5 Preferred DNS Server (DNS1) Subscreen

Push the **OK** key to change the DNS1, press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until all digits have been selected. Push the **OK** key to confirm the input. By default, the DNS1 is set to 008.008.008.008.

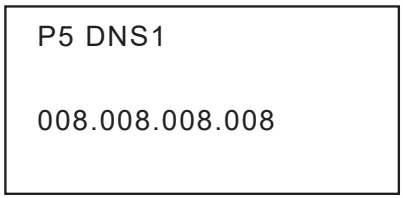


Figure 3-63 DNS 1 Address Configuration

3.8.6 Alternate DNS Server (DNS2) Subscreen

Push the **OK** key to change the DNS2, press the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to cycle to the next adjacent digit. Continue until all digits have been selected. Push the **OK** key to confirm the input. By default, the DNS2 is set to 008.008.004.004.

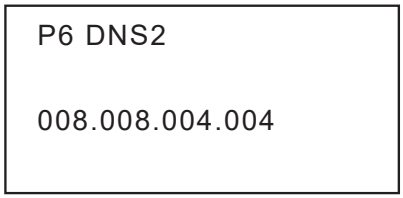


Figure 3-64 DNS 2 Address Configuration

3.8.7 Reset Network Subscreen

The Reset Network setting allows the user to reset the AcuDC 300 DC meter network back to its default setting. The user can press the **Left** and **Right** keys to switch between the Yes and No options. Select Yes to reset the network. Push the **OK** key to confirm selection.

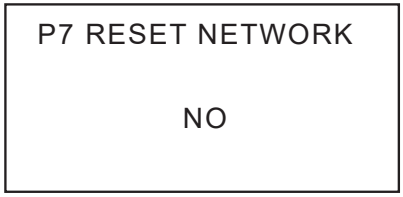


Figure 3-65 Reset Network Subscreen

ALERT: All existing network configurations will be permanently removed from the AcuDC 300 DC meter.

Chapter 4: Advanced Functions and Data Monitoring via Acuview 2

The AcuDC 300 features advanced metering capabilities to measure a multitude of power, energy, and power quality parameters. Some advanced functions are only accessible from the Acuview 2 Meter Data Management Software to access additional information.

4.1 Acuview 2 Initial Setup

The Acuview 2 is a free data management software compatible with Microsoft Windows® operating system to supplement the AcuDC 300 's functionality. It can be used to read and log advanced metering data, as well as configure and view settings at a remote location. This software is free to download at www.accuenergy.com/acuview2.

4.1.1 Launch Acuview 2

With the computer turned on, use your mouse to double-click the Acuview 2 icon on the desktop, or left-click the Start icon from your taskbar to locate and left-click the Acuview 2 icon to launch the Acuview 2 software. The Acuview 2 software will start up and an **Add Connection** window will appear. The **Add Connection** window allows users to either select an existing meter from the list or add a new meter.

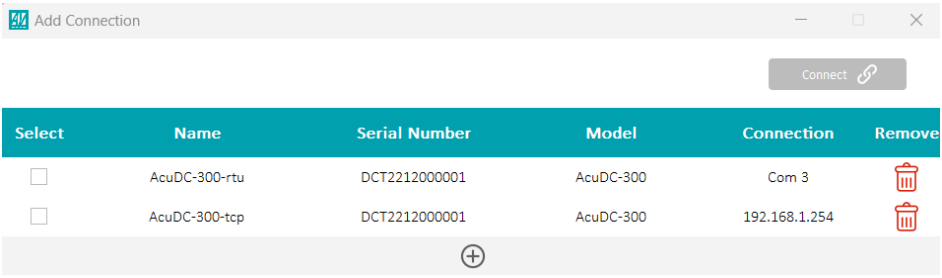


Figure 4-1 Acuview 2 Add Connection

Add a New Meter Connection: Clicking the ⊕ **Add** button allows the **Add Device** panel to appear. The user is required to enter AcuDC 300 information to establish a Modbus RTU or Modbus TCP communication.

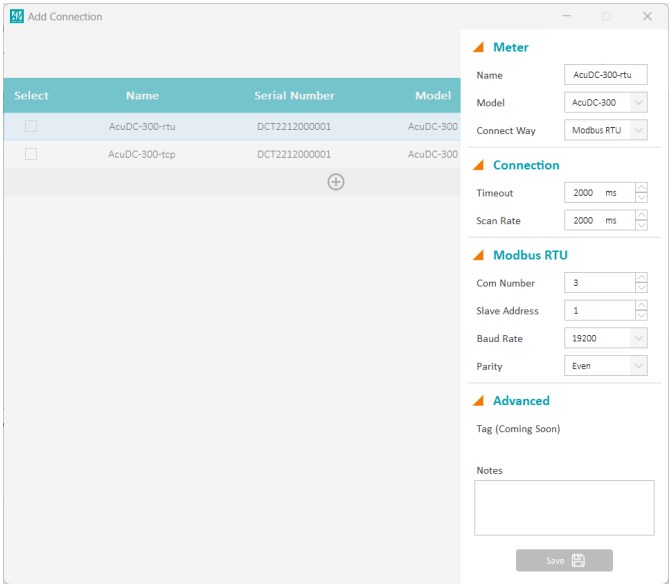


Figure 4-2 Add New AcuDC 300 Panel Using Acuview 2

Name: Customized name for the AcuDC 300 meter.

Model: Select AcuDC 300 as the meter model.

Connect Way: Modbus RTU or Modbus TCP.

Timeout: Specifies when the connection will time out and disconnect if there is no response from the meter after the set time lapses. By default, the timeout is set at 2000 milliseconds (ms).

Scan Rate: Acuview 2 polls from AcuDC 300 every 2000ms by default. The range is between 1000 to 30000ms.

Configure the necessary connection information for either Modbus RTU or Modbus TCP. The connection details are discussed in Chapter 4.1.2 (Modbus RTU) and Chapter 4.1.3 (Modbus TCP). Click the **Save** button after all settings have been completed, and the AcuDC 300 will be successfully added to the list.

4.1.2 Connecting with Modbus RTU

The AcuDC 300 RS485 port can be used to establish a connection to the Acuview 2 through Modbus RTU protocol. This physical communication layer uses a half-duplex, single twisted pair,

two-wire transmission where data travels in one direction at a time. The send (A+) and receive (B-) data signals are shared between the two wires.

Figure 4-1 depicts the wire configuration between the RS485-USB and the AcuDC 300. The AcuDC 300 RS485 port has three terminals, A+ (Positive), B- (Negative), and S (Shield).

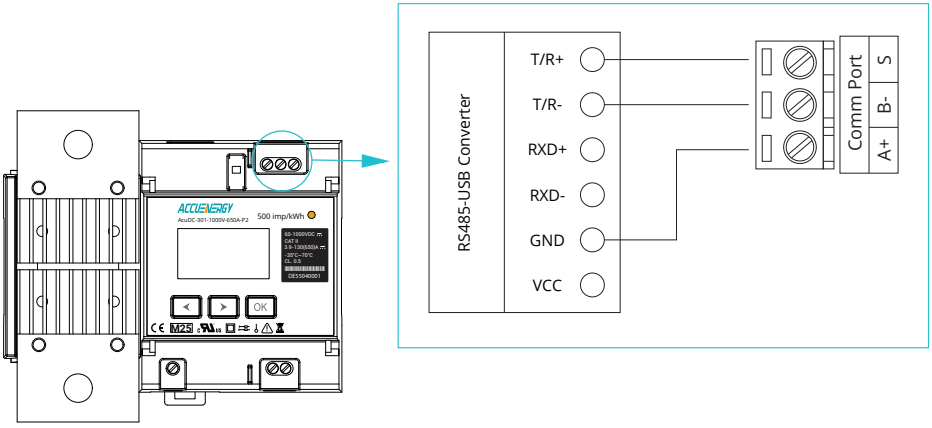


Figure 4-4 RS485-USB Connection to AcuDC 300

After connecting the RS485-to-USB converter to the computer, the COM port must be identified in order to connect to the AcuDC 300.

To assign the COM port,

1. Open the **Device Manager** window on the personal computer.
2. From the list, locate and click **Ports (COM & LPT)** to expand the selection to find the COM port number.

The following figure illustrates that the RS485-to-USB converter has been allocated to COM4.

NOTE: The COM port may be different on each PC. Be sure to identify the correct COM port used by the RS485-to-USB converter.

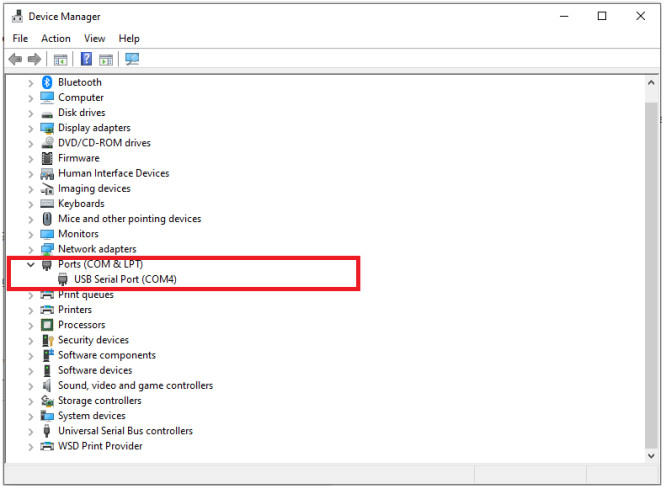


Figure 4-4 COM Port Number Assigned to RS485-to-USB Converter

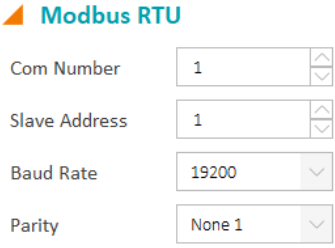


Figure 4-5 Acuview 2 Modbus RTU Connection Setting

Slave Address: Parameter ranges from 1 to 247.

Baud Rate: The rate at which information is transmitted. Select a rate speed from the options of 2,400 bits/s, 4,800 bits/s, 9,600 bits/s, 19,200 bits/s, 38,400 bits/s, 57,600 bits/s, 76,800 bits/s, and 115,200 bits/s.

Parity: Available parameter options for parity are **None1** (no parity, 1 stop bit), **None2 (**no parity, 2 stop bit), **Even**, and **Odd**.

Default Modbus RTU setting:
Modbus Slave Address: 1
COM Number: 1
Baud Rate: 19200
Parity: None1 (no parity, 1 stop bit)

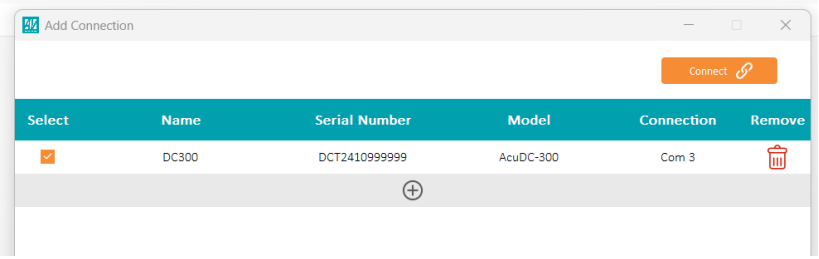


Figure 4-6 Connecting AcuDC 300 to Acuview 2 through Modbus RTU

Once the AcuDC 300 has been successfully added to the Acuview 2, a connection can be established by selecting the AcuDC 300 from the list and clicking on the **Connect** button located in the upper right corner of the window. The AcuDC 300 will automatically connect to the Acuview 2.

4.1.3 Connecting with Modbus TCP

The AcuDC 300 supports connection via Modbus TCP, which utilizes the Ethernet communication interface. To establish a connection using Modbus TCP, ensure that the AcuDC 300 and the computer running Acuview 2 are connected to the same local area network (LAN).

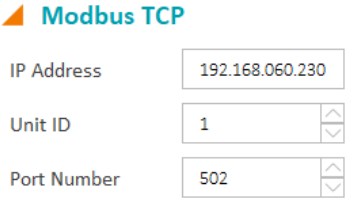


Figure 4-7 Acuview 2 Modbus TCP Connection Setting

Default Modbus TCP settings:
IP Address:192.168.001.254
Unit ID (Slave ID): 1
Port Number: 502

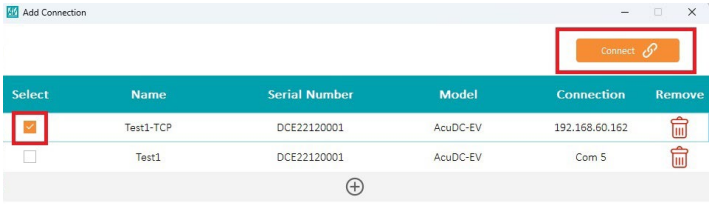


Figure 4-8 Connecting AcuDC 300 to Acuview 2

Once the AcuDC 300 has been successfully added to the Acuview 2, a connection can be established by selecting the AcuDC 300 from the list and clicking on the **Connect** button located in the upper right corner of the window, and the AcuDC 300 will automatically connect to the Acuview 2.

4.2 Basic Analog Measurements

AcuDC 300 lists standard basic analog measurements from Acuview 2. A full summary of these parameters is listed in the following table.

Table 4-1 AcuDC 300 Basic Analog Measurements

Parameter Type	Parameter Name	Resolution	Accuracy
Basic	Voltage	0.001V	0.1%
	Measured Voltage	0.001V	0.1%
	Compensated Voltage	0.001V	0.1%
	Current	0.001A	0.2%
	Power	0.001kW	0.5%
	Voltage Ripple Factor	0.001%	N/A
	Current Ripple Factor	0.001%	N/A

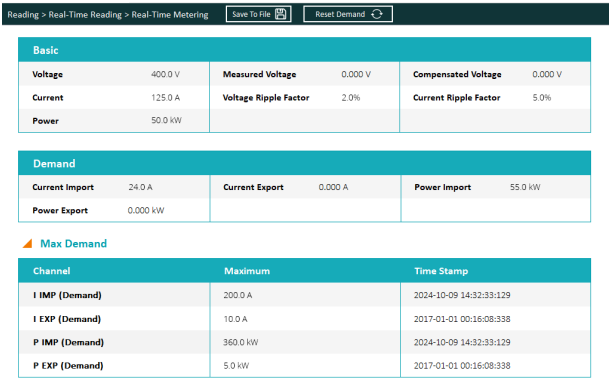


Figure 4-9 Accessing Real-Time Metering Data via Acuview 2

4.3 Demand

AcuDC 300 supports demand measurements. A full summary of these demand parameters is listed in the following table.

Table 4-2 AcuDC 300 Demand Measurements

Parameter Type	Parameter Name	Resolution	Accuracy
Demand	Current Import	0.001A	0.2%
	Current Export	0.001A	0.2%
	Power Import	0.001kW	0.5%
	Power Export	0.001kW	0.5%

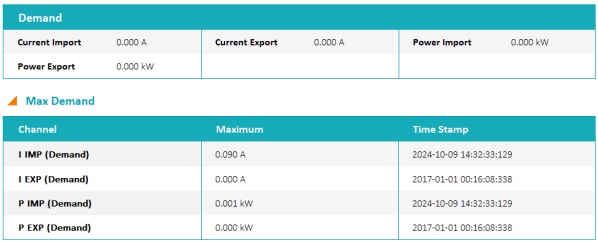


Figure 4-10 Demand Readings

4.4 Energy and Charge

AcuDC 300 supports energy and charge measurements. A full summary of these energy and charge parameters is listed in the following table.

Table 4-3 AcuDC 300 Energy and Charge Measurements

Parameter Type	Parameter Name	Resolution	Accuracy
Energy	Import Energy	0.0001kWh	0.5%
	Export Energy	0.0001kWh	0.5%
	Net Energy	0.0001kWh	0.5%
	Total Energy	0.0001kWh	0.5%
Charge	Import Charge	0.0001Ah	0.5%
	Export Charge	0.0001Ah	0.5%
	Net Charge	0.0001Ah	0.5%
	Total Charge	0.0001Ah	0.5%

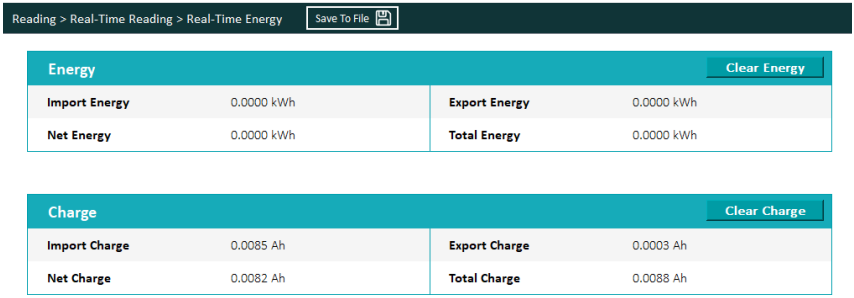


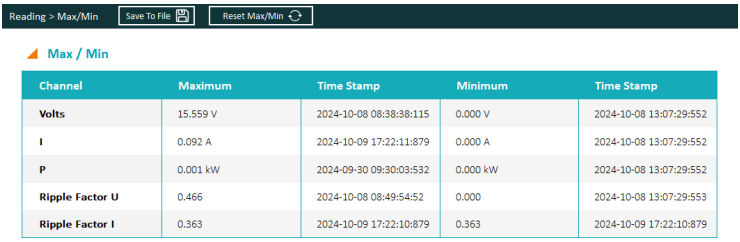
Figure 4-11 Real-Time Energy Readings

Clear Energy: Reset energy readings to 0.

Clear Charge: Reset charge readings to 0.

4.5 Max/Min

AcuDC 300 logs maximum and minimum statistics for all real-time parameters along with a timestamp indicating when they occurred. All data are stored in non-volatile memory, so all statistical information is preserved when the AcuDC 300 loses power or is powered off.



Channel	Maximum	Time Stamp	Minimum	Time Stamp
Volts	15.559 V	2024-10-08 08:38:38:115	0.000 V	2024-10-08 13:07:29:552
I	0.092 A	2024-10-09 17:22:11:879	0.000 A	2024-10-08 13:07:29:552
P	0.001 kW	2024-09-30 09:30:03:532	0.000 kW	2024-10-08 13:07:29:552
Ripple Factor U	0.466	2024-10-08 08:49:54:52	0.000	2024-10-08 13:07:29:553
Ripple Factor I	0.363	2024-10-09 17:22:10:879	0.363	2024-10-09 17:22:10:879

Figure 4-12 Max and Min Readings

Reset Max/Min: Updating both minimum and maximum values with instantaneous readings.

4.6 Meter Settings

The AcuDC 300 settings can be configured from the AcuDC 300 display screen. Modbus registers, or Acuview 2.

To apply any changes made to the AcuDC 300 settings, users must click the **Update** button at the top of the panel.

NOTE: Refer to Chapter 3 to find out how to configure the settings from the display screen and Chapter 5 for Modbus registers.

4.6.1 IP Settings

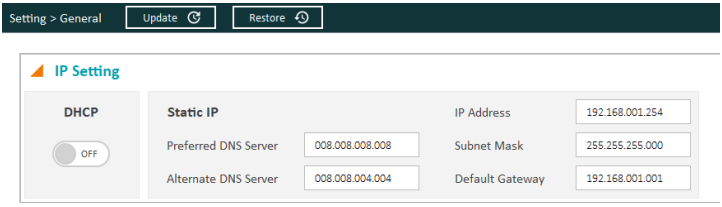


Figure 4-13 IP Settings

DHCP: AcuDC 300 allows users to choose between manually configuring an IP address or automatically assigning one by DHCP.

Preferred DNS Server: Can also be configured from the meter screen (DNS1), refer to Chapter 3.8.5.

Alternate DNS Server: Can also be configured from the meter screen (DNS2), refer to Chapter 3.8.6.

IP Address: When DHCP is ON, the IP address will be configured automatically.

Subnet Mask: Can also be configured from the meter screen, refer to Chapter 3.8.3.

Default Gateway: Can also be configured from the meter screen, refer to Chapter 3.8.4.

4.6.2 Modbus Settings

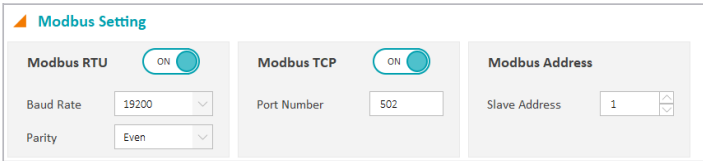


Figure 4-14 Modbus Settings

Protocol: Modbus RTU and/or Modbus TCP.

Address: This is the slave ID, with the default value being 1. The allowable range is from 1 to 247.

Baud Rate: The communication speed measured in bits per second (bits/s). The default value is 19,200, and the range is from 2,400 to 115,200.

Parity: The communication parity by default is set to **None1**, indicating no parity and 1 stop bit.

NOTE: Resetting to the factory default settings will reset the communication channel. The baud rate for the communication channel will be reset to 19,200 and parity will be set to **None1**. The default slave ID address is 1.

4.6.3 Demand Settings

Figure 4-16 Demand Settings

Fixed Window Demand: The demand is calculated by selecting the window interval between 1 to 30 minutes. The AcuDC 300 will calculate and update the demand values at the end of each window interval.

$$Demand_{fix} = \frac{\sum_{t=0}^{window} P_{avg}(t)}{Window\ Interval}$$

Sliding Window Demand: The demand is calculated by selecting the window interval between 1 to 30 minutes. The AcuDC 300 will average the energy accumulated within this period, and the demand value is updated every calculation interval.

$$Demand_{slid}(n) = \frac{\sum_{t=n}^{n+window} P_{avg}(t)}{Window\ Interval}$$

$$Demand_{slid}(n+1) = \frac{\sum_{t=(n+1)}^{(n+1)+window} P_{avg}(t)}{Window\ Interval}$$

Window Interval: The window size used in the demand calculation. The default is 15 minutes, with a range of 1 to 30 minutes.

Calculation Interval: The demand update interval. The default setting is 1 minute, with an adjustable range of 1 to 30 minutes. The update interval should not exceed the window interval.

4.6.4 Cable Loss Compensation Settings

Cable resistance can lead to inaccuracies in energy measurements, as a portion of the energy will be dissipated as heat. For billing applications such as EV charging stations, it is important to ensure the customer is only billed for the amount that is delivered. The AcuDC 300 compensates for cable losses using its resistance, ensuring accurate and reliable measurements.

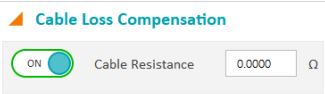


Figure 4-18 Cable Loss Compensation Settings

Cable Resistance: Parameters used in cable loss compensation. The range is from 0Ω to 6.5535Ω.

4.6.5 Security Settings

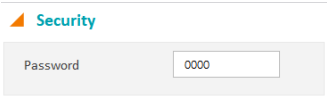


Figure 4-19 Password Settings

To access the AcuDC 300 settings from the Acuview 2 window, the user must enter a four-digit password. By default, the meter password is 0000. This password can also be changed from Acuview 2.

4.6.6 Other Settings

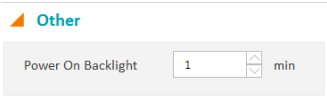


Figure 4-20 Power On Backlight Settings

Backlight: Default setting is 30 minutes, with an adjustable range from 1 to 120 minutes. AcuDC 300 backlight will turn off after the specified time has lapsed.

4.6.7 Device Information

The AcuDC 300 features an AcuDC 300 information page on Acuview 2. Device Information includes:

- Serial Number
- Firmware Version
- Hardware Version
- Function Model
- Voltage Input
- Current Input
- Power Supply
- Mac Address
- Release Date

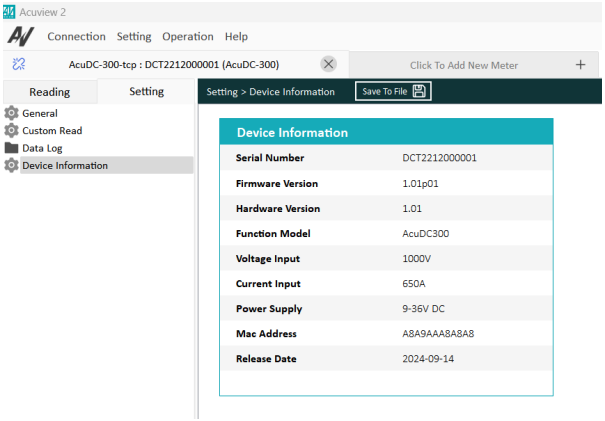


Figure 4-21 Acuview 2 Device Information

4.7 Time & Date Configuration

The time and date on AcuDC 300 can be configured on Acuview 2 or by writing to the Modbus registers. Refer to Chapter 5 for more details.

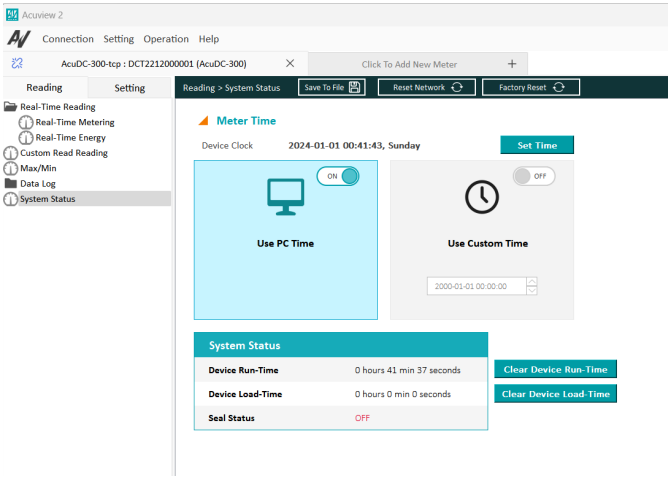


Figure 4-22 AcuDC 300 Time Configuration

Use PC Time: Synchronize it with the internal system clock from the user's PC.

Use Custom Time: Allows the user to manually set the time on AcuDC 300.

Once an option is selected, click the **Set Time** button to confirm the changes.

NOTE: The AcuDC 300 will retain its time settings when powered off for up to three days. After the time period has lapsed, it will revert to the default time.

4.8 Data Logging

The AcuDC 300 includes a data logging feature where data is stored onto its built-in 16MB internal memory. Users can read and pull the timestamped data from memory to monitor the exact time each record was logged.

4.8.1 Data Log Setting

The AcuDC 300 has four data logs available where each log setting can be individually and independently programmed. This allows each data log to monitor different types of parameters, where the user can program up to 30 parameters for Data Log 1, Data Log 2, and Data Log 3 respectively. For Data Log 4, up to 11 parameters can be programmed.

Users can select and configure the data logging parameters from Acuview 2. A full summary of data log parameters is listed in the following table.

Table 4-4 AcuDC 300 Data Log Parameters

Parameter Type	Data Type	Parameter Name
Real-Time Metering	Float 32 Int 16	Volts
		Current
		Power
		V Ripple Factor
		I Ripple Factor
		Demand I Import
		Demand I Export
		Demand P Import
		Demand P Export
		Measured V
		Compensated V

Parameter Type	Data Type	Parameter Name
Energy	Double 64	Import Energy
		Export Energy
		Net Energy
		Total Energy
		Import Charge
		Export Charge
		Net Charge
		Total Charge

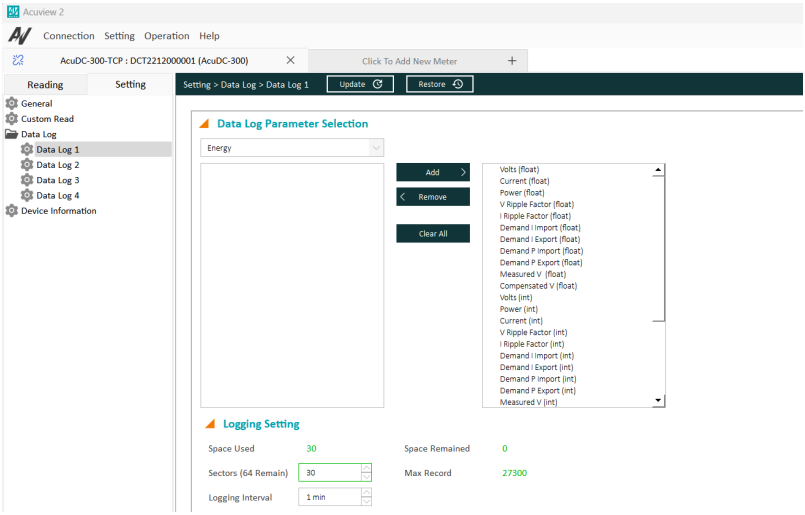


Figure 4-23(a) Data Log 1 Settings

Add: Add the selected parameters.

Remove: Delete the selected parameters.

Clear All: Delete all parameters.

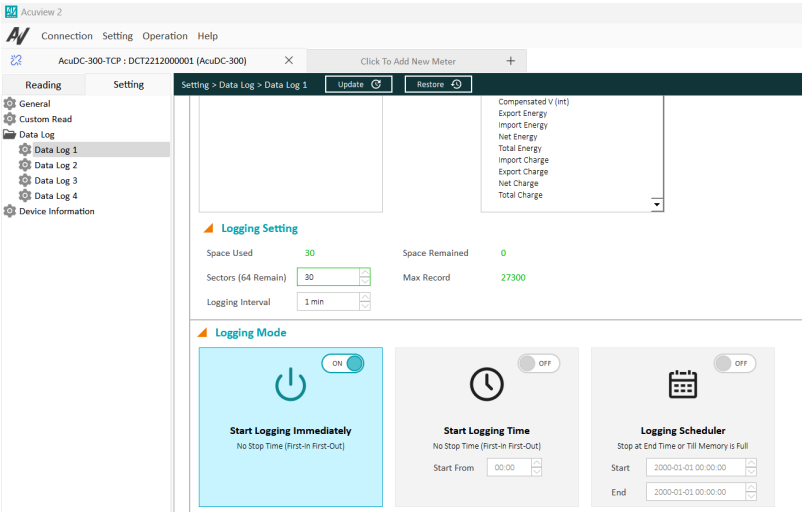


Figure 4-23(b) The Data Log 1 Logging Mode

Memory Usage: As parameters are added to the data log, there is a **Space Allocation** section from Acuview 2 that allows users to monitor memory usage. Data Logs 1, 2, and 3, can accommodate up to 3,145,728 bytes of data, while Data Log 4 can accommodate 1,048,576 bytes of data. Each parameter uses 14 to 144 bytes of memory. The maximum records will depend on the sector percentage configured for the data log. A higher sector percentage will result in more records being available to store in the data log.

Registers & Sectors: Users can set the sector to an appropriate value for Data Logs 1, 2, 3 and 4. The sector range of Data Log 1, 2, 3 is from 1 to 48, which can be freely allocated. The sector range of Data Log 4 is from 1 to 16.

NOTE: The combined total sector number for Data Log 1, 2 and 3 must not exceed 48, and the sector number for Data Log 4 must not exceed 16.

Logging Mode: Users have the option to start logging immediately or select a custom starting time without a stop time. If the memory is full, the first log will be removed to make space for new logs (First-In First-Out strategy). Users can also schedule a start and end time, in which case logging will either stop at the scheduled end time or when the memory is full.

4.8.2 Retrieving Data Log

The data logs can be retrieved directly from Acuview 2 or by Modbus registers (Chapter 5). In Acuview 2, under the **Readings** menu tab, select Data Log. The top of the screen will show an overview of the four data logs which include the maximum number of records for the data log, the number of used records, the record size, the window status, and the first/last timestamp records.

In the number selection field, users can select which data log to retrieve the data. By default, Data Log 1 will appear. Use the menu on the left to switch between Data Log 1, 2, 3, and 4.

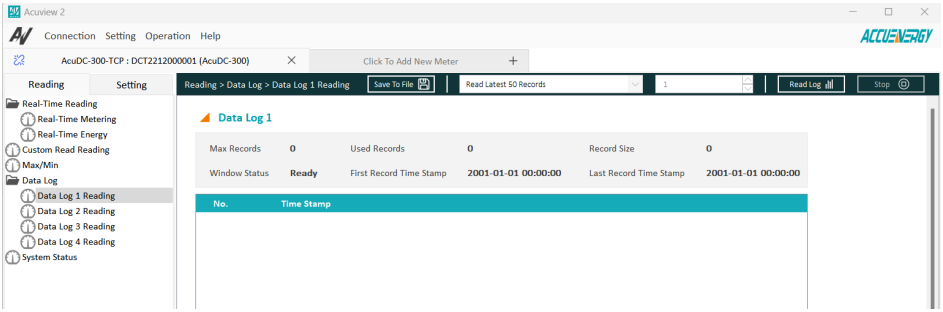


Figure 4-24 The Data Log Reading Window

Read Order: Users can select the number of records, or a specific range of records they wish to view. The following options are available:

- Read the latest 50 records
- Read 1000 records (From Selected Record)
- Read 64000 records (From Selected Record)
- Read 1000 records (From Selected Time)
- Read 64000 records (From Selected Time)

Read Log: Once the data log settings are configured, click on **Read Log** button from the upper right corner of the window, and the data will begin to populate. The time taken for data population will vary depending on the number of records selected to read. The data will be displayed in a tabular format, allowing users to scroll through the data. Figure 4-24 shows the retrieved data.

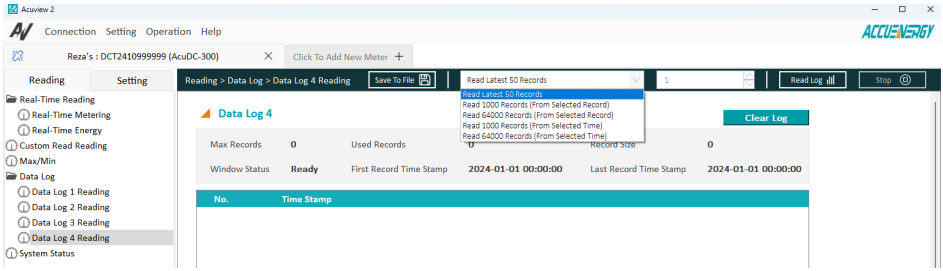


Figure 4-25 Data Log Retrieval Panel

Stop: Exit the data log reading process.

Save to File: Save the data log as a **CSV** file.

4.9 Firmware Updating

4.9.1 Preparation

Download the latest version of the AcuDC 300 firmware. The firmware file usually ends with ".MFEA".

4.9.2 Update the Firmware

1. Click the **Operation** menu tab and select **Firmware Update**.

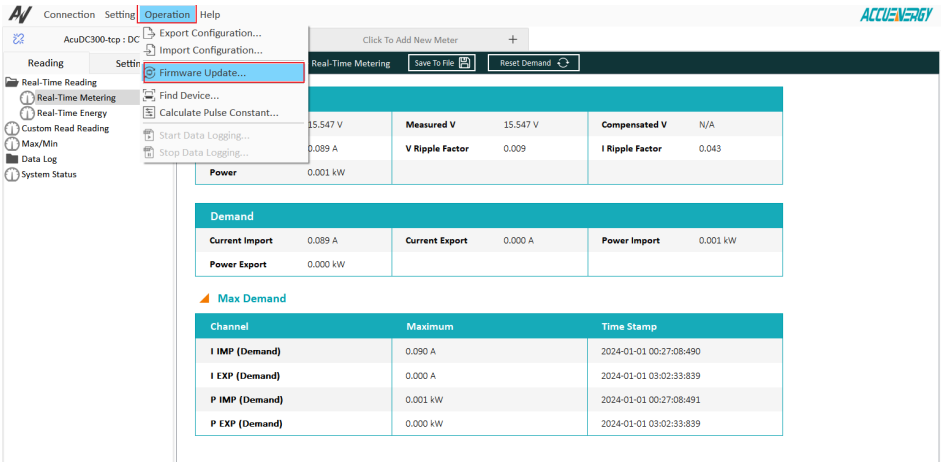


Figure 4-26 Firmware Update Screen

2. Select the firmware file to be updated.

4.9.2.1 Update the Firmware via Modbus RTU

1. Enable **Scan Mode:** In scan mode, the Acuview 2 will scan and display all active serial ports.
2. Select the expected COM port.

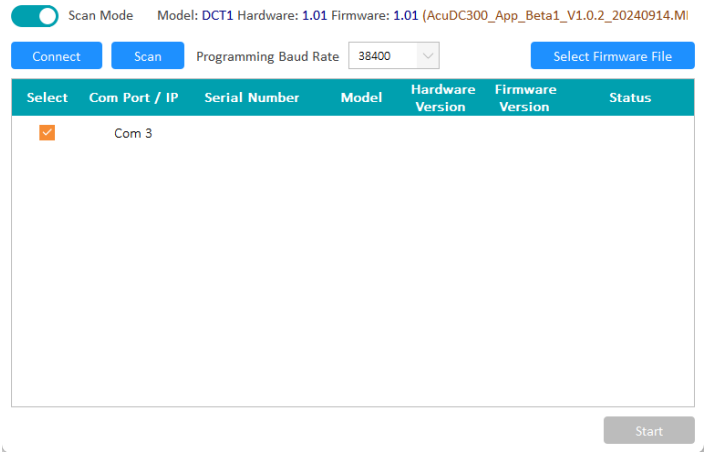


Figure 4-27 Update the Firmware via Modbus RTU

3. Select the COM port and then click **Connect**.
4. In the pop-up menu, configure the slave address, baud rate, and parity according to the Modbus RS485 settings of AcuDC 300, and then click **OK** to confirm.

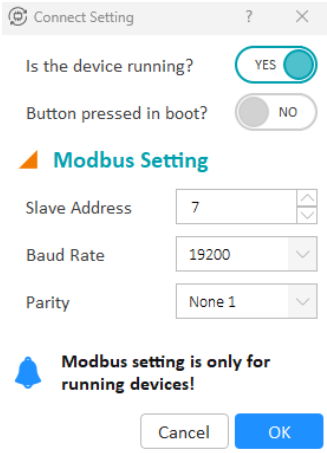


Figure 4-28 Connection Setting Menu

5. If the connection is successfully established, the upgrade will start automatically.

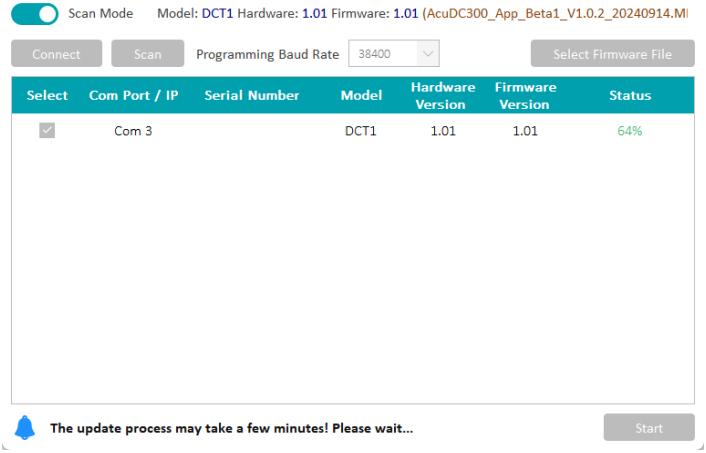


Figure 4-29 Upgrading Screen

4.9.2.2 Update the Firmware via Modbus TCP

1. Disable Scan Mode
2. Select the expected IP

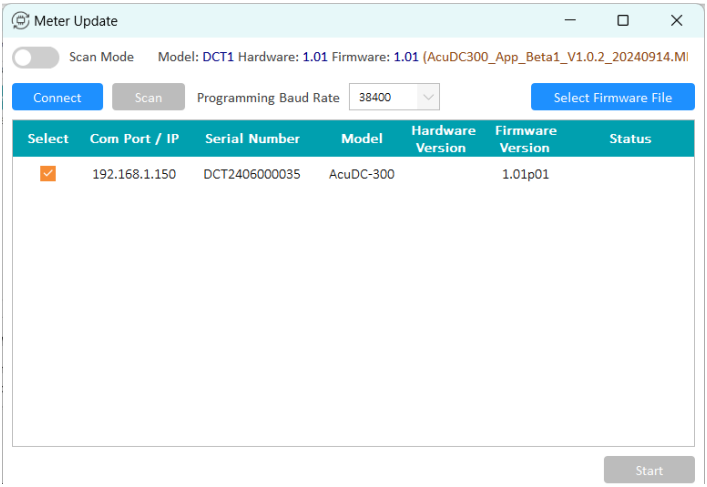


Figure 4-30 Update the Firmware via Modbus TCP

3. Select the device to be updated, then click **Connect**
4. If the connection is successfully established, the upgrade will start automatically.

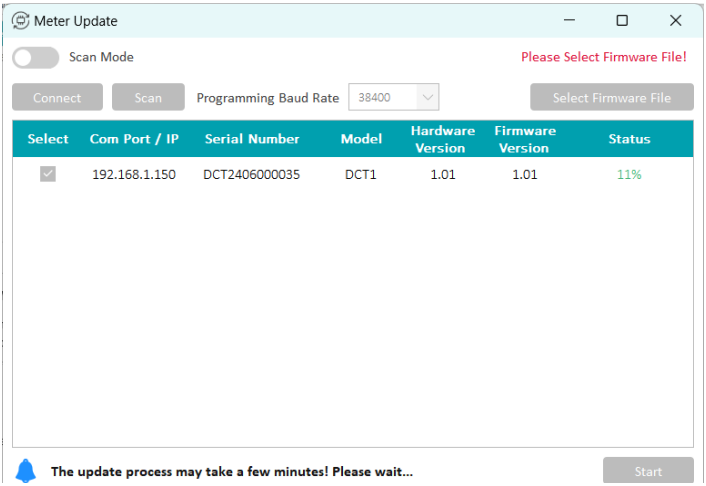


Figure 4-31 Upgrading Screen

5. After the upgrade is complete, AcuDC 300 will restart automatically.

ALERT: Do not disconnect the connection between the computer and AcuDC 300 during the upgrade process. If the upgrade fails, please restart AcuDC 300 and try upgrading again.

Chapter 5: Modbus Communication

The AcuDC 300 built-in Modbus protocol uses register addresses to communicate with other devices on the network.

5.1 Modbus Protocol Introduction

Modbus RTU is a widely used communication protocol which is also used in the AcuDC 300 DC meter. Data format and error checking methods are defined in the Modbus protocol. The half-duplex query and respond mode is adopted in the Modbus protocol. There is only one master device in the communication network, accompanied by slave devices waiting for a query from the master.

Transmission Mode

Modbus RTU mode of transmission defines the data frame structure and the rules for how data is transmitted. The mode is defined in the following table.

Data Frame

Table 5-1 Data Frame Structure

Address Field	Function Field	Data Field	Error Check Field
8-Bits	8-Bits	Nx8-Bits	16-Bits
Coding System		8-Bit Binary	
Start Bit		1	
Data Bits		8	
Parity		None1, None2, ODD, EVEN	
Stop Bit		1 or 2	
Error Checking		CC Check	

Address Field

The data frame contains an 8-bit address field to allow a master device to identify slave devices during the communication process. Valid slave device addresses are within the decimal range of 1 to 247. When communication is initiated between a master and a slave device, a unique slave address is sent by the master by placing it in the message address field. The slave responds by sending its own unique address in the address field to allow the master to identify the corresponding slave device.

Function Field

The function field of a message frame contains 8 bits. Valid codes are within the decimal range of 1 to 255. When a message is sent from a master to a slave device, the function code field specifies the type of action to be performed by the slave device.

Table 5-2 Function Field Codes & Action

Code	Meaning	Action
03 (03H)	Read Data	Obtain current binary value from one or more registers.
16 (10H)	Write Multiple-Register	Place specific binary values into a series of consecutive multiple registers.

Data Field

The data field is constructed using multiple sets of two hexadecimal digits within the range of 00 to FF. The data field of messages sent from a master to slave devices contains additional information that the slave must use to take the action defined by the function field. This can include items such as register addresses, the quantity of items to be handled, and the count of actual data bytes presented in the field. For example, if the master writes to a group of registers in the slave (function code 10H), the data field specifies the starting register, how many registers to write, the count of data bytes to follow in the data field, and the data to be written into the registers.

If no error occurs, the data field of a response from a slave to a master device contains the data requested. If an error occurs, the data field contains an exception code that the master application uses to determine the next action. The data field can be nonexistent (length is 0) in certain types of messages.

Error Check Field

Every message incorporates an error checking field based on the cyclical redundancy check (CRC) method. The CRC field checks the contents of the entire message. It is applied regardless of any parity check method that is used for the individual characters of the message. The CRC field is two bytes long, containing a 16-bit binary value. The CRC value is calculated by the transmitting device and is appended to the message. The receiving device recalculates the CRC value upon the reception of the message, and the result is compared to the calculated value it received in the CRC field. If the two values are not equal, an error will be reported.

The CRC process can follow these steps:

1. The CRC calculation begins by initializing a 16-bit register to all 1s. The CRC is then calculated by sequentially applying every 8-bit of the message to the current register, ignoring the start, stop, and the parity bit.
2. The message will be processed one byte (8-bits) at a time, and every byte will perform an exclusive OR (XOR) operation with the current 16-bit register.
3. The result is then shifted towards the least significant bit (LSB), and a 0 will be filled into the most significant bit (MSB) position.
4. If the LSB equals to 1, the 16-bit register will perform an XOR operation with a predefined value. If the LSB equals to 0, no actions will be taken.
5. This shifting and conditional XOR process will be repeated eight times for each byte (8 bits). After the eighth shift, the next byte will perform an XOR operation with the 16-bit register's current value, and the above process will be repeated for another eight times.
6. Every byte in the message will be processed in the same manner. Once all bytes in the massage are processed, the high-byte and the low-byte in the 16-bit register will be swapped, and the remaining value is the CRC score.
7. When the CRC is appended to the message, the low-byte is appended first, followed by the high-byte.

5.2 Communication Format

Table 5-3 Explanation of Frame

Address	Function	Data Start Register HI	Data Start Register LO	Number of Registers HI	Number of Registers LO	CRC 16 HI	CRC 16 LO
06H	03H	00H	00H	00H	21H	84H	65H

5.2.1 Read Data (Function Code 03H)

This function code 03H is used by Modbus to read the contents of a contiguous block of holding registers in the AcuDC 300 EV Charging meter.

Query

This function allows the master device to obtain the measurement results from the AcuDC 300. Table 5-4 is an example of a reading from the measured data.

Example: Reading of two measured data, voltage and current (V, I), from the AcuDC 300.

The data address of the voltage includes 3000H and 3001H. The data address of terminal one current (I1) includes 3002H and 3003H.

Table 5-4 Data Request Table

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7~32
Address Field	Function Field	Data Start Register HI	Data Start Register LO	Number of Registers HI	Number of Registers LO	CRC Error Check Field
01H	03H	30H	00H	00H	04H	00H

Response

The response includes the AcuDC 300 EV Charging meter address, function code, quantity of data bytes, data, and error checking.

Table 5-5 Data Response Table

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12~32
Address Field	Function Field	Byte Count	Data Field 1 HI	Data Field 1 LO	Data Field 2 HI	Data Field 2 LO	Data Field 3 HI	Data Field 3 LO	Data Field 4 HI	Data Field 4 LO	Error Check Field
01H	03H	08H	42H	EFH	F5H	93H	40H	20H	0AH	4BH	00H

(V=42EFF593H (119.98 V), I1=40200A4BH (2.50063A))

5.2.2 Preset/Reset Multi-Register (Function Code 10H)

This function code 10H is used in Modbus to write a block of contiguous registers in the AcuDC 300, such as system parameters setting and so on.

Example: Modbus can be used to change the slave ID (address: 4110H), enable Modbus RTU (4111H), as well as the Value to 50 (0032H) and 1 (0001H) respectively.

Query

Function code 10H allows the user to modify the contents of a multi-register. Some registers of AcuDC 300 can have their contents changed by this message.

Table 5-6 Data Request Table

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Address Field	Function Field	Data Start Register HI	Data Start Register LO	Number of Registers HI	Number of Registers LO	Byte Count	Data Field 1 HI
01H	10H	41H	10H	00H	02H	04H	00H

Byte 9	Byte 10	Byte 11	Byte 12~32
Data Field 1 LO	Data Field 2 HI	Data Field 2 LO	Error Check Field
32H	00H	01H	00H

Response

The normal response to a preset multi-register request includes the AcuDC 300 address, function code, data start register, the number of registers, and error checking.

Table 5-7 Data Response Table

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7~32
Address Field	Function Field	Data Start Register HI	Data Start Register LO	Number of Registers HI	Number of Registers LO	Error Check Field
01H	10H	41H	10H	00H	02H	00H

5.3 Data Address Table and Application Details

There are several rules to follow when using the AcuDC 300 EV Charging meter.

5.3.1 Data Type

- **word** represents a 16-bit unsigned integer, using one data address and occupying 2 bytes of memory. Its range spans from 0 to 65535.
- **int16** represents a 16-bit integer, using one data address and occupying 2 bytes of memory. Its range spans from -32768 to 32767.
- **int32** represents a 32-bit integer, using one data address and occupying 4 bytes of memory. Its range spans from -2147483648 to 2147483647.

- **d-word** represents a 32-bit unsigned integer, using two data addresses and occupying 4 bytes of memory. This is organized with the high word at the front and the low word at the end. Its range spans from 0 to 4294967295. The value is calculated as Rx = high word*65536 + low word.
- **Timestamp** represents timestamp using 7 data addresses and occupying 14 bytes of memory, in the format of YY-MM-DD HH:MM:SS:MS.
- **float32** represents a 32-bit single value, using two data addresses and occupying 4 bytes of memory. Its range spans from -1.175494E-38 to 3.402823E+38.
- **double** represents a 64-bit single value, using four data addresses and occupying 8 bytes of memory. Its range spans from - $1.7 \times 10^{(308)}$ to + $1.7 \times 10^{(308)}$.

5.3.2 System Parameter Setting

System parameters determine how the AcuDC 300 operates.

Function code: 03H for reading, 10H for writing.

Data type: word

Table 5-8 System Parameters

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x1000	4096	Meter Password	0 - 9999	0	word	R/W
0x1001	4097	RS485 Baud Rate	2400 - 115200	19200	word	R/W
0x1002	4098	RS485 Parity	0: Even 1: Odd 2: None2 3: None1	0	word	R/W
0x1003	4099	DHCP Enable	0: Manual 1: DHCP	0	word	R/W
0x1004	4100	IP Address 1st Byte (High) IP Address 2nd Byte (Low)	0 ~ 255	192.168.1.254	word	R/W

0x1005	4101	IP Address 3rd Byte (High) IP Address 4th Byte (Low)	0 ~ 255		word	R/W
0x1006	4102	Subnet Mask 1st Byte (High) Subnet Mask 2nd Byte (Low)	0 ~ 255	255.255.255.0	word	R/W
0x1007	4103	Subnet Mask 3rd Byte (High) Subnet Mask 4th Byte (Low)	0 ~ 255		word	R/W
0x1008	4104	Gateway 1st Byte (High) Gateway 2nd Byte (Low)	0 ~ 255	192.168.1.1	word	R/W
0x1009	4105	Gateway 3rd Byte (High) Gateway 4th Byte (Low)	0 ~ 255		word	R/W
0x100A	4106	DNS Primary Server 1st Byte (High) DNS Primary Server 2nd Byte (Low)	0 ~ 255	8.8.8.8	word	R/W
0x100B	4107	DNS Primary Server 3rd Byte (High) DNS Primary Server 4th Byte (Low)	0 ~ 255		word	R/W
0x100C	4108	DNS Secondary Server 1st Byte (High) DNS Secondary Server 2nd Byte (Low)	0 ~ 255	8.8.4.4	word	R/W
0x100D	4109	DNS Secondary Server 3rd Byte (High) DNS Secondary Server 4th Byte (Low)	0 ~ 255		word	R/W
0x100E	4110	Modbus Slave ID	1-247, used for both Modbus RTU and TCP	1	word	R/W
0x100F	4111	Modbus RTU Enable	0: Disable 1: Enable	1	word	R/W
0x1010	4112	Modbus TCP Enable	0: Disable 1: Enable	1	word	R/W

0x1011	4113	Modbus TCP Port	1 - 65534	502	word	R/W
0x1012	4114	PT1	Fixed as 1000 for now	1000	word	R
0x1013	4115	PT2	Fixed as 1000 for now	1000	word	R
0x1014	4116	CT1	Fixed as 650A	650	word	R
0x1015	4117	CT2	Fixed as 18mV	18	word	R
0x1016	4118	Demand Calculation Method	0: Fixed block 1: Sliding block	1	word	R/W
0x1017	4119	Demand Window Time	1 ~ 30	15	word	R/W
0x1018	4120	Demand Update Period	1 ~ 30	1	word	R/W
0x1019	4121	Energy Pulse Parameter	0: None 1: Import Energy 2: Export Energy 3: NET Energy 4: TOTAL Energy 2	0	word	R/W
0x101A ~ 0x101B	4122 ~ 4123	Energy Pulse Constant	0.1 - 100000.000	1	word	R/W
0x101C	4124	Backlight Time Reading Type	0 - 120	1	word	R/W
0x101D	4125	Seal Status	Sealed:0x0A	0	word	R
0x101E	4126	Device Run Time (High 16 Bits)	U-int in second		word	R/W
0x101F	4127	Device Run Time (Low 16 Bits)			word	R/W
0x1020-	4128	Device Load Time (High 16 Bits)	U-int in second		word	R/W
0x1021	4129	Device Load Time (Low 16 Bits)			word	R/W
0x1022	4130	Enable Cable Loss Compensation	0: Disable 1: Enable	0	word	R/W
0x1023	4131	Cable Resistance	0 ~ 65535(in 0.0001Ω)	0	Word	R/W

0x2000	8192	Clear Energy	0: None 1: Clearing	0	word	R/W
0x2001	8193	Clear Charge	0: None 1: Clearing	0	word	R/W
0x2002	8194	Clear Demand	0: None 1: Clearing	0	Word	R/W
0x2003	8195	Clear Max/Min	0: None 1: Clearing	0	word	R/W
0x2004	8196	Clear Device Run Time	0: None 1: Clearing	0	word	R/W
0x2005	8197	Clear Load Time	0: None 1: Clearing	0	word	R/W
0x2006	8198	Factory Reset	0: None 1: Resetting	0	word	R/W
0x2007	8199	Network Reset	0: None 1: Resetting	0	word	R/W

5.3.3 System Info

System Info includes detail about the firmware version.

Function code: 03H for reading, 10H for writing.

Data type: word

Table 5-9 System Status Parameters

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0xF000 ~ 0xF001	61440 ~ 61441	Firmware Version	In the format x.yz (e.g., 1.01)	Determined by firmware	N/A	R
0xF002 ~ 0xF004	61442 ~ 61444	Firmware Release Date	In the format YYMMDD (e.g. 221228)	Determined by firmware	N/A	R
0xF005 ~ 0xF005	61445 ~ 61445	Firmware Patch Number	In the format xy (e.g. 01)	Determined by firmware	N/A	R

5.3.4 Date and Time Registers

Function code: 03H for reading, 10H for pre-setting.

Table 5-10 Data and Time Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x103F	4159	Week	1~7	1	word	R/W
0x1040	4160	Year	2000~2099	2024	word	R/W
0x1041	4161	Month	1~12	1	word	R/W
0x1042	4162	Day	1~31	1	word	R/W
0x1043	4163	Hour	0~23	0	word	R/W
0x1044	4164	Minute	0~59	0	word	R/W
0x1045	4165	Second	0~59	0	word	R/W

5.3.5 Real Time Parameters (Int) Registers

Function code: 03H for reading, 10H for pre-setting.

Table 5-11 Real Time Parameters (Int) Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x3200	12800	V (Measured or Compensated)	10x amplification	N/A	int16	R
0x3201	12801	Current	100x amplification	N/A	int16	R
0x3202	12802	Power	100x amplification	N/A	int16	R
0x3203	12803	Voltage Ripple Factor	1000x amplification	N/A	int16	R
0x3204	12804	Current Ripple Factor	1000x amplification	N/A	int16	R
0x3205	12805	Demand Current Import	100x amplification	N/A	int16	R
0x3206	12806	Demand Current Export	100x amplification	N/A	int16	R

0x3207	12807	Demand Power Import	100x amplification	N/A	int16	R
0x3208	12808	Demand Power Export	100x amplification	N/A	int16	R
0x3209	12809	Demand Power Export	10x amplification	N/A	int16	R
0x320A	12810	V (Compensated)	10x amplification	N/A	int16	R

5.3.6 Real Time Parameters (Float) Registers

Function code: 03H for reading, 10H for pre-setting.

Table 5-12 Real Time Parameters (Float) Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x3000 ~ 0x3001	12288 ~ 12289	V (Measured or Compensated)	N/A	N/A	float32	R
0x3002 ~ 0x3003	12290 ~ 12291	Current	N/A	N/A	float32	R
0x3004 ~ 0x3005	12292 ~ 12293	Power	N/A	N/A	float32	R
0x3006 ~ 0x3007	12294 ~ 12295	Voltage Ripple Factor	N/A	N/A	float32	R
0x3008 ~ 0x3009	12296 ~ 12297	Current Ripple Factor	N/A	N/A	float32	R
0x300A ~ 0x300B	12298 ~ 12299	Demand Current Import	N/A	N/A	float32	R
0x300C ~ 0x300D	12300 ~ 12301	Demand Current Export	N/A	N/A	float32	R
0x300E ~ 0x300F	12302 ~ 12303	Demand Power Import	N/A	N/A	float32	R
0x3010 ~ 0x3011	12304 ~ 12305	Demand Power Export	N/A	N/A	float32	R
0x3012 ~ 0x3013	12306 ~ 12307	V (Measured)	N/A	N/A	float32	R
0x3014 ~ 0x3015	12308 ~ 12309	V (Compensated)	N/A	N/A	float32	R

5.3.7 Energy Parameters Registers

Function code: 03H for reading, 10H for pre-setting.

Table 5-13 Energy Parameters Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x4000 ~ 0x4003	16384 ~ 16387	Import Energy	0 ~ 999999999999.999	0	double	R/W
0x4004 ~ 0x4007	16388 ~ 16391	Export Energy	0 ~ 999999999999.999	0	double	R/W
0x4008 ~ 0x400B	16392 ~ 16395	Net Energy	0 ~ 999999999999.999	0	double	R/W
0x400C ~ 0x400F	16396 ~ 16399	Total Energy	0 ~ 999999999999.999	0	double	R/W

5.3.8 Charge Parameters Registers

Function code: 03H for reading, 10H for pre-setting.

Table 5-14 Charge Parameters Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x4010 ~ 0x4013	16400 ~ 16403	Import Charge	0 ~ 999999999999.999	0	double	R/W
0x4014 ~ 0x4017	16404 ~ 16407	Export Charge	0 ~ 999999999999.999	0	double	R/W
0x4018 ~ 0x401B	16408 ~ 16411	Net Charge	0 ~ 999999999999.999	0	double	R/W
0x401C ~ 0x401F	16412 ~ 16415	Total Charge	0 ~ 999999999999.999	0	double	R/W

5.3.9 Max/Min Parameters Registers

Function code: 03H for reading.

Table 5-15 Max/Min Parameters Registers

System Setting: 03H Read						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x4136 ~ 0x4137	16694 ~ 16695	V Max Value	N/A	N/A	float32	R
0x4138 ~ 0x413E	16696 ~ 16702	V Max Timestamp	N/A	N/A	INT	R
0x413F ~ 0x4140	16703 ~ 16704	I Max Value	N/A	N/A	float32	R
0x4141 ~ 0x4147	16705 ~ 16711	I Max Timestamp	N/A	N/A		R
0x4148 ~ 0x4149	16712 ~ 16713	P Max Value	N/A	N/A	float32	R
0x414A ~ 0x4150	16714 ~ 16720	P Max Timestamp	N/A	N/A		R
0x4151 ~ 0x4152	16721 ~ 16722	Ripple Factor U Max Value	N/A	N/A	float32	R
0x4153 ~ 0x4159	16723 ~ 16729	Ripple Factor U Max Timestamp	N/A	N/A		R
0x415A ~ 0x415B	16730 ~ 16731	Ripple Factor I Max Value	N/A	N/A	float32	R
0x415C ~ 0x4162	16732 ~ 16738	Ripple Factor I Max Timestamp	N/A	N/A		R
0x4163 ~ 0x4164	16739 ~ 16740	Demand I Import Max Value	N/A	N/A	float32	R
0x4165 ~ 0x416B	16741 ~ 16747	Demand I Import Max Timestamp	N/A	N/A		R
0x416C ~ 0x416D	16748 ~ 16749	Demand I Export Max Value	N/A	N/A	float32	R
0x416E ~ 0x4174	16750 ~ 16756	Demand I Export Max Timestamp	N/A	N/A		R
0x4175 ~ 0x4176	16757 ~ 16758	Demand P Import Max Value	N/A	N/A	float32	R
0x4177 ~ 0x417D	16759 ~ 16765	Demand P Import Max Timestamp	N/A	N/A		R

0x417E ~ 0x417F	16766 ~ 16767	Demand P Export Max Value	N/A	N/A	float32	R
0x4180 ~ 0x4186	16768 ~ 16774	Demand P Export Max Timestamp	N/A	N/A		R
0x4187 ~ 0x4188	16775 ~ 16776	V Min Value	N/A	N/A	float32	R
0x4189 ~ 0x418F	16777 ~ 16783	V Min Timestamp	N/A	N/A		R
0x4190 ~ 0x4191	16784 ~ 16785	I Min Value	N/A	N/A	float32	R
0x4192 ~ 0x4198	16786 ~ 16792	I Min Timestamp	N/A	N/A		R
0x4199 ~ 0x419A	16793 ~ 16794	P Min Value	N/A	N/A	float32	R
0x419B ~ 0x41A1	16795 ~ 16801	P Min Timestamp	N/A	N/A		R
0x41A2 ~ 0x41A3	16802 ~ 16803	Ripple Factor U Min Value	N/A	N/A	float32	R
0x41A4 ~ 0x41AA	16804 ~ 16810	Ripple Factor U Min Timestamp	N/A	N/A		R
0x41AB ~ 0x41AC	16811 ~ 16812	Ripple Factor I Min Value	N/A	N/A	float32	R
0x41AD ~ 0x41B3	16813 ~ 16819	Ripple Factor I Min Timestamp	N/A	N/A		R

5.3.10 Custom Read Registers

The custom read function allows users to independently match combinations of parameters and registers.

Table 5-16 Custom Reading Setting Registers

System Setting: 03H Read,10H Write					
Address(H)	**Address(D)**	**Parameter**	**Details**	**Default**	**Access Property**
0x6B00	27392	Number of Byte Set	N/A	N/A	R/W
0x6B01	27393	1st Reading	Address	N/A	R/W
0x6B02	27394	2nd Reading	Address	N/A	R/W

0x6B03	27395	3rd Reading	Address	N/A	R/W
0x6B04	27396	4th Reading	Address	N/A	R/W
0x6B05	27397	5th Reading	Address	N/A	R/W
0x6B06	27398	6th Reading	Address	N/A	R/W
0x6B07	27399	7th Reading	Address	N/A	R/W
0x6B08	27400	8th Reading	Address	N/A	R/W
0x6B09	27401	9th Reading	Address	N/A	R/W
0x6B0A	27402	10th Reading	Address	N/A	R/W
0x6B0B	27403	11th Reading	Address	N/A	R/W
0x6B0C	27404	12th Reading	Address	N/A	R/W
0x6B0D	27405	13th Reading	Address	N/A	R/W
0x6B0E	27406	14th Reading	Address	N/A	R/W
0x6B0F	27407	15th Reading	Address	N/A	R/W
0x6B10	27408	16th Reading	Address	N/A	R/W
0x6B11	27409	17th Reading	Address	N/A	R/W
0x6B12	27410	18th Reading	Address	N/A	R/W
0x6B13	27411	19th Reading	Address	N/A	R/W
0x6B14	27412	20th Reading	Address	N/A	R/W
0x6B15	27413	21st Reading	Address	N/A	R/W
0x6B16	27414	22nd Reading	Address	N/A	R/W
0x6B17	27415	23rd Reading	Address	N/A	R/W
0x6B18	27416	24th Reading	Address	N/A	R/W
0x6B19	27417	25th Reading	Address	N/A	R/W
0x6B1A	27418	26th Reading	Address	N/A	R/W
0x6B1B	27419	27th Reading	Address	N/A	R/W
0x6B1C	27420	28th Reading	Address	N/A	R/W
0x6B1D	27421	29th Reading	Address	N/A	R/W
0x6B1E	27422	30th Reading	Address	N/A	R/W
0x6B1F	27423	31st Reading	Address	N/A	R/W

0x6B20	27424	32nd Reading	Address	N/A	R/W
0x6B21	27425	33rd Reading	Address	N/A	R/W
0x6B22	27426	34th Reading	Address	N/A	R/W
0x6B23	27427	35th Reading	Address	N/A	R/W
0x6B24	27428	36th Reading	Address	N/A	R/W
0x6B25	27429	37thReading	Address	N/A	R/W
0x6B26	27430	38th Reading	Address	N/A	R/W
0x6B27	27431	39th Reading	Address	N/A	R/W
0x6B28	27432	40th Reading	Address	N/A	R/W

Table 5-17 Custom Reading Registers

System Setting: 03H Read,10H Write					
Address(H)	**Address(D)**	**Parameter**	**Details**	**Default**	**Access Property**
0x6A00	27136	1st Reading	Reading	N/A	R/W
0x6A01	27137	2nd Reading	Reading	N/A	R/W
0x6A02	27138	3rd Reading	Reading	N/A	R/W
0x6A03	27139	4th Reading	Reading	N/A	R/W
0x6A04	27140	5th Reading	Reading	N/A	R/W
0x6A05	27141	6th Reading	Reading	N/A	R/W
0x6A06	27142	7th Reading	Reading	N/A	R/W
0x6A07	27143	8th Reading	Reading	N/A	R/W
0x6A08	27144	9th Reading	Reading	N/A	R/W
0x6A09	27145	10th Reading	Reading	N/A	R/W
0x6A0A	27146	11th Reading	Reading	N/A	R/W
0x6A0B	27147	12th Reading	Reading	N/A	R/W
0x6A0C	27148	13th Reading	Reading	N/A	R/W
0x6A0D	27149	14th Reading	Reading	N/A	R/W
0x6A0E	27150	15th Reading	Reading	N/A	R/W

0x6A0F	27151	16th Reading	Reading	N/A	R/W
0x6A10	27152	17th Reading	Reading	N/A	R/W
0x6A11	27153	18th Reading	Reading	N/A	R/W
0x6A12	27154	19th Reading	Reading	N/A	R/W
0x6A13	27155	20th Reading	Reading	N/A	R/W
0x6A14	27156	21st Reading	Reading	N/A	R/W
0x6A15	27157	22nd Reading	Reading	N/A	R/W
0x6A16	27158	23rd Reading	Reading	N/A	R/W
0x6A17	27159	24th Reading	Reading	N/A	R/W
0x6A18	27160	25th Reading	Reading	N/A	R/W
0x6A19	27161	26th Reading	Reading	N/A	R/W
0x6A1A	27162	27th Reading	Reading	N/A	R/W
0x6A1B	27163	28th Reading	Reading	N/A	R/W
0x6A1C	27164	29th Reading	Reading	N/A	R/W
0x6A1D	27165	30th Reading	Reading	N/A	R/W
0x6A1E	27166	31st Reading	Reading	N/A	R/W
0x6A2F	27167	32nd Reading	Reading	N/A	R/W
0x6A20	27168	33rd Reading	Reading	N/A	R/W
0x6A21	27169	34th Reading	Reading	N/A	R/W
0x6A22	27170	35th Reading	Reading	N/A	R/W
0x6A23	27171	36th Reading	Reading	N/A	R/W
0x6A24	27172	37th Reading	Reading	N/A	R/W
0x6A25	27173	38th Reading	Reading	N/A	R/W
0x6A26	27174	39th Reading	Reading	N/A	R/W
0x6A27	27175	40th Reading	Reading	N/A	R/W

5.3.11 Data Log Parameters Registers

5.3.11.1 Data Log 1, 2, 3 Setting

Function code: 03H for reading, 10H for pre-setting.

Table 5-18 Data Log 1, 2, 3 Setting Registers

System Setting: 03H Read,10H Write					
Address(H)	**Address(D)**	**Parameter**	**Details**	**Default**	**Access Property**
0x1100	4352	Log1 #Registers #Sectors	N/A	N/A	R/W
0x1101	4353	Log1 Interval	N/A	N/A	R/W
0x1102 ~ 0x1133	4354 ~ 4403	Log1 Register #1~#50 identifier	N/A	N/A	R/W
0x1134	4404	Data log mode selection	N/A	N/A	R/W
0x1135	4405	Start month, year	Low byte: Month, high byte: year	1 2000	R/W
0x1136	4406	Start day, hour	Low byte: hour High byte: day	0 1	R/W
0x1137	4407	Start minute, second	Low byte: second High byte: minute	0 0	R/W
0x1138	4408	End month, year	Low byte: month High byte: year	1 2000	R/W
0x1139	4409	End day, hour	Low byte: hour High byte: day	0 1	R/W
0x113A	4410	End minute, second	Low byte: second High byte: minute	0 0	R/W
0x113B	4411	Clear Data Log1	Write 1 to clear	N/A	R/W
0x113C ~ 0x1177	4412 ~ 4471	Log2 setting	N/A	N/A	R/W
0x1178 ~ 0x11B3	4472 ~ 4531	Log3 setting	N/A	N/A	R/W

5.3.11.2 Data Log 1, 2, and 3 Sector Registers

Function code: 03H for reading.

Table 5-19 Data Log 1 Sector Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x1400	5120	First sector, current sector	N/A	N/A	word	R
0x1401	5121	Current address	N/A	N/A	word	R
0x1402	5122	Full (low byte)	0: not full 1: sector is full	N/A	word	R

Table 5-20 Data Log 2 Sector Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x1410	5136	First sector, current sector	N/A	N/A	word	R
0x1411	5137	Current address	N/A	N/A	word	R
0x1412	5138	Full (low byte)	0: not full 1: sector is full	N/A	word	R

Table 5-21 Data Log 3 Sector Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x1420	5152	First sector, current sector	N/A	N/A	word	R
0x1421	5153	Current address	N/A	N/A	word	R
0x1422	5154	Full (low byte)	0: not full 1: sector is full	N/A	word	R

5.3.11.3 Data Log 1, 2, 3 Reading

Function code: 03H for reading, 10H for pre-setting.

Table 5-22 Data Log 1,2,3 Reading Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x6000	24576	Record type, reserved	N/A	N/A	N/A	R/W
0x6001	24577	Record count of each window, window state	N/A	N/A	N/A	R/W
0x6002 ~ 0x6003	24578 ~ 24579	OFFSET	N/A	N/A	N/A	R/W
0x6004 ~ 0x60CC	24580 ~ 24780	Window	N/A	N/A	N/A	R

5.3.11.4 Data Log 1, 2, 3 Status

Function code: 03H for reading.

Table 5-23 Data Log 1 Status Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x6100 ~ 0x6101	24832 ~ 24833	Max Records	N/A	N/A	unit32	R
0x6102 ~ 0x6103	24834 ~ 24835	Used Records	N/A	N/A	unit32	R
0x6104	24836	Record size	N/A	N/A	unit16	R
0x6105	24837	Log Availability	N/A	N/A	unit16	R
0x6106 ~ 0x6108	24838 ~ 24840	First Record Timestamp	N/A	N/A	word	R
0x6109 ~ 0x610B	24841 ~ 24843	Last Record Timestamp	N/A	N/A	word	R
0x610C ~ 0x610D	24844 ~ 24845	Record Index	N/A	N/A	uint32	R

Table 5-24 Data Log 2 Status Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x6200 ~ 0x6201	25088 ~ 25089	Max Records	N/A	N/A	unit32	R
0x6202 ~ 0x6203	25090~ 25091	Used Records	N/A	N/A	unit32	R
0x6204	25092	Record Size	N/A	N/A	unit16	R
0x6205	25093	Log Availability	N/A	N/A	unit16	R
0x6206 ~ 0x6208	25094 ~ 25096	First Record Timestamp	N/A	N/A	word	R
0x6209 ~ 0x620B	25097 ~ 25099	Last Record Timestamp	N/A	N/A	word	R
0x620C ~ 0x620D	25100 ~ 25101	Record Index	N/A	N/A	uint32	R

Table 5-25 Data Log 3 Status Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x6300 ~ 0x6301	25344 ~ 25345	Max Records	N/A	N/A	unit32	R
0x6302 ~ 0x6303	25346 ~ 25347	Used Records	N/A	N/A	unit32	R
0x6304	25348	Record Size	N/A	N/A	unit16	R
0x6305	25349	Log Availability	N/A	N/A	unit16	R
0x6306 ~ 0x6308	25350 ~ 25352	First Record Timestamp	N/A	N/A	word	R
0x6309 ~ 0x630B	25353 ~ 25355	Last Record Timestamp	N/A	N/A	word	R
0x630C ~ 0x630D	25356 ~ 25357	Record Index	N/A	N/A	uint32	R

5.3.11.5 Data Log 4 Setting

Function code: 03H for reading, 10H for pre-setting.

Table 5-26 Data Log 4 Setting Registers

System Setting: 03H Read,10H Write					
Address(H)	**Address(D)**	**Parameter**	**Details**	**Default**	**Access Property**
0x1500	5376	Log4 #Registers #Sectors	1-50; 0-64	0	R/W
0x1501	5377	Log4 Interval	1 ~ 1440	0	R/W
0x1502~ 0x1533	5378 ~ 5427	Log4 register #1-#50 identifier	Parameter selection address range: 0x3000, 0x3002, 0x3004, 0x3006, 0x3008, 0x300A, 0x300C, 0x300E, 0x3010, 0x3012, 0x3014	0	R/W
0x1534	5428	Data log mode selection	0~2	0	R/W
0x1535	5429	Start month, year	Low byte: Month, high byte: year	1 2000	R/W
0x1536	5430	Start day, hour	Low byte: hour High byte: day	0 1	R/W
0x1537	5431	Start minute, second	Low byte: second High byte: minute	0 0	R/W
0x1538	5432	End Month, year	Low byte: month High byte: year	1 2000	R/W
0x1539	5433	End day, hour	Low byte: hour High byte: day	0 1	R/W
0x153A	5434	End minute, Second	Low byte: second High byte: minute	0 0	R/W

0x153B	5435	Clear Data Log 4	Write 1 to clear	0	R/W

5.3.11.6 Data Log 4 Sector Registers

Function code: 03H for reading.

Table 5-27 Data Log 4 Sector Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x1430	5168	First sector, current sector	N/A	N/A	word	R
0x1431	5169	Current address	N/A	N/A	word	R
0x1432	5170	Full (low byte)	0: not full 1: sector is full	N/A	word	R

5.3.11.7 Data Log 4 Reading

Function code: 03H for reading, 10H for pre-setting.

Table 5-28 Data Log 4 Reading Registers

System Setting: 03H Read,10H Write					
Address(H)	**Address(D)**	**Parameter**	**Details**	**Default**	**Access Property**
0x6400	25600	Record type, reserved	0~3 (3 for data log 4)	0	R/W
0x6401	25601	Record count of each window +window state	High byte: Record number of window(setting) Low byte: window state **0x0B:** data effective, **0xFF:** data not effective **0xAA:** Data Log on clearing **0xBB:** Data Log clearing end	0	R/W

0x6402 ~ 0x6403	25602 ~ 25603	OFFSET	N/A	0	R/W
0x6404 ~ 0x64CC	25604 ~ 25804	Window	Data Log format: record number (4 bytes) + time stamps (6bytes) + [data1~dataN] (6Nbytes) + CRC (2bytes) Data format: parameter1 average value, parameter2 average value... parameter1 max value, parameter2 max value, parameter1 min value, parameter2 min value...	N/A	R

5.3.11.8 Data Log 4 Status

Function code: 03H for reading.

Table 5-29 Data Log 4 Status Registers

System Setting: 03H Read,10H Write						
Address(H)	**Address(D)**	**Parameter**	**Range**	**Default**	**Data Type**	**Access Property**
0x6500 ~ 0x6501	25856 ~ 25857	Max Records	0 ~ 468104	N/A	unit32	R
0x6502 ~ 0x6503	25858 ~ 25859	Used Records	1 ~ 468104	N/A	unit32	R
0x6504	25860	Record Size	18 ~ 714	N/A	unit16	R
0x6505	25861	Log Availability (reserve)	N/A	N/A	word	R
0x6506 ~ 0x6508	25862 ~ 25864	First Record Time Stamp	N/A	N/A	word	R
0x6509 ~ 0x650B	25865 ~ 25867	Last Record Time Stamp	N/A	N/A	word	R
0x650C ~ 0x650D	25868 ~ 25869	Record Index	N/A	N/A	unit32	R

NOTE: The maximum records possible of Data Log 4 is calculated by the following equation:

$$Record_{max} = floor\left(\frac{65536}{(N_R \times 12 + 12)}\right) \times N_S$$

Where N_R is the number of register and N_S is the sector number (fixed to 16 at present).

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