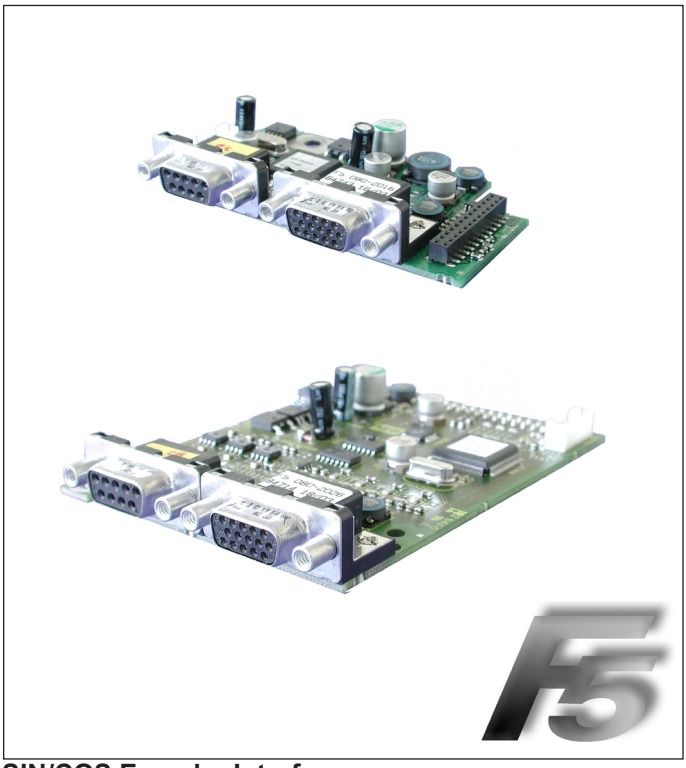
COMBIVERT



SIN/COS Encoder Interface

DC.F5.ZEM-K001

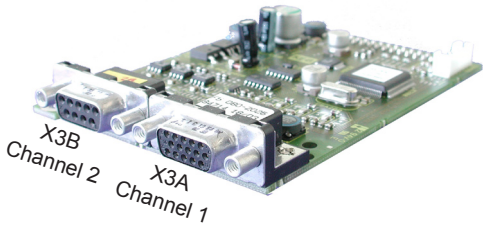
KEB

11/2005

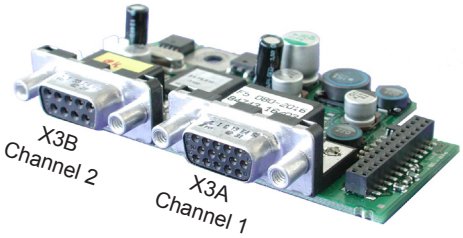
Content

1. Product description

For housing size G…U



For housing size D and E



1.1 General

Each of the interface cards delivered by KEB include two interfaces. As there are numerous different combinations available each interface will be described by means of separate instructions. The instruction covers the installation of the interface card, the connection as well as the start-up of a suitable encoder. Further information and the parameter adjustments are described in the application manual for the inverter/servo.

1.2 Description of encoder interface channel 1

For encoder type:	SIN/COS-encoder
Voltage level:	1 Vss
Inputs/Tracks:	A, B, C, D, and R
Particularities:	-

1.3 Part number

2M.F5.K8G-M Z X X

Term of delivery	0: installed	Z: Option, spare part
2. Encoder interface	1: SSI-input	n: TTL-input
	M: TTL-output	
applicable for housing size	1: D, E	2: G…U

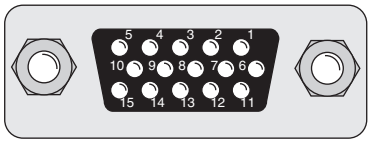
1.4 Scope of delivery (option or replacement delivery)

- encoder interface
- two instruction manuals
- fixing bolt
- packing material

1.5 Description of socket X3A

Socket X3A (top view)

SubD 15pole



PIN	Name	Description
1	C-	Differential signal to C+
2	D-	Differential signal to D+
3	A-	Differential signal to A+
4	B-	Differential signal to B+
5	-	-
6	C+	Absolute track for initial position and angular calculation
7	D+	Absolute track for initial position and angular calculation
8	A+	Incremental signals A for counter and direction detection
9	B+	Incremental signals B for counter and direction detection
10	-	-
11	-	-
12	+5,25 V	Power supply for encoder
13	COM	Reference potential for supply voltage
14	-R	Differential signal to zero track R+
15	+R	Zero track

1.6 Power supply

1.6.1 Max. load capacity in dependence of voltage supply

Max. load capacity at +5 V: 300 mA

The specified current is reduced by the current taken from the second interface (see application manual Chapter 6.10).

1.6.2 Line length

The maximum line length results from the voltage drop of the supply line. The value is calculated as follows:

$$\text{Encoder cable length} = \frac{U - U_{min}}{I_{max} \cdot 2 \cdot R}$$

max. encoder current input Imax:	see encoder description
Supply voltage U:	5,25 V
min. supply voltage Umin:	4,75 V
KEB encoder cable resistance R:	0,072 Ω/m

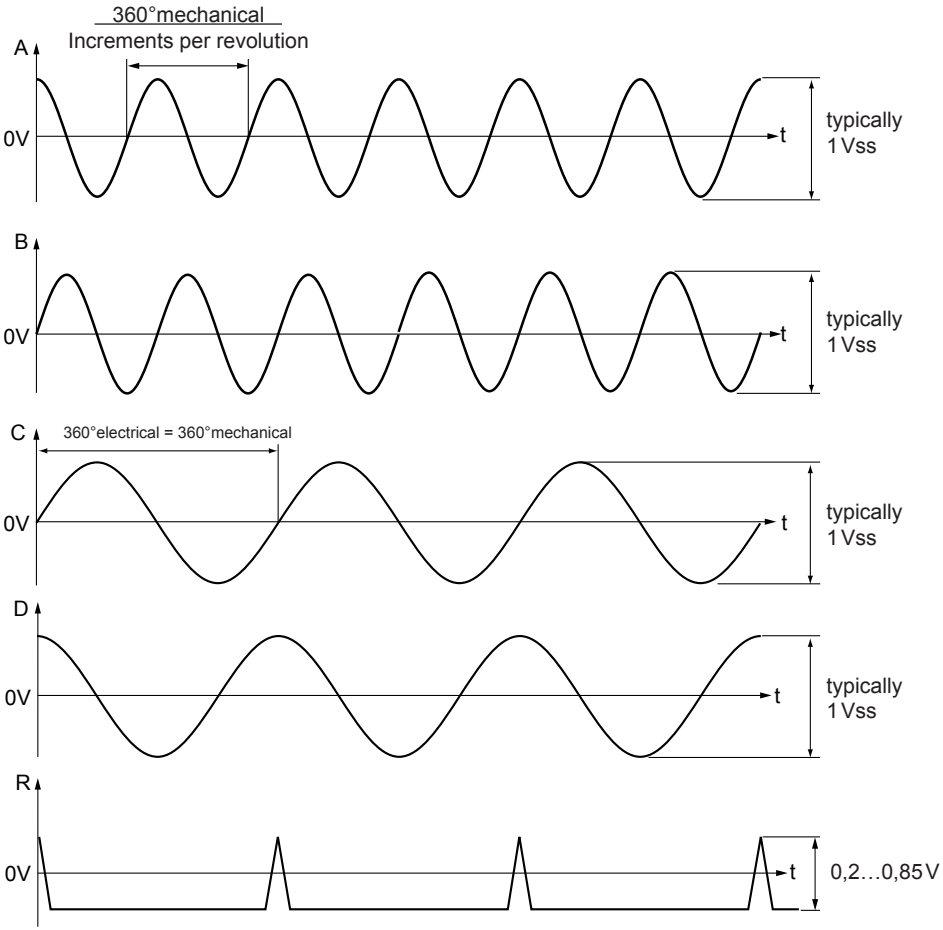
1.7 Signal inputs

1.7.1 Technical data

Input resistance:	120 Ω
Logic level:	1 Vss typical (0,6…1,2)
Limiting frequency:	200 kHz
Encoder line number:	1…2048 Inc (Recommendation: 1024 Inc at rotary speed < 4500 rpm

1.7.2 Input signals of encoder inputs

Output Signals of SIN/COS-Encoder



1.7.3 Description of encoder signals

Tracks C and D are giving an absolute signal to the control unit. The period is correspond exactly to one mechanical revolution of the encoder. At starting the control unit will start with this relative inaccurate absolute value. With the first zero pulse the position will be corrected. Thus a reference point search is not necessary.
The output signals of tracks A and B are dependent on the encoder line number. If the encoder line number, adjusted in parameter Ec.1, is not correspond with the actual encoder line number, an error will be triggered immediately after revolution of the rotor axis.
The zero track will permanently be compared with the position. In case a difference occurs the position will be corrected with a ramp time after a filter. In addition the position value of the absolute track (C and D) will be compared with the position any 30 ms. Since the absolute track is relatively inaccurate, corrections are only made until a valid zero signal is recognized. Then only an error is released, if the difference exceeds a maximum value.

If no absolute and/or zero track is recognized during power-on, this functions are getting deactivate. Operation with exclusively utilization of the high resolution tracks A and B is possible.

1.7.4 Encoder breakage recognition

The recognition of encoder breakage is a software function and dependent on the encoder type. It is possible to insert the encoder during operation. By writing on Ec.0 the initialization starts. After fault-free initialization the correct position will be send.
The absolute track is monitored approx. all 30 ms and the incremental track is monitored approx. all 16 ms. An error is triggered, if the permissible signal levels are fallen below. Dependent on the encoder type the response time can be 100 ms and more.

1.7.5 Adjustment of increments per revolution (Ec.1)

The inc/r of the inverter has to correspond with the inc/r of the encoder. In case of SIN/COS encoders the interface is not able to recognize the inc/r of the encoder and generates an error message (status ec.37=69) after the rotation of the rotor axis.

2. Installation and Start-up

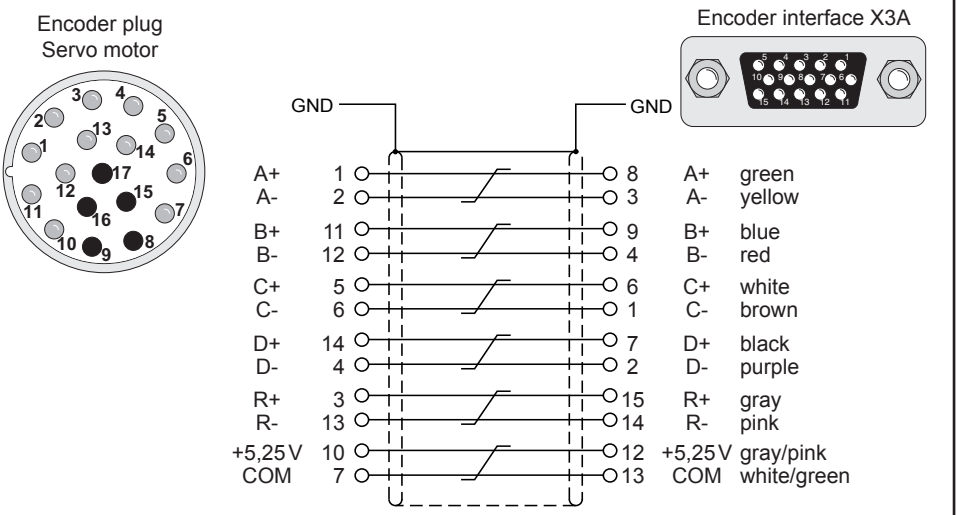
2.1 Mechanical installation

All kind of works on the inverter may be carried out by authorized personnel in accordance with the EMC and safety rules only.

- Switch inverter de-energized and await capacitor discharge time
- Pull off operator
- Remove plastic cover
- Remove fixing bolt
- Fix interface board beginning from the socket connector straightly
- Screw in fixing bolt
- Attach plastic cover

2.2 Electrical installation

Connection of the encoder cable



2.3 Tested encoder

The following SIN/COS-encoders encoders have been tested by KEB on it application:

- Heidenhain ERN 1188

However, this does not restrict the use of rotary encoder with same specifications of other manufacturers.

2.4 Start-up

After the installation or exchange of an encoder interface some adjustments of the inverter/ servo software have to be done before operation:

- Switch on inverter
- Select application mode
- when using synchronous motors set ud.2 to F5-S
- Select parameter Ec.0 and control whether „14: SIN/COS“ is displayed. **The displayed value has to be confirmed by „ENTER“ in any case.**
- Select parameter Ec.10 and carry out the same for the 2. encoder interface
- Select parameter Ec.1 and adjust increments per revolution

2.6 Encoder 1 status (Ec.37)

This parameter displays, by means of different status messages, the status of encoder and interface. Dependent on the encoder only special messages are possible. All errors are only set at control release, although they are already displayed in Ec.37.

The following value is displayed at correct operation:

16: position values are being transferred, encoder and interface are working

The following status messages triggers **„Error Encoder Change“ (E.EncC)** because the correct evaluation of the position is no longer guaranteed:

67: The signals of the incremental track are not correct, e.g. no encoder is connected or the encoder cable is defective.

68: The signals of the absolute track are not correct. The absolute track at Endat, Hiperface and SSI-Sin/Cos is digital. The absolute track at Sin/Cos is analog.

69: position deviation too high. The position determined by the incremental signals and the absolute position (of absolute track, zero signal or serial selected) does no longer correspond or cannot be corrected.

71: interface type is unknown: Interface has not been recognized.

98: Interface is busy

Error E.EncC can only be reset via parameter Ec.0.

Following status messages trigger error **„Error Hybrid“ (E.HYb)**:

0, 255: no communication between interface and control card

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