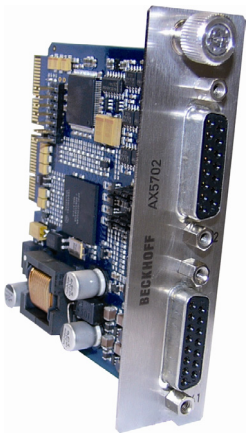

Technical Documentation

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Please read carefully before commissioning!

Foreword

Appropriate use

The optional encoder cards are exclusively intended for application in the optional rear slot of a servo drive from the AX5000 series. The cards are installed together with the servo drive as components in electrical systems and machinery and may only be used in this way.

Security

Safety rules

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations and guidelines.

DANGER	**Caution – Danger of death!** Due to the DC link capacitors dangerous voltage (> 890VDC) may persist at the DC link contacts “ZK+ and ZK- (DC+ and DC-)“ and “RB+ and RB-“ after the servo drive has been disconnected from the mains supply. After disconnecting the servo drive wait at AX5101 - AX5125 and AX520x; 5 minutes, at AX5140/AX5160/AX5172; 15 minutes, at AX5190/AX5191; 30 minutes and at AX5192/AX5193; 45 minutes and measure the voltage at the DC link contacts ZK+ and ZK- (DC+ and DC-). The device is safe once the voltage has fallen below 50 V.

WARNING	**Caution – Risk of injury!** Electronic equipment is not fail-safe. The machine manufacturer is responsible for ensuring that the connected motors and the machine are brought into a safe state in the event of a fault in the drive system.

Attention	**Destruction of the optional encoder card through electrostatic charging!** The optional encoder card is an ESD-sensitive component. Follow the usual ESD safety procedures when handling the card (anti-static wrist straps, earthing of the relevant components, etc.).

Personnel qualification

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards. Knowledge of machine safety legislation is compulsory.

Product description

The optional encoder card enables connection of an additional feedback systems per channel. The system parameters match the standard parameters that are analysed via inputs X11 and X21. Through simple configuration via jumpers up to six further digital inputs (In “A” to In “F”) can be analysed, which are provided through special feedback systems via parameter channels. The X41 and X42 sockets are compatible with the plugs of the X11 and X21 front sockets of the AX5000, which means that the tried and tested cables from the ZK4510 series can be used. To analyse the additional digital inputs you simply have to insert an adapter or establish a suitable wiring. The optional encoder card cannot be used as Commutation-Feedbacksystem (primary).

Firmware version

AX5000-xxxx-02xx = mind. FW 2.03 Build 0009

Type key

Note	**Operation of the optional encoder card** The AX5701 can only be used in single-channel servo drives, the AX5702 can only be used in two-channel servo drives.

AX5701 – optional encoder card for single-channel servo drives

AX5702 – optional encoder card for two-channel servo drives

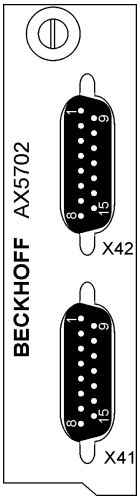
Description of the digital inputs

Note	**Functional reliability** Ensure that the ground potentials of the digital inputs “A” to “D” are connected with the ground potential of the AX5000.

Inputs “A” to “D” are “single-wire” inputs (single-ended). They have a certain potential to ground, which is analysed.

Inputs “E” and “F” are “two-wire inputs” (differential). They require (+) and (-) and analyse the voltage difference between the conductors.

Overview of sockets X41 (channel A) and X42 (channel B)



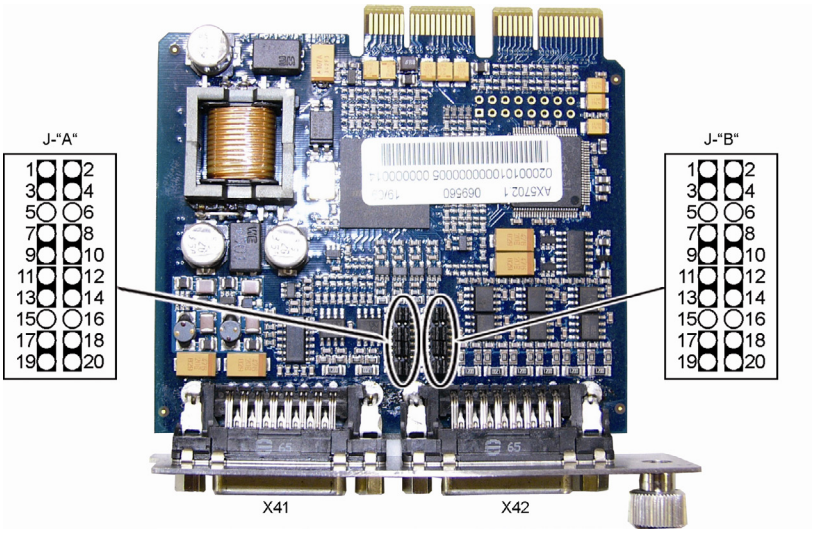
Pin	EnDAT / BiSS	Hiperface	Sin / Cos 1V_{pp}	TTL [1]	In „A“	In „B“	In „C“	In „D“	In „E“	In „F“
1	SIN +	SIN +	SIN +	n.c.	X				X (+)	
2	GND_5 V	GND_9 V	GND_5 V	GND_5 V						
3	COS	COS	COS	n.c.			X			X (+)
4	U_S_5 V	n.c.	U_S_5 V	U_S_5 V						
5	DX+ (Data)	DX+ (Data)	n.c.	B+			Y			
6	n.c.	U_S_9 V	n.c.	n.c.						
7	n.c.	n.c.	REF Z	REF Z						
8	CLK+ (Clock)	n.c.	n.c.	A+	Y					
9	REFSIN	REFSIN	REFSIN	n.c.		X			X (-)	
10	GND_Sense	n.c.	GND_Sense	GND_Sense						
11	REF COS	REF COS	REF COS	n.c.				X		X (-)
12	U_S_5 V Sense	n.c.	U_S_5 V Sense	U_S_5 V Sense						
13	DX- (Data)	DX- (Data)	n.c.	B-				Y		
14	n.c.	n.c.	Z	Z						
15	CLK- (Clock)	n.c.	n.c.	A-		Y				

1) Attention: Wire break detection for TTL encoder is not supported

The digital inputs “A” to “D” can be connected to X or Y.
The digital inputs “E” and “F” must be connected to X (+) and X (-).

Configuration of jumpers J-“A” for channel “A” and J-“B” for channel “B”

Jumpers J-“A” and J-“B” (1) are located at the centre of the printed circuit board near the front panel of the card. For each channel there are 2 row of jumpers, each with 20 pins. The default setting without analysis of the additional inputs is shown in the following figure.



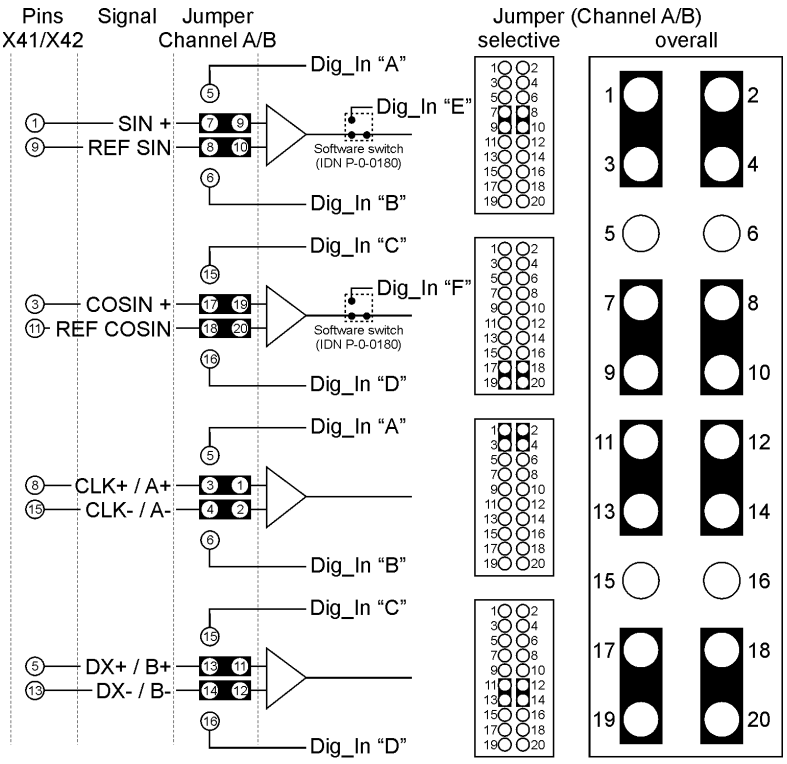
The opposite figure shows the basic jumper configuration, which is the same for channel A and channel B. The pins of input sockets X41 and X42 are wired firmly to the corresponding pins of the jumpers rows. The non-configurable pins are not shown. To use the additional inputs proceed as follows:

- Reposition the relevant jumpers und set IDN P-0-0180→Feedback options→Digital Inputs “**Input A**” to “**Input D**” to “**used**” or set IDN P-0-0180→Feedback options→Digital Inputs “**Input E**” or “**Input F**” to “**used**” <u>without</u> repositioning the jumpers.
- Connect the encoder cable as required for the relevant inputs or use an adapter.

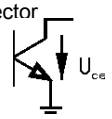
The following table shows a selection of combination options.

Feedback system	Input “A”	Input “B”	Input “C”	Input “D”	Input “E”	Input “F”
EnDAT	Input “A-F” not available					
BiSS	Input “A-F” not available					
Hiperface	X	X				
Sin / Cos 1V_{pp}	X	X	X	X		
TTL	X[1]	X[1]	X[2]	X[2]	X[1]	X[2]

1) Either inputs “A” and “B” or input “E” can be used.
2) Either inputs “C” and “D” or input “F” can be used.



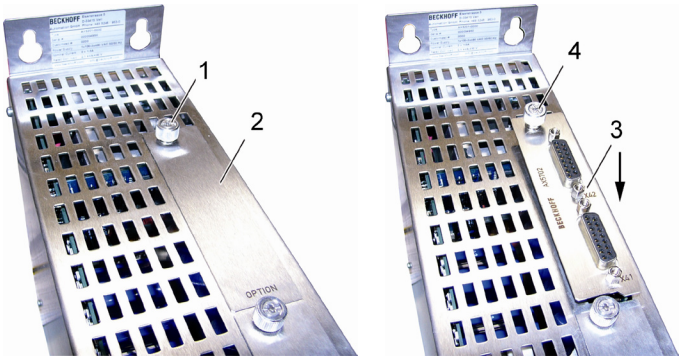
Technical data

Digital inputs “A” to “D” (single-ended)	Open collector  max. 1 mA
Digital inputs “E” to “F” (differential)	0 – 5 V inp. resistance: 120 Ω

Installation of the optional encoder card

CAUTION	**Caution – Do not work on live equipment!** Disconnect the equipment at all poles from live parts and secure it against being switched on again, so that there is no possibility of uncontrolled movements of the equipment occurring.
DANGER	**Caution – Danger of death!** Due to the DC link capacitors dangerous voltage (> 890VDC) may persist at the DC link contacts “ZK+ and ZK- (DC+ and DC-)“ and “RB+ and RB-“ after the servo drive has been disconnected from the mains supply. After disconnecting the servo drive wait at AX5101 - AX5125 and AX520x; 5 minutes, at AX5140/AX5160/AX5172; 15 minutes, at AX5190/AX5191; 30 minutes and at AX5192/AX5193; 45 minutes and measure the voltage at the DC link contacts ZK+ and ZK- (DC+ and DC-). The device is safe once the voltage has fallen below 50 V.
Attention	**Destruction of the optional encoder card through electrostatic charging!** The optional encoder card is an ESD-sensitive component. Follow the usual ESD safety procedures when handling the card (anti-static wrist straps, earthing of the relevant components, etc.).

- Fully release the bolt (1).
- Remove the panel (2).
- Carefully insert the optional card (3) into the opening in the direction of the arrow. The slot has guides for the card on the short sides. Ensure that the card is inserted into these guides.
- Tighten the bolt (4).



Example: Renishaw RGH 22Z30D00 (TTL encoder with 2 parameter channels)

Configuration via TCDrivemanager (IDN-P-0-0180)

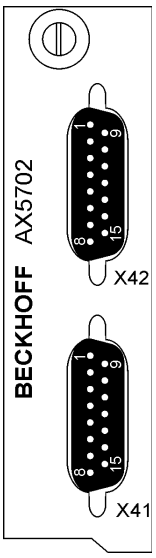
Encoders and inputs

P-0-0180	Feedback 2 type		
	Manufacturer	13: Renishaw	13: Renishaw
	Feedback type	1: Linear feedback	1: Linear feedback
	Feedback type string	Reni#RGH22Z-TTL-5...	Reni#RGH22Z-TTL-5...
	Feedback use	1: Additional second m...	1: Additional second m...
	Feedback direction	0: Positive direction	0: Positive direction
⊞	rsvd		
⊞	Power settings		
⊞	Process channel		
⊞	Parameter channel		
⊞	Manufacturer limits settings		
⊟	Feedback options		
⊟	Digital Inputs		
	Input A (single ended)	0: Not used	0: Not used
	Input B (single ended)	0: Not used	0: Not used
	Input C (single ended)	1: used	1: used
	Input D (single ended)	0: Not used	0: Not used
	Input E (differential)	1: used	1: used
	Input F (differential)	0: Not used	0: Not used
	reserved	0	0
	rsvd	0	0
⊞	rsvd		

Scaling

P-0-0180	Feedback 2 type		
	Manufacturer	13: Renishaw	13: Renishaw
	Feedback type	1: Linear feedback	1: Linear feedback
	Feedback type string	Reni#RGH22Z-TTL-5...	Reni#RGH22Z-TTL-5...
	Feedback use	1: Additional second m...	1: Additional second m...
	Feedback direction	0: Positive direction	0: Positive direction
	rsvd		
	Power settings		
	Process channel		
	Process interface	2: Incremental 5V TTL	2: Incremental 5V TTL
	Connector	41: X41 (Option Slot, E...	41: X41 (Option Slot, E...
	rsvd		
	Data		
	Sin / Cos		
	TTL		
	Resolution per rotation	48000	48000
	Length per signal period	500	500
	rsvd		
	Resolver		
	MES		
	Parameter channel		
	Manufacturer limits settings		
	Feedback options		

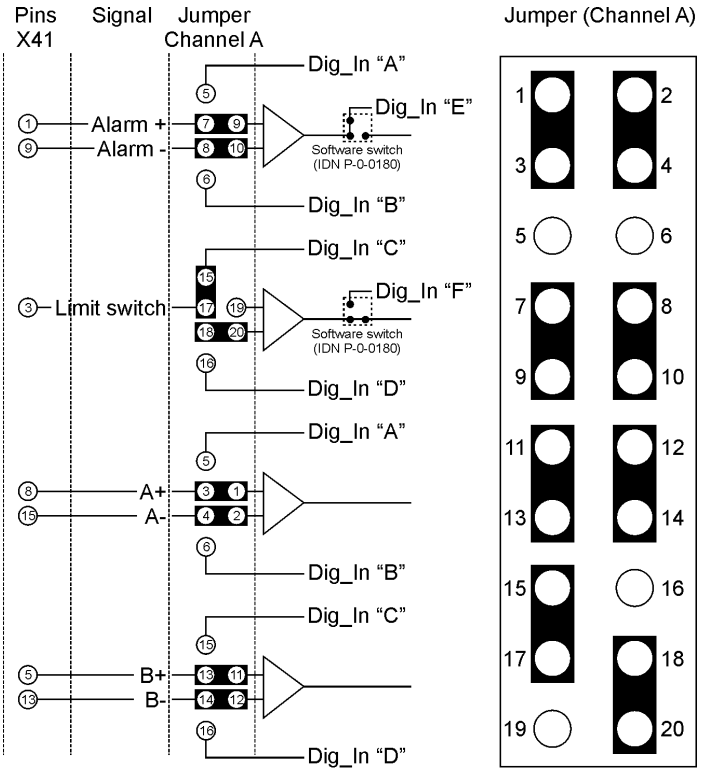
Overview of socket X41 (channel A) and jumper configuration



Socket X41

Pin	Renishaw	In “C”	In “E”
1	Alarm (+)		X (+)
2	GND_5 V		
3	Limit switch	X	
4	U_S_5 V		
5	B+		
6	n.c.		
7	REF Z		
8	A+		
9	Alarm (-)		X (-)
10	GND_Sense		
11	n.c.		
12	U_S_5 V Sense		
13	B-		
14	Z		
15	A-		

Jumper configuration



Notes on the documentation

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards. It is essential that the following notes and explanations are followed when installing and commissioning these components. The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development. For this reason, the documentation may not always be have been fully checked for consistency with the performance data, standards or other characteristics described. In the event that it contains technical or editorial errors, we retain the right to make alterations at any time and without warning. No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

Copyright

Scope of supply

The scope of supply includes the following components:

Optional encoder card AX570x, technical documentation and packaging

If one of the components is damaged please notify the logistics company and Beckhoff Automation GmbH & Co. KG immediately.