10.10 SDOL-0424

10.10.1 Safe loop-monitored digital output module (24 V DC, 1 A, 4 channels)

The safe loop-monitored digital output module SDOL-0424 has four 24 V DC, 1 A loop-monitored output channels to drive loads up to 24 W. The maximum module load is 3.6 A. These loads may be resistive or inductive. For inductive loads, a suppression diode is included on each output.

The outputs, including the suppression diode, the lead breakage detection and short-circuit detection, are fully tested and may therefore be used for safe applications.

The outputs are tested for:

- Ability to de-energize
- Ability to de-energize via secondary means
- Cross talk between outputs
- Function of the suppression diodes
- Lead breakage in the (external) output wiring
- Short circuit of the outputs

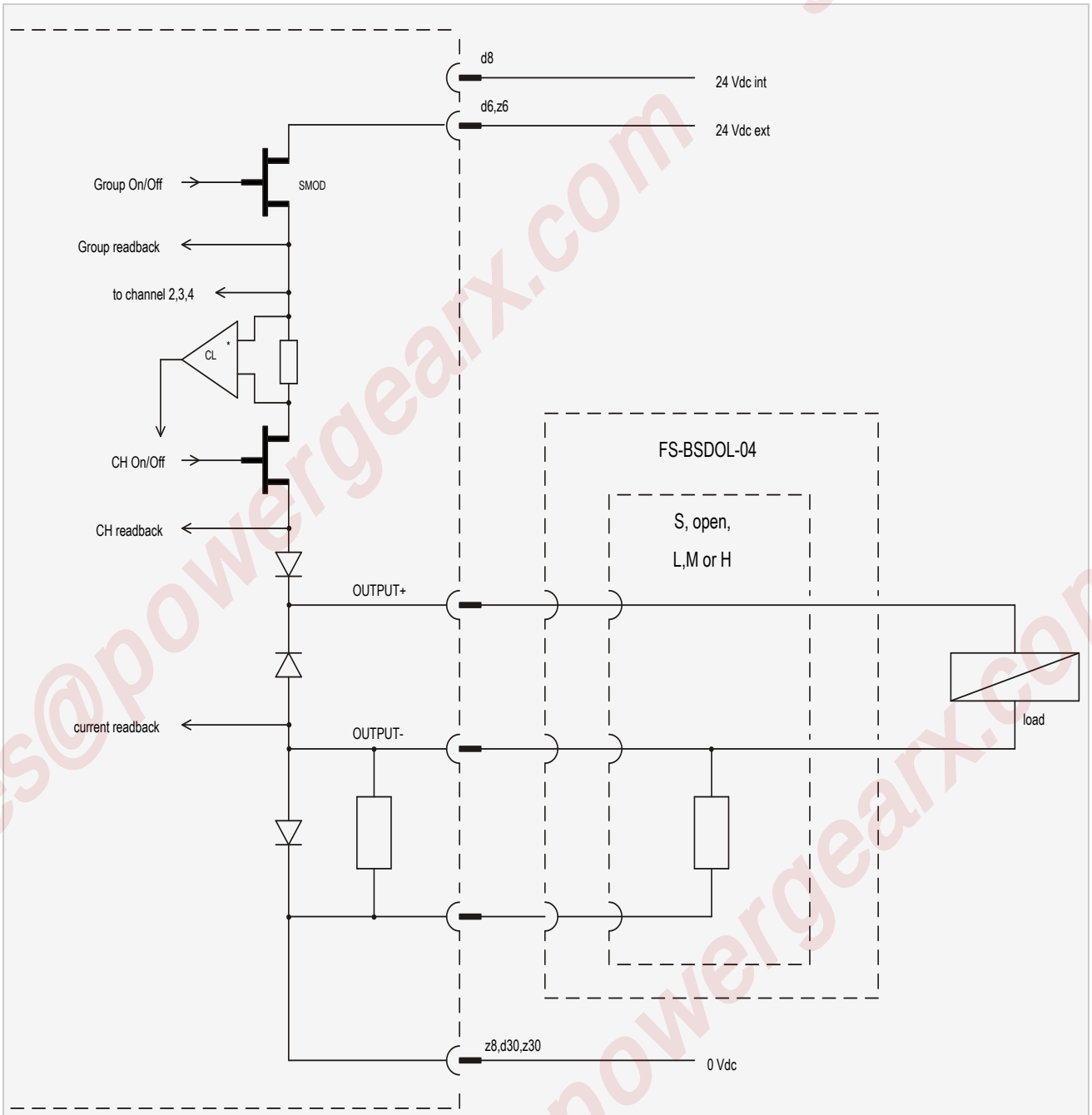

Figure 10-47: Schematic diagram for connection of one output to the SDOL-0424 module
*Current Limiting circuit

The outputs have secondary means of de-energizing (SMOD). This enables the watchdog and/or the processor to de-energize the outputs irrespective of the result of the application function.

Note:
The SDOL-0424 module can only be used in combination with an IO backplane, since the outputs require an BSDOL-04UNI module.

10.10.2 Loop monitoring

All outputs are monitored for lead breakage and short circuit. To get a rough lead breakage current setting, the current sense level must be programmed (see the below table). A BSDOL-04UNI module consists of a BSDOL-01 section, placed on the IO-backplane program connector PX and sixteen (4xS, 4xL, 4xM, 4xH) range setting sub-modules.

Table 1. Selection of range-setting module

LOAD		Range-setting module
Spare channel		Sub-module “S”
0.1-0.39 W	4-16 mA	None
0.4-1.1 W	17-47 mA	Sub-module “L”
1.2-4.7 W	48-199 mA	Sub-module “M”
≥ 4.8 W	≥ 200 mA	Sub-module “H”

Attention:
The second fault timer is started when only one Control Processor is running and the non-redundant SDOL-0424 has an open loop fault.

10.10.3 LEDs

The SDOL-0424 module has one LED for each channel; four in total.

If a channel is Off, its corresponding LED is off and gives short intermittent flashes. These indicate the lead breakage tests are being performed.

If a channel is On and the configuration is non-redundant, its corresponding LED is on and gives (very) short periodic flashes, which are hardly visible to the naked eye. These indicate the internal switch-off self-tests are being performed.

If a channel is On and the configuration is redundant, its corresponding LEDs appear to flash intermittently. This happens because the module in Control Processor 2 switches off briefly to allow the module in Control Processor 1 to perform its self-test. After the self-test of the module in Control Processor 1 has been completed, the module in Control Processor 2 switches on again (this may take some time) and the module in Control Processor 1 switches off to allow the module in Control Processor 2 to perform its self-test, etc. Due to this, it looks as if the channel LEDs of both modules flash intermittently. The LED flash speed may vary, depending on the application cycle time and configuration of Diagnostic Test Interval.

10.10.4 Pin allocation

The back view and pin allocation of the SDOL-0424 module connector are as follows:

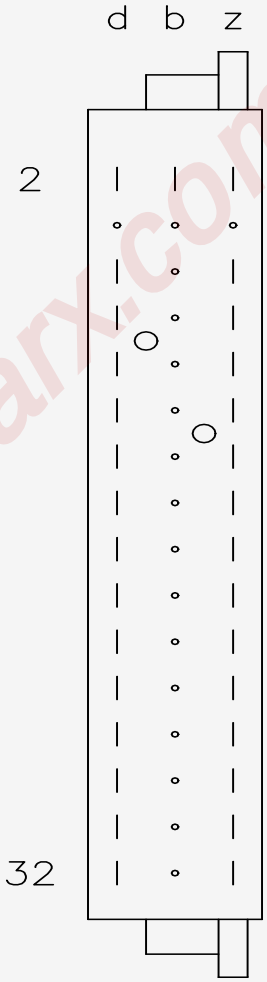

Figure 10-48: Back view and pin allocation of the SDOL-0424 module connector

d2	WDG
d4	–
d6	Supply 24 V DC ext.
d8	Supply 24 V DC int.
d10	
d12	(0 V DC)
d14	OUT 1+
d16	0 V DC
d18	OUT 2+
d20	0 V DC
d22	OUT 3+
d24	0 V DC
d26	OUT 4+
d28	0 V DC
d30	Supply 0 V DC
d32	
b2	GND
z2	VCC
z4	–
z6	Supply 24 V DC ext.
z8	Supply 0 V DC
z10	

z12	(0 V DC)
z14	OUT 1–
z16	0 V DC
z18	OUT 2–
z20	0 V DC
z22	OUT 3–
z24	0 V DC
z26	OUT 4–
z28	0 V DC
z30	Supply 0 V DC
z32	

10.10.5 Connection examples

The figure below shows a connection example for the safe digital output module SDOL-0424.

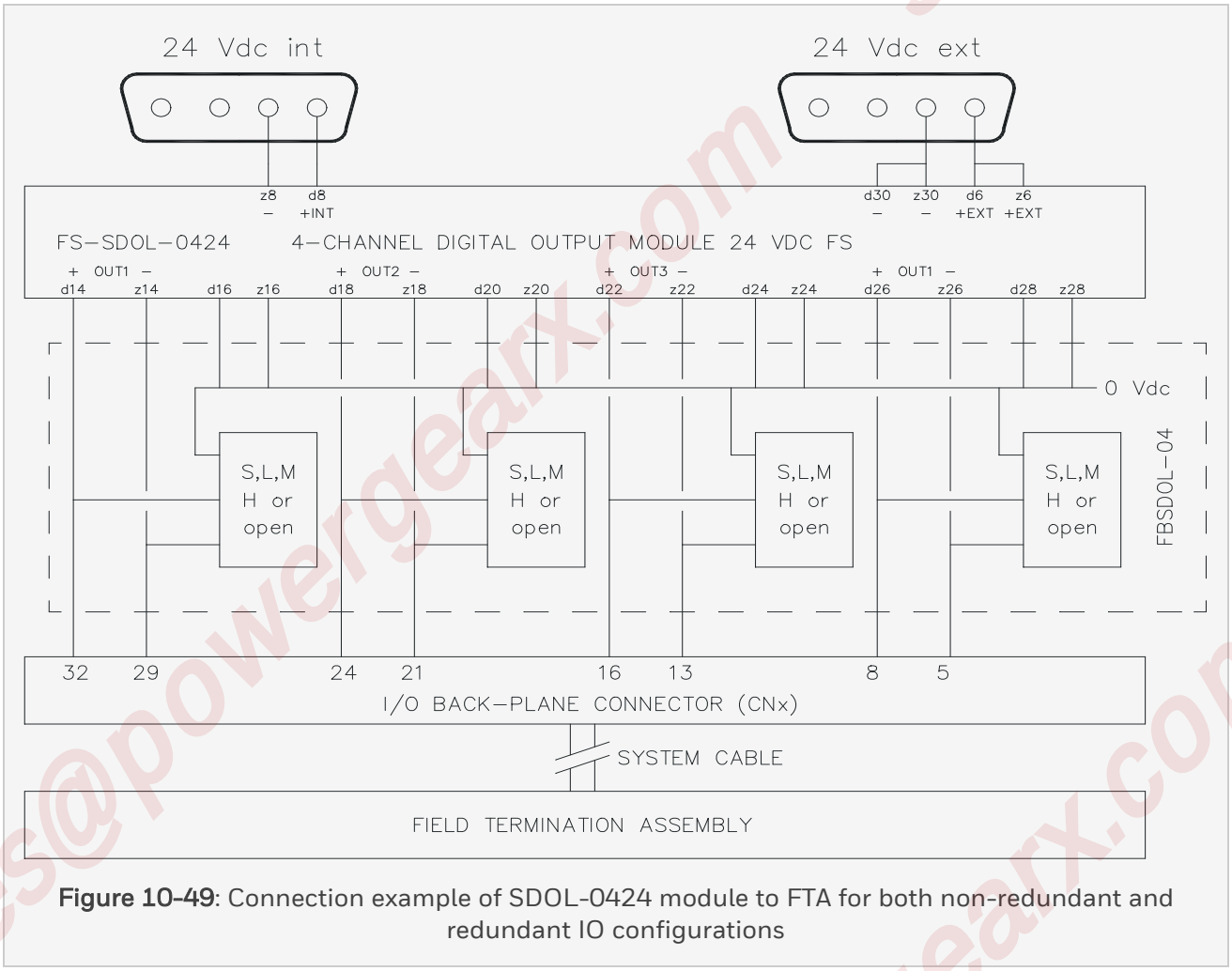

Figure 10-49: Connection example of SDOL-0424 module to FTA for both non-redundant and redundant IO configurations

Note:
The 24 V DC internal power supply (d8 and z8) must be connected to prevent fault detection during the self-test of the output module. The external power supply (d6/z6 and d30/z30), as well as (dummy) loads on all channels, must be connected to prevent fault detection during the lead breakage test of the output module.

10.10.6 Technical data

The SDOL-0424 module has the following specifications:

General	Type numbers:	FS-SDOL-0424
		FC-SDOL-0424
	Approvals:	CE, TUV, UL, CSA, FM
	Space requirements:	4 TE, 3 HE (= 4 HP, 3U)
Power	Power requirements:	5 V DC, 15 mA
		24 V DC internal, 50 mA
		24 V DC external, 15 mA (without output load)
Output	Number of output channels:	4
	Output specification:	24 V DC solid-state source, short circuit proof
	Maximum channel current:	1 A
	Maximum total module load:	3.6 A (module dissipation limit)
	Maximum load inductance:	0.5 H
	Maximum load capacitance:	1 µF
	Top of overload detection:	> 10 Ω
	Cold resistance lamp:	> 20 Ω
	Voltage drop:	< 1.3 V at 1 A
	Off current:	< 0.1 mA
	Current sense voltage drop:	< 1 V at 1 A
	WDG input current:	4 mA

Key coding	(See section Key coding)	
	Module code:	
	• Holes	A13, C9
	Chassis code:	
	• Large pins	A13, C9