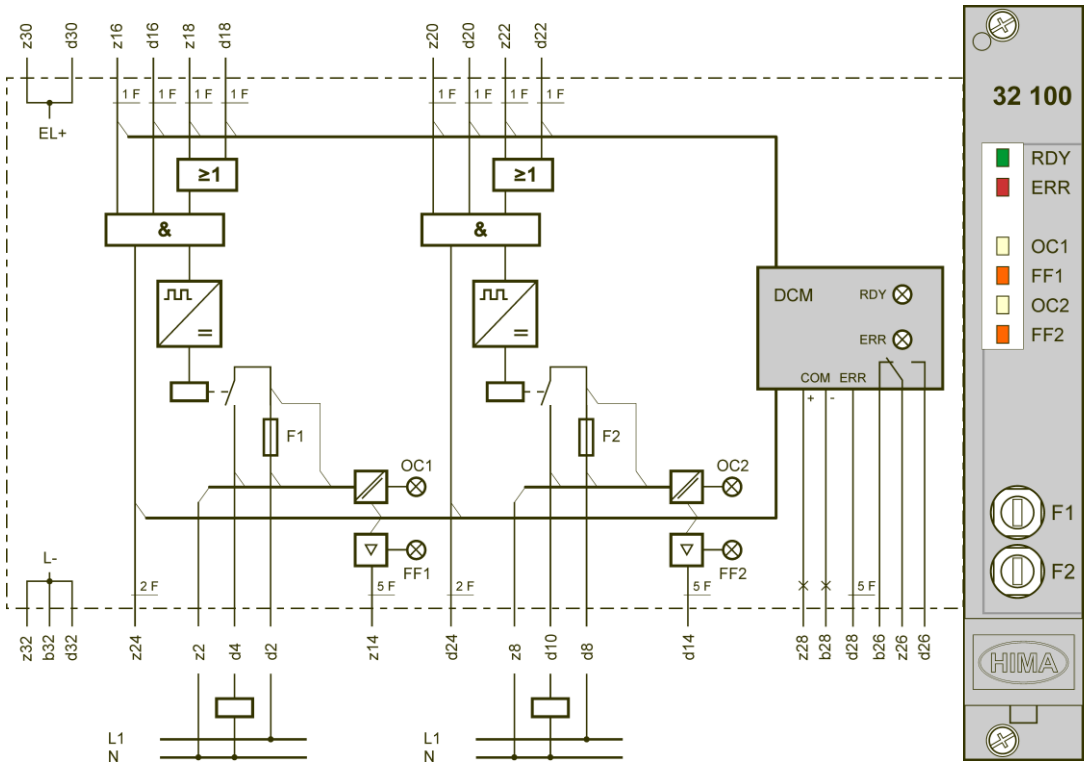
32 100: Relay Module

- **Safety-related**
- 2 channels
- Switching voltage 24 VDC/ 24 VAC

The module is TÜV-tested for SIL 4 in accordance with IEC 61508.



F1, F2 delivery condition 4 A time-lag (T)

Figure 1: Block Diagram

The module is equipped with diverse relays in accordance with the IEC 61508 standard.

To ensure touch protection if the switching voltages do not comply with SELV or PELV, this module should be placed in a separate subrack with a complete coverage of the rear side or by covering the connections with heat-shrinkable sleeves.

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Output	1 potential-free make contact each (sealed) Contact data: see below
Switching time (contact)	Approx. 10 ms
Reset time (contact)	Approx. 12 ms
Switching time (signal)	Approx. 3 ms
Reset time (signal)	Approx. 8 ms
Operating data	24 VDC / 135 mA
Space requirement	3 RU, 4 HP

The relay amplifier features protective separation of the inputs and supply voltage from the output contacts in accordance with DIN EN 50178 (VDE 0160). The air and creepage distances are designed for overvoltage category III up to 300 V.

The output contacts are separated from one another up to 250 V in accordance with EN 60664-1 (VDE 0110-1), overvoltage category III.

Relay Contact Data

Contact material	AgNi, gold plated
Switching voltage	24 VDC, -15…+20% / 24 VAC, -15…+10%
Switching current	≤ 4 A, ≥ 10 mA
Inrush peak current	≤ 12 A for 1 s (not periodic)
Fuse	4 A time-lag (T), delivery condition
Switching capacity AC	≤ 120 VA, cos φ > 0.5
Switching capacity DC	≤ 120 W, induction-free load
Bounce time	< 1.5 ms
Frequency of operation	≤ 10 switching operations/s
Lifetime	
mechanical	> 10^7 switching operations
electrical	> 2.5 x 10^5 switching operations at ohmic load and ≤ 0.1 switching operations/s

The switching state of relay contact d2-d4 (d8-d10) is indicated through OC1 (OC2). In closed state, OC1 (OC2) is switched on. A triggered fuse F1 (F2) is signalized by output z14 (d14) and LED FF1 (FF2). Outputs z14 and d14 are not safety-related; they are suitable for busbar wiring.

All the module functions, including the output contacts with the fuses, are monitored by a microcontroller. If a malfunction occurs, the *ERR* LED is lit, output d28 is on 1-signal and relay contact z26-d26 opens.

Output z28-b28 is intended for connecting to the communication module, e.g., for transferring data to a distributed control system (DCS).

RDY (Ready) indicates the applied operating voltage (≥ 20 V).

Notices

Output z24 (d24) is intended for the design of a latching circuit via input d18 (d22). Outputs z24 and d24 may only be used for logic functions.

To monitor the output circuits, the switching voltage reference pole N must be connected to z2 (z8). If reference pole N is not connected, the following points must be observed:

- If the relay contact is open, a residual current of up to < 2 mA can flow at the output. This residual current can be within the holding current range for solenoid valves from certain manufacturers. For this reason, the holding current of the connected solenoid valve must be checked!
- The switching state of relay contact d2-d4 (d8-d10) is indicated inverted through OC1 (OC2).
- Fault output FF1 (FF2) has no function with respect to the contact circuit.

Communication via Modbus

Read Variables

Type BOOL: Function code 1
Type WORD: Function code 3
Events: Function codes 65, 66, 67

Relative address	Data type	Value	Description	Relative event no.
0	WORD	31 H	Module type 32 100	
1	BOOL	0	None	
2	BOOL	1	Module removed	
3	BOOL	1	Communication with module not ok	
4	BOOL	1	Module in slot, communication ok	
5	BOOL	1	Operating voltage too low, no RDY	
6	BOOL	1	Module fault, ERR	
7	BOOL	1	Fuse faulty, FF1, FF2	
8	BOOL	1	No switching voltage at the contact circuit	
9	BOOL	1	1-signal at input z16	0
10	BOOL	1	1-signal at input d16	1
11	BOOL	1	1-signal at input z18	2
12	BOOL	1	1-signal at input d18	3
13	BOOL	1	1-signal at input z20	4
14	BOOL	1	1-signal at input d20	5
15	BOOL	1	1-signal at input z22	6
16	BOOL	1	1-signal at input d22	7
17...40	BOOL	0	None	
41	BOOL	1	1-signal at output z24	24
42	BOOL	1	1-signal at output d4	25
43	BOOL	1	1-signal at output d24	26
44	BOOL	1	1-signal at output d10	27
45...48	BOOL	0	None	

Table 1: Module Status via Modbus

Value: 0 always has the opposite meaning
H: Hexadecimal value
Absolute address: A = p * 256 + relative address
Absolute event no.: E = (p - 1) * 32 + relative event no.
p = Slot no. in the subrack

Reading of All Variables

Function code 3, 84 WORDS

Starting with address 2000 H, 3000 H or 4000 H

	WORD 0 (16-bit)		WORD 1 (16-bit)		WORD 2 (16-bit)		WORD 3 (16-bit)	
Relative address	0	8…1	24…17	16…9	40…33	32…25		48…41
Data	Module type	Module status	None	None	None	None	None	Outputs

For error-free data transfer, all 84 WORDS must be read. This ensures that the variables of all the modules within a subrack are transferred. 0 is transferred for unused module slots.

Communication via PROFIBUS DP

Read Variables

Relative addresses of WORD and BYTE type

WORD	Bit	BYTE	Bit	Value	Description
0	0...7	0	0...7	31 H	Module type 32 100
	8	1	0	0	None
	9		1	1	Module removed
	10		2	1	Communication with module not ok
	11		3	1	Module in slot, communication ok
	12		4	1	Operating voltage too low, no RDY
	13		5	1	Module fault, ERR
	14		6	1	Fuse faulty, FF1, FF2
	15		7	1	No switching voltage at the contact circuit
1	0	2	0	1	1-signal at input z16
	1		1	1	1-signal at input d16
	2		2	1	1-signal at input z18
	3		3	1	1-signal at input d18
	4		4	1	1-signal at input z20
	5		5	1	1-signal at input d20
	6		6	1	1-signal at input z22
	7		7	1	1-signal at input d22
	8...15	3	0...7	0	None
2		4...5		0	None
3	0	6	0	1	1-signal at output z24
	1		1	1	Voltage at output d4
	2		2	1	1-signal at output d24
	3		3	1	Voltage at output d10
	4...7		4...7	0	None
	8...15	7	0...7	0	None

Table 2: Module Status via PROFIBUS DP

Value:	0 always has the opposite meaning H: Hexadecimal value
Absolute address WORD:	W = 4 * (p - 1) + relative address
Absolute address BYTE:	B = 8 * (p - 1) + relative address p = Slot no. in the subrack