

X67AI4850

1 General information

This module is a 4-channel analog input module. It is used to evaluate potentiometer displacement gauges.

- 4 inputs for potentiometer displacement gauge

2 Order data

Model number	Short description	Figure
	Analog input modules	
X67AI4850	X67 analog input module, 4 inputs, potentiometer displacement gauge 14-bit	

Table 1: X67AI4850 - Order data

Required accessories
For a general overview, see section "Accessories - General overview" of the X67 system user's manual.

3 Technical data

Model number	X67AI4850
Short description	
I/O module	4 inputs for potentiometer displacement gauge
General information	
B&R ID code	0x9957
Status indicators	Channel status, operating status, module status
Diagnostics	
Module run/error	Yes, using status LED and software
Input	Yes, using status LED and software
Connection type	
X2X Link	M12, B-keyed
Inputs	4x M12, A-keyed
I/O power supply	M8, 4-pin
Power consumption	
Bus	0.75 W
Internal I/O	2 W
Certifications	
CE	Yes
KC	Yes
EAC	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5
ATEX	Zone 2, II 3G Ex nA IIA T5 Gc IP67, Ta = 0 - Max. 60°C TÜV 05 ATEX 7201X
I/O power supply	
Nominal voltage	24 VDC
Voltage range	18 to 30 VDC

Table 2: X67AI4850 - Technical data

Model number	X67AI4850
Integrated protection	Reverse polarity protection
Potentiometer power supply	
Short-circuit proof	Yes
Potentiometer supply voltage U_{pot}	4.5 V / max. 50 mA
Voltage drop for short-circuit protection at 50 mA	Max. 0.13 VDC
Potentiometer, displacement gauge	
Input type	Single ended input in the range from 0 to U_{pot}
Digital converter resolution	14-bit
Measurement sensor	0.5 to 10 k Ω , potentiometer
Conversion time	<200 μ s for all channels
Output format	INT (16-bit 2s complement)
Short-circuit protection U_{pot}	Yes
Influence of cable length	The shielded twisted pair cable should be as short as possible and run separately to the sensor (isolated from load circuit) without intermediate terminals
Common-mode range	0 to U_{pot}
Isolation voltage between input and bus	500 V _{Eff}
Quantization; LSB value (14-bit)	275 μ V
Conversion procedure	Sample & Hold
Output of digital value	
Open GND circuit	0x7FFF
Open circuit on slider	0x7FFF
Open circuit on U_{pot}	0x0000
Valid range of values	0x0000 - 0x7FFF
Input filter	
Cutoff frequency	10 kHz
Slope	60 dB/Dec.
Electrical properties	
Electrical isolation	Bus isolated from analog input
Operating conditions	
Mounting orientation	
Horizontal	Yes
Vertical	Yes
Installation elevation above sea level	
0 to 2000 m	No limitations
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m
Degree of protection per EN 60529	IP67
Ambient conditions	
Temperature	
Operation	-25 to 60°C
Derating	-
Storage	-40 to 85°C
Transport	-40 to 85°C
Mechanical properties	
Dimensions	
Width	53 mm
Height	85 mm
Depth	42 mm
Weight	195 g
Torque for connections	
M8	Max. 0.4 Nm
M12	Max. 0.6 Nm

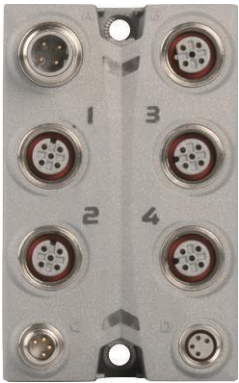
Table 2: X67AI4850 - Technical data

4 LED status indicators

Figure	LED	Description	
 Status indicator 1: Left: Green, Right: Red Status indicator 2: Left: Green, Right: Red	Status indicator 1	Status indicator for X2X Link	
	Green	Red	Description
	Off	Off	No supply via X2X Link
	On	Off	X2X Link supplied, communication OK
	Off	On	X2X Link supplied, but X2X Link communication is not functioning
	On	On	PREOPERATIONAL: X2X Link supplied, module not initialized
	1 - 4	Status indicator for corresponding analog input (green)	
	LED	Status	Description
	1 - 4	On	A/D converter running
		Blinking	Input signal overflow or underflow
		Off	Open circuit or disconnected sensor
	Status indicator 2	Status indicator for module function	
	LED	Status	Description
	Green	Off	No power to module
		Single flash	RESET mode
	Double flash	BOOT mode (during firmware update) ¹⁾	
	Blinking	PREOPERATIONAL mode	
	On	RUN mode	
Red	Off	No power to module or everything OK	
	On	Error or reset status	
	Single flash	Warning/Error on an I/O channel. Overflow in analog inputs.	

1) Depending on the configuration, a firmware update can take up to several minutes.

5 Connection elements



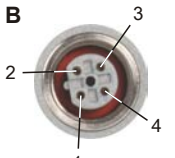
X2X Link
Connection A: Input
Connection B: Output

Connections for channel 1 to 4

24 VDC I/O power supply
Connection C: Supply
Connection D: Routing

6 X2X Link

This module is connected to X2X Link using pre-assembled cables. The connection is made using M12 circular connectors.

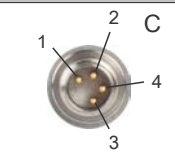
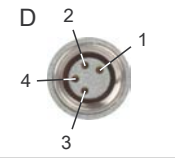
Connection	Pinout	
	Pin	Description
	1	X2X+
	2	X2X
	3	X2X⊥
	4	X2X\
	Shield connection made via threaded insert in the module.	
	A → B-keyed (male), input	
	B → B-keyed (female), output	

7 24 VDC I/O power supply

The I/O power supply is connected via M8 connectors C and D. The I/O power supply is connected via connector C (male). Connector D (female) is used to route the I/O power supply to other modules.

Information:

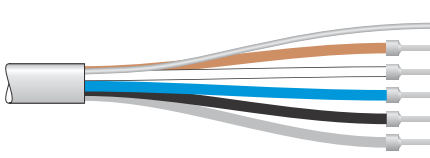
The maximum permissible current for the I/O power supply is 8 A (4 A per connection pin)!

Connection	Pinout	
	Pin	Description
	1	24 VDC
	2	24 VDC
	3	GND
	4	GND
	C → Connector (male) in module, feed for I/O power supply	
	D → Connection (female) in module, routing of I/O power supply	

8 Pinout



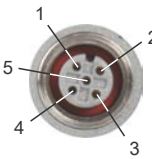
X1 to X4
M12 ①



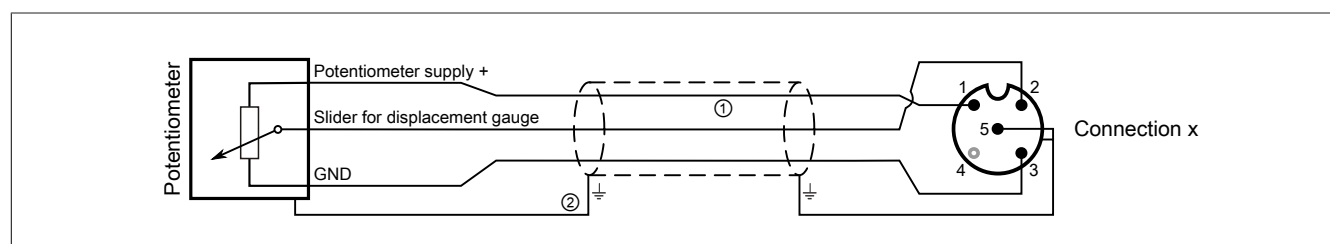
Shield	
1	+24 VDC
2	AI +
3	GND
4	NC
5	Shield

- ① X67CA0A41.xxxx: M12 sensor cable, straight
- X67CA0A51.xxxx: M12 sensor cable, angled

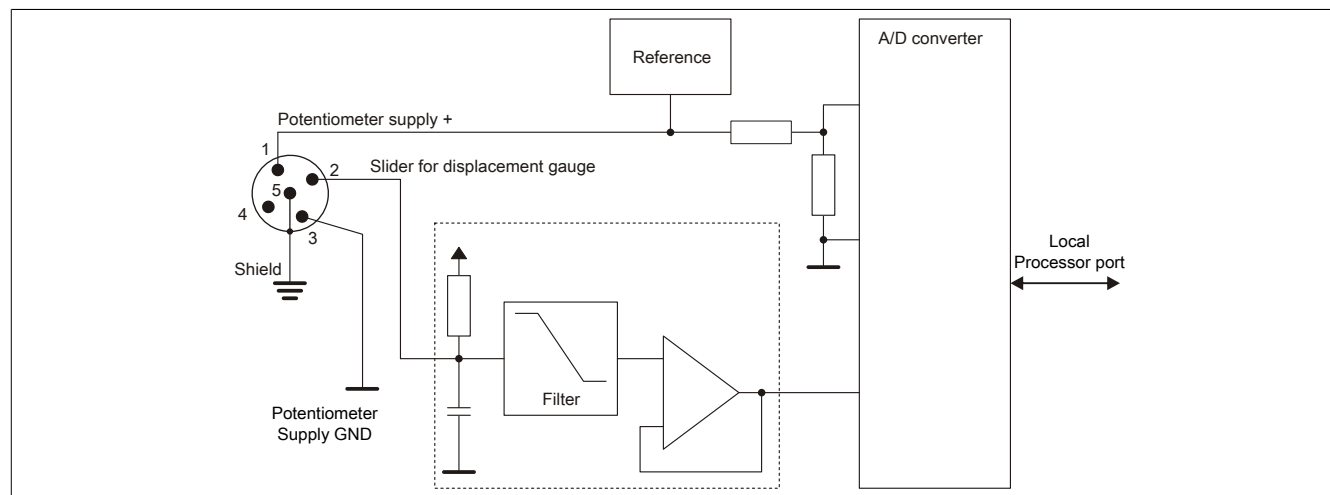
8.1 Connections X1 to X4

M12, 5-pin	Pinout	
	Pin	Description
Connections 1/2  Connections 3/4 	1	Potentiometer supply +
	2	Slider for displacement gauge
	3	Potentiometer supply GND
	4	NC
	5	Shield ¹⁾
1) Shielding also provided by threaded insert in the module. X1 to X4 → A-keyed (female), input		

9 Connection example



10 Input circuit diagram



11 Register description

11.1 General data points

In addition to the registers listed in the register description, the module also has other more general data points. These registers are not specific to the module but contain general information such as serial number and hardware version.

These general data points are listed in section "Additional information - General data points" of the X67 system user's manual.

11.2 Function model 0 - Standard

Register	Name	Data type	Read		Write	
			Cyclic	Acyclic	Cyclic	Acyclic
Communication						
0	AnalogInput01	INT	•			
2	AnalogInput02	INT	•			
4	AnalogInput03	INT	•			
6	AnalogInput04	INT	•			
30	StatusInput01	USINT	•			
8196	ModulState	USINT		•		

11.3 Function model 254 - Bus controller

Register	Offset ¹⁾	Name	Data type	Read		Write	
				Cyclic	Acyclic	Cyclic	Acyclic
Communication							
0	0	AnalogInput01	INT	•			
2	2	AnalogInput02	INT	•			
4	4	AnalogInput03	INT	•			
6	6	AnalogInput04	INT	•			
30	-	StatusInput01	USINT		•		
8196	-	ModulState	USINT		•		

1) The offset specifies the position of the register within the CAN object.

11.3.1 Using the module on the bus controller

Function model 254 "Bus controller" is used by default only by non-configurable bus controllers. All other bus controllers can use additional registers and functions depending on the fieldbus used.

For detailed information, see section "Additional information - Using I/O modules on the bus controller" of the X67 user's manual (version 3.30 or later).

11.3.2 CAN I/O bus controller

The module occupies 1 analog logical slot on CAN I/O.

11.4 Analog signal - Communication

11.4.1 Input values of analog inputs

Name:

AnalogInput01 to AnalogInput04

The analog input value of the potentiometer is mapped in this register.

Data type	Value	Input signal:
INT	0 to 32767	0 to 100% of the potentiometer

11.4.2 Status of the inputs

Name:
StatusInput01

This register is used to monitor the module inputs. A change in the monitoring status generates an error message. The following states are monitored depending on the settings:

Data type	Values
USINT	See the bit structure.

Bit structure:

Bit	Description	Value	Information
0 - 1	Channel 1	00	No error
		01	Below lower limit value
		10	Above upper limit value
		11	Open circuit
...		...	
6 - 7	Channel 4	00	No error
		01	Below lower limit value
		10	Above upper limit value
		11	Open circuit

11.5 Operating limits

Name:
ModulState

Data type	Value
USINT	See bit structure.

Bit structure:

Bit	Description	Value	Information
0	I/O power supply within/outside warning limits	0	Within the warning limits (18 to 30 V)
		1	Outside of the warning limits (<18 V or >30 V)
1 - 7	Reserved	0	

11.6 Minimum I/O update time

The minimum I/O update time defines how far the bus cycle can be reduced while still allowing an I/O update to take place in each cycle.

Minimum I/O update time
250 µs

11.7 Minimum cycle time

The minimum cycle time specifies the time up to which the bus cycle can be reduced without communication errors occurring. It is important to note that very fast cycles reduce the idle time available for handling monitoring, diagnostics and acyclic commands.

Minimum cycle time
250 µs