

HIMax®

Field Termination Assembly
Manual

SAFETY
NONSTOP



X-FTA 005 02L

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Revision index	Revisions	Type of Change	
		technical	editorial
3.02	Added: Numbering of the male connectors (cable plugs) XG1, XG2, XG3 and XG4	X	X
5.00	Updated edition SILworX V5 Added: New I/O module X-DO 12 51 and block diagram	X	X

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1 Introduction

This manual describes the technical characteristics of the field termination assembly (FTA) X-FTA 005 02L and its use.

It provides information on how to install and start up the module.

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
- Repairs
- 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 SILworX.
<i>Italics:</i>	System parameter and 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: 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.
- 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.

NOTICE



Type and source of damage!
Damage prevention

1.3.2 Operating Tips

Additional information is structured as presented in the following example:

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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 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 II 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 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 danger results from a HIMax FTA itself.

Residual risk may result from:

- Faults in the engineering
- 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 FTAs are mounted on the DIN rails of the control or marshalling cabinets and are used to connect the individual actuators or sensors of the field zone to the corresponding I/O modules. The FTA is connected to the connector board of the I/O module via system cables, see Figure 5.

The FTA is suitable for operating relay output modules redundantly or as single modules. The use of the FTA to set the redundancy allows I/O modules that are not located in the base plate adjacently to be connected redundantly.

The X-FTA 005 02L can be connected via system cable with the connector boards of the following I/O modules:

Modules	Connector Boards	System cable
X-DO 12 01	X-CB 011 03/04	X-CA 012 01
X-DO 12 51	X-CB 011 53/54	X-CA 012 01

Table 3: Appropriate I/O Modules for the X-FTA 005 02L

3.1 Safety Function

No safety function is performed by the FTA.

3.2 Scope of Delivery

The FTA is delivered with 12 device fuses inserted in the F1...F12 fuse holders. The fuse holder and the G-fuse cartridge are described in Chapter 3.5.1.

3.3 Type Label

The type label specifies the following important details:

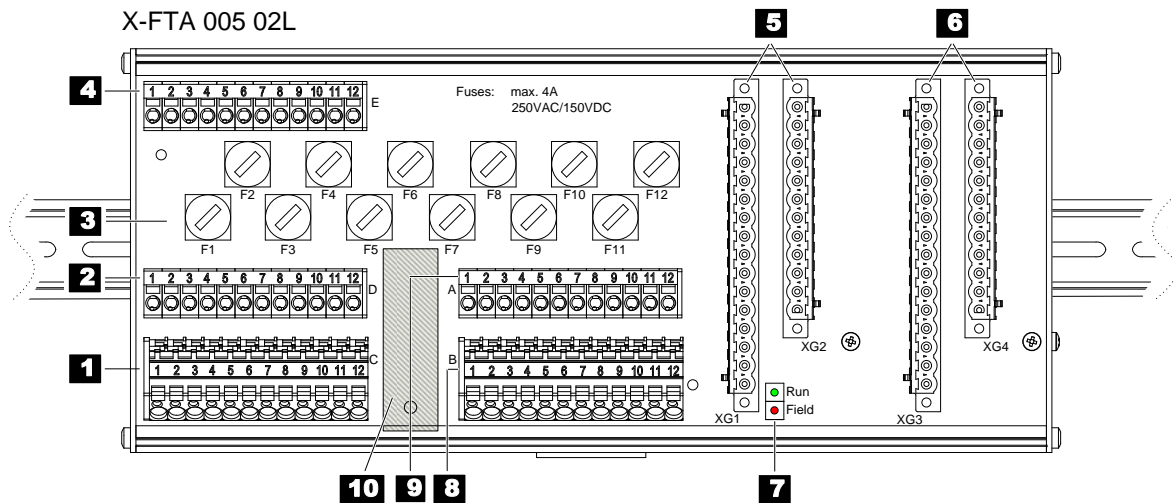
- Product name
- Mark of conformity
- Bar code (1D or 2D code)
- Part number (Part-No.)
- Hardware revision index (HW Rev.)
- Ex specifications (if applicable)
- Production year (Prod-Year:)



Figure 1: Sample Type Label

3.4 Assembly

The FTA is structured as follows:



- | | |
|---|---|
| 1 Row of Terminals C | 6 Female Connector (Cable Plug 2) XG3, XG4 |
| 2 Row of Terminals D | 7 Status Indicators |
| 3 Fuse Holder F1...F12 | 8 Row of Terminals B |
| 4 Row of Terminals E | 9 Row of Terminals A |
| 5 Female Connector (Cable Plug 1) XG1, XG2 | 10 Label Field |

Figure 2: X-FTA 005 02L

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Only use a felt marker or a sticker to mark the label field **10** since traces are placed underneath it.

3.4.1 Pin Assignment

The FTA is equipped with five rows of terminals (A, B, C, D and E) containing 12 terminals each.

Patched wires are connected as follows:

Row of Terminals	Terminal	Signal	Description
A (XGA)	1...12	DO1-...DO12-	Connection: Load positive pole (Relay contact: negative pole)
B (XGB)	1...12	DO1+...DO12+	Clamp terminal L+, L (Relay contact positive pole)
C (XGC)	1...12	L-, N	Clamp terminal L-, N
D (XGD)	1...12	L-, N (Last)	Connection: Load negative pole
E (XGE)	1...12	F1...F12	Test terminal Monitoring F1...F12

Table 4: Pin Assignment of Patched Wires

The relay outputs are connected to the row of terminals A and B, whereas the current must flow from DO+ to DO-, see Figure 5.

A load can be connected to the row of terminals A and D for each channel. For the loads to be switched, the supply voltage is connected to clamp terminals B and C, see Figure 5. The fuses in fuse holders F1...F12 can be monitored at terminal row E, see Figure 5.

3.5 Product Data

General	
Permissible voltage	250 VAC/150 VDC
Current load rating per channel	4 A per terminal
Total switching current, all 12 channels	30 A
Terminal cross-section	0.2...2.5 mm ² flexible (rows of terminals B, D, E) 0.2...4 mm ² flexible (rows of terminals A,C)
Operating temperature	0...+60 °C
Storage temperature	-40...+85 °C
Humidity	max. 95 % relative humidity, non-condensing
Type of protection	IP20
Dimensions (H x W x D)	258 x 111 x 60 mm 258 x 111 x 95 mm (with cable plug)
Mounting	On DIN rail 35 mm
Weight	approx. 800 g
Mounting position	Horizontal or vertical

Table 5: Product Data

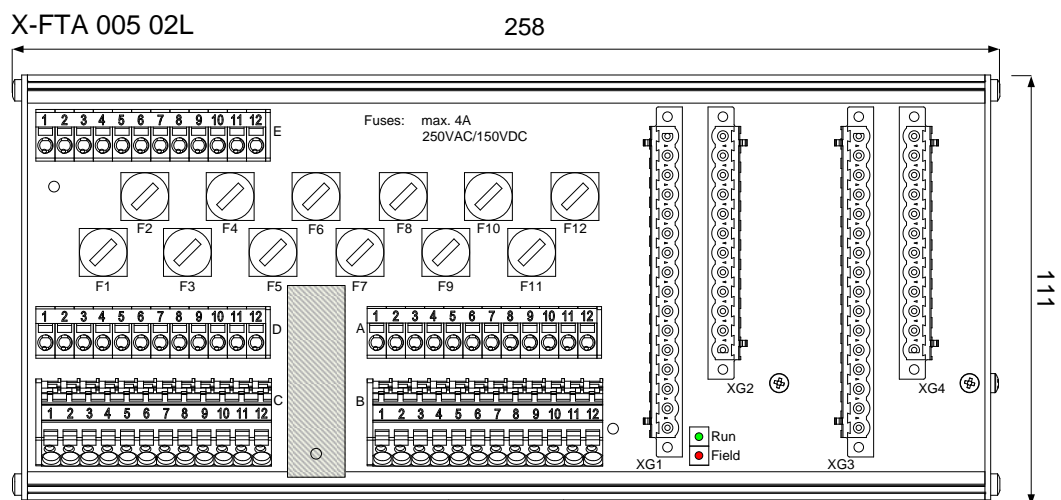


Figure 4: Dimension Drawing

3.5.1 F1...F12 Fuse Holders

The FTA is equipped with 12 fuse holders (F1...F12) each containing a G-fuse cartridge of type 5 x 20 mm. Depending on the application, the G-fuse cartridges can be replaced by fuses of the same type, see Chapter 4.1.2. The fuses can be used to limit the switching current of contact circuits to a permissible maximum value, e.g., for burner applications.

The fuse holders are delivered with the following G-fuse cartridges:

G-fuse cartridge 5 x 20 mm	
Nominal current	4 A
Voltage	250 VAC
Time-current characteristics	Time-lag (T)
Breaking capacity	1500 A / 250 VAC, 50...60 Hz, $\cos \varphi = 0.7...0.8$
Operating temperature	-20...+85 °C

Table 6: Fuse Data



The breaking capacity of the G-fuse cartridge has to be compared with the fuse for the power supply.

3.6 Accessories

No accessories are provided with the X-FTA 005 02L.

4 Start-up

The I/O modules are connected to the FTA via pre-assembled cables. The single cable plug of the system cable is plugged in to the connector board of the corresponding I/O module and the double cable plug to the FTA. The patched wires are applied to the rows of terminals on the FTA and connect the field cables attached to the field terminals with the FTA.

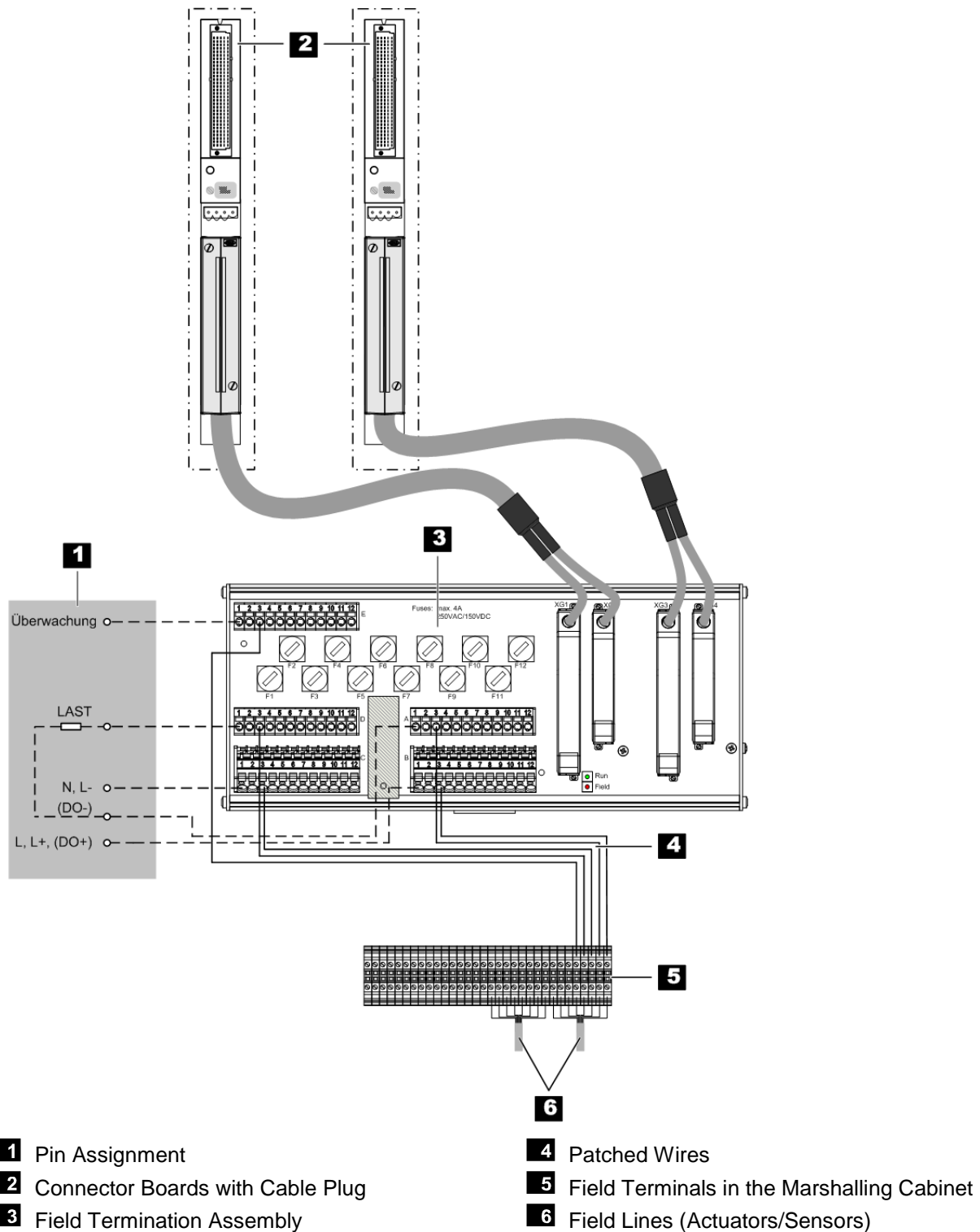


Figure 5: Connection of the Field Lines to an I/O Module via FTA

4.1 Installation/Mounting

This chapter describes how to connect the patched wires. Refer to the corresponding module manual for details on proper wiring of relay modules via FTAs.

4.1.1 Connecting the Patched Wires

Tools and utilities:

- Screwdriver, slotted 0.6 x 3.5 mm
- Wire stripper

1. Strip the insulation from the ends of the connector cables to a length of 8 mm.
2. Hold the stripped end in the round openings intended for the wires. Insert the screwdriver into the rectangular opening of the spring terminal to reduce its tension..
3. Insert the wire as far as it can go and remove the screwdriver.
4. Check that the connector cable is holding securely.
5. Reduce the tension on the spring terminal to release the patched wires. To do so, insert the screwdriver into the rectangular opening of the spring terminal.

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After the system cable plugs were plugged in to the connector board and FTA, use the captive screws located on the plugs to secured them.

4.1.2 Replacing the G-Fuse Cartridge

Tools and utilities:

- Screwdriver, slotted 1.0 x 5.5 mm

1. Maintain the screwdriver in the notch on the fuse holder and push it downwards applying light pressure.
2. Turn the screwdriver counterclockwise (25°) to unlock the fuse holder.
3. Remove the cartridge from the fuse holder and replace the fuse inserted in the holder with the desired fuse.
4. Insert the cartridge in the holder such that the noses directly match the holder notches.
5. Apply light pressure with the screwdriver to screw in the cartridge clockwise.

5 Operation

The field termination assembly is operated within a control or a marshalling cabinet and does not require any specific monitoring.

5.1 Handling

Direct handling of the FTA is not foreseen.

5.2 Diagnosis

The green LED *Run* and the red LED *Field* are used to indicate states:

LED	State
Run	The I/O module is supplied with voltage and connected to the FTA via system cables.
Field	Mono operation: The I/O module has detected field faults (e.g., in the I/O loop or in the connection between I/O module and FTA) Redundant operation: Both modules detect field faults

Table 7: LED Indicators

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The LED indicators are not refreshed when the module is in STOP mode. For this reason, the LEDs still indicate field faults, even if they were removed. The LED indicators are refreshed as soon as the module is in RUN mode again.

6 Maintenance

The FTA is maintenance free. All system components are designed for continuous operation. Defective FTAs must be replaced with a faultless FTA of the same type or with an approved replacement model.

Only the manufacturer is authorized to repair the FTA.

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

WARNING



Electrostatic discharge can damage the electronic components within the systems.

7 Decommissioning

Remove the system cable to decommission the FTA.

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
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 Diagram
FTT	Fault Tolerance Time
ICMP	Internet Control Message Protocol: Network protocol for status or error messages
IEC	International Electrotechnical Commission
MAC address	Hardware address of one network connection (Media Access Control)
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
PFD	Probability of Failure on Demand, probability of failure on demand of a safety function
PFH	Probability of Failure per Hour, probability of a dangerous failure per hour
R	Read
r_p	Peak value of a total AC component
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 "non-reactive" 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 safely manageable faults
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
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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