

# HIMatrix

Safety-Related Controller

GEH 01 Manual



HIMA Paul Hildebrandt GmbH + Co KG  
Industrial Automation

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Revision index	Revisions	Type of change	
		technical	editorial
1.00	Added: Configuration with SILworX	X	X
1.01	Revised: Table 5 <i>Product Data</i>	X	X
2.00	Added: GEH 014	X	X

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# 1 Introduction

This manual describes the technical characteristics of the subrack and its use. It provides information on how to install, start up and configure the module.

## 1.1 Structure and Use of this Manual

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

This manual is organized in the following main chapters:

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

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**i** This manual usually refers to the plug-in cards of a modular controller as *modules*. *Modules* is also the term used in SILworX.

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Additionally, the following documents must be taken into account:

Name	Content	Document number
HIMatrix System Manual Compact Systems	Hardware description of the HIMatrix compact systems	HI 800 141 E
HIMatrix System Manual Modular System F60	Hardware description of the HIMatrix modular system	HI 800 191 E
HIMatrix Safety Manual	Safety functions of the HIMatrix system	HI 800 023 E
HIMatrix Safety Manual for Railway Applications	Safety functions of the HIMatrix system using the HIMatrix in railway applications	HI 800 437 E
SILworX Online Help	Instructions on how to use SILworX	-
ELOP II Factory Online Help	Instructions on how to use ELOP II Factory, Ethernet IP protocol	-
SILworX First Steps	Introduction to SILworX using the HIMax system as an example	HI 801 103 E
ELOP II Factory First Steps	Introduction to ELOP II Factory	HI 800 006 E

Table 1: Additional Relevant Documents

The latest manuals can be downloaded from the HIMA website at [www.hima.com](http://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 modules 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:

<b>Bold</b>	To highlight important parts Names of buttons, menu functions and tabs that can be clicked and used in the programming tool.
<i>Italics</i>	For parameters and system variables
<code>Courier</code>	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.
- Caution 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 document must be strictly observed. The product may only be used if all guidelines and safety instructions are adhered to.

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

### 2.1 Intended Use

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

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

#### 2.1.1 Environmental Requirements

Requirement type	Range of values <sup>1)</sup>
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
<sup>1)</sup> The values specified in the technical data apply and are decisive for devices with extended environmental requirements.	

Table 2: Environmental Requirements

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

#### NOTE



##### Device damage due to electrostatic discharge!

- When performing the work, make sure that the workspace 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 HIMatrix 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 HIMatrix system is a part of the safety equipment of a site. If a device or a module fails, the system enters the safe state.

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

### 3 Product Description

The subrack is intended for being equipped with modules of the F60 system. Slots 1 and 2 are reserved for the power supply module and central module, respectively. Any type of F60 modules can be plugged in to slots 3...8.

#### 3.1 Safety Function

No safety function is performed by the subrack.

#### 3.2 Equipment, Scope of Delivery

The following table specifies the available components:

Designation	Description
GEH 01	Subrack (earth grid, 2 fans, slots for power supply module, central module and 6 I/O modules)
GEH 014	Subrack (earth grid, 2 fans, slots for power supply module, central module and 6 I/O modules) Operating temperature: -25...+70 °C (temperature class T1), Vibration and shock tested according to EN 50125-3 and EN 50155, class 1B according to IEC 61373
BLK 01	Cover plate for unused slots

Table 3: Available Variants

#### 3.3 Type Label

The type plate contains the following details:

- Product name
- Bar code (1D or 2D code)
- Part no.
- Production year
- Hardware revision index (HW Rev.)
- Firmware revision index (FW Rev.)
- Operating voltage
- Mark of conformity

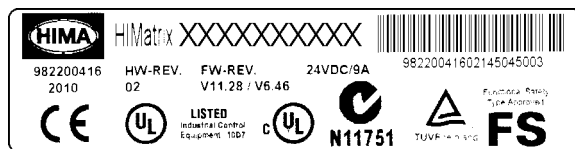


Figure 1: Sample Type Label

### 3.4 Structure



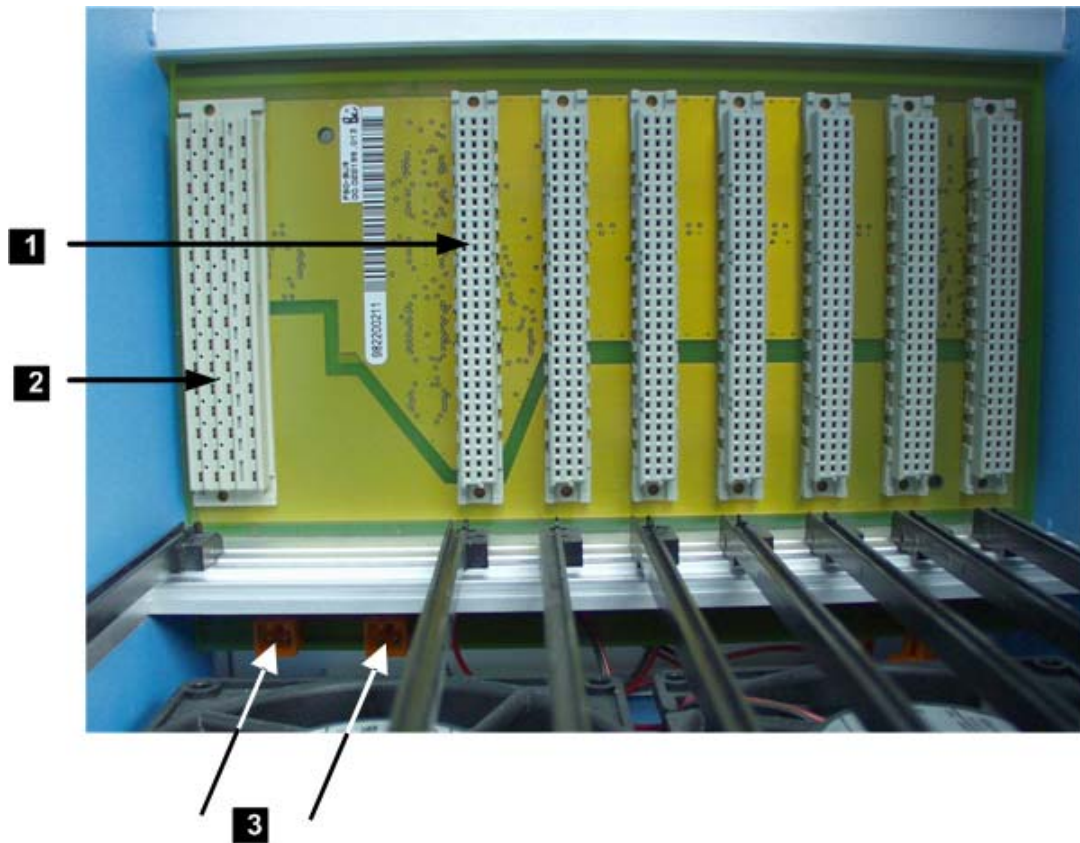
Figure 2: F60 Subrack

The F60 subrack is composed of:

- Housing,
- Earth grid,
- Backplane PCB (printed circuit board),
- Guiding rails, and
- 2 fans.

The backplane PCB contains connectors for connecting the power supply module and the F60 modules.

The plug connections for the power supply of the fans are located on the left bottom side of the PCB backplane.



**1** Connection of the Central Module

**2** Connection of the Power Supply

**3** Current Connections for the Fans

Figure 3: Backplane PCB of the F60 Subrack

The subrack is completed mounted, including the earth grid, backplane PCB, guiding rails and 2 fans.

**3.5 Product Data**

Specifications	
Material	Aluminum, anodized, partially coated
Horizontal pitch	40 HP (1 HP = 5.08 mm)
Modules	in accordance with DIN EN 60287-4, 4 HP each
Connector	in accordance with DIN EN 60603-2, Type C, 96-pole
Type of connection	Connector
Fan	Part number: 39 2003001
Humidity	< 95 % relative humidity, non-condensing
Ambient temperature	0...60 °C
Storage temperature	-40...+85 °C
Dimensions	40 HP, 7 RU W x H x D: 259 x 310 x 228 mm
Weight	approx. 1.5 kg

Table 4: Product Data

**3.5.1 Product Data GEH 014**

The GEH 014 model variant is intended for use in railway applications. The electronic components are coated with a protective lacquer.

GEH 014	
Operating temperature	-25...+70 °C (temperature class T1)
Weight	approx. 1.5 kg

Table 5: Product Data GEH 014

The GEH 014 subrack meets the vibration and shock requirements in accordance with EN 61373, Category 1, Class B.

## 4 Start-up

This chapter describes how to install the GEH 01 subrack.

### 4.1 Mounting

To ensure faultless operation, choose a suitable mounting location for the subrack in accordance with the operating requirements.

Observe the following points when mounting the module:

- Mount the subrack on horizontal DIN rails to ensure effective cooling.
- A distance of at least 100 mm above and below the subrack must be maintained.
- Do not mount the subrack above heating equipment or any heat source.

For more information, refer to HIMatrix system manual for the modular system (HI 800 191 E).

#### 4.1.1 Mounting the GEH 01 Subrack in Zone 2

(EC Directive 94/9/EC, ATEX)

The subrack is suitable for mounting in zone 2. Refer to the corresponding declaration of conformity available on the HIMA website.

When mounting the device, observe the special conditions specified in the following section.

##### Specific Conditions X

1. Mount the subrack in an enclosure that meets the EN 60079-15 requirements and achieves a type of protection of at least IP54 in accordance with EN 60529. Provide the enclosure with the following label:

##### **Work is only permitted in the de-energized state**

Exception:

If a potentially explosive atmosphere has been precluded, work can also be performed when the controller is under voltage.

2. The enclosure in use must be able to safely dissipate the generated heat. The power dissipation (PV) of each GEH 01 subrack is 9 W at maximum output load.
3. The 24 VDC power must come from a power supply unit with safe isolation. Use power supply units of type PELV or SELV only.
4. Applicable standards:
 

VDE 0170/0171 Part 16,	DIN EN 60079-15: 2004-5
VDE 0165 Part 1,	DIN EN 60079-14: 1998-08

Pay particular attention to the following sections:

DIN EN 60079-15:

Chapter 5	Design
Chapter 6	Terminals and cabling
Chapter 7	Air and creeping distances
Chapter 14	Connectors

DIN EN 60079-14:

Chapter 5.2.3	Equipment for use in zone 2
Chapter 9.3	Cabling for zones 1 and 2
Chapter 12.2	Equipment for zones 1 and 2

The subrack is additionally equipped with the label represented below:

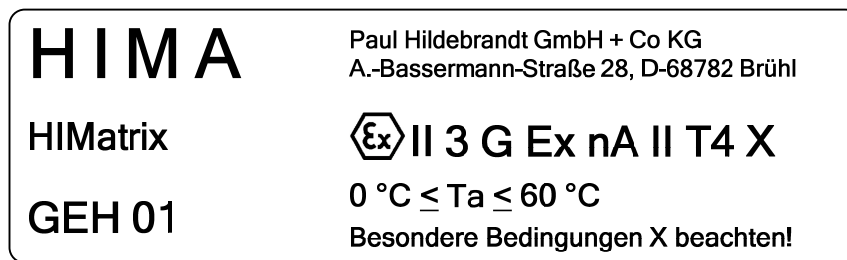


Figure 4: Label for Ex Conditions

## 5 Operation

Handling of the subrack or mounted modules during operation is not required.

The subrack is maintenance free, all system components are designed for continuous operation.



## 6 Maintenance

No maintenance measures are required during normal operation.

If a failure occurs, the defective module or device must be replaced with a module or device of the same type or with a replacement model approved by HIMA.

Only the manufacturer is authorized to repair the device or module.

### 6.1 Replacing Fans

HIMA recommends replacing the fans:

- At normal temperatures (< 40 °C): every 5 years
- At increased temperatures (≥ 40 °C): every 3 years

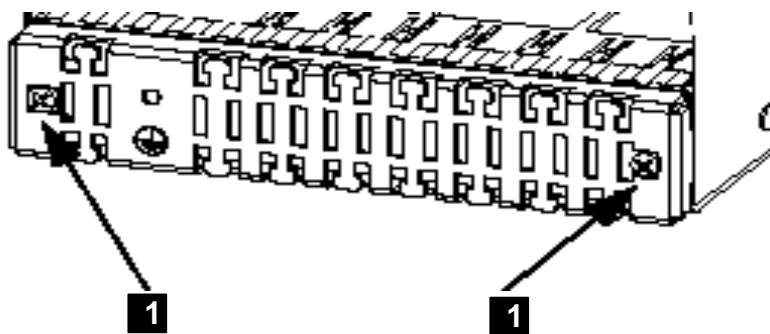
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**i** The fans may be replaced while the PES is operating, the PES needs not be shut down.

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#### To replace the fans:

1. Unscrew both fastening screws located on the left and right of the earth grid.



**1** Fastening Screws

Figure 5: Earth Grid for F60 Subrack

2. Position the earth grid (including the attached cables) to allow removal of the fan mounting plate located behind it.
3. Release the plugs for the fan voltage supply located on the backplane PCB and remove the fan mounting plate completely.
4. Unscrew and remove the 4 fastening screws on each fan to allow replacement of the fans.

## 7 Decommissioning

Remove the supply voltage to decommission the device. Afterwards pull out the pluggable screw terminal connector blocks for inputs and outputs and the Ethernet cables.

## 8 Transport

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

Always store HIMatrix 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 HIMatrix 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
COM	Communication module
CRC	Cyclic redundancy check
DI	Digital input
DO	Digital output
ELOP II Factory	Programming tool for HIMatrix systems
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 or ELOP II Factory
PE	Protective earth
PELV	Protective extra low voltage
PES	Programmable electronic system
R	Read: The system variable or signal provides value, e.g., to the user program
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 <i>interference-free</i> if it does not distort the signals of the other input circuit.
R/W	Read/Write (column title for system variable/signal type)
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 HIMatrix systems
SNTP	Simple network time protocol (RFC 1769)
SRS	System.rack.slot addressing of a module
SW	Software
TMO	Timeout
W	Write: System variable/signal is provided with value, e.g., from the user program
$r_{PP}$	Peak-to-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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SAFETY  
NONSTOP

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