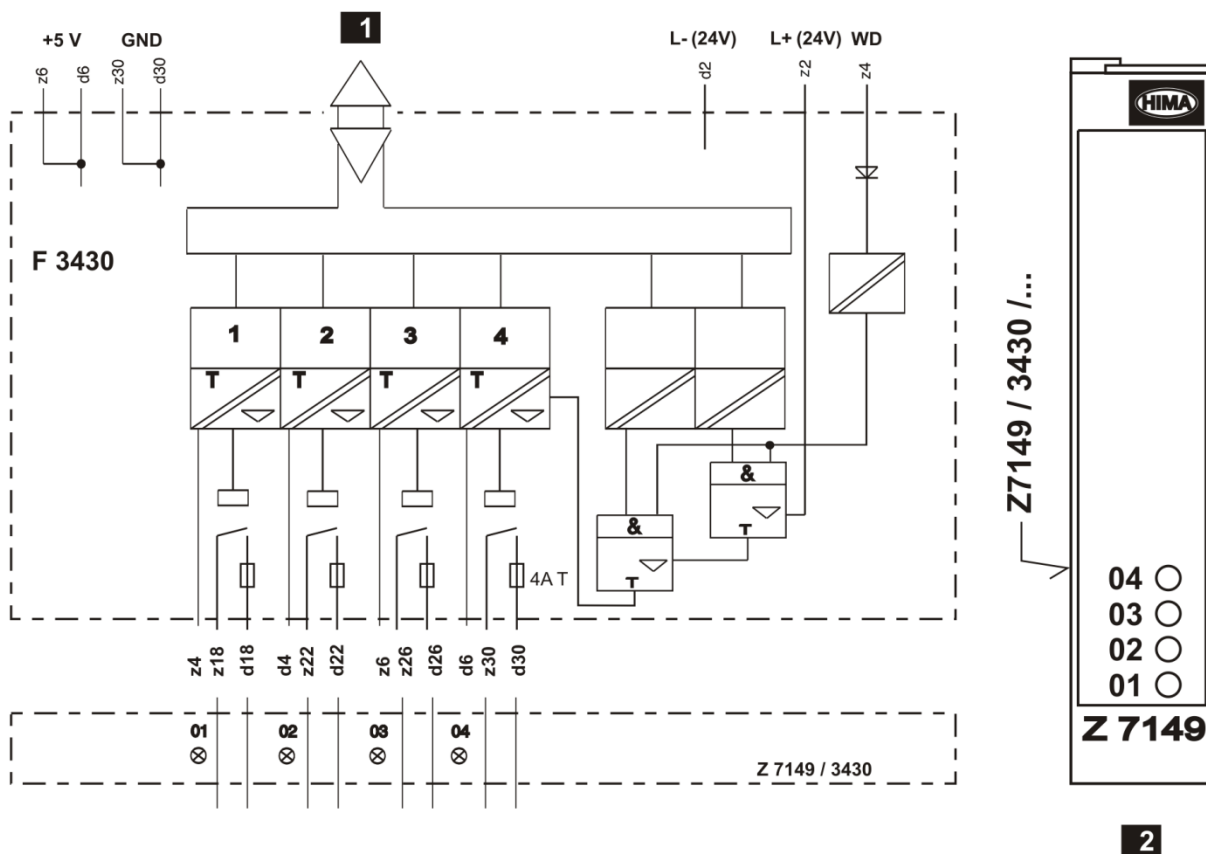




F 3430: Relay Module

Safety-related, TÜV-tested in accordance with IEC 61508 for applications up to SIL 3

- 4 channels.
- Switching voltage $\geq 5\text{ V}$, $\leq 250\text{ VAC}$ / $\leq 110\text{ VDC}$.
- With integrated safety shutdown.
- With protective separation, with 3 downstream relays (diverse).
- Semiconductor output (open collector) for LED display in the cable plug.
- For HIQuad X (SILworX) and HIQuad (ELOP II).



1 I/O bus

2 Cable plug, front view

Figure 1: Module's Block Diagram and Cable Plug Front View

Specifications

Relay outputs	Make contact, dust-tight	
Contact material	Silver alloy, hard gold plated	
Switching time	Approx. 8 ms	
Reset time	Approx. 6 ms	
Bounce time	Approx. 1 ms	
Switching current	$10 \text{ mA} \leq I \leq 4 \text{ A}$	
Lifetime: mechanical	$\geq 30 \times 10^6$ switching operations	
Lifetime: electrical	$\geq 2.5 \times 10^5$ switching operations at ohmic full load and ≥ 0.1 switching operations per second	
Switching capacity VAC	Up to 250 VAC	Maximum 240 VA, $\cos \varphi \geq 0.5$
Switching capacity VDC (induction-free)	Up to 30 VDC	Maximum 120 W
	Up to 70 VDC	Maximum 50 W
	Up to 110 VDC	Maximum 30 W
Current consumption WD	Maximum 30 mA	
Space requirement	4 HP	
Current consumption	< 100 mA at 5 VDC (via backplane)	
	< 120 mA at 24 VDC (via backplane)	

The input of the module is safely separated from the output in accordance with EN 50178 (VDE 0160). The air and creepage distances are designed for overvoltage category III up to 300 V.

The module is equipped with diverse relays.

The relay module is suitable for switching safety-related circuits. The module can thus be used for safety shutdowns, e.g., for shutting down the entire fuel supply in combustion plants.

Wiring

Refer to the following table for the wire color coding:

Channel	Pin	Color	Connection
1	z18	WH	Cable: LiYY 8 x 1.5 mm ²
	d18	BN	
2	z22	GN	
	d22	YE	
3	z26	GY	
	d26	PK	
4	z30	BU	
	d30	RD	

Table 1: Wire Color Coding of the Cable Plug Z 7149/3430/Cx/P2

Requirements

- For the application, ensure that the module is replaced once the maximum number of switching operations has been reached (e.g., 300 000 switching operations at nominal operation of 30 VDC / 4 A).
- For SIL 3 systems (in accordance with IEC 61508), the manufacturer must perform functional tests within 5 years, and within 20 years for SIL 2 systems.
- Components may only be replaced by the manufacturer in accordance with the valid standards and the TÜV requirements.

1 Configuration in SILworX

The module is configured in the Hardware Editor of the SILworX programming tool.

Observe the following points when configuring the module:

- To diagnose the module and channels, both the statuses and the measured value can be evaluated within the user program. For more information on the statuses and parameters, refer to the tables starting with Chapter 1.1.
- If a redundancy group is created, its configuration is defined in the tabs. The tabs specific to the redundancy group differ from those of the individual modules, see the following tables.

To evaluate the system parameters in the user program, they must be assigned to global variables. Perform this step in the Hardware Editor using the module's detail view.

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

1.1 The Module Tab

The **Module** tab contains the following system parameters:

System parameters	Data type	S ¹⁾	R/W	Description
Name	---	---	W	Module name.
Noise Blanking	BOOL	Y	W	Noise blanking performed by the system module allowed (activated/deactivated). After a transient fault, the system delays the fault response until the safety time. The user program retains its last valid process value. Default setting: Activated. Refer to the system manual (HI 803 211 E) for more details on noise blanking.
The following statuses and parameters can be assigned global variables and used in the user program.				
Explicitly Triggered Restart Required	BOOL	Y	R	TRUE The module must be explicitly required to restart.
				FALSE <ul style="list-style-type: none"> ▪ Restart is necessary and the module performs it automatically. ▪ Module in the STOP state. ▪ Connection loss.
Background Test Noise Blanking Active	BOOL	Y	R	TRUE Error detected by a background test.
				FALSE <ul style="list-style-type: none"> ▪ No errors detected by the background tests. ▪ Module in the STOP state. ▪ Connection loss.
Initialization Active	BOOL	Y	R	TRUE The module is performing initial tests.
				FALSE <ul style="list-style-type: none"> ▪ The initial tests are complete. ▪ Module in the STOP state. ▪ Connection loss.
Module OK	BOOL	Y	R	TRUE No internal fault detected by the system.
				FALSE <ul style="list-style-type: none"> ▪ Internal fault detected by the system. ▪ Module in the STOP state. ▪ Connection loss.
Module Process Value OK	BOOL	Y	R	TRUE No channel fault detected by the system.
				FALSE <ul style="list-style-type: none"> ▪ At least one channel fault detected by the system. ▪ Module in the STOP state. ▪ Connection loss.

System parameters	Data type	S ¹⁾	R/W	Description				
Restart on Error Suppressed	BOOL	Y	W	Automatic restart after errors can be suppressed by the user. To cause the automatic restart to be performed after an error, the system parameter must have been set to FALSE for longer than the F-CPU safety time (does not apply to field faults).				
				<table><tr><td>TRUE</td><td>No automatic restart after a module or channel fault.</td></tr><tr><td>FALSE</td><td>Automatic restart after a module or channel fault.</td></tr></table>	TRUE	No automatic restart after a module or channel fault.	FALSE	Automatic restart after a module or channel fault.
				TRUE	No automatic restart after a module or channel fault.			
FALSE	Automatic restart after a module or channel fault.							
Default setting: FALSE								

¹⁾ The operating system handles the system parameter in a safety-related manner, yes (Y) or no (N).

Table 2: The **Module** Tab in the Hardware Editor

1.2 The F 3430_1: Channels Tab

The **F 3430_1: Channels** tab contains the following system parameters for each channel:

System parameters	Data type	S ¹⁾	R/W	Description	
Channel no.	---	---	R	Channel number, preset and cannot be changed.	
Channel Value [BOOL] ->	BOOL	J	R	Binary value in accordance with the switching level LOW (dig) and HIGH (dig).	
				TRUE	Channel energized.
				FALSE	Channel de-energized.
-> Process Value OK [BOOL]	BOOL	J	R	TRUE	Fault-free channel. No internal fault nor fault on the field side detected. Module initialization successfully completed.
				FALSE	<ul style="list-style-type: none">Faulty channel. Internal fault or fault on the field side detected.The initial test has not been completely performed.Module in the STOP state.Connection loss.
-> Channel OK [BOOL]	BOOL	J	R	TRUE	Fault-free channel. The channel value is valid.
				FALSE	<ul style="list-style-type: none">Faulty channel.Module in the STOP state.Connection loss.
Redund.	BOOL	J	R	Requirement: A redundant module must exist.	
				TRUE	The channel redundancy for this channel is active.
				FALSE	The channel redundancy for this channel is not active.
Default setting: TRUE					

¹⁾ The operating system handles the system parameter in a safety-related manner, yes (Y) or no (N).

Table 3: Tab **F 3430_1: Channels** in the Hardware Editor

Global variables can be assigned to the system parameters with -> and used in the user program. The values of the system parameters without -> must be directly defined.

1.3 Description of Diagnostic Entry

The module is completely and automatically tested for safety-related errors during operation. The diagnostic entry is not 0 if one or more errors were detected in the module.

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

Bit	Coding ¹⁾	Description
0	0x00000001	Hardware module fault.
1	0x00000002	The module in the slot was not deleted. The slot is either empty or equipped with incorrect module type.
2	0x00000004	Module defective (the error code is for internal purposes only).
...	...	
31	0x80000000	
¹⁾ The status may consist of several codings, e.g.: Module status = 0x80000001 (0x00000001 + 0x80000000).		

Table 4: Diagnostic Entry Coding

1.3.1 Channel Status

The channel status byte in the diagnostic entry shows the following status:

Bit	Coding ¹⁾	Description
0	0x01	Hardware channel fault. F-IOP indicator: Continuous light of the channel LED.
6	0x40	Hardware channel fault (the error code is for internal purposes only). F-IOP indicator: Continuous light of the channel LED.
7	0x80	
1) The status may consist of several codings, e.g.: Channel status = 0x81 (0x01 + 0x80).		

Table 5: Channel Status the F 3430

