SIEMENS

Insights Hub

MindConnect Hardware General Description

System Manual

03/2024

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠️ **DANGER**

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠️ **WARNING**

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠️ **CAUTION**

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠️ **WARNING**

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Getting Started

<div style="text-align: right; font-size: 2em; font-weight: bold;">1</div>

1.1 Getting Started

This document provides an overview of the MindConnect devices to connect your assets to Industrial IoT.

For a quick installation guide, see:

- [MindConnect Nano](#)

- [MindConnect IoT2040](#)

- [MindConnect IoT2050](#)

Safety Notes 2

2.1 General safety instructions

> ⚠️ **Life-threatening voltages are present with an open control cabinet**
>
> When you install the device in a control cabinet, some areas or components in the open control cabinet may be carrying life-threatening voltages.
> If you touch these areas or components, you may be killed by electric shock.
> Switch off the power supply to the cabinet before opening it.

System Expansions

> ✏️ **Damage through system expansions**
>
> Device and system expansions may be faulty and can affect the entire machine or plant.
> The installation of expansions can damage the device, machine or plant. Device and system expansions may violate safety rules and regulations regarding radio interference suppression. If you install or exchange system expansions and damage your device, the warranty becomes void.

Note the following for system expansions:
Only install system expansion devices designed for this device. Contact your technical support team or the team where you have purchased your PC to find out which system expansion devices may safely be installed.

> ✏️ **"Open Type" UL508**
>
> Note that the device is classified as "Open Type" for use in the area of Industrial Control Equipment (UL508).
> Installation of the device in an enclosure complying with UL508 is a prerequisite for approval or operation in accordance with UL508.

Battery and rechargeable battery

> ⚠️ **Risk of explosion and release of harmful substances**
>
> Improper handling of lithium batteries can result in an explosion of the batteries. Explosion of the batteries and the released pollutants can cause severe physical injury.
> Worn batteries jeopardize the function of the device.
> Note the following when handling lithium batteries:
>
> - Replace used batteries in good time; see the section "Replacing the backup battery" in the operating instructions.
>
> - Replace the lithium battery only with an identical battery or types recommended by the manufacturer.
>
> - Do not throw lithium batteries into fire, do not solder on the cell body, do not recharge, do not open, do not short-circuit, do not reverse polarity, do not heat above 100°C and protect from direct sunlight, moisture and condensation.

Strong high-frequency radiation

> ✏️ **Observe immunity to RF radiation**
>
> The device has an increased immunity to RF radiation according to the specifications on electromagnetic compatibility in the technical specifications. Radiation exposure in excess of the specified immunity limits can impair device functionality resulting in malfunctions and therefore injuries or damages.
> Read the information on immunity to RF radiation in the technical specifications.

ESD Guideline

Electrostatic sensitive devices can be labeled with an appropriate symbol.

> ✏️ **Electrostatic sensitive devices (ESD)**
>
> When you touch electrostatic sensitive components, you can destroy them through voltages that are far below the human perception threshold.
> If you work with components that can be destroyed by electrostatic discharge, observe the ESD Guideline. Refer to the chapter ESD guideline.

Open Source Software

Siemens will identify the open source software components contained in MindConnect Nano and MindConnect IoT2040, including the applicable license text and will include such license text(s) in or provide them together with MindConnect Nano/ Iot2040. Should the license(s) applicable to any part of the open source software require the distribution of the open source software's source code and build scripts together with MindConnect Nano/IoT2040 (or, alternately, an offer to make the source code and build scripts available upon request), then Siemens will provide such source code or such offer to customer together with MindConnect Nano. No license fee is charged to customer for the use of such open source software. Customer acknowledges and agrees that Siemens provides no warranties, express or implied, and no indemnification for the open source software itself. Customer hereby accepts that the open source software is subject to the specific license terms included in or provided together with MindConnect Nano. To the extent there is a conflict between these terms and the open source specific license terms, such terms shall prevail with regard to the open source software.

Industrial Security

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks. In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions only form one element of such a concept. Customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens' guidance on appropriate security measures should be taken into account. For more information about industrial security, please visit Cybersecurity for Industry.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends to apply product updates as soon as available and to always use the latest product versions. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under: Cybersecurity for Industry.

2.2   Notes on usage

!!! notice "Possible functional restrictions in case of non-validated plant operation" The device is tested and certified on the basis of the technical standards. In rare cases, functional restrictions

can occur during plant operation.

Validate the correct functioning of the plant to avoid functional restrictions.

A highly reliable system is provided, however the MindConnect can be affected by system internal incidents.

> Use in an industrial environment without additional protective measures.
> This device was designed for use in a normal industrial environment according to IEC 60721-3-3.

> **Firmware MiniWeb versions**
>
> The connection to a SIMOCODE, SIMOTION, SINAMICS OPC UA Server cannot reestablish automatic if the used Firmware has a MiniWeb version is less than V5.1. It's recommended to upgrade to a new Firmware version of the SIMOCODE, SIMOTION, SINAMICS device.

2.3   ESD guideline

What does ESD mean?

An electronic module is equipped with highly integrated components. Due to their design, electronic components are highly sensitive to overvoltage and thus to the discharge of static electricity. Such electronic components or modules are labeled as electrostatic sensitive devices. The following abbreviations are commonly used for electrostatic sensitive devices:

- ESD – Electrostatic sensitive device,

- ESD – Electrostatic Sensitive Device as a common international designation.

Electrostatic sensitive devices can be labeled with an appropriate symbol.

> ✏️ **Damage to ESD from touch**
>
> Electrostatic sensitive devices, ESD, can be destroyed by voltages which are far below the human perception limit. If you touch a component or electrical connections of a module without discharging any electrostatic energy, these voltages may arise.
>
> The damage to a module by an overvoltage can often not be immediately detected and only becomes evident after an extended period of operation. The consequences are incalculable and range from unforeseeable malfunctions to a total failure of the machine or system.
>
> Avoid touching components directly. Make sure that persons, the workstation and the packaging are properly grounded.

Charge

Every person without a conductive connection to the electrical potential of his/her surroundings can be electrostatically charged.

The material with which this person comes into contact is of particular significance. The figure shows the maximum electrostatic voltages with which a person is charged, depending on humidity and material. These values conform to the specifications of IEC 61000-4-2.
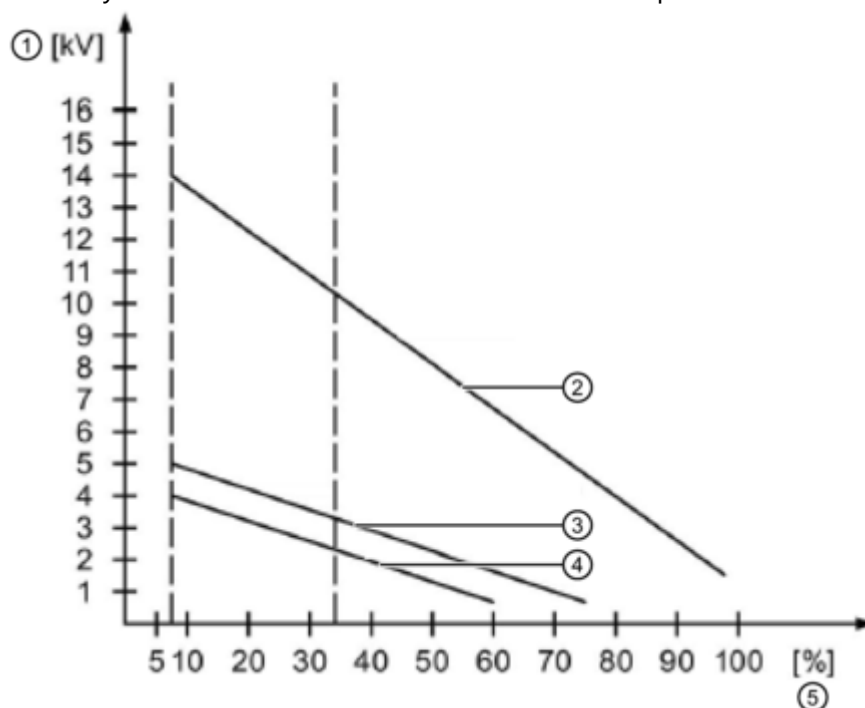
①   Voltage

②   Synthetic materials

③   Wool

④   Antistatic materials such as wood or concrete

⑤   Relative humidity

> ✏️ **Grounding measures**
>
> There is no equipotential bonding without grounding. An electrostatic charge is not discharged and may damage the ESD.
>
> Protect yourself against discharge of static electricity. When working with electrostatic sensitive devices, make sure that the person and the workplace are properly grounded.

Protective measures against discharge of static electricity

- Disconnect the power supply before you install or remove modules which are sensitive to ESD.

- Pay attention to good grounding:
  - When handling electrostatic sensitive devices, make sure that persons, the workstation and devices, tools and packaging used are properly grounded. This way you avoid static discharge.

- Avoid direct contact:
  - As a general rule, do not touch electrostatic sensitive devices, except in the case of unavoidable maintenance work.
  - Hold the modules at their edge so that you do not touch the connector pins or conductor paths. This way, the discharge energy does not reach and damage the sensitive components.
  - Discharge your body electrostatically before you take a measurement at a module. Do so by touching grounded metallic parts. Always use grounded measuring instruments.

Introduction 3

3.1 Getting Started with MindConnect Elements

This manual gives you an overview of MindConnect Elements, enabling you to commission these devices.

Basic knowledge requirements

- General knowledge about personal computers is required.

- General knowledge in the field automation control engineering is recommended.

Scope of validity of this document

This manual is valid for Industrial IoT and MindConnect Elements:

- [MindConnect Nano](#)

- [MindConnect IoT2040](#)

- [MindConnect IoT2050](#)

- [MindConnect Software Agent](#)

Convention

The term "device" is used to refer to MindConnect Nano, MindConnect IoT2040 and MindConnect Software Agent.
The configuration parameters should be extracted out of the text or tables and depend respectively on the needs and constellation of the individual system.

3.2 Purpose of this document

This Getting Started provides you with information to become familiar with commissioning the devices MindConnect Elements and working with Industrial IoT.

By using the examples given in this manual, you will be able to mount and install your MindConnect Elements. You will know how to connect with the network these devices with your network plan and permit the position of these devices.

3.3   Functional overview

This part of Getting Started outlines the functional overview.

You can monitor asset status as well as support maintenance and services. This requires sensor data, the tools to collect and transfer data as well as intelligent software that offers the monitoring and support functions.

MindConnect Elements provide the hardware for collecting data from assets and transferring it into Insights Hub, which includes hosting via a web user interface.
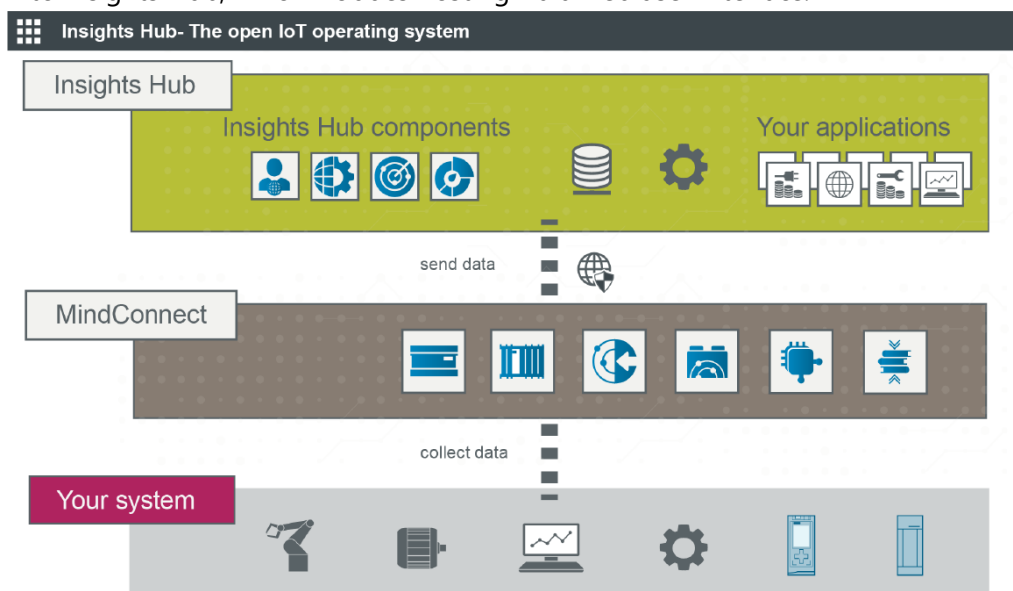
With Insights Hub and MindConnect Elements you can:

- Create and manage users and customers

- Create, manage and change assets in Insights Hub

- Onboard MindConnect Elements to Insights Hub in order to collect data from your assets and transfer it to Insights Hub

- Collect data from data sources (S7, OPC UA) via MindConnect Elements

- Visualize the uploaded data (timeseries)

- Display datapoints and open events of an asset

- Manage the connected assets and automate rules

3.4   Working with Industrial IoT

This part of the Getting Started provides you with a brief summary of instructions described in detail in this manual.

Requirements

- Internet connection and newest version of your internet browser (e. g. Google chrome or Firefox) for online user interface

- Internet connection for MindConnect Element devices.

- Provide standard HTTPS capabilities for MindConnect Elements - outbound HTTPs connection(s) on port 443

- Link to the online Launchpad with user and password data as supplied by Siemens

- Device (PC, tablet etc.) with minimum screen resolution of 1024x768

Configuring steps

Prepare MindConnect Elements for Industrial IoT:

1. Mount MindConnect Nano/IoT2040 on your physical asset.

2. Connect MindConnect Elements to power supply and the Internet.

Onboard MindConnect Elements:

1. Log in to your Insights Hub account.

2. Configure your asset and MindConnect Element which is mounted to your physical asset.

3. Configure network settings of MindConnect Elements and proxy as needed to establish Internet connection to Insights Hub

4. Upgrade to the newest firmware version.

5. Establish the initial connection (onboarding) by transferring the configuration manually by USB stick.

Configure data collection with Asset Manager

1. Log in to Insights Hub with your account.

2. Create an asset in Asset Manager.

3. Configure the data points you want to use.

4. MindConnect Elements receives the configuration from Insights Hub via an existing Internet connection.

5. MindConnect Elements starts the data acquisition.

6. The timeseries can be displayed in Insights Hub Monitor.

Visual analysis of assets with Insights Hub Monitor

1. Monitor assets in different views.

2. Monitor aspects and events.

For more information about visualizing assets, aspects and event in Insights Hub Monitor application, refer to [Insights Hub Monitor](#) documentation.

3.5   Data model in "Asset Manager"

This chapter describes the data model of Asset Manager. The data model will show you what processes are necessary to connect and use your asset data.

Definition asset

An asset is a digital representation of a machine or an automation system with one or multiple automation units (e.g. PLC) connected to Insights Hub.
The data collection and data provisioning is based on so called (virtual) assets. This can be anything like a pump, motor, PLC, an entire tool machine, a production line, a robot, a crane, a car, a wind turbine and so on. The data of an asset is collected and sent to Industrial IoT to make that data available for further processing and analytics.

Definition aspect

Aspects are a data modeling mechanisms for assets. Aspects group related data points based on their logical association. For example: The pump skid has an aspect e.g. "Energy_consumption" that contains the data points: "power", "current", "voltage" etc. Aspect is specified in Asset Manager and its name can be freely chosen, but should have conjunction to datapoints and a physical asset. An aspect can consist of several variables.

Data model

The following graphic shows the data model in Asset Manager:
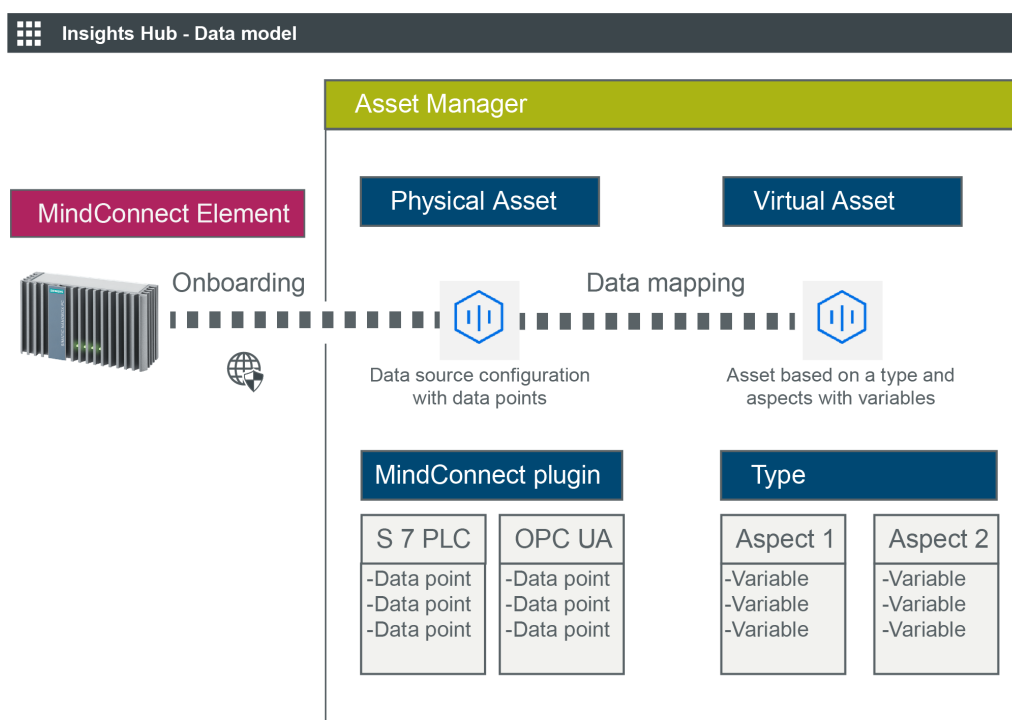
In Asset Manager devices like MindConnect Nano are defined as the data source. The device sends data points to Industrial IoT. These data points must be connected to the aspects and variables. Asset Manager uses aspects and variables as data containers.

You can add data points to a data source to collect the data, for example from a control unit. In the next step you have to link the data points to the respective variables of an aspect.

To enable data connecting and in order to use your data you have to fulfill the following processes:

- Overview of onboarding MindConnect Elements: Onboarding is the process of attaching a MindConnect Elements to Insights Hub.

- **Data mapping**: Data mapping matches variables of an aspect with the respective data points of a data source:

    ○ Data mapping for MindConnect Nano

    ○ Data mapping for MindConnect IoT2040

    ○ Data mapping for MindConnect IoT2050

Overview of MindConnect Elements $\qquad$ 4

4.1   Overview of MindConnect Elements

MindConnect Elements are embedded industrial PCs to connect industrial data sources with Industrial IoT. They allow you to connect with Industrial IoT and collect data from the field and then transfer it with encryption to Industrial IoT.

There are three types of MindConnect Elements which are listed below:

- [MindConnect Nano](#)

- [MindConnect IoT2040](#)

- [MindConnect IoT2050](#)

- [MindConnect Sofware Agent](#)

Mounting and installing MindConnect Elements 5

5.1 Checking package upon delivery

1. When accepting a delivery, please check the package for visible transport damage.

2. If any transport damage is present at the time of delivery, submit a complaint at the shipping company in charge. Have the shipper confirm the transport damage immediately.

3. Unpack the device at its installation location.

4. Keep the original packaging in case you have to transport the unit again.

> ✏ **Damage to the device during transport and storage**
>
> If a device is transported or stored without packaging, shocks, vibrations, pressure and moisture may impact the unprotected unit. Damaged packaging indicates that ambient conditions may have already had a massive impact on the device.
> The device may be damaged.
> **Do not dispose of the original packaging**: Pack the device during transportation and storage.

5. Check the content of the packaging and any accessories you may have ordered for completeness and damage.

- Device

- DC connecting terminal, already plugged into the device.

- One mounting accessory kit including: 1 x Rail clamp, 2 x mounting brackets and screws.

6. If the content of the package is incomplete, damaged or does not match your order, inform the responsible delivery service immediately.

> ⚠️ **Electric shock and fire hazard due to damaged device**
>
> A damaged device can be under hazardous voltage and trigger a fire in the machine or plant. A damaged device has unpredictable properties and states. Death or serious injury could occur.
>
> Make sure that the damaged device is not inadvertently installed and put into operation. Label the damaged device and keep it locked away. Return the device for immediate repair.

> ✏️ **Damage from condensation**
>
> If the device is subjected to low temperatures or extreme fluctuations in temperature during transportation, for example in cold weather, moisture could build up on or inside the HMI device.
>
> Moisture causes a short circuit in electrical circuits and damages the device. In order to prevent damage to the device, proceed as follows:
>
> - Store the device in a dry place.
>
> - Bring the device to room temperature before starting it up.
>
> - Do not expose the device to direct heat radiation from a heating device.
>
> - If condensation develops, wait approximately 12 hours or until the device is completely dry before switching it on.

7. Please keep the enclosed documentation in a safe place. It belongs to the device. You will need the documentation when you commission the device for the first time.

8. Write down the identification data of the device.

> ✏️
>
> Mounting and installing process is applicable for MindConnect Nano and MindConnect IoT2040.

5.2   Mounting MindConnect Nano

> ✏️ **Security of MindConnect Elements**
>
> In order to ensure the security of your MindConnect Element, you should mount it in a restricted access location e. g. lockable cabinet.
>
> This reduces the possibility of manipulations on the device/customer data.

5.3   Permitted mounting positions and surrounding temperature for MindConnect Nano

The following mounting positions and surrounding conditional temperature are permitted:

- **Horizontal mounting position**: The horizontal mounting position is the preferred position. Maximum surrounding temperature is 60°C.

- **Vertical mounting position**: Maximum surrounding temperature is 50°C.

> ✏️ **> 50°C: Install in RAL**
>
> RAL = Restricted Access Location - e.g. a lockable cabinet

Free space around the device

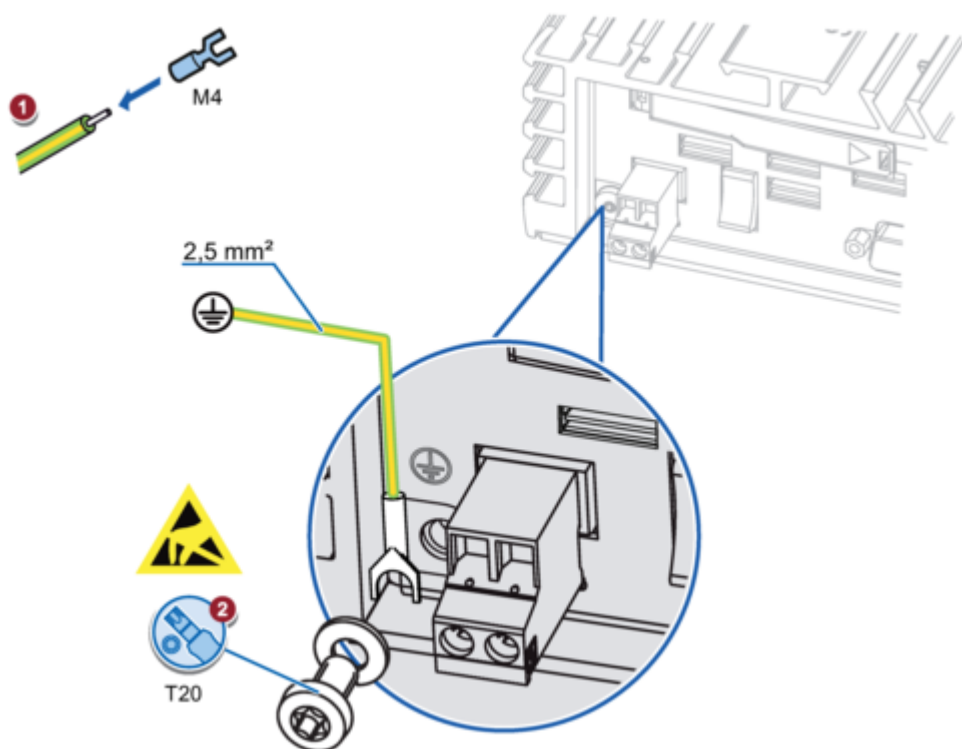Please make sure there's enough empty space around the device

- Above the device: ≥ 50mm

- Below the device: ≥ 100mm

> ✏️ **Maximum height**
>
> The maximum altitude to install MindConnect Nano is 4000m.

5.4   Connecting the protective earth

5.5 Permitted mounting positions and surrounding temperature for MindConnect IoT2040

The following mounting positions and surrounding conditional temperature are permitted:

- **Horizontal mounting position**: The horizontal mounting position is the preferred position. Maximum surrounding temperature is 50°C.

- **Vertical mounting position**: Maximum surrounding temperature is 50°C.

> ✏️ **>50°C: Install in RAL**
>
> RAL = Restricted Access Location - e.g. a lockable cabinet

Free space around the device

Please make sure there's enough space around the device

- Above the device: ≥ 50mm

- Below the device: ≥ 50mm

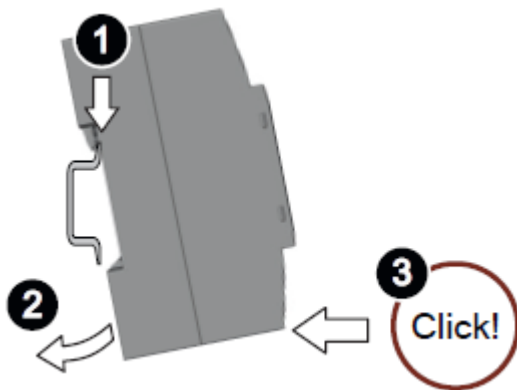## 5.6 Mounting types for MindConnect IoT2040

✏️

Ensure that the mounting surface on the wall can bear four times the total weight of the device, including attached elements.
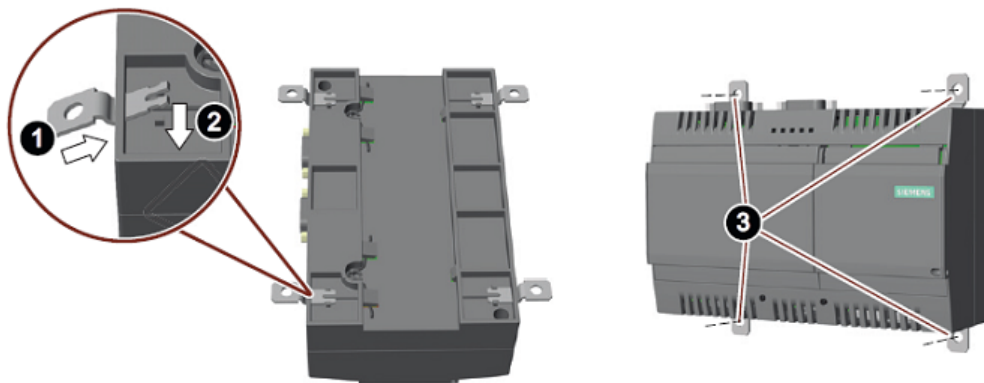
Use only the anchors and screws specified in the operating instructions.

The following mounting types of the device are possible:

Mounting on rails

Wall mounting

5.7 Permitted mounting positions and surrounding temperature for MindConnect IoT2050

The following mounting positions and surrounding conditional temperature are permitted:

Rail mounting:

- **Horizontal mounting position**: The horizontal mounting position is the preferred position. Maximum surrounding temperature is 0 to 40°C.

- **Vertical mounting position**: Maximum surrounding temperature is 0 to 50°C.

Wall mounting:

- **Horizontal mounting position**: The horizontal mounting position is the preferred position. Maximum surrounding temperature is 0 to 40°C.

- **Vertical mounting position**: Maximum surrounding temperature is 0 to 45°C.

> ✏️ **>50°C: Install in RAL**
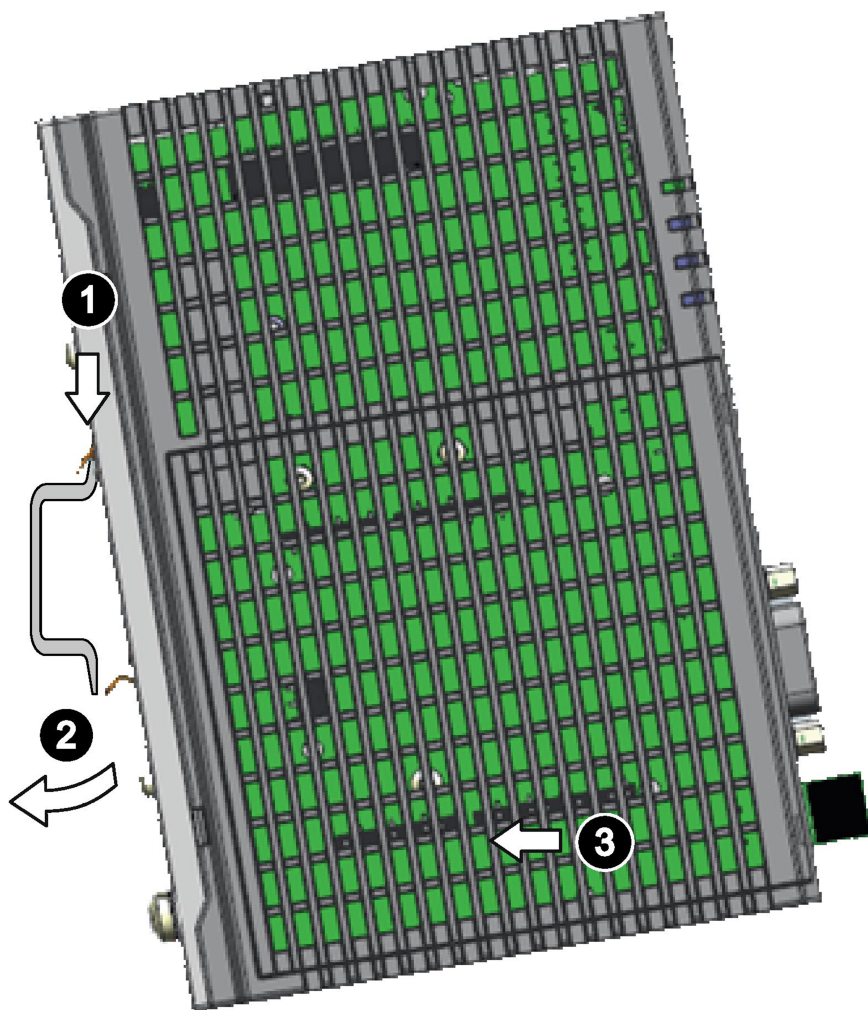>
> RAL = Restricted Access Location - e.g. a lockable cabinet

Free space around the device

Please make sure there's enough space around the device
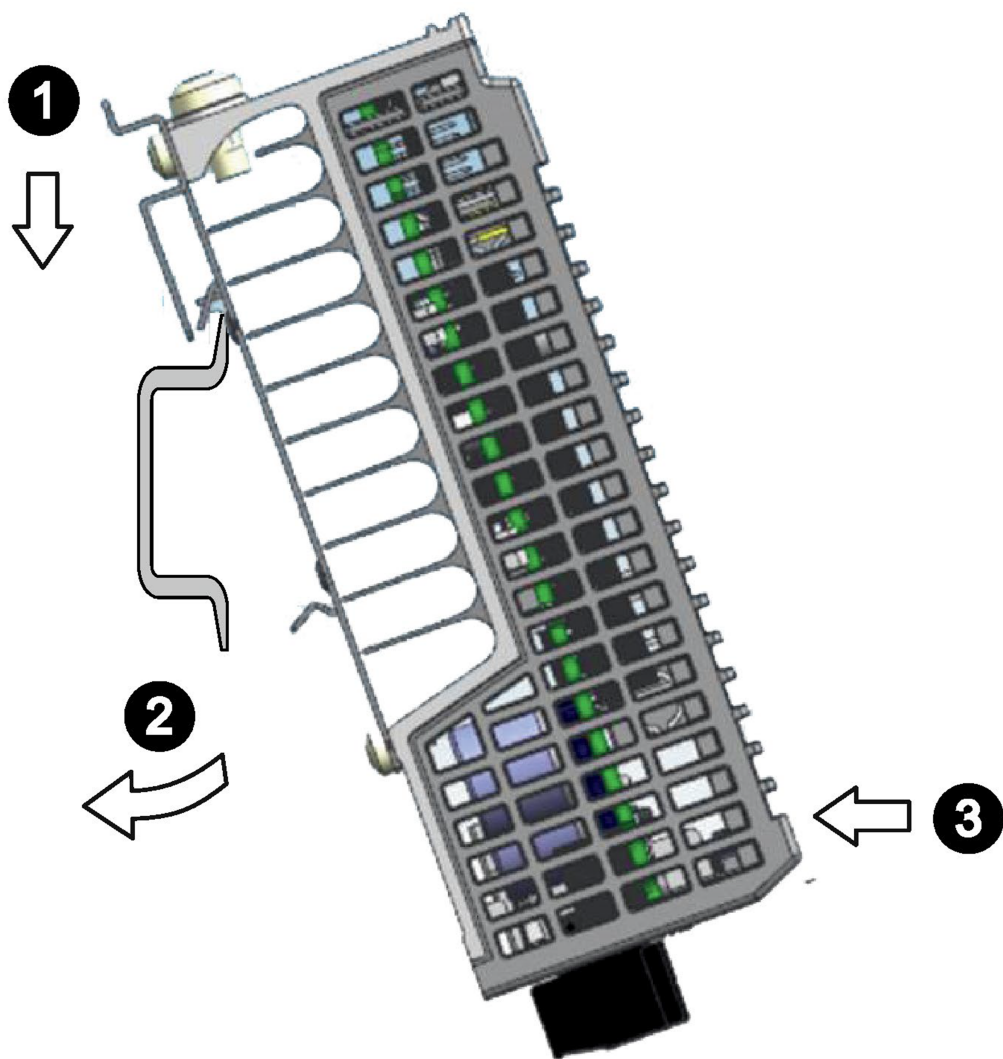
- Above the device: ≥ 50mm

- Below the device: ≥ 50mm

5.8   Mounting types for MindConnect IoT2050

The device can be mounted horizontally or vertically on a DIN rail or to a wall.

Vertical mounting position (preferred)

Horizontal mounting position

5.9   LED lights of MindConnect Nano

LED lights

The LED lights status provide information on efficient self-diagnostics. The following graphics show the LED lights of the MindConnect Nano:

LED lights – bottom view 1

LED lights - bottom view 2

The following table shows the meanings of the LED lights:

LED-Name	Status	Description
PC ON/WD	GREEN ORANGE	Power on System restart
L1-RUN/STOP	ORANGE	- No connection to proxy· - No connection to Insights Hub
	Blinking ORANGE	Connection to Insights Hub is being established.
	Blinking GREEN	Onboarding is in progress.
	GREEN	MindConnect Nano is onboarded to Insights Hub.
L2 - ERROR	Blinking ORANGE	Firmware update active.
	ORANGE	- No connection to the data sources
	Blinking RED	- Data loss
	RED	Firmware update error
L3 - MAINT	Blinking ORANGE	USB stick is active: - Installing USB configuration
	ORANGE	Onboarding failed: - Configuration file on the USB stick is not valid
	Blinking RED	- USB stick Error

You can find more information about LED error codes in section Troubleshooting for MindConnect Nano.

For more information about MindConnect Nano, see MindConnect Nano documentation.

5.10   LED lights of MindConnect IoT2040

LED lights

The LED lights provide information on the status of the device for efficient self-diagnostics.

MindConnect IoT2040 features the following LED lights:

5.10 LED lights of MindConnect IoT2040

LED-Name	Status	Description
PWR	GREEN	Power on
SD	GREEN	Micro SD card active
USB	GREEN	USB Power (5V) is available
OC	RED	Overcurrent
USER	GREEN/RED/ORANGE	Programmed for Industrial IoT, see details below

The USER LED light is only programmed for Industrial IoT.

USER LED light

The following table describes the device behavior associated when a different USER LED status is displayed:

Name	Status	Description
USER LED	Fast ORANGE Blinking	USB STICK ACTIVE - Network diagnostics are running - Configuration file is being read
USER LED	RED Blinking	USB STICK ERROR - Read error, USB flash drive is damaged - Configuration file is invalid (damaged, illegible or configured for a different asset) - Write error, USB flash drive is write-protected or its memory is full.
	ORANGE Blinking	FIRMWARE UPDATE ACTIVE
	RED	FIRMWARE UPDATE ERROR
	ORANGE	NO CONNECTION TO PROXY - Network cable is missing or damaged - Ethernet port on MindConnect IoT2040 is damaged - "ipconfig" of MindConnect IoT2040 is incorrect - Firewall of MindConnect IoT2040 blocks - Your company's router is damaged - Proxy is offline - No authentication on Proxy - Proxy configuration is invalid

Name	Status	Description
	ORANGE	NO CONNECTION TO CLOUD - Proxy is invalid - Server is offline - An addressed server cannot be accessed - Network problems of a provider - No authorization
	ORANGE Blinking	CONNECTION TO CLOUD ESTABLISHED LED light flashes green for a short time to indicate the onboarding process - otherwise is orange
	GREEN Blinking	ONBOARDING IN PROGRESS
USER LED	ORANGE Flashing	ONBOARDING FAILED LED flashes red for a short time to indicate onboarding is falling Possible reason: - Server error - OBT is no longer valid
	GREEN	ONBOARDED
	ORANGE	NO CONNECTION TO DATA SOURCE - Problem with network connection of your machine - Network cable is not plugged in or is damaged - Machine is offline
	RED Blinking	MindConnect IoT2040 IS LOSING DATA - MindConnect IoT2040 is offline and the data buffer is full - Slow data transfer

You can find more information about LED error codes in section Troubleshooting for MindConnect IoT2040.

For more information about MindConnect IoT2040, see MindConnect IoT2040 documentation.

## 5.11 LED lights of MindConnect IoT2050

The LED lights status provide information on efficient self-diagnostics.

The following LED lights are MindConnect IoT2050 features:

LED-Name	Status	Description
PWR	GREEN	Power on
STAT	GREEN/RED	System status

5.11 LED lights of MindConnect IoT2050

LED-Name	Status	Description
USER 1	GREEN/ORANGE/RED	Programmed for Industrial IoT, see details below
USER 2	GREEN/ORANGE/RED	Programmed for Industrial IoT, see details below

The following graphics show the LED lights of the MindConnect IoT2050:
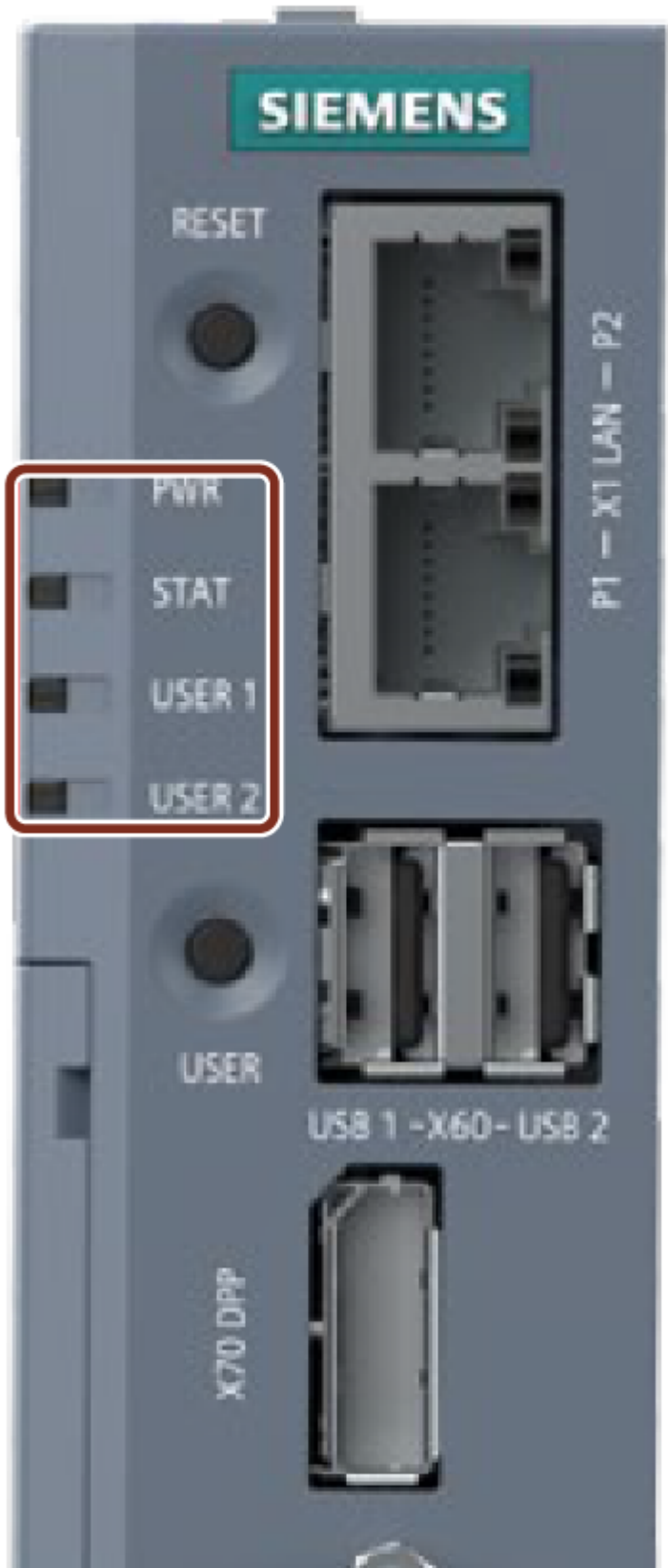
LED lights - front view 1

LED lights - front view 2

The following table describes the device behavior associated when a different USER LED status is displayed:

Name	Status	Description
PWR	GREEN	Power
STAT	GREEN	OS is running
	RED	OS is not running
USER 1	Blinking ORANGE	- After switching device on: MindConnect IoT2050 is starting up. - Connection to Insights Hub is being established.
	ORANGE	- No connection to cloud. - Onboarding failed.

5.11 LED lights of MindConnect IoT2050

Name	Status	Description
	Blinking GREEN	Onboarding is in progress.
	GREEN	MindConnect IoT2050 is onboarded to Insights Hub.
USER 2	Blinking ORANGE	Data loss.
	ORANGE	No connection to data source.
	Blinking GREEN	- Firmware update active. - USB stick active.
	Blinking RED	- USB stick error. - System error.
	RED	Firmware update error

You can find more information about LED error codes in section Troubleshooting for MindConnect IoT2050.

For more information about MindConnect IoT2050, see MindConnect IoT2050 documentation.

Connecting MindConnect Elements 6

6.1 Commissioning MindConnect Element

This section describes about commissioning MindConnect Nano, MindConnect IoT2040 and MindConnect IoT2050.

Objective

The MindConnect Elements should be connected to the power supply and commissioned.

Requirements

- The protective conductor is connected (valid only for MindConnect Nano). Refer to the chapter [Connecting the protective earth](#).

- A two-core cable with a cable cross-section of 0.75 mm² to 2.5 mm².

- A slotted screwdriver with a 3 mm blade.

> ✏️ **Power supply requirements**
>
> - MindConnect Nano should only be connected to a 24 V DC to power supply which satisfies the requirements of safety extra low voltage (SELV) according to IEC/EN/DIN EN/UL 60950-1.
>
> - MindConnect IoT2040 should only be connected to a 9...36 V DC power supply which meets the requirements of safe extra low voltage (SELV) according to IEC/EN/DIN EN/UL 60950-1.
>
> - MindConnect IoT2050 should only be connected to a 12 to 24 V DC power supply which meets the requirements of safe extra low voltage (SELV) according to IEC/EN/DIN EN/UL 61010-1.
>   The power supply must meet the NEC class 2 or LPS requirement in accordance with IEC/EN/DIN EN/UL 60950-1.

> ✏️
>
> The MindConnect Nano/IoT2040 package does not include power supply. The appropriate power supply product from Siemens with the name SITOP can be used.

Procedure

> ⚠️ **Danger of burns**
>
> The surface of the device can reach temperatures of over 70 °C. Any unprotected contact may cause burns.
> Avoid direct contact during operation of the device. Touch the device only with appropriate protective gloves.

1. Switch off the power supply on the device.

2. Connect the cores of the power supply.

3. Insert the terminal at the indicated position.

   - The graphic shows how to connect the power supply for MindConnect Nano:
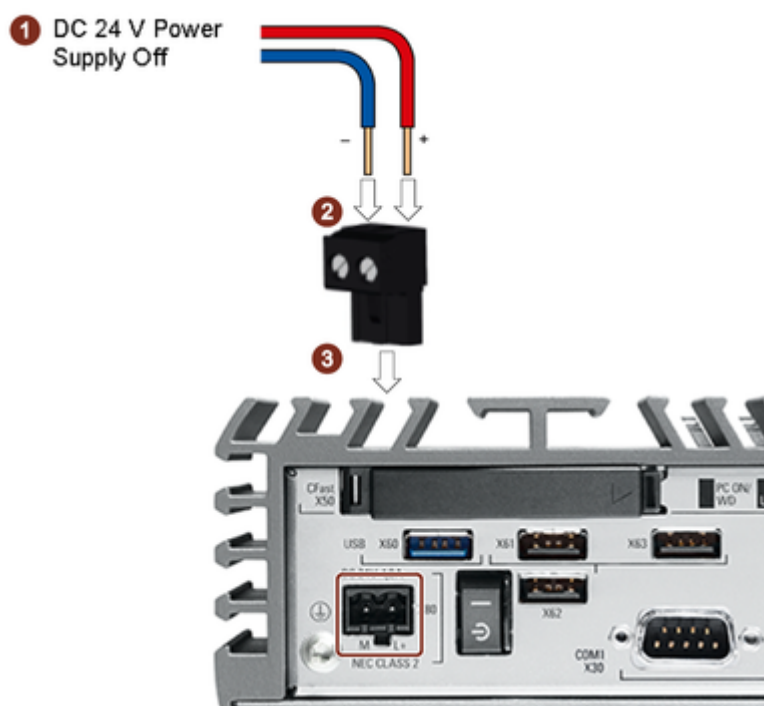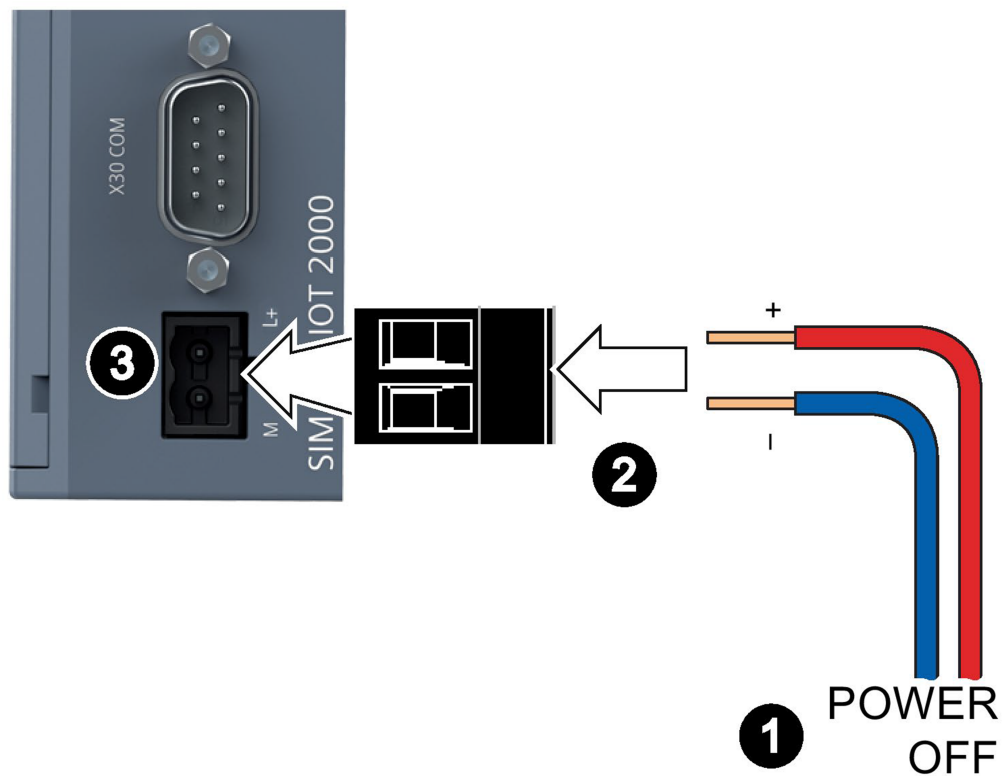

   Connecting the power supply for MindConnect Nano

   - The graphic demonstrates the steps how to connect the power supply for MindConnect IoT2040:
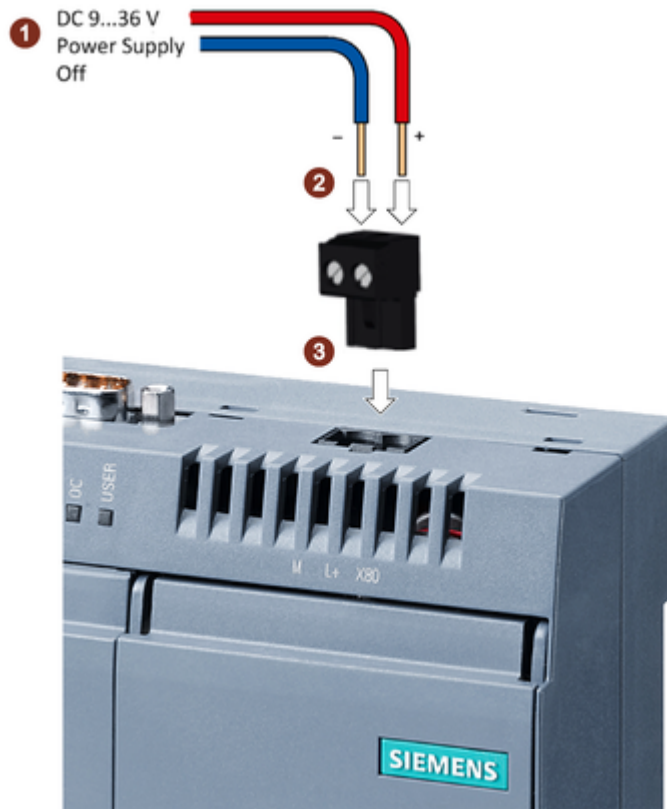
Connecting the power supply for MindConnect IoT2040

o The graphic demonstrates the steps how to connect the power supply for MindConnect IoT2050:

Connecting the power supply for MindConnect IoT2050

4. Power on the power supply.

- For MindConnect Nano, set the on/off switch to position "I" (ON). The "PC ON/WD" LED lights up green.

- For MindConnect IoT2040, switch on the power supply. The graphic shows the "PWR" LED lights up green.

Power on a power supply for MindConnect IoT2040.

- For MindConnect IoT2050, set the on/off switch to position "I" (ON). The "PC ON/WD" LED lights up green.

- When powering-on MindConnect IoT2050 for the first time, follow these steps:

  - Wait until the LED USER1 stops blinking orange and glows orange continously.

  - Wait for one more minute to the system to get stable.

  - Press the "RESET" button, or switch off and on the device to power cycle it.

  - After LED USER1 stops blinking and glows orange light continously system is ready to use.

Result

MindConnect Nano/IoT2040/IoT2050 is now prepared and you can onboard it to Insights Hub. If the green light does not appear, refer to section Troubleshooting for MindConnect Nano for more information about LED messages.

If the green light does not appear, refer to section [Troubleshooting for MindConnect IoT2040](#) for more information about LED messages.

If the green light does not appear, refer to section [Troubleshooting for MindConnect IoT2050](#) for more information about LED messages.

6.2 Connecting MindConnect Nano to Insights Hub network

The following options are available for integrating the device in existing or planned system environments and networks.

①   X63 port

②   PN/IE LAN X1 P1 port

③   PN/IE LAN X2 P1 port

The two network adapters are separated from each other. There is no direct connection between the two networks possible to ensure network security. Therefore, you can not create any configuration from the cloud to the field level (e.g. OPC UA server).

The following table explains each connection port in detail:

Port	Description
X63	USB 2.0 port, high current. Configuration file on USB stick.
	Required during onboarding process.
PN/IE LAN X1 P1	RJ45 Ethernet connection 1 for 10/100/1000 Mbps. Access to the Internet (to Insights Hub).
	Required to start onboarding process.
PN/IE LAN X2 P1	RJ45 Ethernet connection 2 for 10/100/1000 Mbps. Access to the plant network or asset (e.g. S7, OPC UA).

Port	Description
	Required to complete onboarding process.

Prerequisite

For 250 datapoints read per second, the upload bandwidth should be at least 0.5 Mb/s.

Procedure

Before you start onboarding, connect MindConnect Nano to Insights Hub, as follows:

Insert Ethernet cable into the port labeled with **X1 P1** to connect MindConnect Nano to Insights Hub.

> 🖉 **MindConnect Nano MAC address**
>
> The type plate on of the MindConnect Nano shows 2 MAC addresses. The first MAC address belongs to port X1 P1.

Connecting the port X1 P1 for Internet (Insights Hub)

6.3   Connecting MindConnect IoT2040 to Insights Hub network

The following options are available for integrating the device in existing or planned system environments and networks.
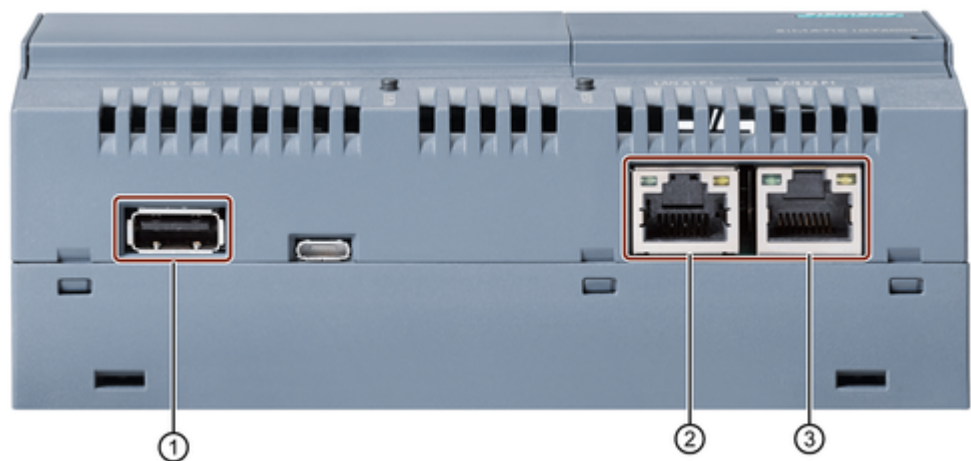
①   X60 port

②   PN/IE LAN X1 P1 port

③   PN/IE LAN X2 P1 port

The following table explains each connection port in detail:

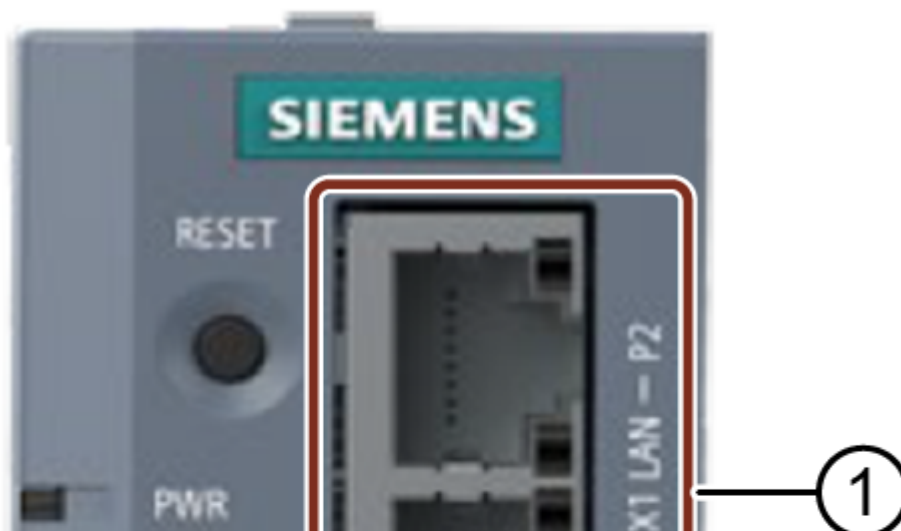| Port	Description
X60	USB 2.0 port, high current. Configuration file on USB stick.
	Required during onboarding process..
PN/IE LAN X1 P1	RJ45 Ethernet connection 1 for 10/100/1000 Mbps. Access to the Internet (to Insights Hub).
	Required to start onboarding process
PN/IE LAN X2 P1	RJ45 Ethernet connection 2 for 10/100/1000 Mbps. Access to the plant network (e.g. S7, OPC UA).
	Required to complete onboarding process.

Procedure

Before you start onboarding, connect MindConnect IoT2040 to Insights Hub, as follows:

Insert Ethernet cable for Internet into the port labeled with **X1 P1**.

> ✏️
>
> During the onboarding process, only one USB stick is supported. Do not plug in more than one USB stick. The recommended USB port is the USB port with label X60.

6.4 Connecting MindConnect IoT2050 to Insights Hub network

The following options are available for integrating the device in existing or planned system environments and networks.

① X1 LAN - P1 port, X1 LAN - P2 port

② X60-USB 1 port, X60-USB 2 port

The following table explains each connection port in detail:

| Port	Description
X1 LAN - P1	RJ45 Ethernet connection 1 for 100/1000 Mbps. Access to the plant network or asset (e.g. S7, OPC UA). **Required to connect to production data sources like PLCs, HMI etc.**
X1 LAN - P2	RJ45 Ethernet connection 2 for 100/1000 Mbps. Access to the Internet (to Insights Hub). **Required to start onboarding process.**
X60-USB 1	USB3.0 Type A, high current (max. 900 mA). Configuration file on USB stick. **Required to execute commands.**
X60-USB 2	USB2.0 Type A, high current (max. 500 mA). Configuration file on USB stick. **Required to execute commands.**

Prerequisite

For 250 datapoints read per second, the upload bandwidth should be at least 0.5 Mb/s.

Procedure

Before you start onboarding, connect MindConnect IoT2050 to Insights Hub, as follows:
Insert Ethernet cable into the port labeled with X1 LAN - P2 to connect MindConnect IoT2050 to Insights Hub.
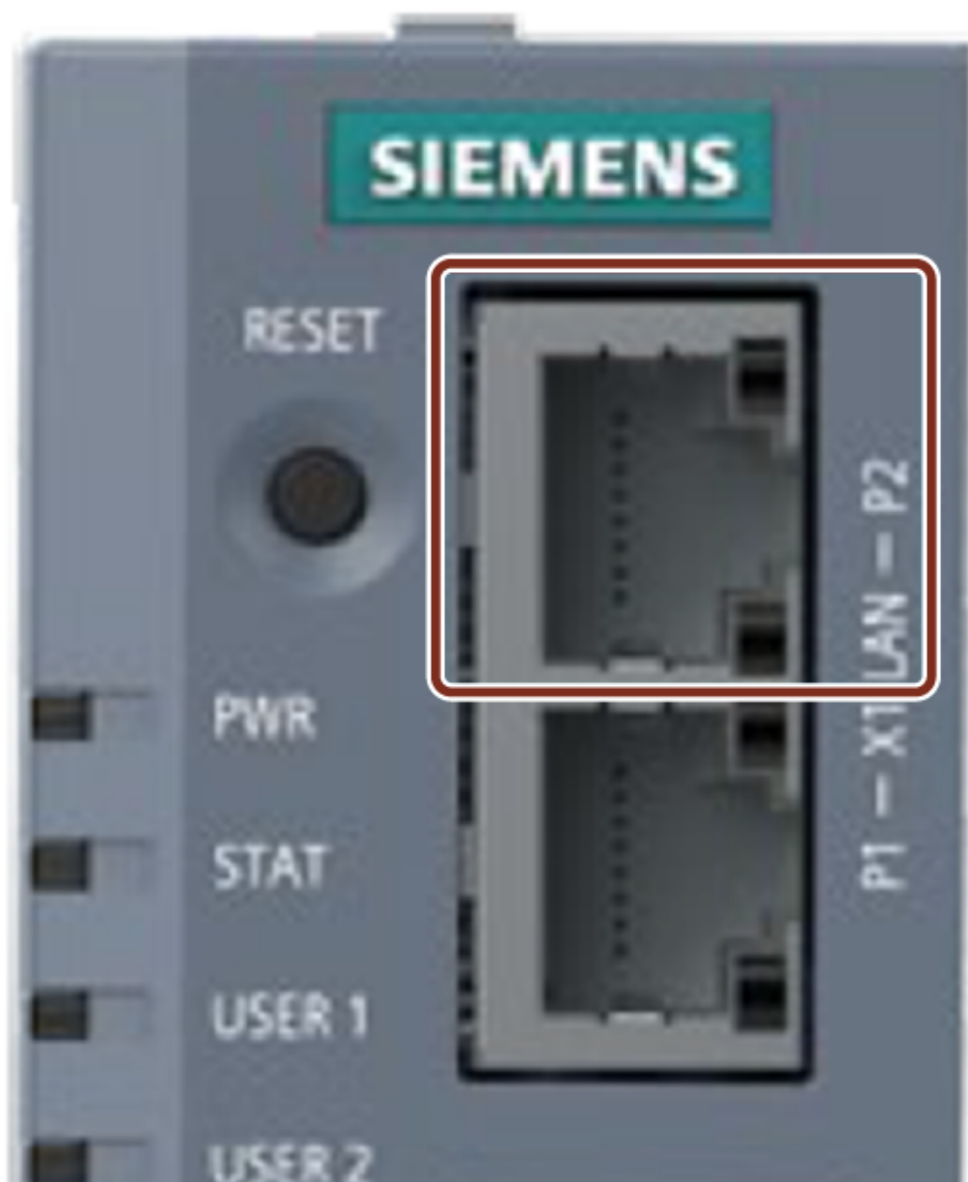
Connecting to the port X1 LAN - P2 for Internet (Insights Hub)

6.5 Connecting Port X2 P1 for MindConnect Element

Objective

The MindConnect Element can now be connected to the plant network or asset.

Requirements

- An asset has been created in Asset Manager.

- The configuration has been transferred via USB stick to the MindConnect Element.

Procedure

To connect the MindConnect Element to your plant network or asset, insert the Ethernet cable into the port labeled with **X2 P1** or **X1 LAN - P1**.

The following graphic shows the connecting port of the MindConnect Nano:
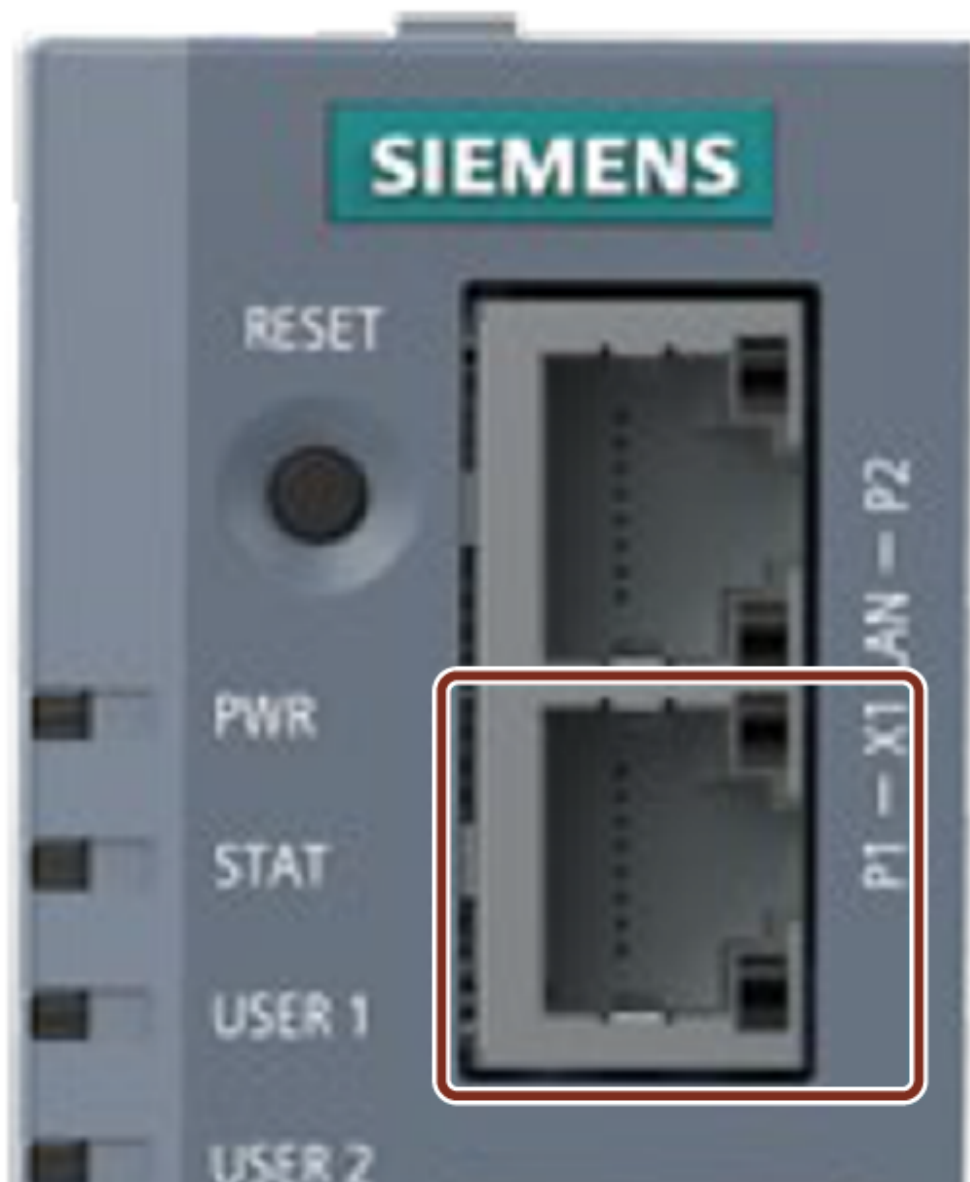

For more information on connecting MindConnect Nano, see <u>Connecting MindConnect Nano</u>.

The following graphic shows the connecting port of the MindConnect IoT2040:

For more information on connecting MindConnect IoT2040, see <u>Connecting MindConnect IoT2040</u>.

The following graphic shows the connecting port of the MindConnect IoT2050:

For more information on connecting MindConnect IoT2050, see [Connecting MindConnect IoT2050](#).

6.6   MindConnect network plan

You can set up the network plan for your MindConnect Elements in two ways. The following scenarios show them with IP address examples:

> ✏️
>
> In both scenarios it is important that you set X1 and X2 in different (and not overlapping) subnets.

Scenario A

The following scenario shows a setup example where each network-port of the MindConnect is connected to another switch or router.
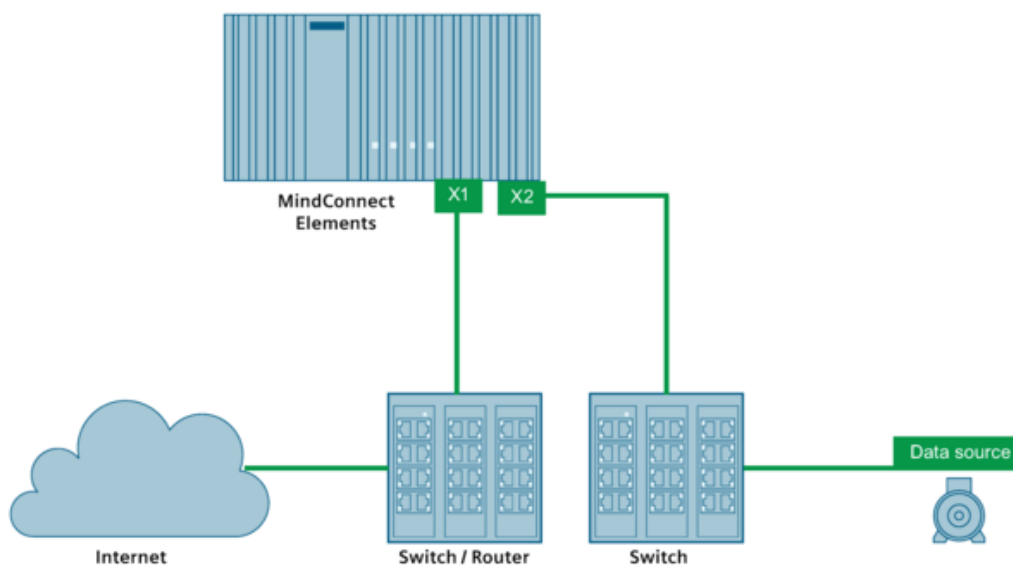
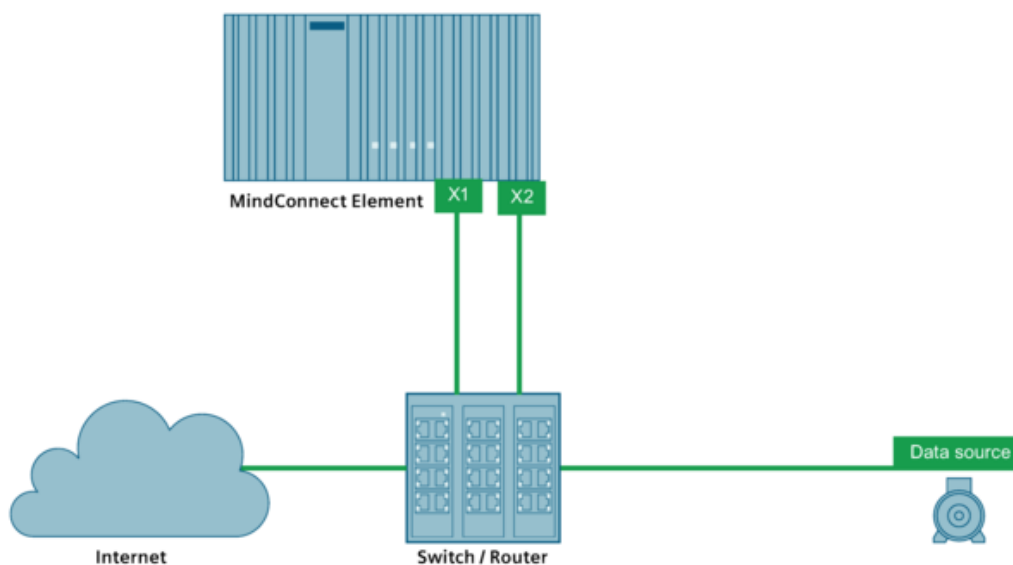The following table shows possible setups:

Port	Exemplary configuration
X1	- IP address: **192.168.1**.10 - Mask: 255.255.255.0
X2	- IP address: **192.168.3**.110 - Mask: 255.255.255.0
Data source	- IP address: **192.168.3**.120 - Mask: 255.255.255.0

- Make sure that X1 is in another and not overlapping subnet then X2.

- If you have a DHCP master in both network, you can use DHCP in both. In this case, make sure that the DHCP masters are set up so that X1 and X2 are in another subnet.

Scenario B

This following scenario shows a setup example where both network-ports of the MindConnect, are connected to the same switch or router.

The following table shows possible configuration setups:

Port	Exemplary configuration
X1	- IP address: **192.168.1**.10 - Mask: 255.255.255.0
X2	- IP address: **192.168.3**.110 - Mask: 255.255.255.0
Data source	- IP address: **192.168.3**.120 - Mask: 255.255.255.0

- Make sure that X1 is in another and not overlapping subnet then X2.

- You can only use DHCP for one port or subnet. The other has to be set up as static IP address. In this case, make sure that the DHCP master is set up so that X1 and X2 are in another subnet.

For more information about importing data to the MindConnect elements, refer to the below chapters:

- Importing data source configurations for MindConnect Nano

- Importing data source configurations for MindConnect IoT2040

- Importing data source configurations for MindConnect IoT2050

- Importing data source configurations with datapoint mapping for MindConnect Software Agent

Onboarding MindConnect Elements 7

7.1   Onboarding MindConnect Elements

This chapter describes the initial configuration of an asset and MindConnect Elements (MindConnect Nano, MindConnect IoT2040 or MindConnect Software Agent) in order to onboard these MindConnect Elements to Insights Hub. Onboarding is the process of attaching a MindConnect Elements to Insights Hub. And also, it describes the process of connecting industrial data sources to Insights Hub using MindConnect Software Agent.
To establish the initial connection between MindConnect Elements and Insights Hub (onboarding), you have to configure the essential asset and MindConnect Elements data. For onboarding the full configuration is not required, although you can accomplish all steps using Asset Manager.
The respective data to be configured for onboarding is described in the following procedure.

Requirements

- MindConnect Elements is connected to the Internet and powered on.

- The connection cable for the Internet is correctly plugged into the Ethernet port for the Internet.

- MindConnect Elements is connected to asset or plant network.

- You have received the link to the Insights Hub UI with credentials (user and password data).

- A customer account is created.

- A standard USB device with a single partition in FAT or FAT32 is formatted for MindConnect Nano/IoT2040 only.

- You have the role "mdsp:core:TenantAdmin". The user roles are set in Settings.

- MindConnect Software Agent is installed on Windows 10 system which supports Hyper-V and also can be installed on Linux systems which supports Docker.

> **✎ Prepare MindConnect Elements**
>
> To prepare your MindConnect Elements for V3, you have to update the firmware for boxes that were already connected to V2 (SAP). For devices connecting to Insights Hub region China 1, the MindConnect Elements firmware should be V3.3.0.4 or higher.

Onboarding Procedure

In order to onboard MindConnect Elements (MindConnect Nano, MindConnect IoT2040, MindConnect IoT2050 or MindConnect Software Agent), refer the below documents:

- [Overview of onboarding MindConnect Nano](#)

- [Overview of onboarding MindConnect IoT2040](#)

- [Overview of onboarding MindConnect IoT2050](#)

- [Overview of MindConnect Software Agent](#)