HIMax®

Manual

SAFETY
NONSTOP

HIMA

X-CPU 01

8

Contact

HIMA contact details:

HIMA Paul Hildebrandt GmbH + Co KG

P.O. Box 1261

68777 Brühl, Germany

Phone: +49 6202 709-0

Fax: +49 6202 709-107

E-mail: info@hima.com

Revision index	Revisions	Type of Change	
		technical	editorial
4.00	New edition for HIMax V4 and SILworX V4	X	X

Table of Contents

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 this 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 system	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 Relevant 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 SILworX.
Italics:	System parameter and 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: danger, warning, caution, notice
- Type and source of danger
- Consequences arising from the danger
- Danger prevention

⚠ SIGNAL WORD

Type and source of danger!
Consequences arising from the danger
Danger prevention

The signal words have the following meanings:

- Danger indicates hazardous situation which, if not avoided, will result in death or serious injury.
- 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.

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 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 danger results from a HIMax module itself.

Residual risk may result from:

- Faults in the engineering
- Faults in the user program
- Faults in 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-CPU 01 processor module is absolutely required for data processing within the HIMax system. The processor module is used for:

- Processing of up to 32 user programs
- Performing all central functions including communication
- Handling redundancy with up to 3 additional processor modules
- Handling communication via safe**ethernet.**
- Creating and storing CPU events.
- Storing events created by I/O modules.

The module has been certified by the TÜV for safety-related applications up to SIL 3 (IEC 61508, IEC 61511 and IEC 62061), Cat. 4 (EN 954-1) and PL e (EN ISO 13849-1).

Refer to the HIMax Safety Manual (HI 801 003 E) for more information on the standards used to test and certify the modules and the HIMax system.

3.1 Safety Function of the Module

The safety function of the processor module includes the following points:

- Processing the user programs.
  - If faults occur: Stop the user program and reset the variables to the initial values
  - If faults occur: Reset the processor module to the safe state and report the CPU status
- Safe communication between HIMA controllers (HIMax, HIMatrix, and remote I/O modules) using the safety-related safe**ethernet** protocol.
  Data is transferred using either the Ethernet interfaces of the processor module itself or using the Ethernet interfaces of a COM module.

The safety function is performed in accordance with SIL 3.

The following elements also contribute to achieving the safety function:

- Hardware self-tests
- Safe communication with the I/O modules

3.1.1 Reaction in the Event of a Fault

If the test harness detects faults, the processor module enters the ERROR STOP state and restarts itself. The fault cause can be investigated using the diagnostic information.

Start after an Error Stop

If the cause of the fault is still present, the processor module avoids restarting and repeating the error stop:

- After a first error stop, the processor module restarts normally and switches to its system operation.
- After the second error stop, the user must restart the system using the PADT after eliminating the problem.
- Once the processor module has run in system operation for approximately one minute, the next error stop to occur is considered to be as *first* error stop.

3.2 Scope of Delivery

The module must be installed on a suitable connector board to be able to operate. The connector board is described in Chapter 3.6. An Ethernet cable is required to connect to the PADT.

Connector boards and Ethernet cables are not included within the scope of delivery of the module.

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

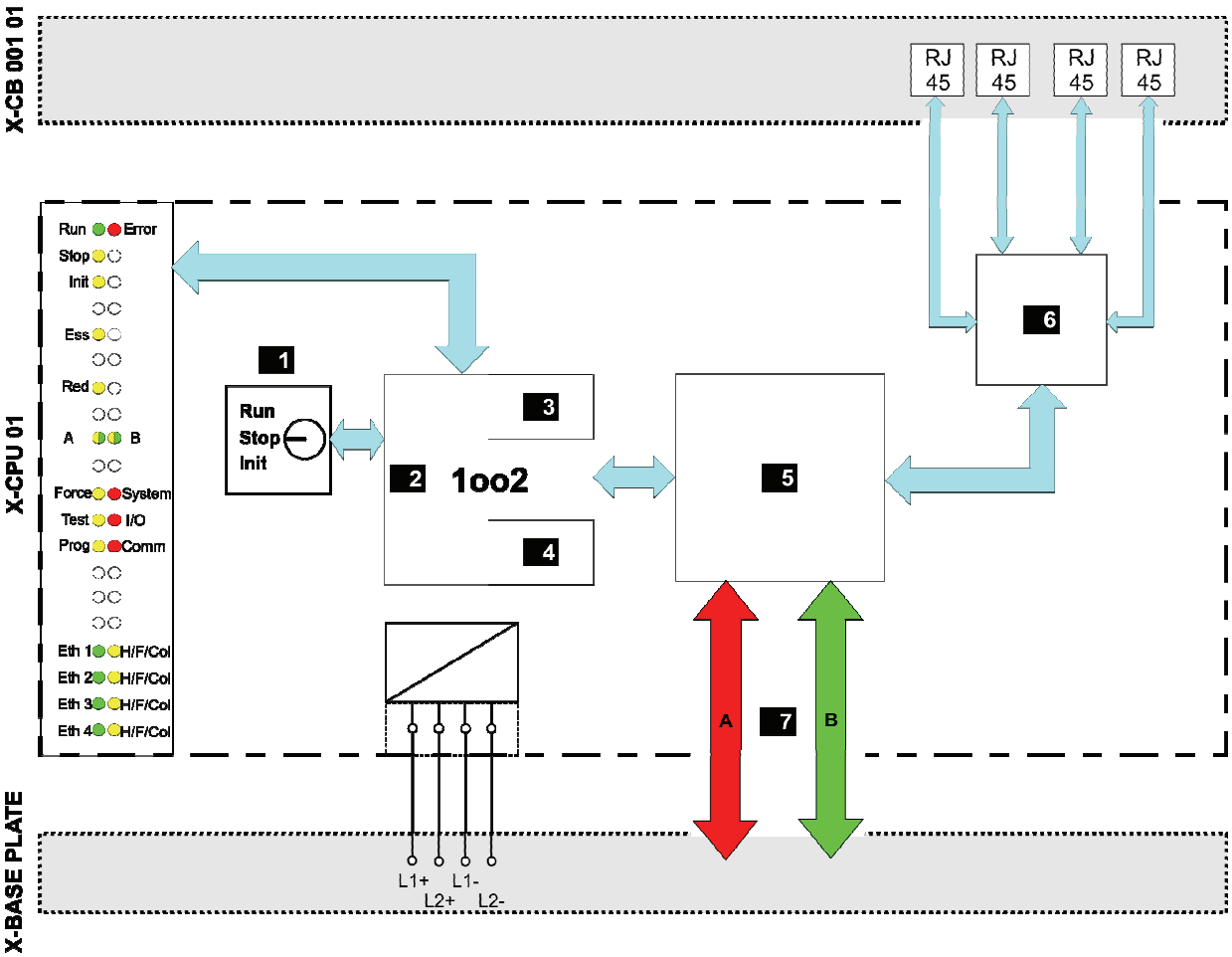
The processor module is a plug-in module that is inserted into a base plate and supplied with electric power.

Functional units of the module:

- Safety-related processor system 1oo2
- System controller
- Ethernet switch
- Memory
- Mode switch, see Chapter 3.4.18.
- Indicators, see Chapter 3.4.11.

3.4.1 Block Diagram, Functional Units

The following block diagram illustrates the structure of the module.



1 Mode Switch
2 1oo2 Processor System
3 Comparator
4 Watchdog
5 System Controller
6 Ethernet Switch
7 System Bus A and System Bus B

Figure 2: Block Diagram

3.4.2 Safety-Related Processor System

The safety-related processor module is a 1oo2 processor system. Continuous self-tests ensure safety-related operation.

Characteristics:

- Two synchronous microprocessors
- Specific DDRAM memory for each microprocessor
- Testable hardware comparator for data buses
- Watchdog (WD)
- Gold capacitor for buffering date/time
- LEDs for indicating the system statuses
- Mode switch for configuring the module behavior when voltage is switched on

The processor module compares the data on both processors and triggers an interrupt if a fault occurs.

A watchdog monitors both processors. Self-tests of the module also check the watchdog.

3.4.3 System Controller

The system controller handles the entire data transfer between the various components of the module:

- Safety-related processor system
- System busses A and B
- Ethernet switch with connected interfaces

3.4.4 Memory

The module has a RAM and a non-volatile memory. The non-volatile memory is protected by a CRC.

The non-volatile memory contains the following programs and information:

- Operating System
- User project
- Enable switch, watchdog time, safety time
- Online modifications
- Variable with the RETAIN attribute
- Production data and, if necessary, trimming data
- Fault status history
- Events

While booting, the system transfers the program code from the non-volatile memory to the redundant program and data memory.

3.4.5 Alarms and Events

The processor module records alarms and other events in its non-volatile memory.

Events are state changes of a variable that are performed by the plant or controllers and are provided with a timestamp.

Alarms are events that signalize an increasing risk potential.

The HIMax system records the state changes as events specifying the time point when they occurred. The X-OPC server transfers the events to other systems such as control systems, that display or evaluate the events.

HIMax differentiate between Boolean and scalar events.

Boolean Events:

- Changes of Boolean variables, e.g., of digital inputs.
- Alarm and normal state: They can be arbitrarily assigned to the variable states.

Scalar Events:

- Exceedance of the limit values defined for a scalar variable.
- Scalar variables have a numeric data type e.g., INT, REAL.
- Two upper limits and two lower limits are possible.
- For the limit values, the following condition must be met:
  Highest limit ≥ upper limit ≥ normal area ≥ lower limit ≥ lowest limit.
- An hysteresis can be effective in the following cases:
  - If the value falls below the upper limit.
  - If the value exceeds the lower limit.

An hysteresis is defined to avoid a needless large number of events when a global variable strongly oscillate around a limit.

The processor module can only create events if they are configured in SILworX, see Chapter 4.1.5.

3.4.6 Creating Events

Both the processor module and certain types of I/O modules are able to create events. In the following sections, these I/O modules are referred to as SOE modules.

Creating Events on the Processor Module

The processor module uses global variables to create the events and stores them in the buffer, see Chapter 3.4.7. The events are created in the user program cycle.

Creating Events on SOE Modules

SOE modules can create events using the input states. The events are created in the SOE module cycle.

The SOE module stores the events in the intermediate buffer that the processor modules use to read them. The intermediate buffer is part of the volatile memory so that the events are lost if the power is switched off.

Every event that has be read can be overwritten by a new event.

System Events

In addition to events, which records changes of global variables or input signals, processor and SOE modules creates the following types of system events:

- Overflow: Some events were not stored due to buffer overflow. The timestamp of the overflow event corresponds to that of the event causing the overflow.
- Init: The event buffer was initialized.
- Operating mode Stop: A SOE module changed its operating mode to STOP.
- Operating mode 'Run': A SOE module changed its operating mode to Run.
- Establishing communication: Communication between processor module and SOE module has started.
- Losing communication: Communication between processor module and SOE module was terminated.

System events contain the SRS identifier of the module causing the events.

Status Variables

Status variables provide the user program with the state of scalar events. Each of the following states is connected to a status variable and can be assigned a global variable of type BOOL:

- Normal.

- Lower limit exceeded.
- Lowest limit exceeded.
- High limit exceeded.
- Highest limit exceeded.

The assigned status variable becomes TRUE when the corresponding state is achieved.

3.4.7 Recording Events

The processor module collects the events:

- created by I/O modules
- created by the processor module itself

The processor module stores all the events in its buffer. The buffer is part of the non-volatile memory.and has a capacity of 5 000 events.

The processor module arranges the events from different sources by the time of their arrival and does not sort them by their timestamp.

If the event buffer is full, no new events can be stored as long as no further events are read and thus marked as to be overwritten.

The OPC server can read the events and make them available to external systems for evaluation and storing.

3.4.8 Protocols and Interfaces

Communication with external systems occurs via the Ethernet interfaces. The interfaces are part of a 10/100/1000 BaseT switch.

The four RJ-45 connectors are located on the connector board. The LEDs on the front plate of the module indicate the connections statuses. For more information, see Chapter 3.4.11.

On these interfaces, the module can process the following protocols:

- The safety-related protocol safe**ethernet**
- Connection to the PADT

Parameter	Value
Number of connectors	4
Transfer standard	10/100/1000 Base-T, 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**, PADT
[1)] Observe the general rules valid for assigning IP address and subnet masks.	

Table 3: Specifications for the Ethernet Interfaces

The MAC address of the module is specified on the label on the lower part of the front plate.

3.4.9 Ports in Use for Ethernet Communication

UDP ports	Use
8000:	Programming and operation with SILworX
8001:	Configuring the remote I/O using the PES
6010:	safe**ethernet**
123:	SNTP (time synchronization between PES and remote I/O, PES and external devices)

Table 4: Ports in Use

3.4.10 Mechanical Structure

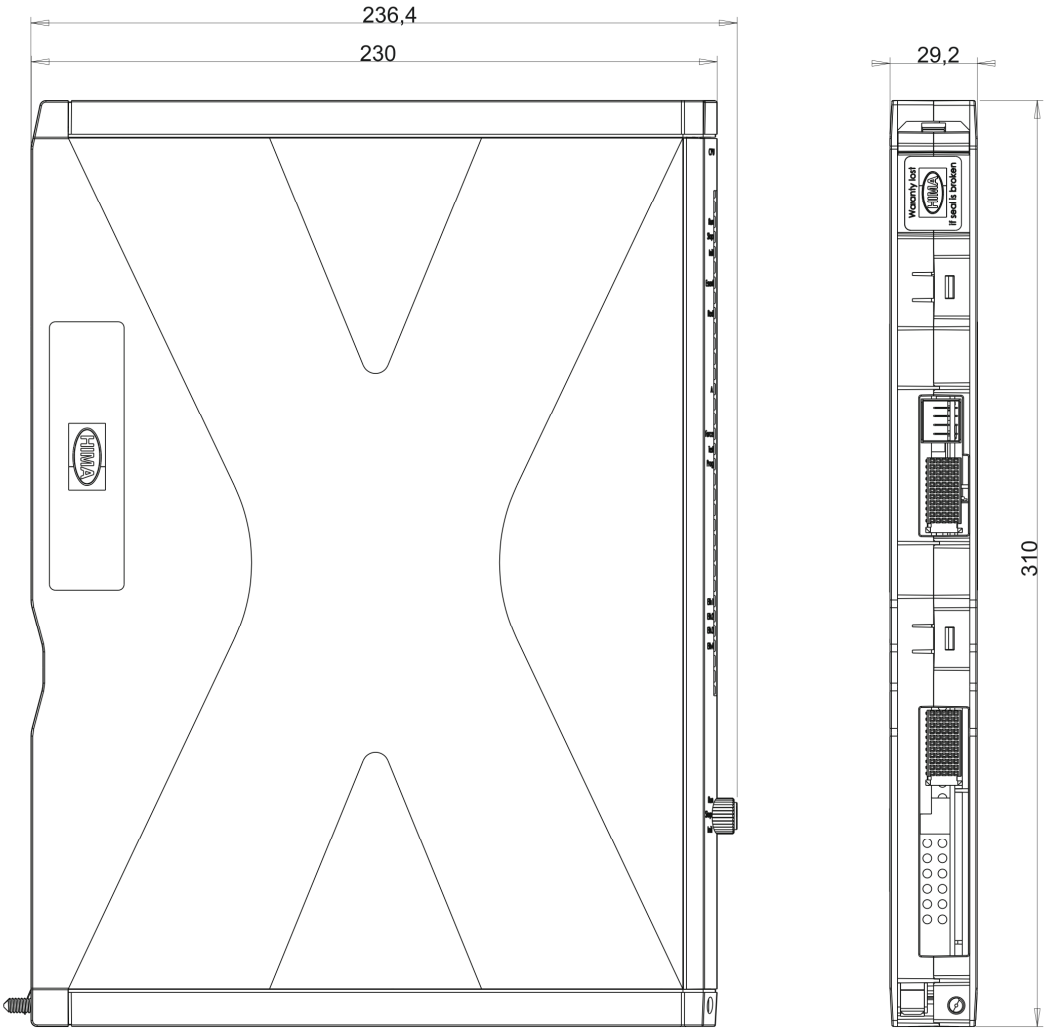


Figure 3: Mechanical Structure

3.4.11 Indicators

The following figure shows the LED indicators for the processor module. These LEDs are located on the front plate, on the upper part of the module. The mode switch described in Chapter 3.4.18 is also located on the front plate of the module.

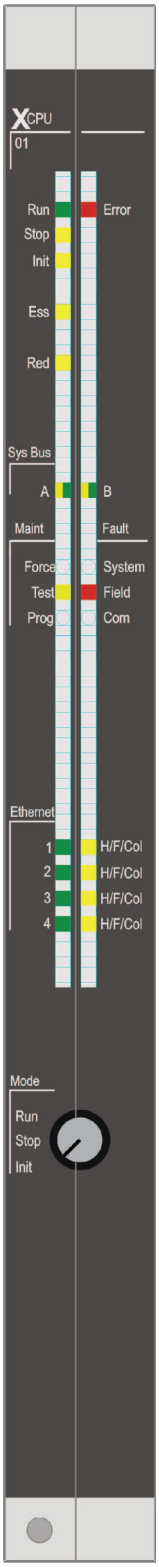


Figure 4: Front View with LEDs and Mode Switch

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

- Module status indicators (Run, Error, Stop, Init)
- Redundancy indicators (Ess, Red)
- System bus indicators (A, B)
- Maintenance indicators (Force, Test, Prog)
- Fault indicators (System, Field, Com)
- Ethernet indicators (Eth1...4, H/F/Col1...4)

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

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: Flashing in sync with data transfer

Table 5: Blinking Frequencies of LEDs

3.4.12 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, software 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, observe the other status LEDs
		Blinking1	Module state: LOCKED, observe to the other status LEDs
		Off	Module state: neither INIT nor LOCKED, observe the other status LEDs

Table 6: Module Status Indicators

3.4.13 Redundancy Indicators

LED	Color	Status	Description
Ess	Yellow	On	**Do not remove the module!** The module is absolutely required for operating the HIMax system. Only one module is configured.
		Blinking1	**Do not remove the module!** The module is absolutely required for operating the HIMax system. Multiple redundant modules are configured.
		Off	The module is not absolutely required for operation. It may be removed, if required.
Red	Yellow	On	The module is operating redundantly with at least one additional module.
		Blinking1	At least one processor module starts system operation or less modules than planned are operating redundantly.
		Off	The module is not operating redundantly.

Table 7: Redundancy Indicators

3.4.14 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 8: System Bus Indicators

3.4.15 Maintenance Indicators

The maintenance LEDs are labeled *Maint*.

LED	Color	Status	Description
Force	Yellow	On	Forcing prepared, processor module in STOP, RUN or RUN / UP STOP
		Blinking1	Forcing active, processor module in RUN or OPERATE
		Off	Forcing inactive
Test	Yellow	On	Connection to the PADT with write permission
		Blinking1	At least one user program is in the RUN_FREEZE state (single step operation)
		Off	No connection to the PADT with write access and no user program in the RUN_FREEZE state
Prog	Yellow	On	Download (processor module in STOP), the configuration is being loaded, A PADT write command is being processed
		Blinking1	Reload procedure active or exchange of configuration data between processor modules
		Off	No loading procedure active and no configuration data exchange between processor modules

Table 9: Maintenance Indicators

3.4.16 Fault Indicators

The fault LEDs are labeled *Fault*.

LED	Color	Status	Description
System	Red	On	System warning, only if no module fault occurred in a HIMax system module.
		Blinking1	Faults detected in a HIMax system module, e.g., hardware, software, over temperature or power supply. The module or base plate is missing or does not match the configuration or cannot be operated as intended.
		Off	No module fault displayed for a HIMax system module
Field	Red	On	Field warning, only if no field fault occurred in a HIMax system I/O module
		Blinking1	Field faults in an I/O module of the HIMax system
		Off	No field faults displayed for an I/O module in the HIMax system
Com	Red	On	COM warning, only if no faults occurred in the external process data communication
		Blinking1	Fault in the external process data communication
		Off	No faults displayed for the external process data communication

Table 10: Fault Indicators

3.4.17 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 11: Ethernet Indicators

3.4.18 Mode Switch

The mode switch defines how the processor module behave when restarted.

The processor module is restarted in the following cases:

- Automatically:
  - When connecting the operating voltage
  - After a severe failure
  - After loading the operating system
- During operation, using the corresponding command on the PADT.

The mode switch has three different switch positions:

- Init
- Stop
- Run

The switch position during normal operation is Run.

Switch Position: Init

The Init switch position is used to set the processor module to the LOCKED states. In this state, the settings previously configured for the module can no longer be accessed. This can be required if, for instance, the administrator password is unknown.

In the LOCKED state, the module is reset to the factory settings:

- Default SRS, the slot number depends on the slot used
- Default IP address and IP settings
- Only accessible for *Administrator* user account with empty password
- Enabling switches set to default values

Setting values that are are modified in this state overwrite the factory settings and all the settings previously used!

If the settings remain unchanged, the previously saved settings are used when the module is restarted (the switch is not set to Init).

Transition from LOCKED State to Exclusive System Operation

Prerequisite:

- Processor module state: LOCKED

The system operation is started if one of the following events occur:

- The position of the mode switch changes from Init to Run or Stop
- The user sends a command from within the PADT.

The controller might not restart automatically after interrupting the operating voltage

If the mode switch of one processor module is in the Init position and this processor module is accidentally the first to be started when the operating voltage is reconnected, it remains in the LOCKED state and does not adopt system operation.

If an Autostart is required after interrupting the operating voltage, the mode switches on all the processor modules must be set to Run!

Turn the mode switch quickly from Init to Run to prevent the processor module from entering the STOP state.

Switch Position: Stop

Only operative if the processor module is not operating redundantly.

Effect:

- Non-redundant operation:
  The processor module disables any pre-configured Autostart and remains in STOP.
- Redundant operation:
  The processor module adopts the same operating state as the other processor modules.

The controller might not restart automatically after interrupting the operating voltage

If the mode switch of one processor module is in the Stop position and this processor module is accidentally the first to be started when the operating voltage is reconnected, it remains in the STOP state. Consequentially, also the remaining processor modules cannot start.

If an Autostart is required after interrupting the operating voltage, the mode switches on all the processor modules must be set to Run!

Switch Position: Run

To set for safety-related operation!

Effect:

- Non-redundant operation:
  The processor module starts the user programs if Autostart is activated.
- Redundant operation:
  The processor module adopts the same operating state as the other processor modules.

Overview of Switch Positions

Module behavior if the module starts after switching on the operating voltage or after a fault:

Switch Position	Only individual processor module	Additional processor module (redundant operation)
Init	Enters the LOCKED state with the factory settings	
Switch from Init to Stop	Enters the STOP state	Starts redundant operation
Switch from Init to Run	Starts operation, if the *Autostart* system parameter is set to TRUE	
Init: Command from PADT ▪ System operation ▪ Cold Start	Enters RUN state (mono operation)	
Stop	Enters the STOP state	
Run	Executes the user programs.	

Table 12: Overview of the Mode Switch Positions

3.4.19 Monitoring the Operating Voltage

The HIMax processor module monitors its supply voltages L1+/L1-, L2+/L2-. The following applies for each supply voltage:

Voltage level	Voltage status
< approx. 18 V	supply voltage faulty
otherwise	Supply voltage OK

Table 13: Supply Voltage Status

NOTE

Controller damage due to excessively high operating voltage!

Do not connect supply voltage exceeding 30 volts

3.4.20 Monitoring the Temperature

Sensors continuously monitor the operating temperature of the modules.

The temperature status of a processor module indicates wether the temperature thresholds have been exceeded with respect to the following environment temperature ranges:

Temperature range (approx.)	Temperature status
< 40 °C	Temperature OK
40...60 °C	Temperature threshold 1 exceeded
> 60 °C	Temperature threshold 2 exceeded

Table 14: Temperature Status

If the temperature exceeds a specific threshold or falls below it, the temperature status changes.

Table 14 applies to normal operation with operating fans. In case of abnormal operation, e.g., without fans, the temperature status can indicate that the temperature thresholds have been exceeded even at a lower environment temperature.

The temperature status is a status of the processor module. After logging in to the processor module, the module status is displayed in the SILworX Control Panel.

NOTE

Module damage due to overtemperature!

The HIMax modules may only be operated in conjunction with a X-FAN 01 Fan Rack or a replacement type.

3.4.21 Operating System

The operating system loaded into the CPU contains all basic functions of the HIMax programmable electronic system (PES), for example:

- Processing the user programs,
- Performing all test routines for hardware and software
- Cycle time monitoring (watchdog)
- Safe communication with the I/O modules
- Safe communication with other systems, such as:
  - HIMax
  - HIMatrix
- Creating and storing events.

For a description of the operating system functions, see the System Manual (HI 801 001 E).

Cycle Processing

A CPU cycle runs through the following phases:

- Reading the input data
- Processing the user programs
- Writing the output data
- Other activities, e.g., reload processing.

3.5 Product Data

Parameter	Value
Supply voltage	24 VDC, -15 %...+20 %, r_P ≤ 5 %, SELV, PELV
Current input	1.4 A
Fuse (internal)	7.5 A
Microprocessor	PowerPC
Flash EPROM	128 MB
DDRAM, NVRAM	256 MB
Program memory for each user program	1023 kB
Data memory for variables per user program	1023 kB
Total program and data memory for all user programs	10 MB less 4 kBytes for CRCs
Data memory for retain variables	
per user program	2 kB
A total for all user programs	32 kB
Number of variables being able to trigger events	20 000
Number of events that can be stored	5000
Safety time	≥ 20 ms, depending on the application
Buffer for date/time	Gold capacitor
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	approx. 310 x 29.2 x 236
Weight	approx. 1.3 kg

Table 15: Product Data

3.6 Connector Board

The X-CB 001 01 connector board connects the module with other HIMA controllers or with the PADT. Module and connector board form together a functional unit. The connector board contains the four ports (Eth1...Eth4) of the Ethernet switch on the processor module.

3.6.1 Connecting Options

- Connection to other HIMA controllers.
- Connection of the PADT

Figure 5: X-CB 001 01 Connector Board

Designation	Description
Ethernet Interfaces	
Eth1, X3	Connections for Ethernet: Chapter 3.4.9 describes the characteristics of the external Ethernet connections. The pin assignment of the RJ-45 connectors complies with the applicable standards.
Eth2, X4	
Eth3, X5	
Eth4, X6	

Table 16: Pin Assignment of X-CB 001 01