

Operating Guide

AK-SM 800A Modbus TCP/IP Communication with the X-Gate: a step-by-step guide

This guide demonstrates how to establish communication between the X-Gate and the AK-SM 800A via Modbus TCP/IP. The goal is to integrate a third-party controller with the AK-SM 800A via Modbus TCP/IP.

Prerequisites

- Hardware: X-Gate (v5.26 or newer) and AK-SM 800A (SW4.2.x or newer)
- Software: Ensure both devices have the required software versions.
- Tools: a PC (with internet access if an update is necessary), a switch or router depending on the installation.

Wiring Connection

Below are the most common wiring connections. Other connections are possible but require networking knowledge.

Note: *It is up to the Customer to maintain a high level of security over the network configuration from an IT perspective.*

It is recommended to use static IP addresses for the X-Gate and the controller that are supposed to be integrated, either in the controllers themselves (if supported) or in the router by using MAC binding.

Details about the ethernet possibilities of both devices:

AK-SM 800A:

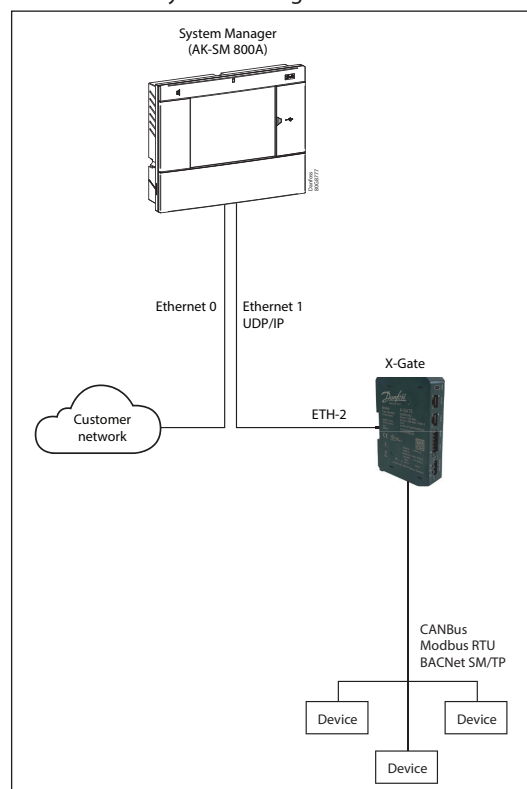
- ETH0: Supports DHCP and Static IP,
- ETH1: Requires DHCP.

X-Gate:

- ETH1: Default DHCP, support Static IP,
- ETH2: Default Static IP: 192.168.2.101, support DHCP.

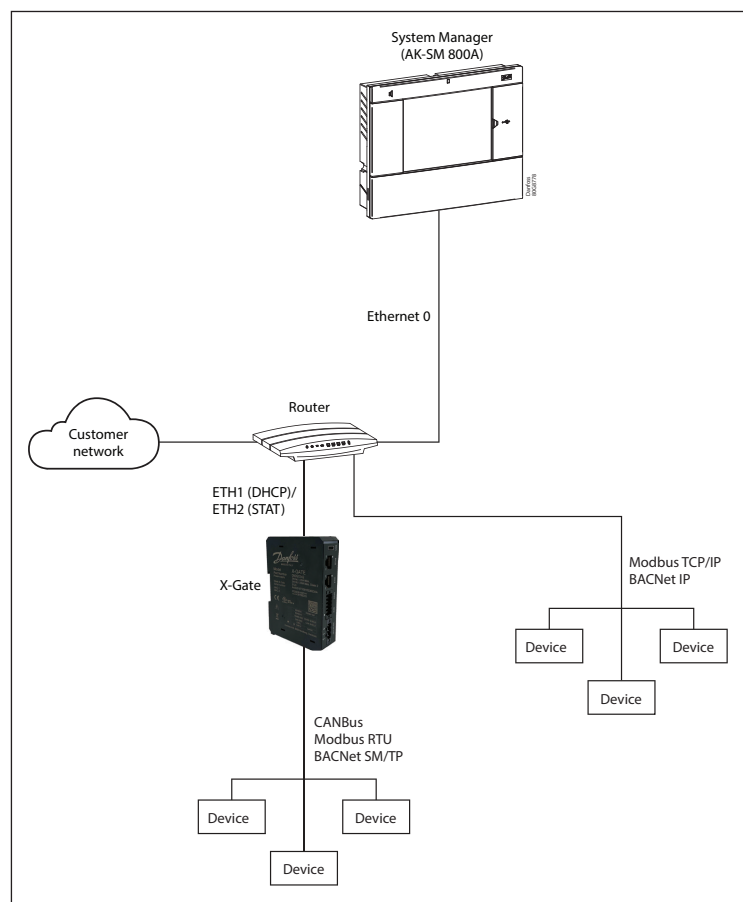
Option 1: Point to Point

Connect a PC to ETH2 to access all parameters of the X-Gate. After configuring the X-Gate, enable ETH1 on the AK-SM 800A via the local screen and connect ETH1 from the AK-SM 800A to ETH2 on the X-Gate. The X-Gate features a built-in DHCP server that can assign an IP address to the system manager.



Option 2

This option offers the most convenient method for accessing both the AK-SM 800A and the X-Gate from the customer's network. Ensure that the router is equipped with a firewall and appropriate security measures.

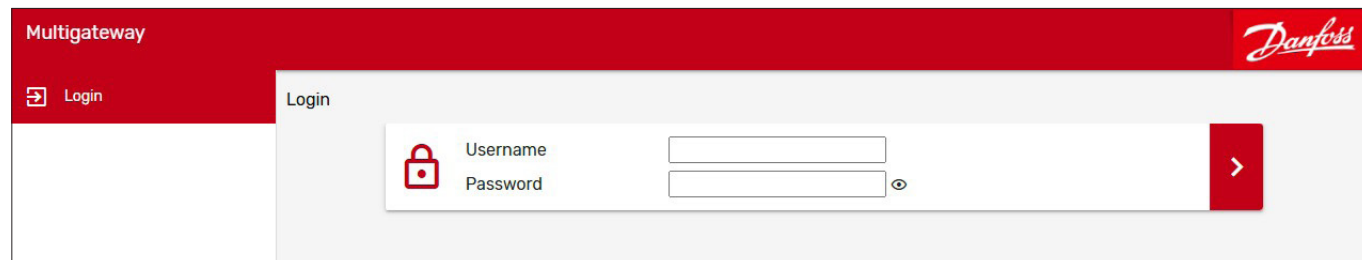


Configuration of the X-Gate

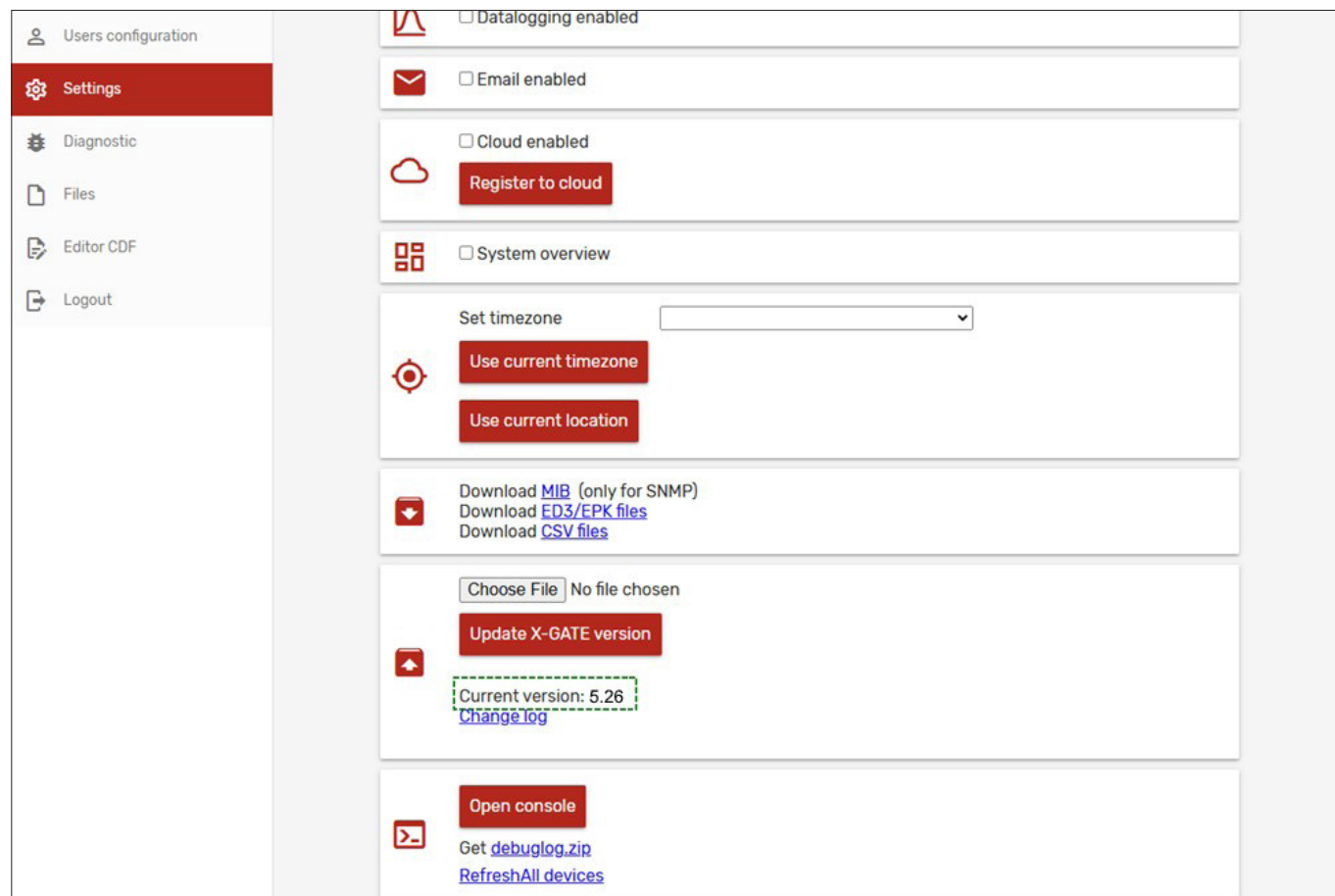
To configure the X-Gate, follow these steps: Start by logging in and verifying the software version. Next, enable the Modbus TCP Server to facilitate communication. If needed, adjust settings in the Optional Configuration section. Finally, export the ED3/EPK files, these files will then be uploaded to the System Manager for integration.

1. Log in to the X-Gate and check the software version

- Enter the IP address of the X-Gate in a web browser.
- Log in with the credentials. In case of need, use the default credentials as provided in the X-Gate User Manual.

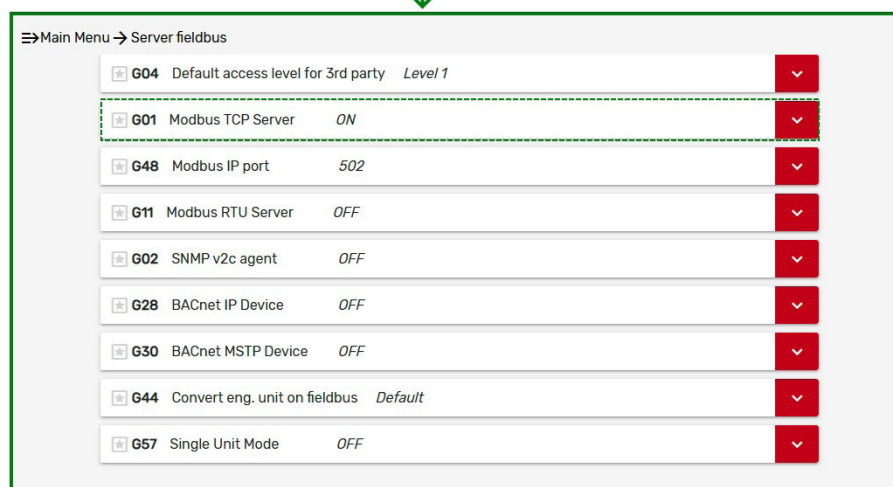
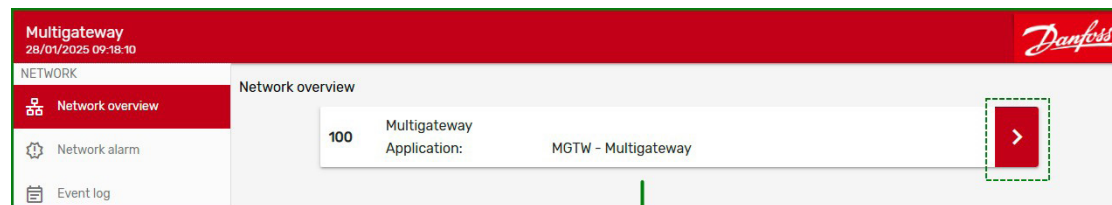


- Navigate to Settings and verify the software version is 5.26 or higher.
- Update the X-Gate software if necessary via the Danfoss X-Gate Software link: [Danfoss X-Gate Software](#).



2. Enable Modbus TCP Server

- Go to Network Overview → Server Fieldbus.
- Enable (G01) Modbus TCP Server and ensure the (G48) Modbus IP port is set to 502.
- The default Modbus address for the X-Gate is 100. If a different address is needed, please refer to point 3: Optional Configuration.



3. Optional Configuration

- If another device uses the default Modbus address (100), change the X-Gate Modbus address (as example to 42) in Supervisor settings (SU1). Apply the new address, wait for 1-2 minutes, and log out.

⇒ Main Menu → Supervisor

SU0	Site name	Multigateway	▼
SU1	Address	100	▼
SU2	Baudrate	38400	▼
SU3	Serial Settings	8E1	▼
SU4	CAN Baudrate	50kbps	▼
G35	Use external RS485	NO	▼
S10	COM1 Protocol	Auto	▼

- Log back in and remove the Multigateway with the old address in Network Configuration. Save the configuration.

Multigateway
28/01/2025 10:36:34

NETWORK

- Network overview
- Network alarm
- Event log

CONFIGURATION

- Network configuration
- Users configuration
- Settings

Network configuration

42	Multigateway	▼
100	Multigateway	▼

ADD NODE

SAVE

Protocol address help
Select protocol: ▼

Network configuration

42	Multigateway	▼
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Node Id: 100 - Multigateway ▼

Description: Multigateway

Application: MGTW - Multigateway ▼

Protocol address:

Delete Node

ADD NODE

SAVE

Protocol address help
Select protocol: ▼

- Only one Multigateway should remain in the Network Overview.

Multigateway
28/01/2025 10:38:11

NETWORK

Network overview

Network alarm

Event log

CONFIGURATION

Network configuration

Users configuration

Settings

Network overview

42

Multigateway

Application: MGTW - Multigateway

>

4. Export the ED3/EPK files

- Navigate to Settings and download the ED3/EPK files, which need to be uploaded later into the system manager.
- When exporting the ED3/EPK files, they will contain all necessary files for all of the controllers.

Multigateway
24/02/2025 14:57:28

NETWORK

Network overview

Network alarm

Event log

CONFIGURATION

Network configuration

Users configuration

Settings

Diagnostics

Files

Editor CDF

Settings

Site name: Multigateway

Unit: °C / bar

Date format: Day month year

Decimal separator: . / .

☐ NTP enabled

Set timezone: Europe/Copenhagen

Use current timezone

Use current location

Download MIB (only for SNMP)

Download ED3/EPK files

Download CSV files

6 | AQ539932415039en-000101

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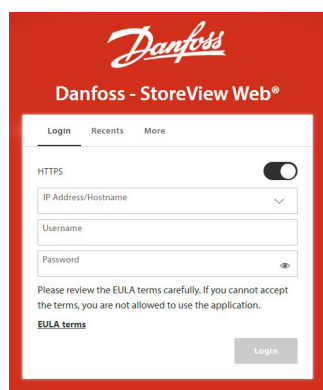
Configuration of the System Manager AK-SM 800A

Note: The configuration is based on wiring connection Option 1, which is point-to-point. The configuration for Option 2 is very similar and requires only selecting ETH0 instead of ETH1 in the settings. **Please remember that the X-Gate and the System Manager must be on the same subnet.**

To configure the System Manager, begin by logging in and checking the software version to ensure compatibility. Next, upload the ED3/EPK file to integrate necessary files. Enable ETH1 to establish network connectivity and configure the network nodes for proper communication. Verify that the X-Gate is detected within the system. Proceed with configuring the X-Gate in the System Manager to finalize setup. Lastly, perform validation to confirm that all settings are correctly applied and the system is functioning as intended.

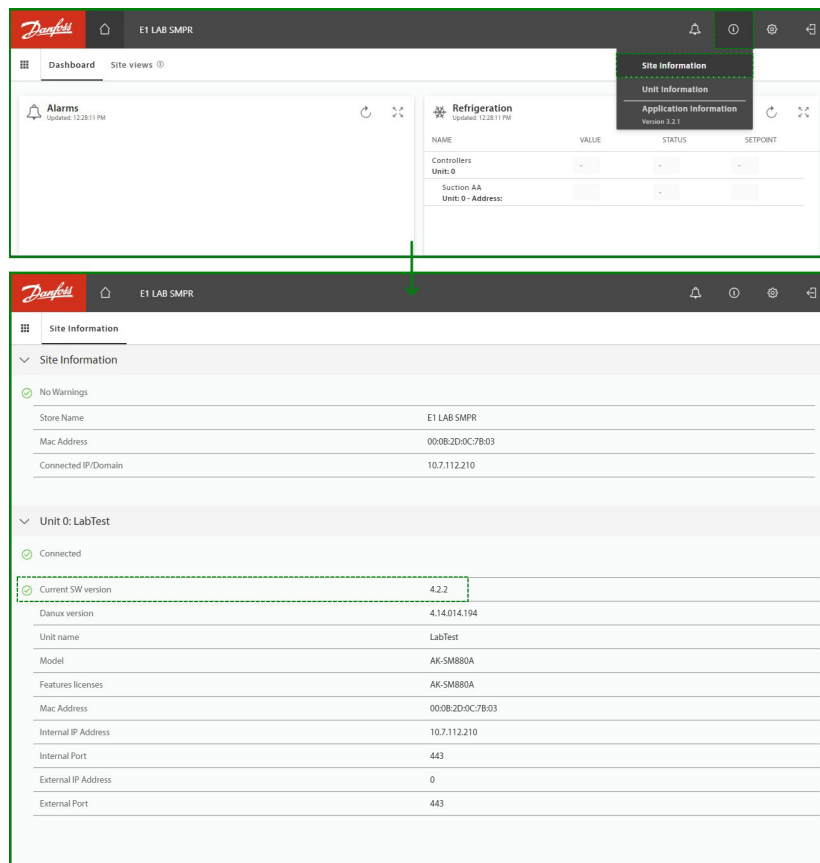
1. Log in to the System Manager and Check software version

- Use the old interface SvB5 by entering the IP address in a web browser or the new interface SvW (requires internet access or offline version download).



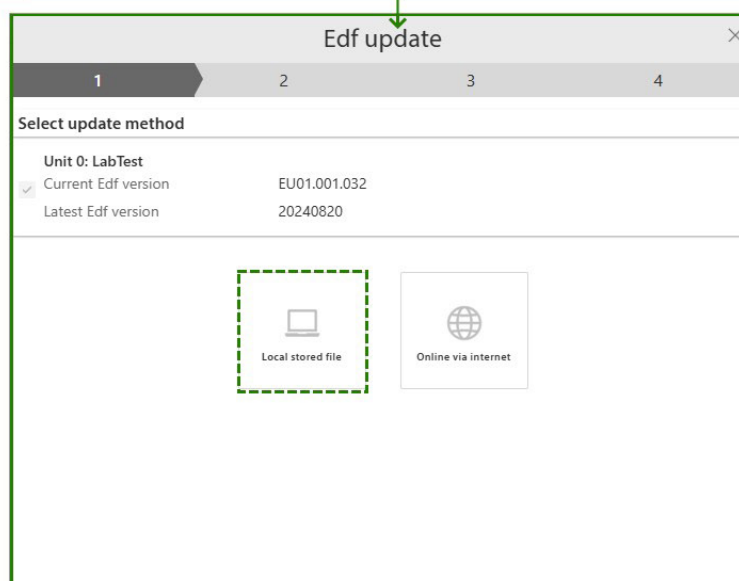
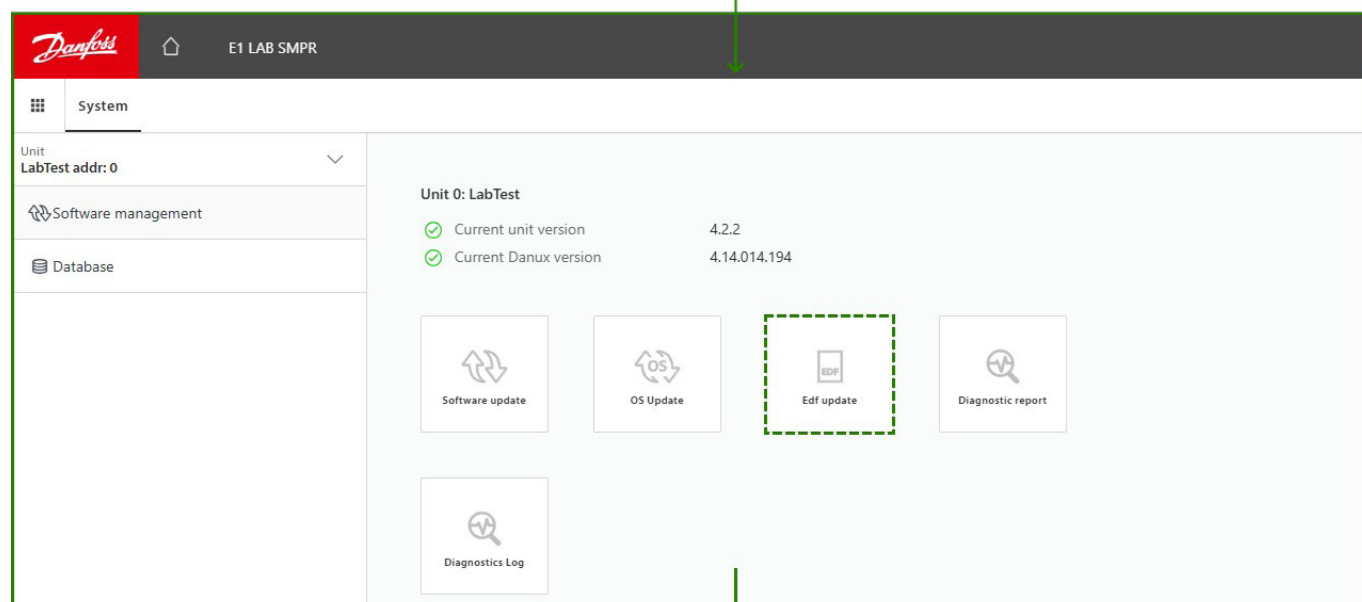
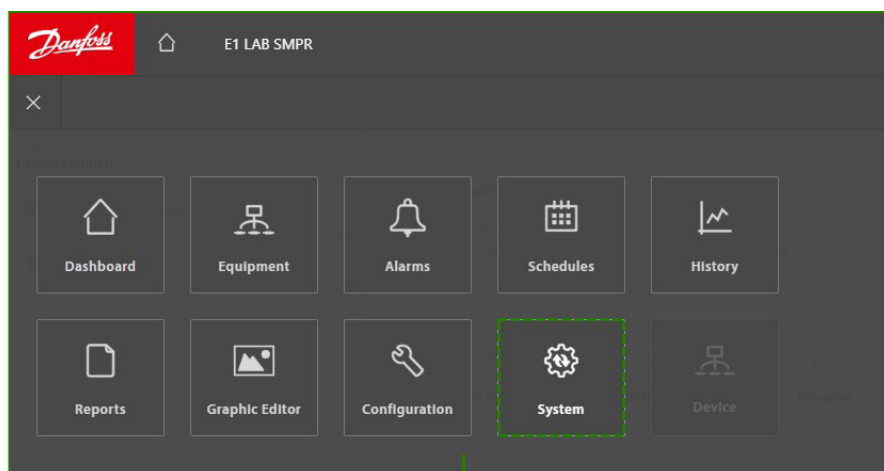
- Ensure the system manager is running version 4.2.x.
- Update the unit if necessary using the integrated online update function or download the update file from the Danfoss AK-SM 800A Software page. Note: Always update the operating system Danux first, then the software.

Depending on the devices integrated into the System Manager, an AK-SM 820A or AK-SM 880A license is required to support HVAC devices. By default, the X-Gate is categorized under the HVAC device category. The settings to change the device category can be found in the CDF Editor. For more information, please refer to the User Guide.



2. Upload the ED3/EPK file

- On your PC extract the previously downloaded “ED3Files.zip” file from the X-Gate
- Go to System → EDF update → Local stored file → Browse and select “all_edf.epk”.
- Follow the instructions to install the file.



3. Enable ETH1

- Go to Comm and check if Ethernet 1 has an assigned IP address.
- If ETH1 is disabled, enable it via the local screen.

The following steps illustrate how to enable Ethernet 1 via the local screen:

- From the main menu, select **Configuration**.
- In the **Configuration** screen, select the **Comm** tab.
- In the **Comm** configuration screen, ensure **Ethernet 1** is set to **Enabled**.

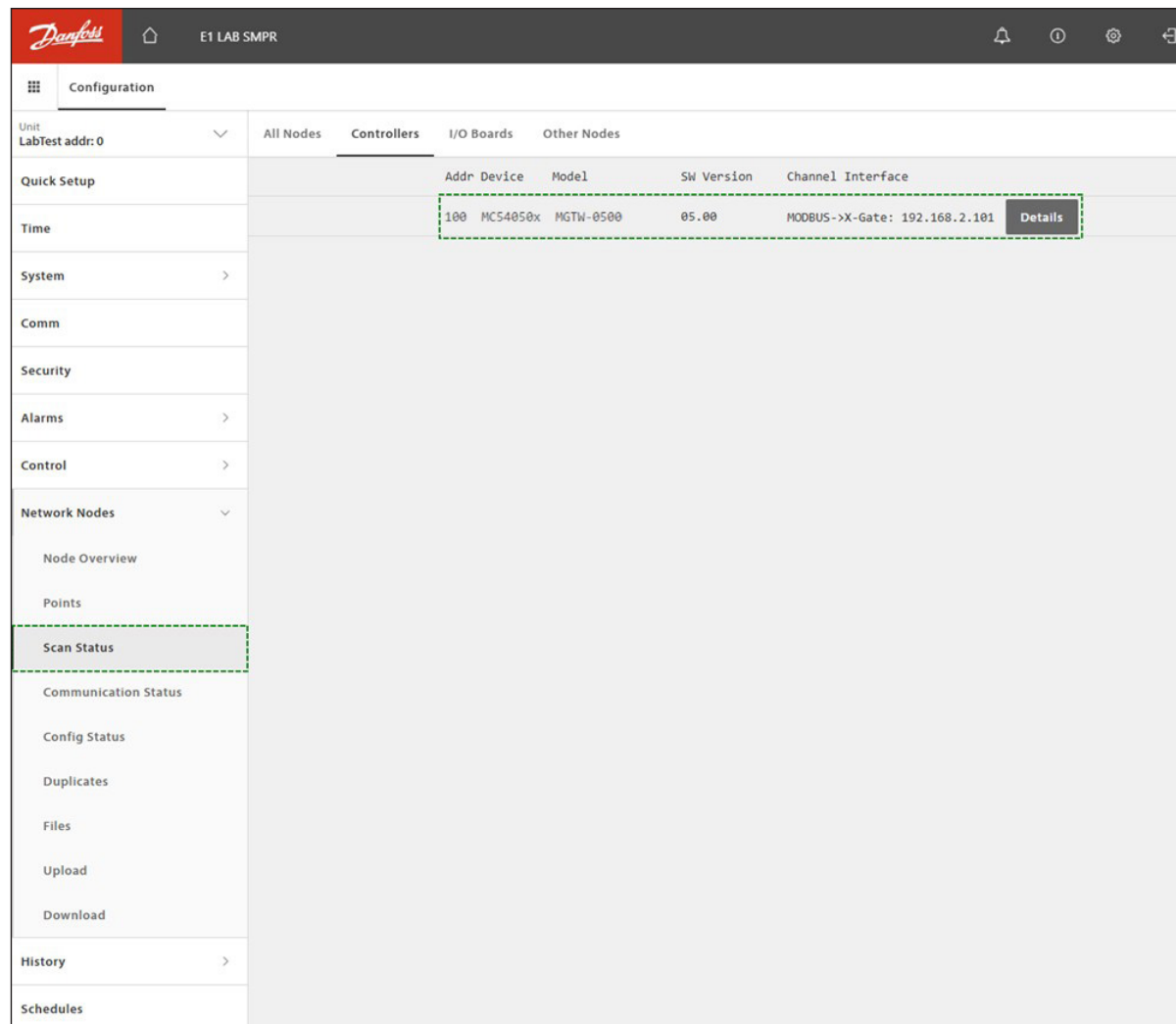
4. Configure Network Nodes

- Navigate to Network Nodes → Node Overview and set "Channel Modbus TCP" to "Use X-Gate Only" or "Modbus TCP and X-Gate" if other controllers are connected.
- Ensure the Network Connection corresponds to the used port.
- Type the **Static** IP address of the X-Gate in the "X-Gate Address" field.
- Optional: To speed up the scan process, increase the "Number of X-Gate Scan Ranges".
 - In "X-Gate Address High 1", enter the highest address of the controllers connected to the X-Gate.
 - In "X-Gate Address Low 1", enter the lowest address of the controllers connected to the X-Gate.
- Press the "Press for complete rescan" button. Depending on the other channels, the scan can take several minutes.
- After the scan, the number of "Nodes scanned on network" should increase.

Configuration	
Unit LabTest addr: 0	Node Overview
Quick Setup	Channel LONWORKS Disabled
Time	Channel MODBUS 1 Disabled
System	Channel MODBUS 2 Disabled
Comm	Channel SNMP Disabled
Security	Channel AK-IP / PI-200 Disabled
Alarms	Channel MODBUS TCP Use X-Gate Only
Control	X-Gate Settings 1
Network Nodes	Network Connection ETH1 X-Gate Address 192.168.2.101 Number of X-Gate Scan Ranges 1 X-Gate Address Low 1 100 X-Gate Address High 1 100
Node Overview	
Points	
Scan Status	
Communication Status	
Config Status	Polling Config Active (default)
Duplicates	Polling Status Active
Files	
Upload	Clear MODBUS 2 device types and rescan
Download	Press for complete rescan
History	Last scan 28/01/25 14:47
Schedules	
	Nodes scanned on network 1
	Nodes configured in database 0

5. Check if the X-Gate is detected

- Go to Scan Status → Controllers and check the list to verify if the X-Gate is detected.



The screenshot shows the Danfoss E1 LAB SMPR web interface. The top navigation bar includes the Danfoss logo, a home icon, the text "E1 LAB SMPR", and several utility icons (notification, help, settings, and a share icon). Below the navigation bar is a "Configuration" tab. The main content area is divided into a left sidebar and a main table.

The left sidebar contains a "Unit" dropdown set to "LabTest addr: 0". Below this is a "Quick Setup" section with links for Time, System, Comm, Security, Alarms, and Control. Further down is a "Network Nodes" section with links for Node Overview, Points, Scan Status (highlighted with a green dashed box), Communication Status, Config Status, Duplicates, Files, Upload, and Download. At the bottom of the sidebar are links for History and Schedules.

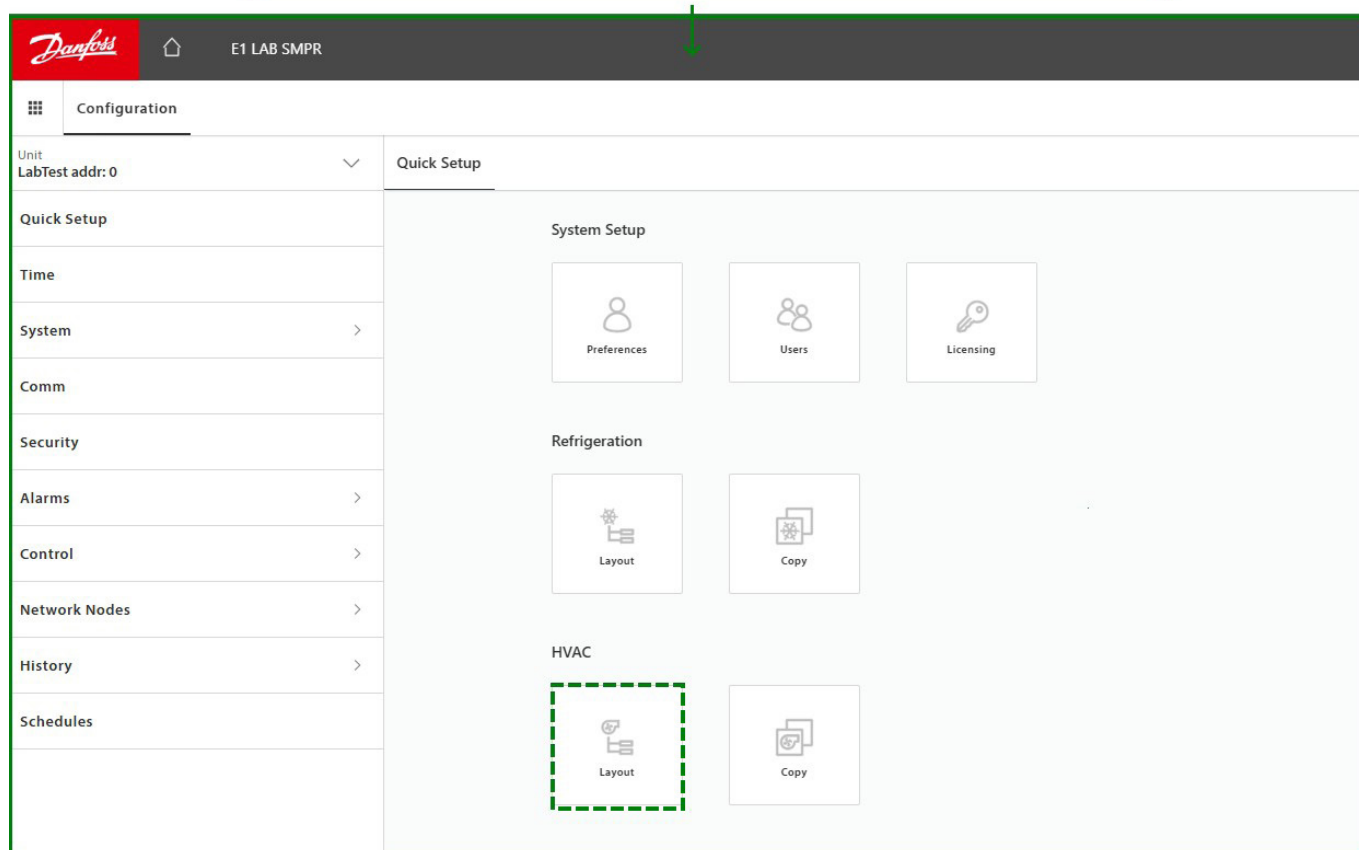
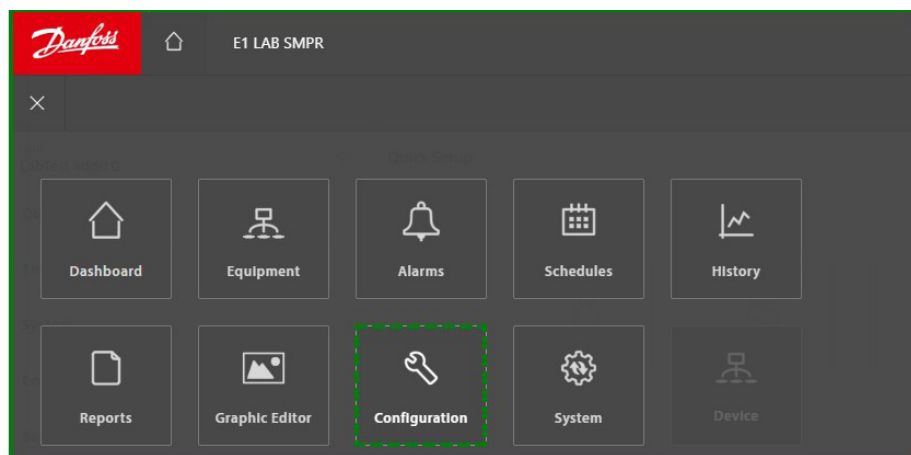
The main table has tabs for "All Nodes", "Controllers", "I/O Boards", and "Other Nodes". The "Controllers" tab is active. The table has columns: "Addr", "Device", "Model", "SW Version", and "Channel Interface". A single row is visible, representing the detected X-Gate, with the following data: Addr: 100, Device: MCS4050x, Model: MGTW-0500, SW Version: 05.00, and Channel Interface: MODBUS->X-Gate: 192.168.2.101. A "Details" button is located to the right of this row. The entire row and the "Scan Status" link in the sidebar are highlighted with green dashed boxes.

Addr	Device	Model	SW Version	Channel Interface
100	MCS4050x	MGTW-0500	05.00	MODBUS->X-Gate: 192.168.2.101

6. Configuring the X-Gate in the System Manager

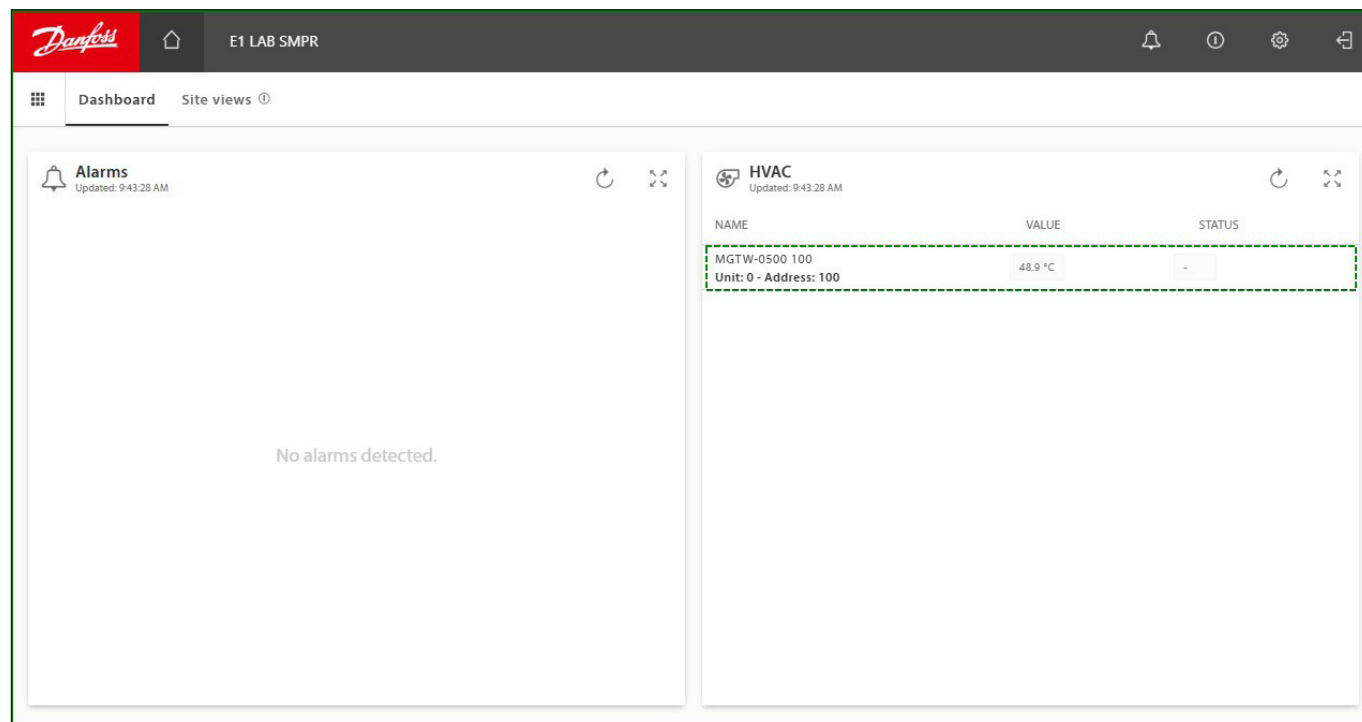
- Go to Configuration → HVAC Layout and follow the instructions, there are no changes needed.

If the device category is Evap or Pack, use the Layout for Refrigeration. For other device categories, please refer to the User Guide of the AK-SM 800A.

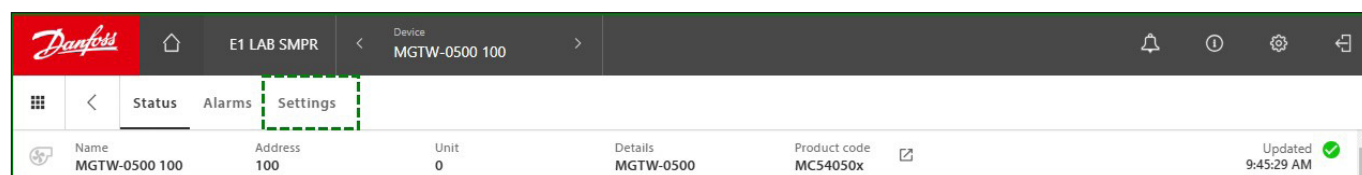


7. Validation

- In the HVAC tab of the Dashboard, the X-Gate should appear under the default name 'MGTW-0500'.



- Select the item to access the settings menu.



Glossary of Terms

Term	Definition
X-Gate	A device used for communication and data exchange in a network.
AK-SM 800A	A system manager used for controlling and monitoring refrigeration systems.
Modbus TCP/IP	A protocol used for transmitting data over TCP/IP networks.
ETH	Ethernet port.
SvB5	The old interface for logging into the system manager.
SvW	The new interface for logging into the system manager, requires internet access or installed software.
ED3/EDF/EPK	These –files are used to store configuration settings and other information for Danfoss devices, ensuring that the devices operate efficiently. ED3/EDF/EPK are formats specially used by Danfoss for the Danfoss System Manager AK-SM 800A.
DHCP	Dynamic Host Configuration Protocol: A network protocol that automatically assigns IP addresses to devices on a network, allowing them to communicate effectively without manual configuration. DHCP simplifies network management by dynamically allocating IP addresses from a predefined range.
Static IP	A method of assigning a fixed IP address to a device on a network. Unlike DHCP, static IP addresses do not change over time, providing consistent network identification and reducing the risk of IP address conflicts. This is often used for servers and network devices that require a permanent address.
HVAC	An acronym for Heating, Ventilation, and Air Conditioning. It refers to the systems used for regulating indoor environmental comfort by providing heating and cooling services. HVAC systems are essential for maintaining air quality and temperature control in residential, commercial, and industrial buildings.

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