



Edition

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EQUIPMENT MANUAL

Condition Monitoring System

CM VIB/CM FPP Connection Module
www.siemens.com

SIEMENS

CONDITION MONITORING SYSTEM

CM VIB/CM FPP Connection Module

Equipment Manual

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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.

Trademarks

All names identified by ® are registered trademarks of Siemens Aktiengesellschaft. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

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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Introduction

1.1 About CMS - Condition Monitoring System

The Condition Monitoring System (CMS) with its connection modules (CM) VIB and FPP is used for the preventive monitoring of machines and plants. The system evaluates data from various sensors, such as speed or temperature.

The VIB (vibration) CM measures vibrations via an IEPE input, while the FPP (fast process parameters) CM measures currents or voltages via an analog input.

1.2 ID Link and Siemens Online Support

You can find additional information about the product:

- via ID link
- by using Siemens Industry Online Support:
 - Website: SIOS
 - Industry Online Support app (for Apple iOS and Android)

Product-specific information via ID link

The QR code on your product and on the product packaging contains the ID link.

ID link is a globally unique identifier according to IEC 61406-1.

You can use the ID link to obtain product data, manuals, declarations of conformity, certificates and other information about your product.



Figure 1-1 QR code with ID link included

You can recognize the ID Link by the frame with a black corner at the bottom right.

Content of Siemens Online Support

- Product support
- Global forum for information and best practice sharing between users and specialists
- Local contact persons via the contact person database (→ Contact)

1.4 Spare parts services

- Product information
- FAQs (Frequently Asked Questions)
- Application examples
- Manuals
- Downloads
- Compatibility tool
- Newsletter with product selection
- Catalogs/brochures
- Certificates

See also

SIOS (<https://support.industry.siemens.com/cs/ww/en/>)

1.3 CMS usage information on the Internet

CMS usage information on the Internet

You can find the complete usage information, including further manuals, on the Internet.

1.4 Spare parts services

Spare parts services

The online spare parts service "Spares on Web" offers specific spare parts for the product.

See also

SOW (<https://www.sow.siemens.com>)

1.5 Use for the intended purpose

WARNING

Improper use

If you do not use the CMS for its intended use, there is a risk of death, severe injury and/or material damage.

- Only use the CMS as intended.
- Do not use the CMS in hazardous areas (where there is a risk of explosion) unless expressly released and authorized for this purpose. Comply with the separately added supplementary notes.
- Make sure that the conditions at the location of use comply with all the rating plate data.
- Make sure that the conditions at the location of use comply with the conditions specified in this documentation. Take into consideration deviations regarding approvals or country-specific regulations.

The CMS is intended for industrial or commercial plants.

The CMS is designed for operation in sheltered areas under normal climatic conditions, such as those found on shop floors.

Operating the CMS in a hazardous area is prohibited unless the CMS is approved for this purpose.

For more detailed information, refer to the Equipment Manual.

Any other use of the CMS is considered to be improper use.

Correct and intended use includes compliance with all of the specifications in the product documentation.

Observe the data on the rating plate.

Contact your sales partner if you have questions regarding proper and intended use, or if you wish to use special versions and design variants.

1.6 Predictable incorrect use

Predictable incorrect use

WARNING

Injuries due to incorrect use

Death or severe injury can occur if you use the CMS other than how SIEMENS intended. You can damage or destroy the CMS.

1.6 Predictable incorrect use

Misuse includes, for example

- Failure to observe the contents of the product documentation
- Failure to observe the data on the rating plate
- Using the CMS in hazardous areas unless the CMS is approved for this purpose
- Using the CMS outside the permissible ambient conditions
- Using the CMS as a result of its size, its weight, its shape or its material for applications other than those precisely described in this manual

NOTICE
Property damage due to improper use
The CMS is not a machine protection solution. Do not use the data and signals recorded by the CMS for control purposes (e.g. shutting down a machine).

Fundamental safety instructions

2.1 General safety instructions



! WARNING

Electric shock and danger to life due to other energy sources

Touching live components can result in death or severe injury.

- Only work on electrical devices when you are qualified for this job.
- Always observe the country-specific safety rules.

Generally, the following steps apply when establishing safety:

1. Prepare for disconnection. Notify all those who will be affected by the procedure.
2. Isolate the drive system from the power supply and take measures to prevent it being switched back on again.
3. Wait until the discharge time specified on the warning labels has elapsed.
4. Check that there is no voltage between any of the power connections, and between any of the power connections and the protective conductor connection.
5. Check whether the existing auxiliary supply circuits are de-energized.
6. Ensure that the motors cannot move.
7. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems, or water. Switch the energy sources to a safe state.
8. Check that the correct drive system is completely locked.

After you have completed the work, restore the operational readiness in the inverse sequence.



! WARNING

Electric shock due to connection to an unsuitable power supply

When equipment is connected to an unsuitable power supply, exposed components may carry a hazardous voltage. Contact with hazardous voltage can result in severe injury or death.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV- (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.

Note

Measuring errors caused by radio devices or cellphones

Using radio devices, cellphones, or mobile WLAN devices in the immediate vicinity of the components can result in measuring errors.

- Avoid operating radio devices, cellphones and mobile WLAN devices in the direct vicinity of the components.



! WARNING

Electric shock due to unconnected cable shield

Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.

- As a minimum, connect cable shields and the conductors of power cables that are not used (e.g. brake cores) at one end at the grounded housing potential.

NOTICE

Damage to equipment due to unsuitable tightening tools.

Unsuitable tightening tools or fastening methods can damage the screws of the equipment.

- Only use screw inserts that exactly match the screw head.
- Tighten the screws with the torque specified in the technical documentation.
- Use a torque wrench or a mechanical precision nut runner with a dynamic torque sensor and speed limitation system.
- Adjust the tools used regularly.

! CAUTION

Symptomatic reactions of the respiratory tract and the skin to chemicals

A newly purchased product may contain traces of substances that have been identified as sensitizers.

Sensitizers are substances that can cause sensitization in the lungs and skin after exposure to them.

Once sensitized, further exposure can result in severe reactions, even at low levels. In the most extreme cases, those affected can develop asthma and/or dermatitis.

- If the product has a strong smell associated with it, keep it in a well ventilated room for 14 days.

2.2 Industrial cybersecurity

Further information is provided on the Internet: Industrial Security Configuration Manual (<https://support.industry.siemens.com/cs/ww/en/view/108862708>)



WARNING

Unsafe operating states resulting from software manipulation

Software manipulations, e.g. viruses, Trojans, or worms, can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Keep the software up to date.
- Incorporate the automation and drive components into a state-of-the-art, integrated industrial cybersecurity concept for the installation or machine.
- Make sure that you include all installed products in the integrated industrial cybersecurity concept.
- Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.
- Carefully check all cybersecurity-related settings once commissioning has been completed.

2.3 Cybersecurity information

Siemens provides products and solutions with industrial cybersecurity 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 cybersecurity concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial cybersecurity measures that may be implemented, please visit <https://www.siemens.com/cybersecurity-industry>.

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

To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS Feed under <https://new.siemens.com/cert>.

Cybersecurity references

You will find further information on this product relevant to cybersecurity in the course of the documentation. The following list provides an overview showing which sections deal with the information in more detail:

- The system must not be used for control purposes, e.g. as a machine protection solution (see Predictable incorrect use (Page 7)).
- The system should only be deployed in a separate, isolated network, without exposing it to the Internet or other external network traffic (see Installer and terminal diagram (Page 48)).
- An external PTP (precision time protocol) master compliant with IEEE 1588 is not permitted (see Installer and terminal diagram (Page 48)).
- Cascading switches are not permitted (see Installer and terminal diagram (Page 48)).
- Ports and protocols that are relevant for Ethernet communication can be found at Ports and protocols (Page 88).
- Security updates must be carried out as soon as they are available in SIOS (see ID Link and Siemens Online Support (Page 5)).

System overview

3.1 Features

With the Condition Monitoring System and the associated VIB and FPP connection modules (CM), analog signals from various sensors are recorded to monitor the status of components subject to wear, e.g. motors, bearings and critical machine parts, with the aid of X-Tools.

Other features

- 4 analog sensor channels for signal acquisition at a high sampling rate (96 kHz)
- One configurable digital/analog input for speed measurement
- 3 temperature inputs (PT100/1000)
- Problem-free integration into new and existing machines
- Synchronous data recording

3.2 Configuration

Configuration

The diagram below shows a sample configuration of the VIB and FPP connection modules (CM), together with X-Tools:

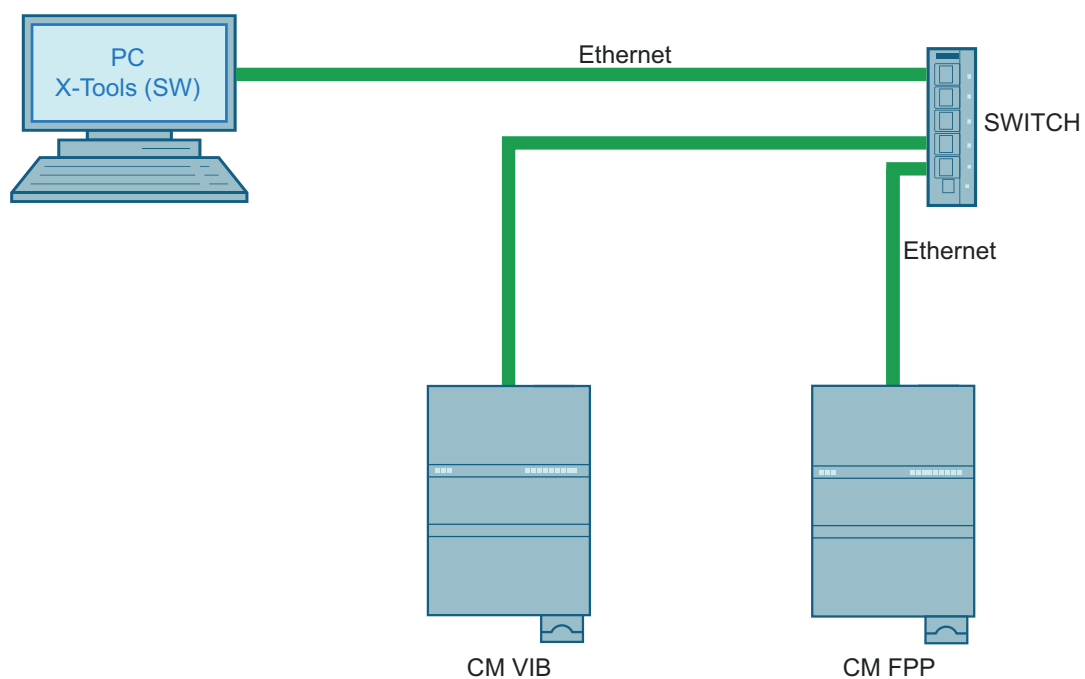
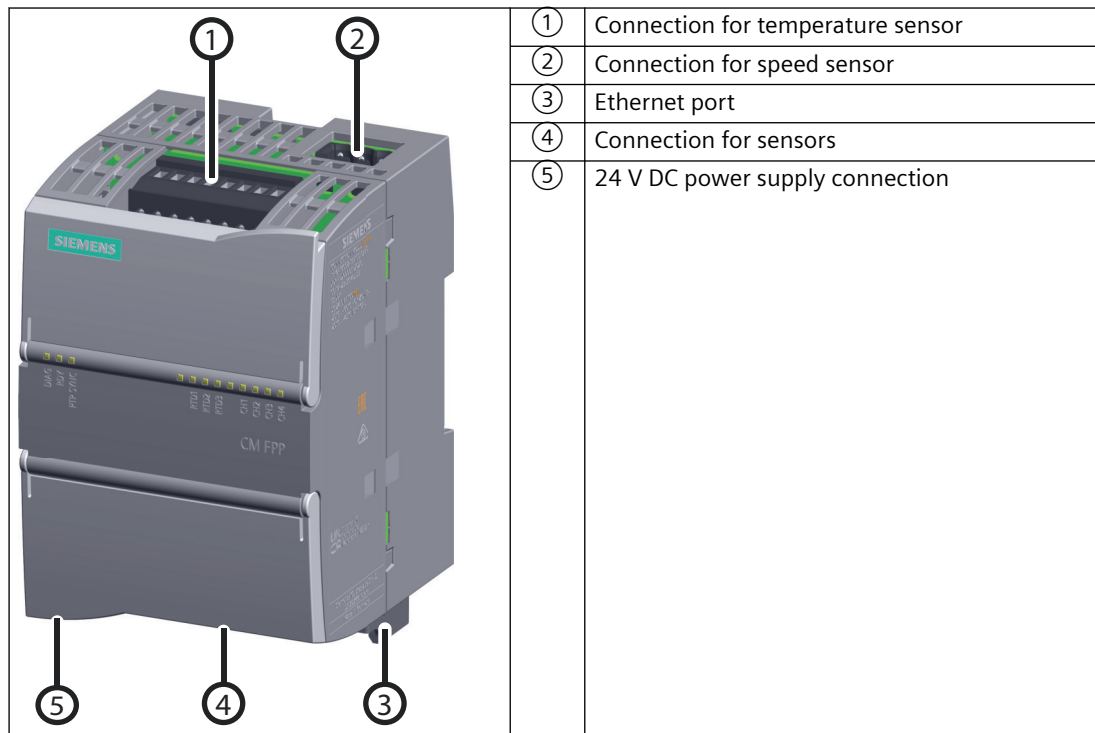


Figure 3-1 CM example configuration

3.3 Structure

CM design



3.4 Ordering data

The following components are used:

CM VIB/CM FPP and shielding bracket set

Product	Article number
CM VIB	9SA2054-5AA00-0AB1
CM FPP	9SA2054-6AA00-0AB1
Shielding bracket set	9SA2054-1AA00-0EB1

Cables and sensors

Siemens recommends use of these products:

Product	Article number
SIPLUS CMS2000 connection cable for connecting the VIB sensors, 3 m long	6AT8002-4AC03
SIPLUS CMS2000 connection cable for connecting the VIB sensors, 10 m long	6AT8002-4AC10
SIPLUS CMS2000 connection cable for connecting the VIB sensors, 30 m long	6AT8008-2BA12-0AA0
SIPLUS CMS2000 VIB sensor S01 (IEPE vibration sensor, 100 mV/g, 0.5 Hz ... 15 kHz)	6AT8002-4AB00
SIPLUS CMS2000 VIB sensor S02 (IEPE vibration sensor, 10 mV/g, 1 Hz ... 15 kHz)	6AT8008-2AA00-0AA0
SIPLUS CMS2000 VIB sensor S03 (IEPE vibration sensor, 500 mV/g, 0.2 Hz ... 3 kHz)	6AT8008-2AA02-0AA0

PTP-enabled switch

Synchronized operation of the CM VIB/CM FPP requires a PTP-enabled switch (IEEE 1588). Use one of the following products for this:

Product	Article number
SCALANCE XC 208 G	6GK5208-0GA00-2AC2
SCALANCE XC224-4C G	6GK5224-4GS00-2AC2
RUGGEDCOM RSG910C	6GK6491-0CB...*

*) Products with an article designation with (...) must be configured in SIOS.

Siemens Industrial PC (IPC)

Operation of the CM VIB/CM FPP requires a Siemens industrial PC. Use one of the following products for this:

Product	Article number
SIMATIC IPC427E	6AG4141-.....-....*
SIMATIC IPC627E (Box PC)	6AG4131-3.....-....*

*) Products with an article designation with (...) must be configured in SIOS.

X-Tools software

Product	Article number
CMS X-TOOLS PROFESSIONAL V05.00	9AE4160-3BA00
CMS X-TOOLS ANALYSIS LIBRARY V05.00	9AE4160-4BA00
CMS X-TOOLS MQTT ADAPTER V05.00	9AE4160-4CA00

*) Products with an article designation with (...) must be configured in SIOS.

DTA Onsite software

Product	Article number
DTA Onsite V1.1	9AE49SA1112-0AA00-0DA0

*) Products with an article designation with (...) must be configured in SIOS.

Functions

4.1 Status and actual displays

The following options are available for obtaining information on the current status of the device/system/process:

LEDs

The LEDs on the CM provide information on the status and quality of signal acquisition. For information on the meaning of the LED displays, see section Status LEDs (Page 81).

X-Tools

You can find information about X-Tools in the X-Tools Manual (9AE4160-3BA00).

4.2 Self-monitoring of the system

The CM has functions for self-monitoring that ensure a high level of reliability of the system in continuous operation.

Self-test

The CM performs a self-test during start-up. In the event of an error, the device enters a fault status, which can be recognized by means of the LEDs on the front of the enclosure and is displayed in X-Tools.

Watchdog

The CM has a watchdog function that prevents the system from being in an undefined operating mode.

Note

In the event of an error, the CM restarts.

4.2 Self-monitoring of the system

Application planning

5.1 Shipping

NOTICE
Damage to the device The device can be damaged by inappropriate shipping. <ul style="list-style-type: none">• Transport the device, therefore, only in the original packaging. This will give it the necessary protection against shock and impact.

5.2 Storage

Observe the storage conditions when storing the CM (see section Technical specifications for CM VIB/FPP (Page 83)). If any of the following problems occur, commissioning is only permissible after agreement with Siemens AG regarding further measures:

- Contamination
- Ingress of liquid
- Occurrence of condensation
- Damage or other violations of the storage conditions

5.3 Scope of delivery

You have been supplied with a VIB or FPP connection module (CM).

Unpacking and checking the delivery

1. Unpack the device.
2. Check the device for transport damage by visual inspection.

Accessories are not included in the scope of delivery and can be ordered separately.

NOTICE
Damage to the system Damaged parts can result in damage to the system. <ul style="list-style-type: none">• Do not use any parts that are damaged.

5.4 Installation location

The product is designed for use in an industrial environment.

The device is only suitable for indoor use.

Note

Installation in control cabinet/device connection box

The CM is intended for installation in a control cabinet or in a device connection box.

- In these cases, the LEDs on the front of the device will remain visible and usable only during commissioning. Please take this into consideration for subsequent operation of the device.
 - It is important to note that installation in a control cabinet or device connection box is essential for compliance with UL regulations.
 - The control cabinet/device connection box must comply with the regulations regarding fire-protection housings.
 - Ensure that all cables and leads that protrude externally are equipped with adequate strain relief.
-

Electromagnetic compatibility (EMC)

NOTICE
Damage to the device Inadequately dimensioned overvoltage protection can result in severe damage to the device. Therefore ensure that the overvoltage protection is adequate (see section Technical specifications for CM VIB/FPP (Page 83)). To do this, use the shielding bracket set (see section Ordering data (Page 15)) or take comparable actions.

EMF assessments for 24 V components

The 24 V components, e.g. control systems (NCU, MCU, PPU), IPCs, ITCs, IFPs, handheld units or machine control panels, do not generate any appreciable electromagnetic fields.

No minimum clearance has to be maintained to the 24 V components.

Choice of installation location/mounting position

The device can be mounted on a standard DIN rail.

- Permissible mounting positions:
 - Horizontal (device is upright)
 - Vertical (device is rotated clockwise through 90°)
- Permissible ambient temperature:
 - Horizontal installation: -20 °C to 60 °C
 - Vertical installation: -20 °C to 45 °C

Restrictions

Restrictions of the max. ambient temperature specified with regard to the installation altitude

Installation altitude	Derating factor for ambient temperature ¹⁾
-1 000 to 2 000 m	1.0
2 000 to 3 000 m	0.9
3 000 to 4 000 m	0.8
4 000 to 5 000 m	0.7

¹⁾ Base value for the application of the derating factor is the maximum permissible ambient temperature in °C for 2 000 m

Note

- Linear interpolation between altitudes is permissible.
- The derating factors compensate for the decreasing cooling effect of air at higher altitudes due to lower density.
- Note the mounting position of the respective module in the technical specifications. The basis for this is the standard IEC 61131-2.
- Make sure that the power supplies you use are also rated for altitudes > 2 000 m.

Note

Effects on availability

The higher cosmic radiation present during operation at altitudes above 2 000 m also starts to have an effect on the failure rate of electronic components (the "soft error rate"). In rare cases this can result in a transition of the module into the safe state, especially for Safety Modules. However, the functional safety of the module is fully retained.

Minimum clearances

Maintain the minimum clearances from walls and other devices:

- Sides: 0 mm
- Top: 40 mm
- Bottom: 45 mm

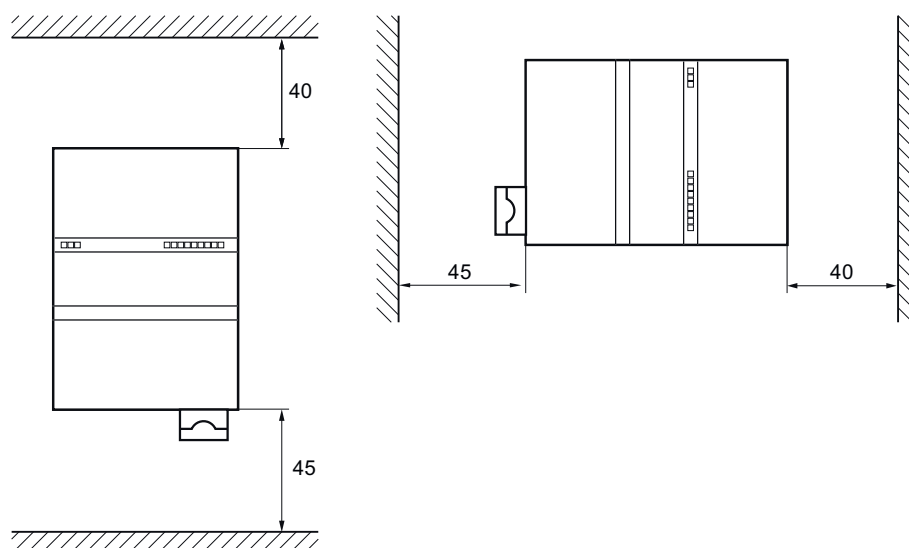


Figure 5-1 Minimum cooling clearances for horizontal and vertical installation

Note the following device dimensions in this regard:

Table 5-1 Device dimensions

Width	70 mm
Height	120 mm
Depth	75 mm

NOTICE**Damage due to overheating**

It is essential that you comply with the instructions regarding the installation location and mounting position. Otherwise the device may malfunction or incur permanent damage as a result of overheating.

Mounting

6.1 Preparing for installation

Please note

The CM is easy to install. You can install it either in a control panel or on a standard 35 mm DIN rail compliant with DIN EN 60715; the CM can be installed horizontally or vertically.

The CM is classified as open equipment according to standards for electrical devices. You must install it in an enclosure, control cabinet or control center.

Only authorized personnel may have access to the enclosure, control cabinet or control center.

Install the CM in a dry environment.

The installation must offer the approved mechanical protection and environmental protection for open equipment in your specific location category according to the applicable electrical regulations and building code. Contamination of conductive parts by dust, moisture and air pollution can lead to operational errors and electrical faults in the CM.

If the CM is located in an area where contamination of conductive parts can occur it must be protected by an enclosure with the appropriate degree of protection.



WARNING

Incorrect installation of the CM can lead to electrical faults or unexpected operation of the machine

Electrical faults or unexpected operation of the machine can lead to fatal or severe injuries and/or to material damage. All instructions for the installation and maintenance of a proper operating environment must be followed to ensure safe operation of the devices.

Keep the CM away from heat, high voltage and electrical interference

As a general rule for the arrangement of devices in your system, keep devices that generate high voltage or a high level of electrical interference away from low-voltage switchgear and controlgear such as the CM.

When planning the layout of the CM in your control panel, take into account heat-generating devices and arrange the electronic devices in the cooler areas of your control cabinet. The less an electronic device is exposed to high-temperature environments, the longer its service life will be.

Also take into account the manner in which you install the wiring of the devices in the control panel. Avoid laying low-voltage signal cables and communication cables along the same cable path as AC supply lines and high-speed switching DC lines.

Allow sufficient clearance for cooling and wiring

The CM is designed for natural heat dissipation by means of convection. To guarantee heat dissipation, keep at least 40 to 45 mm space above and below the device, see section Installation location (Page 22). Also make sure that a depth of at least 25 mm remains clear between the front of the module and the inner surface of the enclosure.



CAUTION

For vertical mounting, the maximum permissible ambient temperature is 15 °C lower.

Make sure that the CM is fitted correctly.

Note

Technical specifications

Please note the information in section Technical specifications (Page 83).

6.2 Installing the CM

Mounting on a standard mounting rail

Proceed as follows:

1. Hook the CM onto the DIN rail.
2. Swing the CM back until you hear it click into place.

NOTICE

Mounting slides can become deformed

If the device is not mounted on a control panel, the mounting slides must always be in the default positions set at the factory. Otherwise, the mounting slides can deform if they are exposed to hot and moist ambient conditions for long periods.

Mounting on a control panel

Preparations

- Drill holes (M4). Take the dimensions for the drill holes from the diagram below.

Mounting

Proceed as follows:

1. Move the slides ① outwards until they latch in place.
2. Screw the CM on tightly. Use a cylinder head screw M4 as well as a spring lock washer and a flat washer for this.

NOTICE

Use the correct type of screw

Do not use a countersunk head screw. The type of screw required depends on the type of material on which the module is mounted. Fasten the screw with the corresponding torque until the spring lock washer is pressed flat. Do not fasten the screws with excessive torque.

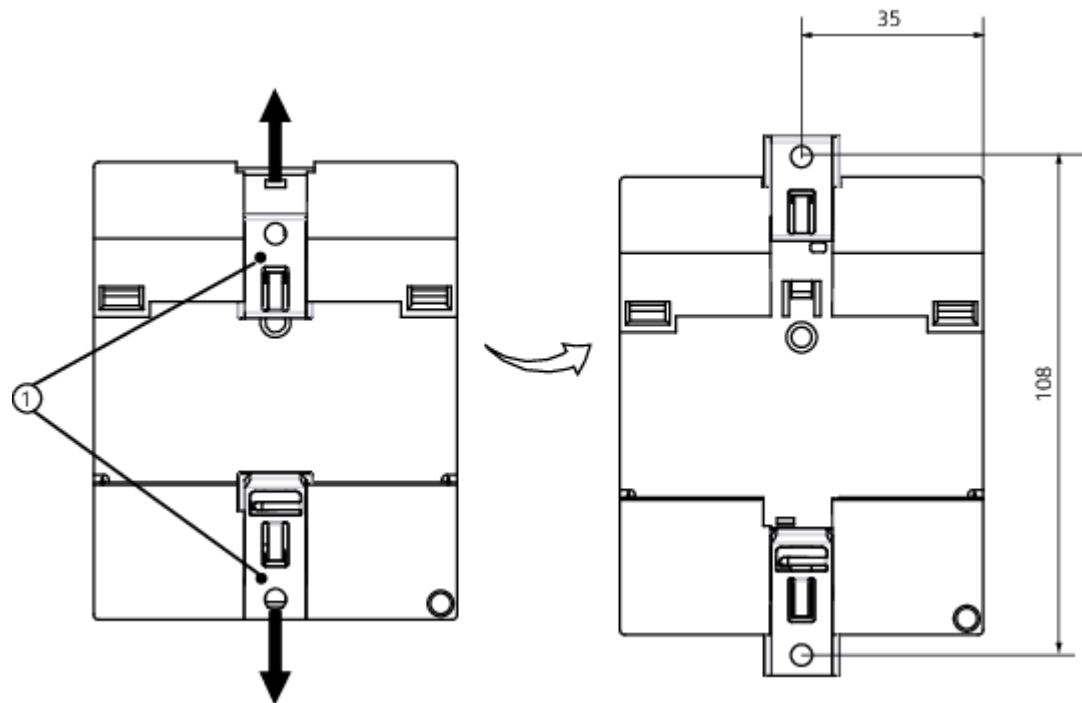


Figure 6-1 Control panel mounting of the CM

Installation according to cULus

The Connection Modules are classified as "open type" according to cULus. The following installation variants are mandatory in order to comply with the specifications of the cULus approval for safe operation:

- Installation in a suitable cabinet
- Installation in a suitable housing

The cabinet or the housing must comply with the requirements relating to a fire protected housing.

Refer to the manufacturer's data for information on the suitability of the cabinet or the housing.

6.3 Mounting the shielding bracket set

Application

The shielding bracket set is used for the EMC-compliant connection of signal and encoder cables to the CM.

The set contains 2 shielding brackets, 9 terminal clamps, and one copy of the Compact Hardware Installation Instructions. It can be ordered as an accessory.

- Upper shielding bracket: Grounding of the cable shield for the speed and temperature sensor
- Lower shielding bracket: Grounding of the cable shields for the IEPE sensors or the analog inputs, as well as for the Ethernet cable

Note

Do not use the terminal clamps as strain relief.

Safety instructions



WARNING

Operation by qualified personnel only

- The product/system described in this documentation may only be operated by personnel qualified for the specific task in hand. 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.



WARNING

Electric shock

May cause death or serious injury

- Voltages of more than 60 V can occur in the control cabinet. Suitable safety precautions preventing contact must therefore be taken before and during commissioning and maintenance work.
- Before working in the control cabinet, ensure that the system is disconnected.
- The sensor cables can be up to 100 meters long. If the sensor cable is longer than 30 meters, the cable shield must be connected (grounded) at both ends.

Note

Cable length

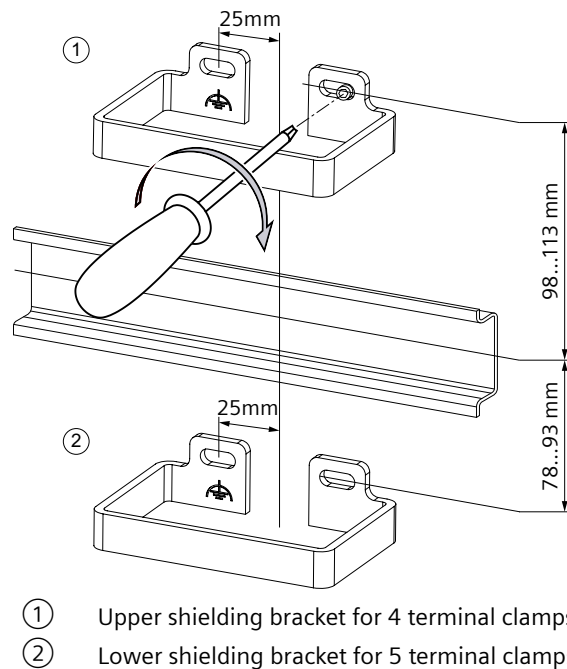
The sensor cables can be up to 100 meters long. Short cables provide the best signal quality.

Mounting the shielding brackets

Screw the shielding brackets to the mounting plate above and below the standard DIN rail.

6.3 Mounting the shielding bracket set


The permissible distance between the module and the shielding bracket is a minimum of 30 mm and a maximum of 45 mm.



Connection


7.1 Safety instructions and guidelines

Safety instructions

 CAUTION
<p>Safe electrical separation</p> <p>For the 24 V DC power supply, use only power supply units with safe electrical isolation in accordance with IEC 60364-4-41 or HD 384.04.41 (VDE 0100, Part 410), for example, in accordance with the PELV standard.</p> <p>The supply voltage must be within the specified voltage range. Otherwise, functional failures of the device cannot be ruled out (observe the information in the section Technical specifications (Page 83)).</p> <p>Applies to non-isolated system design:</p> <p>Connect the terminal for GND 24 V from the 24 V power supply output to equipotential bonding for uniform reference potential. Select a connection point that is as central as possible.</p>

Wiring guidelines

All electrical devices must be grounded and wired properly not only to ensure that your system functions as smoothly as possible but also to provide additional noise immunity for the CM. Before grounding or wiring an electrical device, you must ensure that the power supply for the device is switched off. Also ensure that all connected devices are switched off. When wiring the CM and all connected devices, make sure that you observe all applicable and legally binding standards. Adhere to the relevant national and regional regulations when installing and operating the device. Check with the local authorities regarding the standards and rules to be followed in your particular case.

 WARNING
<p>If you install or wire the CM or devices connected to it while it is switched on, you may receive an electric shock or the devices may operate unexpectedly.</p> <p>If the power supply to the CM and all connected devices is not switched off during the installation or removal of devices, this may result in serious or fatal injury and/or damage to property due to electric shock or unexpected operation of the devices. Take all necessary safety precautions and make certain that the power supply to the CM is switched off before installing or removing a device.</p>

Always consider safety when planning the grounding and wiring of your CM. Electronic control devices such as the CM can fail, causing unexpected operation of the controlled or monitored devices. You should therefore implement safety relays that are independent of the

7.1 Safety instructions and guidelines

CM and protect against possible personal injury and/or damage to property. Only use copper cable to connect the power supply

Guidelines for wiring the CM

When planning the wiring of your CM, install a single disconnecting switch, which simultaneously separates the CM power supply, the voltage of all input circuits and the voltage of all output circuits. Provide overcurrent protection, e.g. using a fuse or a circuit breaker in order to limit any fault current in the supply wiring. You can install additional protection in the form of fuses or other current limiting devices in the individual output circuits.



CAUTION

Temperature requirements for cables

As a minimum, the cables must be specified for a temperature of +75 °C.

Galvanic isolation guidelines

Communication circuits and circuits of the internal logic of a CM with an integrated AC power supply are supplied as safety extra-low voltage (SELV) in accordance with EN 61131-2.

To obtain the safe property of the low voltage circuits of the CM, external connections at communication ports, analog electric circuits as well as all 24 V rated voltage supplies must be fed-in from permissible sources, which comply with the requirements according to various standards for SELV, PELV, Class 2, voltage-limited or power-limited sources.



WARNING

The use of non-electrically isolated or single isolated supplies for the extra-low voltage circuits of AC cables can lead to dangerous voltages in circuits that are considered safe to touch, e.g. communication circuits or low-voltage encoder wiring.

Unexpectedly high voltages can cause an electric shock resulting in serious or fatal injuries and/or damage to property. Only use high-voltage/low-voltage converters that are approved as sources for finger-safe circuits with limited voltage.

Cable routing and grounding

Note

Interference due to incorrect cable routing

Route all analog signals (CH1 to CH4) separately from other cables to ensure that the measured signals can be transmitted without interference. The same applies to the transmission of temperature input (RTD) and speed input (r/min) signals.

- Maintain this spatial separation throughout the entire cable route. This is the only way to provide optimal EMC protection.

Note**Electromagnetic interference**

Ensure that adequate equipotential bonding is implemented for all plants or systems in which the CM is installed, e.g. using a low-impedance connection to a ground potential.

Note**Securing the cable shielding**

The permissible distance between the module and the shielding bracket is a minimum of 30 mm and a maximum of 45 mm.

Use the shielding bracket set, which is available as accessory.

Note**Strain relief**

Ensure that all cables and leads that protrude externally are equipped with adequate strain relief.

Lightning protection

NOTICE**Damage to property if an unsuitable lightning protection element is used**

When using cable lengths over 30 m and/or laying outside buildings, a suitable protection element is required. This also ensures operation in the event of indirect lightning discharges. Use without a suitable lightning protection element can lead to damage and measurement anomalies.

- Use the Dehn lightning protection element, article number 918422, Type: AVD, Type 3 P1 or equivalent lightning protection elements. Pay attention to the equivalence types when using other elements. Consult a manufacturer of lightning protection. Installation must be in accordance with the manufacturer's instructions.

Other requirements

NOTICE**Damaged cables**

- The cables must be suitably dimensioned to ensure they are not damaged. Make sure that the cables are suitable for the individual application.
- Observe the bending radii.

7.2 Terminal assignment for CM FPP

The following diagram shows the terminals on the device:

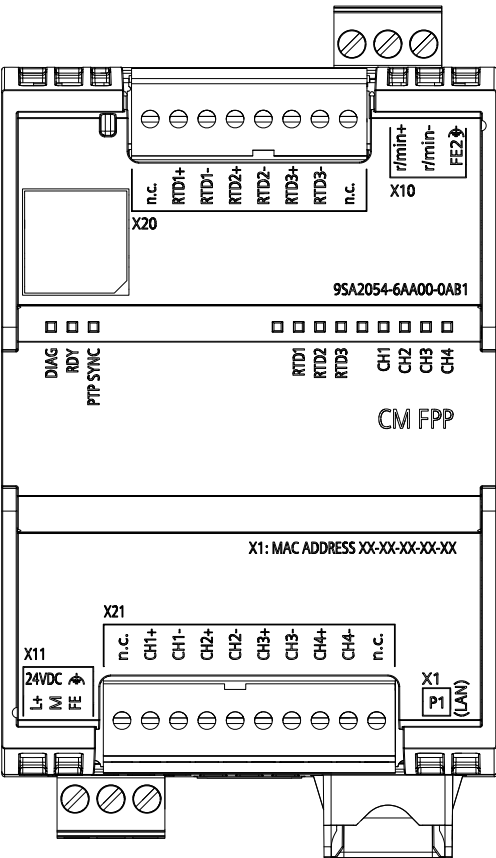



Figure 7-1 Terminal diagram for CM FPP

Terminal assignment					
24 V DC supply			r/min sensor		
L+	24 V supply for CM (+)		r/min+	Speed input (+)	
M	24 V supply for CM (-)		r/min-	Speed input (-)	
	Functional grounding		FE2	Functional grounding	

High-speed analog inputs			Temperature sensors	
PIN1	n.c.		PIN1	n.c.
CH1+	Analog input 1 (+)		RTD1+	Temperature input 1 (+)
CH1-	Analog input 1 (-)		RTD1-	Temperature input 1 (-)
CH2+	Analog input 2 (+)		RTD2+	Temperature input 2 (+)
CH2-	Analog input 2 (-)		RTD2-	Temperature input 2 (-)
CH3+	Analog input 3 (+)		RTD3+	Temperature input 3 (+)
CH3-	Analog input 3 (-)		RTD3-	Temperature input 3 (-)
CH4+	Analog input 4 (+)		PIN8	n.c.
CH4-	Analog input 4 (-)			
PIN10	n.c.			

7.3 Terminal assignment for CM VIB

The following diagram shows the terminals on the device:

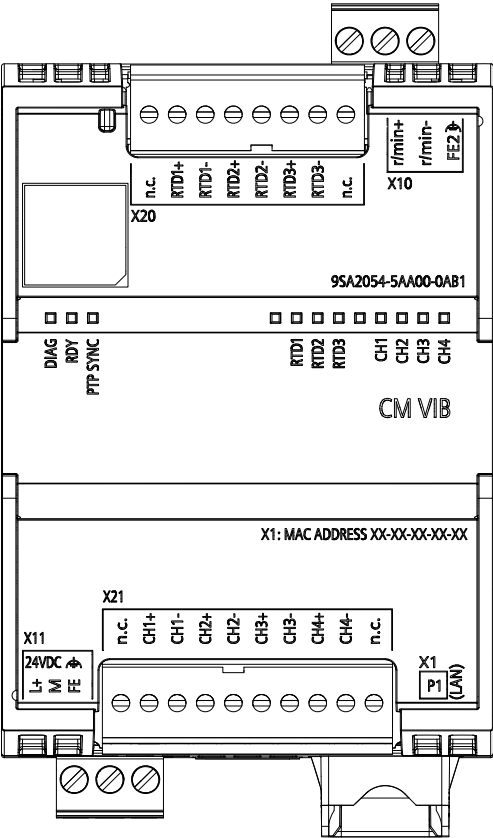



Figure 7-2 Terminal diagram for CM VIB

7.4 Connecting the cable shield (shielding bracket set)

Terminal assignment			
24 V DC supply			r/min sensor
L+	24 V supply for CM (+)		r/min+ Speed input (+)
M	24 V supply for CM (-)		r/min- Speed input (-)
	Functional grounding		FE2 Functional grounding

IEPE sensors		Temperature sensors	
PIN1	n.c.	PIN1	n.c.
CH1+	IEPE sensor input 1 (+)	RTD1+	Temperature input 1 (+)
CH1-	IEPE sensor input 1 (-)	RTD1-	Temperature input 1 (-)
CH2+	IEPE sensor input 2 (+)	RTD2+	Temperature input 2 (+)
CH2-	IEPE sensor input 2 (-)	RTD2-	Temperature input 2 (-)
CH3+	IEPE sensor input 3 (+)	RTD3+	Temperature input 3 (+)
CH3-	IEPE sensor input 3 (-)	RTD3-	Temperature input 3 (-)
CH4+	IEPE sensor input 4 (+)	PIN8	n.c.
CH4-	IEPE sensor input 4 (-)		
PIN10	n.c.		

7.4 Connecting the cable shield (shielding bracket set)

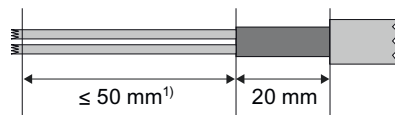
Connect the following process signals of the Condition Monitoring System using shielded cables:

- Speed sensor
- Temperature sensor
- Sensor signals (CH1 to CH4)
- Ethernet

To do this, apply the shields of the cables to the upper and/or lower shielding bracket with the help of the terminal clamps. The shielding bracket set can be ordered as an accessory (see section Ordering data (Page 15)).

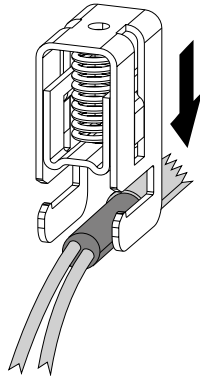
Proceed as follows:

1. Strip the cable.



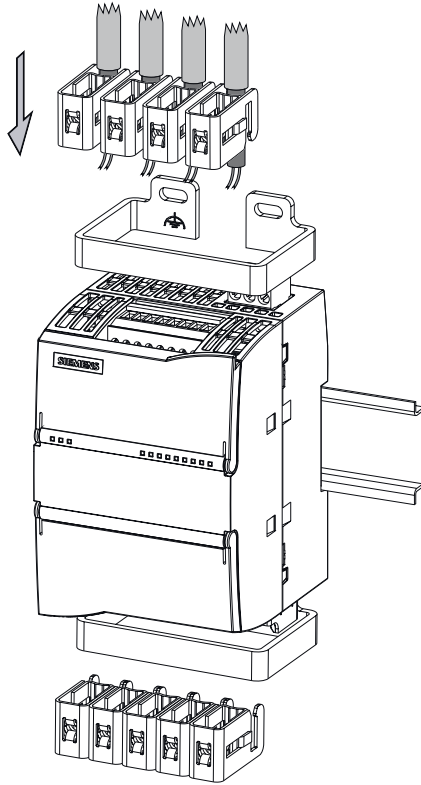
¹⁾ The length depends on the distance between the shielding bracket and the device.

2. Press the terminal clamps onto the protective braided shield of the cable.

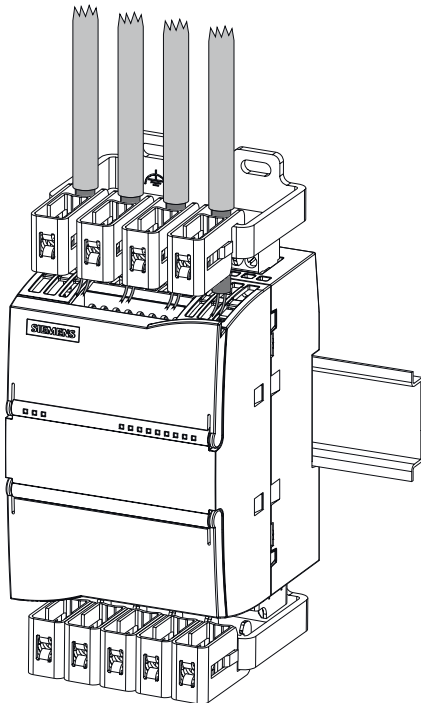


7.4 Connecting the cable shield (shielding bracket set)

3. Slide the terminal clamps with cables onto the shielding bracket.



4. The result should look like this:



Configuration with multiple CMs

If you use multiple CMs in your configuration, an equivalent grounding of the cable shields, e.g. via a grounding rail, is also permitted.

7.5 Power supply

24 V DC power supply

An external 24 V DC supply is connected to the CM via plug-in terminals (min: 19.2 V DC, max: 28.8 V DC). The power supply serves the following purposes:

- Power supply for the internal electronics of the CM
- Constant power supply of the IEPE sensors

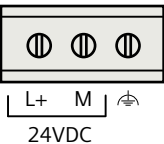

Safety instructions

<p>! CAUTION</p> <p>Safe electrical isolation</p> <p>For the 24 V DC power supply, use only power supply units with safe electrical isolation in accordance with IEC 60364-4-41 or HD 384.04.41 (VDE 0100, Part 410), for example, in accordance with the PELV standard.</p> <p>The supply voltage must be within the specified voltage range. Otherwise, function failures on the device cannot be excluded.</p> <p>Applies to non-isolated system design:</p> <p>Connect the terminal for GND 24 V from the 24 V power supply output to equipotential bonding for uniform reference potential. Select a connection point that is as central as possible.</p>
--

Connector pin assignment

The diagram below shows the assignment of the terminals for the 24 V DC power supply (front view). The permissible cable cross-section is AWG 12 to 24.

Table 7-1 Terminal assignment for the 24 DC power supply


	L+	24 V power supply unit (+)
	M	24 V power supply (-)
		Functional grounding

Connect the FE terminal to the right-hand position.

Always wire the FE terminal.

7.6 Connecting sensors

7.6.1 Connection of sensors

 WARNING
Voltage hazards May cause death or serious injury <p>The inputs are not galvanically isolated. Only those sensors may be used that ensure safe electrical separation up to the maximum level of the potential configured for the plant.</p> <p>Observe the insulation characteristics of the sensors used. Take measures, if required, to ensure safe electrical separation.</p>

NOTICE
Material damage <p>Connecting sensors during operation can lead to damage to the sensors and the device.</p> <p>De-energize the system before you connect or replace sensors.</p>

Note

Cable length

Cable lengths of up to 100 m are permissible. To keep the measurement value deviations to a minimum, use the shortest possible cable lengths.

7.6.2 Speed sensors

Speed sensor

A speed sensor can be connected via the "r/min sensor" terminal. The input can be configured as an analog or digital rotational speed counter.

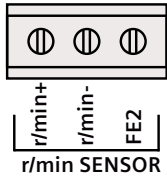
Note

On the sensor side, the output current of the speed sensor must be limited to < 1 A.

Connector pin assignment

The diagram below shows the terminal assignment for the speed sensor. The permissible cable cross-section is AWG 12 to 24.

Table 7-2 Terminal assignment for the speed encoder

	r/min+	Speed input (+)
	r/min-	Speed input (-)
	FE2	Functional grounding

7.6.3 Temperature sensors

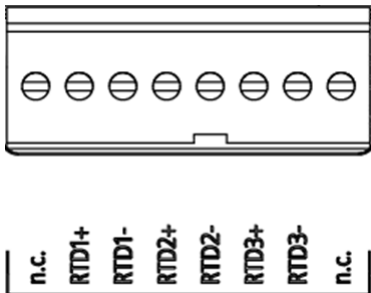
Temperature sensor

An RTD sensor (resistance temperature device) can be connected. The RTD inputs support the Pt100 and Pt1000 versions. The sensor type can be parameterized for each channel.

Connector pin assignment

The diagram below shows the terminal assignment for the temperature sensor. The permissible cable cross-section is AWG 14 to 22.

Table 7-3 Terminal assignment for the temperature sensor

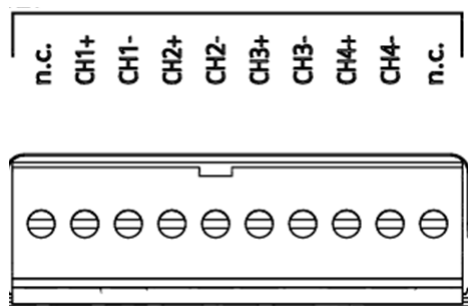
	PIN1	n.c.
	RTD1+	Temperature input 1 (+)
	RTD1-	Temperature input 1 (-)
	RTD2+	Temperature input 2 (+)
	RTD2-	Temperature input 2 (-)
	RTD3+	Temperature input 3 (+)
	RTD3-	Temperature input 3 (-)
	PIN8	n.c.

7.6.4 High-speed analog inputs (CM FPP)

Connector pin assignment

The diagram below shows the terminal assignment for IEPE sensors. The permissible cable cross-section is AWG 14 to 22.

Table 7-4 Terminal assignment for IEPE sensors

	PIN1	n.c.
	CH1+	Analog input 1 (+)
	CH1-	Analog input 1 (-)
	CH2+	Analog input 2 (+)
	CH2-	Analog input 2 (-)
	CH3+	Analog input 3 (+)
	CH3-	Analog input 3 (-)
	CH4+	Analog input 4 (+)
	CH4-	Analog input 4 (-)
	PIN10	n.c.

Measuring range of the CM FPP

The measuring range of the CM FPP is limited to between -10 V and +10 V (nominal range) with the voltage measurement setting. At values <-10 V and > 10 V a poor signal quality is reported.

Note

When measuring current, the frequency response is only linear up to 1 kHz.

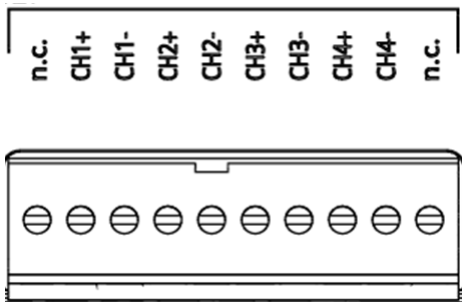
7.6.5 High-speed vibration inputs (CM VIB)

You can use all IEPE sensors (Integrated Electronics Piezo-Electric) that fulfill the specification for the relevant sensor inputs CH1 to CH4. We recommend that you use sensors from the Siemens portfolio (see section Order data). The technical specifications for the sensor inputs are listed in section Technical specifications.

Connector pin assignment

The diagram below shows the terminal assignment for IEPE sensors. The permissible cable cross-section is AWG 14 to 22.

Table 7-5 Terminal assignment for IEPE sensors

	PIN1	n.c.
	CH1+	IEPE sensor input 1 (+)
	CH1-	IEPE sensor input 1 (-)
	CH2+	IEPE sensor input 2 (+)
	CH2-	IEPE sensor input 2 (-)
	CH3+	IEPE sensor input 3 (+)
	CH3-	IEPE sensor input 3 (-)
	CH4+	IEPE sensor input 4 (+)
	CH4-	IEPE sensor input 4 (-)
	PIN10	n.c.

Measuring principle

The sensors are supplied by a constant current and form an operating point from this constant current that is comparable to a fixed resistor. For the CM VIB, the basis of this constant current power supply is the external 24 V module supply.

A Piezo crystal in the IEPE sensor generates a voltage signal proportional to the vibration acceleration. The signal is modulated up to the operating point with a sensor-dependent amplification, comparable to a variable resistor. The supply current and the measured signal are transmitted via the measurement cables (2-wire connection).

Measuring range of the CM VIB

The measuring range of the CM VIB is limited to between 0 and 20 V (nominal range). At values < 0 V and > 20 V a poor signal quality is reported.

See also

Technical specifications (Page 83)

7.7 Connecting the functional grounding (shielding bracket set)

Requirements


The shielding bracket set can be ordered as an accessory (see section Ordering data (Page 15)).

- The mounting plate must not be painted in the contact area of the shielding brackets and must be connected at low-impedance to the cabinet ground.
- Ensure that the cable for the functional grounding is as short as possible.

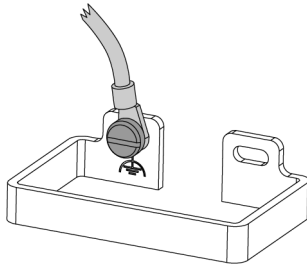
7.9 Pin assignment for Industrial Ethernet interface

- The conductor cross-section must be 2 mm² (AWG14).
- The functional grounding (FE) must not be made using a green/yellow conductor.

Procedure

Connect all terminals with the symbol  (see Terminal assignment for CM FPP (Page 34) and Terminal assignment for CM VIB (Page 35)) to the screw connections of the shielding brackets.

Use ring cable lugs for connecting the cables to the shielding brackets.



7.8 Connecting Ethernet

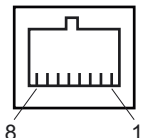
The Ethernet connection is made via RJ45 sockets.

For the increased mechanical and electrical stress in industrial applications, we recommend the SIMATIC NET Industrial Ethernet FastConnect Twisted Pair Standard Cable with Fast Connect connections.

When shipped from the factory, securing collars for the Ethernet connection are attached to the lower section of the CM enclosure. They are optimized for the SIMATIC NET Fast Connect RJ45 connection plugs and are intended to increase mechanical stability.

7.9 Pin assignment for Industrial Ethernet interface

Pin assignment for Industrial Ethernet interfaces

Industrial Ethernet	Pin	Pin assignment
	1	Transmit Data (+)
	2	Transmit Data (-)
	3	Receive Data (+)
	4	Terminated
	5	Terminated
	6	Receive Data (-)
	7	Terminated
	8	Terminated

Note

It is only permitted to connect shielded CAT5 cables (or cables of a higher standard) to the Ethernet socket. The maximum cable length is 100 m.

Commissioning

8.1 Requirements for commissioning

Requirements

- The shielding brackets are fitted (see Section Mounting the shielding bracket set (Page 28)).
- The sensors are installed.
- The CM and all other components (switch and IPC) are wired and connected.
- A network with a fixed IP address must be set up on a vacant Ethernet port of the IPC to which the sensor bus is to be connected (the sensor bus interface service contains its own DHCP server, which determines the IP addresses of the CM).
- The latest Ethernet drivers must always be installed.
- To install the SBI, as a minimum .NET-Version 4.6.2 must be installed on the IPC.
- The SBI and the Connection Module Config are installed by installing the X-Tools Update Package (see Order data (Page 15)).

Please note

Note

- Changes to the standard configurations of the IPC's network settings can have a negative effect on data throughput.
 - Virus scanner settings can also have a negative impact on the data throughput of the Ethernet interface.
 - At maximum configuration, the initial address assignment by the DHCP server for a newly installed system can take up to 50 s.
 - No second DHCP server may be active on the interface used (e.g. due to a setting in Microsoft Windows).
 - All switches in the topology must be assigned a static IP address.
-

8.2 Installer and terminal diagram

Configuring the CM

The diagram below shows a sample configuration of the VIB and FPP Connection Modules (CM), together with X-Tools:

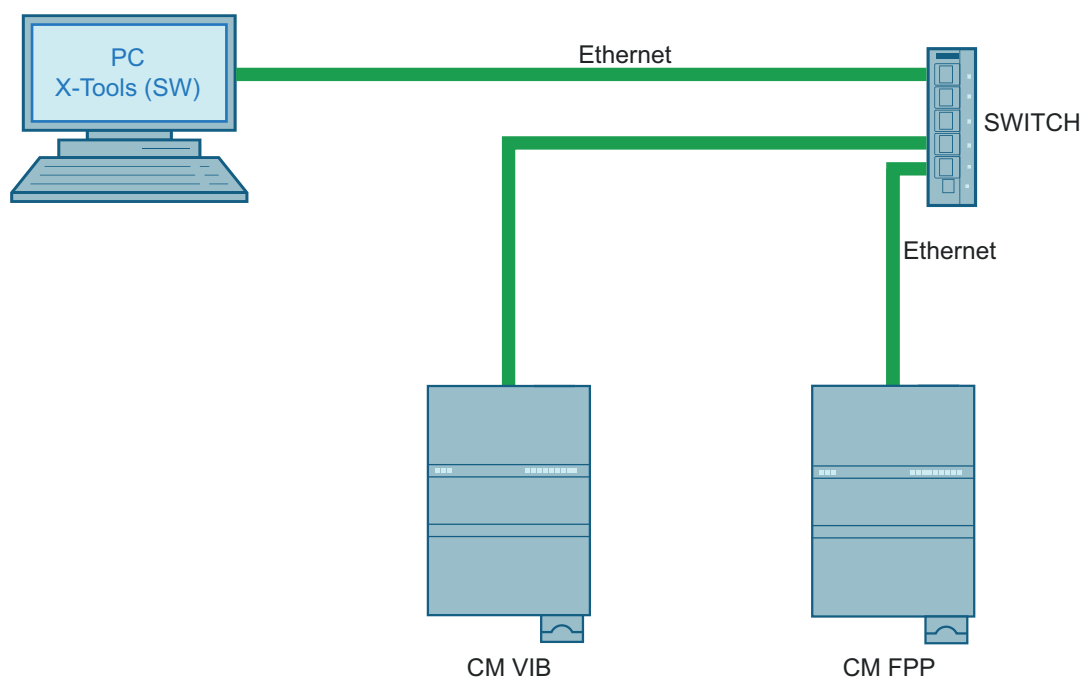


Figure 8-1 CM configuration example

NOTICE**Operation only in a separate network**

The Connection Modules should only be deployed in a separate, isolated network, without exposing them to the Internet or other external network traffic.

Note**Setting up the network correctly**

- The CM is released only for operation on Siemens industrial PCs (see the section on Order data (Page 15)).
 - Do not operate the sensor bus interface on USB Ethernet adapters.
 - Only CM modules and a suitable switch may be used on this bus for network configuration; other network nodes are not permitted.
 - The network configuration may contain only one switch.
 - A switch must be used if there are two or more CMs.
-

Note

No functional guarantee can be given for other configurations.

Note**Settings on the Ethernet driver**

When installing the SBI, settings are made to the Ethernet driver to increase data throughput. These settings are not reset if the SBI is uninstalled.

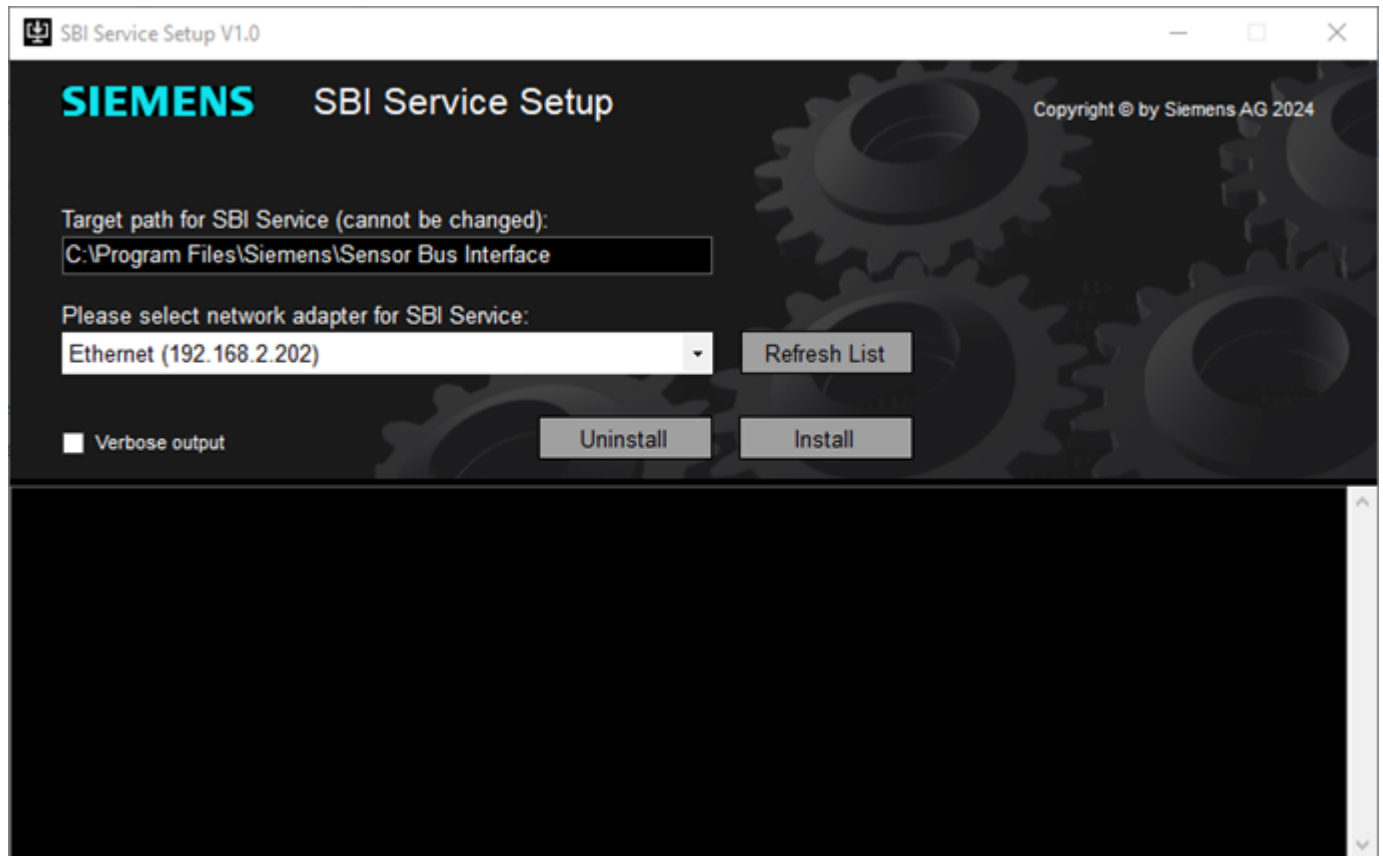
Note**Changing the interface**

If the interface is changed, the SBI must first be uninstalled and then reinstalled after the new interface has been connected.

Information for a VLAN configuration is in the appendix under VLAN configuration (Page 88).

Setting up SBI service

Start the installer with admin rights and follow the instructions.



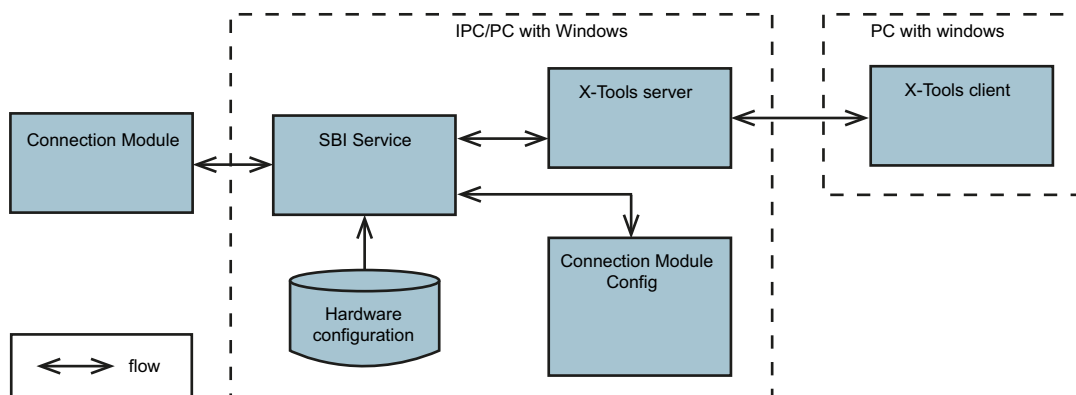
Note

Select the previously configured interface (SBI Interface to sensor bus) in the installer. When installing the X-Tools update for sensor bus support, the installer is called up automatically.

Note

The installer makes entries in the firewall rules that enable communication with the sensor boxes.

Flowchart of the CM software



The CMs are configured using the Connection Module Config application. The configuration is transferred from this program to the SBI service. X-Tools reads the configuration. The software records and processes the data from the sensor bus.

8.3 Configuring a PTP-enabled (IEEE 1588) SCALANCE Switch

Description

This section explains the configuration of a PTP-enabled (IEEE1588) SCALANCE switch using the example of a SCALANCE XC 208 G (see Order data (Page 15)). Devices from the Siemens SCALANCE or RUGGEDCOM family are suitable as switches for synchronized CMs.

Updating the firmware

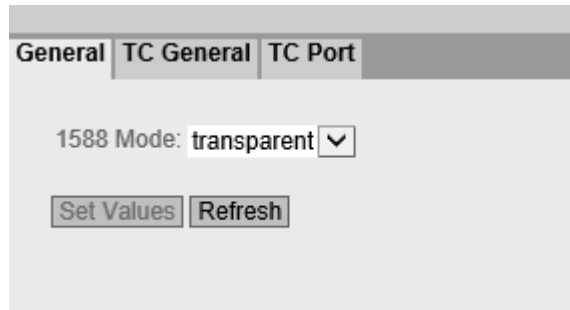
Before configuring the switch for PTP, make sure that the latest firmware version of the switch is installed. The firmware contains the necessary functions and settings for PTP. To update the firmware, proceed as follows:

1. Download the latest firmware version for the switch from the Siemens website.
2. Open the "SINEC PNI" tool.
3. Log on using your user name and password.
4. Navigate to the "Firmware update" menu item. Select the downloaded firmware file.
5. Click on "Update" and wait for the process to finish. The switch will restart automatically.

Settings

When you have updated the firmware, activate PTP and Transparent Clock on the switch. Proceed as follows:

1. Open the "SINEC PNI" tool or a web browser on the PC. Enter the IP address of the switch.
2. Log on using your user name and password.
3. Navigate to the menu item "Layer 2". Select the sub-item "PTP".
4. Under "General", select the "transparent clock" option. Confirm this by clicking on "Set values".



The screenshot shows a web interface with three tabs: "General", "TC General", and "TC Port". The "General" tab is active. Below the tabs, there is a label "1588 Mode:" followed by a dropdown menu showing "transparent". At the bottom of the form, there are two buttons: "Set Values" and "Refresh".

5. Under "TC General", select the "End to end" option. Confirm this by clicking on "Set values".

General | **TC General** | TC Port

Delay Mechanism: end to end ▼

Domain Number: 0

VLAN ID: - ▼

Set Values Refresh

6. Under "TC Port", select all ports that you want to use for PTP, as well as the "Ethernet" protocol. Confirm this by clicking on "Set values".

General | TC General | **TC Port**

	Setting	Transport Mechanism	Copy to Table
All ports	No Change ▼	No Change ▼	Copy to Table

Port	Setting	Faulty Flag	Transport Mechanism
P0.1	<input checked="" type="checkbox"/>	false	Ethernet ▼
P0.2	<input checked="" type="checkbox"/>	false	Ethernet ▼
P0.3	<input checked="" type="checkbox"/>	false	Ethernet ▼
P0.4	<input checked="" type="checkbox"/>	false	Ethernet ▼
P0.5	<input checked="" type="checkbox"/>	false	Ethernet ▼
P0.6	<input checked="" type="checkbox"/>	false	Ethernet ▼
P0.7	<input checked="" type="checkbox"/>	false	Ethernet ▼
P0.8	<input checked="" type="checkbox"/>	false	Ethernet ▼

Set Values Refresh

The selected ports now synchronize their clocks with the clock of the master module and follow its timing.

8.4 Configuring the modules using Connection Module Config

Configuration

Use the software of the Condition Monitoring Systems to set up the Connection Modules.

Configuration example

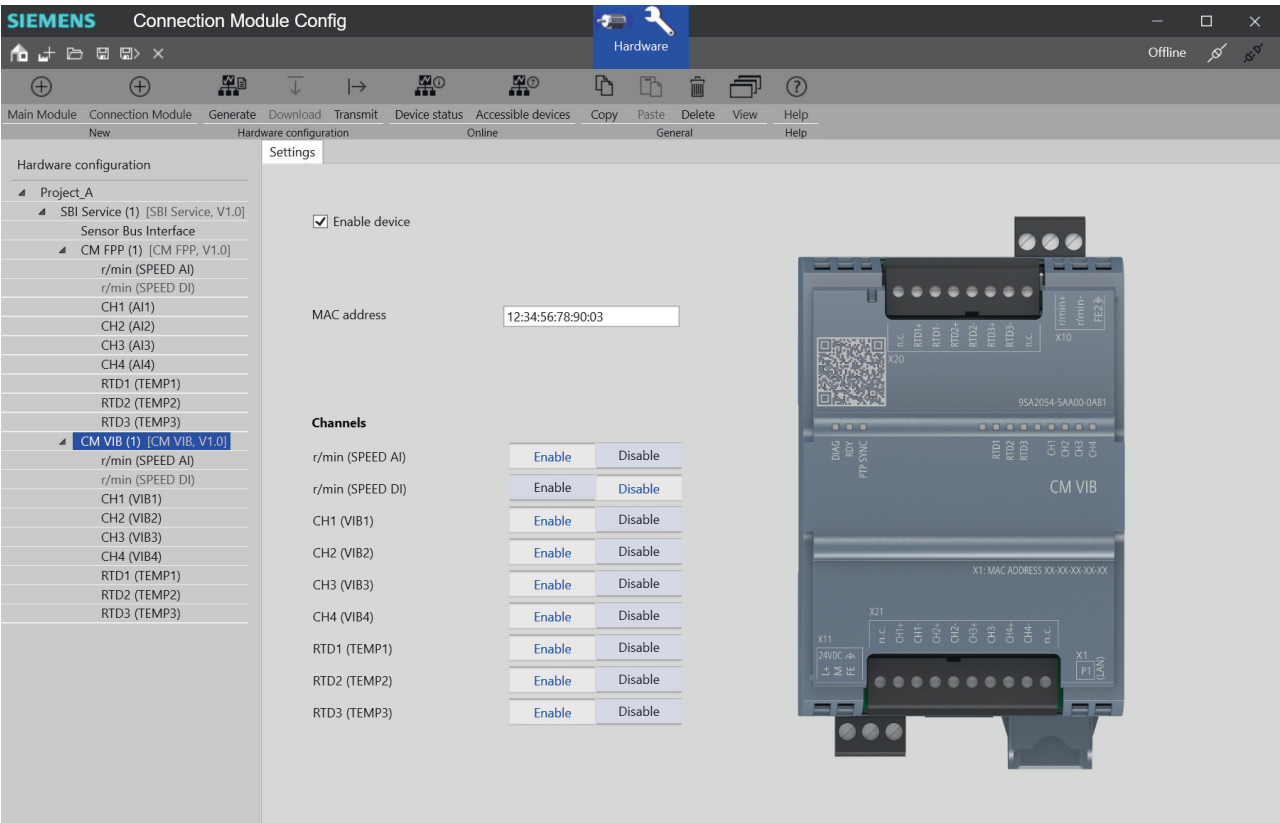


Figure 8-2 Application with the project tree for the "SBI Service" main module

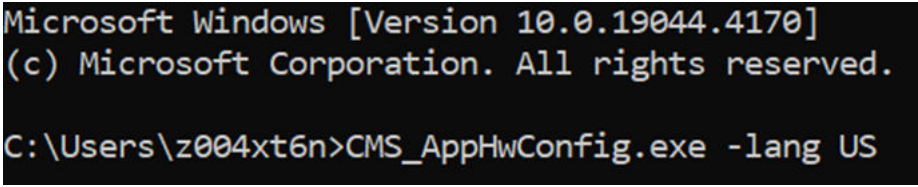
Modules

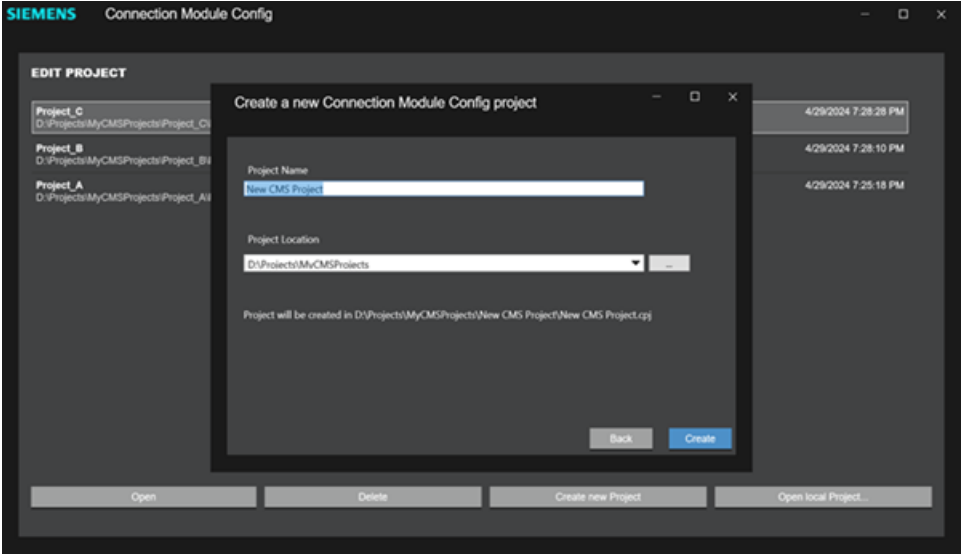
The "SBI Service" module corresponds to an SBI service, which is remotely executed as Windows service on the same computer as the Connection Module Config or on another computer. The SBI service directly receives the hardware configuration as data transfer from the Connection Module Config.

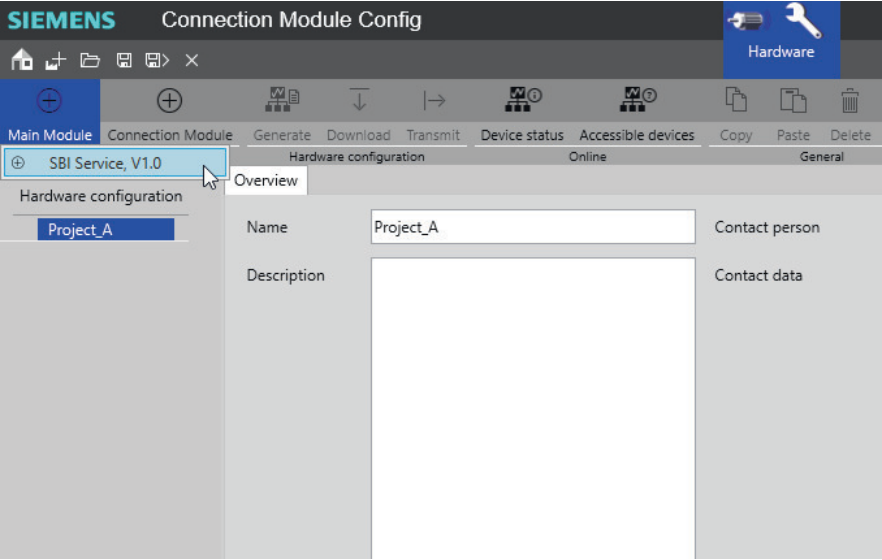
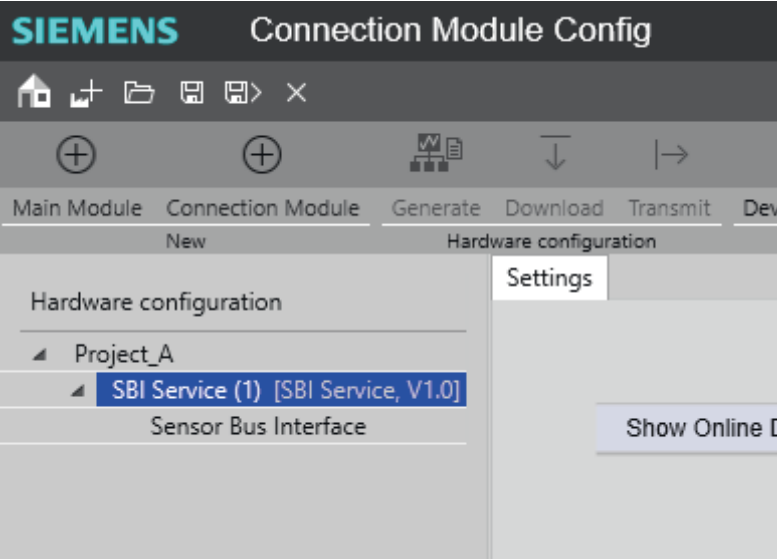
Connection Modules CM FPP and CM VIB are connected to the computer on which the SBI service is running and are controlled from this. You receive the configuration data, which were created using Connection Module Config, from the SBI service.

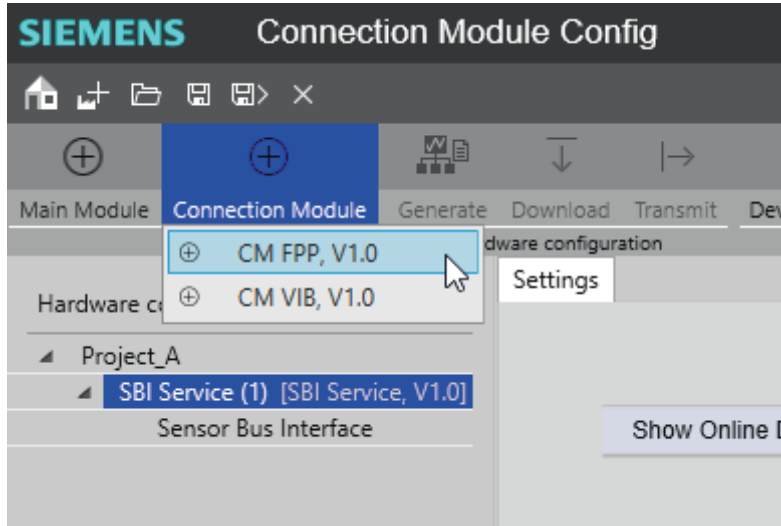
8.4.1 Configuration steps

You have to go through the following steps to set up the software for the Condition Monitoring System on the PC:

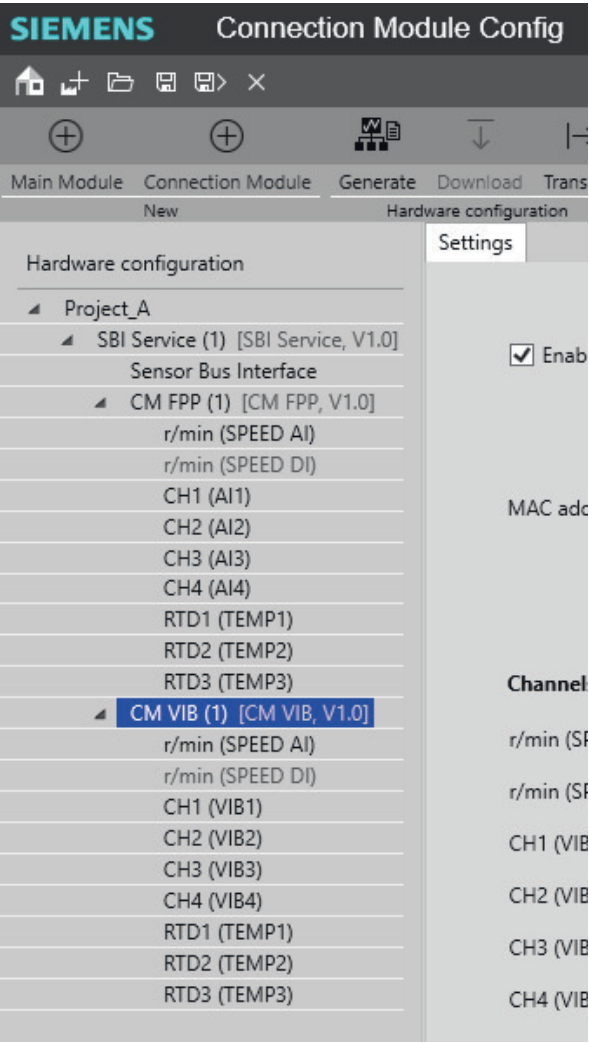
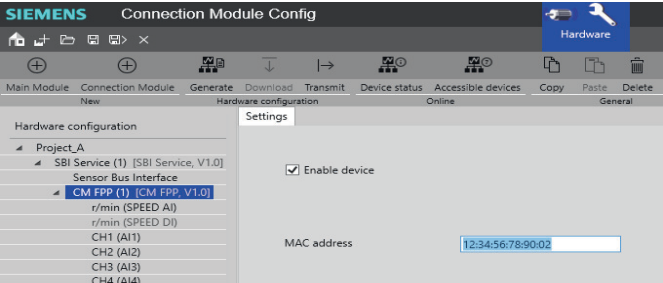
Step	Activity
1	<p>Installation of the Connection Module Config engineering tool (Connection Module configuration only)</p> <p>The tools are provided as a portable version or as an installation setup.</p> <p>Portable version:</p> <p>To use the portable version, simply copy the folder to a storage location of your choice on your PC.</p> <p>Installation setup:</p> <p>Run setup.exe and follow the instructions of the installation process.</p> <p>Please note: In both cases, .NET-Runtime 8 (https://dotnet.microsoft.com/en-us/download/dotnet/8.0) must be installed on your PC. In each case use the latest version of .NET Desktop Runtime 8.x for Windows x64.</p>
2	<p>Starting the application</p> <p>Start the application by double-clicking on "CMS_AppHwConfig.exe" (for Connection Module Config). The application is run in the language of your Windows system. At present, only English and German are supported.</p> <p>If you want to run the applications in a different language, start them by entering "-lang US" for the English version or "-lang DE" for the German version.</p> <p>For example, "CMS_AppHwConfig.exe -lang US" starts Connection Module Config in English.</p>  <p>Starting the program from the CMD input prompt</p>

Step	Activity
3	<div><p>Creating a new project</p><p>You can create a new project in the start window by entering a project name and specifying a storage location.</p></div> <p>Start screen of the application</p>

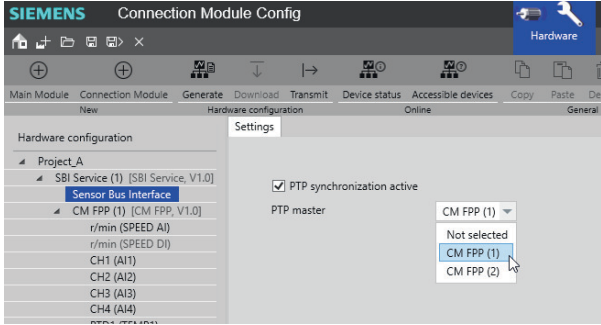
Step	Activity
4	<div><p>Adding the Main Module</p><p>First of all, a Main Module must be added to the project (e.g. "Local SBI Service").</p><p>Adding "Local SBI Service" Main Module</p><p>The selected Main Module is displayed in the project tree.</p><p>Main Module in the project tree</p><p>Refer to the device status for more information about connected modules and installed SBI services.</p></div>

Step	Activity
5	<p>Adding Connection Modules</p> <p>Then add the necessary Connection Modules to the project, e.g. CM FPP.</p>  <p>Adding Connection Module (CM) FPP to project configuration</p> <p>The Connection Modules are added to the previously selected Main Module in the project tree. #For example, one CM VIB Module and one CM FPP Module are added in the image below.</p>

8.4 Configuring the modules using Connection Module Config

Step	Activity
	 <p>Project with hardware configuration tree</p>
6	<p>Setting up MAC address for each Connection Module</p> <p>The MAC address of each added CM must be adapted to the MAC address of the configuration. You will find the MAC address on the modules.</p>  <p>Setting MAC address of the Connection Module</p>

8.4 Configuring the modules using Connection Module Config

Step	Activity
7	<div><p>PTP settings</p><p>If PTP is used, the use of PTP must be activated and the PTP master must be specified. In the display below, CM FPP (1) is selected as PTP master. You can select any displayed module as a PTP master.</p><p>PTP settings of the sensor bus user interface</p></div>

SIEMENS Connection Module Config

Save project

Main Module Connection Module Generate Download Transmit Dev

New Hardware configuration

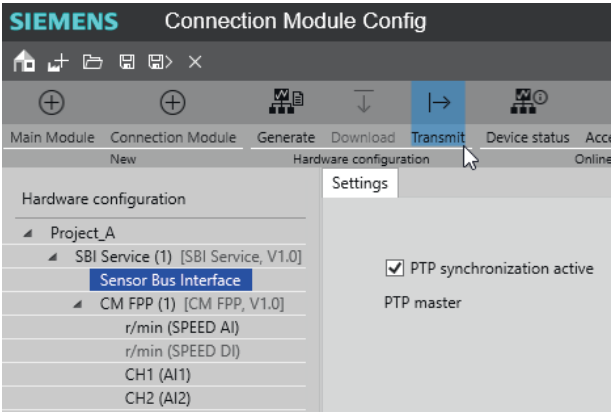
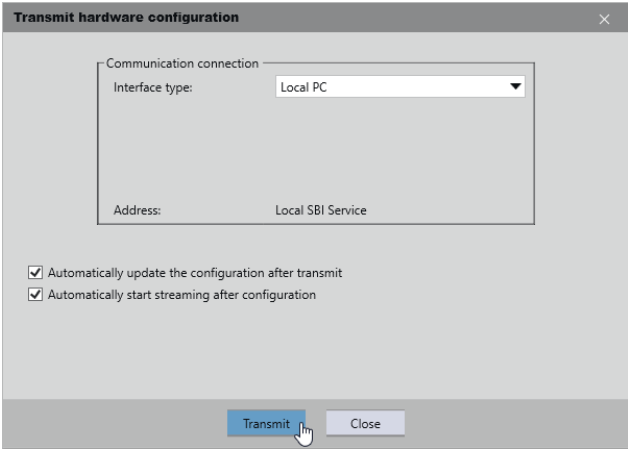
Hardware configuration

- Project_A
 - SBI Service (1) [SBI Service, V1.0]
 - Sensor Bus Interface**
 - CM FPP (1) [CM FPP, V1.0]
 - r/min (SPEED AI)
 - r/min (SPEED DI)
 - CH1 (AI1)
 - CH2 (AI2)

Settings

☒ PTP synchroni...

PTP master

Step	Activity
9	<div><p>Creating and transmitting the hardware configuration</p><p>After successfully creating a CMS configuration, you can download the hardware configuration or transmit it to the Main Module ("Local SBI Service" Main Module only).</p><p>The image below shows the transmit function of the "Local SBI Service" Main Module.</p></div> <p>Calling up the transmit dialog</p> <p>Clicking on the Transmit button in the menu bar displays the transmit dialog for the hardware configuration. The dialog box contains information about the SBI service component installed on the same Windows PC.</p> 

Step	Activity
	<div><div><div><div><div>Transmit hardware configuration</div><div><div>Communication connection</div><div>Interface type: Local PC</div><div>Address: Local SBI Service</div></div><div><div><div><div><input checked="" type="checkbox"/> Automatically update the configuration after transmit</div><div><input checked="" type="checkbox"/> Automatically start streaming after configuration</div></div></div><div>Transmission of hardware configuration in progress...</div><div><div></div></div><div><div>Transmit</div><div>Close</div></div></div></div></div><div>Progress bar in the transmission dialog</div><div>Once the hardware configuration has been successfully transmitted, an information box is displayed.</div><div><div><div><div>Transmit hardware configuration</div><div><div><div><div><div><div></div><div></div></div><div>The hardware configuration was successfully transmitted to the SBI service. The update of the hardware configuration was carried out successfully. Streaming was able to be successfully started after configuring the SBI service.</div><div>The transmission of the hardware configuration to the SBI service has been carried out successfully.</div></div></div><div><div>OK</div></div></div></div></div><div>Successful transmission of the hardware configuration</div></div></div></div></div>

Installation successful

You can now start working with X-Tools. Please follow the instructions in the X-Tools manual on using the sensor bus.

8.4.2 "Accessible nodes" dialog

Description

Dialog window "Accessible nodes" allows all devices, which are selected via a communication connection, to be displayed. This involves devices, type SBI service, as well as all connection modules that are connected to an SBI service. Further, devices that were found can be selected from the list and transferred into the active project or a project that is selected. This allows a system that has been set up and connected to be quickly configured.

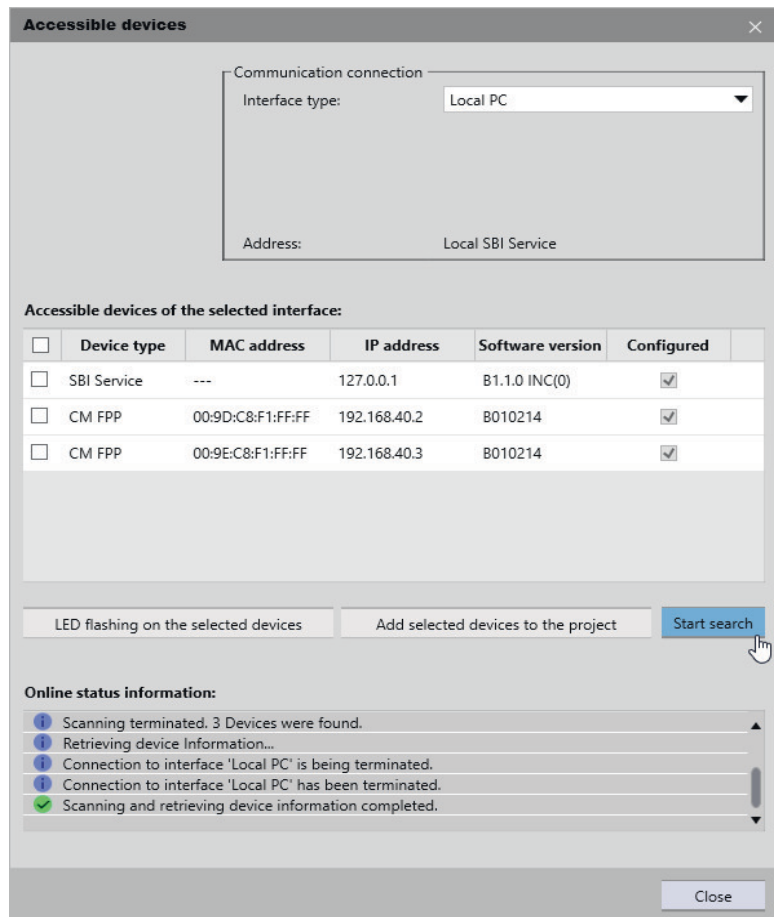


Figure 8-3 "Accessible nodes" dialog

Calling the dialog

Connection Module Config can call dialog window "Accessible nodes" via the ribbon.

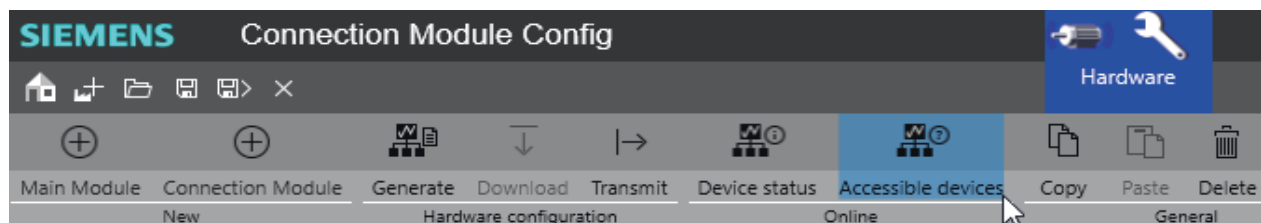
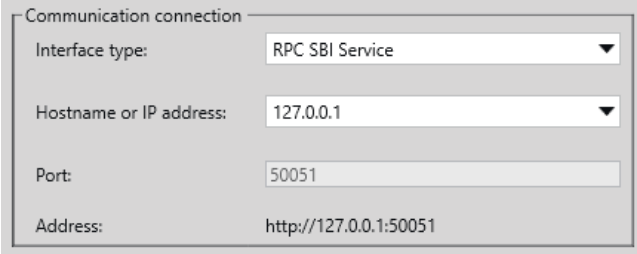


Figure 8-4 Calling the "Accessible nodes" dialog

Functions of the dialog

Functions	Description
Communication connection	<p>Allows selection of the communications interface to be used. Via interface type "Local PC", a communication connection can be established to an SBI service, which runs on the same PC as Connection Module Config.</p>  <p>Via interface type "RPC SBI Service" a communication connection can be established to an SBI service running on a remote PC. To do this, additional data are required, for example host name or IP address.</p>
Start the search	<p>Starts the search for accessible nodes via the selected communication connection.</p> <p>The search result is displayed in the list of accessible nodes.</p>
Adding selected devices to the project	<p>Inserts the devices selected in the list of accessible nodes into the currently active project.</p> <p>Note:</p> <p>For devices that do not have a configuration (see column "Configured"), a device with default settings is inserted in the project.</p> <p>For devices that have a configuration, the device is accepted with the configured settings.</p>
LED flash on the selected devices	<p>Activates that the LEDs on the selected devices flash.</p> <p>Note:</p> <p>The LEDs on devices that are currently in the streaming mode do not flash.</p>

8.4.3 "Online device status" dialog

Description

Dialog Device status allows the current status of all devices accessible via a selected communication connection to be displayed. This involves devices, type SBI service, as well as all connection modules that are connected to an SBI service.

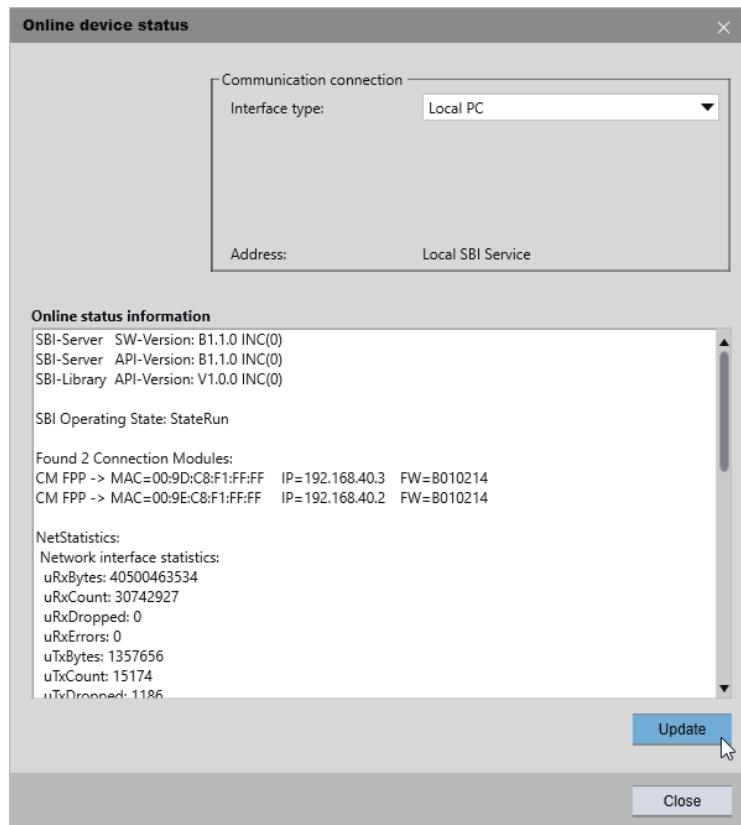


Figure 8-5 "Online device status" dialog

Calling the dialog

Connection Module Config can call dialog window "Online device status" via the ribbon.

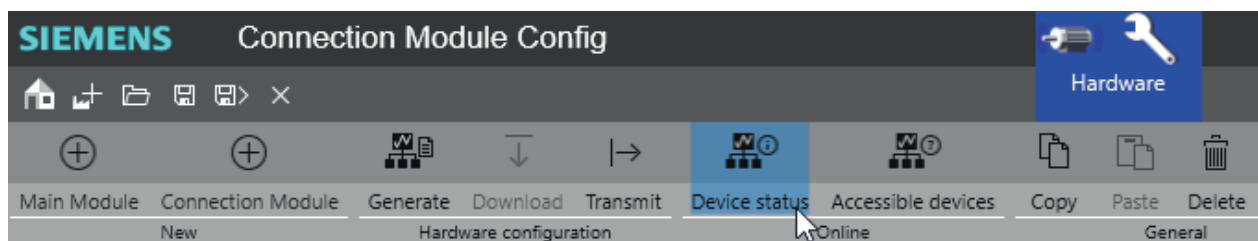
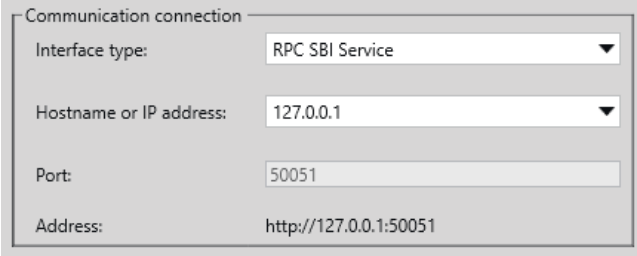


Figure 8-6 Calling the device status dialog

Information shown

Display/function	Description
Selecting the communication connection	<p>Allows the selection of the communication interface to be used.</p> <p>Via interface type "Local PC", a communication connection can be established to an SBI service, which runs on the same PC as Connection Module Config.</p>  <p>Via interface type "RPC SBI Service" a communication connection can be established to an SBI service running on a remote PC. To do this, additional data are required, for example host name or IP address.</p>
Updating	Updates information about the connected devices and displays this in the "Online Status Information" area.
Online status information	<p>Displays the status information of the connected devices.</p> <p>The status display contains the following information:</p> <ul style="list-style-type: none"> • Version information about the SBI service • Current operating state of the SBI service • Connection modules that have been found with the MAC and IP addresses as well as the firmware versions • Network statistics at the sensor bus for data streaming

8.4.4 Configuration settings

8.4.4.1 SBI service main module

Description

The "SBI Service" corresponds to an SBI service, which is remotely executed as Windows service on the same computer as the Connection Module Config. The SBI service directly receives the hardware configuration as data transfer from the Connection Module Config.

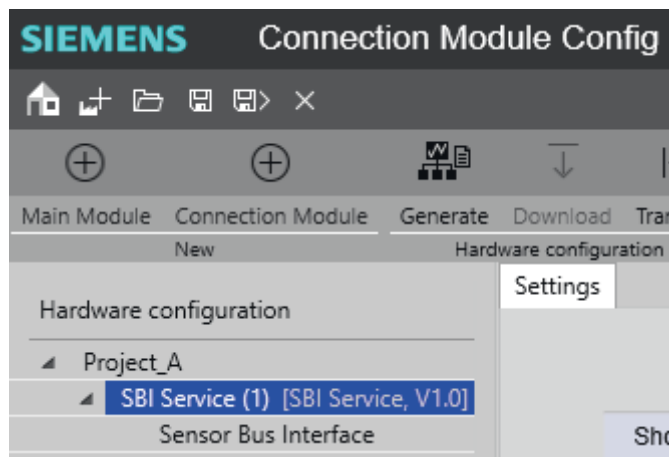


Figure 8-7 SBI service main module

Settings

The SBI service main module has setting options for the sensor bus interface.

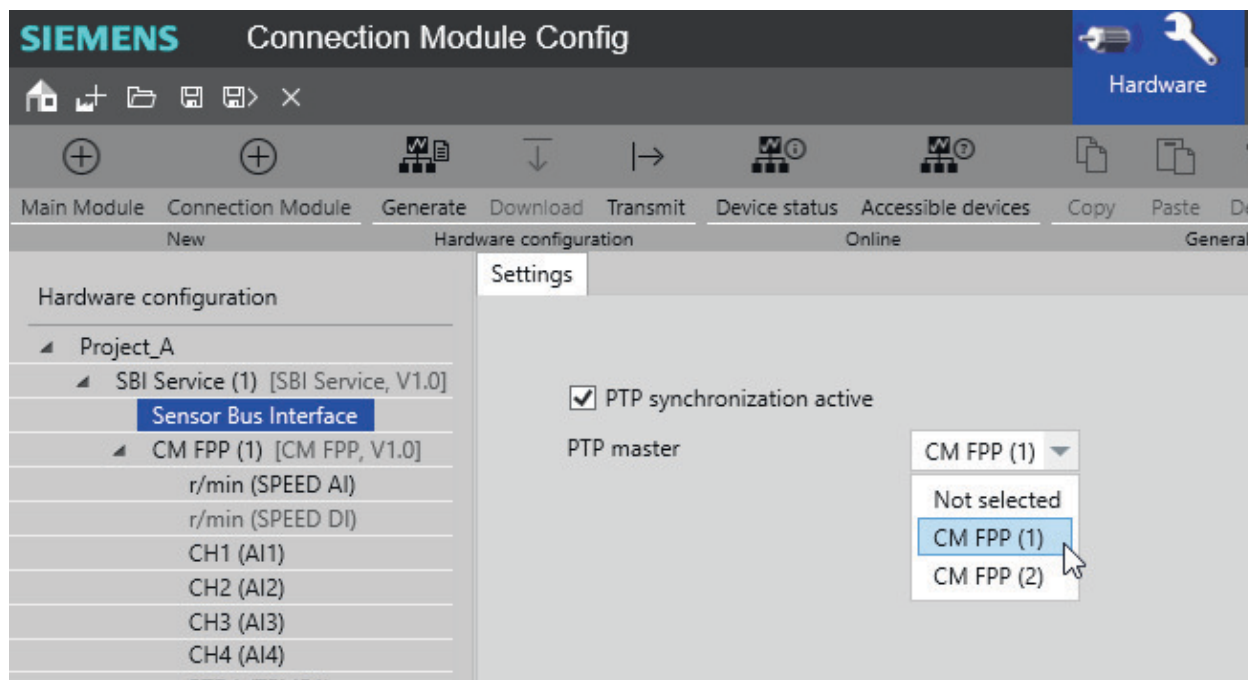


Figure 8-8 Sensor bus interface settings

Parameters	Description	Default setting
PTP synchronization active	Defines whether the PTP synchronization on the sensor bus should be used to determine the system time. Note: If PTP synchronization is activated, then a Connection Module must be defined as PTP master.	Inactive
PTP master	Allows a connection module to be selected from the existing configuration as PTP master.	Not selected

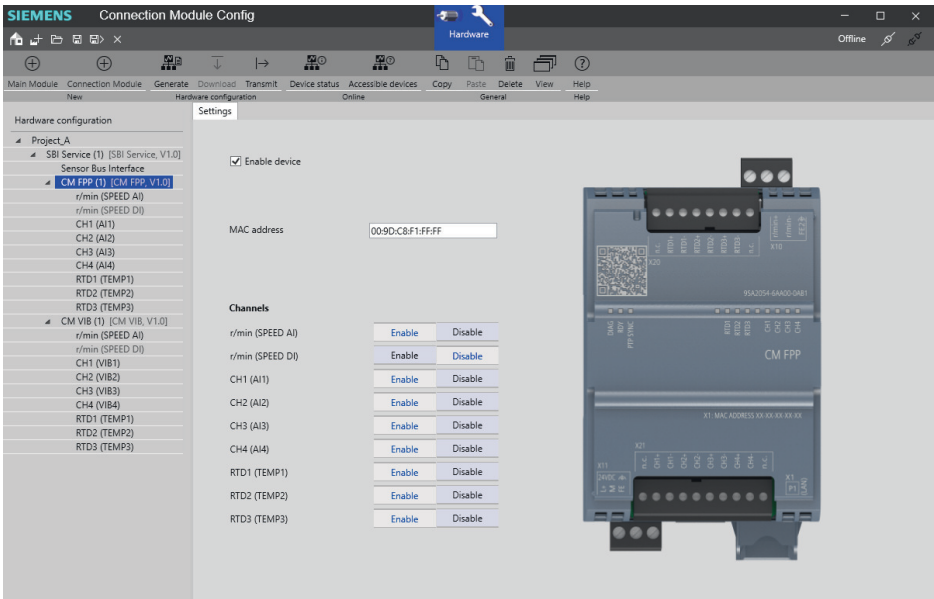
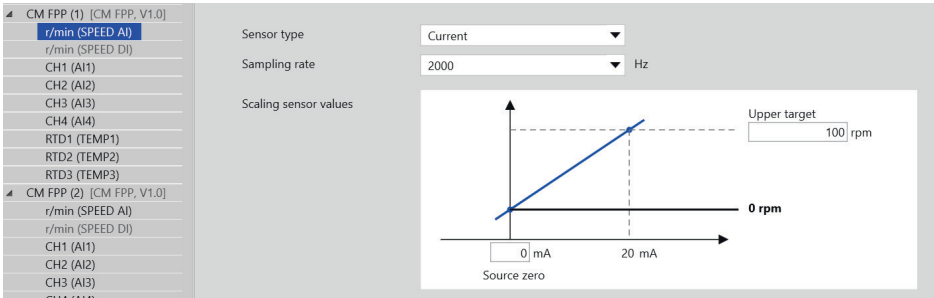
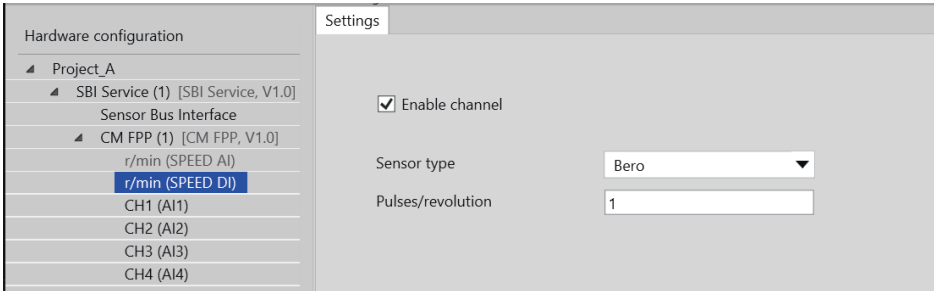
8.4.4.2 Connection Module CM FPP

Overview

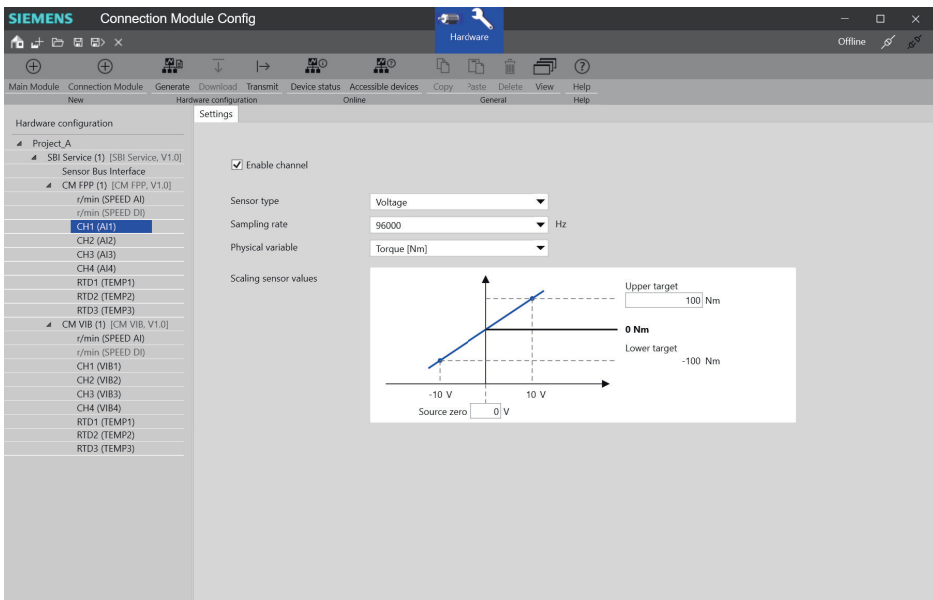
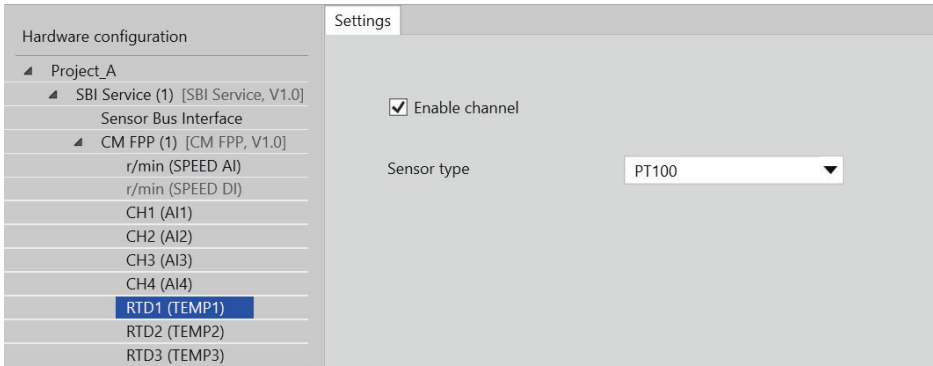
The table below contains a description of the individual screens of the user interface.

8.4 Configuring the modules using Connection Module Config

The next table describes which parameters can be set in the individual screens.

Settings	User interface
General information	
Channel r/min (speed AI)	
Channel r/min (speed DI)	

8.4 Configuring the modules using Connection Module Config

Settings	User interface
Channel CHx (AIx) – analog inputs	
Channel RTDx (TEMPx) – temperature inputs	

Settings	Parameters	Description	Default setting
General information	Activate device	Defines whether the Connection Module should be used for the current hardware configuration – or not.	Active
	MAC address	MAC address of the connection module that should be used for the HW configuration.	12.34.56.78.90:<consecutive device number>
	Channels	Allows individual channels of the Connection Module to be activated and deactivated.	

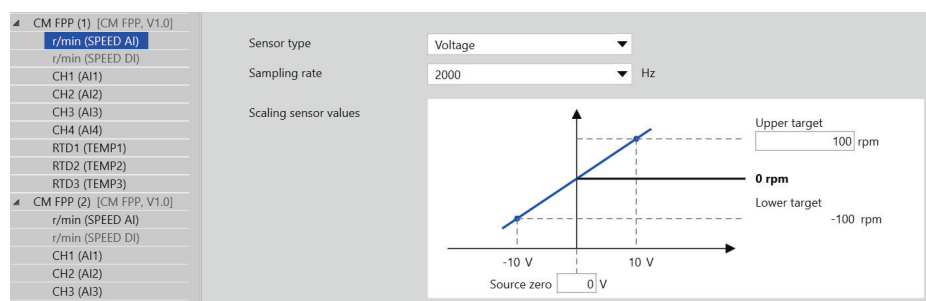
8.4 Configuring the modules using Connection Module Config

Settings	Parameters	Description	Default setting
Channel r/min (speed AI)	Activate channel	Defines whether the channel in the Connection Module should be activated – or not. Note: Channel "r/min (SPEED AI)" cannot be simultaneously operated with channel "r/min (SPEED DI)". One of the two channels must always be deactivated.	Active
	Sensor type	Defines whether the sensor type is operated with voltage or current measurement.	Voltage
	Sampling rate	Defines the sampling rate of the measurements for the fast speed input.	2000 Hz
	Scaling sensor values – Voltage measurement	Defines the scaling of the measured values for the voltage measurement. ¹⁾	"Source zero" parameter: Defines the measured voltage value for speed 0 rpm. 0 V
			"Upper target" parameter: Defines the speed for a measured voltage value of +10 V. 100 rpm
	Scaling sensor values – Current measurement	Defines the scaling of the measured values for the current measurement. ²⁾	"Source zero" parameter: Defines the measured current value for speed 0 rpm. 0 V
			"Upper target" parameter: Defines the speed for a measured current value of +20 mA. 100 rpm
Channel r/min (speed DI)	Activate channel	Defines whether the channel in the Connection Module should be activated – or not. Note: Channel "r/min (SPEED AI)" cannot be simultaneously operated with channel "r/min (SPEED DI)". One of the two channels must always be deactivated.	Active
	Sensor type	Defines the sensor type being used. Currently, only "Bero" sensor types are supported.	Bero
	Pulses/revolution	Defines how many measurement pulses are supplied by the sensor per revolution. This setting is used to scale the measured values.	1

8.4 Configuring the modules using Connection Module Config

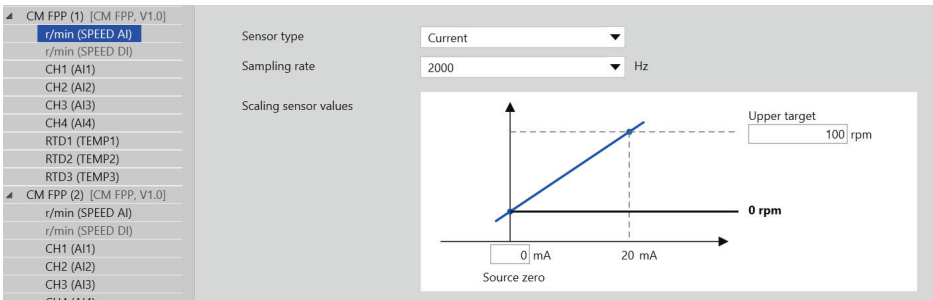
Settings	Parameters	Description		Default setting
Channel CHx (AIx) – analog inputs	Activate channel	Defines whether the channel in the Connection Module should be activated – or not.		Active
	Sensor type	Defines whether the analog input is operated with a sensor type with voltage or current measurement.		Voltage
	Sampling rate	Defines the sampling rate of measurements for the analog input.		
	Physical quantity	Allows the physical quantity, which should be measured at the analog input, to be set. A selection can be made from various fixed physical quantities. For setting "User defined" in addition, for scaling value "Upper target" an input field is displayed to enter a user-defined unit.		Torque [Nm]
	Scaling sensor values – Voltage measurement	Defines the scaling of the measured values for the voltage measurement. ³⁾	"Source zero" parameter: Defines the measured voltage value for the selected physical quantity for value "0" rpm.	0 V
			"Upper target" parameter: Defines the value of the selected physical quantity for a measured voltage value of +10 V.	100 Nm
	Scaling sensor values – Current measurement	Defines the scaling of the measured values for the current measurement. ⁴⁾	"Source zero" parameter: Defines the measured current value for the selected physical quantity for value "0".	0 mA
			"Upper target" parameter: Defines the value of the selected physical quantity for a measured current value of +20 mA.	10 rpm

1)

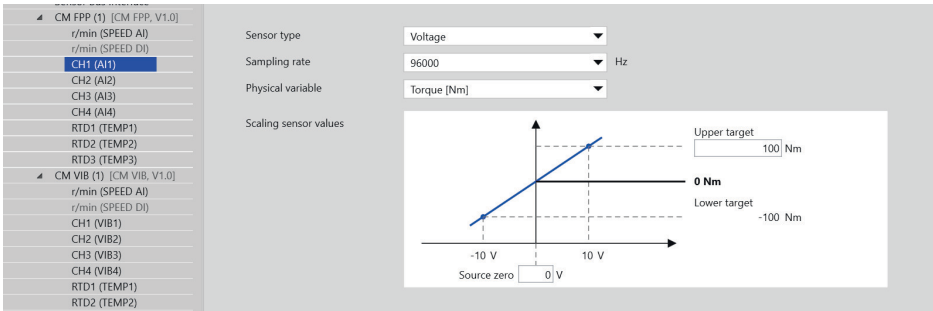


2)

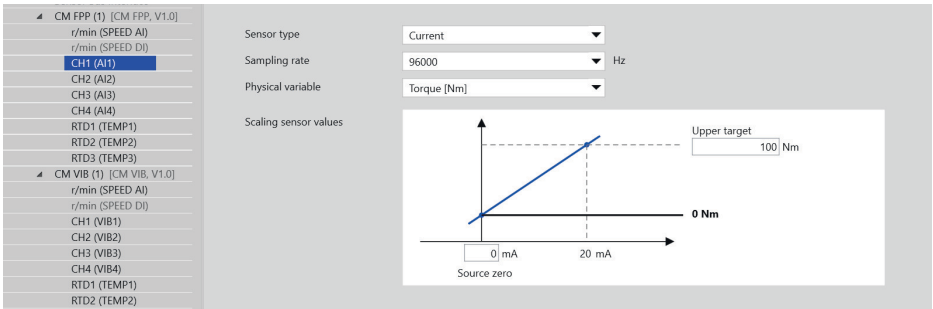
8.4 Configuring the modules using Connection Module Config



3)



4)



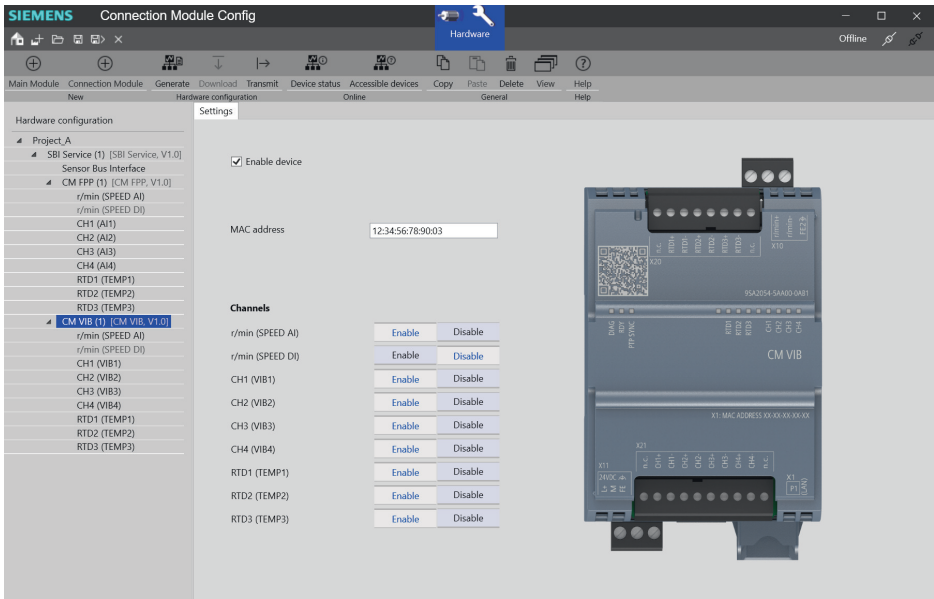
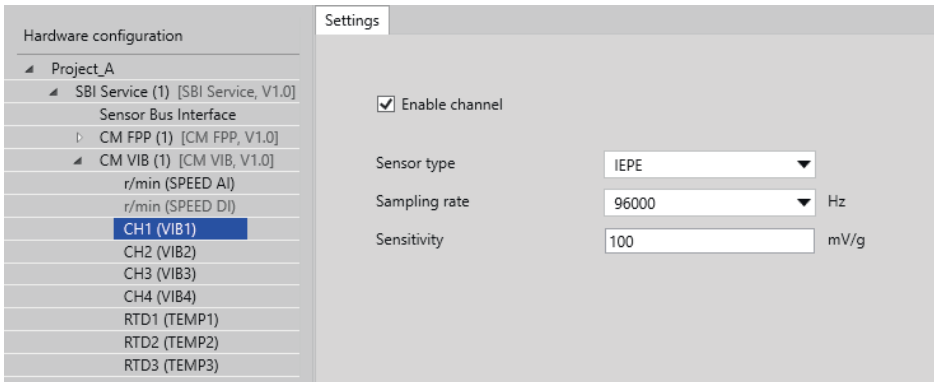
8.4.4.3 Connection Module CM VIB

Description

The table below contains a description of the individual screens of the user interface.

8.4 Configuring the modules using Connection Module Config

The next table describes which parameters can be set in the individual screens.

Settings	User interface
General information	
Channel r/min (speed AI)	See description, channel r/min (speed AI) under Chapter "Connection Module CM FPP (Page 69)".
Channel r/min (speed DI)	See description, channel r/min (speed DI) under Chapter "Connection Module CM FPP (Page 69)".
Channel CHx (VIBx) – vibration inputs	
Channel RTDx (TEMPx) – temperature inputs	See description, channel r/min (speed DI) under Chapter "Connection Module CM FPP (Page 69)".

8.4 Configuring the modules using Connection Module Config

Settings	Parameters	Description	Default setting
General information	Activate device	Defines whether the Connection Module should be used for the current hardware configuration – or not.	Active
	MAC address	MAC address of the connection module that should be used for the HW configuration.	12.34.56.78.90:<consecutive device number>
	Channels	Allows individual channels of the Connection Module to be activated and deactivated.	
Channel r/min (speed AI)	See description, channel r/min (speed AI) under Chapter "Connection Module CM FPP (Page 69)".		
Channel r/min (speed DI)	See description, channel r/min (speed DI) under Chapter "Connection Module CM FPP (Page 69)".		
Channel CHx (VIBx) – vibration inputs	Activate channel	Defines whether the channel in the Connection Module should be activated – or not.	Active
	Sensor type	Defines the sensor type used for the vibration measurement. Currently, only "IEPE" sensor types are supported.	IEPE
	Sampling rate	Defines the sampling rate of measurements for the vibration input.	96 000 Hz
	Sensitivity	Defines the sensitivity of the connected IEPE sensor. The sensitivity is specified in the product data for every IEPE sensor.	100 mv/g
Channel RTDx (TEMPx) – temperature inputs	See description, channel RTDx (TEMPx) – temperature inputs under Chapter "Connection Module CM FPP (Page 69)".		

Maintenance and service

9.1 Replacing the CM

The principle steps for replacing the CM are described below.

Replacing a device

1. Disconnect the CM from the power supply.
2. Remove terminal blocks and connectors from the device.
3. Removing the device from the DIN rail. Proceed in the reverse order to that described in section Assembly.
4. Installing and connecting the new device.
5. Adjust the MAC address of the CM in Connection Module Config.

More information

Information that must be observed during repairs can be found in section Safety instructions.

9.1 Replacing the CM

Recycling and waste disposal

For environmentally friendly recycling and disposal of your old equipment, contact a certified electronic waste disposal company or dispose of the equipment according to the applicable regulations in your country.

NOTICE
<ul style="list-style-type: none">• Dispose of products described in this manual in compliance with the valid national regulations.• For ecologically compatible recycling and disposal of your old device, contact only a certified disposal service for electronic scrap.

There is no provision for returning the device to Siemens.

For further questions regarding disposal and recycling, please contact your local Siemens contact.

Data security when disposing of the product

No further measures are necessary when disposing of Connection Modules, as the security information stored in the modules cannot be accessed externally.

No personal data or passwords are stored in the current version of the SBI.

Process and system messages

11.1 Status LEDs

Layout of the LEDs on the sensor boxes

The module status LEDs "DIAG", "RDY" and "PTP SYNC" are grouped in a separate block on the left. The three LEDs for RTD channel errors (temperature) are located centrally. The LEDs for error description of the high-speed analog inputs are located on the right-hand side. There are no LEDs for the r/min inputs (speed AI/DI).

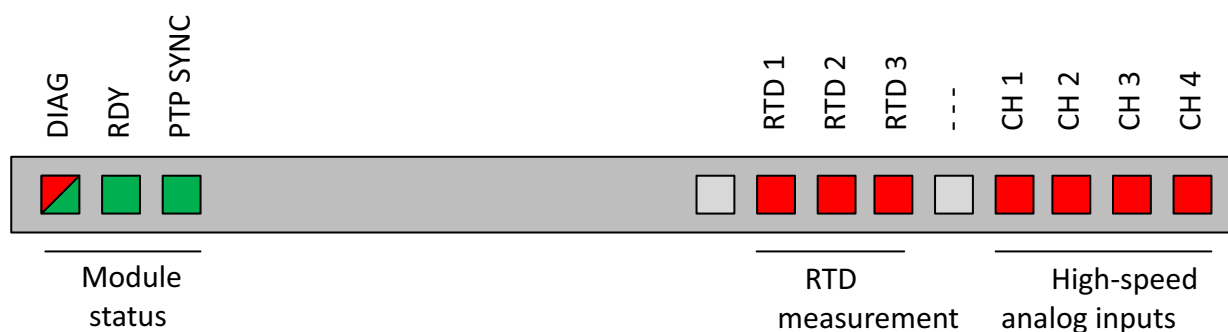


Figure 11-1 Layout of the LEDs on the sensor boxes

LED display

The LEDs on the front indicate the following device statuses:

LED	Meaning	LED status		Description
DIAG	Device diagnostics	Lights up green	■	Correct operation
		Flashes red	⚠	Fault ¹
RDY	Ready	Off	■	No parameterization received yet
		Lights up green	■	Data transfer in progress
		Flashes green	⚡	Configuration received, device stopped
PTP-SYNC	PTP master clock synchronization	Off	■	No PTP set in parameterization or not yet parameterized
		Lights up green	■	Synchronized with PTP master clock
		Flashes green	⚡	No longer synchronized with PTP

11.1 Status LEDs

LED	Meaning	LED status		Description
	Error description of the high-speed inputs and temperature channels (known as "channel errors")	Off	■	Correct operation
		Flashes red	⚡	Error

¹ These errors may have occurred if DIAG is flashing red:

- Internal system error (CM restart; if still present, CM is most likely defective).
- PTP is activated by parameterization, but the PTP-Ready status has not yet been reached or has been canceled again.
- This error is reported if the 24 V voltage falls below a limit value. The error is also reported if the internal voltage is no longer reached, e.g. due to a hardware defect.
- Breakdown of communication with the higher-level control system (SBI).

Behavior of the LEDs during normal startup

During an error-free startup, the LEDs behave as follows:

1. After CM "power on" all LEDs light up.
2. After receiving an IP address, all LEDs go out. The DIAG LED assumes the "green" state.
 - Non-synchronized case: The CM receives a configuration, the RDY LED flashes green and the CM is in the "Stop" state.
 - Synchronized case: The CM receives a configuration, the DIAG LED flashes red until synchronization is achieved. Once synchronization has been achieved, the DIAG LED lights up green. The PTP-Sync LED also lights up green, while the RDY LED flashes green.

Behavior of LEDs during firmware update

If the SBI automatically performs a firmware update, the three RTD LEDs light up red and all other LEDs are off.

Technical specifications

12.1 Technical specifications for CM VIB/FPP

Technical specifications for CM VIB/FPP

Product name	Connection Module Vibration (CM VIB)	Connection Module Fast Process Parameters (CM FPP)
Article number	9SA2054-5AA00-0AB1	9SA2054-6AA00-0AB1
Type of hardware configuration	Modular, up to 16 CMs per IPC	Modular, up to 16 CMs per IPC
Identification Link product function is supported	Yes, according to IEC 61406-1:2022	Yes, according to IEC 61406-1:2022
Power loss: <ul style="list-style-type: none"> Max. Typical 	<ul style="list-style-type: none"> 2.4 W 2.0 W 	<ul style="list-style-type: none"> 2.4 W 2.0 W
Product conformity acc. to IEEE 1588 v2-Precision Time Protocol	Yes	Yes
Ambient conditions		
Air pressure during operation <ul style="list-style-type: none"> Max. Min. Air pressure during storage/transport: <ul style="list-style-type: none"> Max. Min. 	<ul style="list-style-type: none"> 1 080 hPa 795 hPa <ul style="list-style-type: none"> 1 080 hPa 660 hPa 	<ul style="list-style-type: none"> 1 080 hPa 795 hPa <ul style="list-style-type: none"> 1 080 hPa 660 hPa
Relative humidity (no condensation) during operation: <ul style="list-style-type: none"> Max. Min. 	<ul style="list-style-type: none"> 95% 5% 	<ul style="list-style-type: none"> 95% 5%
Ambient temperature during operation: <ul style="list-style-type: none"> Vertical mounting position, max. Vertical mounting position, min. Horizontal mounting position, max. Horizontal mounting position, min. Ambient temperature during storage/transport: <ul style="list-style-type: none"> Max. Min. 	<ul style="list-style-type: none"> 45 °C -20 °C 60 °C -20 °C <ul style="list-style-type: none"> 85 °C -40 °C 	<ul style="list-style-type: none"> 45 °C -20 °C 60 °C -20 °C <ul style="list-style-type: none"> 85 °C -40 °C
Overvoltage category	II	II
Pollution degree	2	2

12.1 Technical specifications for CM VIB/FPP

Product name	Connection Module Vibration (CM VIB)	Connection Module Fast Process Parameters (CM FPP)
Mechanical specifications		
Width	70 mm	70 mm
Depth	75 mm	75 mm
Height	120 mm	120 mm
Installation position	Horizontal / vertical	Horizontal / vertical
Enclosure material	Plastic	Plastic
Net weight	220 g	220 g
IP degree of protection acc. to EN 60529	IP20	IP20
Type of mounting	Standard DIN rail and wall mounting	Standard DIN rail and wall mounting
Ethernet		
Ethernet interface	Yes, RJ45	Yes, RJ45
Type of data transmission	Ethernet	Ethernet
Transmission rate	100 Mbps	100 Mbps
Analog inputs		
Number of analog inputs	4	4
Type of analog input	Differential input	Differential input
A/D resolution	24 bit	24 bit
Sampling frequency	96 kHz	96 kHz
Input voltage at voltage input: <ul style="list-style-type: none"> • Max. • Bipolar, max. • Bipolar, min. • Unipolar, max. • Unipolar, min. 	<ul style="list-style-type: none"> • 30 V • / • / • 20 V • 0 V 	<ul style="list-style-type: none"> • 30 V • 10 V • -10 V • / • /
Constant current supply for IEPE sensors, typ.	6 mA	/
Input current at current input, max.	/	22 mA
Input current at current input: <ul style="list-style-type: none"> • Unipolar, max. • Unipolar, min. 	<ul style="list-style-type: none"> • / • / 	<ul style="list-style-type: none"> • 20 mA • 0 mA
Design of the electrical connection (analog input)	Screw terminal	Screw terminal
Connectable conductor cross-section (analog input): <ul style="list-style-type: none"> • Max. • Min. 	<ul style="list-style-type: none"> • 2 mm² • 0.33 mm² 	<ul style="list-style-type: none"> • 2 mm² • 0.33 mm²
Tightening torque (analog input): <ul style="list-style-type: none"> • Max. • Min. 	<ul style="list-style-type: none"> • 0.56 Nm • 0.56 Nm 	<ul style="list-style-type: none"> • 0.56 Nm • 0.56 Nm

12.1 Technical specifications for CM VIB/FPP

Product name	Connection Module Vibration (CM VIB)	Connection Module Fast Process Parameters (CM FPP)
DC inputs		
Type of supply voltage	DC	DC
Supply voltage: <ul style="list-style-type: none"> Rated value Rated value, max. Rated value, min. 	<ul style="list-style-type: none"> 24 V 28.2 V 19.2 V 	<ul style="list-style-type: none"> 24 V 28.2 V 19.2 V
Design of the electrical connection (supply voltage)	Screw terminal	Screw terminal
Connectable conductor cross-section (supply voltage): <ul style="list-style-type: none"> Max. Min. 	<ul style="list-style-type: none"> 2.5 mm² 0.2 mm² 	<ul style="list-style-type: none"> 2.5 mm² 0.2 mm²
Tightening torque (supply voltage): <ul style="list-style-type: none"> Max. Min. 	<ul style="list-style-type: none"> 0.6 Nm 0.5 Nm 	<ul style="list-style-type: none"> 0.6 Nm 0.5 Nm
Consumed current at 24 V DC: <ul style="list-style-type: none"> Max. Typical 	<ul style="list-style-type: none"> 100 mA 85 mA 	<ul style="list-style-type: none"> 100 mA 85 mA
Speed input		
Number of speed inputs	1, switchable as analog or digital input	1, switchable as analog or digital input
Designation of the speed input	r/min	r/min
Type of speed input	Differential input	Differential input
A/D resolution	16 bit	16 bit
Type of digital input (analog input)	Type 3	Type 3
Design of the electrical connection (digital input)	Screwed connection	Screwed connection
Input current at speed input (digital input), max.	8 mA	8 mA
Connectable conductor cross-section (digital input): <ul style="list-style-type: none"> Max. Min. 	<ul style="list-style-type: none"> 2.5 mm² 0.2 mm² 	<ul style="list-style-type: none"> 2.5 mm² 0.2 mm²
Tightening torque (digital input): <ul style="list-style-type: none"> Max. Min. 	<ul style="list-style-type: none"> 0.6 Nm 0.5 Nm 	<ul style="list-style-type: none"> 0.6 Nm 0.5 Nm
Type of galvanic isolation (speed input)	Optocoupler	Optocoupler
Input resistance (analog input) for voltage input	1 000 kOhm	1 000 kOhm
Input voltage (analog input) for voltage input: <ul style="list-style-type: none"> Bipolar, max. Bipolar, min. 	<ul style="list-style-type: none"> 10 V -10 V 	<ul style="list-style-type: none"> 10 V -10 V
Input resistance (analog input) for current input	150 Ω	150 Ω
Input voltage (analog input) for current input, max.	30 V	30 V

12.1 Technical specifications for CM VIB/FPP

Product name	Connection Module Vibration (CM VIB)	Connection Module Fast Process Parameters (CM FPP)
Input current (analog input) for current input: <ul style="list-style-type: none"> Max. Unipolar, max. Unipolar, min. 	<ul style="list-style-type: none"> 22 mA 20 mA 0 mA 	<ul style="list-style-type: none"> 22 mA 20 mA 0 mA
Inputs for temperature sensors		
Number of inputs for temperature sensors	3	3
Design of the electrical connection (temperature sensor)	Screw terminal	Screw terminal
Sensor designed for motor temperature sensing (Pt100)	Yes, 2-wire measurement	Yes, 2-wire measurement
Sensor deigned for motor temperature sensing (Pt1000)	Yes, 2-wire measurement	Yes, 2-wire measurement
Connectable conductor cross-section (temperature sensor): <ul style="list-style-type: none"> Max. Min. 	<ul style="list-style-type: none"> 2 mm² 0.33 mm² 	<ul style="list-style-type: none"> 2 mm² 0.33 mm²
Tightening torque (temperature sensor): <ul style="list-style-type: none"> Max. Min. 	<ul style="list-style-type: none"> 0.56 Nm 0.56 Nm 	<ul style="list-style-type: none"> 0.56 Nm 0.56 Nm

Appendix

A.1 Certificates and approvals

Note

Approvals are only valid when marked on the product

The specified approvals apply only when the corresponding mark is printed on the product. You can check which of the following approvals have been granted for your product by the markings on the type plate.

CE marking

The CM VIB/CM FPP devices conform to the requirements and safety objectives of the EC Directives listed below.

Industrial environments

The product is designed for use in an industrial environment.

EMC requirements:

Field of application	Interference requirements	Interference immunity requirements
Industrial area	EN 61000-6-4	EN 61000-6-2

The product meets these requirements if you adhere to the installation guidelines and safety instructions included in this equipment manual and in the compact operating instructions during installation and operation.

Declaration of Conformity

The EC Declaration of Conformity is kept available for the responsible authorities in accordance with the above-mentioned EC Directive at the following address:

Siemens AG
 Frauenauracher Str. 80
 DE-91056 Erlangen
 GERMANY

Approvals

- CE

A.2 Licenses

Use of open source software (OSS)

The CM uses open source software in unchanged form or a form we have modified. Mandatory licensing information and sources to be published are saved in the Readme_OSS file. This is supplied on a mini CD for the CM. The Readme_OSS files for the SBI and for the configurator are copied to the PC during installation.

Sources under the GNU General Public License are provided to you free of charge on request. Use the specified communication channels for this purpose.

A.3 Ports and protocols

Ethernet communication

The following ports are reserved for UDP communication:

- SBI IPv4 DHCP server port: 67
- CM IPv4 DHCP client port: 68
- SBI control port: 64102
- SBI streaming port: 64101
- CM control port: 15000
- CM streaming port: 16000

A.4 VLAN configuration

You must use VLAN in situations in which your network already has an existing configuration, e.g. a DHCP server or 2 SBI hosts.

Note

The bandwidth of the connection with a configuration of at least 7 CM connection modules must be at least 1 Gbit/s. Otherwise, data can be lost as a result of network restrictions.

Information about establishing a connection with the switch configuration is provided in Chapter Configuring a PTP-enabled (IEEE 1588) SCALANCE Switch (Page 51).

1. In the SCALANCE switch configuration, select Layer 2 -> VLAN configuration.
2. Set the basis bridge mode to 802.1Q VLAN Bridge. Create your VLAN by entering the VLAN-ID number and clicking on "Create". You should create as many IDs as the number of networks to be distributed, e.g. in the case of 2 SBI hosts you should create two IDs for each SBI.

General GVRP Port Based VLAN

Bridge Mode: Customer

Base Bridge Mode: 802.1Q VLAN Bridge

☐ Update Priority

VLAN ID:

Select	VLAN ID	Name
<input type="checkbox"/>	1	
<input type="checkbox"/>	10	VLAN_10
<input type="checkbox"/>	20	VLAN_20

3 entries.

Create Delete Set Values Refresh

3. Based on your connection, set the individual ports in the correct VLANs, based on the letters for this connection, e.g. M – connection with another switch and U – connection with an end device, such as a PC or CM module.

VLAN ID	Name	Status	Private VLAN Type	Primary VLAN ID	Priority	Update Priority	P0.1	P0.2	P0.3	P0.4	P0.5	P0.6	P0.7
1		Static	-		Do not force	<input type="checkbox"/>	M	M	U	-	-	-	-
10	VLAN_10	Static	-		Do not force	<input type="checkbox"/>	M	M	-	U	-	-	U
20	VLAN_20	Static	-		Do not force	<input type="checkbox"/>	M	M	-	-	U	U	-

- In tab "Port Based VLAN", set up the correct VLAN-ID in column "Port VID" based on the connections in the previous tab. For example, if you have a connection with the letter U at port 4, then you should set up the corresponding VLAN-ID at port 4 in column "PORT VID".

Port Based Virtual Local Area Network (VLAN) Configuration

General GVRP Port Based VLAN

	Priority	Port VID	Acceptable Frames	Ingress Filtering	Copy to Table
All ports	No Change	No Change	No Change	No Change	Copy to Table

Port	Priority	Port VID	Acceptable Frames	Ingress Filtering
P0.1	0	VLAN1	All	<input type="checkbox"/>
P0.2	0	VLAN1	All	<input type="checkbox"/>
P0.3	0	VLAN1	All	<input type="checkbox"/>
P0.4	0	VLAN10	All	<input type="checkbox"/>
P0.5	0	VLAN20	All	<input type="checkbox"/>
P0.6	0	VLAN20	All	<input type="checkbox"/>
P0.7	0	VLAN10	All	<input type="checkbox"/>
P0.8	0	VLAN1	All	<input type="checkbox"/>

Set Values Refresh

- In the menu, select "Layer 3 -> Subnets" to create interfaces for your VLANs. In combo box "Interface", select your VLAN and click on "Create".

Overview Configuration Default Gateway

☐ Single Hop Inter-VLAN Routing

Interface: VLAN1

Select	Interface	TIA Interface	Status	Interface Name	MAC Address	IP Address	Subnet Mask
<input type="checkbox"/>	vlan1	yes	enabled	vlan1	38-4b-24-e1-8d-80	192.168.0.33	255.255.255.0
<input type="checkbox"/>	vlan10	-	enabled	vlan10	38-4b-24-e1-8d-80	192.168.10.200	255.255.255.0
<input type="checkbox"/>	vlan20	-	enabled	vlan20	38-4b-24-e1-8d-80	192.168.20.200	255.255.255.0

3 entries.

Create Delete Set Values Refresh

- In tab "Configuration" select the interface (name) as your VLAN and configure the IP address for this network. For example, if you wish to operate VLAN 10 in IP subnet 10, then you can define 192.168.10.x as your IP address. Note that the SBI host in this VLAN must have an SBI interface with the same IP address subnet.

Note

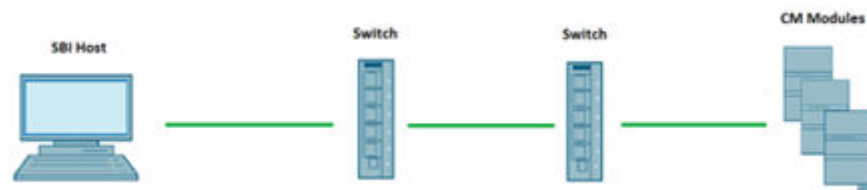
Carefully ensure that you do not change the configuration of the port, which is currently used for your switch configuration. Otherwise, you will lose the connection to your configured switch.

Connected Subnets Configuration

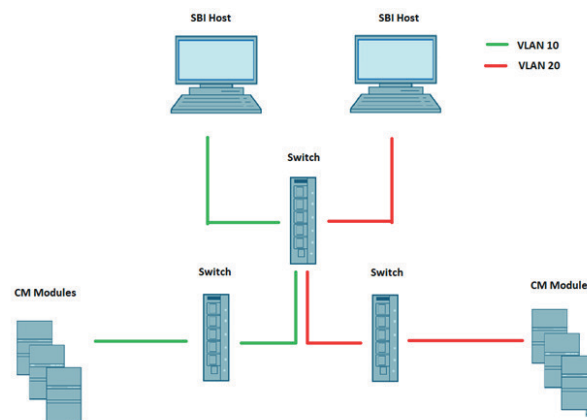
Overview	Configuration	Default Gateway
Interface (Name): vlan20 (vlan20) ▼		
Status: enabled ▼		
Interface Name: vlan20		
MAC Address: 38-4b-24-88-33-cc		
<input type="checkbox"/> DHCP		
IP Address: 192.168.20.202		
Subnet Mask: 255.255.255.0		
Address Type: Primary		
<input type="checkbox"/> TIA Interface		
Set Values Refresh		

Examples for permissible topologies with switches:

- Cascaded topology



- Basic VLAN topology



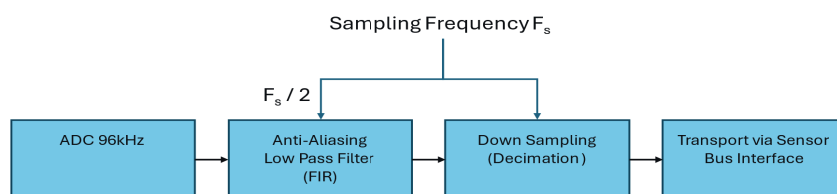
A.5 Downsampling

In version V1.1 of DTA Onsite, the Connection Modules can be parameterized so that the sampling rate can be selected in different stages (also see the description for Connection Module Config).

The following sampling rates are available for the analog speed input: 8 kHz, 2 kHz

The following sampling rates are available for the analog inputs of the measured signals: 96 kHz, 32 kHz, 24 kHz, 16 kHz, 8 kHz, 4 kHz

FIR filters are used to avoid aliasing effects. FIR filters have the advantage that they have linear phases and therefore a constant group runtime over the complete frequency response.



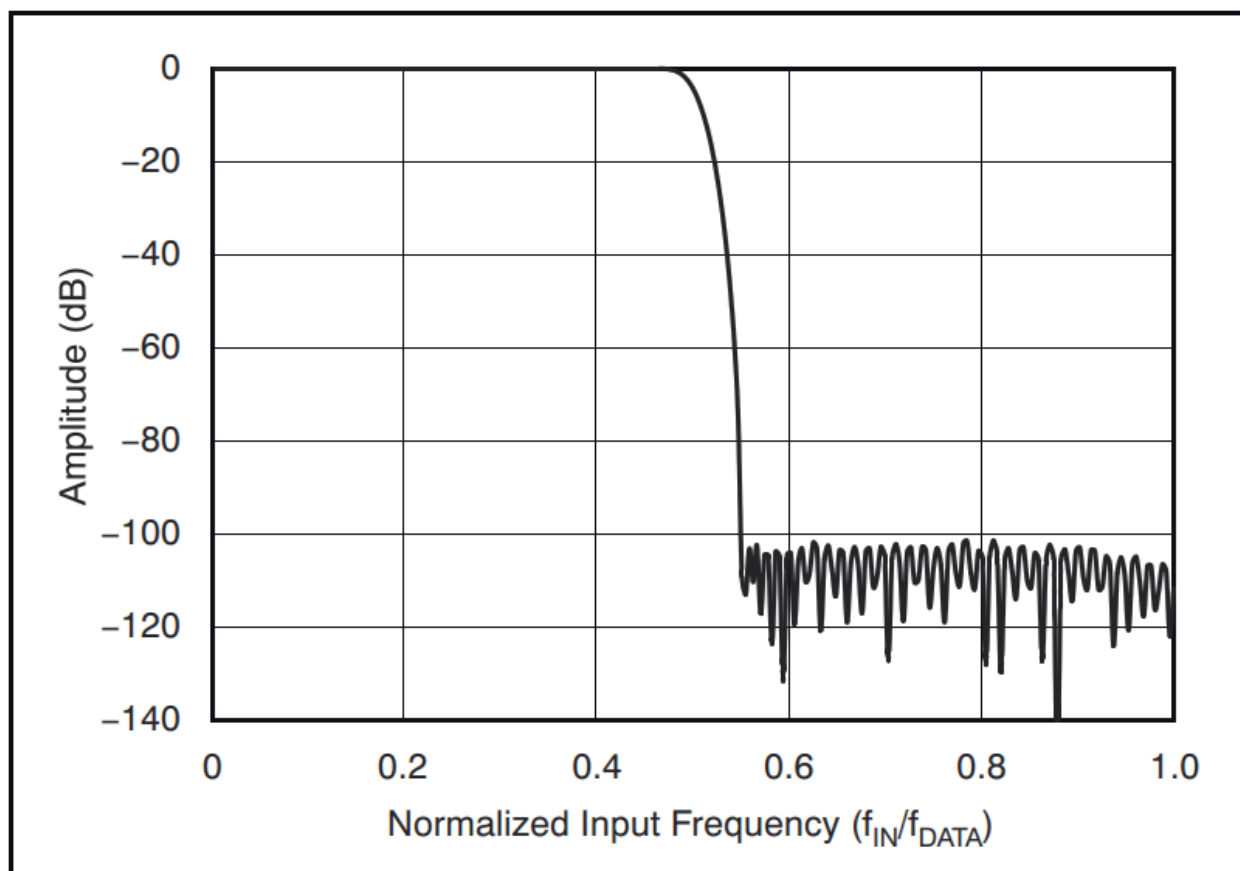
The FIR filters are selected so that their group runtime is the same magnitude to ensure that after downsampling the signals are still in synchronism.

Frequency	FIR filter	Group runtime
96 kHz	No downsampling; however, delay by the group runtime of 95 samples so that the sampling clock synchronism is maintained to possibly other downsampled channels.	95 samples
32 kHz 24 kHz 16 kHz	Order 191	95 samples
8 kHz 4 kHz	Order 381	190 samples

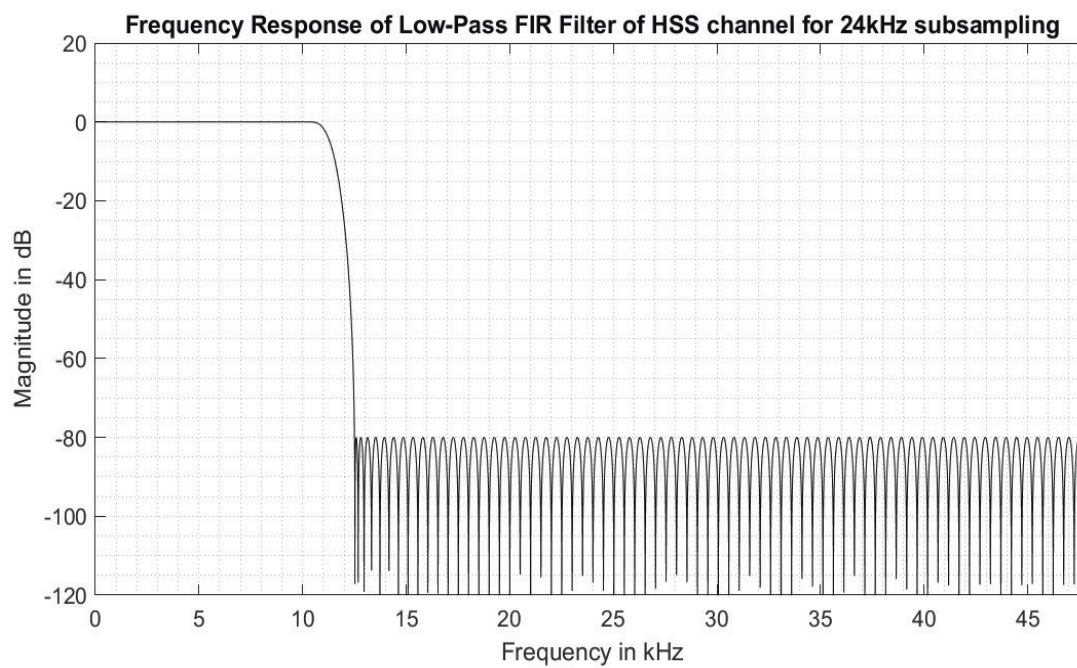
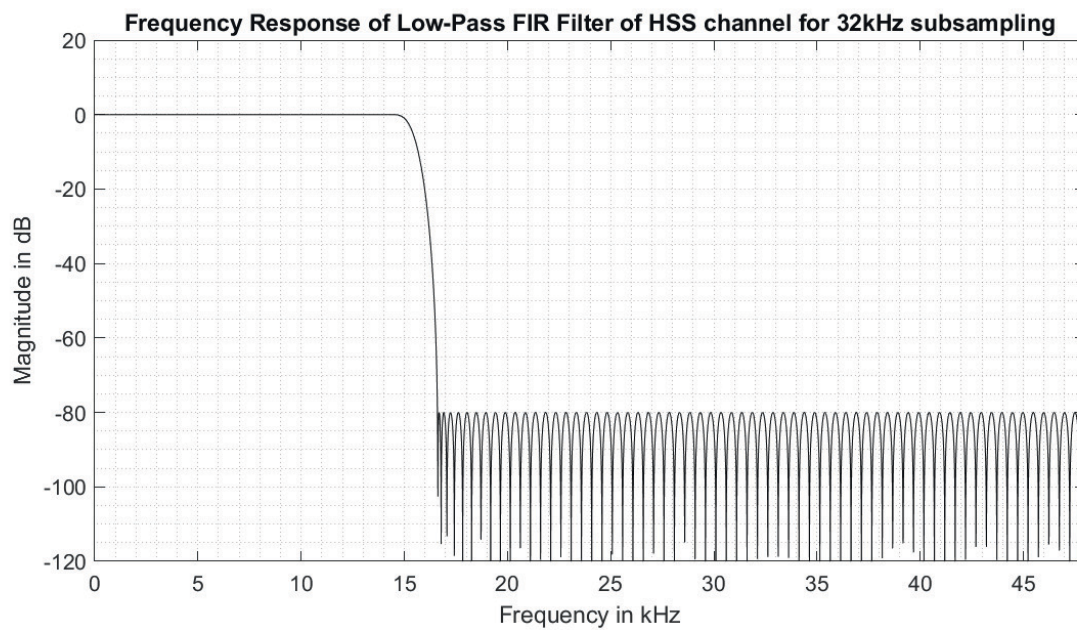
Note

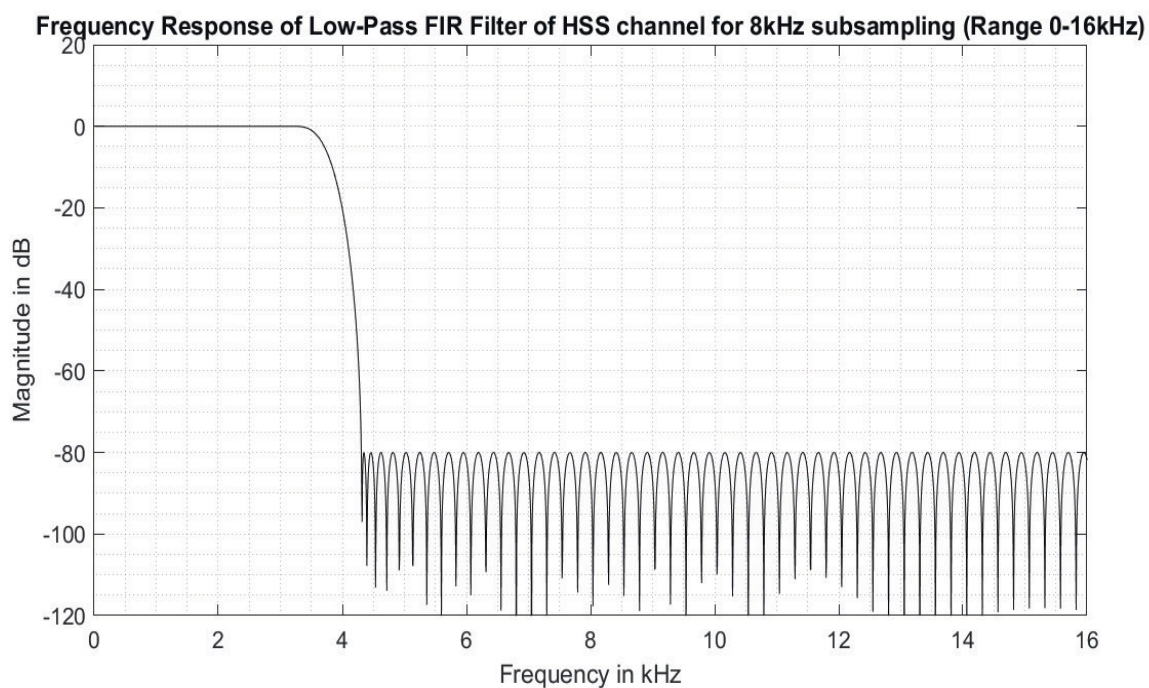
For anti-aliasing filters for 8 kHz and 4 kHz, observe the difference in the group runtime when comparing signals with a higher sampling rate.

The following diagram has been taken from the User Manual of the ADC being used. The scaled frequency is 1.0 for a sampling rate of 96 kHz:

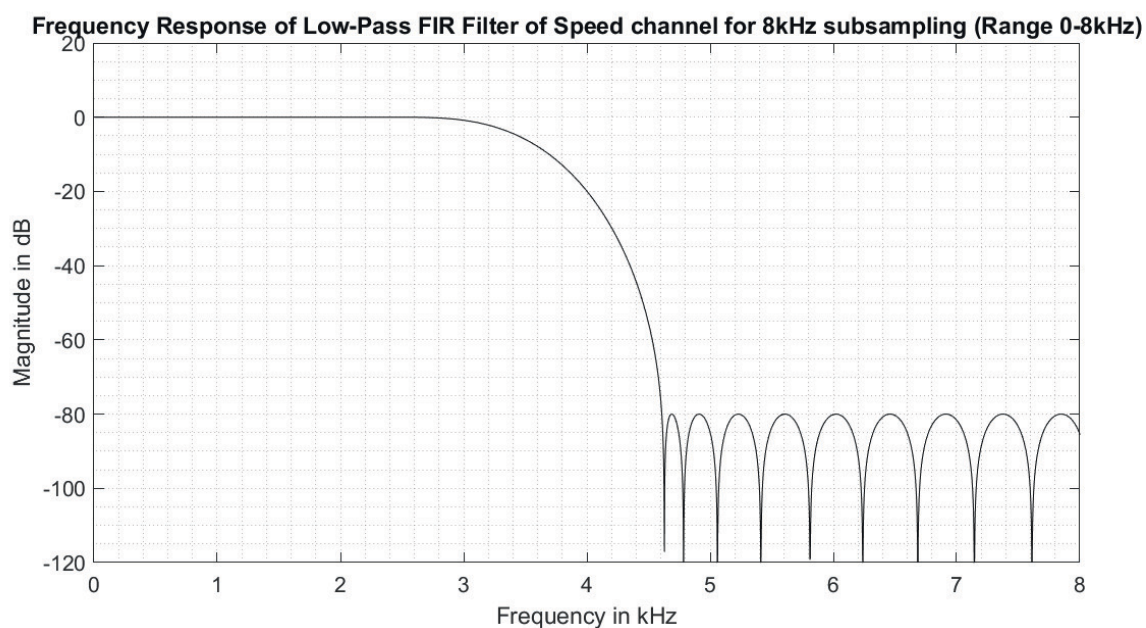


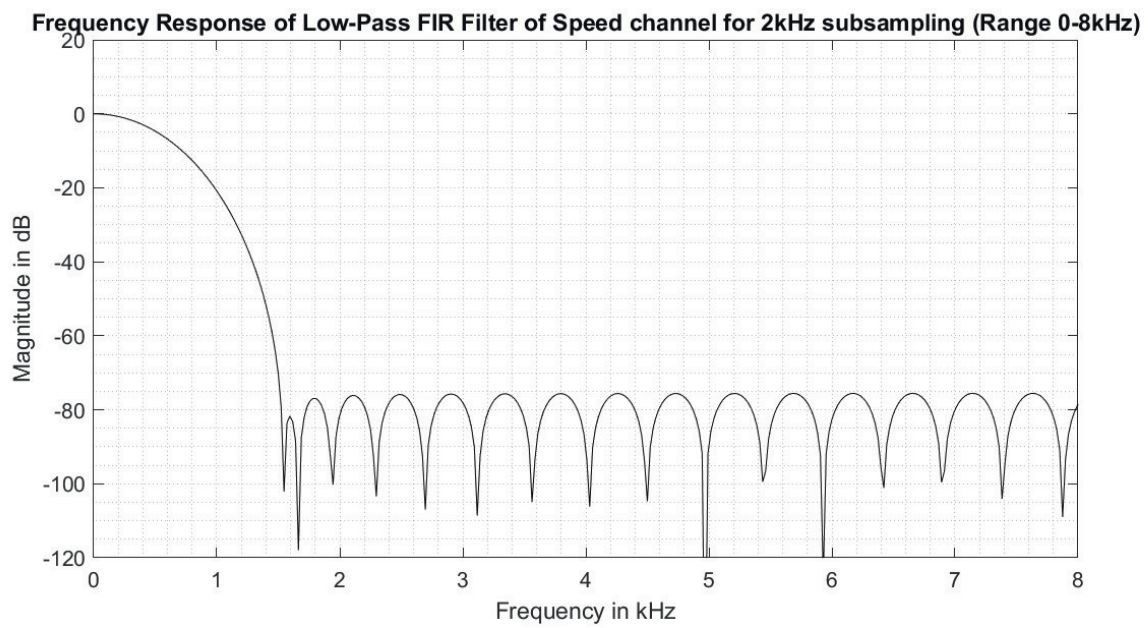
The following diagrams show the filter frequency responses of the anti-aliasing filters used.





The following anti-aliasing filters are used for the analog SPEED inputs:





More information

Condition Monitoring Systems:
www.siemens.com/condition-monitoring

IndustryMall:
www.siemens.com/industrymall

Industry Online Support:
www.siemens.com/online-support