8EAC0151.001-1

1 General information

Incremental encoder plug-in module 8EAC0151.001-1 can be used in the slot of an ACOPOS P3 8EI servo drive. The module includes an incremental encoder interface for evaluating incremental encoders with square wave signals electrically phase-shifted by 90°.

The plug-in module is primarily used to evaluate encoders installed in external motors as well as external axis encoders (i.e. encoders that detect any machine movement).

All 4 edges are always evaluated; the counter frequency is therefore 4x the input frequency.

When switched on, the plug-in module is automatically identified by the operating system on the ACOPOS P3 8EI servo drive.

Information:

The encoder interfaces of 8EAC plug-in modules are each permanently assigned to an axis (motor connection X5xx) of the 8EI servo amplifier in which the respective 8EAC plug-in module is being operated.

8EAC encoder interface plug-in module	Assignment		
	8EIxxxxxS... 1-axis modules	8EIxxxxxD... 2-axis modules	8EIxxxxxT... 3-axis modules
X41x	X51 / X51A	X51 / X51A	X51 / X51A
X42x	---	X52	X52
X43x	---	---	X53

Supported encoder types

- Incremental encoders with RS422 output signals
- Incremental encoders with push, pull or push-pull outputs with no complementary signal
- Incremental encoders with symmetrical push-pull outputs
- Incremental encoders with an encoder power supply of +5 V or +12 V

Caution!

An incorrect configuration can result in irreparable damage to the plug-in module or connected encoder!

Information:

The encoder type for the multi-encoder interface is not predefined from the factory.
Before commissioning, configure the encoder type in Automation Studio for each incremental encoder interface!

2 Order data

Order number	Short description	Figure
	Plug-in modules	
8EAC0151.001-1	ACOPOS P3 plug-in module, incremental encoder interface	
	Optional accessories	
	Adapter cables	
8ECG00X4.3151D-0	ACOPOS P3 adapter cable, length 0.4 m, for analog multi-encoder interfaces and incremental encoder interfaces, 5x 2x 0.14 mm², 10-pin male IX connector to 15-pin female DSUB	

Table 1: 8EAC0151.001-1 - Order data

3 Technical data

Order number	8EAC0151.001-1
General information	
Module type	ACOPOS P3 plug-in module
B&R ID code	F301
Slot	Slot 1
Max. power consumption	In preparation
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E225616 Power conversion equipment
KC	Yes
Encoder connection [1]	
Module-side connection	iX industrial connector 10-pin male, coding B
Status indicators	None
Max. encoder cable length [2]	75 m (RS422, digital filter parameterized to maximum 200 kHz) 25 m (all other interfaces and settings)
Encoder power supply	
Output voltage [3]	5 V ±5% 12 V ±10% [4]
Load capacity	300 mA
Protective measures	
Overload-proof	Yes
Short-circuit proof	Yes
Sense lines	No [5]
Inputs A, B, R [6]	
Single-ended signals	
Input voltage for low	<1 V against COM (TTL 5 V) <1.8 V against COM (HTL 12 V)
Input voltage for high	>2.6 V against COM (TTL 5 V) >7 V against COM (HTL 12 V)
Maximum input voltage	-13 V / +16 V against COM
Differential signals	
Differential voltage	±0.5 V to ±5 V (RS422, TTL 5 V) ±2 V to ±13 V (HTL 12 V)
Terminating resistor	112 Ω (RS422)
Open-circuit monitoring	
RS422, HTL/TTL differential, HTL/TTL single-ended	Yes [7]
HTL/TTL open collector, HTL/TTL open emitter	No [8]
Incremental encoder operation	
Signal form	Square wave signals
Evaluation	4x
Input frequency	Max. 6.25 MHz (RS422) Max. 200 kHz (TTL 5 V, HTL 12 V)
Counter frequency	Max. 25 MHz (RS422) Max. 800 kHz (TTL 5 V, HTL 12 V)
Reference frequency	Max. 6.25 MHz (RS422) Max. 200 kHz (TTL 5 V, HTL 12 V)

Table 2: 8EAC0151.001-1 - Technical data

Order number	8EAC0151.001-1
Distance between edges	Min. 40 ns (RS422) Min. 340 ns (TTL 5 V, HTL 12 V)
Max. acceleration	25 * 10^9 increments / s^2 (RS422) 1.5 * 10^9 increments / s^2 (TTL 5 V, HTL 12 V)
Support	
Motion system	
mapp Motion	5.3.0 and higher
ACP10/ARNC0	5.3.0 and higher (RS422, HTL differential, HTL push-pull, HTL pull) 5.8.0 and higher (remaining interfaces)
Ambient conditions	
Temperature	
Operation	
Nominal	5 to 40°C
Maximum	55°C
Storage	-25 to 55°C
Transport	-25 to 70°C
Relative humidity	
Operation	5 to 85%
Storage	5 to 95%
Transport	Max. 95% at 40°C
Mechanical properties	
Dimensions	
Width	82 mm
Length	24 mm
Depth	103 mm
Weight	72 g

Table 2: 8EAC0151.001-1 - Technical data

1) The encoder must be wired using a single shielded cable with twisted pair signal lines (e.g. 4x 2x 0.14 mm² + 2x 0.5 mm²).
2) Depending on the encoder and cable used, the maximum possible frequency may be reduced for a given cable length or the maximum possible cable length may be reduced for a given frequency.
3) The encoder must be supplied using the voltage source provided. The use of any other power supply is not permitted.
4) Depends on the configuration in Automation Studio.
5) With an output voltage of 5 V ±5%, it is possible to compensate for the sensor voltage drop by configuring the cable resistance (max. 2x 4.014 Ω). When using compensation and current >200 mA, the output voltage accuracy is reduced to ±0.5 V.
6) The values refer to the input of the plug-in module.
7) With HTL/TTL differential without terminating resistor, error detection is only guaranteed if both lines are interrupted.
8) Fault detection is not possible because an open circuit cannot be distinguished from a valid condition.

4 Wiring

4.1 Pinout

Information:

Plug-in module 8EAC is not capable of hot plugging. An 8EAC plug-in module is only permitted to be connected to or disconnected from an ACOPOS P3 8EI servo drive when power to the servo drive is switched off.

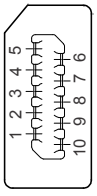
Figure	X41K	Pin	Description	Function
		1	B\ 1)	Channel B inverted
		2	B	Channel B
		3	GND	Encoder power supply 0 V
		4	A\ 1)	Channel A inverted
		5	A	Channel A
		6	R	Reference pulse
		7	R\ 1)	Reference pulse inverted
		8	U+	Encoder supply 5 V / 12 V 2)
		9	T-	Temperature sensor -
		10	T+	Temperature sensor +

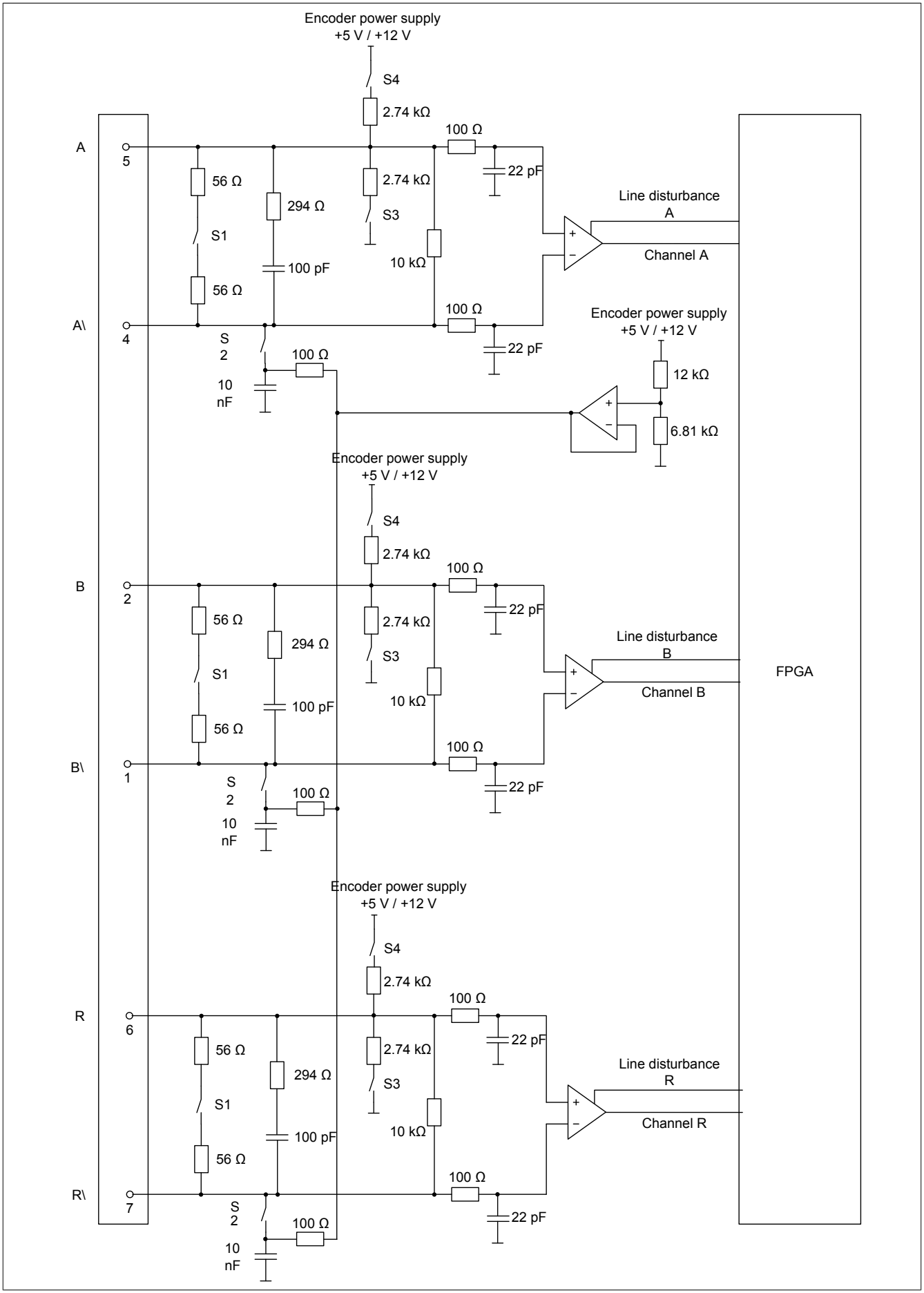
Table 3: Incremental encoder interface 8EAC0151.001-1 - Pinout

1) These pins must be open when operating single-ended encoders; otherwise, the plug-in module may be irreparably damaged.
2) The encoder power supply depends on the configuration in Automation Studio.

Danger!

The connections for the motor temperature sensor and encoder are safely isolated circuits. These connections are therefore only permitted to be connected to devices or components that have sufficient isolation per IEC 60364-4-41 or EN 61800-5-1.

4.2 Principle circuit diagram and states of the switches



Interface	S1 Terminating resistor	S2 Single-ended reference	S3 Pull-down resistor	S4 Pull-up resistor
TTL, differential, with terminating resistor (RS422)	Closed	Open	Open	Open
HTL/TTL, differential, push-pull, without terminating resistor	Open	Open	Open	Open
HTL/TTL, single-ended, push-pull	Open	Closed	Open	Open
HTL/TTL, single-ended, pull / open collector	Open	Closed	Open	Closed
HTL/TTL, single-ended, push / open emitter	Open	Closed	Closed	Open