



10216/2/1

Fail-safe loop-monitored digital output module (24 Vdc, 1 A, 4 channels)

Description

The fail-safe digital output module 10216/2/1 has four 24 Vdc, 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 fail-safe applications.

The outputs are tested for:

- ability to de-energize,
- ability to de-energize via the secondary means,
- crosstalk between outputs,
- function of the suppression diodes,
- lead breakage in the (external) output wiring, and
- short circuit of the outputs.

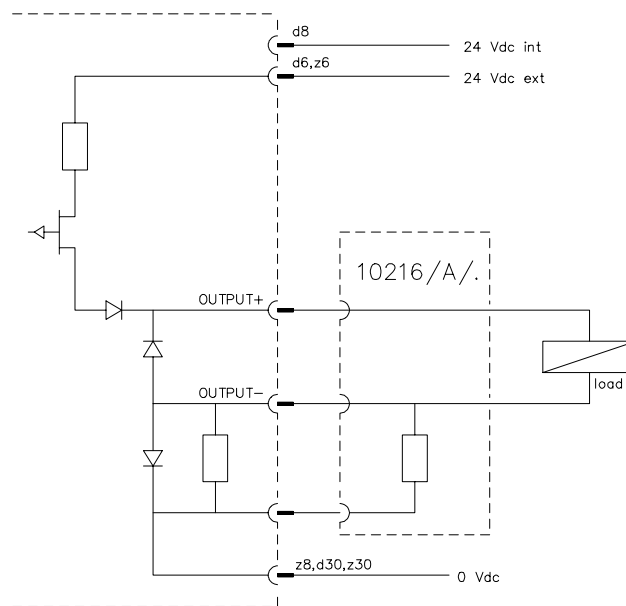


Figure 1 Schematic diagram for connection of one output to the 10216/2/1 module

The outputs have a secondary means of de-energization, which enables the watchdog and/or the processor to de-energize the outputs irrespective of the result of the application function.

Note:

The 10216/2/1 module can only be used in combination with an I/O backplane in the rack, since the outputs require a 10216/A/. module.

Loop-monitoring

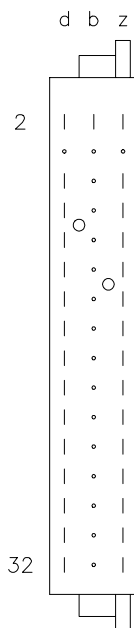
All outputs are monitored for lead breakage and short circuit. To get a rough lead breakage current setting, the current sense level must be programmed (see Table 1 below).

Table 1 Selection of range-setting module

LOAD		Range-setting module
Spare channel		10216/A/1
0.1 - 0.39 W	4 - 16 mA	none
0.4 - 1.1 W	17 - 47 mA	10216/A/2
1.2 - 4.7 W	48 - 199 mA	10216/A/3
≥ 4.8 W	≥ 200 mA	10216/A/4

Pin allocation

The back view and pin allocation of the 10216/2/1 module connector are as follows:



d2	WDG	b2	GND	z2	VCC
d4	—			z4	—
d6	Supply 24 Vdc ext.			z6	Supply 24 Vdc ext.
d8	Supply 24 Vdc int.			z8	Supply 0 Vdc
d10				z10	
d12	(0 Vdc)			z12	(0 Vdc)
d14	OUT 1+			z14	OUT 1—
d16	0 Vdc			z16	0 Vdc
d18	OUT 2+			z18	OUT 2—
d20	0 Vdc			z20	0 Vdc
d22	OUT 3+			z22	OUT 3—
d24	0 Vdc			z24	0 Vdc
d26	OUT 4+			z26	OUT 4—
d28	0 Vdc			z28	0 Vdc
d30	Supply 0 Vdc			z30	Supply 0 Vdc
d32				z32	



Connection example

The figure below shows a connection example for the fail-safe digital output module 10216/2/1.

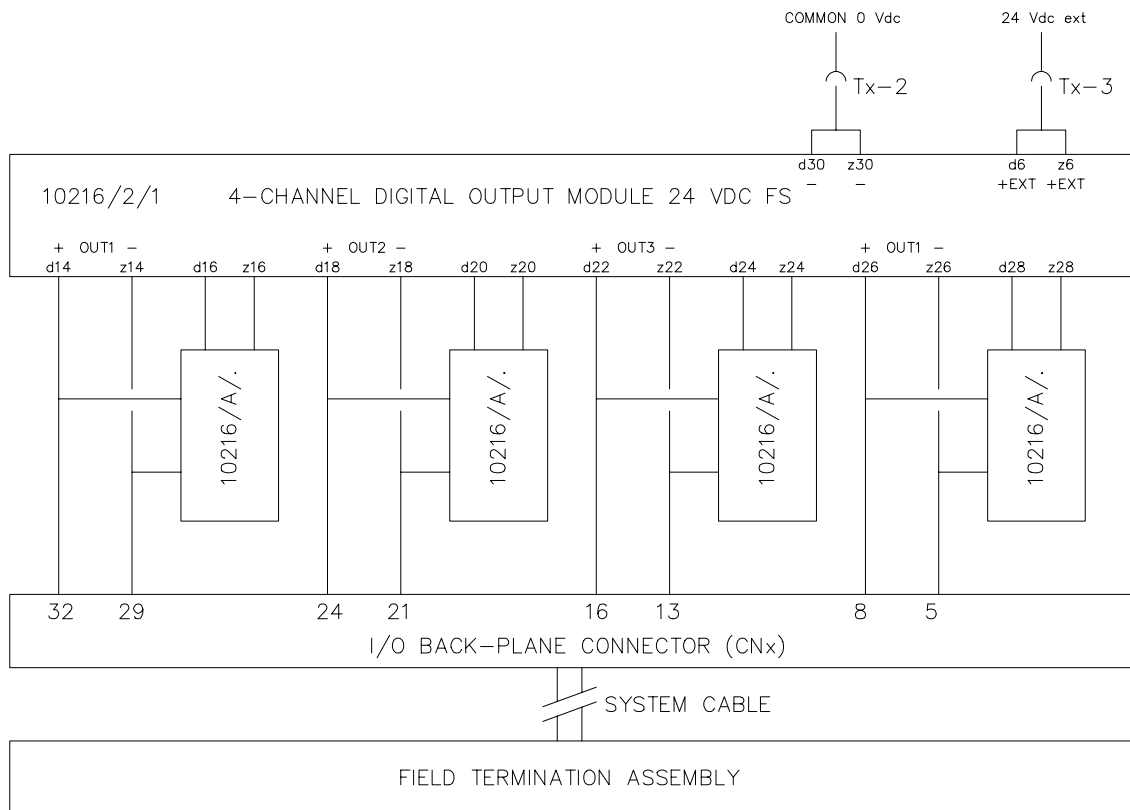


Figure 2 Connection example of 10216/2/1 module to FTA for both non-redundant and redundant I/O configurations

Note:

The 24 Vdc 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 spare channels, must be connected to prevent fault detection during the lead breakage test of the output module.

Technical data

The 10216/2/1 module has the following specifications:

General	Type number:	10216/2/1 12400
	Approvals:	CE, TÜV, UL
	Software versions	≥ 3.00
	Space requirements:	4 TE, 3 HE (= 4 HP, 3U)
Power	Power requirements:	5 Vdc 15 mA
		24 Vdc internal 50 mA
		24 Vdc external 15 mA (without output load)
Output	Number of output channels:	4
	Output specification:	24 Vdc solid-state source, short circuit proof
	Maximum channel current:	1 A (see 'FSC output modules' data sheet)
	Maximum total module load:	3.6 A (module dissipation limit)
	Maximum load inductance:	0.5 H
	Maximum load capacity:	1 µF
	Top of overload detection:	> 10 Ohm
	Cold resistance lamp:	> 20 Ohm
	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 'Key coding' data sheet)	
	Module code:	
	– holes	A13, C9
	Rack code:	
	– large pins	A13, C9

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10216/2/3

Fail-safe loop-monitored digital output module (48 Vdc, 0.5 A, 4 channels)

Description

The fail-safe digital output module 10216/2/3 has four 48 Vdc, 0.5 A loop-monitored output channels to drive loads up to 24 W. 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 fail-safe applications.

The outputs are tested for:

- ability to de-energize,
- ability to de-energize via the secondary means,
- crosstalk between outputs,
- function of the suppression diodes,
- lead breakage in the (external) output wiring, and
- short circuit of the outputs.

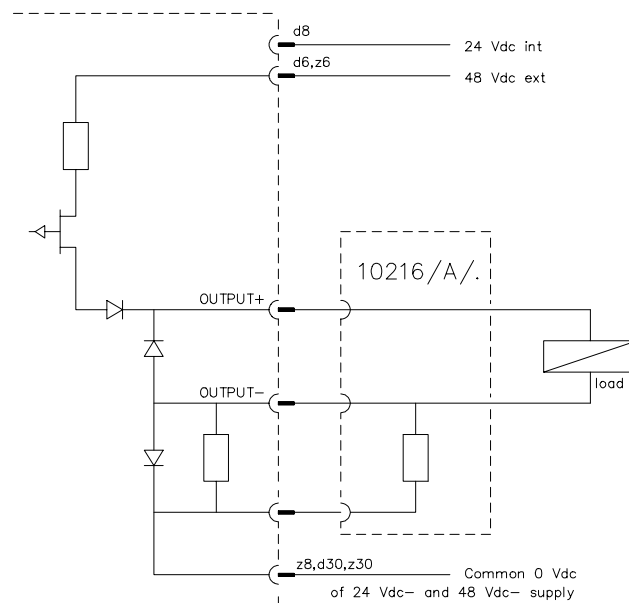


Figure 1 Schematic diagram for connection of one output to the 10216/2/3 module

The outputs have a secondary means of de-energization, which enables the watchdog and/or the processor to de-energize the outputs irrespective of the result of the application function.

Notes:

The 10216/2/3 module can only be used in combination with an I/O backplane in the rack, since the outputs require a 10216/A/. module.

The 24 Vdc (internal) and the 48 Vdc (external) must have a common 0 Vdc connection.

Loop-monitoring

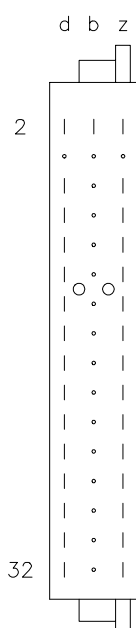
All outputs are monitored for lead breakage and short circuit. To get a rough lead breakage current setting, the current sense level must be programmed (see Table 1 below).

Table 1 Selection of range-setting module

LOAD		Range-setting module
Spare channel		10216/A/1
0.1 - 0.79 W	4 - 16 mA	none
0.8 - 2.3 W	17 - 47 mA	10216/A/2
2.4 - 9.5 W	48 - 199 mA	10216/A/3
≥ 9.6 W	≥ 200 mA	10216/A/4

Pin allocation

The back view and pin allocation of the 10216/2/3 module connector are as follows:



d2	WDG	b2	GND	z2	VCC
d4	—			z4	—
d6	Supply 48 Vdc ext.			z6	Supply 48 Vdc ext.
d8	Supply 24 Vdc int.			z8	Supply 0 Vdc
d10				z10	
d12	(0 Vdc)			z12	(0 Vdc)
d14	OUT 1+			z14	OUT 1—
d16	0 Vdc			z16	0 Vdc
d18	OUT 2+			z18	OUT 2—
d20	0 Vdc			z20	0 Vdc
d22	OUT 3+			z22	OUT 3—
d24	0 Vdc			z24	0 Vdc
d26	OUT 4+			z26	OUT 4—
d28	0 Vdc			z28	0 Vdc
d30	Supply 0 Vdc			z30	Supply 0 Vdc
d32				z32	



Connection example

The figure below shows a connection example for the fail-safe digital output module 10216/2/3.

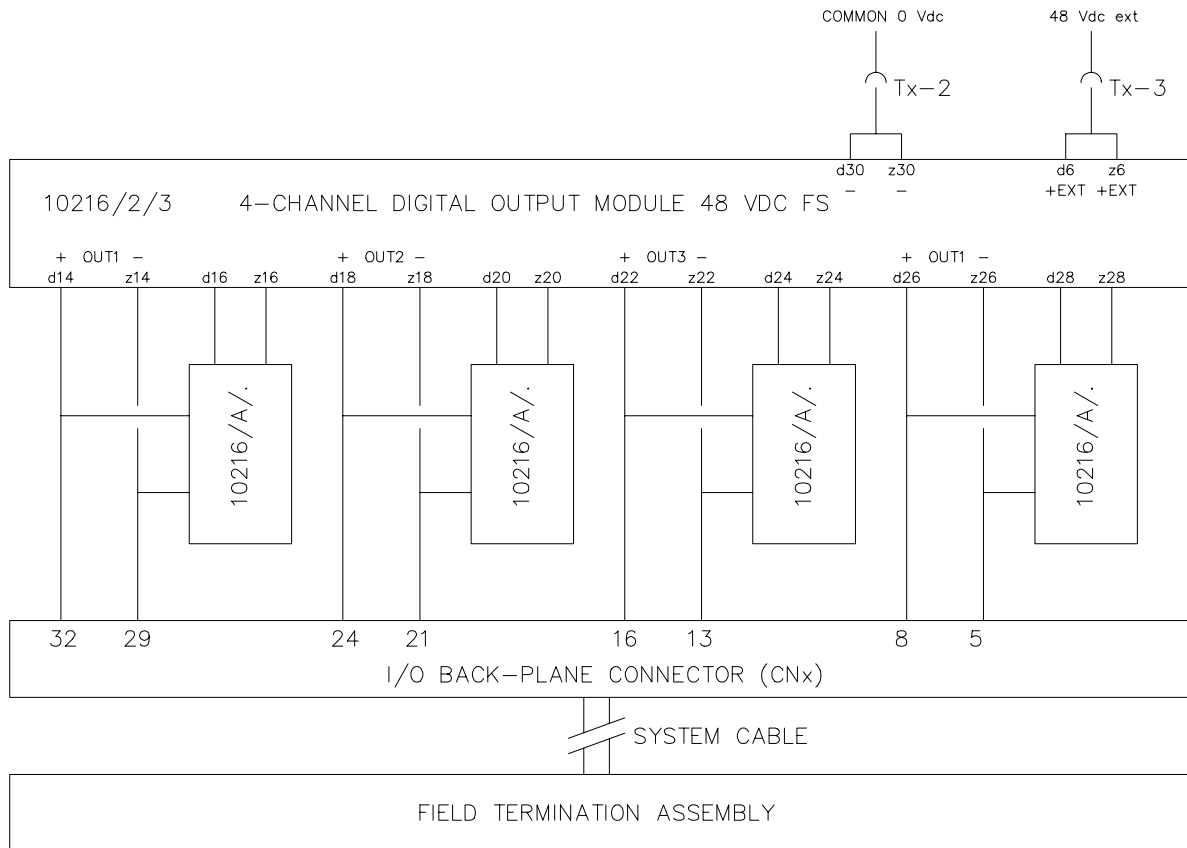


Figure 2 Connection example of 10216/2/3 module to FTA for both non-redundant and redundant I/O configurations

Note:

The 24 Vdc internal power supply (d8 and z8) must be connected to prevent fault detection during the self-test of the output module. The 48 Vdc external power supply (d6/z6 and d30/z30), as well as dummy loads on all spare channels, must be connected to prevent fault detection during the lead breakage test of the output module.



Technical data

The 10216/2/3 module has the following specifications:

General	Type number:	10216/2/3 13400
	Approvals:	CE, TÜV, UL
	Software versions:	≥ 310
	Space requirements:	4 TE, 3 HE (= 4 HP, 3U)
Power	Power requirements:	5 Vdc 15 mA
		24 Vdc internal 50 mA
		48 Vdc external 15 mA (without output load)
Output	Number of output channels:	4
	Output specification:	48 Vdc solid-state source, short circuit proof
	Maximum channel current:	0.5 A (see 'FSC output modules' data sheet)
	Maximum load inductance:	1 H
	Maximum load capacity:	1 µF
	Top of overload detection:	> 40 Ohm
	Cold resistance lamp:	> 80 Ohm
	Voltage drop:	< 1.2 V at 0.5 A
	Off current:	< 0.1 mA
	Current sense voltage drop:	< 1 V at 0.5 A
	WDG input current:	4 mA
Key coding	(See 'Key coding' data sheet)	
	Module code:	
	– holes	A13, C13
	Rack code:	
	– large pins	A13, C13

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10216/A/. Range-setting modules

Description

The loop-monitored output channels of the 10216/2/. module usually need a range-setting module to put the current sense level in the proper range or to prevent lead breakage detection on spare channels. The 10216/A/. modules are placed on a programming connector (Px) on the back of the I/O backplane in the 19-inch rack. To assist proper placement of these 10216/A/. modules, a 10216 positioning print can be placed on the programming connector.

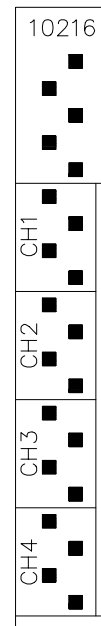


Figure 1 10216 positioning print

The printed circuit board of a 10216/A/. module should be oriented to slide into the cut-out zone of the appropriate channel. Redundant channels require only one 10216/A/. module.

10216/A/1

Spare channel

Description

The 10216/A/1 range-setting module is used for spare channels of 10216/2/. modules to prevent lead breakage detection on those channels.

The 10216/A/1 module has a 4.7 kOhm (dummy load) resistor.

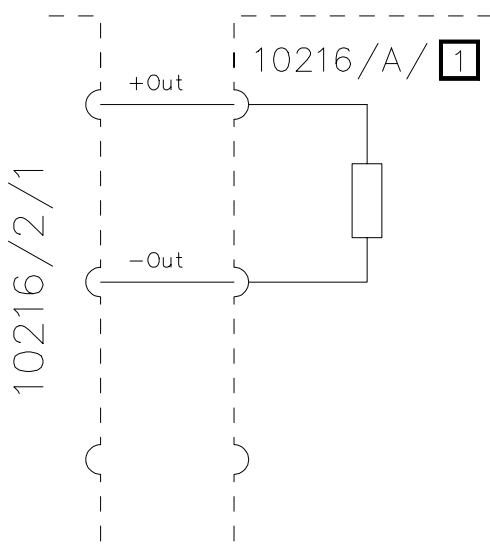


Figure 2 Schematic diagram of a 10216/A/1 module

Technical data

The 10216/A/1 module has the following specifications:

General

Type number:	10216/A/1
Approvals:	CE, TÜV, UL
Number of channels:	1
Dimensions:	23 x 10.2 x 9 mm (0.91 x 0.4 x 0.35 in)
Rack space requirements:	none (placed on programming connector on I/O backplane)

Power

Power requirements:	5 mA from 24 Vext. of 10216/2/1 10 mA from 48 Vext. of 10216/2/3
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