

Introduction to Device Integration

Original text as published before the redesign of this article. Wording unchanged.

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This document is intended for manufacturers of devices like solar inverters, hybrid inverters, EV chargers, etc. The integration of a new device to Reduxi environment is done by the Reduxi development team. However, the manufacturers should assist in the process by providing relevant information.

What is Reduxi?

Reduxi is a smart **Energy Management System (EMS)** designed to optimise the flow of electricity between generation, storage, and consumption. It connects and controls devices such as **hybrid, solar or battery inverters, EV chargers, heat pumps, HVAC systems, and grid meters**, ensuring that energy is used in the most efficient and cost-effective way.

Through real-time monitoring and advanced optimisation, Reduxi enables higher self-consumption of renewable energy, reduces costs, and supports grid stability. In battery storage setups, for example, Reduxi coordinates communication between the **Battery Management System (BMS)** and the **Power Conversion System (PCS)**, but it is important to note that Reduxi itself is not an inverter, PCS, or BMS — it is the overarching intelligence that manages and synchronises them.



How Reduxi communicates with devices?

For Reduxi to perform its role as an EMS, it must **communicate directly with connected devices**. This involves both:

- **Reading measurements and states** – Reduxi collects real-time data such as power output, consumption levels, state of charge (SOC), operating status, and grid conditions.
- **Writing commands and setpoints** – Reduxi actively sends control signals back to the devices to influence their behaviour, e.g. adjusting inverter output, controlling battery charging/discharging power, adjusting EV charging power, or activating flexible loads.

This bidirectional communication is essential: without it, Reduxi could only monitor but not optimise. By exchanging information and commands, Reduxi ensures that each device operates in coordination with the others, aligning local energy flows with economic, technical, and grid requirements.

Reduxi supports **standardised communication protocols** (such as Modbus (RTU and TCP), API, DLMS, OCPP, and others), enabling seamless interoperability with hybrid inverters, battery inverters, meters, and other controllable assets.

The most widely used way of communication is via Modbus.

Requirements for device integration to Reduxi environment

The Reduxi environment typically supports integration of the following device types:

- Battery Energy Storage System (BESS)
- Photovoltaic (PV) inverter
- Hybrid inverter
- Heating, Ventilation, and Air-Conditioning (HVAC) system
- Electric Vehicle Supply Equipment (EVSE / EV charger)
- Other compatible devices

The **primary communication protocol for device integration is Modbus**. However, API communication, M-bus, analogue control (4-20 mA), relay-based control and similar are also possible.

For the Modbus based control, the manufacturer must therefore provide a **complete Modbus register map** that clearly defines:

- **Input registers** for measurement data (e.g. voltage, current, state of charge).
- **Holding registers** for control commands (e.g. enable/disable charging, set power limits, setpoints, enable/disable commands, mode selection).
- **Discrete inputs** for system states (e.g. alarms, protection status).
- **Coils** for binary control signals (e.g. start/stop).

This register map must allow both **monitoring of system parameters** and **control of operational states**.

Example of Modbus Register Definitions for a Battery Energy Storage System:

Register Type	Address (example)	Description	Data Type	Unit	Access
Input Register	30002	Battery active power	INT16	kW	Read-only
Input Register	30003	State of charge (SOC)	UINT16	%	Read-only
Holding Register	40001	Charge/discharge power setpoint	INT16	kW	Read/Write
Coil	00001	Enable battery system	BOOL	—	Write
Discrete Input	10001	System fault active	BOOL	—	Read-only

(Addresses are examples — actual values must be defined by the manufacturer in the register map.)

Steps for Integrating a New Device

1. **Manufacturer confirmation** – The manufacturer verifies that the device complies with the previously defined requirements.
2. **Provision of documentation** – The manufacturer supplies communication and control documentation, typically in PDF or Excel format. This includes a complete Modbus register map and a summary of key registers. Alternative integration methods (e.g. API) are also possible.
3. **Device and controller installation** – A partner installs the device at the target site (e.g. residential or industrial facility). The partner also installs and connects the Reduxi controller, ensuring the device is accessible to Reduxi via TCP/IP, RS485, or another supported interface.
4. **Implementation and testing by Reduxi** – The Reduxi team develops and validates the communication and control according to the provided specifications.
5. **Partner support during testing** – The partner assists during validation, particularly when additional configuration is required through the device's local user interface.
6. **Manufacturer support** – The manufacturer provides clarification and technical assistance if questions arise during integration.
7. **Certification** – The Reduxi team finalises the integration and conducts a certification test suite to validate device compatibility.
8. **Completion** – Once certified, any device of the same type can be connected to Reduxi in less than one minute.

Specific requirements per device type

This section specifies concrete requirements depending on the type of device:

- [Battery inverters](#)
- [Hybrid inverters](#)
- Solar PV inverters (coming soon)
- HVAC (coming soon)
- EV chargers (EVSE) (coming soon)