Manual

HIMax®

X-SB 01

System Bus Module

Contact

HIMA Paul Hildebrandt GmbH

P.O. Box 1261

68777 Brühl

Phone: +49 6202 709-0

Fax: +49 6202 709-107

E-mail: info@hima.com

Document designation	Description
HI 801 006 D, Rev. 10.01 (1923)	German original document
HI 801 007 E, Rev. 10.01.00 (1923)	English translation of the German original document

Table of Contents

1 Introduction

This 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 This Manual

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

This manual contains the following main chapters:

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

Additionally, the following documents must be taken into account:

Document	Content	Document no.
HIMax system manual	Hardware description of the HIMax system	HI 801 001 E
HIMax safety manual	Safety functions of the HIMax system	HI 801 003 E
HIMax maintenance manual	Description of significant operational and maintenance actions.	HI 801 171 E
Communication manual	Description of safeethernet communication and of the available protocols.	HI 801 101 E
Automation security manual	Description of automation security aspects in conjunction with HIMA systems.	HI 801 373 E
SILworX first steps manual	Introduction to SILworX	HI 801 103 E
SILworX online help (OLH)	Instructions on how to use SILworX	

Table 1: Additional Applicable Manuals

The current manuals can be obtained upon request by sending an e-mail to: documentation@hima.com. For registered HIMA customers, the product documentation is available at https://www.hima.com/en/downloads/.

1.2 Target Audience

This document is aimed at the planners, design engineers and programmers of automation systems as well as the persons authorized to start up, operate and maintain the devices and systems concerned. Specialized knowledge of safety-related automation systems is required.

1.3 Writing Conventions

To ensure improved readability and comprehensibility, the following writing conventions 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	Parameters and system variables, references.
`Courier`	Literal user inputs.
RUN	Operating states are designated by capitals.
Chapter 1.2.3	Cross-references are hyperlinks even if they are not specially marked. In the electronic document (PDF): When the mouse pointer hovers over a hyperlink, it changes its shape. Click the hyperlink to jump to the corresponding position.

Safety notices and operating tips are specially marked.

1.3.1 Safety Notices

Safety notices must be strictly observed to ensure the lowest possible risk.

The safety notices are represented as described below.

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

The signal words have the following meanings:

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

⚠ SIGNAL WORD

Type and source of risk!

Consequences arising from non-observance.

Risk prevention.

NOTICE

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 giving additional information is located here.

Useful tips and tricks appear as follows:

TIP	The tip text is located here.

1.4 Safety Lifecycle Services

HIMA provides support throughout all the phases of the plant's safety lifecycle, from planning and engineering through commissioning to maintenance of safety and security.

HIMA's technical support experts are available for providing information and answering questions about our products, functional safety and automation security.

To achieve the qualification required by the safety standards, HIMA offers product or customer-specific seminars at HIMA's training center or on site at the customer's premises. The current seminar program for functional safety, automation security and HIMA products can be found on HIMA's website.

Safety Lifecycle Services:	
Onsite+ / On-Site Engineering	In close cooperation with the customer, HIMA performs changes or extensions on site.
Startup+ / Preventive Maintenance	HIMA is responsible for planning and executing preventive maintenance measures. Maintenance actions are carried out in accordance with the manufacturer's specifications and are documented for the customer.
Lifecycle+ / Lifecycle Management	As part of its lifecycle management processes, HIMA analyzes the current status of all installed systems and develops specific recommendations for maintenance, upgrading and migration.
Hotline+ / 24 h Hotline	HIMA's safety engineers are available by telephone around the clock to help solve problems.
Standby+ / 24 h Call-Out Service	Faults that cannot be resolved over the phone are processed by HIMA's specialists within the time frame specified in the contract.
Logistics+/ 24 h Spare Parts Service	HIMA maintains an inventory of necessary spare parts and guarantees quick, long-term availability.

Contact details:	
Safety Lifecycle Services	https://www.hima.com/en/about-hima/contacts-worldwide/
Technical Support	https://www.hima.com/en/products-services/support/
Seminar Program	https://www.hima.com/en/products-services/seminars//

2 Safety

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

The product is operated with SELV or PELV. No imminent risk results from the product itself. Use in the Ex zone is only 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

All the environmental requirements specified in this manual must be observed when operating the HIMax system. The environmental requirements are listed in the product data.

2.1.2 ESD Protective Measures

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

NOTICE

Damage to the HIMax system due to electrostatic discharge!

- **When performing the work, make sure that the workspace is free of static, and wear a grounding strap.**
- **If not used, ensure that the components are protected from electrostatic discharge, e.g., by storing them in their packaging.**

2.2 Residual Risk

No imminent risk results from a HIMA system itself.

Residual risk may result from:

- Faults related to engineering.
- Faults in 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 HIMA system is a part of the safety equipment of an overall system. If the controller fails, the system enters the safe state.

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

3 Product Description

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

The module is used for:

- Establishing the connections between modules.
- Connecting to other base plates, in line or network structure, refer to the system manual (HI 801 001 E) for details.
- Managing the rack IDs and SRS of the modules.
- Providing the interface to the programming and debugging tool (PADT).

The module can only be inserted into base plate slots 1 and 2.

If the base plate only contains one module, the HIMax system operates with only one system bus (mono operation). If the base plate contains two modules, the HIMax system operates with two redundant system buses (redundancy operation).

HIMA recommends using redundancy operation (default) to exploit the high availability of the HIMax system.

The module has been certified by the TÜV for safety-related applications up to SIL 3 (IEC 61508, IEC 61511, IEC 62061 and EN 50156), Cat. 4 and PL e (EN ISO 13849-1). Cat.4 and PL e (EN ISO 13849-1) and SIL 4 (EN 50126, EN 50128 and EN 50129).

3.1 Safety Function

The module transfers the data via a safety-related protocol.

The safety function is performed in accordance with SIL 3.

3.1.1 Response in the Event of a Fault

If a failure occurs on a system bus, the bus connection is ensured via the redundant system bus, provided that both system buses have been previously configured.

For mono operation, the redundant system bus is not available.

3.2 Scope of Delivery

To operate, the module must be installed on a matching connector board. The connector boards for the system bus modules are integrated into the base plate and are contained within the scope of delivery, see Chapter 3.7.

3.3 X-SB 01 Certification

Refer to the HIMax safety manual (HI 801 003 E) for more information on the standards used to test and certify the module and the HIMax system.

The certificates and the EU type test certificate are available on the HIMA website.

3.4 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.)
- Operating system revision index (OS-Rev.)
- Supply voltage (Power)
- Ex specifications (if applicable)
- Production year (Prod-Year:)

Figure 1: Sample Type Label

3.5 Structure

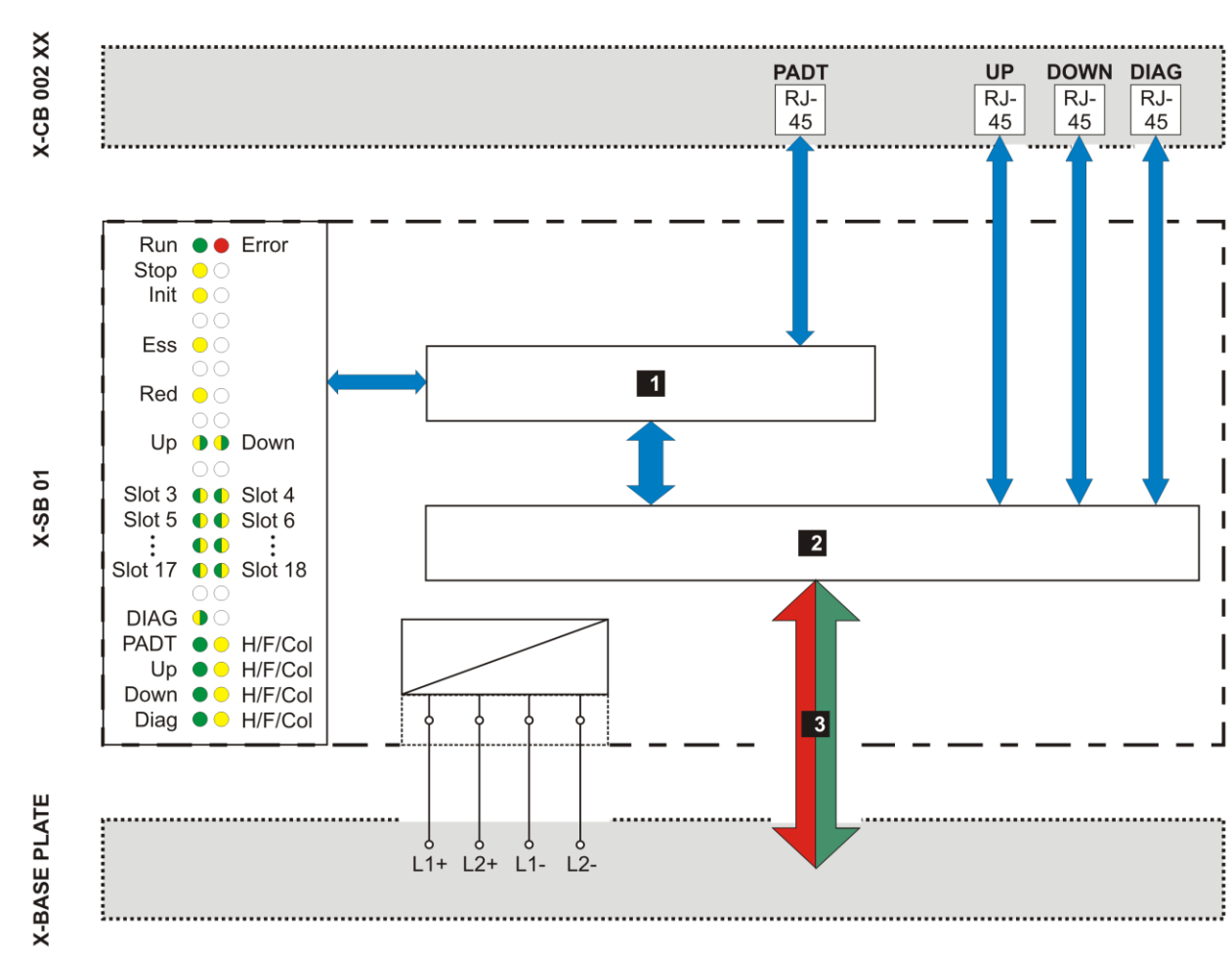
Essential functional units of the module are:

- Safety-related processor system.
- System bus controller and interfaces.

LEDs on the indicator panel displaying the status, see Chapter 3.5.4.

3.5.1 Block Diagram

The following block diagram illustrates the structure of the module:



1 1oo2 processor system

2 System bus controller

3 System bus A or system bus B

Figure 2: Block Diagram

3.5.2 Safety-Related Processor System

The safety-related 1oo2 processor system controls and monitors one system bus of the HIMax system. The module in rack slot 1 controls and monitors system bus A and the module in slot 2 controls and monitors system bus B.

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

3.5.3 Interfaces

The connector board associated with the module is equipped with the following interfaces:

- One service interface (PADT).
- Two system bus interfaces (UP, DOWN).
- One diagnostic interface (DIAG), for future applications.

Service Interface PADT

The service interface enables connection to the PADT. The service interface can be used to load the user program into the processor module as well as the operating system into the individual modules.

Service interface PADT	
Number	1
Transmission standard	10BASE-T/100BASE-Tx, half and full duplex
Autonegotiation	Yes
Autocrossover	No
Connection socket	RJ-45
IP address	Freely configurable [1)]
Subnet mask	Freely configurable [1)]
[1)] The general rules for assigning IP address and subnet masks must be adhered to.	

Table 2: Specifications for the Service Interface

i The service interface PADT has no autocrossover. A crossover cable must be used for point-to-point connections.

System Bus Interface UP, DOWN

The system bus interfaces are used to connect to additional base plates in the HIMax system and are configured with the SILworX programming tool. Cables complying with Ethernet megabit standard (at least CAT 5e cable) must be used to connect the interfaces.

System bus interfaces	
Number	2
Transmission standard	1000BASE-T, half and full duplex
Autonegotiation	Yes
Autocrossover	Yes
Connection socket	RJ-45
Labeling	UP, DOWN

Table 3: Specifications for the System Bus Interface

Diagnostic Interface DIAG

In line structures, the diagnostic interface is reserved for future applications.

In network structures, the DIAG interface is used to connect to other base plates. In this case, the UP, DOWN and DIAG ports are equivalent.

3.5.4 Indicators

The following figure shows the front view of the module with the LEDs.

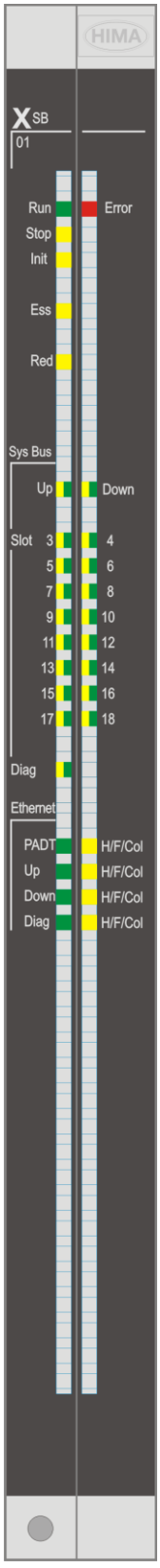


Figure 3: Front View with LEDs

The LEDs indicate the operating state of the module. All LEDs should be considered together. The LEDs on the module are divided into the following groups:

- Module status indicators (Run, Error, Stop, Init)
- Redundancy indicators (Ess, Red)
- Rack connection indicators (Up, Down)
- Slot indicators (Slot 3…18)
- Diagnostic indicators (Diag)
- Communication indicators (Ethernet)

After connecting the supply voltage, an LED test is performed and all the LEDs are lit for at least 2 s. The color of two-color LEDs changes once during the test.

Definition of blinking frequencies

The following table defines the blinking frequencies:

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

Table 4: Blinking Frequencies of the LEDs

Some LEDs can report warnings (On) and faults or errors (Blinking1), see the following tables. The indication of errors or faults has priority over the indication of warnings. Warnings cannot be reported if errors or faults are being signaled.

3.5.5 Module Status Indicators

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

LED	Color	Status	Description
Run	Green	On	▪ RUN, normal operation. ▪ The emergency loader is active.
		Blinking1	The module is in the LOADING OS state.
		Off	The module is not in the RUN or STOP state.
Error	Red	On	System warning, for example: ▪ No license for additional functions (e.g., communication protocols), test mode. ▪ Temperature warning.
		Blinking1	System error, for example: ▪ Internal module faults detected by self-tests, e.g., hardware or voltage supply faults. ▪ System configuration error. ▪ Error while loading the operating system. ▪ The emergency loader is active.
		Off	No faults detected.
Stop	Yellow	On	▪ The module is in the STOP / VALID CONFIGURATION state. ▪ The emergency loader is active.
		Blinking1	The module is in one of the following states: ▪ STOP / INVALID CONFIGURATION. ▪ STOP / LOADING OS.
		Off	The module is in none of the states described.
Init	Yellow	On	▪ The module is in the INIT state. ▪ The emergency loader is active.
		Blinking1	The module is in one of the following states: ▪ LOCKED. ▪ STOP / LOADING OS.
		Off	The module is in none of the states described.

Table 5: Module Status Indicators

3.5.6 Redundancy Indicators

The LEDs are located below the module status indicators.

LED	Color	Status	Description
Ess	Yellow	On	**Do not remove the module!** ▪ Only one system bus module is configured and only one system bus module set to *Responsible* can be reached. (Complying with the configuration or in case of repair). ▪ The emergency loader is active.
		Blinking1	**Do not remove the module!** The system bus module is required for system operation (set to *Essential*). Although two system bus modules are configured within the system, only one system bus module is set to *Responsible*.
		Off	The system bus module is not set to *Essential*. The system bus module may only be removed, if it is not set to *Essential* and is additionally detected as redundant (the *Red* LED is on). Prior to removing the module, check for proper configuration!
Red	Yellow	On	Redundancy operation, the system bus module is operating redundantly. ▪ The redundant system bus module periodically allocates the system and rack IDs that are valid within the system. (System/rack ID matching was successful). ▪ The emergency loader is active.
		Blinking1	Redundant system bus module reports invalid rack ID.
		Off	The system bus module is not operating redundantly!

Table 6: Redundancy Indicators

3.5.7 Rack Connection Indicators

The rack connection LEDs are labeled *Sys Bus*.

LED	Color	Status	Description
With system bus structure *Line*			
Up	Green	On	Physical and logical connection to a system bus module in another base plate.
	Yellow	Blinking1	Only a physical connection to a system bus module in another base plate.
	Off	Off	No connection to another system bus module.
Down	Green	On	Logical and physical connection to a system bus module in another base plate.
	Yellow	Blinking1	Only a physical connection to a system bus module in another base plate.
	Off	Off	No connection to another system bus module.
Diag	-	-	No function.
With system bus structure *Network*			
Up	Green	On	Physical and logical connection to a system bus module in another base plate. There is a direct or indirect connection to a system bus module set to *Responsible* in base plate 0 or 1.
		Blinking1	Transient interference on the system bus.
	Yellow	On	Physical and logical connection to a system bus module in another base plate. There is **no** direct or indirect connection to a system bus module set to *Responsible* in base plate 0 or 1.
		Blinking1	Only a physical connection to a system bus module in another base plate.
	Off	Off	No connection to another system bus module.
Down			Same as *Up*.
Diag			Same as *Up*.

Table 7: Rack Connection Indicators

In a *Network* system bus structure, the path to the system bus module set to *Responsible* is indicated by the LEDs *Up*, *Down*, *Diag* lit in green. Yellow *Up*, *Down*, *Diag* LEDs indicate a proper connection to the system bus module set to *Responsible*. The normal state of the system bus module is indicated by more than one of these LEDs lit in yellow.

3.5.8 Slot Indicators

The slot indicator LEDs are located after the *Slot* label.

LED	Color	Status	Description
3…18	Green	On	Module inserted in slot X, logical connection established.
	Yellow	Blinking1	Module inserted in slot X, logical connection not established.
	Off	Off	Slot X not used.

Table 8: Slot Indicators

3.5.9 Diagnostic Indicators

The diagnostic indicators are reserved for future use!

3.5.10 Communication Indicators

The communication LEDs are labeled *Ethernet*.

Contrary to the processor and the communication modules, the following table apply to the description of the communication indicators:

LED	Color	Status	Description
PADT	Green	Blinking-x	Communication detected on interface.
		Off	No PADT connected.
H/F/Col (PADT) [1)]	Yellow	On	Connection established.
		Blinking1	IP address conflict detected.
		Off	No connection.
Up, Down, Diag	Green	On	Full duplex operation on Ethernet line.
		Blinking-x	Collision detected on Ethernet line.
		Off	Half duplex operation on Ethernet line.
H/F/Col (Up) [1)]	Yellow	On	System bus module connected, physical connection established.
		Blinking-x	Communication detected on interface.
		Off	No system bus module connected.
H/F/Col (Down) [1)]	Yellow	On	System bus module connected, physical connection established.
		Blinking-x	Communication detected on interface.
		Off	No system bus module connected.
H/F/Col (Diag) [1)]	Yellow	On	Diagnostic device connected, physical connection established.
		Blinking-x	Communication detected on interface.
		Off	No diagnostic device connected.

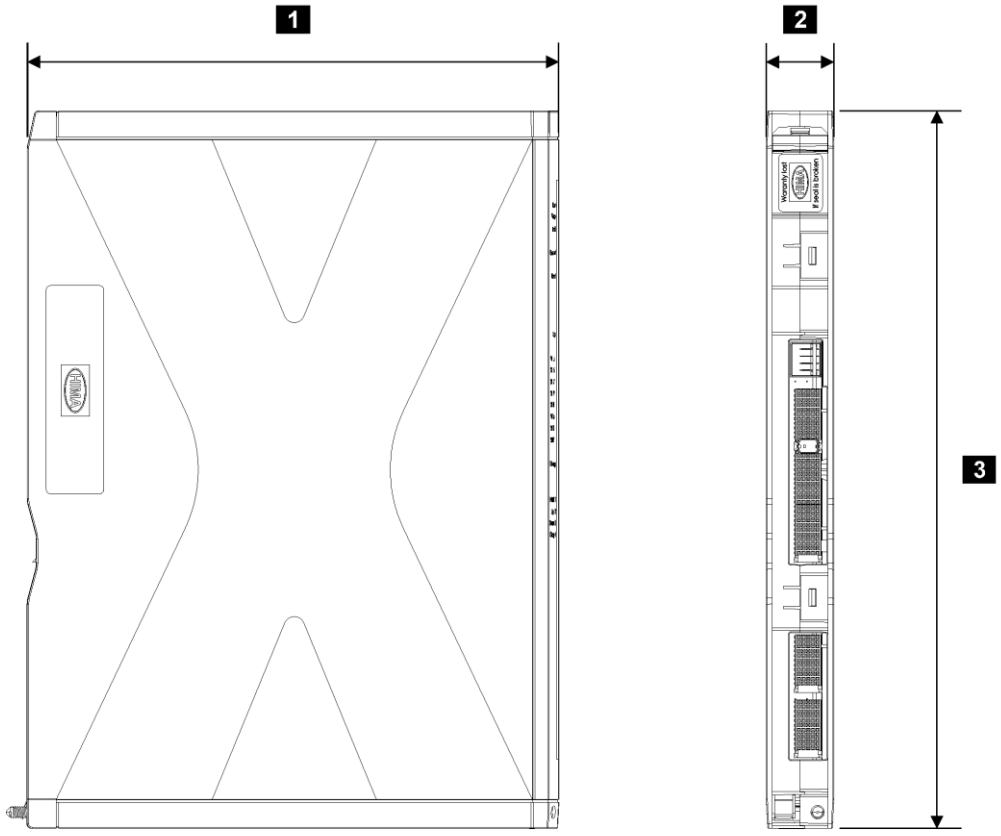
[1)] The description applies in accordance with the position of the LEDs on the module, from top to bottom. The designation of the right LED is indicated in brackets.

Table 9: Communication Indicators

3.6 Product Data

General	
Supply voltage	24 VDC, -15…+20 %, r_p ≤ 5 % SELV, PELV
Current consumption	0.65 A at 24 VDC
Module cycle time	2 ms
Protection class	Protection class III in accordance with IEC/EN 61131-2
Ambient temperature	0…+60 °C
Transport and storage temperature	-40…+85 °C
Humidity	Max. 95 % relative humidity, non-condensing
Pollution	Pollution degree II in accordance with IEC/EN 60664-1
Altitude	< 2000 m
Degree of protection	IP20
Dimensions (H x W x D) in mm	310 x 29.2 x 230
Weight	Approx. 1.2 kg

Table 10: Product Data



1 Depth: 230 mm
2 Width: 29.2 mm
3 Height: 310 mm

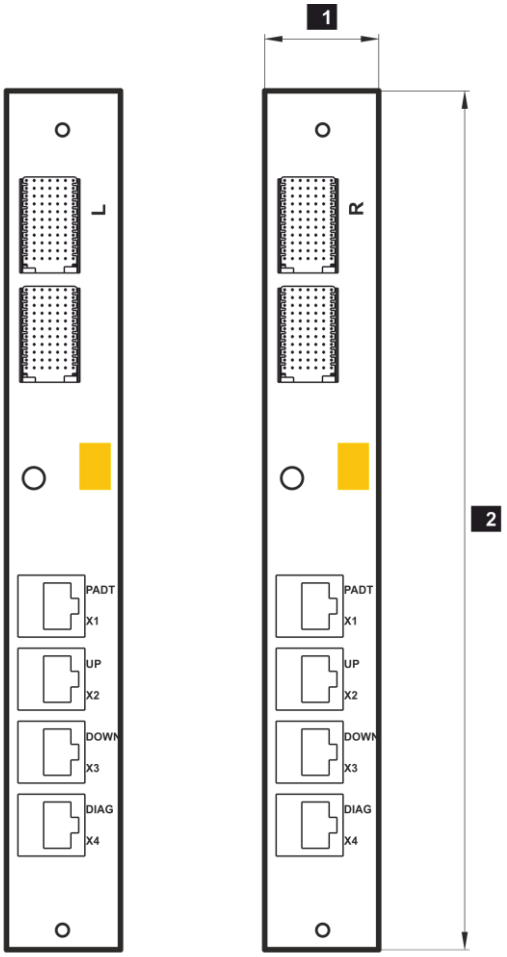
Figure 4: Views

3.7 Connector Boards

The connector boards connect the system bus modules to the Ethernet interfaces. Two connector boards are secured to the base plate: one left connector board (L) for slot 1 and one right connector board (R) for slot 2. The connector boards contain information on the number of modules (10, 15 or 18) that can be inserted into the base plate and the corresponding slot IDs.

3.7.1 Pin Assignment

The interface name is printed on the connector boards.



1 Width: 29.2 mm

2 Height: 220 mm

Figure 5: Connector Boards

Designation	Description
External interface	
PADT (X1)	Connection to PADT
External system bus interfaces	
UP (X2)	Connection to additional HIMax base plates
DOWN (X3)	Connection to additional HIMax base plates
External diagnostic interface	
DIAG (X4)	Connection reserved for future applications.

Table 11: Description of the Connector Boards

4 Start-Up

This chapter describes how to install and configure the module. For further details, refer to the HIMax system manual (HI 800 001 E).

4.1 Mounting

Observe the following points when mounting the module:

- Only operate the module with the appropriate fan components. For further details, see the system manual (HI 801 001 E).
- Operation is only allowed with connector boards secured to the base plate, see Chapter 3.7.
- Use crossover cables to connect to the PADT, see Chapter 3.5.3.

4.2 Mounting and Removing the Module

This chapter describes how to replace an existing module or mount a new one.

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

4.2.1 Mounting and Removing a 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.

NOTICE

Damage to bus and power sockets due to module jamming!

Failure to comply with these instructions can damage the controller.

Always insert the module in the base plate carefully.

Tools and utilities:

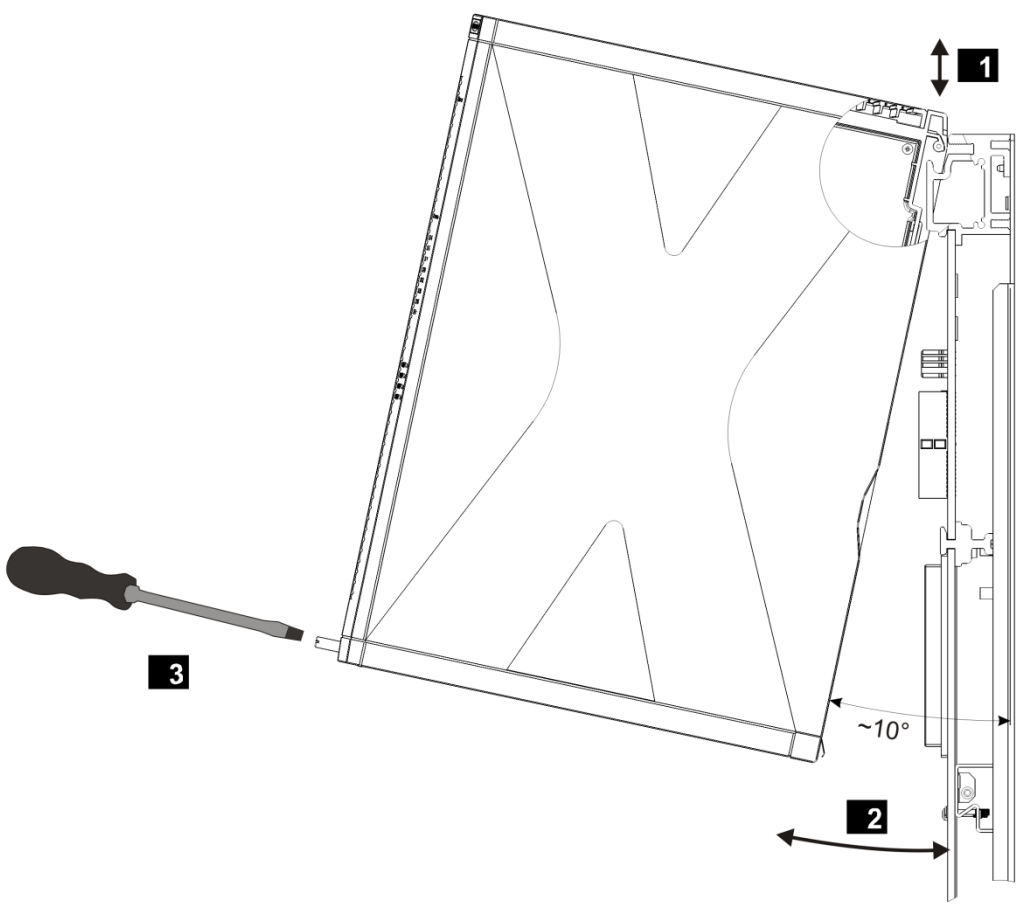
- Screwdriver, slotted 0.8 x 4.0 mm.
- Screwdriver, slotted 1.2 x 8.0 mm.

To insert the modules

1. Open the cover plate on the fan rack:
   ☑ Move the locks to the *open* position.
   ☑ Lift the cover plate and insert it 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.

To remove the modules

1. Open the cover plate on the fan rack:
   ☑ Move the locks to the *open* position.
   ☑ Lift the cover plate and insert it into the fan rack.
2. Release the screw, see 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 the module in and out
3 Securing and releasing a module

Figure 6: 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 module is configured in the Hardware Editor of the SILworX programming tool.

Another important property of the system bus module is the *Responsible* attribute. In each system bus (bus A and bus B), access of processor modules to the system bus is controlled by the system bus module set to Responsible.

For system bus A, the *Responsible* attribute is fixed and assigned to the system bus module in rack 0, slot 1.

In most standard configurations of system bus B, the *Responsible* attribute is assigned to the system bus module in rack 0, slot 2. However, the *Responsible* attribute can also be assigned to the system bus module in rack 1, slot 2, if processor modules are used in rack 1.

For further details on how to change the attribute setting, refer to the system manual (HI 801 001 E).

The following tables present the system parameters for the module in the same order as in the SILworX Hardware Editor.

4.3.1 The **Module** Tab

The **Module** tab contains the following system parameters for the module.

System parameters	Description
Name	Module name
IP address	IP address of the Ethernet interface. Default value: 192.168.0.99
Subnet mask	32-bit address mask to split up the IP address into network and host address. Default value: 255.255.252.0
Speed Mode	Transfer rate: ▪ 10 MBit/s ▪ 100 MBit/s ▪ Autoneg HIMA recommends keeping the *Autoneg* default setting.
Flow Control Mode	Transfer control operating mode: ▪ Half Duplex ▪ Full Duplex ▪ Autoneg HIMA recommends keeping the *Autoneg* default setting.
Standard Interface	Activated: The interface is used as standard interface for system login. Default setting: Deactivated
Default Gateway	IP address of the default gateway. Default value: 0.0.0.0
ARP Aging Time [s]	A system bus module stores the MAC addresses of the communication partners in a MAC/IP address assignment table (ARP cache). The MAC address remains stored in the ARP cache if messages from the communication partner are received within 1x…2x *ARP Aging Time*. The MAC address is erased from the ARP cache if no messages from the communication partner are received within 1x…2x *ARP Aging Time*. The typical value for the *ARP Aging Time* in a local network ranges from 5…300 s. The contents of the ARP cache cannot be read out. Range of values: 1…3600 s Default value: 60 s **Note:** If routers or gateways are used, the *ARP Aging Time* must be adjusted (increased) 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 and communication is delayed or interrupted. For an efficient performance, the *ARP Aging Time* value must be greater than the receive timeout set for the protocols in use.

Designation	Description
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: ▪ 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 1 *ARP Aging Time* and a maximum of 2 *ARP Aging Time* periods. ▪ 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
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 system bus 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 12: Configuration Parameters, **Module** Tab

4.3.2 The **Routings** Tab

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

Element	Description
Name	Designation 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 (in connection with direct host routing) or subnet mask of the addressed subnet. Range of values: 0.0.0.0…255.255.255.255 Default value: 255.255.252.0
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 13: Routing Parameters

5 Operation

The module is operated within a HIMax base plate. No specific monitoring is required.

5.1 Handling

Direct handling of the module is not foreseen.

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

5.2 Diagnostics

LEDs on the front side of the module indicate the module state, see Chapter 3.5.4.

The diagnostic history of the module can also be read out 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 modules of the same type or with approved replacement models.

When replacing modules, observe the instructions specified in the HIMax system manual (HI 801 001 E) and HIMax safety manual (HI 801 003 E).

6.1 Maintenance Measures

The following maintenance measures must be implemented for the modules:

- Proof testing.
- Loading of enhanced operating system versions.

6.1.1 Proof Test

The proof test interval for HIMax modules must be in accordance with the interval required by the application-specific safety integrity level (SIL). For further details, refer to the safety manual (HI 801 003 E).

6.1.2 Loading of Enhanced Operating System Versions

As part of product maintenance, HIMA is continuously improving the operating systems of the modules. HIMA recommends using system downtimes to load the current operating system versions into the modules.

i The current operating system versions of modules are displayed in the SILworX Control Panel. The type label specifies the delivered module version, see Chapter 3.4.

Before loading operating systems into the modules, check the system compatibilities and restrictions of the operating system versions. To this end, use the applicable release notes. Use SILworX to load the operating systems into the modules and ensure that these are in the STOP state.

7 Decommissioning

To decommission the module, remove it from the base plate. For more details, refer to Chapter *Mounting and Removing the Module*.

8 Transport

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

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

9 Disposal

Industrial customers are responsible for correctly disposing of decommissioned 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
AI	Analog input
AO	Analog output
ARP	Address resolution protocol, network protocol for assigning the network addresses to hardware addresses
COM	Communication module
CRC	Cyclic redundancy check
DI	Digital input
DO	Digital output
EMC	Electromagnetic compatibility
EN	European standard
ESD	Electrostatic discharge
FB	Fieldbus
FBD	Function block diagrams
HW	Hardware
ICMP	Internet control message protocol, network protocol for status or error messages
IEC	International electrotechnical commission
Interference-free	Inputs are designed for interference-free operation and can be used in circuits with safety functions
MAC	Media access control address, hardware address of one network connection
PADT	Programming and debugging tool (in accordance with IEC 61131-3), PC with SILworX
PELV	Protective extra low voltage
PES	Programmable electronic system
R	Read, the variable is read out
R/W	Read/Write, column title for system variable type
Rack ID	Base plate identification (number)
r_P	Peak value of a total AC component
SB	System bus (module)
SC/OC	Short-circuit/open-circuit
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
SNTP	Simple network time protocol (RFC 1769)
SRS	System.Rack.Slot, addressing of a module
SW	Software
TMO	Timeout
W	Write, the variable receives a value, e.g., from the user program
WD	Watchdog, device for monitoring the system's correct operation Signal for fault-free process
WDT	Watchdog time

Index of Figures

Index of Tables

Index

MANUAL
X-SB 01

HI 801 007 E

For further information, please contact:

HIMA Paul Hildebrandt GmbH
Albert-Bassermann-Str. 28
68782 Brühl, Germany

Phone: +49 6202 709-0
Fax +49 6202 709-107
E-mail: info@hima.com

Learn more about HIMax online:

https://www.hima.com/en/products-services/himax/

www.hima.com