EN-SERIES IO MODULE

EN-AIAO

The EN-AIAO is a compact DIN-rail mounted extension IO module with 1 analog input and 1 analog output. It communicates over Modbus RTU on RS485 with multiple baud rate options, so it works as an expansion module for the EN-CPU-V7 controller or with any third-party Modbus master.

The 0–10 V DC output sends a speed or position command while the 0–10 V DC / 4–20 mA input reads back feedback — a command-and-feedback pair for one VFD, valve or damper in a single small module.

Modbus RTU | RS485 | 1 AI | 1 AO

1 AI	1 AO	Modbus RTU	110 × 70	24 V
0–10 V / 4–20 mA input	0–10 V DC output	RS485 slave	Compact footprint (mm)	AC/DC supply

FEATURES & BENEFITS

- 1 analog input for 0–10 V DC or 4–20 mA signals
- 1 analog output, 0–10 V DC
- Command and feedback for one modulating device
- Compact 110 × 70 × 70 mm housing for small panels
- Modbus RTU slave on RS485 (B, A, GND), multiple baud rate options
- Works with EN-CPU-V7 or any third-party Modbus master
- No configuration required — ready to poll from the master
- Customer-specific IO configuration available on request
- Failed modules are replaced on site without re-programming

APPLICATIONS

AHU VFD
Speed control and speed feedback

Control Valves
Valve command and position feedback

Pump VFD
Speed control and speed feedback

Modulating Dampers
Damper command and position feedback

Typical sectors: Commercial buildings · IT parks · Pharmaceutical · Healthcare · Data centres · Industrial

TECHNICAL DATA

INPUTS & OUTPUTS	
Analog input	1, 0–10 V DC or 4–20 mA
Analog output	1, 0–10 V DC

COMMUNICATION	
Protocol	Modbus RTU (slave)
Interface	RS485 — B, A, GND
Baud rate	Multiple baud rate options
Compatible masters	EN-CPU-V7, third-party Modbus masters

CONFIGURATION	
Set-up	No configuration required
Custom IO	Customer-specific configuration on request
Commissioning	Modbus master utility (e.g. Modscan) via USB-to-RS485, or EN-CPU-V7 over IP

POWER	
Supply voltage	24 V AC/DC
Power terminals	+24V, –24V
Power consumption	To be confirmed

OPERATING ENVIRONMENT	
Operating temperature	0 °C to 50 °C
Operating humidity	0–95 % RH

MECHANICAL	
Dimensions (L × W × H)	110 × 70 × 70 mm
Mounting	DIN rail
Enclosure	ABS

STANDARDS & CERTIFICATIONS	
Certifications	CE, RoHS

ORDERING INFORMATION

PART NUMBER	DESCRIPTION
EN-AIAO	EN-series IO module — 1 AI (0–10 V DC / 4–20 mA), 1 AO (0–10 V DC), Modbus RTU RS485, 24 V AC/DC, DIN rail, 110 × 70 × 70 mm
EN-CPU-V7	SmartNova DDC Controller — Modbus master for EN-series IO modules (ordered separately)

TERMINALS & WIRING

Terminal layout as viewed from the front of the module.

NO.	GROUP	TERMINALS	SIGNAL	DESCRIPTION
1	**Analog output**	**AO1: −, +**	0–10 V DC	Command signal to a VFD, valve or damper actuator
2	**Analog input**	**AI1: −, +**	0–10 V DC / 4–20 mA	Feedback or transmitter input
3	**Power supply**	**+24V, −24V**	24 V AC/DC	Module supply input
4	**Modbus RS485**	**B (−), A (+), GND**	Modbus RTU	Connection to an EN-CPU-V7 RS485 port or third-party Modbus master

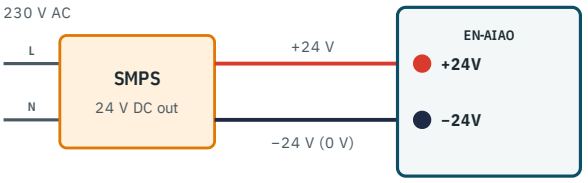
IO WIRING

- Connect AO1 + to the 0–10 V control input and AO1 − to the signal common of the device.
- Wire the feedback or transmitter signal to AI1, observing + / − polarity.
- Use shielded cable for analog signals and keep it away from mains and VFD power wiring.
- Write the output at 40004 and read the input at 40001 from the Modbus master.

RS485 BUS WIRING

- Use shielded twisted-pair cable and daisy-chain modules on the bus.
- Connect A (+), B (−) and GND to the matching terminals on the master and every module.
- Fit 120 Ω termination at both ends of long bus segments.
- Segment length up to 1200 m per TIA/EIA-485, reduced at higher baud rates.

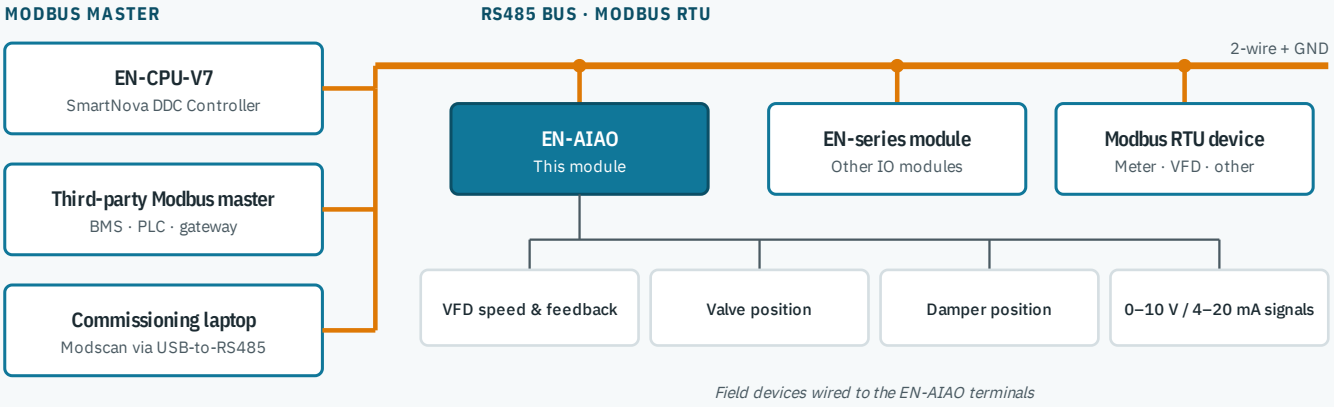
POWER SUPPLY WIRING



24 V AC/DC input

- Supply from a 24 V AC/DC source, such as a 230 V AC to 24 V DC SMPS.
- Connect + supply to +24V and − supply to −24V.
- One SMPS can feed several modules; size it for the total load.

SYSTEM ARCHITECTURE



Field devices wired to the EN-AIAO terminals

MODBUS COMMUNICATION

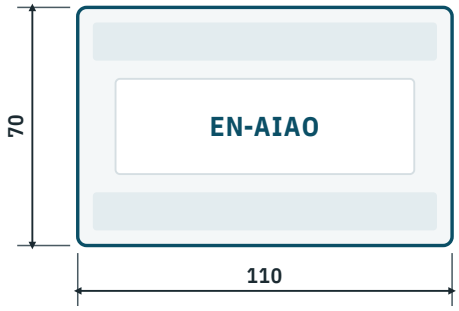
COMMUNICATION SETTINGS	
Protocol	Modbus RTU, slave
Physical layer	RS485, B (–), A (+), GND
Baud rate	Multiple options
Default slave address	To be confirmed
Data format	To be confirmed
Function codes	03, 06

Addresses use the standard Modbus 4x notation, as listed in the module address details. Register scaling for analog values to be confirmed.

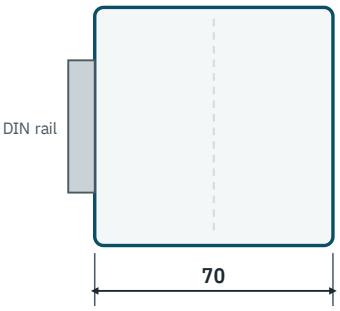
MODBUS REGISTER MAP

NO.	IO POINT	ADDRESS	TYPE	ACCESS
1	AI-1 (0–10 V / 4–20 mA)	40001	Holding register	R
2	AO-1 (0–10 V)	40004	Holding register	R/W

DIMENSIONS



FRONT VIEW



SIDE VIEW

Overall dimensions

110 × 70 × 70

L × W × H (mm)

Mounting

DIN rail

Enclosure

ABS

INSTALLATION

- Mount on DIN rail inside a control panel or enclosure.
- Leave space around the unit for ventilation and cable access.
- Isolate the power supply before wiring or servicing.
- Route RS485 and analog signal cables away from power and VFD wiring.
- A failed module can be replaced on site and the system resumes without re-programming.

COMMISSIONING

1. Mount the module and connect the 24 V AC/DC supply.
2. Wire AO1 to the device control input and AI1 to its feedback signal as per the wiring drawing.
3. Connect RS485 B (−), A (+), GND to the EN-CPU-V7 port or Modbus master.
4. Write the output and read the input using the Modbus register map.
5. Verify with Modscan over USB-to-RS485 or through EN-CPU-V7 over IP.

SYSTEM REQUIREMENTS

- EN-CPU-V7 controller or any third-party Modbus master
- Modbus master utility (e.g. Modscan) for commissioning
- USB-to-RS485 converter for commissioning over serial
- 24 V AC/DC power supply
- DIN rail mounting inside a control panel

SAFETY INFORMATION

- ▲ Installation, wiring and maintenance must be carried out by qualified personnel in line with local electrical regulations.
- ▲ Disconnect all power before connecting or removing terminal wiring.
- ▲ Install inside a closed control panel, protected from dust, water and direct sunlight.
- ▲ Operate only within the supply voltage and environmental limits stated in this datasheet.
- ▲ Observe ESD precautions when handling the unit.
- ▲ Dispose of the product as electronic waste in accordance with local e-waste regulations.

SERVICES & SUPPORT

Technical support	Installation & setup	Maintenance	Application support	Hardware support	Warranty

EnSmart™ Smart way to connect buildings

EnSmart Controls
Erode · Coimbatore · Chennai — Tamil Nadu, India
+91 99410 42612 · www.ensmart.ai

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