BECKHOFF New Automation Technology

Documentation | EN

ZB8610

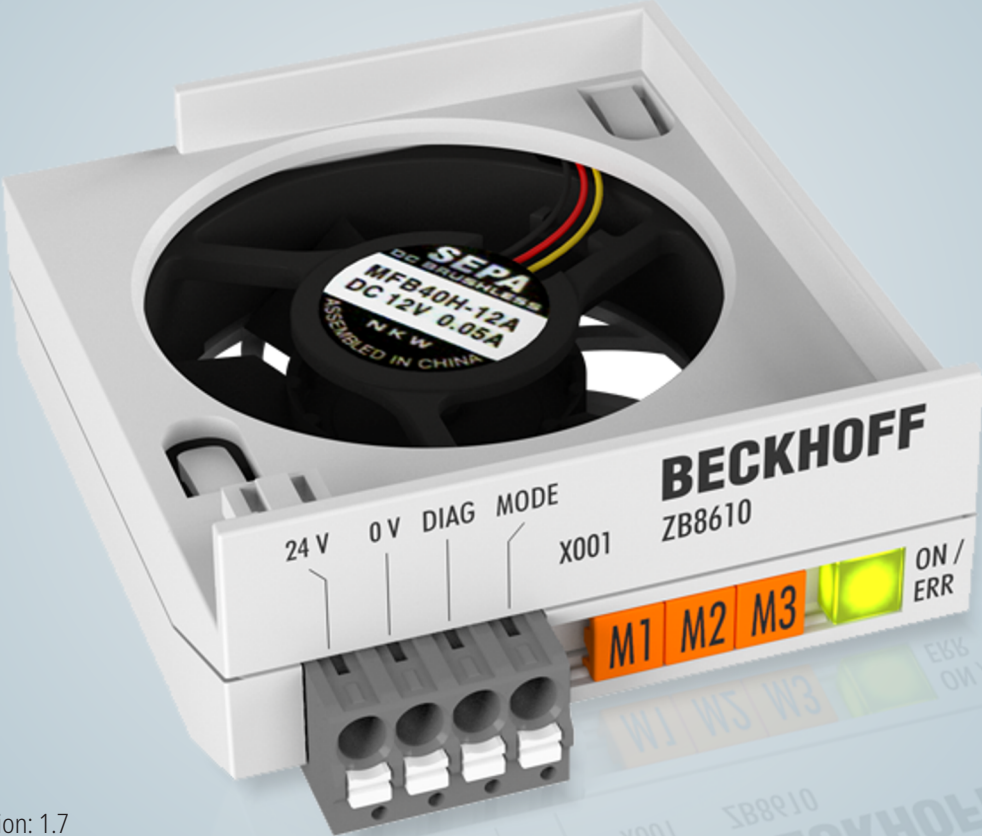Fan cartridge for EtherCAT and Bus Terminals

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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.

Trademarks

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Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents: EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702 with corresponding applications or registrations in various other countries.

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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 instructions

In this documentation the following instructions are used.
These instructions must be read carefully and followed without fail!

⚠ **DANGER**
Serious risk of injury!
Failure to follow this safety instruction directly endangers the life and health of persons.

⚠ **WARNING**
Risk of injury!
Failure to follow this safety instruction endangers the life and health of persons.

⚠ **CAUTION**
Personal injuries!
Failure to follow this safety instruction can lead to injuries to persons.

NOTE
Damage to environment/equipment or data loss
Failure to follow this instruction can lead to environmental damage, equipment damage or data loss.

Tip or pointer

This symbol indicates information that contributes to better understanding.

1.3   Documentation issue status

| Version	Comment
1.7	• New title page • Chapter "Introduction" updated • Chapter "Technical data" updated
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, 1st public issue
0.1	• first provisional documentation for ZB8610

2 Product overview

2.1 Introduction
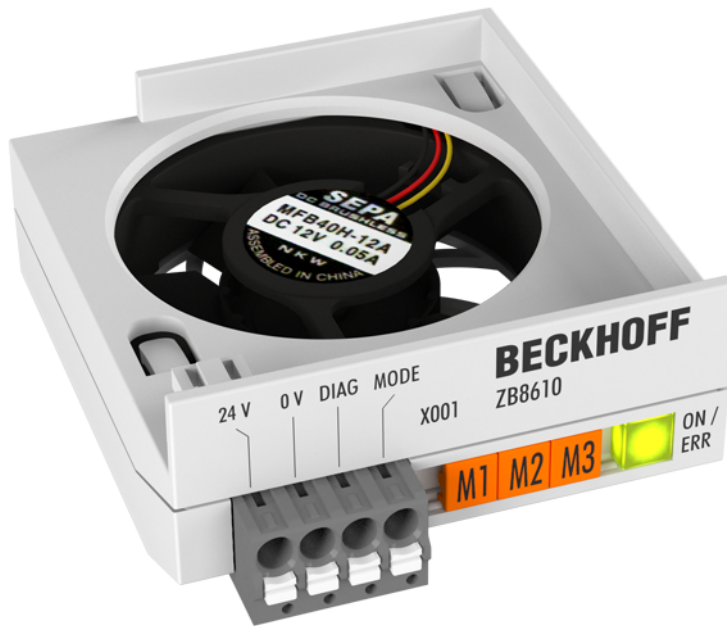
Fig. 1: *ZB8610*

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.

The fan can be operated in three different modes:

1. Demand-based control via an integrated temperature sensor (default, only power supply required)
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 to 9 Hz) at the mode pin, which is converted internally in steps from 2700 rpm to max. ~5500 rpm. A digital output terminal can be used as external source. The measurement of the internal terminal temperature, which is integrated in Twin-CAT, is used as reference for speed control of the fan via the frequency.

A typical application of the fan cartridge 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 (Irms = 4.5 A instead of 2.8 A), so that the performance is on a par with the EL7211, with the benefit of a 50 % smaller footprint.

A further application is the extension of the operating temperature range of the terminals. Depending on the technical specification, the fan cartridge 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.
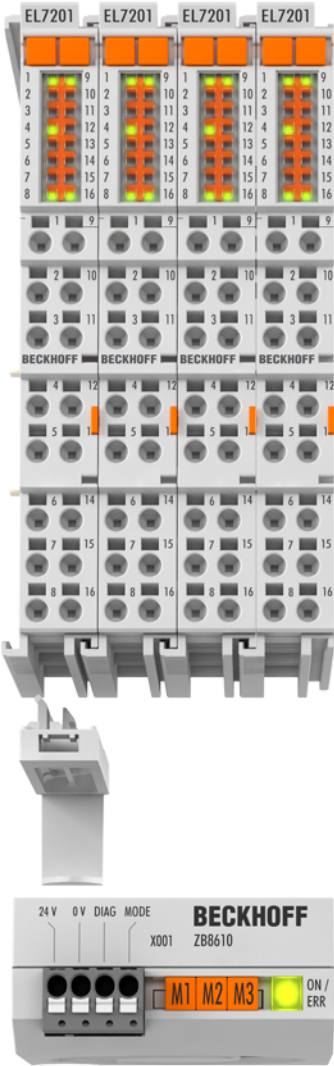
Fig. 2: Components ZB8610

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]"
Approvals/Markings[*]	CE, EAC, UKCA cULus [▶ 19]

*) Real applicable approvals/markings see type plate on the side (product marking).

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.
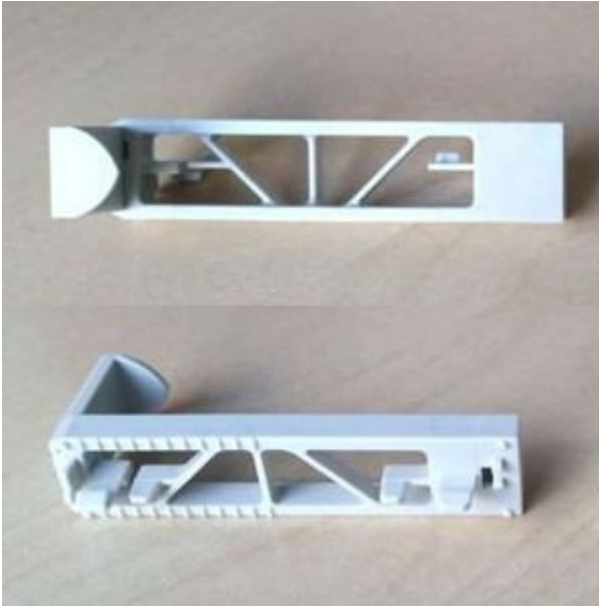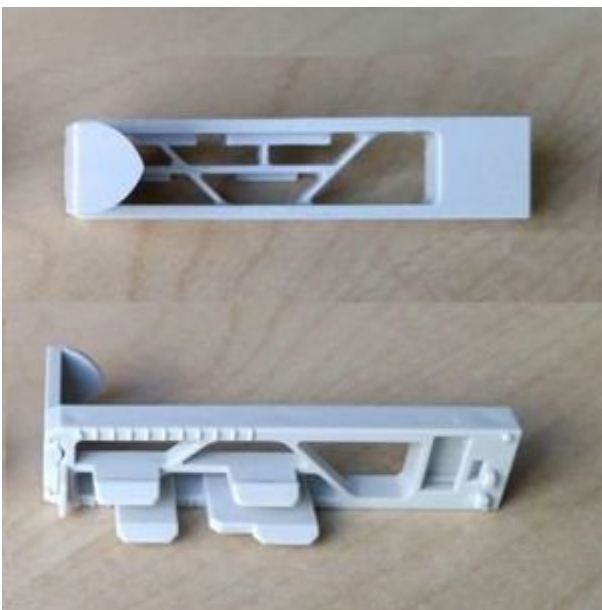

Fig. 3: Fan cartridge holder, 8-channel

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.

⚠ WARNING
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.

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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".
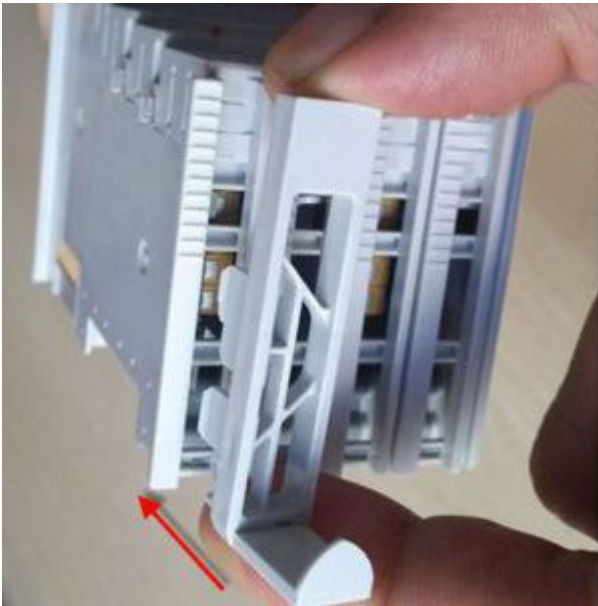

Fig. 5: Engaging the holder for the fan cartridge

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.
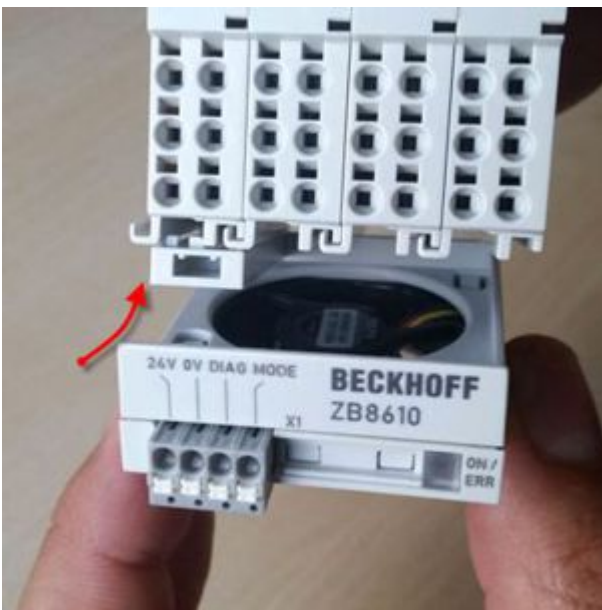

Fig. 8: Attaching the fan cartridge

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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.
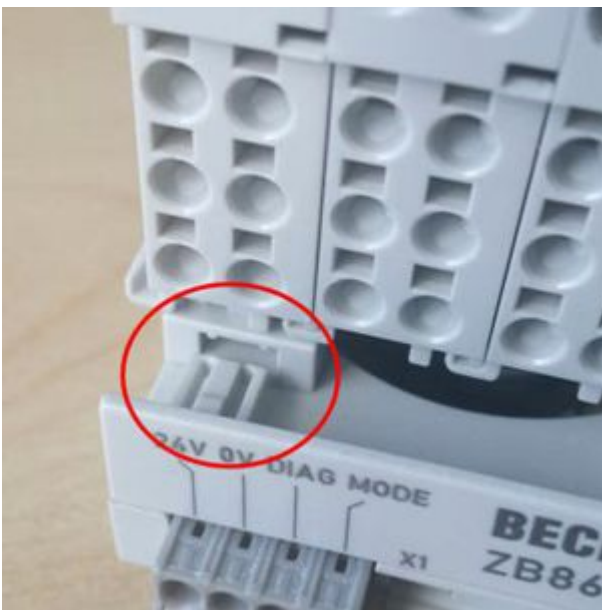

Fig. 10: Push latching tab into groove

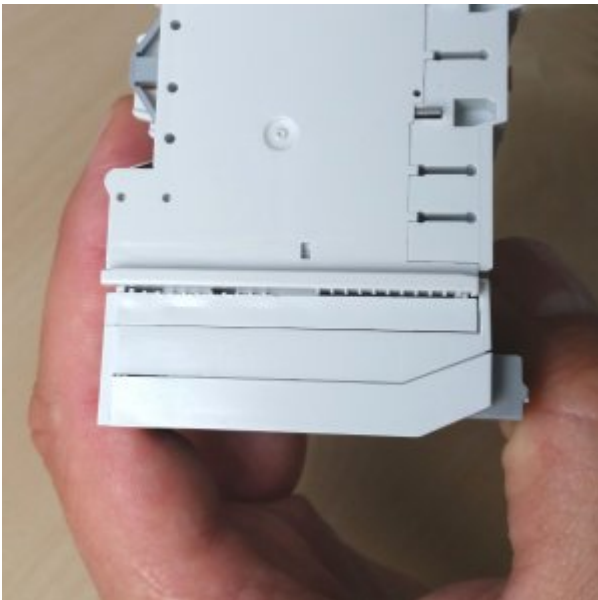Fig. 11: Correctly attached fan cartridge, front view

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.
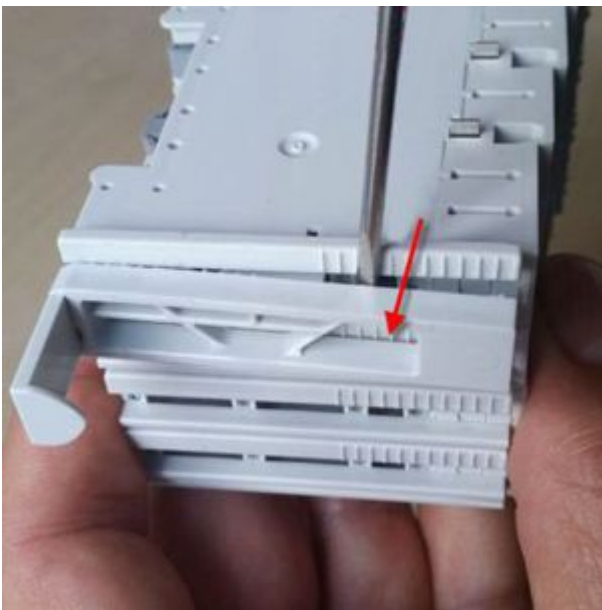

Fig. 14: Remove the holder using a screwdriver

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.
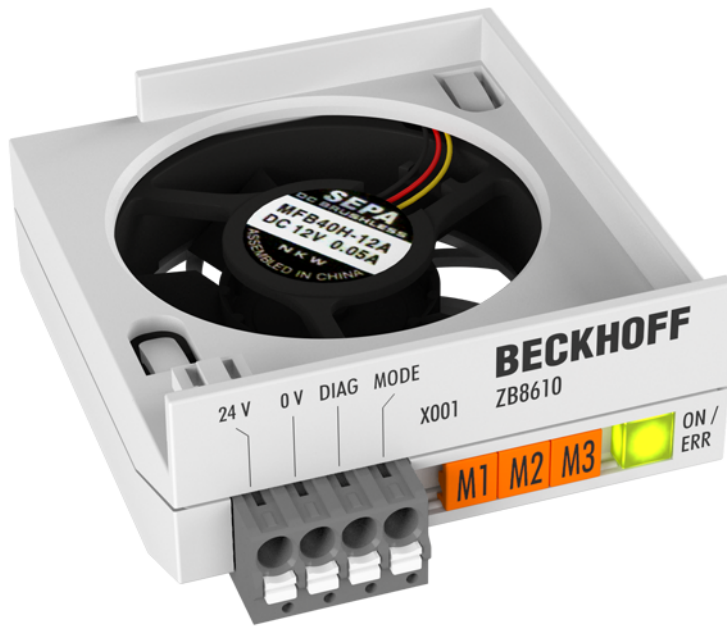
2.4 LED display and connection

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

⚠ CAUTION	
	Application Beckhoff EtherCAT modules are intended for use with Beckhoff's UL Listed EtherCAT System only.

⚠ CAUTION	
	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).

⚠ CAUTION	
	For devices with Ethernet connectors Not for connection to telecommunication circuits.

Basic principles

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

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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