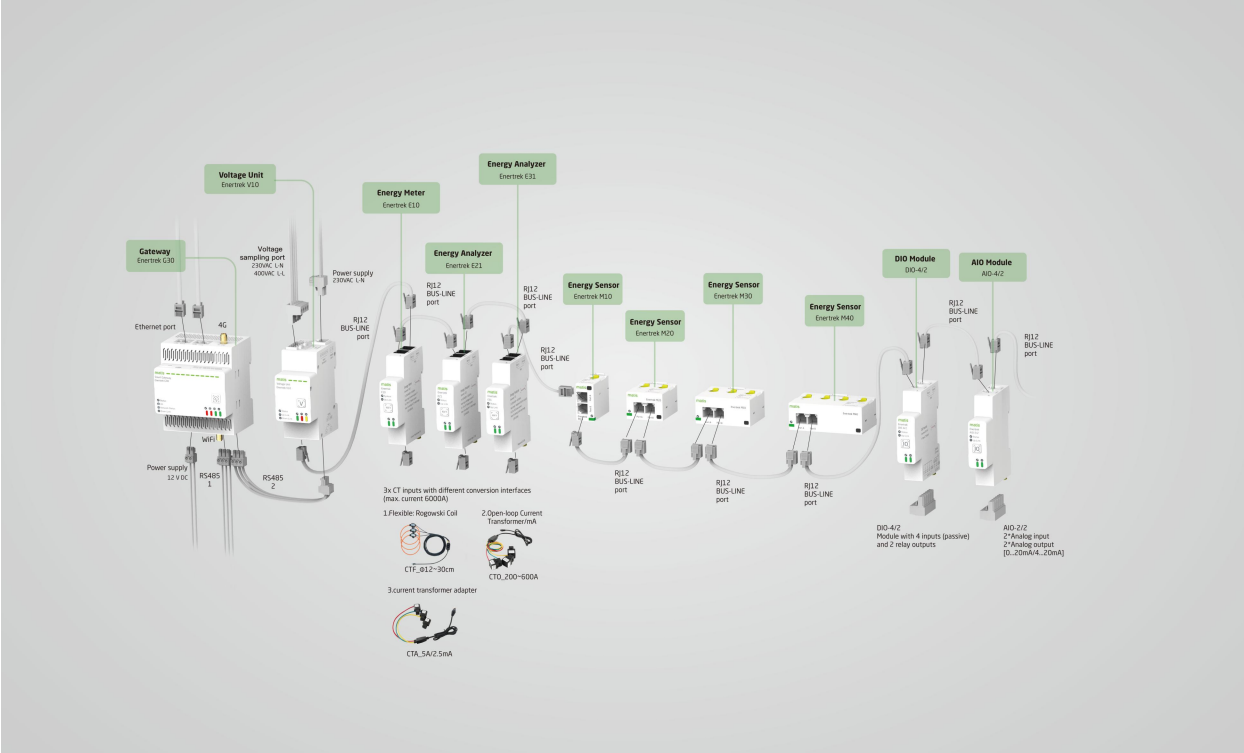
Multi-Circuit Power Monitoring and Control System

Enertrek Series

User Manual

11/2025



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1. System Overview

Enertrek is a modular power measurement and monitoring system.

The system is composed of a voltage measurement module (such as the Enertrek-V series) and one or more current measurement modules (such as the Enertrek-M/E series), providing comprehensive and flexible electrical measurement and monitoring functionalities.

Currently, the Enertrek series includes two types of current measurement modules:

Enertrek-M Series: Features built-in current transformers (CTs), supporting current measurements up to 63A. It is suitable for 1-Pole (1P), 2-Pole (2P), 3-Pole (3P), and 4-Pole (4P) configurations.

Enertrek-E Series: Compatible with various types of external current transformers (e.g., closed-core, split-core, flexible Rogowski coils, etc.), supporting current measurements ranging from 5A up to 6000A. This makes it suitable for diverse electrical systems.

1.1 System Features

The Enertrek system is based on a modular design, utilizing the dedicated Enertrek-V voltage module for centralized voltage measurement, while the current modules (such as the Enertrek-M / E series) perform centralized current measurement.

All modules are connected via the Enertrek_Bus (RJ12), which centrally manages both data transmission and power supply. Multiple modules can be expanded through the bus, enabling electrical parameter monitoring for multiple loads from a single voltage measurement point.

This design significantly simplifies the wiring process, enhancing installation efficiency. Furthermore, the use of quick-connect wiring further streamlines the installation. The combined measurement of both current and voltage ensures the overall accuracy and reliability of the system.

1.2 Functions and Applications

The Enertrek system supports a wide range of applications, including:

Comprehensive Energy Measurement and Electrical Monitoring: Provides high-accuracy measurement of electrical parameters such as voltage, current, power, and frequency, helping users precisely analyze energy usage.

Power Quality Monitoring: Real-time monitoring of power quality helps identify equipment faults, abnormal fluctuations, or potential risks, ensuring the stable operation of the electrical system.

Flexible Expansion and Integration: Modules connect and expand via the Enertrek_Bus, supporting large-scale load monitoring. This makes the system ideal for applications in power distribution systems, industrial equipment, and energy management systems.

Remote Configuration and Visualization: Configuration, data display, and analysis are performed using the Enertrek Vision software. Users can obtain real-time system operating status, enabling remote operation and monitoring.

1.3 Applicable Scenarios

The Enertrek system is widely applied across the industrial, commercial, and building sectors, particularly in large-scale power systems that demand precise electrical energy measurement and monitoring.

Leveraging its modular design, flexible installation methods, and efficient data communication capabilities, the Enertrek system serves as a crucial tool for optimizing energy management and enhancing the operational efficiency of electrical power systems.

Power measurement and monitoring equipment compliant with the following standards:• GB_T 18216.12-2010(IEC 61557-12)

• GB_T 17215.321-2021 (IEC 62053-21)

• GB_T 17215.322-2008 (IEC 62053-22)

Through this innovative design, the Enertrek system offers a highly efficient electrical monitoring solution and can be seamlessly integrated into various Energy Management Systems (EMS), supporting the monitoring and analysis of a large number of electrical loads.

2. Products

2.1 Product Lists

No.	Products Name	Product Model	Product Description	Notes
1	Power Supply Module	Enertrek P10	Gateway Power Supply Module	Launched
2	Display Panel	Enertrek D10	Data Display & Control Panel	Launched
3	Smart Gateway	Enertrek G10	Gateway Module-Ethernet/WiFi	Launched
4	Smart Gateway	Enertrek G20	Gateway Module-Ethernet/4G	Launched
5	Smart Gateway	Enertrek G30	Gateway Module-Ethernet/4G/WiFi	Launched
7	Communication Module	Enertrek C10	Communication Module-Ethernet	Upcoming
8	Communication Module	Enertrek C20	Communication Module-Wi-Fi	Upcoming
6	Communication Module	Enertrek C30	Communication Module-4G	Upcoming
7	Communication Module	Enertrek C31	Communication Module-4G, Tuya APP, One-to-Many MT53RST	Upcoming
8	Communication Module	Enertrek C32	Communication Module-4G, Tuya APP, One-to-Two MT53RST	Launched
9	Communication Module	Enertrek C33	Communication Module-4G, Tuya APP, One-to-Two MT88M	Upcoming
10	Data Transmission Adapter	Enertrek H10		Upcoming
11	Voltage Unit	Enertrek V10	Voltage Measurement & Management Module (AC)	Launched

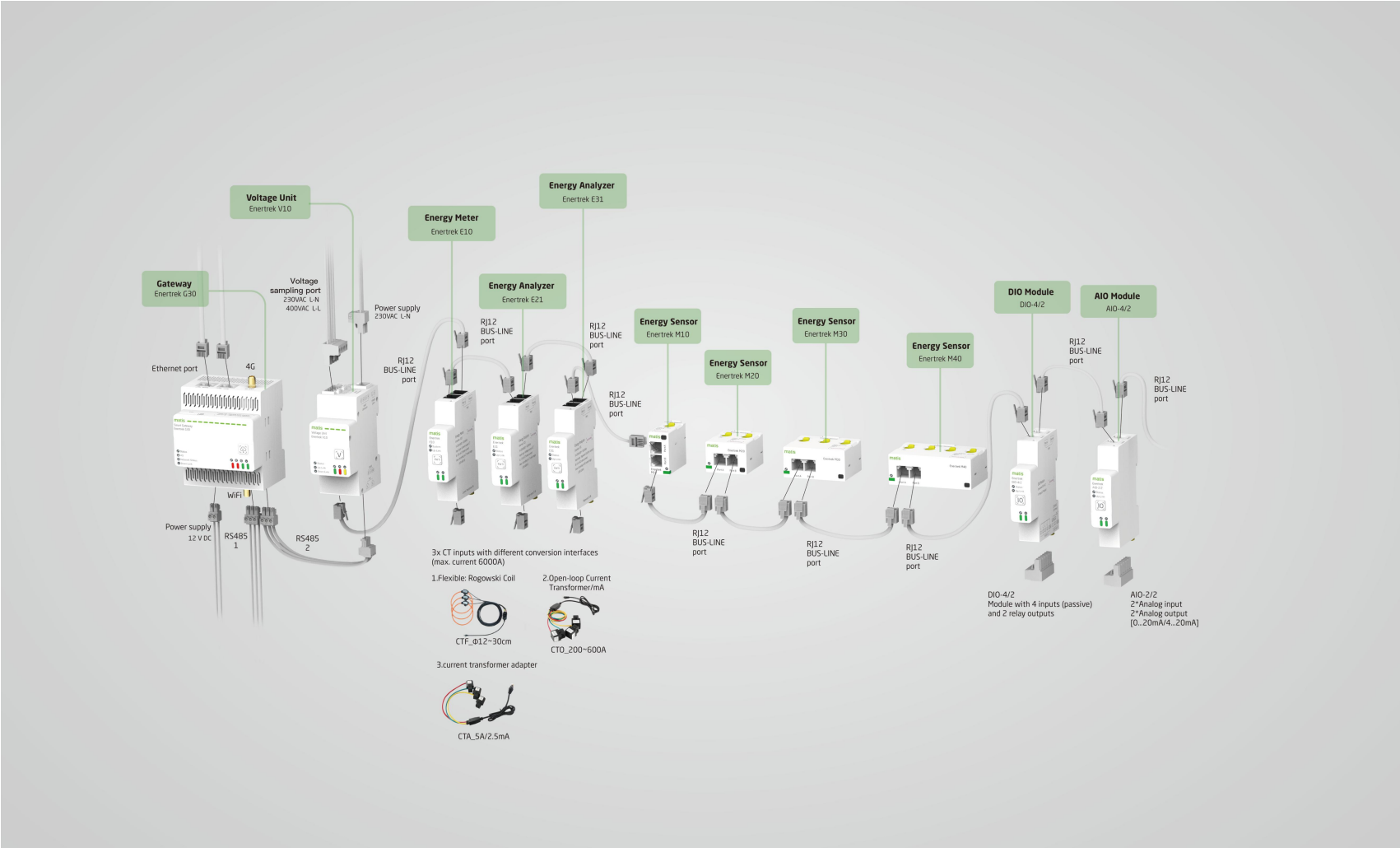
12	Voltage Unit	Enertrek V10dc	Voltage Measurement & Management Module (48Vdc)	Upcoming
13	Voltage Unit	Enertrek V11dc	Voltage Measurement & Management Module (240Vdc)	Upcoming
14	Voltage Unit	Enertrek V500dc	Voltage Measurement & Management Module (500Vdc)	Upcoming
15	Voltage Unit	Enertrek V1000dc	Voltage Measurement & Management Module (1000Vdc)	Upcoming
16	Voltage Unit	Enertrek V1500dc	Voltage Measurement & Management Module (1500Vdc)	Upcoming
17	Energy Sensor	Enertrek M10	Energy Sensor-1P	Launched
18	Energy Sensor	Enertrek M20	Energy Sensor-2P	Launched
19	Energy Sensor	Enertrek M30	Energy Sensor-3P	Launched
20	Energy Sensor	Enertrek M40	Energy Sensor-4P	Launched
21	Energy Sensor	Enertrek M11	Energy Sensor (Split Type)	Upcoming
22	Energy Meter	Enertrek E10-100	Energy Meter (Type A)	Launched
		Enertrek E10-200		Launched
		Enertrek E10-400		Launched
		Enertrek E10-600		Launched
23	Energy Analyzer	Enertrek E21-100	Energy Analyzer (Type V)	Launched
		Enertrek E21-200		Launched

		Enertrek E21-400		Launched
		Enertrek E21-600		Launched
24	Energy Analyzer	Enertrek E31-800	Energy Analyzer (Rogowski Coil)	Launched
		Enertrek E31-1000		Launched
		Enertrek E31-2000		Launched
		Enertrek E31-3000		Launched
		Enertrek E31-6300		Launched
		Enertrek E31-10k		Launched
25	Energy Meter	Enertrek E10dc		Upcoming
26	Split-core Current Transformer	CTO-100 / 22	Split-core Current Transformer(Current Type)	Launched
		CTO-200 / 36		Launched
		CTO-400 / 36		Launched
		CTO-600 / 36		Launched
27	Split-core Current Transformer	CTOV-100 / 16	Split-core Current Transformer(Voltage Type)	Launched
		CTOV-200 / 24		Launched

		CTOV-400 / 36		Launched
		CTOV-600 / 50		Launched
28	Flexible Rogowski Coil	CTF-800 / 50	Flexible Rogowski Coil	Launched
		CTF-1000 / 80		Launched
		CTF-2000 / 100		Launched
		CTF-3000 / 150		Launched
		CTF-6300 / 200		Launched
		CTF-10000 / 300		Launched
29	Hall-effect Current Sensor	CTH-10A~600A		Upcoming
30	DIO Module	DIO-4/2		Launched
31	AIO Module	AIO-2/2		Upcoming
32	Control Module	Enertrek R10		Upcoming
33	Mounting Clip-S	Clip-S		Launched
34	Mounting Clip-L	Clip-L		Launched
35	Connection Cable(6CM)	RJ12-06		Launched
36	Connection Cable(10CM)	RJ12-10		Launched
37	Connection Cable(20CM)	RJ12-20		Launched
38	Connection Cable(50CM)	RJ12-50		Launched
39	Connection Cable(100CM)	RJ12-100		Launched

40	Connection Cable(200CM)	RJ12-200		Launched
41	Connection Cable(300CM)	RJ12-300		Launched

2.2 Product Architecture Diagram



3. Features and Key Characteristics

3.1 Function

Product Module Classification and Function Introduction

3.1.1 Voltage Acquisition and Measurement Module

Enertrek_V：Voltage Unit

Provides precise voltage measurement and monitoring, supporting voltage measurement and various voltage quality analyses of the power grid system.

• Real-time measurement of voltage and frequency

• Voltage Harmonic (THD) analysis, supporting up to the 63rd harmonic

3.1.2 Current Acquisition and Measurement Module

Enertrek_M：Energy Sensor

Multifunctional Current Measurement Module, supporting single-phase and three-phase multi-circuit current measurement, suitable for branch circuit monitoring.

• Maximum cascade connection of 20 current measurement circuits

• Capable of managing single-phase, two-phase, and three-phase loads

• Built-in integrated Current Transformers (CTs), supporting current measurement up to 63A

•Enertrek_E：Energy Meter & Energy Analyzer

Module designed for high-current measurement, offering various specifications of Current Transformers (CTs) and flexible installation options.

• Supports fixed-core, split-core Current Transformers (CTs), and flexible Rogowski coils.

• Provides accurate measurement of current, power (active, reactive), and energy (active, reactive, apparent).

• Functions include phase angle Φ, power factor measurement, maximum/minimum values, demand, multi-tariff metering, and harmonic analysis.

3.1.3 Gateway, Communication Module & Display Panel

Enertrek_G：Smart Gateway

Gateway Data Workstation, integrating multi-protocol communication capabilities to achieve system data acquisition, processing, and analysis.

- Provides a local Web interface (Enertrek Vision) for convenient real-time monitoring and configuration.

Enertrek_C：Communication Module

Data Passthrough Module, ensuring the integrity and real-time capability of data within the system.

- Efficient transmission of energy consumption and measurement data
- Compatible with various communication interfaces to ensure accurate data delivery

Enertrek_D：Display Panel

Display and Configuration Module, providing an intuitive operating interface and local parameter configuration functions.

- Displays real-time data and historical records
- Supports the display and rapid processing of alarm information

3.1.4 IO Module

Enertrek_IO：

Supports digital and analog input/output, suitable for industrial automation scenarios.

- Digital inputs are used for status monitoring; digital outputs are used for alarm or control signal output.
- Analog inputs/outputs adapt to various sensors and actuators.

3.2 Module Features

Comprehensive Functionality: Covers voltage and current measurement, communication management, and I/O control, providing a systematic energy monitoring solution.

Intelligent Management: Features automatic module identification and configuration, supporting remote data monitoring and cloud-based management.

Diverse Interfaces: Supports RS485, Ethernet, and various communication protocols to meet the requirements of different scenarios.

Strong Scalability: Modular design adapts to complex measurement needs ranging from single circuits to multi-circuit configurations.

3.3 Accuracy

Overall System Measurement Accuracy When M/E Modules are Combined with the V Module.

Name	Model	Active Power / Energy (P / Epa)	Reactive Power (Q)	Reactive Energy (Era)	Apparent Power (S)	Apparent Energy (Eap)
Energy Sensor-1P	Enertrek M10	Class 0.5	Class 1	Class 2	Class 1	Class 2
Energy Sensor-2P	Enertrek M20	Class 0.5	Class 1	Class 2	Class 1	Class 2
Energy Sensor-3P	Enertrek M30	Class 0.5	Class 1	Class 2	Class 1	Class 2
Energy Sensor-4P	Enertrek M40	Class 0.5	Class 1	Class 2	Class 1	Class 2
Energy Meter (External CT Type A)	Enertrek E10	Class 1	Class 1	Class 2	Class 1	Class 2
Energy Analyzer (External CT Type V)	Enertrek E21	Class 1	Class 1	Class 2	Class 1	Class 2
Energy Analyzer (External Rogowski Coil)	Enertrek E31	Class 1	Class 1	Class 2	Class 1	Class 2

3.4 Key Parameters

3.4.1 Display Panel Enertrek_D, Smart Gateway Enertrek_G, Communication Module Enertrek_C

Features	Enertrek D10	Enertrek G10	Enertrek G20	Enertrek G30	Enertrek C10	Enertrek C20	Enertrek C30
Feature and	Local Display &	Data Acquisitio	Standard Data	High-Perfo rmance	Ethernet Comm.	Wi-Fi Comm.	4G Comm. Module

Function	Configuration	n & Analysis	Acquisition & Management	Data Analysis & Management	Module	Module	
Display Function	Supported	-	-	-	-	-	-
Gateway Function	-	Basic Gateway Function	Standard Gateway Function	Advanced Gateway Function	-	-	-
Data Analysis & Management	-	Supported	Supported	Supported	-	-	-
Data Transmission	-	Supported	Supported	Supported	Supported	Supported	Supported
Power Supply	12 VDC Power Supply	12 VDC Power Supply	12 VDC Power Supply	12 VDC Power Supply	12 VDC Power Supply	12 VDC Power Supply	12 VDC Power Supply
Communication Interface							
RS485 Slave Interface	•	•	•	•	•	•	•
Ethernet	-	•	•	•	•	-	-
Wi-Fi	-	-	•	•	-	•	-
4G	-	-	-	•	-	-	•

Network Services							
WEBVIEW	-	Supported	Supported	Supported	-	-	-
WEB-CONFIG	•	•	•	•	-	-	-
Installation Method	Panel Mount	DIN Rail	DIN Rail	DIN Rail	DIN Rail	DIN Rail	DIN Rail
Dimensions	86mm x 86mm	3 Module	4 Module	5 Module	1 Module	1 Module	1 Module
Product Number							

3.4.2 Voltage Unit Enertrek_V

Feature/Application	Description
Metering and Monitoring	- Phase Voltage：UA、UB、UC(Phase to Neutral)； - Phase Voltage Avg(Three-Phase Average)； - U0(Zero-Sequence Voltage) - Line Voltage：UAB、UBC、UCA； - Line Voltage Avg(Three-Phase Average) - Frequency：f
Power Quality Analysis	Achievable when used in conjunction with the E31 module - Total Harmonic Distortion(THD)：UATHD、UBTHD、UCTHD - Total Odd Harmonic Percentage：UATOHD、UBTOHD、UCTOHD - Total Even Harmonic Percentage：UATEHD、UBTEHD、UCTEHD - Individual Harmonic Percentage：UAHD1、UBHD1、UCHD1 to UAHD50、UBHD50、UCHD50 - Harmonic Voltage Value：UAHDV1、UBHDV1、UCHDV1 to UAHDV50、

	UBHDV50、UCHDV50
Voltage Fluctuation Analysis	Achievable when used in conjunction with the E31 module - Phase Voltage Maximum/Minimum：UA Max/Min、UB Max/Min、UC Max/Min - Phase Voltage Average Maximum/Minimum：Phase UAVGMax、UAVGMin - Line Voltage Maximum/Minimum：UAB、UBC、UCA Max/Min - Line Voltage Average Maximum/Minimum：LineUAVGMax、LineUAVGMin
Voltage Unbalance Rate	Achievable when used in conjunction with the E31 module - Voltage Negative Sequence Unbalance - Voltage Zero Sequence Unbalance
Waveform Distortion	Achievable when used in conjunction with the E31 module - Crest Factor：CFUA、CFUB、CFUC
Phase Angle / Power Factor Angle	Achievable when used in conjunction with the E31 module - Phase Voltage Angle：UA、UB、UC - Voltage-Current Angle：UIA(Phase A)、UIB(Phase B)、UIC(Phase C)
Unbalance Function	Achievable when used in conjunction with the E31 module
Alarm Function	Achievable when used in conjunction with the E31 module Over-limit Alarm: Triggered when the measured value exceeds the set threshold.
Structural Dimensions	Width：27 mm(1.5 Module)
Applicable Voltage Range	Supports configurations such as 1P (1×230V)、3P+N (3×400V)、3P (3×230V) and others

3.4.3 Energy Sensor Enertrek_M

Function		M-10	M-20	M-30	M-40
Basic Parameters	Number of Current Inputs	1	1	3	3
	Base Current Ib	10A	10A	10A	10A
	Maximum Current Imax	63A	63A	63A	63A
	Supported Load Types	1P 1P+N	1P+N	3P 3P+N	3P+N
Metering	±kWh、±kvarh、kVAh	•	•	•	•
Multi-Parameter Measurement	I1、I2、I3、ΣP、ΣQ、ΣS、ΣPF	•	•	•	•
	P、Q、S、PF Per Phase	•	•	•	•
Specifications	Width	18mm	36mm	54mm	72mm

3.4.4 Energy Meter & Energy Analyzer Enertrek_E

Function	Enertrek E10 (Basic Version)	Enertrek E21 (Advanced Version)	Enertrek E31 (Advanced Version)
CT Connection	mA-level CT mV-level CTRogowski Coil	mA-level CT mV-level CT Rogowski Coil	mA-level CT mV-level CT Rogowski Coil
Current Measurement Function	I1、I2、I3、In、ΣI	I1、I2、I3、In、ΣI	I1、I2、I3、In、ΣI
Power / Power Factor Measurement	P、Q、S、PF	P、Q、S、PF	P、Q、S、PF
Metering Function	±kWh、±kvarh、kVAh	±kWh、±kvarh、kVAh	±kWh、±kvarh、kVAh
Multi-Tariff Metering		Supported (Max 5 tariffs)	Supported (Max 5 tariffs)

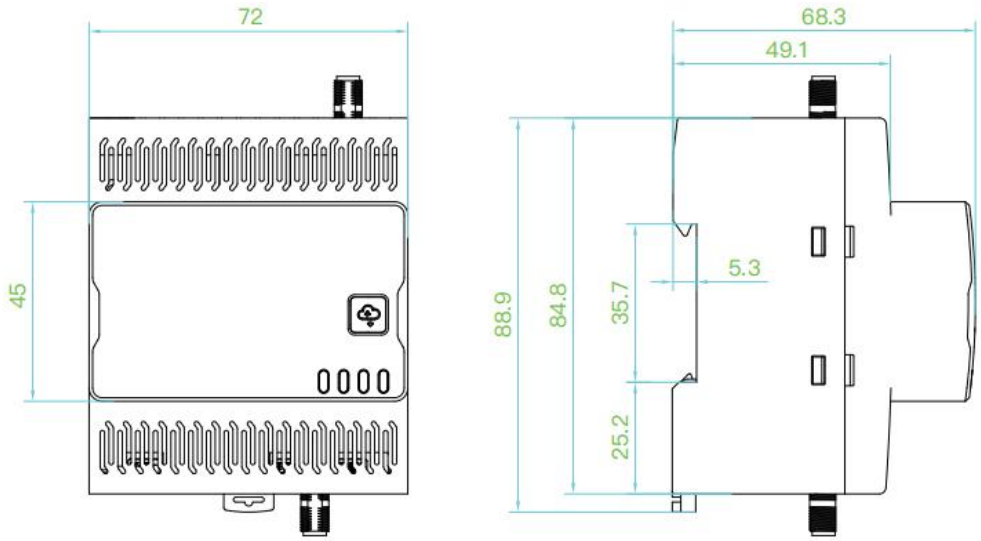
Demand & Maximum Demand	-	Supported	Supported
Current Unbalance Rate	-	Supported	Supported
Power Quality Analysis (THD)	-	Supported	Supported
Individual Voltage Harmonic Analysis	-	Supported (Up to 50th)	Supported (Up to 50th)
Voltage Fluctuation Analysis (Max/Min)	-	Supported(Uab/Ubc/Uca、average value)	Supported(Uab/Ubc/Uca、average value)
Waveform Distortion (Crest Factor, K-Factor, etc.)	-	Supported(CFUA、CFUB、CFUC)	Supported(CFUA、CFUB、CFUC)
Phase Angle / Power Factor Angle	-	Supported(UA、UB、UC；UIA、UIB、UIC)	Supported(UA、UB、UC；UIA、UIB、UIC)
Alarm Function (Over-limit, Harmonic, Unbalance)	-	Over-limit + Harmonic + Unbalance Alarm	Over-limit + Harmonic + Unbalance Alarm
Accuracy Class	Class 0.5	Class 0.5	Class 0.5

3.4.5 IO Module Enertrek_DIO-4/2 & Enertrek_AIO-2/2

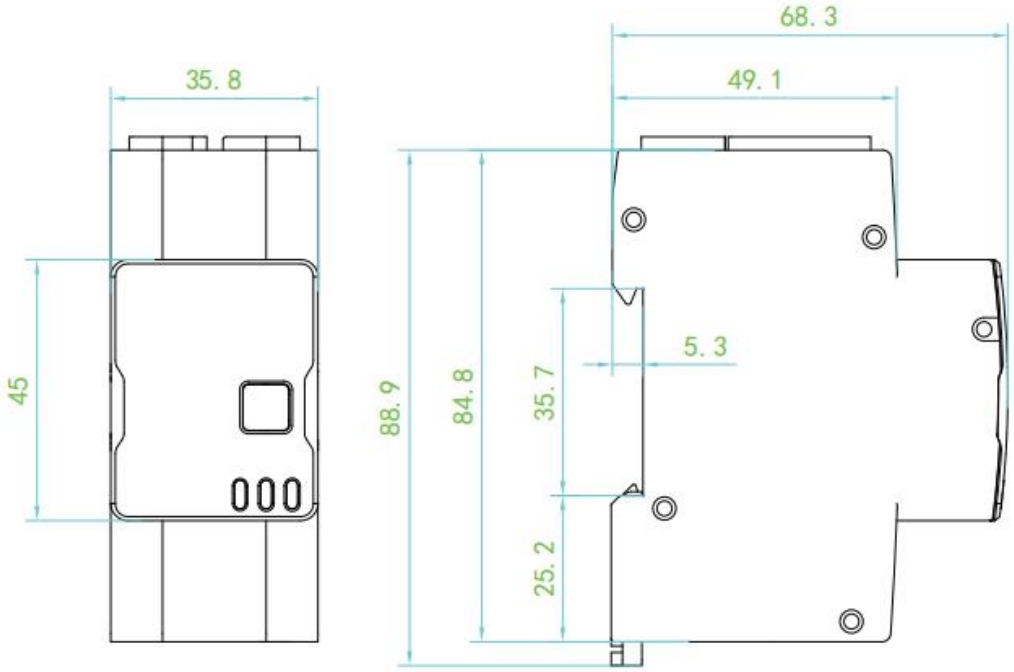
Module Name	DIO-4/2	AIO-2/2
Application Scenarios	Logic State Monitoring - Alarm Linkage - Signal Counting	Environmental Parameter Monitoring (e.g., pressure, humidity, temperature, etc.) - Industrial Equipment Control
Number of Inputs	4 Digital Inputs	2 Analog Inputs
Input Signal Types	- Dry contact input (passive signal) - Voltage Range: 12-48 VDC, maximum current 3mA	- Supports 4-20 mA current input - Programmable support for 0-10 V voltage input
Input Functions	- Status Monitoring: Monitors circuit breaker OF, SD, or equipment status. - Signal Counting: Counts and logs the number of input pulses.	Analog Signal Acquisition: Collects analog signals for precise environmental and equipment monitoring.
Number of Outputs	2 Relay Outputs	2 Analog Outputs
Output Signal Types	- Passive output - Output Support: Supports 48 VDC / 50 mA or 24 VAC / 100 mA output.	- Supports 4-20 mA current output - Supports 0-10 V voltage output - Linear control signal output
Output Functions	- Remote Logic Control - Alarm Trigger: Input event triggered alarm output.	- Alarm Linkage: Triggered in association with input events (such as over-limit or status changes).
Enclosure Width	18mm	18mm

4. Product Dimensions

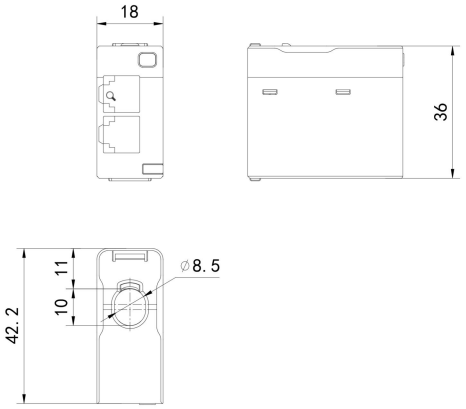
4.1 Smart Gateway Enertrek_G



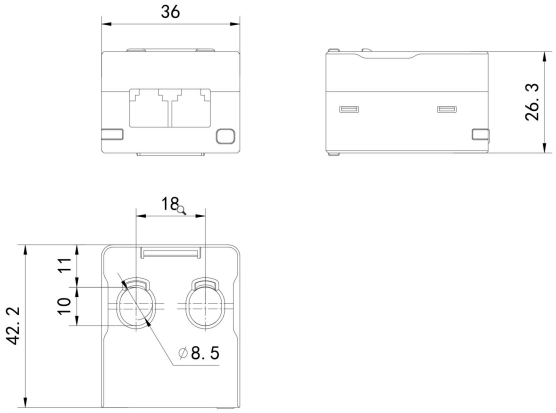
4.2 Voltage Unit Enertrek_V



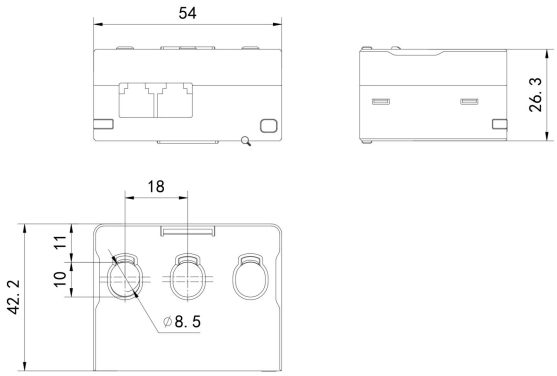
4.3 Energy Sensor Enertrek_M



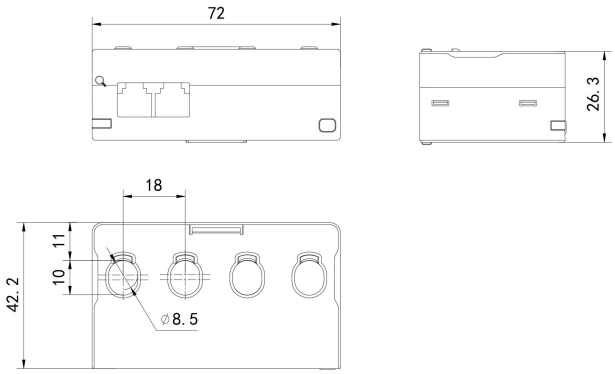
Enertrek_M10



Enertrek_M20

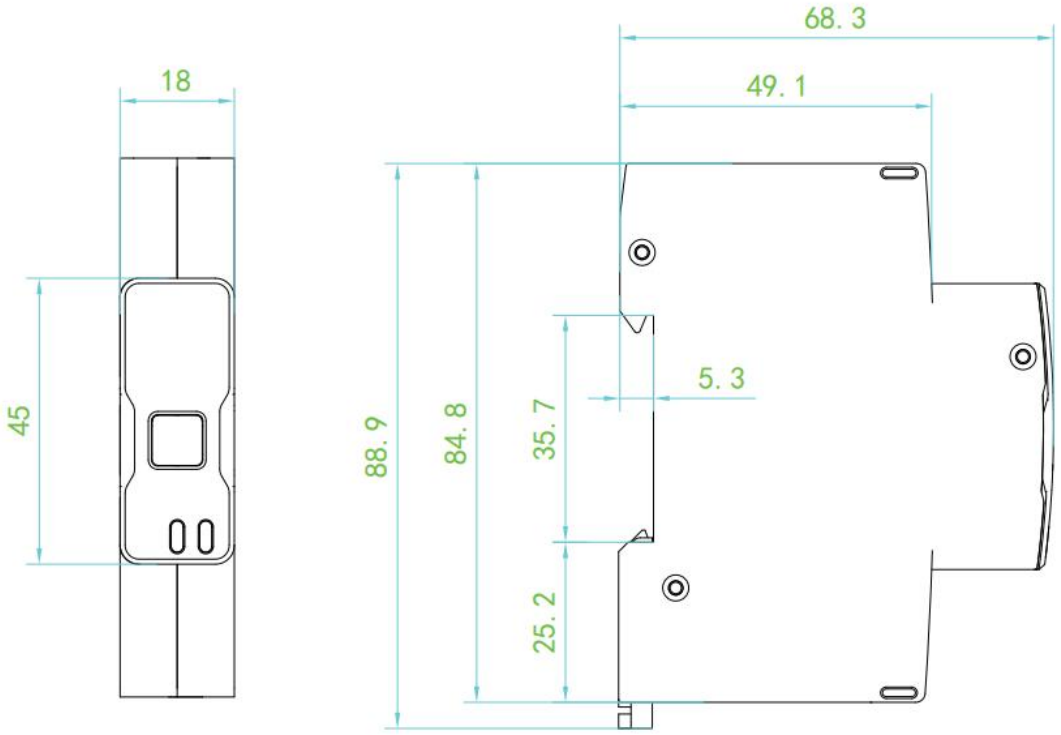


Enertrek_M30

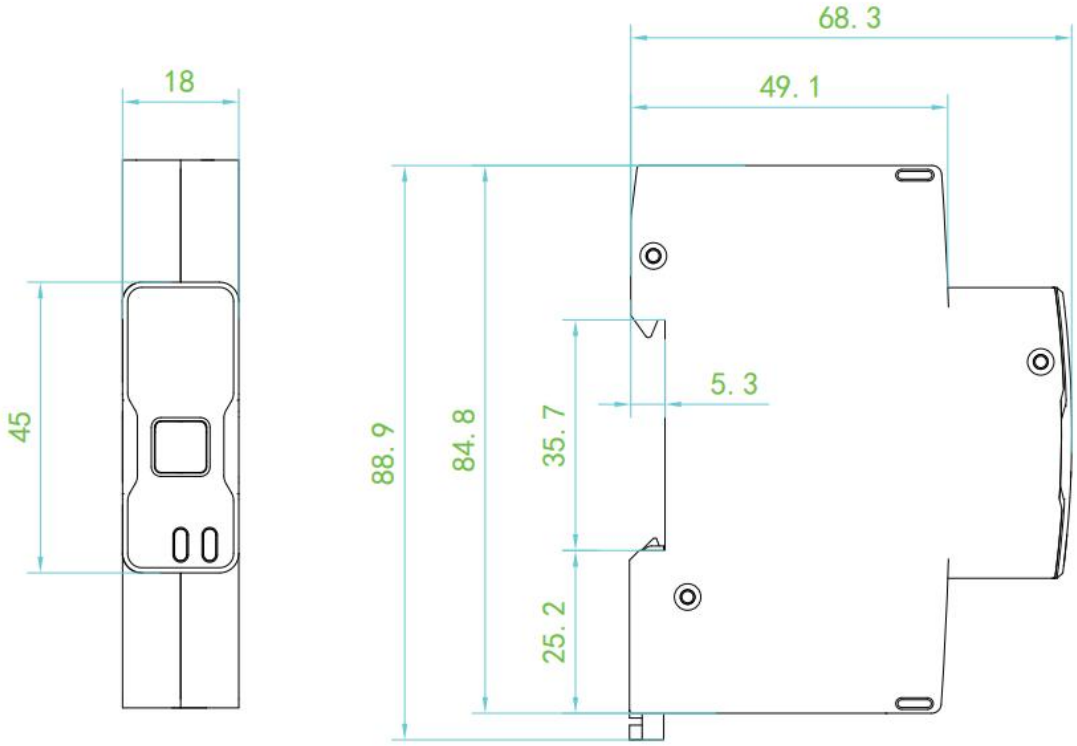


Enertrek_M40

4.4 Energy Meter & Energy Analyzer Enertrek_E



4.5 IO Module DIO-4/2



4.6 Introduction to Current Transformers (CTs)

The Enertrek Power Monitoring System supports various types of Current Transformers (CTs) to meet measurement requirements in different scenarios, including new construction projects, retrofit installations, and high-current environments.

The CTs connect rapidly to the Enertrek modules via dedicated cables, ensuring convenient installation and eliminating wiring errors, while simultaneously guaranteeing measurement accuracy and reliability.

4.6.1 Types of Enertrek CTs

Type	Chinese Definition	Key Features	Application Scenarios	Typical Advantages
CTA Type	5A Adapter	Converts traditional 5A secondary current into a small signal recognizable by the device.	Retrofit/Upgrade of old systems; Compatibility with existing 5A CTs.	High compatibility, enables smooth system upgrade.
CTO Type	Split-Core CT (Current Output)	Features an openable core; Secondary signal is a current signal (commonly 100 mA / 1 A).	Retrofit projects; Requires rapid installation and maintenance.	Easy to install under live operation; Direct connection to current-type input modules.
CTOV Type	Split-Core CT (Voltage Output)	Secondary signal is a voltage signal (typically 333 mV); Low risk of open-circuit damage.	Three-phase branch retrofits; Long cable runs; High-EMI environments.	Simple wiring, better safety, less sensitive to load impedance.
CTF Type	Flexible CT (Rogowski Coil)	Flexible coil requires an integrator; Extremely wide range, no magnetic	High-current busbars; Space-constrained areas.	High flexibility, wide measurement range, fast installation.

		saturation.		

4.6.2 Quick Connection and Compatibility

• Quick Installation: Uses RJ45 cables for direct connection, eliminating the need for wiring calibration and reducing installation time.

• Safety Assurance: Features an IP20 protection rating, making it suitable for industrial and commercial environments and meeting the demands for long-term stable operation.

 CTO 100A/25mA 200A/25mA 400A/100mA 600A/100mA	 CTOV 100A/333mv 200A/25mA 400A/100mA 600A/100mA
 CTA 5A/2.5mA Used for the secondary current acquisition of conventional Current Transformers (CTs)	 CTF 800A/100mV 1000A/100mV 2000A/100mV 3000A/100mV 6300A/100mV 10000A/100mV

4.6.3 CTO Split-Core CT (Current Output Type)

The Enertrek CTO Split-Core CT (Current Output Type) is a high-precision measurement device specifically designed for both new and retrofit projects, supporting quick installation without the need for power interruption. It connects with the Enertrek_E10 module as a plug-and-play device via an RJ45 interface.

This current transformer features Class 0.5 accuracy, making it suitable for current, voltage, and

harmonic analysis. It is widely applied in industrial power distribution, energy management, and electrical monitoring scenarios.

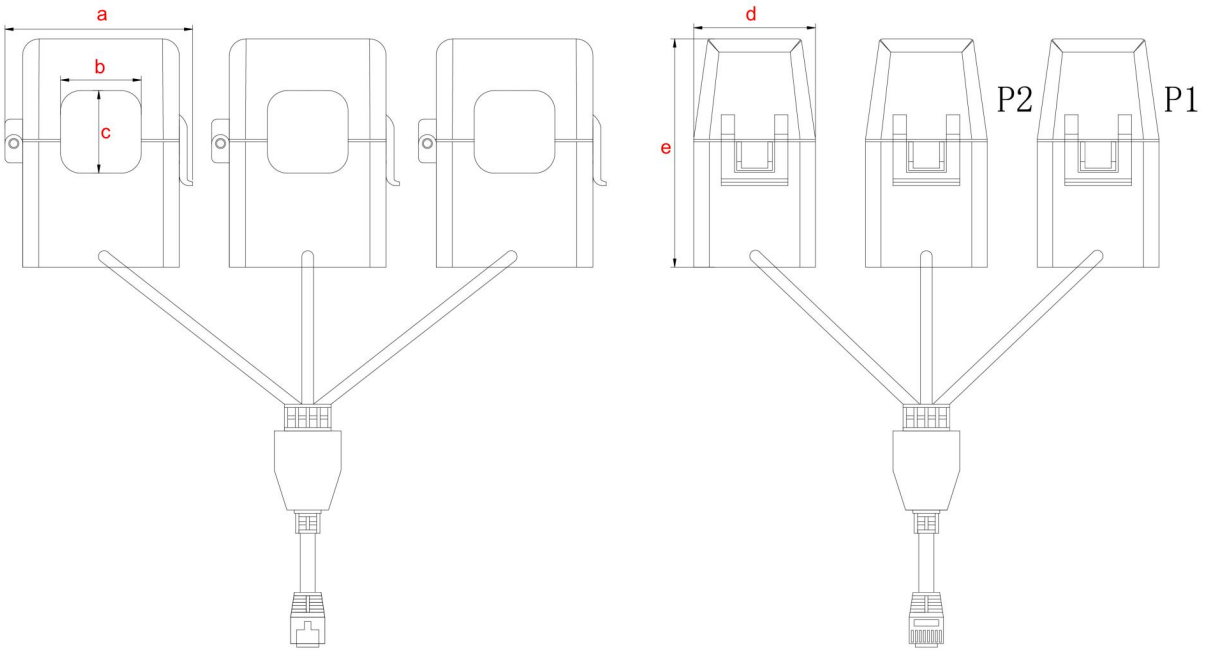
● **Specification**

The Enertrek CTO Series Current Transformers are available in four models with ratings ranging from 100A to 600A, suitable for various load types and application scenarios.

Parameters / Specifications	**CTO-100**	**CTO-200**	**CTO-400**	**CTO-600**
Cable Aperture Diameter(mm)	Φ16	Φ24	Φ36	Φ45
Rated Current Range (A)	0 – 100	0 – 200	0 – 400	0 – 600
Recommended Cable Cross-Section(mm²)	3 – 15 mm²	10 – 24 mm²	20 – 36 mm²	25 – 45 mm²
Maximum Current (A)	120	240	480	720
Secondary Current(mA / A)	25 mA / 100 A	25 mA / 200 A	100 mA / 400 A	100 mA / 600 A
Rated Load	≤ 20 Ω (when 120 A)	≤ 10 Ω (when 240 A)	≤ 10 Ω (when 480 A)	≤ 10 Ω (when 600 A)
Accuracy Class	Class 0.5 (± 0.5 %)	Class 0.5 (± 0.5 %)	Class 0.5 (± 0.5 %)	Class 0.5 (± 0.5 %)
Phase Difference at Rated Current	≤ 50′	≤ 30′	≤ 30′	≤ 30′
Non-linearity Error	≤ 0.3 %	≤ 0.3 %	≤ 0.3 %	≤ 0.3 %
Insulation Withstand Voltage	AC 4 kV / 1 min	AC 4 kV / 1 min	AC 4 kV / 1 min	AC 4 kV / 1 min
Operating Temperature	−25 ~ +75 °C	−20 ~ +75 °C	−20 ~ +75 °C	−20 ~ +75 °C
Relative Humidity		≤ 90 %	≤ 90 %	≤ 90 %

	≤ 90 % RH(non-condensing)	RH(non-condensing)	RH(non-condensing)	RH(non-condensing)
Operating Frequency Range	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz

● 5.3.2 Dimension



No.	Item Description	CTO-100	CTO-200	CTO-400	CTO-600
a	External Width(mm)	38.2	44.5	66.3	72.5
b	Aperture Width(mm)	16	24	36	45
c	Aperture Width(mm)	16	24	36	45
d	External Depth(mm)	30.5	41	55.4	61
e	External	49.5	64	81.5	92

	Height(mm)				

4.6.4 CTF Flexible Current Transformer (Rogowski Coil)

The Flexible Current Transformer (Rogowski Coil) is a current measurement device based on the Rogowski principle, suitable for wide-range, high-accuracy current monitoring requirements. Its open-core design and flexible structure make it particularly well-suited for installation environments with limited space, such as distribution cabinets, industrial equipment, and retrofit projects.

When combined with the Enertrek_E31 module, the flexible current transformer enables high-accuracy current monitoring, energy management, and data analysis, making it ideal for applications in industrial, power system, and building management scenarios.

● **Specification**

Supports high-current measurement up to 10 kA, with different coil lengths and aperture sizes to accommodate various scenarios.

Feature / Model	**CTF-50/800A**	**CTF-80/1000A**	**CTF-100/2000A**	**CTF-150/3000A**	**CTF-200/6300A**	**CTF-300/10KA**
Coil Diameter (Ø mm)	50	80	100	150	200	300
Current Measurement Range (a.c.)	800A	1000A	2000A	3000A	6300A	10KA
Frequency Response	1Hz ~20kHz(-3dB)	1Hz to 20kHz(-3dB)	1Hz to 20kHz(-3dB)	1Hz to 20kHz(-3dB)	1Hz to 20kHz(-3dB)	1Hz to 20kHz(-3dB)
Measurement Accuracy	Class 0.5	Class 0.5	Class 0.5	Class 0.5	Class 0.5	Class 0.5
Power Supply Mode	Self-powered	Self-powered	Self-powered	Self-powered	Self-powered	Self-powered
Output Signal	100mV	100mV	100mV	100mV	100mV	100mV

Communication Interface	RJ45	RJ45	RJ45	RJ45	RJ45	RJ45
Installation Method	Split-core and Quick-connect Installation	Split-core and Quick-connect Installation	Split-core and Quick-connect Installation	Split-core and Quick-connect Installation	Split-core and Quick-connect Installation	Split-core and Quick-connect Installation
Ingress Protection (IP) Rating	IP20 or Higher	IP20 or Higher	IP20 or Higher	IP20 or Higher	IP20 or Higher	IP20 or Higher
Ambient Temperature Range	-40℃–85℃	-40℃–85℃	-40℃–85℃	-40℃–85℃	-40℃–85℃	-40℃–85℃
Humidity Range	5%–95%(non-condensing)	5%–95%(non-condensing)	5%–95%(non-condensing)	5%–95%(non-condensing)	5%–95%(non-condensing)	5%–95%(non-condensing)

● **Dimension**

Feature / Model	**CTF-50**	**CTF-100**	**CTF-150**	**CTF-200**	**CTF-300**	**CTF-600**
Aperture Size (Ø mm)	50	100	150	200	300	600
Circumference P (mm)	157.08	314.16	471.24	628.32	942.48	1884.96
Signal Cable Length (m)	2	2	2	2	2	2

4.6.5 CTOV Split-Core CT (Voltage Output Type)

The Enertrek CTOV Split-Core CT (Voltage Output Type) is a high-precision measurement device specifically designed for both new and retrofit projects, supporting quick installation without the need for power interruption. It connects with the Enertrek_E21 module as a plug-and-play device via an RJ45 interface.

This current transformer features Class 0.5 accuracy, making it suitable for current, voltage, and harmonic analysis. It is widely applied in industrial power distribution, energy management, and electrical monitoring scenarios.

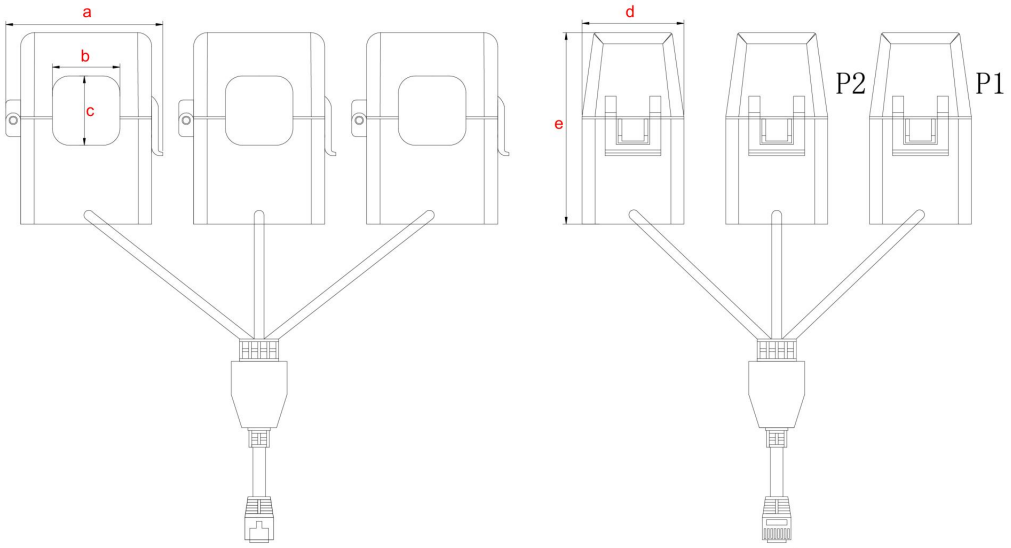
● **Specification**

Enertrek CTOV Series Current Transformers are available in four models with ratings ranging from 100A to 600A, suitable for various load types and application scenarios.

Feature / Model	CTOV-100	CTOV-200	CTOV-400	CTOV-600
Cable Aperture Diameter (mm)	Φ16	Φ24	Φ36	Φ45
Rated Current Range(A)	0 – 100	0 – 200	0 – 400	0 – 600
Recommended Cable Cross-Section(mm²)	3 – 15	10 – 24	20 – 36	25 – 45
Maximum Current (A)	120	240	480	720
Secondary Voltage (V)	0.333 V @ In	0.333 V @ In	0.333 V @ In	0.333 V @ In
Rated Load Impedance	≥ 10 kΩ	≥ 10 kΩ	≥ 10 kΩ	≥ 10 kΩ
Accuracy Class	Class 0.5 (±0.5 %)	Class 0.5 (±0.5 %)	Class 0.5 (±0.5 %)	Class 0.5 (±0.5 %)
Phase Difference at Rated Current	≤ 50′	≤ 30′	≤ 30′	≤ 30′

Non-linearity Error	≤ 0.3 %	≤ 0.3 %	≤ 0.3 %	≤ 0.3 %
Insulation Withstand Voltage	AC 4 kV / 1 min	AC 4 kV / 1 min	AC 4 kV / 1 min	AC 4 kV / 1 min
Operating Temperature	−25 ~ +75 °C	−20 ~ +75 °C	−20 ~ +75 °C	−20 ~ +75 °C
Relative Humidity	≤ 90 % RH (non-condensing)	≤ 90 % RH (non-condensing)	≤ 90 % RH (non-condensing)	≤ 90 % RH (non-condensing)
Operating Frequency Range	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz

● **Dimension**



No.	Item Description	CTOV-100	CTOV-200	CTOV-400	CTOV-600
a	Ecternal Width(mm)	38.2	44.5	66.3	72.5
b	Aperture Width(mm)	16	24	36	45
c	Aperture Depth(mm)	16	24	36	45
d	External	30.5	41	55.4	61

	Depth(mm)				
e	External Height(mm)	49.5	64	81.5	92

4.6.6 CTA Current Transformer Adapter

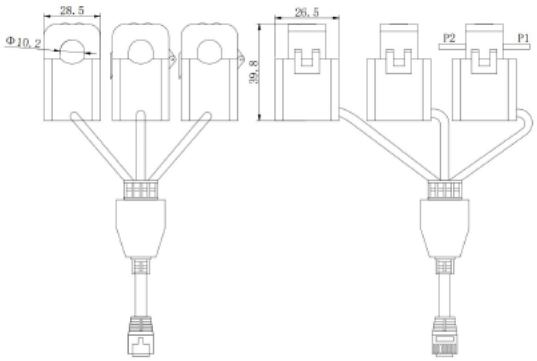
The Enertrek Current Transformer Adapter (CTA) supports connection to standard current transformers, providing a 5A/1.25mA secondary current output. This functionality is suitable for extending the current measurement range or achieving compatibility with existing CT systems.

- **Specification**

Item	Specification
Model	CTA-5A
Primary Current (A)	5
Secondary Current (mA)	1.25

- **Dimension**

Item	Size (mm)
Overall Dimensions (Length × Height × Depth)	28.5 × 26.5 × 39.8
Cable Aperture	10
Weight (kg)	



5. Installation

5.1 Enertrek_Mxx Modules Installation

DIN Rail Mounting (Enhanced Stability and Robustness)

Based on the successful completion of the basic installation, proceed with DIN rail mounting using the snap-in accessory, following the steps below:

- **Installation Steps:**

• Snap the module's upper section into the standard snap-in accessory. Press downwards to ensure the module is securely fixed.

• Insert the module (with the snap-in accessory attached) into the DIN rail, ensuring stable mounting.

• **Electrical and Communication Connection:**

• Connect the load output and communication interface (RJ12) according to the module wiring diagram.

• Ensure the RJ12 BUS is fully seated and locked to prevent communication anomalies.

• **Testing and Commissioning:**

• Apply power, check the indicator light status, and verify that the data acquisition and communication functions are operating normally.

Backplane Mounting (Enhanced Stability and Robustness)

Based on the successful completion of the basic installation, proceed with backplane mounting using the snap-in accessory, following the steps below:

• **Installation Steps:**

• Secure the standard snap-in accessory to the backplane using screws. Ensure the mounting holes are aligned for secure fastening.

• Snap the module's upper section into the fixed snap-in accessory. Press downwards to ensure the module is securely fixed.

• **Wiring and Commissioning:**

• Connect the load output and communication interface (RJ12) according to the module wiring diagram.

• Apply power and check the communication and measurement status to ensure the module is operating normally.

5.2 Enertrek_Exx Modules Installation

DIN Rail Mounting

- **Installation Steps：**

• Align the module with the DIN rail slot and press downwards from above to ensure secure fastening.

• Connect the corresponding CT modules via the RJ45 interface.

- **Electrical and Communication Connection：**

• Connect the load output and communication interface (RJ12) according to the wiring diagram.

• Ensure the RJ12 BUS connector is fully seated and locked to prevent communication anomalies.

- **Testing and Commissioning：**

• Apply power, check the indicator light status, and verify communication and measurement accuracy.

5.3 Enertrek_CTO & CTOV Split-Core CT (Current/Voltage Output Type) Installation

Cable Installation

It is highly recommended that the installation of the Enertrek_CTO/CTOV Split-Core CTs be performed under a de-energized state to ensure safety. If installation must be carried out on live cables, strictly adhere to the following steps:

- **Preparation**

• Ensure the CT is suitable for the cable being measured and that the secondary output matches the adapter input specifications (CTO with E10, CTOV with E21).

• Check that the surface of the busbar or cable is clean and undamaged.

• Based on measurement requirements, confirm that the current direction (CT direction arrow) is correct and that the turns ratio configuration meets the specifications.

- **Installation Steps**

Connect Output Wires

• Before mounting the CT, connect the output wire to the measuring module's input port (RJ45), ensuring a secure connection.

Mount the CT

• Open the CT clamp jaw and carefully place it around the cable to be measured, avoiding direct contact with live parts.

• Close the clamp jaw, ensuring it is fully locked to prevent movement that could lead to measurement errors.

Confirm Current Direction

• Ensure the CT direction arrow aligns with the direction of the current flow to avoid directional errors affecting measurement accuracy.

Secure the CT

• Use cable ties or mounting clips to reinforce the CT, ensuring it is firmly fixed and does not move.

- **Testing and Calibration:**

• Apply power and check that the measurement module is correctly reading the current data.

• Verify signal transmission to ensure data accuracy and the absence of abnormal fluctuations.

• If measurement deviation is found, perform calibration according to the equipment manual to guarantee measurement accuracy.

- **Important Notes：**

• Safety First: Live operation carries high risks; relevant safety operation procedures must be strictly followed to ensure personal and equipment safety.

• Professional Operation: It is highly recommended that such operations be performed by trained professional personnel to avoid accidents.

5.7.4 Enertrek_CTF Flexible Current Transformer (Rogowski Coil) Installation

Busbar or Cable Installation

- **Preparation：**

• Ensure the coil is suitable for the diameter of the cable being measured, and that the surface is clean and undamaged.

• Confirm that the coil turns ratio configuration is correct and meets the measurement requirements.

- **Installation Steps：**

• Open the coil clamp jaw and select the appropriate size according to the cable diameter.

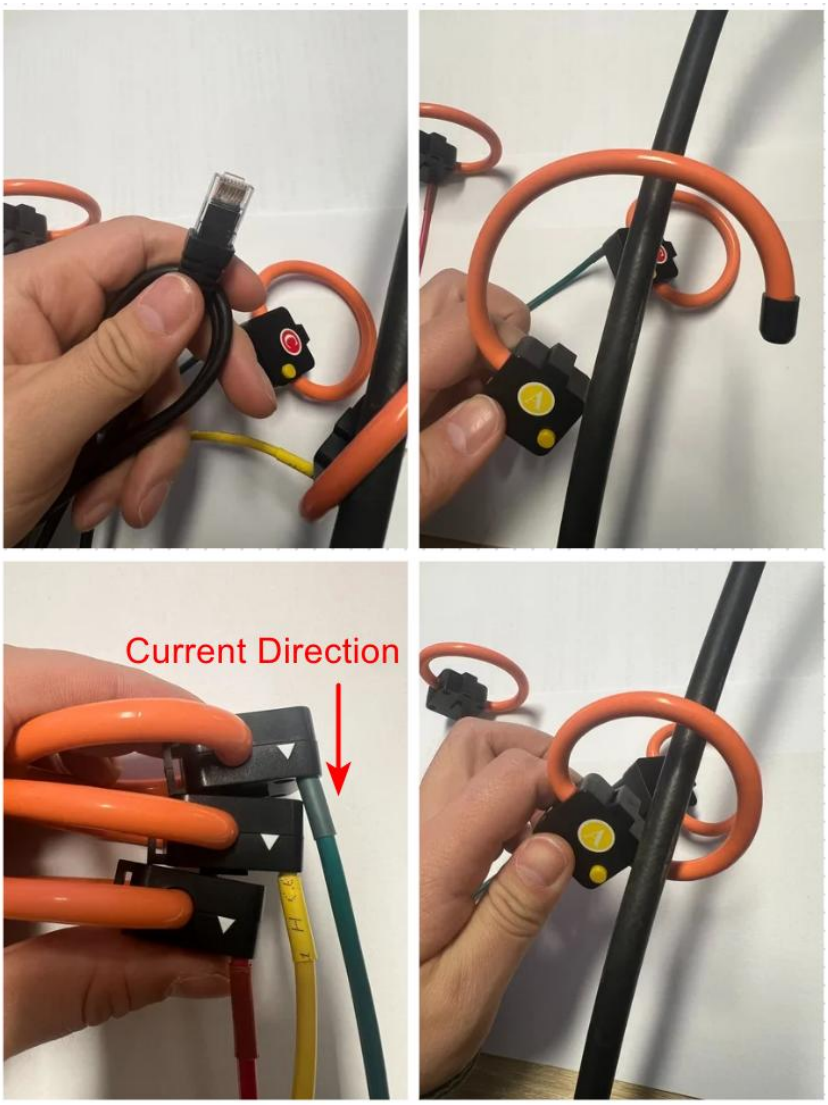
• Place the coil around the cable to be measured, ensuring it is completely enclosed and avoids contact with other conductors.

• Close the clamp jaw, ensuring a seamless closure to prevent signal interference.

• Confirm current direction: Ensure the coil direction arrow aligns with the direction of the current flow.

• Secure the coil: Use cable ties or mounting clips to stabilize the coil, preventing movement due to vibration or external forces from affecting measurement.

• Organize cables: Ensure a stable connection to the adapter, and secure excess cable runs to minimize interference.



- **Check and Test:**

•Connection Check: Confirm that all connection points are secure and correct, including the wiring for the adapter, the measurement module, and the Rogowski coil.

•Signal Test: After applying power, check that the measurement module data is normal and confirm that the Rogowski coil is functioning correctly.

•Adjustment and Optimization: If the measured data is abnormal, check the coil's closure state, adapter connection, and signal direction, and make necessary adjustments.

5.4 Enertrek_CTA 5A Current Transformer Adapter Installatio

Installation and Wiring

● **Preparation：**

•Ensure the adapter's input matches the CT's secondary output, and that the current direction is correct.

•Check the integrity of the adapter and cables; ensure there is no damage or looseness.

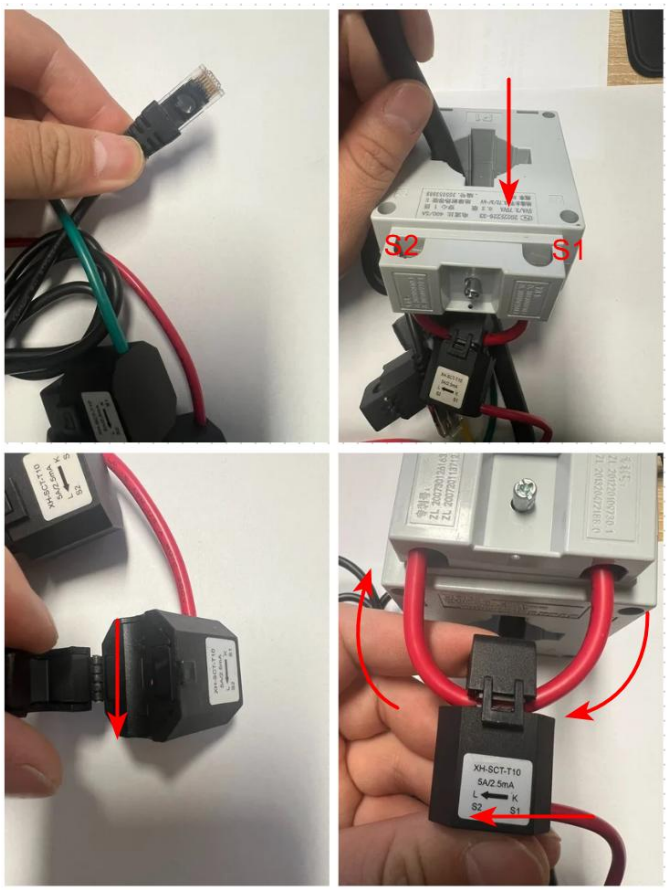
● **Installation Steps**

•Connect the adapter input to the CT's secondary output terminals, ensuring a secure connection.

•Connect the adapter output to the measuring module's input (e.g., RJ45).

•Confirm current direction: Ensure the adapter's direction arrow aligns with the CT's current flow direction to avoid directional errors.

•Secure the connection: Use insulating tape or cable ties to secure the cables and the adapter, preventing movement and ensuring connection stability.



● **Testing and Calibration：**

• Apply power and check that the measurement module is correctly reading the current data.

• Verify signal transmission to ensure data accuracy and the absence of abnormal fluctuations.

• If measurement deviation is found, perform calibration according to the equipment manual to guarantee measurement accuracy.

5.5 Enertrek_DIO I/O Control Module Installation

DIN Rail Mounting

● **Installation Steps：**

• Align the module with the DIN rail slot and press downwards from above to ensure secure fastening.

● **Electrical and Communication Connection：**

• Connect the signal input, signal output, and communication interface (RJ12) according to the wiring diagram.

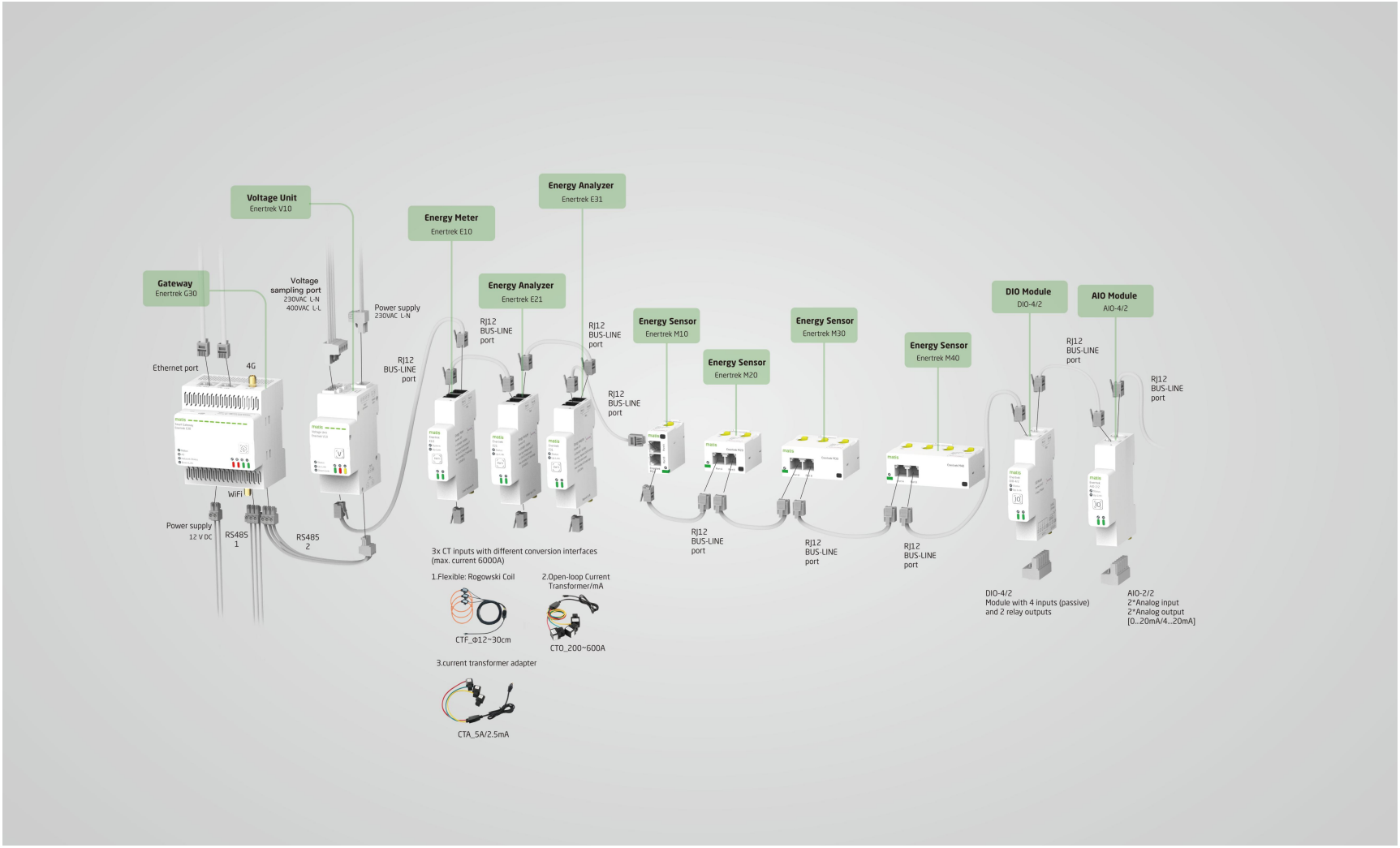
• Ensure the RJ12 BUS connector is fully seated and locked to prevent communication anomalies.

● **Testing and Commissioning：**

• Apply power, check the indicator light status, and verify the communication status.

6. System Connection

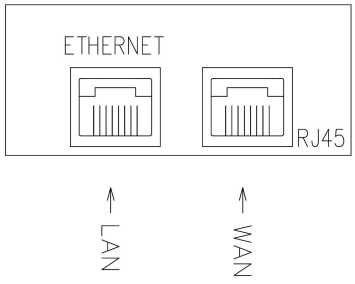
6.1 Enertrek System Connection Diagram



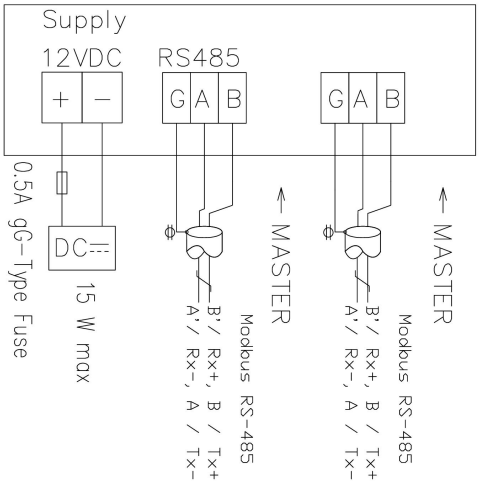
6.2 Terminal Description Diagram

6.2.1 Smart Gateway

Network Port

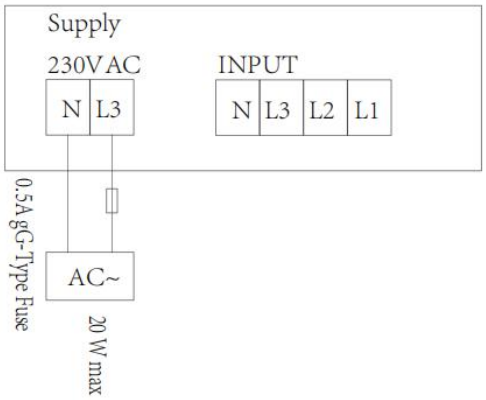


Power Supply / RS485

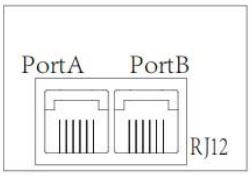


6.2.2 Voltage Unit

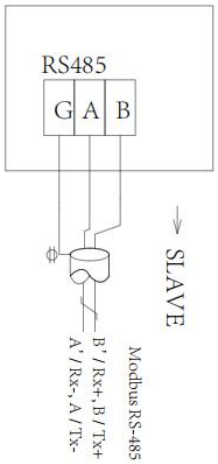
Power Supply and Voltage Sampling



Cascade BUS

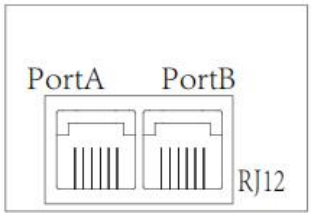


RS485



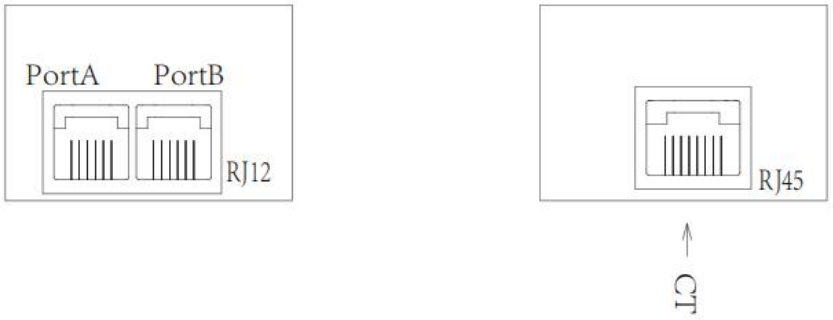
6.2.3 Energy Sensor

Cascade BUS



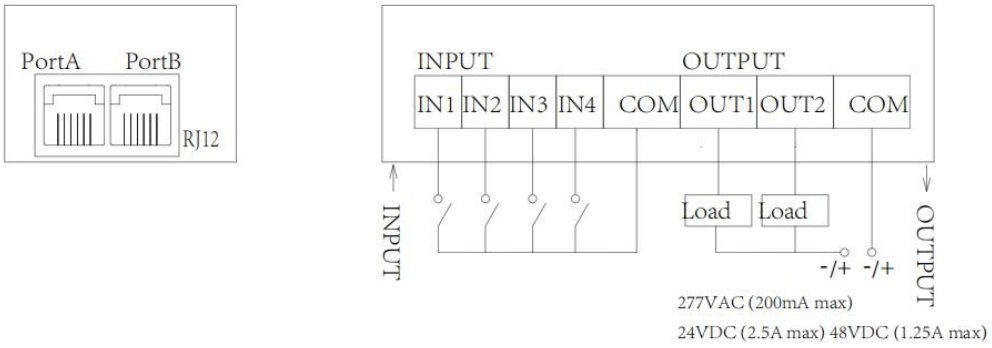
6.2.4 Energy Meter and Energy Analyzer AC

Cascade BUS **CT Plug-in Port**



6.2.5 I/O Module DI/DO

Cascade BUS **Digital I/O DI/DO**



6.3 Current Transformer Connection

6.3.1 Enertrek_Mxx Module (Internal Current Transformer)

● **Features：**

• Integrated built-in Current Transformer, requiring no external connection devices.

• Suitable for small current measurement; easy to install.

● **Connection Method：**

• Pass the conductor to be measured directly through the M module's built-in aperture, ensuring the conductor is centered.

• Once the conductor is fixed, the M module can complete the current measurement.

• Use the RJ12 interface to connect the M module to the Enertrek system BUS for data transmission.

6.3.2 Enertrek_Exx Module (External Current Transformer, RJ45 Connection)

● **Features:**

• Supports connection to a variety of external Current Transformers (CTs), such as split-core CTs, Rogowski coils, and 5A CT adapters.

• Uniformly uses the RJ45 interface to connect CTs, allowing for flexible installation.

● **Connection Method:**

CT Installation：

• Secure the split-core CT or Rogowski coil onto the cable being measured, or connect the 5A CT via the adapter.

• Pay attention to the polarity marking(P1 pointing to the power side， P2 pointing to the load side)。

RJ45 Interface Connection：

• Use the signal cable provided with the CT and insert it into the E module's RJ45 interface.

• Ensure the connection is secure to prevent looseness.

System Communication：

• The E module communicates with the master device via the Enertrek system BUS, supporting MODBUS RTU protocol for measurement data transmission.

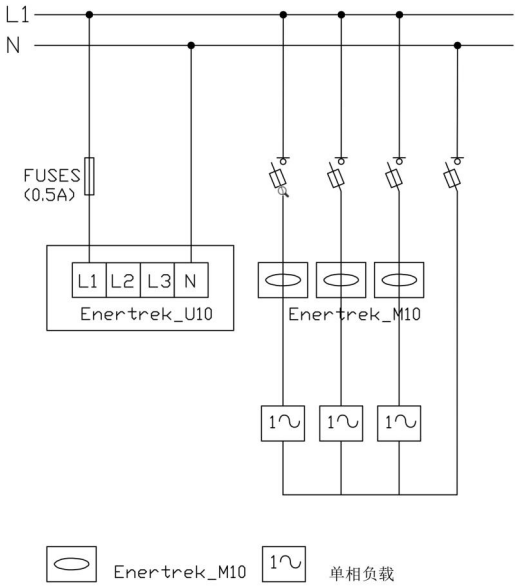
6.3.3 Enertrek_MXX Power Supply System and Load Configuration Instructions

- **1L+N Single-phase Two-wire System**

Consists of one line wire (L) and one neutral wire (N). Commonly used in household and small load scenarios.

• Applicable Load: Single-phase loads

• Configuration：3*M10

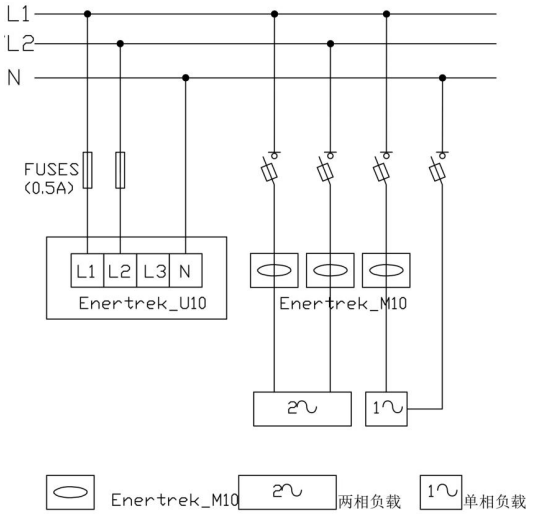


- **2L+N Single-phase Three-wire System**

Includes two line wires (L1, L2) and one neutral wire (N). Typically used for residential power supply under the North American standard.

• Applicable Load: Two-phase loads and single-phase loads

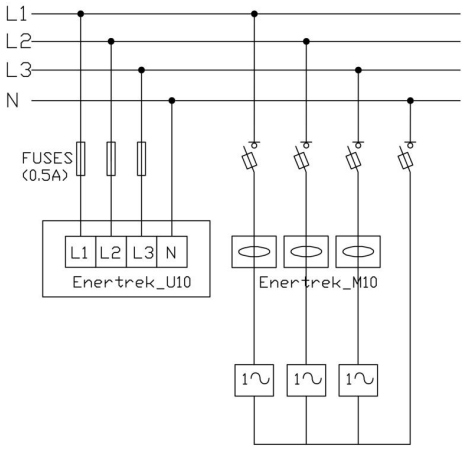
• Configuration：2M10+1M10

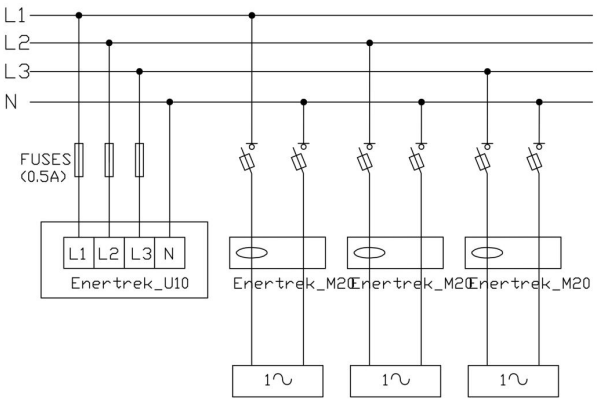


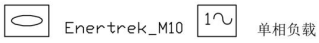
● 3L+N Three-phase Four-wire System(Single-Phase Loads

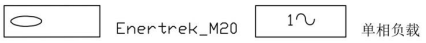
• Applicable Load: Three sets of single-phase loads

• Configuration： 3*M10 or 3*M20







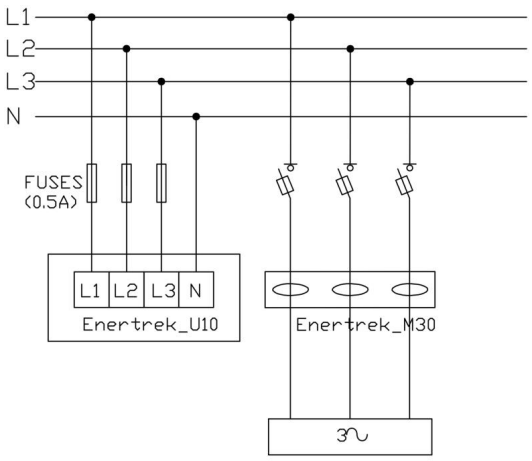


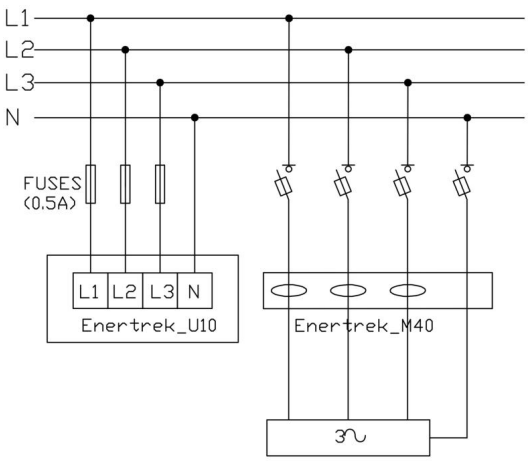
● 3L+N Three-phase Four-wire System(Three-Phase Loads)

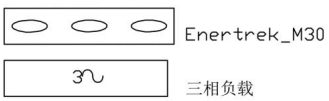
The most common low-voltage power distribution system, including three line wires(L1,L2 and L3) and one neutral wire (N), Typically used for industrial equipment and building power supply systems.

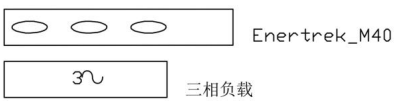
• Applicable Load: Three-phase four-wire loads

• Configuration： 1*M30 or 1*M40







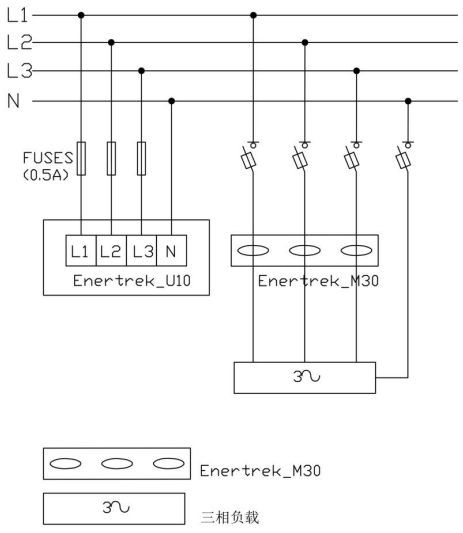


● **3L+N Three-phase Three-wire System**

Lacks a neutral line, containing only three line wires(L1, L2 and L3). Primarily used for motor loads or high-voltage power distribution systems.

• Applicable Load: Three-phase three-wire loads

• Configuration： 1*M30

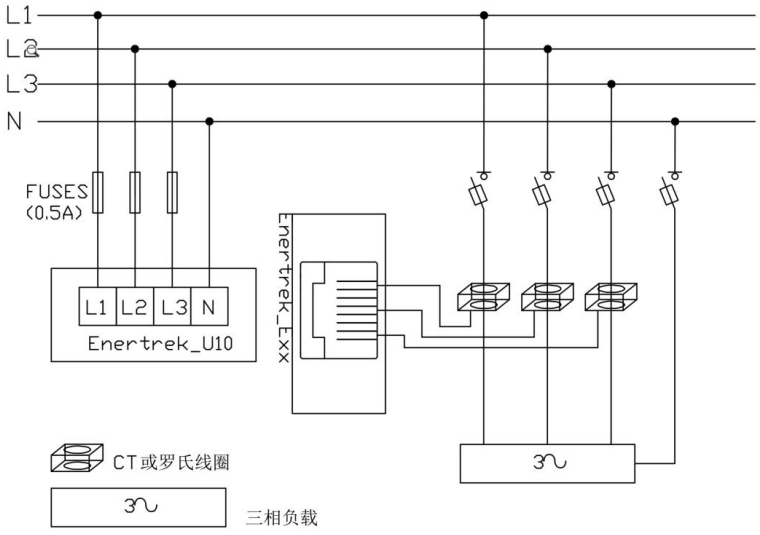


6.3.4 Enertrek_EXX Power Supply System and Load Configuration Instructions

● **3L+N Three-phase Four-wire System**

• Applicable Load: Three-phase four-wire loads

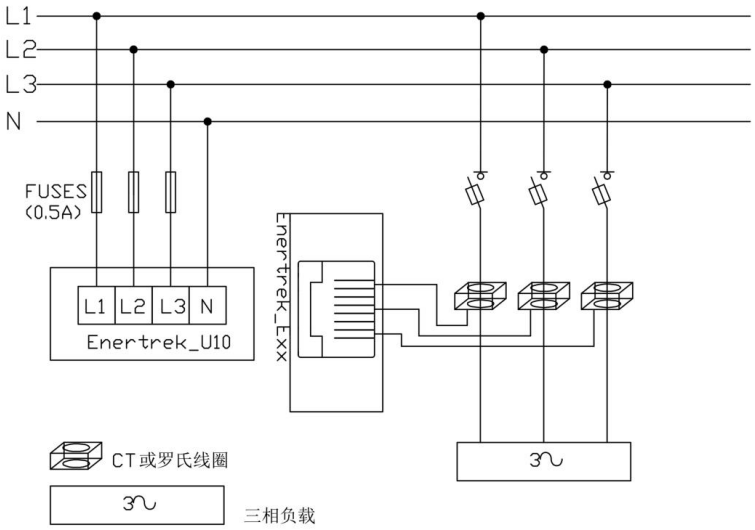
• Configuration： 3*CT



● **3L+N Three-phase Three-wire System**

• Applicable Load: Three-phase three-wire loads

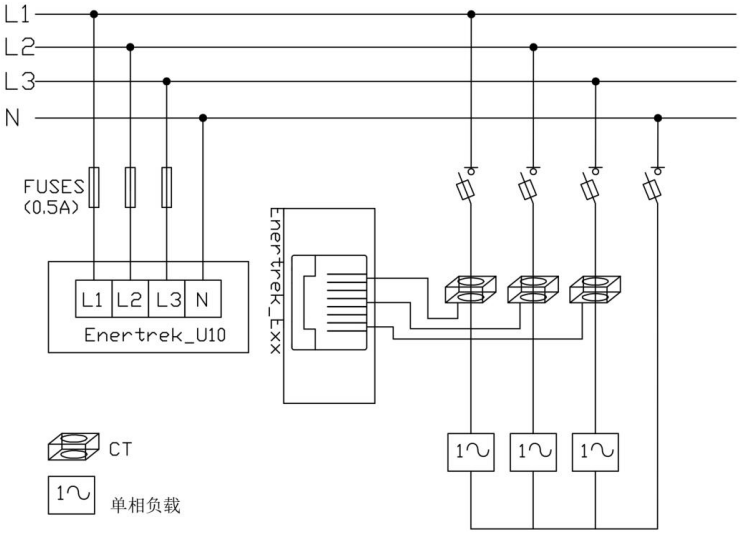
• Configuration：3*CT



● 3L+N Three-phase Four-wire System(Single-Phase Loads)

• Applicable Load: Three sets of single-phase loads

• Configuration：3*CT



7. Enertrek_Bus

7.1 Device Power Consumption

Module Name	Model	Power Provided(W)	Power Consumption(W)
Auxiliary Power Supply Module	Enertrek-AP	25	-
Display Panel	Enertrek_D10	-	2
Smart Gateway	Enertrek_G30	-	1.5
Voltage Unit	Enertrek_V10	15	0.8
Energy Sensor-1P	Enertrek_M10	-	0.2
Energy Sensor-2P	Enertrek_M20	-	0.2
Energy Sensor-3P	Enertrek_M30	-	0.35
Energy Sensor-4P	Enertrek_M40	-	0.35
Energy Meter(mA CT/ A CT)AC	Enertrek_E10	-	0.5
IO Module	Enertrek_DIO-4/2	-	0.5
IO Module	Enertrek_AIO-2/2	-	0.5

7.2 Calculation Rule for Maximum Number of Products Allowed on the Enertrek_Bus

7.2.1 Rule Description

• The total power consumption of all devices connected to the Enertrek_Bus must not exceed the power provided by the 12 VDC power supply.

• Power Supply Limit: Maximum 15W.

Enertrek_V10 Voltage Unit with a maximum output power of 15W

Module Name	Model	Property	Power Provided(W)	Power Consumption(W)	Quantity	Total Power Consumption(W)
Smart Gateway	Enertrek_G30	Essential	-	1.30	1	1.3
Voltage Unit	Enertrek_V10	Essential	15	1.10	1	1.1
Energy Sensor-1P	Enertrek_M10	Optional	-	0.10	3	0.3
Energy Sensor-2P	Enertrek_M20	Optional	-	0.10	3	0.3
Energy Sensor-3P	Enertrek_M30	Optional	-	0.15	3	0.45
Energy Sensor-4P	Enertrek_M40	Optional	-	0.15	3	0.45
Energy Meter (mA CT/ A CT)AC	Enertrek_E10	Optional	-	0.15	3	0.45
IO Module	Enertrek_DIO-4/2	Optional	-	0.20	2	0.4
IO Module	Enertrek_AIO-2/2	Optional	-			
Remaining Power/Quantity/Total Power Consumptio			10.25		19	4.75

n						

8. Status and Indicators

8.1 Smart Gateway Enertrek_Gxx

8.1.1 Gateway Status LED

Indicates the status of the gateway.

Name	Color	Status	Description
Operation Indicator (Green, Red)	Solid Green	Initialization / Operational	Device operating normally
	Flashing Green (2 flashes/second)	Reset (Level 1)	Confirm Reset Button (Press for 5 to 10 seconds). IP settings are reconfigured to DHCP mode.
	Rapidly Flashing Red (2 flashes/second)	Reset (Level 2)	When the Reset button is pressed for more than 15 to 20 seconds, the Red light rapidly flashes (2 flashes/second).
	Flashing Red (1 flash/second)	Duplicate Downstream Address	Flashing Red (1 flash/second): The system detected a duplicate downstream device address. Check and replace the downstream device address.
	Solid Red: Not in operation or hardware failure	Fault	Solid Red: Not in operation or hardware failure.
	Alternating Red/Green Flash	Device firmware is being upgraded.	

	(2 flashes/second)		

8.1.2 4G Status LED

Name	LED Indicator	Status	Description
Network Status Indicator (Green)	Solid Green	4G module operating normally	
	Off	4G module not working / inactive	

8.1.3 Network Status LED

The Network Status LED indicates the network status of the gateway.

Name	LED Indicator	Status	Description
Network Status Indicator (Blue, Orange)	Solid Blue	Device WiFi/Ethernet/4G data communication is normal.	Solid Blue indicates the device is connected to the platform.
	Solid Orange	Device WiFi/Ethernet/4G data communication is abnormal.	Solid Orange indicates a network anomaly; the device is not connected to the platform.

8.1.4 RS485 Traffic Status LED

The traffic on the RS485 serial line is indicated by the Blue LED:

The Blue LED will flash when the gateway is transmitting or receiving data on the RS485 network. The Blue LED will be off when no messages are being transmitted or received.

Name	LED Indicator	Status
Network Status Indicator (Blue)	Flashing Blue (Normal)	Serial data transmission or reception
	Off / Solid Off	No data being transmitted or received

8.1.5 Ethernet Communication LED

The Ethernet bi-color LED indicates the communication status of the Ethernet ports ETH1 and ETH2.

LED Indicator	Status Indication
Yellow	10Mbps Link
Flashing Yellow	10Mbps Activity
Green	100Mbps Link
Flashing Green	100bps Activity

8.2 Voltage Unit Enertrek_Vxx

8.2.1 Run LED Status

Name	LED Indicator	Status Indication	Description
Operation Indicator(Green, Red)	Flashing Green (1 flash/second)	Device operating normally	

8.2.2 Uplink LED Status

Name	LED Indicator	Status Indication	Description
Uplink COM Indicator (Blue)	Flashing Blue	Serial data transmission or reception	
	Off / Solid Off	No data being transmitted or received	

8.2.3 Downlink LED Status

Name	LED Indicator	Status Indication	Description
Downlink COM Indicator (Blue)	Solid Blue	Device missing or address anomaly during the	Resolving downstream device address anomaly

		automatic downstream device discovery process.	via auto-discovery.
	Flashing Blue	Serial data transmission or reception	
	Off	No data being transmitted or received	

8.3 Energy Sensor Enertrek_Mxx

8.3.1 Run LED Status

Name	LED Indicator	Status Indication
Operation Indicator (Green, Red)	Flashing Green (1 flash/second)	Device operating normally
	Flashing Red	Serial data transmission or reception

8.4 Energy Meter and Energy Analyzer AC Enertrek_Exx

8.4.1 Run LED

Name	LED Indicator	Status Indication
Operation Indicator (Green, Red)	Flashing Green (2 flashes/second)	Device operating normally
	Solid Red	Communication fault / failure
	Flashing Red (2 flashes/second)	Configuration issue / problem

8.4.2 Communication LED

Name	LED Indicator	Status Indication
COM Indicator (Blue)	Flashing Blue (Normal)	Serial data transmission or reception
	Off	No data being transmitted or received

8.5 IO Module Enertrek_DIO-4/2、Enertrek_AIO-2/2

8.5.1 Run LED

Name	LED Indicator	Status Indication
Operation Indicator (Green, Red)	Flashing Green (2 flash/second)	Device operating normally
	Solid Red	Communication fault / failure
	Flashing Red (2 flashes/second)	Configuration issue / problem

8.5.2 Communication LED

Name	LED Indicator	Status Indication
COM Indicator(Blue)	Flashing Blue (Normal)	Serial data transmission or reception
	Off	No data being transmitted or received

9. Automatic Address Allocation Instructions

Configuration Steps: System automatically completes.

The Enertrek V module supports fully automatic address allocation, requiring no manual operation or intervention from a host computer. The system automatically identifies and completes the configuration upon power-up.

- **Automatic Identification Upon Power-Up**

When the device is powered on, the system automatically scans all modules on the bus and assigns a unique communication address to each module.

- **Dynamic Device Detection**

When a new module is connected, the system automatically detects it and assigns a new address to the added device.

When an existing module is disconnected or fails, the system automatically identifies it and shields that device address, maintaining normal communication.

- **Address Self-Verification Mechanism**

The system includes an address conflict detection and correction function. When a duplicate address is detected, the system will automatically re-allocate addresses, ensuring network address uniqueness and stability.

- **Automatic Activation**

All address allocation processes are completed automatically in the background, requiring no manual confirmation. Upon completion of configuration, the module's indicator light will briefly flash to indicate status synchronization.

10. Communication

10.1 Enertrek System Communication Overview

The Enertrek system communicates via RS485 or Ethernet, and measurement data is primarily accessed through the following devices：

• Enertrek_VXX also serves as Voltage Unit

• Enertrek _GXX Smart Gateway

• Enertrek_DXX Data Management and Display Module

All serve as core access points for measurement data, supporting the following communication protocols:

- Modbus RTU
- MQTT
- HTTP

10.2 Enertrek_VXX Circuit Device Access

10.2.1 Access via Host PC Software：

• Use the Enertrek_Vision host PC software to connect to the Enertrek_VXX circuit devices via RS485 communication.

• Enables monitoring and data reading of the circuit devices.

10.2.2 Access via Gateway:

• Use the WAN port of the Enertrek_GXX Series Gateway to access and read data from downstream devices.

• Supports direct monitoring and management of devices via the Web interface.

10.3 Enertrek_DXX Data Management and Display Module

10.3.1 Connection and Functionality：

• Enertrek_DXX Data Management and Display Module connects to the Enertrek_Vxx circuit devices via RS485.

• Provides data management and local display functionality, facilitating real-time viewing of device status.

10.3.2 Multi-Device Access Scenarios：

• If the Enertrek_DXX Data Management and Display Module is used simultaneously with other host PC devices (such as Enertrek_Vision software), an RS485 time-sharing buffer must be added.

• Time-Sharing Buffer Functionality：

• Ensures conflict avoidance when multiple devices communicate on the same RS485 bus.

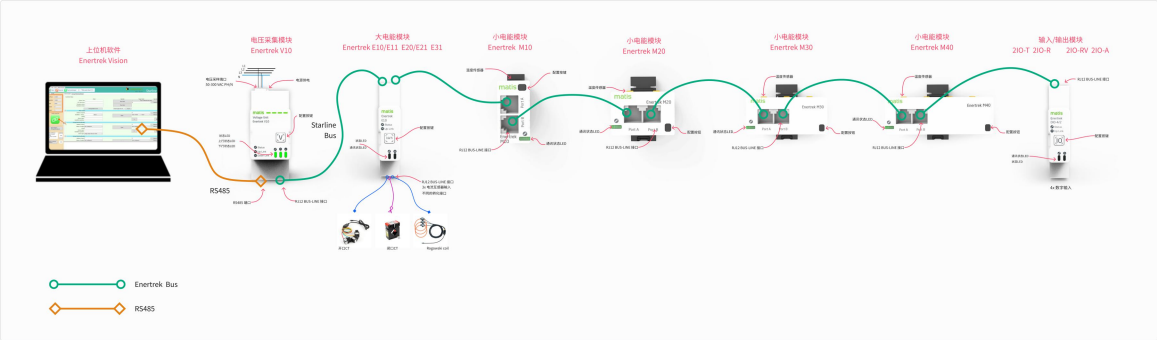
• Enhances system communication stability and data transmission efficiency.

10.4 Enertrek Modbus Protocol (See Communication Protocol Document)

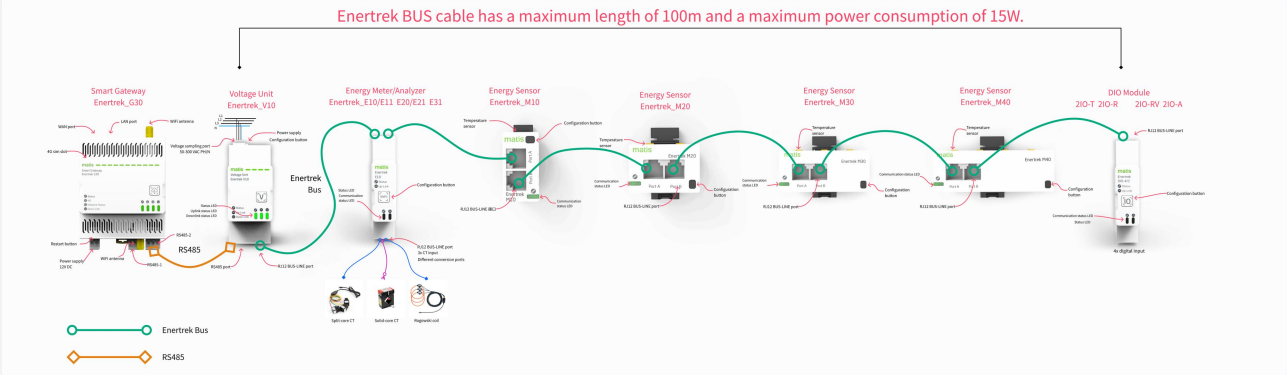
10.4.1 Configuration

Access and Configuration via Host PC Software:

Parameters for Enertrek_Vxx、Enertrek_Mxx and Enertrek_Exx can be configured via Enertrek_Vision.

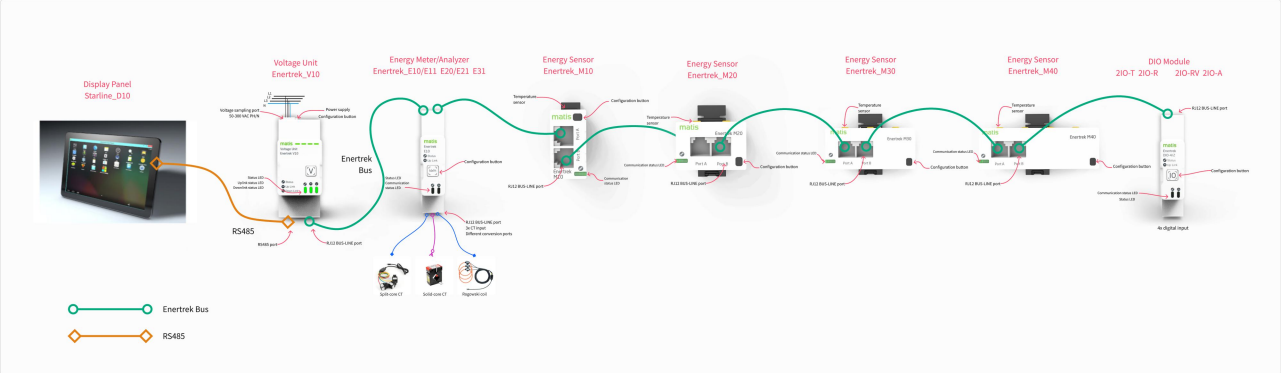


Access via Gateway



Access and Configuration via the Data Management and Display Module:

Parameters for Enertrek_Vxx、Enertrek_Mxx、Enertrek_Exx can be configured via Enertrek_D10.



11. Technical Features

11.1 Enertrek_Gxx

Feature	Parameter
Processor	ARM926EJ-S Core
RAM	Max operating speed 300 MHz
DDR	Built-in 64 MB DDR II memory
eMMC	GB
USB 2.0	USB Host / Device
Encryption/Decryption Engine	• ECC-256 • AES-256 • RSA-2048 • SHA-512 • HMAC • Random Number Generator
Operating System	Deeply customized Linux-based system

11.2 Enertrek_Vxx

Feature	Parameter
Current	Supports various current ranges to meet different load current requirements.

Measurement	
Compatible Current Transformers	CTO Split-core, CTF Flexible Rogowski Coil
Current Measurement Accuracy	• Class 1 when using CTO CTs • Class 1 when using CTF Flexible Rogowski Coils
Connection Method	Dedicated cable with RJ12 connector, ensuring stable and reliable connection.
Energy Measurement	Accurately meters various energy parameters, meeting diverse power monitoring needs.
Active Energy Accuracy	Class 0.5
Reactive Energy Accuracy	Class 1
Communication Method	Supports ModBUS RTU protocol and Enertrek BUS (RJ12) interface communication, ensuring data exchange with the host system.
Anti-Interference Capability	High anti-interference design, suitable for application scenarios with complex electrical environments.
Installation Method	Quick wiring and easy to install, suitable for distribution cabinets and system retrofits, adapting to different load scenarios.
Scalability	Supports expansion of more modules via the Enertrek BUS (RJ12), flexibly meeting complex system requirements.

11.3 Enertrek_Mxx

Application		M-10	M-20	M-30	M-40
Basic Parameter	Number of Current Inputs	1	1	3	3
	Base Current Ib	10A	10A	10A	10A
	Maximum Current Imax	63A	63A	63A	63A

	Accepted Load Types	1P 1P+N	1P+N	3P 3P+N	3P+N
Metering	±kWh、±kvarh、kVAh	•	•	•	•
Multi-Parameter Measurement	I1、I2、I3、ΣP、ΣQ、ΣS、ΣPF	•	•	•	•
	P、Q、S、PF Each Phase	•	•	•	•
Specification	Width	18mm	36mm	54mm	72mm

11.4 Enertrek_Exx

Feature	Parameter
Current Measurement	Supports various current ranges to meet different load current requirements.
Compatible Current Transformers	CTO Split-core, CTF Flexible Rogowski Coil
Current Measurement Accuracy	• Class 1 when using CTO CTs • Class 1 when using CTF Flexible Rogowski Coils
Connection Method	Dedicated cable with RJ12 connector, ensuring stable and reliable connection.
Energy Measurement	Accurately meters various energy parameters, meeting diverse power monitoring needs.
Active Energy Accuracy	Class 0.5
Reactive Energy Accuracy	Class 1
Communication Method	Supports ModBUS RTU protocol and Enertrek BUS (RJ12) interface communication, ensuring data exchange with the host system.
Anti-Interference Capability	High anti-interference design, suitable for application scenarios with complex electrical environments.

Installation Method	Quick wiring and easy to install, suitable for distribution cabinets and system retrofits, adapting to different load scenarios.
Scalability	Supports expansion of more modules via the Enertrek BUS (RJ12), flexibly meeting complex system requirements.

11.5 Enertrek_DIO-4/2、AIO-2/2

Digital I/O Module DIO-4/2

Feature	Parameter
Number of Inputs	4
Input Type	Dry contact input (passive signal), supporting logic state monitoring and high-speed pulse counting.
Input Voltage Range	12-48 VDC, with built-in current limit protection, maximum current 3mA
Input Functions	- Logic State Monitoring: Monitoring equipment status (e.g., ON/OFF, trip count). - High-Speed Pulse Counting: Supports signal counting below 100kHz
Number of Outputs	2
Output Type	Passive relay output, supporting: - 48VDC/50mA - 24VAC/100mA
Output Functions	Remote Logic Control: Achieves remote operation of devices. Alarm Linkage: Input events trigger output alarm signals.
Reliability Design	- Input terminals use relays for strong anti-interference capability (Enhanced isolation and surge protection)
Response Speed Optimization	- Input response time ≤10ms, meeting high-speed signal monitoring requirements. - Output response time ≤20ms,enabling fast actuation.

Expansion Capability	- Provides multi-channel support; for example, two modules can expand to 8 inputs / 4 outputs.

Analog I/O Module AIO-2/2

Feature	Parameter
Number of Inputs	2
Input Signal Types	- Input 1 supports 4-20 mA current input. - Output 2 supports 0-20 mA current input, compatible with 0-10 V voltage input (requires configuration).
Input Impedance	Current input: <200Ω Voltage input：>10kΩ
Input Functions	Environmental Monitoring: Connects to sensors for pressure, humidity, temperature, flow, etc., achieving multi-dimensional parameter
Number of Outputs	2
Output Signal Types	- Output 1 supports 4-20 mA current output. - Output 2 supports 4-20 mA current output, compatible with 0-10 V voltage output (requires configuration).
Output Functions	- Linkage Control: Output action triggered based on input events. - Linear Signal Output: Suitable for industrial control systems or alarm equipment.
Compatibility Design	High compatibility, supporting various sensor types and industrial equipment.
Anti-Interference Design	- Input terminals feature anti-interference design to suppress external noise interference. - Output terminals include voltage/current stabilization protection to enhance system stability.
Response Capability Optimization	Input response time ≤15ms,Output response time≤20ms
Expansion Functions	Output signal supports user-programmable adjustment to meet the needs of complex control scenarios.