

Documentation

ZB8610

Fan cartridge for EtherCAT and Bus Terminals

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BECKHOFF

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1 Foreword

1.1 Notes on the documentation

Intended audience

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.

It is essential that the documentation and the following notes and explanations are followed when installing and commissioning these components.

It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

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.

We reserve the right to revise and change the documentation at any time and without prior announcement.

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.

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Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents: EP1590927, EP1789857, DE102004044764, DE102007017835 with corresponding applications or registrations in various other countries.

The TwinCAT Technology is covered, including but not limited to the following patent applications and patents: EP0851348, US6167425 with corresponding applications or registrations in various other countries.

The logo for EtherCAT, featuring the word "EtherCAT" in a bold, sans-serif font. A red arrow points from the top of the "A" towards the right, ending above the "T". A registered trademark symbol (®) is located to the right of the "T".

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1.2 Safety instructions

Safety regulations

Please note the following safety instructions and explanations!
Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

Exclusion of liability






All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

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

Description of symbols

In this documentation the following symbols are used with an accompanying safety instruction or note. The safety instructions must be read carefully and followed without fail!

 DANGER	<p>Serious risk of injury! Failure to follow the safety instructions associated with this symbol directly endangers the life and health of persons.</p>
 WARNING	<p>Risk of injury! Failure to follow the safety instructions associated with this symbol endangers the life and health of persons.</p>
 CAUTION	<p>Personal injuries! Failure to follow the safety instructions associated with this symbol can lead to injuries to persons.</p>
 Attention	<p>Damage to the environment or devices Failure to follow the instructions associated with this symbol can lead to damage to the environment or equipment.</p>
 Note	<p>Tip or pointer This symbol indicates information that contributes to better understanding.</p>

1.3 Documentation issue status

Version	Comment
1.6	- Update chapter "Commissioning"
1.5	- Update chapter "Technical Data"
1.4	- Update chapter "Technical Data"
1.3	- Update chapter "Basic Function Principles and Commissioning"
1.2	- Addenda
1.1	- Addenda
1.0	- Addenda, 1 st public issue
0.1	- first provisional documentation for ZB8610

2 Product overview

2.1 Introduction

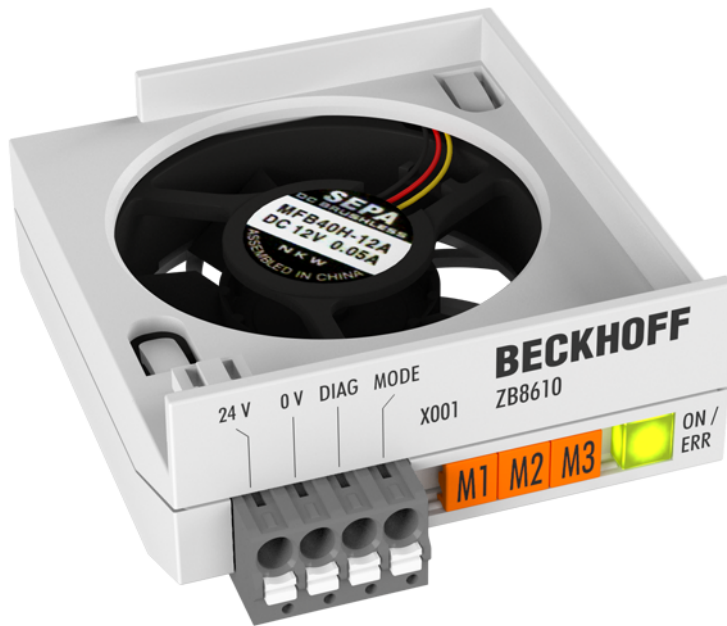


Fig. 1: ZB8610

Fan cartridge for EtherCAT and Bus Terminal

The ZB8610 fan cartridge is used for forced ventilation within the terminal housing and ensures better heat dissipation from the housing. It extends the thermal operating range of EtherCAT Terminals (ELxxxx) and Bus Terminals (KLxxxx) and offers a wide range of new application options. The cartridge is installed on the underside of the terminal segment and covers a width of four standard terminals (4 x 12 mm). It consists of the fan, an installation plate, a terminal strip (24 V DC, 0 V DC, diag, mode) and a bracket for fixation on different terminal housings (see fig. "Components ZB8610").

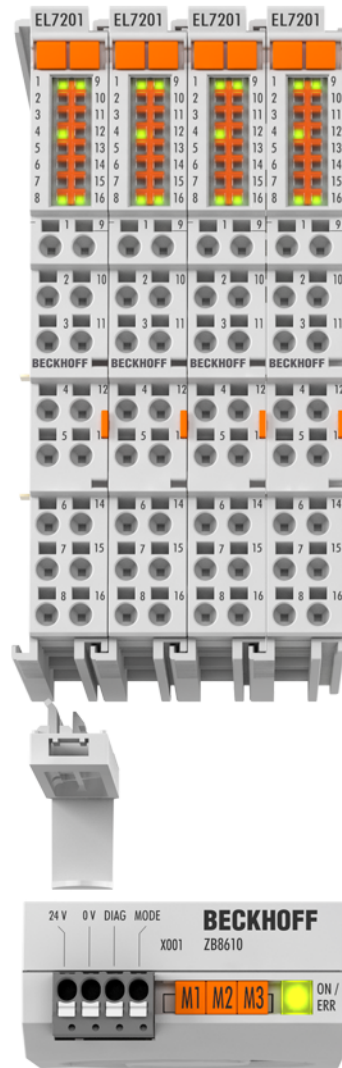


Fig. 2: Components ZB8610

2.2 Technical data

Technical data	ZB8610
Number of channels	1 fan
Nominal voltage	24 V DC (-15 %/+20 %)
Current consumption (at 24 V operating voltage)	ca. 45 mA
Operating modes	temperature-controlled, full speed, frequency-controlled
Rotational frequency fan	adjustable in 9 steps via frequency (1...9 Hz), max. ~5,500 rpm
Diagnostics, max. output current	fan fault, 15 mA
Life span	MTBF typ. = 280,000 h @ 20 °C
Special features	increased performance and extended temperature range for various terminals
Dimensions (W x H x D)	47 mm x 22 mm x 55 mm
Weight	32 g (incl. bracket)
Operating/storage temperature	-25...+70 °C/-40...+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protect. class/installation pos.	IP 20/see chapter " Mounting/Demounting [► 11] "
Approval	CE cULus [► 19]

2.3 Mounting and demounting

The ZB8610 fan cartridge is snapped onto a 48-mm wide terminal group of Beckhoff standard or high-density (HD) terminals using the "8-channel/16-channel fan cartridge holder" supplied as an accessory.

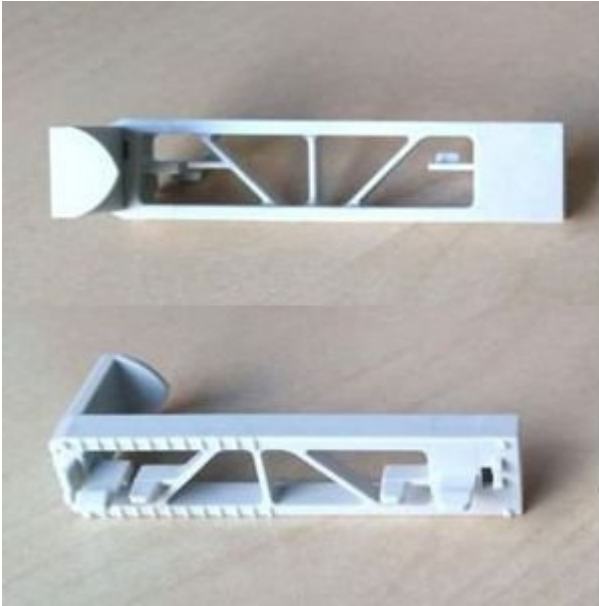


Fig. 3: Fan cartridge holder, 8-channel

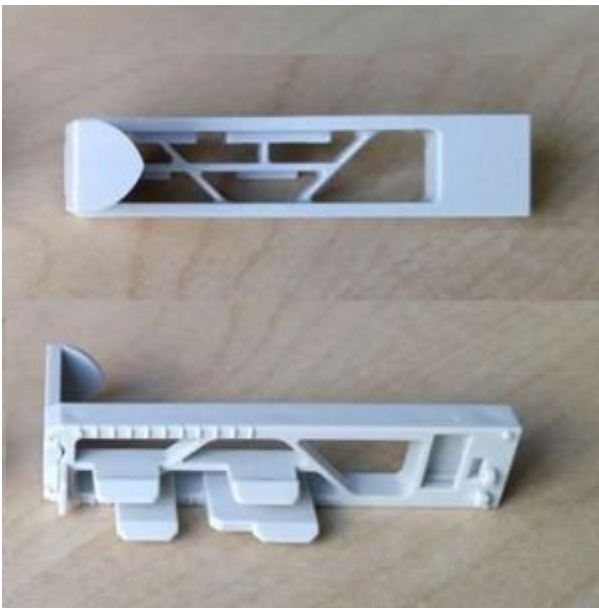


Fig. 4: Fan cartridge holder, 16-channel

The width of the individual terminals may be 12 mm (single width) or 24 mm (double width) or a combination of both.

The mounting of the ZB8610 is described below by way of an example.

	<p>Risk of injury through electric shock and damage to the device! Bring the Bus Terminals system into a safe, de-energized state before starting mounting, disassembly or wiring of the Bus Terminals.</p>
<p>WARNING</p>	

Mounting

1. Assemble the terminals to be ventilated into a group with a width of 48 mm and snap the holder on the left in the lower ventilation cut-outs of the first terminal to be ventilated, as shown in fig. "Engaging the holder for the fan cartridge".



Fig. 5: Engaging the holder for the fan cartridge

The holder is correctly engaged when a clear click sound is heard.



Fig. 6: Correctly engaged holder, front view



Fig. 7: Correctly engaged holder, side view

2. Push the fan cartridge onto the holder as shown in fig. "Attaching the fan cartridge". The holding tab and the recess (see fig. "Push fan cartridge with recess over holding tab") on the fan cartridge fit each other and close flush in a downward direction.

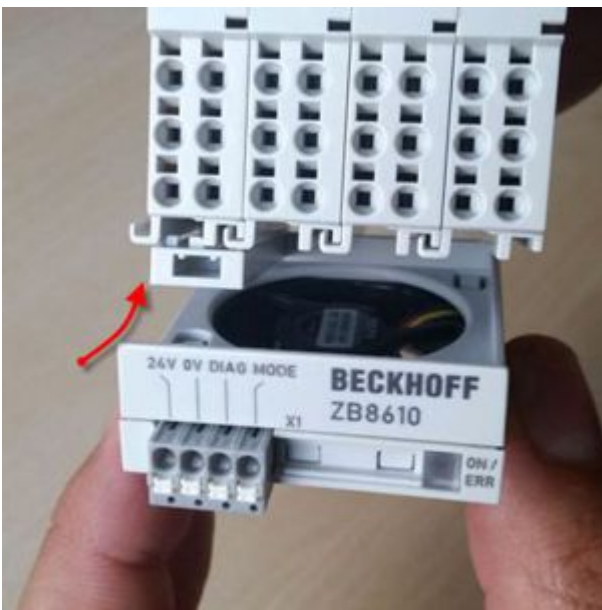


Fig. 8: Attaching the fan cartridge



Fig. 9: Push fan cartridge with recess over holding tab

3. Make sure that the latching tab is pushed into the groove until a click noise is heard as in fig. "Push latching tab into groove". The fan cartridge is now correctly attached.

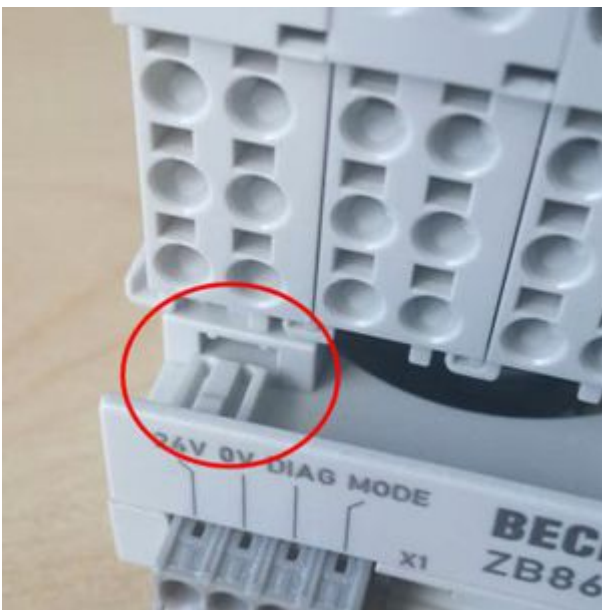


Fig. 10: Push latching tab into groove



Fig. 11: Correctly attached fan cartridge, front view

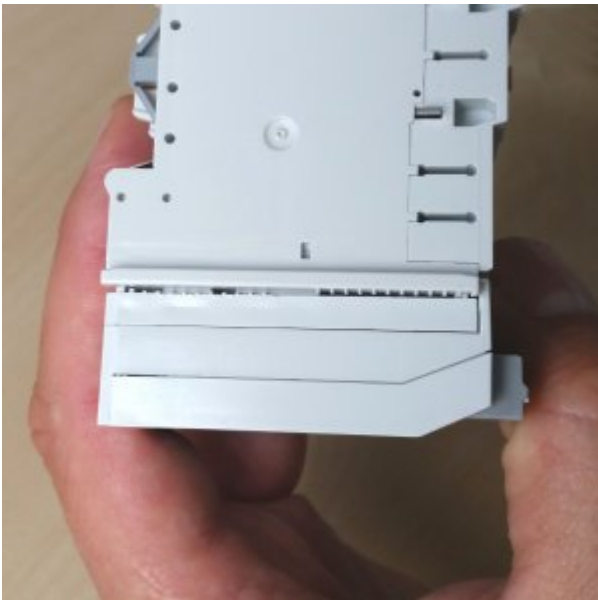


Fig. 12: Correctly attached fan cartridge, side view

Removal

1. To dismantle, pull the fan cartridge off the terminal group in the direction of the arrow (see fig.).

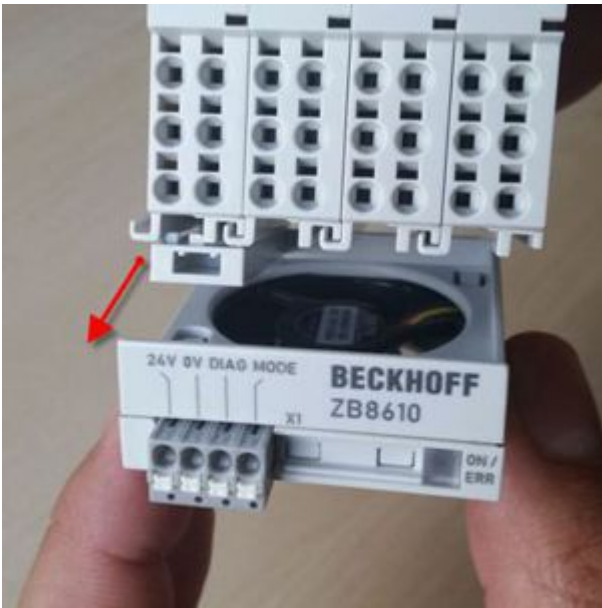


Fig. 13: Pull the fan cartridge off towards the front

2. To detach the holder from the terminal, place a screwdriver between the terminal and holder (see fig.) and carefully lever until the holder releases.

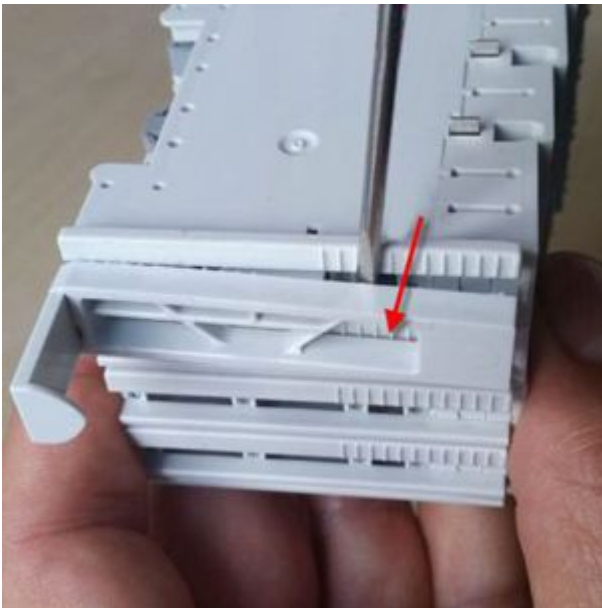


Fig. 14: Remove the holder using a screwdriver



Note

Clearance of the fan cartridge module

When installing terminals with mounted fan cartridge module ensure that an adequate spacing (> 35 mm) is maintained between other components above and below the terminals (incl. fan cartridge) in order to guarantee a flawless operation of the fan cartridge and adequate ventilation of the terminals.

2.4 LED display and connection

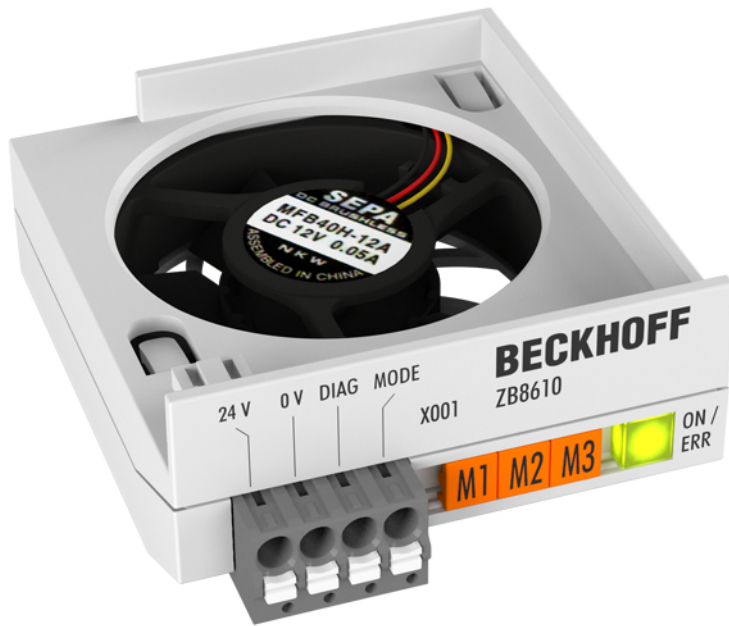


Fig. 15: ZB8610 LED

Diagnosis LED

LED	Display		
On ERR	off		No power supply
	green	on	supply voltage present, fan does not move, revolution temperature-controlled
		flashing	Operating display, flashing frequency depends on revolution (see table connection "Mode")
	red		Error/ fan malfunction

Connection

Designation	Meaning
24 V	+24 V power supply
0 V	0 V power supply
Mode	Input speed regulation via external voltage - 0 V, revolution temperature-controlled - 1 Hz, approx. 2700 U/min - 2 Hz, approx. 3150 U/min - 3 Hz, approx. 3600 U/min - 4 Hz, approx. 3960 U/min - 5 Hz, approx. 4290 U/min - 6 Hz, approx. 4620 U/min - 7 Hz, approx. 5010 U/min - 8 Hz, approx. 5370 U/min - 9 Hz, approx. 5500 U/min - High level (11 - 24 V): max. revolution, approx.. 5500 U/min.
Diag	Output diagnosis (max. output current 15 mA) Low level: Error/ fan malfunction High level: normal operating status, no malfunction

2.5 Basic Function Principles and Commissioning

Area of application

The ZB8610 fan cartridge is delivered ready to operate. No adjustments need to be made to the device.

A typical application of the fan module is extension of the performance range of the terminals through forced cooling. This enables the EL7201 EtherCAT servo terminal to operate with higher output current, for example (4.5 A_{RMS} instead of 2.8 A_{RMS}), so that the performance is on a par with the EL7211, with the benefit of a 50 % smaller footprint.




A further application is extension of the operating temperature range of the terminals. Depending on the technical specification, the fan module enables the terminals to operate at temperatures of up to 70 °C. The exact terminal-specific information for this application can be found in the documentation for the respective terminals.

Commissioning

- Connect the ZB8610 fan cartridge according to the instructions in the section "[LED display and connection \[► 17\]](#)".
- The fan can be operated in three different modes:
 1. Demand-based control via an integrated temperature sensor (default, only power supply required)
 - The fan cartridge starts operating at approx. 40 °C (-2.700 U/min) and increases the speed stepwise with increasing temperature
 - From approx. 55 °C the fan reaches the full speed (-5.500 U/min)
 - If the temperature decreases below approx. 35 °C, the fan cartridge switches off
 2. Continuous operation at full load (in addition to the power supply a high signal is applied at the mode pin.)
 3. Frequency controlled by an externally applied frequency (1 – 9 Hz) at the Mode pin, which is converted internally in steps from 2,700 rpm to max. ~5,500 rpm. A digital output terminal, for example, can be used as an external source. The measurement of the internal terminal temperature, which is integrated in TwinCAT, is used as reference for speed control of the fan via the frequency.
- In case of error there is a low signal on the "Diag" output and the LED display lights up red.

3 Appendix

3.1 UL notice

	<p>Application Beckhoff EtherCAT modules are intended for use with Beckhoff's UL Listed EtherCAT System only.</p>
	<p>Examination For cULus examination, the Beckhoff I/O System has only been investigated for risk of fire and electrical shock (in accordance with UL508 and CSA C22.2 No. 142).</p>
	<p>For devices with Ethernet connectors Not for connection to telecommunication circuits.</p>

Basic principles

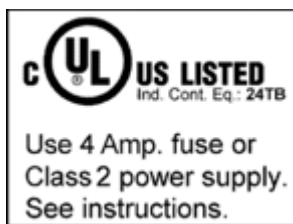
Two UL certificates are met in the Beckhoff EtherCAT product range, depending upon the components:

- UL certification according to UL508
 Devices with this kind of certification are marked by this sign:



Almost all current EtherCAT products (as at 2010/05) are UL certified without restrictions.

- UL certification according to UL508 with limited power consumption
 The current consumed by the device is limited to a max. possible current consumption of 4 A. Devices with this kind of certification are marked by this sign:



Almost all current EtherCAT products (as at 2010/05) are UL certified without restrictions.

Application

If terminals certified *with restrictions* are used, then the current consumption at 24 V_{DC} must be limited accordingly by means of supply

- from an isolated source protected by a fuse of max. 4A (according to UL248) or
- from a voltage supply complying with *NEC class 2*.
 A voltage source complying with *NEC class 2* may not be connected in series or parallel with another *NEC class 2* compliant voltage supply!

These requirements apply to the supply of all EtherCAT bus couplers, power adaptor terminals, Bus Terminals and their power contacts.

3.2 Support and Service

Beckhoff and their partners around the world offer comprehensive support and service, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

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