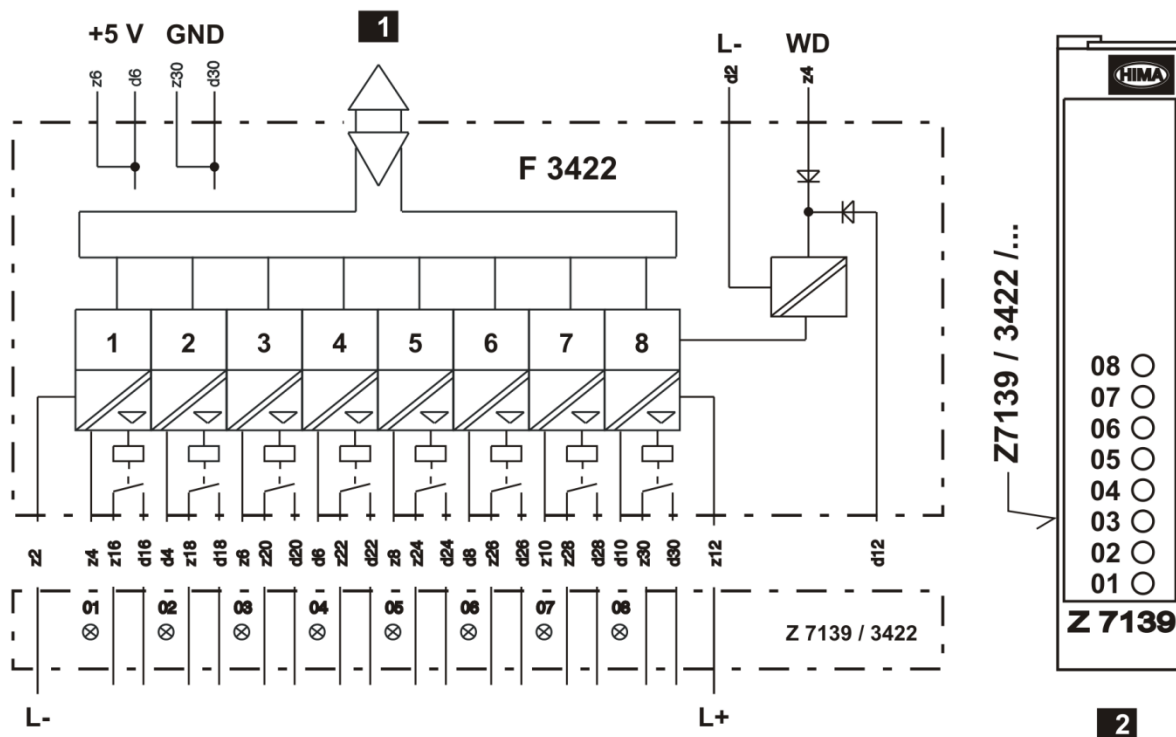# F 3422: Relay Module

- 8 channels.
- Switching voltage 60 VDC / VAC.
- Circuits with protective separation.
- 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 Block Diagram and Cable Plug Front View

Specifications

Relay outputs	Make contact, dust-tight
Contact material	AgNi 0.15, hard gold plated
Switching time	Approx. 10 ms
Bounce time	Approx. 1.5 ms
Switching current	$1\ mA \leq I \leq 4\ A$
Inrush peak current	$\leq 12\ A$ for 4 s (relative duty cycle: $\leq 10\ \%$)
Lifetime: mechanical	2×10^7 switching operations
Lifetime: electrical	$> 10^5$ switching operations at ohmic full load and ≤ 0.1 switching operations per second
Switching capacity VAC	Up to 60 VAC: maximum 240 VA, $\cos \varphi \leq 0.5$
Switching capacity VDC	Up to 30 VDC: maximum 120 W
(induction-free)	Up to 60 VDC: maximum 40 W
Switching frequency	Maximum 18 Hz
Current consumption WD	Maximum 30 mA
Space requirement	4 HP
Current consumption	60 mA at 5 VDC (via backplane)
	150 mA at 24 VDC (via cable plug)
Isolation between	Up to 300 V in accordance with EN 50178 (VDE 0160),
contact circuits	Overvoltage category II

Wiring

Refer to the following table for the wire color coding:

Channel	Pin	Color	Connection
1	z16	WH	
	d16	BN	
2	z18	GN	
	d18	YE	
3	z20	GY	
	d20	PK	
4	z22	BU	
	d22	RD	Cable: LiYY 16 x 0.5 mm^2
5	z24	BK	
	d24	VT	
6	z26	WHBN	
	d26	WHGN	
7	z28	WHYE	
	d28	WHGY	
8	z30	WHPK	
	d30	WHBU	
L-	z2	BK	Female connector 2.8 x 0.8 mm²
L+	z12	RD	$q = 1\ mm^2$, $l = 750$ mm

Table 1:   Wire Color Coding of the Cable Plug Z 7139/3422/Cx

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:

- In addition to the measuring values, the system parameters can be evaluated in the user program to diagnose the module or channels. For more information on the statuses and parameters, refer to the tables starting with Chapter 1.1.
- If redundancy groups are created, their configuration is defined in the associated tabs. The redundancy group tabs 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. The necessary steps are to be performed in the detail view of the Hardware Editor.

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	R/W	Description	
Name	---	W	Module name.	
Noise Blanking	BOOL	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	R	TRUE	The module must be explicitly required to restart.
			FALSE	▪ Restart is necessary and the module performs it automatically. ▪ Module in the STOP state. ▪ Connection loss.
Background Test Noise Blanking Active	BOOL	R	TRUE	Error detected by a background test.
			FALSE	▪ No errors detected by the background tests. ▪ Module in the STOP state. ▪ Connection loss.
Initialization Active	BOOL	R	TRUE	The module is performing initial tests.
			FALSE	▪ The initial tests are complete. ▪ Module in the STOP state. ▪ Connection loss.
Module OK	BOOL	R	TRUE	No internal fault detected by the system.
			FALSE	▪ Internal fault detected by the system. ▪ Module in the STOP state. ▪ Connection loss.
Module Process Value OK	BOOL	R	TRUE	No channel fault detected by the system.
			FALSE	▪ At least one channel fault detected by the system. ▪ Module in the STOP state. ▪ Connection loss.

System parameters	Data type	R/W	Description	
Restart on Error Suppressed	BOOL	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).	
			TRUE	No automatic restart after a module or channel fault.
			FALSE	Automatic restart after a module or channel fault.
			Default setting: FALSE	

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

1.2 The F 3422_1: Channels Tab

The **F 3422_1: Channels** tab contains the following system parameters for each channel:

System parameters	Data type	R/W	Description		
Channel no.	---	R	Channel number, preset and cannot be changed.		
Channel Value [BOOL] ->	BOOL	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	R	TRUE	Fault-free channel. No internal fault nor fault on the field side detected. Module initialization successfully completed.	
			FALSE	▪ 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	R	TRUE	Fault-free channel. The channel value is valid.	
			FALSE	▪ Faulty channel. ▪ Module in the STOP state. ▪ Connection loss.	
Redund.	BOOL	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		

Table 3: Tab **F 3422_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.
16	0x00010000	
…	…	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