

Input modules

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This chapter describes the input modules that are available for Safety Manager. The following input modules are described:

input module	see
SDI-1624	Safe digital input module (24 Vdc, 16 channels) page 293
SDI-1648	Safe digital input module (48 Vdc, 16 channels) page 298
SAI-0410	Safe analog input module (4 channels) page 303
SAI-1620m	Safe high-density analog input module (16 channels) page 309
SDIL-1608	Safe loop-monitored digital input module with earth fault monitor (16 channels) page 313

For related input converter modules, see “Input converter modules” on page 321. For related FTAs, see “Field Termination Assembly modules” on page 499.

General info about input modules

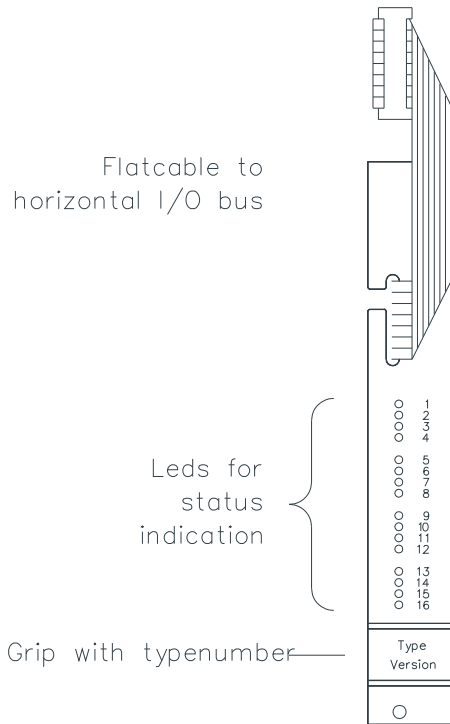
General

All input modules are standard European size (100 × 160 mm) instrument modules. The width of the module front is 4 TE = 4 HP (20.32 mm, 0.8 in), which is one slot in a standard 19 inch IO chassis.

Each input module is connected to the horizontal IO bus (IOBUS-HBS or IOBUS-HBR) via a flatcable, which extends from the module front.

Digital input modules have status LEDs for each input channel. The LEDs are located in the module front, below the flat cable.

Figure 169 Front of a digital input module



There are digital input modules for 24 Vdc, 48 Vdc and Namur signals. The modules are powered with 5 Vdc for circuits associated with the horizontal bus logic, and with 24 Vdc or 48 Vdc for the circuits associated with the input signals.

There are analog inputs for 0—20 mA, 0—5 V and 0—10 V field signals. These field signals can be converted to the required input voltage of the input modules (such as 0—2 V or 0—4 V) by using an FTA or an input converter module.

Input Modules

Input modules have galvanic isolation between 5 Vdc circuitry and field inputs. They are fitted with a male connector according to DIN 41612, type F, with the d, (b) and z rows in use.

The following items terminate on the chassis connector:

- 5 Vdc internal power supply
- 24 Vdc or 48 Vdc internal power supply
- 24 Vdc or 48 Vdc external power supply (if needed)
- Wiring for the input signals

The 5 Vdc signals are physically separated from the IO connections and supply.

The following DC supply voltage ranges apply to ensure correct operation of the Safety Manager modules:

- 110 Vdc: +25% / -15%
- 48 Vdc: +15% / -15%
- 24 Vdc: +30% / -15%



Notes:

1. If it cannot be guaranteed that the DC power supplied to Safety Manager remains within the above ranges, additional voltage monitoring is required.
 2. It is assumed that the 24Vdc Plant power fed to the SM Controller is uninterrupted. If not, means should be provided to avoid power dips at the 24Vdc lines to the SM Controller.
 3. When using Plant power, the Plant power supply must fulfill the requirements as laid down in IEC 61010 or IEC 60950.
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Address

The address of an input module is determined by the modules slot in the IO chassis. This means that input modules have no jumpers or switches for setting the address. Each input module can be replaced by any module of the same type.

Replacing an input module

Input modules can be replaced with power switched on. Depending on the input signal function and the system IO configuration, process operation may be affected.

When removing an input module, first disconnect the flat cable from the horizontal IO bus (IOBUS-HBS or IOBUS-HBR), loosen the screws, and carefully slide the module out of the chassis.

When placing an input module into the chassis, carefully push it into the slot until it is flush with the chassis, fasten the screws, then connect the flatcable to the horizontal IO bus (IOBUS-HBS or IOBUS-HBR).

SDI-1624

Safe digital input module (24 Vdc, 16 channels)

Description

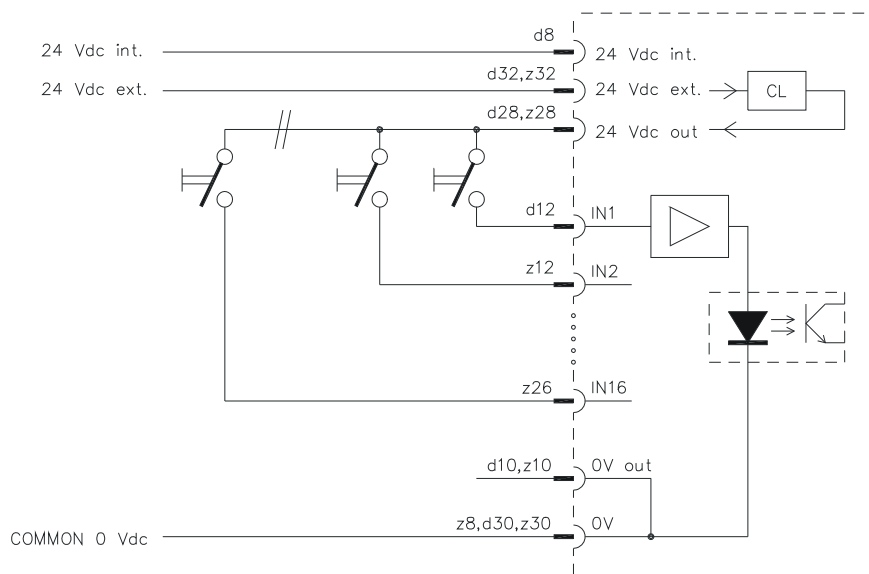
The safe digital input module SDI-1624 has sixteen 24 Vdc digital input channels. The input stage of the module is of a 'fail-to-safe' nature. This means that a component failure results in a de-energized input signal to the processor, which is the safe condition in a normally energized system.

The remaining logic circuitry on the module is completely covered by the self-test functions of the system. Within the configured Diagnostic Test Interval, the modules are tested for:

- Ability to receive logic level '0' signals
- Ability to receive logic level '1' signals
- Crosstalk between inputs

The 24 Vdc out pin is a current limited output, intended for energizing the (redundant) inputs via a field contact.

Figure 170 Schematic diagram for connection of inputs to the SDI-1624 module



Pin allocation

The following overview contains the back view and pin allocation of the SDI-1624 module connector:

	d2		b2	GND	z2	5 Vdc
	d4	–			z4	–
	d6				z6	
	d8	Supply 24 Vdc int.			z8	Supply 0 Vdc
	d10	0 Vdc out			z10	0 Vdc out
	d12	IN 1			z12	IN 2
	d14	IN 3			z14	IN 4
	d16	IN 5			z16	IN 6
	d18	IN 7			z18	IN 8
	d20	IN 9			z20	IN 10
	d22	IN 11			z22	IN 12
	d24	IN 13			z24	IN 14
	d26	IN 15			z26	IN 16
	d28	24 Vdc ext. out			z28	24 Vdc ext. out
	d30	Supply 0 Vdc			z30	Supply 0 Vdc
	d32	Supply 24 Vdc ext.			z32	Supply 24 Vdc ext.

Connection examples

The figures below show a number of connection examples for the safe digital input module SDI-1624.



Note

The 24 Vdc (internal) supply must be connected to prevent fault detection during self-test.

Figure 171 Connection example of SDI-1624 module to FTA for both non-redundant and redundant IO configurations

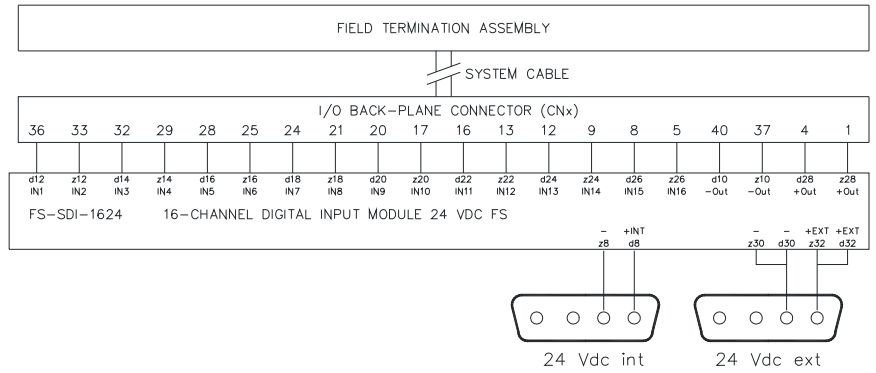


Figure 172 IO connection example of SDI-1624 module for non-redundant IO configurations

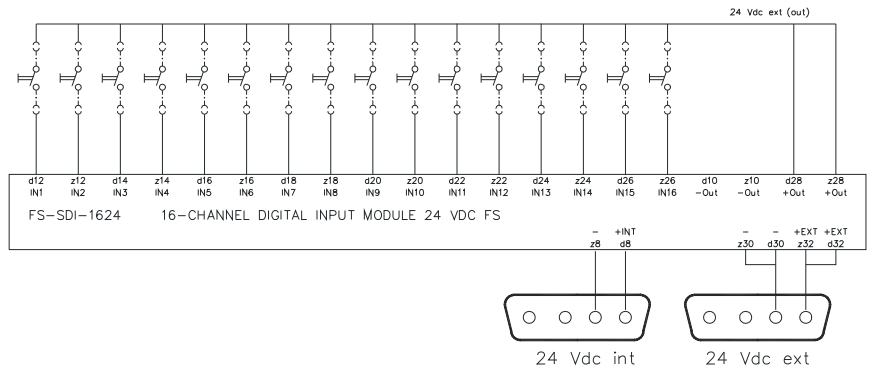
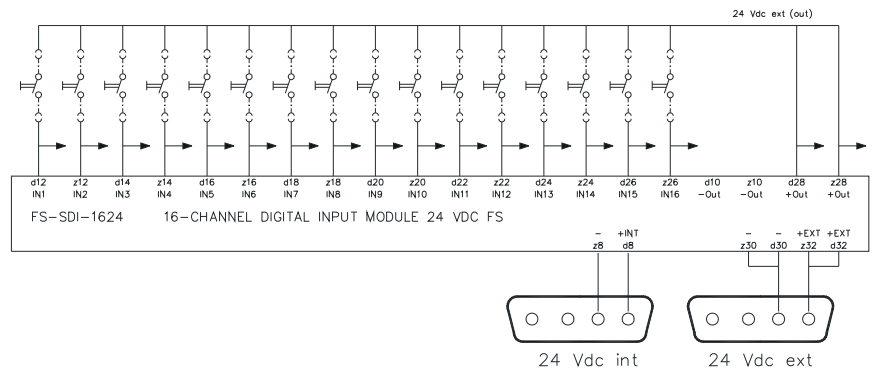


Figure 173 IO connection example of SDI-1624 module for redundant IO configurations



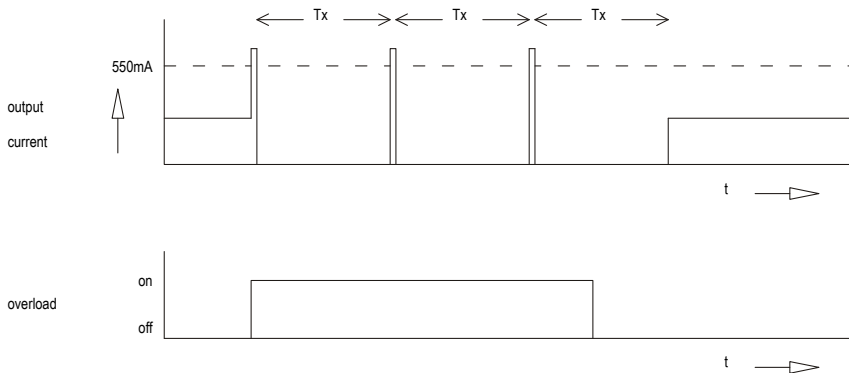
Hazardous locations (FM 3611)

The SDI-1624 module can also be used in non-hazardous areas for non-incendiary field circuits to Division 2 locations in compliance with FM 3611 (Class I, Division 2, Groups ABCD; Class II, Division 2, Groups FG). For more details, see the FM Approval Guide EP-SM.6287.

24 Vdc Output current limiting

The 24 Vdc Out provides power to the switching elements. This transistor output has an electronic current-limiting circuit. If the output is overloaded or shorted, it goes into current limit for a brief period of time (several milliseconds), supplying *at least* the specified maximum current. If the overload or short-circuit persists, the output switches off for several hundred milliseconds, and tries again.

Figure 174 24V output overload / short-circuit behavior



Technical data

The SDI-1624 module has the following specifications:

General	Type numbers ¹ :	FS-SDI-1624 V1.0
		FC-SDI-1624 CCV1.0
	Approvals:	CE, TUV, UL, CSA, FM
	Space requirements:	4 TE, 3 HE (= 4 HP, 3U)
Power	Power requirements:	5 Vdc, 8 mA 24 Vdc int., 110 mA 24 Vdc ext., 110 mA (input currents)
	Ripple content (on 5 Vdc):	< 0.5 Vp-p (0—360 Hz)
Input	Number of input channels:	16
	Maximum input voltage:	36 Vdc
	Input current:	7 mA at 24 Vdc
	Input HIGH:	> 15 Vdc
	Input LOW:	< 9 Vdc (I < 2 mA)
	Input delay:	Typically 10 ms
Output	Type	24 Vdc solid state, short circuit proof
	Maximum current	450 mA (see Figure 174 on page 296)
	Max. load capacitance	32 μ F
	Voltage drop	< 1.5 V at 450 mA
Key coding	(See section “Key coding” on page 17)	
	Module connector code:	
	• Holes	A5, C5
	Chassis connector code:	
• Large pins	A5, C5	

- 1 FS-type modules are non conformal coated modules.
FC-type modules are conformal coated modules. Conformal coated modules have the letters “CC” preceding the version number.