

15 Field Termination Assembly Module

15.16 TSAI-1620m

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15.16.1 Safe 0-20 mA and 4-20 mA analog input FTA (16 channels)

Field termination assembly module TSAI-1620m is the interface between field components (such as sensors) and the safe high-density analog input module SAI-1620m in Safety Manager. It can be used for interfacing signals from Class I, Division 2 Hazardous Locations.

The TSAI-1620m module has sixteen analog input channels, which may be used for both safety-related and non-safety-related applications. These sixteen channels (separated into two groups of eight channels with common 0 V) are connected via a system interconnection cable (SICC-0001/Lx), which is plugged into the SIC connector on the FTA module.

The FTA module has a universal snap-in provision for standard DIN EN rails, and screw terminals for connection of power supply, ground and field wiring.

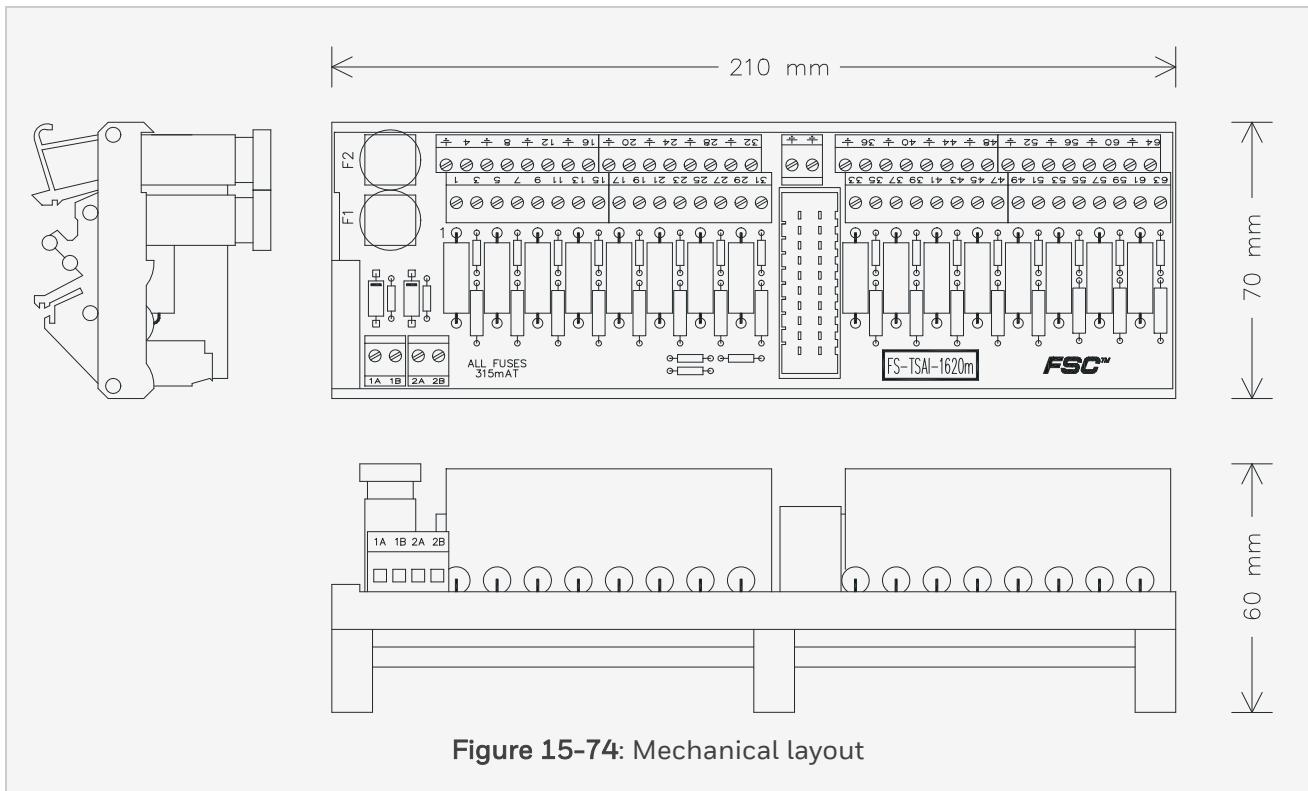


Figure 15-74: Mechanical layout

15.16.2 Main functions

TSAI-1620m module has three main functions:

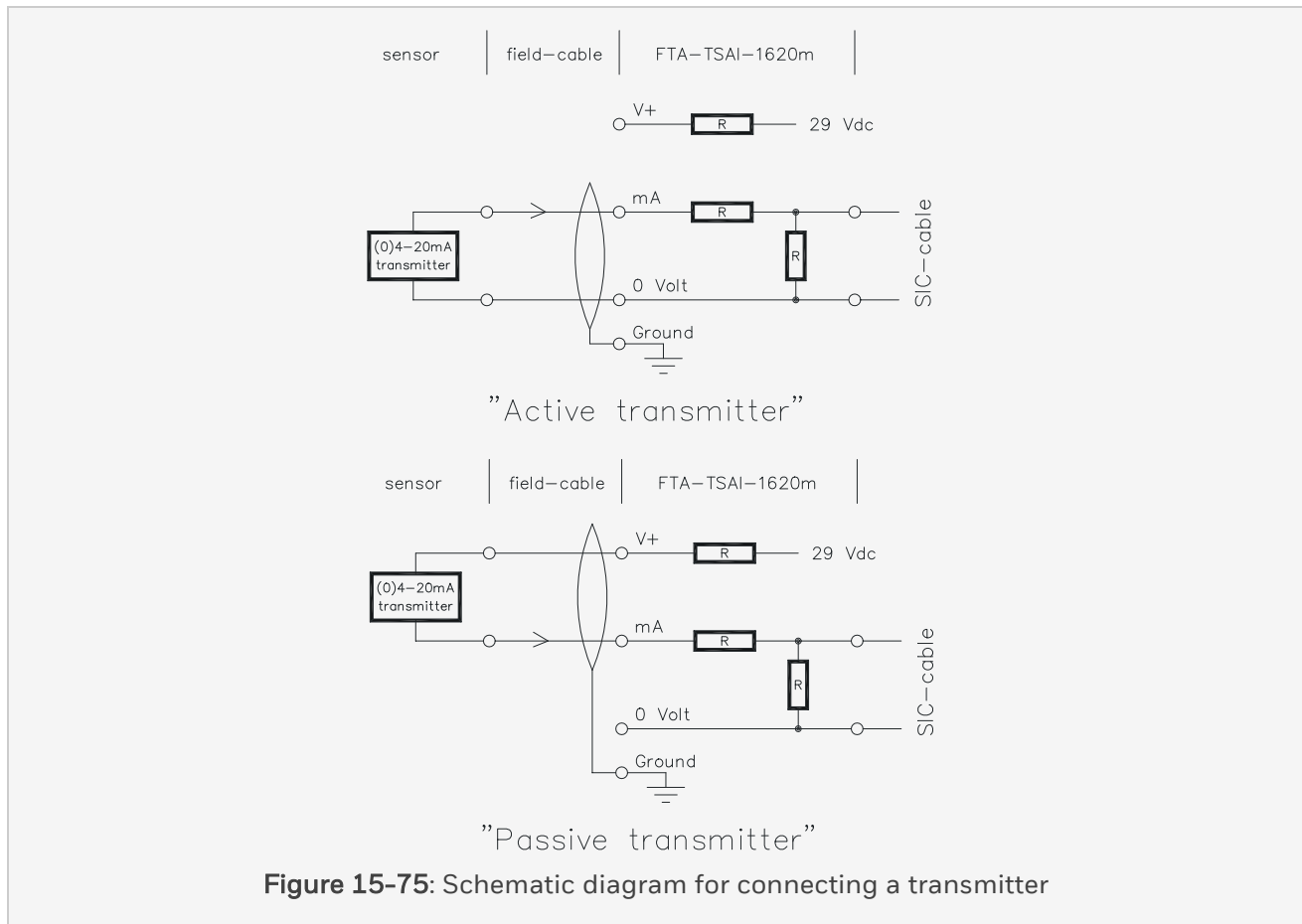
- Linear direct conversion of 0(4)-20 mA DC field signals to the signal levels of the safe high-density analog input module SAI-1620m
- Power supply distribution to each transmitter with voltage-current limitation in compliance with Hazardous Area Class I Division 2
- Enabling monitoring of the external power connected to the FTA module

15.16.2.1 Linear direct conversion

The input circuit of each channel consists of a high-precision resistor, which converts the input current (0-20 mA) to the input voltage for the high-density analog input module SAI-1620m. Power is supplied to the analog transmitter via a series resistor. Each analog signal has its own terminal for the field cable shield. The below figure shows the schematic diagram for connecting a transmitter (active and passive).

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15.16.2.2 Class I division 2

The TSAI-1620m module may be used for non-incendiary field circuits for Class I, Division 2 applications. The external output voltage (V+) is current-limited by means of a series resistor.

15.16.2.3 Transmitter voltage

The below figure shows the available transmitter voltage for passive transmitters.

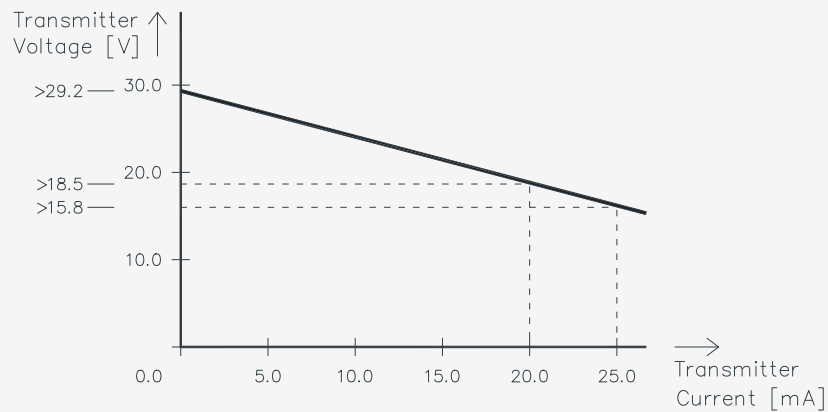


Figure 15-76: Transmitter voltage for passive transmitters

15.16.2.4 External power

If all inputs are active, no external power is required.

For loops, which contain passive transmitters, analog process data is only available if the supply voltage to the electronics is guaranteed. The high-density analog input concept (using TSAI-1620m / TPSU-2430 modules) offers full monitoring of power that is provided externally. If DC/DC converter modules TPSU-2430 are used, even redundant power supplies are covered.

Redundant external power can be connected to the TSAI-1620m module via two screw terminal pairs marked '1A', '1B', '2A' and '2B'. The external power supplies are de-coupled via diodes (see the below figure). The sixteen channels on the FTA module are divided into two groups of eight channels, with each group being protected by a 315 mA fuse. Single-channel errors (shorts from V+ to 0 V) cannot blow the group fuse.

Note:

The 0 V connection of the external power is directly connected to the common 0 V of all sixteen analog inputs.

The Safety Manager application software must monitor the external power voltage via the safe high-density analog input module SAI-1620m when safety-related analog input signals are connected to the TSAI-1620m.

The below figure shows the schematic diagram for power distribution with monitoring.

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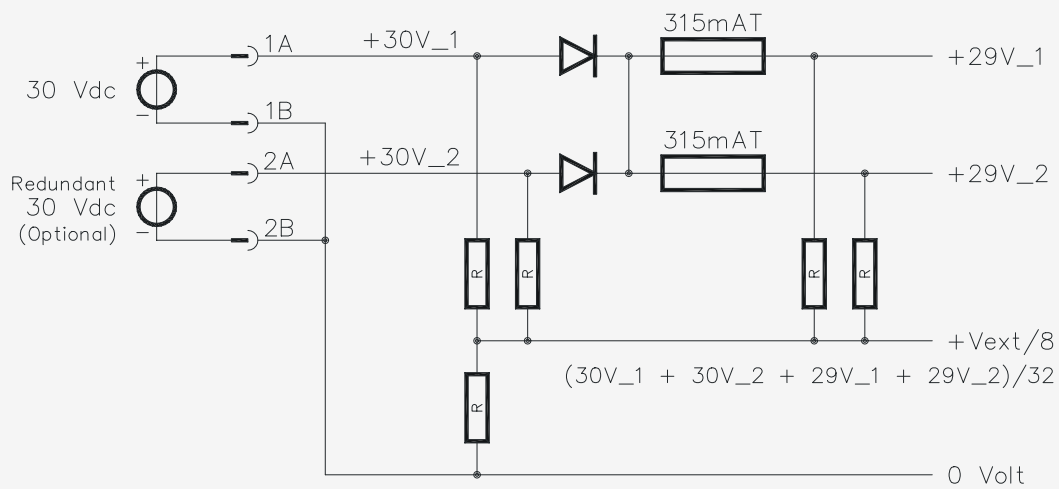


Figure 15-77: Schematic diagram for power distribution with monitoring

15.16.3 Applications

For details on applications and connection options for the TSAI-1620m module, see section [SICC 0001/Lx](#).

15.16.4 Connections

15.16.4.1 External power and ground

The redundant external supply voltage (Vext) and ground are connected to the following screw terminals (marked '1A', '1B', '2A', '2B' and '⏏' on the FTA):

Screw terminal	Function
1A	30 V DC Vext feeder 1
1B	0 V DC Vext feeder 1
2A	30 V DC Vext feeder 2
2B	0 V DC Vext feeder 2
⏏	Ground connection
⏏	Ground connection (1 ground wire is enough)

15.16.4.2 Connections diagram

TSAI-1620m has 16 groups (= 16 channels) of four screw terminals to provide optimum connection of field wiring, with a ground terminal per channel for screening of analog input cables. The screw terminals are numbered 1 to 64.

The connections diagram of the TSAI-1620m module:

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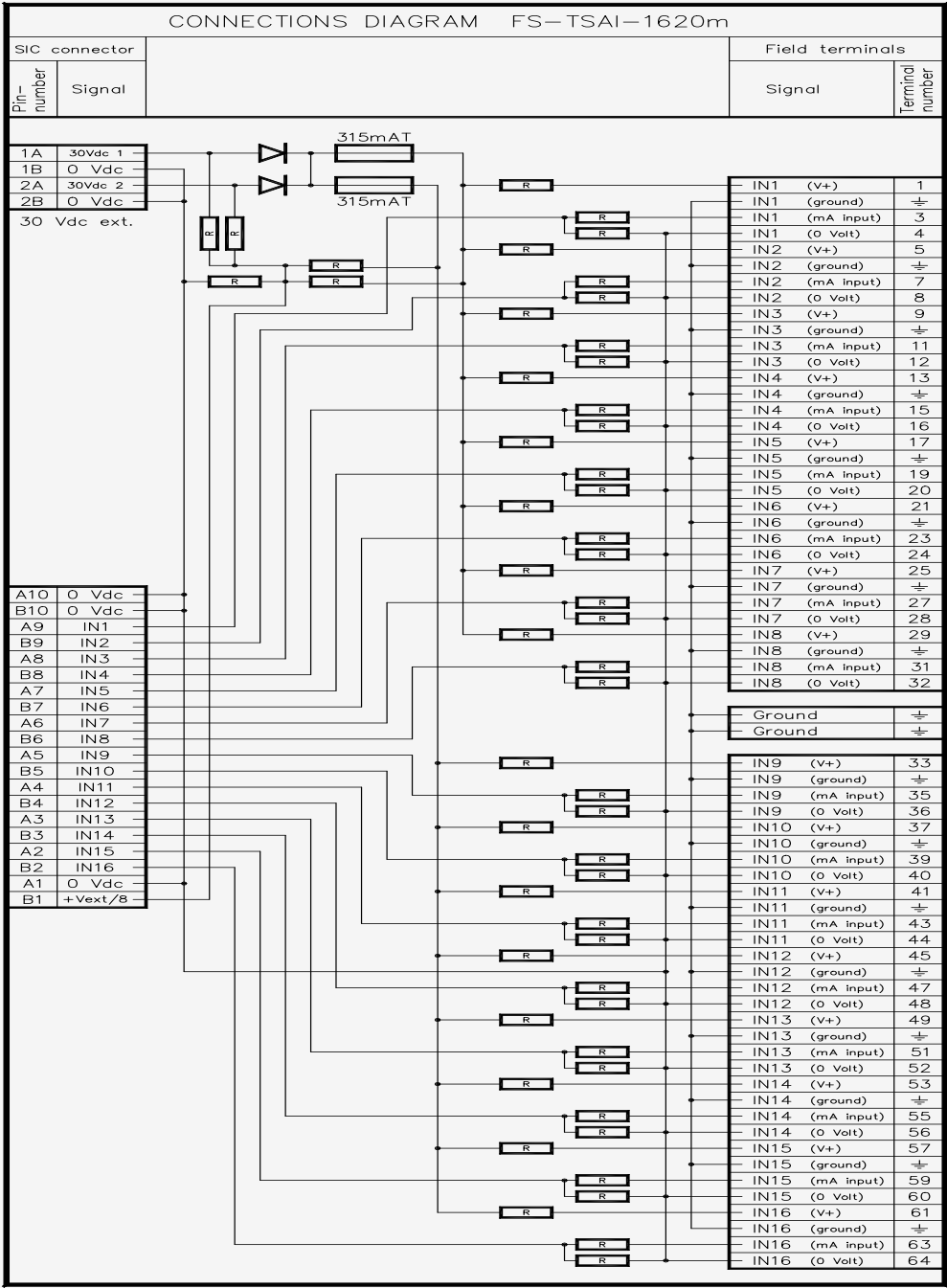


Figure 15-78: Connections diagram

15.16.5 Technical data

The TSAI-1620m module has the following specifications:

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General	Type numbers:	FS-TSAI-1620m
		FC-TSAI-1620m
	Approvals:	CE, TUV, UL, CSA, FM
Input	Number of input channels:	16 (2 groups of 8 with common 0 V)
	Power requirements:	30 V DC external, 3 mA (without input loop loads)
	Input current:	0-25 mA
	Input resistance:	250 Ω ($\pm$ 1%)
Output	To passive transmitters (Vext):	
	• Output resistance:	270 Ω ($\pm$ 5%)
	• Igniting current per channel:	< 120 mA at 30 V DC
	To SAI-1620m module:	
	• Output voltage	0-4 V DC
	• Accuracy	0.10%
Fuse	Fuse rating:	315 mA
	Fuse dimensions:	5x20 mm
	Voltage rating AC:	125 V
	Voltage rating DC:	-
	Manufacturer:	SOC
	Manufacturer PN:	MQ2 315 mA
	Maximum output current per fuse:	220 mA

Physical	Module dimensions:	210 × 70 × 60 mm (L × W × H)
		8.26 × 2.76 × 2.36 in (L × W × H)
	DIN EN rails:	TS32 / TS35 × 7.5
	Used rail length:	211 mm (8.30 in)
Termination	Screw terminals:	
	• Max. wire diameter	2.5 mm > 2; (AWG 14)
	• Strip length	7 mm (0.28 in)
	• Tightening torque	0.5 Nm (0.37 ft-lb)

The TSAI-1620m module has the following for non-incendive field circuits, Class1 Division 2 specifications:

Field signal specifications for non-incendive field circuits, Class1 Division 2	HYDROGEN (Group A & B):	
	• Max. loop inductance	6 mH
	• Max. loop capacitance	0.25 μF
	NON-HYDROGEN (Group C & D):	
	• Max. loop inductance	20 mH
	• Max. loop capacitance	5 μF

15.17 TSAO-0220m

15.17.1 Safe analog output FTA (0(4)-20 mA, 2 channels)

Field termination assembly module TSAO-0220m is the interface between system interconnection cable SICC-0001/Lx and external field wiring (screw terminals). The two channels of an TSAO-0220m module can be connected to a (redundant pair of) SAO-0220m module(s) with the system interconnection cable SICC-0001/Lx.