HIMax®

Communication Module
Manual

SAFETY
NONSTOP

HIMA

X-COM 01

8

Contact

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1 Introduction

The present manual describes the technical characteristics of the module and its use. It provides information on how to install, start up and configure the module in SILworX.

1.1 Structure and Use of the Manual

The content of this manual is part of the hardware description of the HIMax programmable electronic system.

This manual is organized in the following main chapters:

- Introduction
- Safety
- Product Description
- Start-up
- Operation
- Maintenance
- Decommissioning
- Transport
- Disposal

Additionally, the following documents must be taken into account:

Name	Content	Document no.
HIMax System Manual	Hardware description of the HIMax system	HI 801 001 E
HIMax Safety Manual	Safety functions of the HIMax systems	HI 801 003 E
HIMax Communication Manual	Description of communication and protocols	HI 801 101 E
SILworX Online Help (OLH)	Instructions on how to use SILworX	-
First Steps	Introduction to SILworX	HI 801 103 E

Table 1: Additional Valid Manuals

The latest manuals can be downloaded from the HIMA website at www.hima.com. The revision index on the footer can be used to compare the current version of existing manuals with the Internet edition.

1.2 Target Audience

This document addresses system planners, configuration engineers, programmers of automation devices and personnel authorized to implement, operate and maintain the devices and systems. Specialized knowledge of safety-related automation systems is required.

1.3 Formatting Conventions

To ensure improved readability and comprehensibility, the following fonts are used in this document:

Bold	To highlight important parts Names of buttons, menu functions and tabs that can be clicked and used in the programming tool.
Italics	For parameters and system variables
`Courier`	Literal user inputs
RUN	Operating state are designated by capitals
Chapter 1.2.3	Cross references are hyperlinks even though they are not particularly marked. When the cursor hovers over a hyperlink, it changes its shape. Click the hyperlink to jump to the corresponding position.

Safety notes and operating tips are particularly marked.

1.3.1 Safety Notes

The safety notes are represented as described below.
These notes must absolutely be observed to reduce the risk to a minimum. The content is structured as follows:

- Signal word: warning, caution, notice
- Type and source of risk
- Consequences arising from non-observance
- Risk prevention

⚠ SIGNAL WORD

Type and source of risk!
Consequences arising from non-observance
Risk prevention

The signal words have the following meanings:

- Warning indicates hazardous situation which, if not avoided, could result in death or serious injury.
- Warning indicates hazardous situation which, if not avoided, could result in minor or modest injury.
- Notice indicates a hazardous situation which, if not avoided, could result in property damage.

NOTE

Type and source of damage!
Damage prevention

1.3.2 Operating Tips

Additional information is structured as presented in the following example:

i The text corresponding to the additional information is located here.

Useful tips and tricks appear as follows:

TIP The tip text is located here.

2 Safety

All safety information, notes and instructions specified in this manual must be strictly observed. The product may only be used if all guidelines and safety instructions are adhered to.

This product is operated in accordance with SELV or PELV. No imminent danger results from the module itself. The use in Ex-Zone is permitted if additional measures are taken.

2.1 Intended Use

HIMax components are designed for assembling safety-related controller systems.

When using the components in the HIMax system, comply with the following general requirements

2.1.1 Environmental Requirements

Requirement type	Range of values
Protection class	Protection class III in accordance with IEC/EN 61131-2
Ambient temperature	0...+60 °C
Storage temperature	-40...+85 °C
Pollution	Pollution degree II in accordance with IEC/EN 61131-2
Altitude	< 2000 m
Housing	Standard: IP20
Supply voltage	24 VDC

Table 2: Environmental Requirements

Exposing the HIMax system to environmental conditions other than those specified in this manual can cause the HIMax system to malfunction.

2.1.2 ESD Protective Measures

Only personnel with knowledge of ESD protective measures may modify or extend the system or replace modules.

NOTE

Device damage due to electrostatic discharge!

- **When performing the work, make sure that the working area is free of static and wear an ESD wrist strap.**
- **If not used, ensure that the device is protected from electrostatic discharge, e.g., by storing it in its packaging.**

2.2 Residual Risk

No imminent risk results from a HIMax system itself.

Residual risk may result from:

- Faults related to engineering
- Faults related to the user program
- Faults related to the wiring

2.3 Safety Precautions

Observe all local safety requirements and use the protective equipment required on site.

2.4 Emergency Information

A HIMax controller is a part of the safety equipment of a system. If the controller fails, the system adopts the safe state.

In case of emergency, no action that may prevent the HIMax systems from operating safely is permitted.

3 Product Description

The X-COM 01 communication module is intended for use in the programmable electronic system (PES) HIMax.

The module is inserted into any of the base plate slots with the exception of the slots reserved for system bus modules. For more information, refer to the System Manual (HI 801 001 E).

The module is approved for use in the safety-related HIMax system and can be used to transport safety-related protocols.

The module ensures communication with systems via Ethernet and fieldbus interfaces with safe**ethernet** and different standard protocols.

i Fore more information on how to configure the protocols and for details of the fieldbus interfaces, refer to the Communication Manual (HI 801 101 E).

Use the SILworX programming tool to select the interfaces for the available protocols.

3.1 Safety Function

No safety function is performed by the communication module.

3.1.1 Reaction in the Event of a Fault

If fault occur, the module enters the temporary ERROR STOP. The module is then rebooted and restarted from the INIT state.

No process data is exchanged with external communication partners in the ERROR STOP state. No process data is transferred to process module.

3.2 HIMax COM Module Part Number

Each COM module forms a functional unit with the X-CB 001 02 connector board. Note that the connector board must be separately purchased.

The fieldbus submodules are optional and must be mounted by the manufacturer. The fieldbus submodule is selected when ordering the controller using the part number. Additionally, the protocols used must be activated.

⚠ CAUTION

Improper opening of the COM module

Damage to COM module

Only HIMA is authorized to retrofit the fieldbus submodules.

When the module is equipped with one or multiple fieldbus submodules, the part number and also the module name changes from X-COM 01 to X-COM 010 XY.

The following table specifies the available components:

Designation	Description
X-COM 01	Communication module without fieldbus submodules
X-COM 010 **XY** [1)]	Communication module with fieldbus submodule
X-CB 001 02	Connector board
[1)] **X**: Option for fieldbus interface FB1 according to Table 4 **Y**: Option for fieldbus interface FB2 according to Table 4	

Table 3: Available HIMax Components

Numbers are allocated to the fieldbus to create the part numbers, see Table 4.

Options for FB1(X) and FB2(Y)	Description
0	No fieldbus submodule inserted
1	RS485 for Modbus (master or slave) or ComUserTask
2	PROFIBUS DP master
3	PROFIBUS DP slave
5	RS232 for ComUserTask
6	RS422 for ComUserTask
7	SSI for ComUserTask

Table 4: Options for Fieldbus Interfaces FB1(X) and FB2(Y)

The following table shows examples for part numbers and names:

Part no.	Designation	Fieldbus submodule 1 (FB1)	Fieldbus submodule 2 (FB2)
98 52600**21**	X-COM 010 **21**	PROFIBUS master (max. 12 Mbit/s)	RS485
98 52600**23**	X-COM 010 **23**	PROFIBUS master (max. 12 Mbit/s)	PROFIBUS slave (max. 1.5 Mbit/s)
98 52600**11**	X-COM 010 **11**	RS485	RS485
98 5260000	X-COM 01	---	---

Table 5: Examples of COM Module Part Numbers and Names

i HIMA recommends operating the PROFIBUS DP using the FB1 fieldbus interface (maximum transfer rate 12 Mbit/s). The maximum transfer rate permitted for the FB2 fieldbus interface is 1.5 Mbit/s.

The designation and part number (part no.) are printed on the type label of the module.

For more information, refer to the SILworX Communication Manual (HI 801 101 E).

3.3 Type Label

The type label specifies the following important details:

- Product name
- Mark of conformity
- Bar code (2D or 1D code)
- Part number (Part-No.)
- Hardware revision index (HW Rev.)
- Software revision index (SW Rev.)
- Operating voltage (Power)
- Ex specifications (if applicable)
- Production year (Prod-Year:)

Figure 1: Sample Type Label

3.4 Structure

The module is composed of:

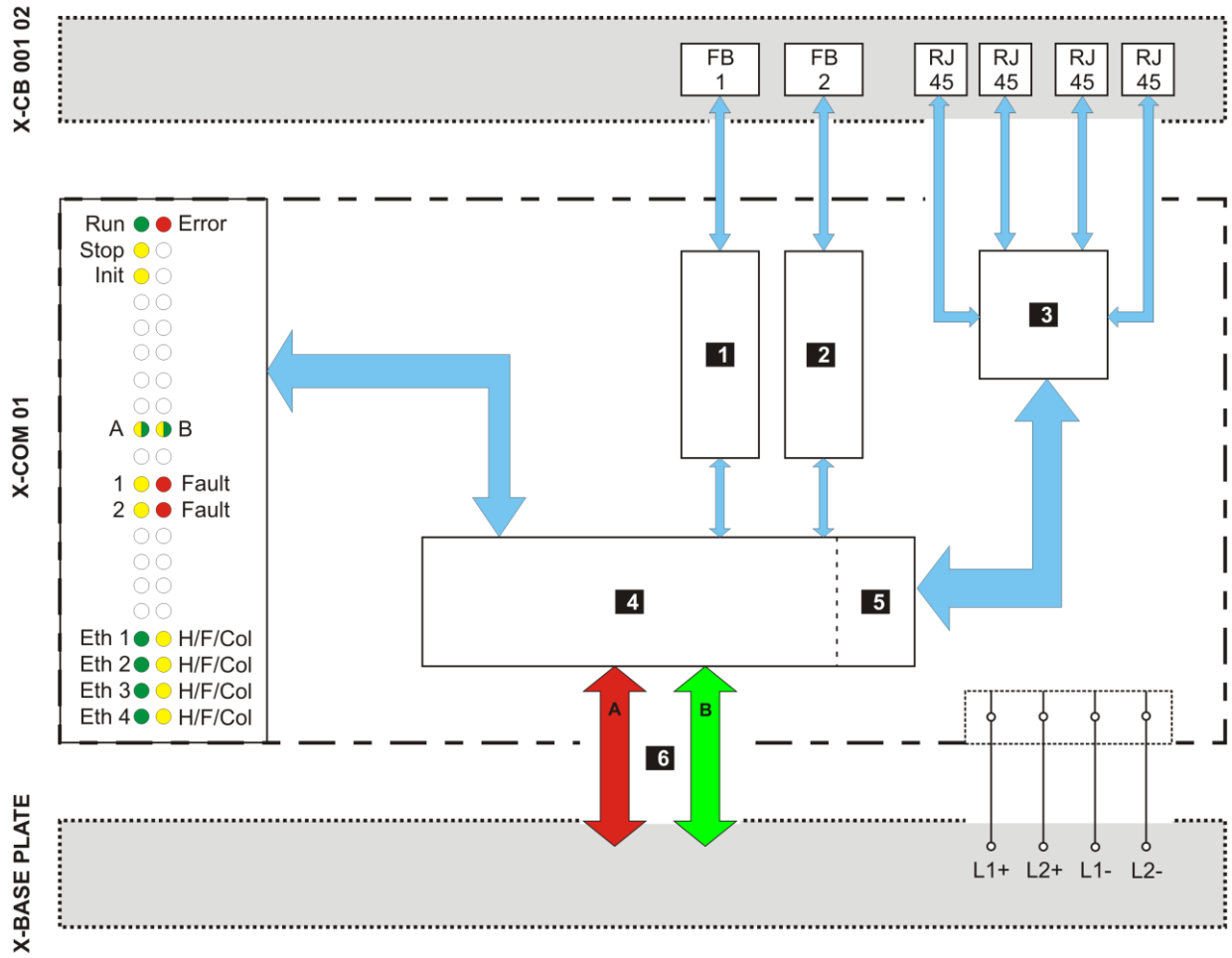
- Processor System
- Ethernet Switch

Ethernet and fieldbus interfaces on the connector board.

The module is equipped with LEDs to indicate the status, see Chapter 3.4.3.

3.4.1 Block Diagram

The following block diagram illustrates the structure of the module.



1 Fieldbus submodule 1
2 Fieldbus submodule 2
3 Ethernet Switch
4 Processor System
5 Ethernet Interface
6 System Busses

Figure 2: Block Diagram

3.4.2 Processor System

The processor system uses self tests to control and monitor the communication. Data is exchanged between the communication module and the processor module is carried out via redundant system bus. The system bus has a redundant structure for reasons of availability. Redundancy is only ensured if both system bus modules are inserted in the base plates and configured accordingly.

Operating system and error code history are stored in a non-volatile memory and can be read in SILworX via the diagnosis.

Ethernet Switch

Integrated Ethernet switch to configure different networks.

Ethernet interface

The communication module is equipped with four Ethernet switch ports connected to the Ethernet interface of the processor system via an integrated Ethernet switch.

Property	HIMax COM module
Ports	4
Transfer standard	10BASE-T/100BASE-Tx, Half and full duplex
Auto negotiation	Yes
Auto crossover	Yes
Connection Socket	RJ-45
IP address	Freely configurable[1)]
Subnet mask	Freely configurable[1)]
Supported protocols	safe**ethernet** Standard Protocols
[1)] The general rules for assigning IP address and subnet masks must be adhered to.	

Table 6: Ethernet Interface Properties

i Ensure that no loops result from the network wiring. Data packets may only reach a controller over a single path.

Fieldbus Interfaces

The fieldbus submodules activate the fieldbus interfaces and define the interface transfer standard. The required fieldbus submodules must be specified when ordering the module, see Chapter 3.2. Only one protocol can be run on each fieldbus interface.

Fieldbus interfaces	
Number	2
Transfer standard	For each fieldbus submodule
Connection Socket	D-sub connector, 9 poles
Supported protocols	Standard protocols, see Communication Manual (HI 801 101 E).

Table 7: Fieldbus Interface Specifications

i Wiring, Bus Termination:

- Observe the corresponding fieldbus standard when connecting the fieldbus interfaces.
- Use the bus terminations to terminate the fieldbuses on their physical ends.

3.4.3 Indicators

The following figure shows the LED indicators for the module.

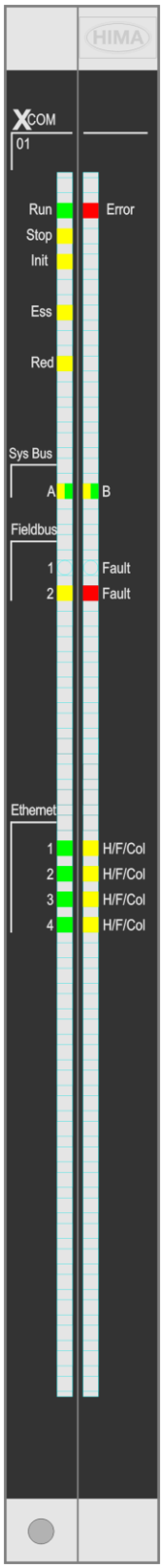


Figure 3: Indicators

The LEDs indicate the operating state of the communication module.

The LEDs on the module are divided into three groups:

- Module status indicators (Run, Error, Stop, Init)
- System bus indicators (A, B)
- Fieldbus indicators (1, 2, Fault)
- Communication indicators (Ethernet)

When the supply voltage is switched on, a LED test is performed and all LEDs are briefly lit.

Definition of blinking frequencies

The following table defines the blinking frequencies of the LEDs:

Name	Blinking frequencies
Blinking1	Long (approx. 600 ms) on, long (approx. 600 ms) off
Blinking2	Short (approx. 200 ms) on, short (approx. 200 ms) off, short (approx. 200 ms) on, long (approx. 600 ms) off
Blinking-x	Ethernet communication: Blinking synchronously with data transfer

Table 8: Blinking Frequencies of LEDs

3.4.4 Module Status Indicators

These LEDs are located on the front plate, on the upper part of the module.

LED	Color	Status	Description
Run	Green	On	Module in RUN, normal operation
		Blinking1	Module state: STOP/OS_DOWNLOAD or OPERATE (only with processor modules)
		Off	Module not in RUN, observe the other status LEDs
Error	Red	On/Blinking1	Internal module faults detected by self-tests, e.g., hardware or voltage supply. Fault while loading the operating system
		Off	Normal operation
Stop	Yellow	On	Module state: STOP / VALID CONFIGURATION
		Blinking1	Module state: STOP / INVALID CONFIGURATION or STOP / OS_DOWNLOAD
		Off	Module not in STOP, observe the other status LEDs
Init	Yellow	On	Module state: INIT
		Blinking1	Module state: LOCKED or STOP / LOADING OS
		Off	Module state: neither INIT nor LOCKED, observe the other status LEDs

Table 9: Module Status Indicators

3.4.5 Redundancy indicators

The LEDs are located below the module status indicators.

LED	Color	Status	Description
Ess	Yellow	On	At least one non-redundant fieldbus protocol is configured.
		Blinking1	A fieldbus protocol configured for redundant operation is not operating redundantly.
		Off	▪ All fieldbus protocols configured for redundant operation are operating redundantly. ▪ No non-redundant fieldbus protocols are running.
Red	Yellow	On	All fieldbus protocols configured for redundant operation are operating redundantly to the partner module.
		Blinking1	▪ Synchronization ▪ The redundant partner of at least one redundant fieldbus protocol is missing.
		Off	No redundant fieldbus protocol is configured.

Table 10: Redundancy Indicators

3.4.6 System Bus Indicators

The system bus LEDs are labeled Sys Bus.

LED	Color	Status	Description
A	Green	On	Physical and logical connection to the system bus module in slot 1.
		Blinking1	No physical connection to the system bus module in slot 1.
	Yellow	Blinking1	The physical connection to the system bus module in slot 1 has been established. No connection to a (redundant) processor module running in system operation.
B	Green	On	Physical and logical connection to the system bus module in slot 2.
		Blinking1	No physical connection to the system bus module in slot 2.
	Yellow	Blinking1	The physical connection to the system bus module in slot 2 has been established. No connection to a (redundant) processor module running in system operation.
A+B	Off	Off	Neither physical nor logical connection to the system bus modules in slot 1 and slot 2.

Table 11: System Bus Indicators

3.4.7 Fieldbus Indicators

The fieldbus LEDs are labeled Fieldbus.

LED	Color	Status	Description
1, 2	Yellow	On	Fieldbus operating
		Off	No activity, fieldbus not operating
Fault	Red	Blinking1	Fieldbus fault of the bus (e.g., the slave is not present or faulty response), depending on the fieldbus protocol (minimum blinking duration 5 s).
		Off	No fieldbus faults

Table 12: Fieldbus Indicators

3.4.8 Ethernet Indicators

The Ethernet LEDs are labeled Ethernet.

LED	Color	Status	Description
Eth 1…4	Green	On	Communication partner connected No communication detected on interface
		Blinking-x	Communication detected on interface.
		Blinking1	IP address conflict detected All Ethernet LEDs are blinking
		Off	No communication partner connected
H/F/Col 1…4	Yellow	On	Full duplex operation on Ethernet line *F*
		Blinking-x	Collisions detected on Ethernet line *Col*
		Blinking1	IP address conflict detected All Ethernet LEDs are blinking
		Off	Half duplex operation on Ethernet line *H*

Table 13: Ethernet Indicators

3.5 Product Data

General	
Supply voltage	24 VDC, -15 %...+20 %, $r_P \leq 5$ %, SELV, PELV
Current input	min. 0.25 A max. 0.46 A
Operating temperature	0 °C...+60 °C
Storage temperature	-40 °C...+85 °C
Humidity	max. 95 % relative humidity, non-condensing
Type of protection	IP20
Dimensions (H x W x D) in mm	310 x 29.2 x 230
Weight	approx. 1.3 kg

Table 14: Product Data

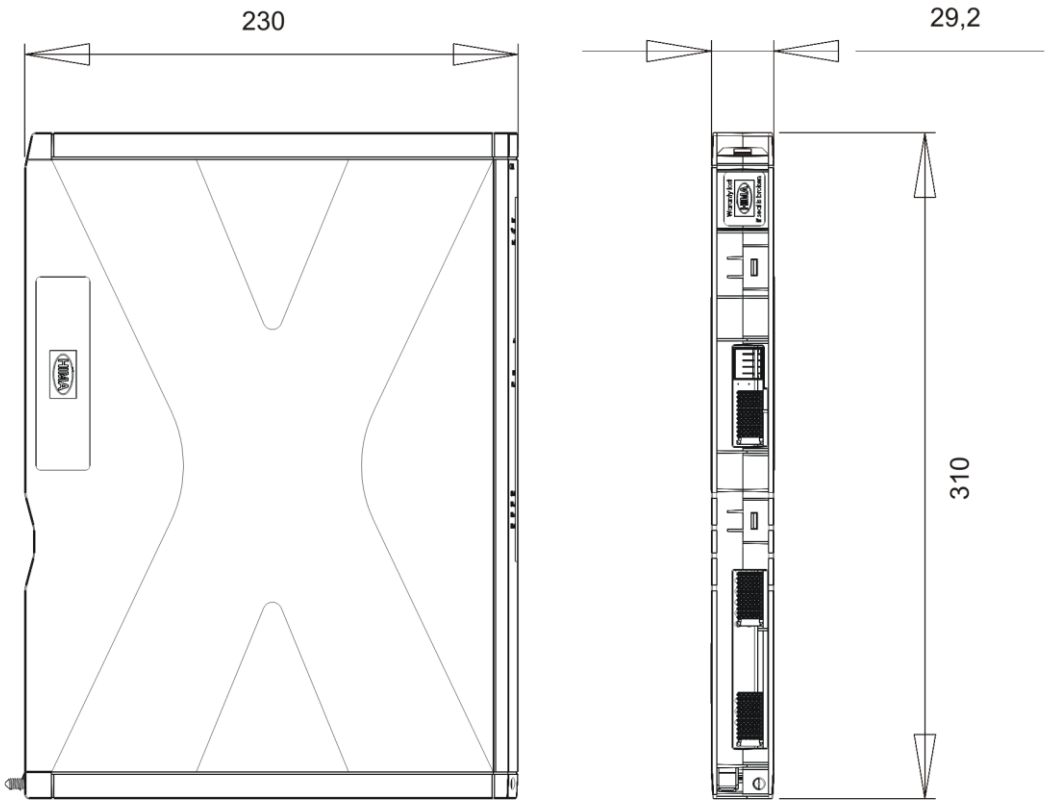


Figure 4: Views

3.6 Connector board

The connector board connects the module to other systems using the Ethernet and fieldbus interfaces. Each module forms a functional unit with the connector board. The connector board for the module is designated as X-CB 001 02. The connector board must be inserted into the appropriate slot prior to mounting the module on the base plate.

3.6.1 Pin Assignment

The interface designation is printed on the connector board.

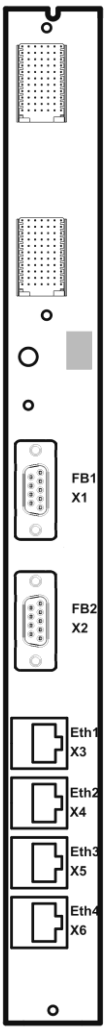


Figure 5: Connector Board

Designation	Description
Fieldbus interfaces	
FB1 (X1)	Connection for fieldbus, the protocol depends on the Fieldbus Submodule
FB2 (X2)	Connection for fieldbus, the protocol depends on the Fieldbus Submodule
Ethernet interfaces	
Eth1 (X3)	Connection for Ethernet
Eth2 (X4)	Connection for Ethernet
Eth3 (X5)	Connection for Ethernet
Eth4 (X6)	Connection for Ethernet

Table 15: Interfaces of X-CB 001 02

3.6.2 Fieldbus interfaces

Fieldbus interfaces of the COM module can be used to communicate with external systems. Only one protocol can be run on each fieldbus interface.

The fieldbus interfaces must be equipped with a fieldbus submodule. If no fieldbus submodule is used, communication is not possible on this interface. The transfer standard for the interface depends on the fieldbus submodule.

Refer to the communication manual (HI 801 101 E) for details of the fieldbus interfaces.

4 Start-up

This chapter describes how to install and configure the module. For more information, refer to HIMax system manual (HI 801 001 E).

4.1 Mounting

Observe the following points when mounting the module:

- Only operate the module with the appropriate fan components. For more information, see the System Manual (HI 801 001 E).
- Only operate the module with the suitable connector board. For more information, see Chapter 3.6.

4.2 Mounting and Removing the Module

When replacing an existing module or mounting a new one, follow the instructions given in this chapter.

When removing the module, the connector board remains in the HIMax base plate. This saves additional wiring effort since all field terminals are connected via the connector board of the module.

4.2.1 Mounting a Connector Board

Tools and utilities

- Screwdriver, cross PH 1 or slotted 0.8 x 4.0 mm
- Matching connector board

To install the connector board

1. Insert the connector board into the guiding rail with the groove facing upwards (see following figure). Fit the groove into the guiding rail pin.
2. Place the connector board on the cable shield rail.
3. Secure the captive screws to the base plate. First screw in the lower screws than the upper ones.

To remove the connector board

1. Release the captive screws from the base plate.
2. Carefully lift the lower section of the connector board from the cable shield rail.
3. Remove the connector board from the guiding rail.

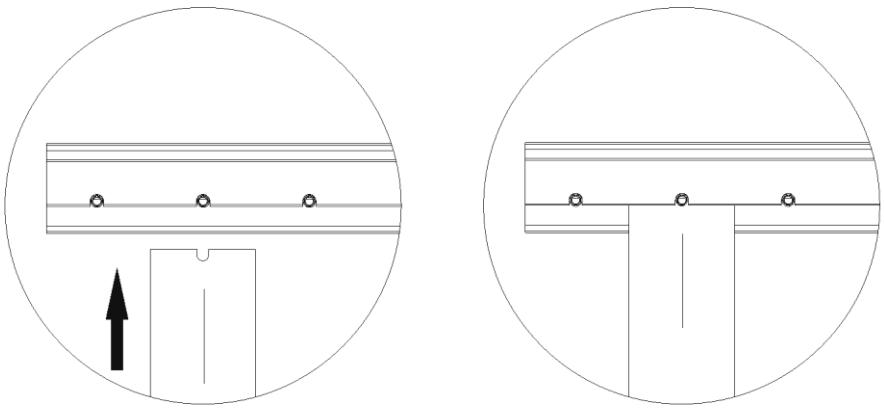


Figure 6: Example of how to Insert the Mono Connector Board

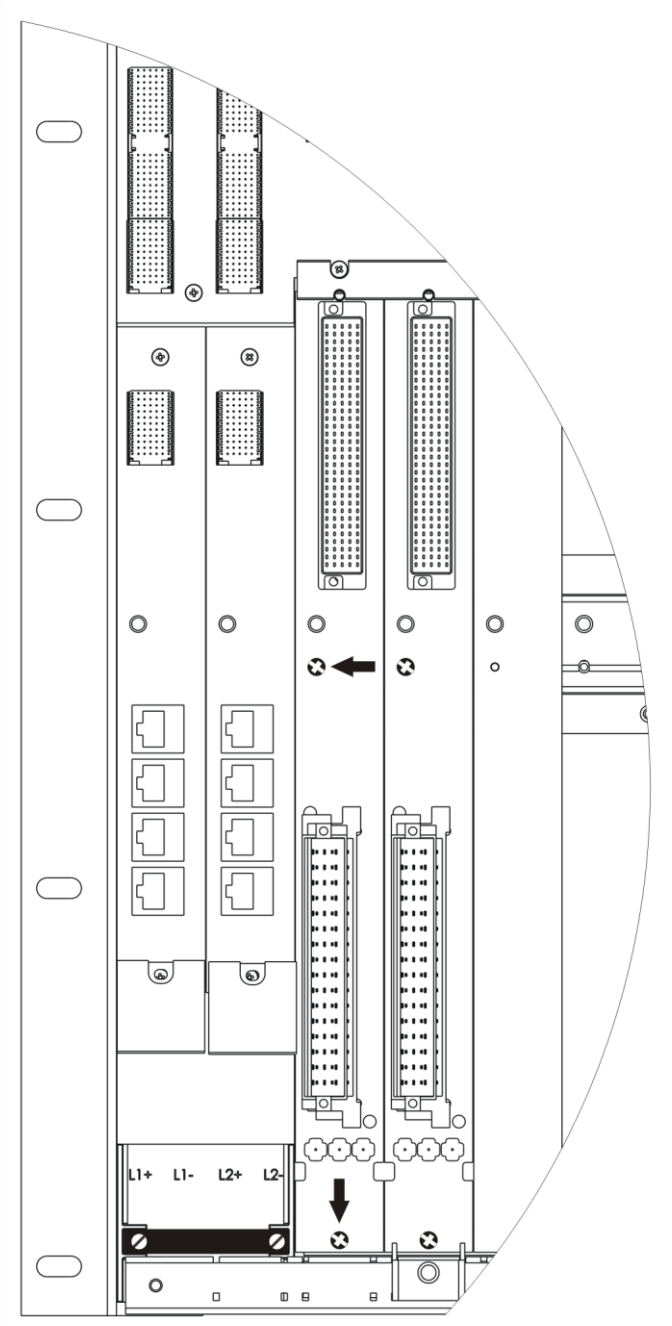


Figure 7: Example of how to Secure the Mono Connector Board with Captive Screws

i These instructions also apply for redundant connector boards. The number of slots used varies in accordance with the connector board type. The number of captive screws depends on the connector board type.

4.2.2 Mounting and Removing the Module

This chapter describes how to mount and remove the HIMax module. A module can be mounted and removed while the HIMax system is operating.

NOTE

Damage to bus and power sockets due to module jamming!

Failure to observe this can damage the controller.

Always take care when inserting the module in the base plate.

Tools and utilities

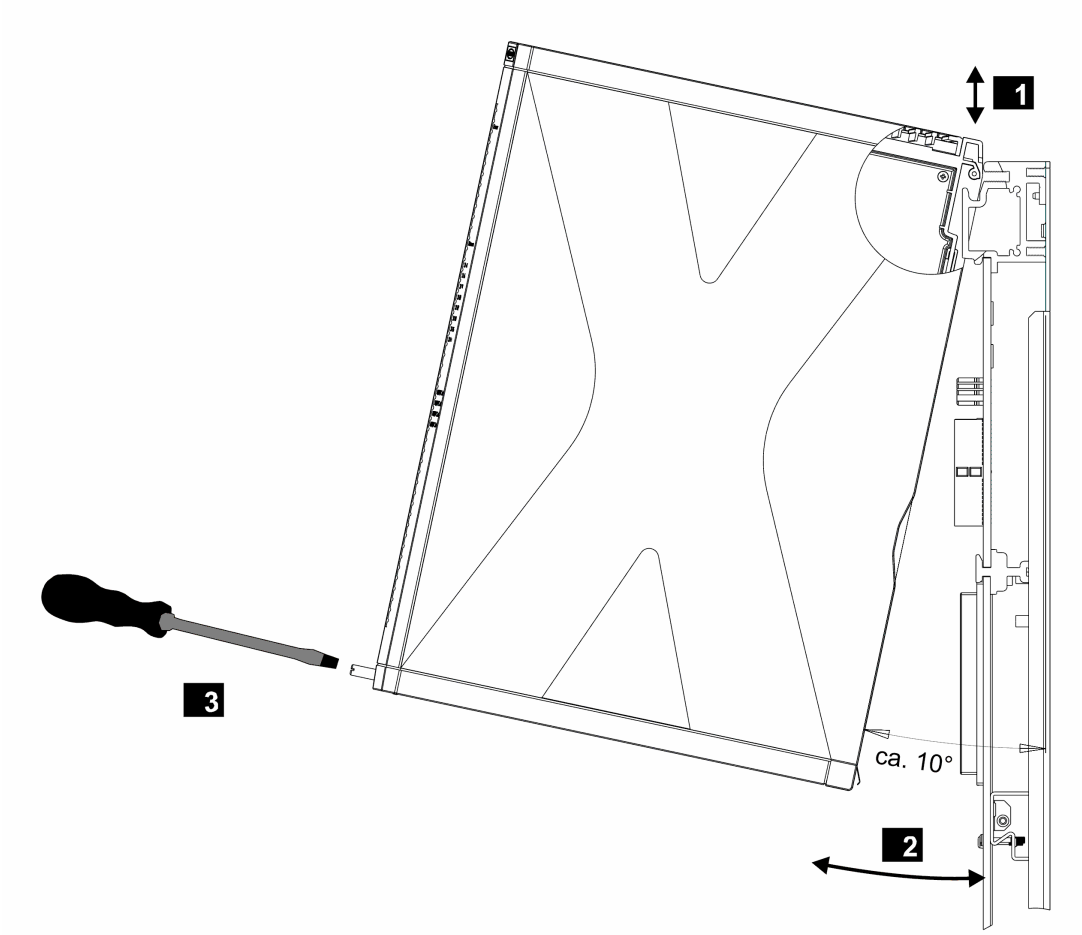
- Screwdriver, slotted 0.8 x 4.0 mm
- Screwdriver, slotted 1.2 x 8.0 mm

Installation

1. Open the cover plate on the fan rack:
   ☑ Move the locks to the *open* position.
   ☑ Lift the cover plate and insert into the fan rack
2. Insert the top of the module into the hook-in rail, see **1**.
3. Swivel the lower edge of the module towards the base plate and apply light pressure to snap it into place, see **2**.
4. Tighten the screws, see **3**.
5. Pull the cover plate out of the fan rack and close it.
6. Lock the cover plate.

Removal

1. Open the cover plate on the fan rack:
   ☑ Move the locks to the *open* position.
   ☑ Lift the cover plate and insert into the fan rack
2. Release the screw **3**.
3. Swivel the lower edge of the module away from the base plate. Lift and apply light pressure to remove the module from the hook-in rail, see **2** and **1**.
4. Pull the cover plate out of the fan rack and close it.
5. Lock the cover plate.



1 Inserting and Removing a Module
2 Swiveling a Module in and out
3 Securing and Releasing a Module

Figure 8: Mounting and Removing a Module

i If the HIMax system is operating, do not open the cover plate of the fan rack for more than a few minutes (< 10 min) since this affects the forced cooling.

4.3 Configuring the Module in SILworX

The Ethernet interfaces are configured in the detail view of the COM module.

i Communication loss!

With an inappropriate Ethernet parameters setting, the processor or communication module might no longer be reachable. Reset the module!

To open the detail view of the communication module

1. In the structure tree, open **Configuration, Resource, Hardware**.
2. Right-click **Hardware ,** and then click **Edit** to open the Hardware Editor.
3. Right-click **Communication Module**, and then click **Detail View** from the context menu. The Detail View opens.

4.3.1 The Tabs of the Detail View

Module

Designation	Description
Name	Name of the communication module.
Activate Max. µP Budget for HH Protocol	▪ Activated: Use CPU load limit from the field *Max. µP Budget for HH Protocol [%]*. ▪ Deactivated: Do not use the CPU Load limit for safe**ethernet.**
Max. µP Budget for HH Protocol [%]	Maximum CPU load of module that can be used for processing the safe**ethernet** protocols. i The maximum load must be distributed among all the implemented protocols that use this communication module.
IP address	IP address of the Ethernet interface.
Subnet mask	32 bit address mask to split up the IP address in network and host address.
Standard Interface	Activated: the interface is used as standard interface for the system login. Default setting: Deactivated
Default Gateway	IP address of the default gateway.

ARP Aging Time [s]	A processor or COM module stores the MAC addresses of the communication partners in a MAC/IP address assignment table (ARP cache). If in a period of 1x....2x *ARP Aging Time ...* ▪ ... messages of the communication are received, the MAC address remains stored in the ARP cache. ▪ ... no messages of the communication partner are received, the MAC address is erased from the ARP cache. The typical value for the *ARP Aging Time* in a local network ranges from 5...300 s. The user cannot read the contents of the ARP cache. Range of values: 1...3600 s Default value: 60 s **Note:** If routers or gateways are used, the user must adjust (increase) the *ARP Aging Time* due to the additional time required for two-way transmission. If the *ARP Aging Time* is too low, the MAC address of the communication partner is erased from the ARP cache, the communication is delayed or interrupted. For an efficient performance, the *ARP aging time* value must be less than the receive timeout set for the protocols in use.
MAC Learning	*MAC Learning* and *ARP Aging Time* are used to set how quick the Ethernet switch should learn the MAC address. The following settings are possible: ▪ This ensures that data packets cannot be intentionally or unintentionally forwarded to external network subscribers (ARP spoofing). Conservative (recommended): If the ARP cache already contains MAC addresses of communication partners, these are locked and cannot be replaced by other MAC addresses for at least one *ARP Aging Time* and a maximum of two *ARP Aging Time* periods. This encsures that data packets cannot be intentionally or unintentionally forwarded to external network subscribers (ARP spoofing). ▪ Tolerant: When a message is received, the IP address contained in the message is compared to the data in the ARP cache and the MAC address stored in the ARP cache is immediately overwritten with the MAC address from the message. The *tolerant* setting must be used if the availability of communication is more important than the authorized access to the controller. Default setting: Conservative
IP Forwarding	Function is not supported, must be deactivated. Default setting: Deactivated

ICMP Mode	The Internet Control Message Protocol (ICMP) allows the higher protocol layers to detect error states on the network layer and optimize the transmission of data packets. Message types of Internet Control Message Protocol (ICMP) supported by the processor module: ▪ No ICMP Responses All the ICMP commands are deactivated. This ensures a high degree of safety against potential sabotage that might occur over the network. ▪ Echo Response If Echo Response is activated, the node responds to a ping command. It is thus possible to determine if a node can be reached. Safety is still high. ▪ Host Unreachable Not important for the user. Only used for testing at the manufacturer's facility. ▪ All Implemented ICMP Responses All ICMP commands are activated. This allows a more detailed diagnosis of network malfunctions. Default setting: Echo Response

Table 16: Configuration Parameters

Routings

The **Routings** tab contains the routing table. This table is empty if the module is new. A maximum of 8 routing entries are possible.

Designation	Description
Name	Denomination of the routing settings
IP Address	Target IP address of the communication partner (with direct host routing) or network address (with subnet routing). Range of values: 0.0.0.0...255.255.255.255 Default value: 0.0.0.0
Subnet mask	Define the target address range for a routing entry. 255.255.255.255 (with direct host routing) or subnet mask of the addressed subnet. Range of values: 0.0.0.0...255.255.255.255 Default value: 255.255.255.255
Gateway	IP address of the gateway to the addressed network. Range of values: 0.0.0.0...255.255.255.255 Default value: 0.0.0.1

Table 17: Routing Parameters

Ethernet Switch

Designation	Description
Name	Port number as printed on the housing; per port, only one configuration may exist. Range of values: 1...4
Speed [Mbit/s]	10 Mbit/s 100 Mbit/s Autoneg: Automatic baud rate setting Default value: Autoneg
Flow Control	Full duplex: Simultaneous communication in both directions Half duplex: Communication in one direction Autoneg: Automatic communication control Default value: Autoneg
Autoneg also with fixed values	The *Advertising* function (forwarding the speed and flow control properties) is also performed if the parameters *Speed* and *Flow Control* have fixed values. This allows other devices with ports set to *Autoneg* to recognize the HIMax port settings.
Limit	Limit the inbound multicast and/or broadcast packets. Off: No limitation Broadcast: Limit broadcast packets (128 kbit/s) Multicast and Broadcast: Limit multicast and broadcast packets (1024 kbit/s) Default value: Broadcast

Table 18: Ethernet Switch Parameters

VLAN (Port-Based VLAN)

For configuring the use of port-based VLAN.

i Should VLAN be supported, port-based VLAN should be off to enable each port to communicate with the other switch ports.

For each port on one switch, the user can define which other ports of the switch received Ethernet frames may be sent to.
The table in the VLAN tab contains entries through which the connection between two ports can be set as *active* or *inactive*.

Default setting: All connection between ports *active*

LLDP

With LLDP (Link Layer Discovery Protocol), information such as MAC address, device name, port number is sent per multicast in periodic intervals via the own device and is received from the neighboring devices.

LLDP uses the following values depending on whether PROFINET is configured on the communication module:

PROFINET on the COM module	ChassisID	TTL (Time to Live)
Used	Device name	20 s
Not used	MAC address	120 s

Table 19: Values for LLDP

The processor and communication modules support LLDP on the Eth1, Eth2, Eth3 and Eth4 ports.

The following parameters define how a given port should work:

Off	LLDP is disabled on this port.
Send	LLDP sends LLDP Ethernet frames, received LLDP Ethernet frames are deleted without being processed.
Receive	LLDP sends no LLDP Ethernet frames, but received LLDP Ethernet frames are processed.
Send/Receive	LLDP sends and processes received LLDP Ethernet frames.

Default setting: Send/Receive

Mirroring

Mirroring is used to configure whether the module should duplicate Ethernet packets on a given port such that they can be read from a device connected to that port, e.g., for test purposes.

The following parameters define how a given port should work:

Off	This port does not participate to the mirroring process.
Egress:	Outgoing data of this port are duplicated.
Ingress/Egress:	Incoming and outgoing data of this port are duplicated.
Dest Port:	This port is used to send duplicated data.

Default setting: OFF

4.3.2 Network Ports Used for Ethernet Communication

UDP Ports / Use

123	SNTP (time synchronization between PES and remote I/O, PES and external devices)
502	Modbus salve (can be modified by the user)
6010	safe**ethernet** and OPC
8001	PES used to configure the remote I/Os
8000	Programming and operation with SILworX
34964	PROFINET endpoint mapper (required for establishing the connection)
49152	PROFINET RPC server
49153	PROFINET RPC client

TCP Ports / Use

502	Modbus salve (can be modified by the user)
Xxx	TCP SR assigned by the user

i All ports listed above are destination ports. The source ports of the communication modules are variable and cannot be affected.

The ComUserTask can use any port if it is not already used by another protocol.

5 Operation

The module runs within a HIMax base plate and does not require any specific monitoring.

5.1 Handling

Direct handling of the module is not foreseen.

The module is operated from within the PADT. For more details, refer to the SILworX documentation.

5.2 Diagnosis

LEDs on the front side of the module indicate the module state, see Chapter 3.4.3.

The diagnostic history of the module can also be read using SILworX.

i If a module is plugged in to a base plate, it generates diagnostic messages during its initialization phase indicating faults such as incorrect voltage values.
These messages only indicate a module fault if they occur after the system starts operation.

6 Maintenance

Defective modules must be replaced with a faultless module of the same type or with an approved replacement model.

Only the manufacturer is authorized to repair the module.

When replacing modules, observe the instructions specified in the System Manual (HI 801 001 E) and Safety Manual (HI 801 003 E).

6.1 Maintenance Measures

6.1.1 Loading the Operating System

HIMA is continuously improving the operating system of the module. HIMA recommends to use system downtimes to load the current version of the operating system into the module.

For detailed instructions on how to load the operating system, see the system manual and the online help. The module must be in STOP to be able to load an operating system.

i The current version of the module in use is displayed in the SILworX Control Panel! The type label specifies the version when the module is delivered, see Chapter 3.3.

6.1.2 Proof Test

HIMax modules must be subjected to a proof test in intervals of 10 years. For more information, refer to the Safety Manual HI 801 003 E.

7 Decommissioning

To decommission the module, remove it from the base plate. For more information, see *Mounting and Removing the Module*.

8 Transport

To avoid mechanical damage, HIMax components must be transported in packaging.

Always store HIMax components in their original product packaging. This packaging also provides protection against electrostatic discharge. Note that the product packaging alone is not suitable for transport.

9 Disposal

Industrial customers are responsible for correctly disposing of decommissioned HIMax hardware. Upon request, a disposal agreement can be arranged with HIMA.

All materials must be disposed of in an ecologically sound manner.

Appendix

Glossary

Term	Description
ARP	Address resolution protocol: Network protocol for assigning the network addresses to hardware addresses
AI	Analog input
AO	Analog output
Connector board	Connector board for the HIMax module
COM	Communication module
CRC	Cyclic redundancy check
DI	Digital input
DO	Digital output
EMC	Electromagnetic compatibility
EN	European norm
ESD	Electrostatic discharge
FB	Fieldbus
FBD	Function block diagrams
FTT	Fault tolerance time
ICMP	Internet control message protocol: Network protocol for status or error messages
IEC	International electrotechnical commission
MAC address	Media access control address: Hardware address of one network connection
PADT	Programming and debugging tool (in accordance with IEC 61131-3), PC with SILworX
PE	Protective earth
PELV	Protective extra low voltage
PES	Programmable electronic system
R	Read
Rack ID	Base plate identification (number)
Interference-free	Supposing that two input circuits are connected to the same source (e.g., a transmitter). An input circuit is termed "interference-free" if it does not distort the signals of the other input circuit.
R/W	Read/Write
SB	System bus (module)
SELV	Safety extra low voltage
SFF	Safe failure fraction, portion of faults that can be safely controlled
SIL	Safety integrity level (in accordance with IEC 61508)
SILworX	Programming tool for HIMax
SNTP	Simple network time protocol (RFC 1769)
SRS	System.rack.slot addressing of a module
SW	Software
TMO	Timeout
W	Write
rP	Peak value of a total AC component
Watchdog (WD)	Time monitoring for modules or programs. If the watchdog time is exceeded, the module or program enters the ERROR STOP state.
WDT	Watchdog time

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