Description

AX5805

List of permissible motors

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BECKHOFF

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1 Foreword

1.1 Notes on the manual

1.1.1 Intendent audience

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

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

1.1.2 Origin of the document

These operating instructions were originally written in German. All other languages are derived from the German original.

1.1.3 Actuality

Please check whether you have the latest and valid version of this document. On the Beckhoff homepage under the link http://www.beckhoff.de/english/download/twinsafe.htm you may find the latest version for download. If in doubt, please contact the technical support (see chapter 5.1 Beckhoff Support and Service).

1.1.4 Product properties

Valid are only the product properties that are specified in the respectively current user documentation. Other information, which is given on the product pages of the Beckhoff homepage, in emails or other publications is not relevant.

1.1.5 Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development. For that reason the documentation is not in every case checked for consistency with performance data, standards or other characteristics.
If it should contain technical or editorial errors, we reserve the right to make changes at any time and without notice.
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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The EtherCAT technology is patent protected, in particular by the following applications and patents:
EP1590927, EP1789857, DE102004044764, DE102007017835 with the corresponding applications and
registrations in various other countries.

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EP0851348, US6167425 with corresponding applications or registrations in various other countries.

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1.1.9 Delivery conditions

In addition, the general delivery conditions of the company Beckhoff Automation GmbH & Co. KG apply.

1.2 Safety instructions

1.2.1 Delivery state

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.

1.2.2 Operator's obligation to exercise diligence

The operator must ensure that
- the TwinSAFE products are only used as intended (see chapter Product description);
- the TwinSAFE products are only operated in sound condition and in working order
  (see chapter Cleaning).
- the TwinSAFE products are operated only by suitably qualified and authorized personnel.
- the personnel is instructed regularly about relevant occupational safety and environmental
  protection aspects, and is familiar with the operating instructions and in particular the safety
  instructions contained herein.
- the operating instructions are in good condition and complete, and always available for reference
  at the location where the TwinSAFE products are used.
- none of the safety and warning notes attached to the TwinSAFE products are removed, and all
  notes remain legible.

1.2.3 Description of safety symbols

The following safety symbols are used in these operating instructions. They are intended to alert the reader to the associated safety instructions.

DANGER	**Serious risk of injury!** **Failure** to follow the safety instructions associated with this symbol directly endangers the life and health of persons.

WARNING	**Caution - Risk of injury!** **Failure** to follow the safety instructions associated with this symbol endangers the life and health of persons.

CAUTION	**Personal injuries!** **Failure** to follow the safety instructions associated with this symbol can lead to injuries to persons.

Attention	**Damage to the environment or devices** **Failure** to follow the instructions associated with this symbol can lead to damage to the environment or equipment.

Note	**Tip or pointer** This symbol indicates information that contributes to better understanding.

1.2.4 Version numbers of the description

Version	Comment
1.7.1	• Update of the certificate
1.7.0	• EFS50 and EFM50 encoder added • EDS35 and EDM35 encoder added • AM87xx for LTN resolver and EDS35, EDM35 added • Certificate updated
1.6.0	• LTN Resolver added to AM8xxx motors
1.5.1	• Motor product name for SKS36 and SKM36 corrected
1.5.0	• Reliability document updated • Safety parameters updated • Foreword overworked
1.4.2	• Reliability document added • Note supplemented
1.4.1	• Certificate updated
1.4.0	• Information re. use of third-party motors added • Document origin and versions added • Company address amended • Further Beckhoff motors added • HFT and element classification according to EN 61508:2010 added
1.3.0	• List of supported AX5000 types added • AM85xx motors added
1.2.0	• AM80xx and AM88xx motors added
1.1.0	• Minor adjustments relating to which AX5000 devices the lists refer to • Certificate updated
1.0.0	• First released version

2 System description

With the integration of safety technology in the drive technology, Beckhoff consistently developed the TwinSAFE system philosophy further. TwinSAFE enables integrated automation, ranging from digital inputs and logic systems to drives or digital outputs. Simple handling, diagnostic and support functions help the user to implement the required application quickly and safely.

Significant hazards to persons arise from the dynamic movements of the electrical drive equipment of machines. The controlling of these hazards whilst achieving a smooth production flow is a big challenge.

The Beckhoff servo amplifiers from the AX5xxx series become fully-fledged safety drives with the AX5805 TwinSAFE drive option card.

The option card is able to switch the motor torque-free or to monitor speed, position and direction of rotation (in accordance with EN ISO 13849-1:2006 to PLe). No further circuits are necessary for this, such as circuit breakers or contactors in the supply lines or special external encoder systems.

This enables a very lean installation and helps to lower costs and control cabinet space. No special encoder system is required in order to implement the SDI (Safe Direction) or SLS (Safely Limited Speed) functions; all Beckhoff motors listed in the document 'AX5805 – List of permissible motors' can be used without further expenditure and without additional encoder systems for these functions. Even safe position monitoring or position range monitoring is simple to implement with the aid of the AX5805 module.

This does not result in any additional wiring, since EtherCAT communication is used in the AX5xxx basic controllers. The AX5805 TwinSAFE drive option card is a self-contained EtherCAT Slave and communicates directly via the AX controller with a TwinSAFE logic terminal existing in the network.
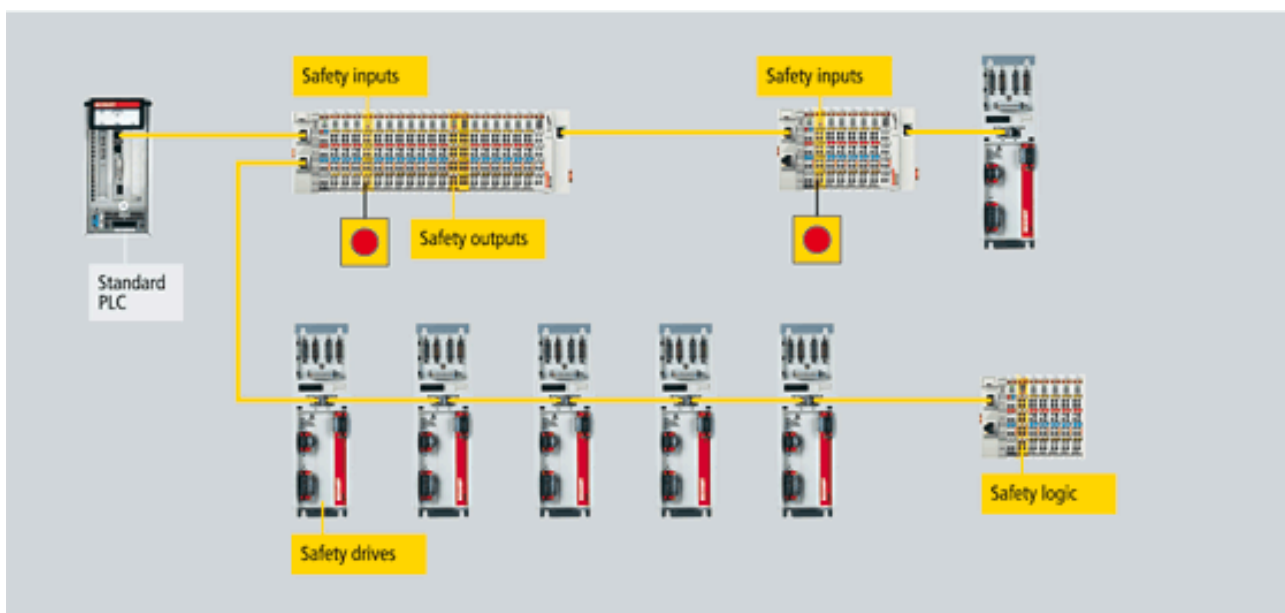
Fig. 1: TwinSAFE system overview

3 List of permissible motors

The AX5805 TwinSAFE drive option card is an optional extension of the Beckhoff AX5000 servo drive series. The following safety functions are realized by installing the AX5805 in the AX5000:

> Stop functions (STO, SOS, SS1, SS2)
> Speed functions (SLS, SSM, SSR, SMS)
> Position functions (SLP, SCA, SLI)
> Acceleration functions (SAR, SMA)
> Direction of rotation functions (SDIp, SDIn)

⚠️ CAUTION	**Permissible motors**
	• The certificate for the AX5805/5806 covers only the motors that are listed in this document.
	• No modifications may be made to the permitted motors
	• The certificate for the AX5805/5806 does not cover any motors or linear drives that are not listed in this document.
	• The customer must provide proof of the safety level attained for applications with third-party motors.

The following tables contain PFH values, together with the achievable category and the achievable performance level for a AX5xxx-xxxx-0200 together with the AX5805 and the listed motor and feedback system. The values for the hardware fault tolerance (HFT) and the element classification according to EN 61508-2:2010, chapter 7.4.4.1.2 and 7.4.4.1.3 are also specified. All other parameters that apply to all combinations can be found in the following table.

To calculate or estimate the $MTTF_d$ value out of the PFH_D value please refer to the Application Guide TwinSAFE or to the ISO 13849-1:2015 table K.1.

Common safety parameter	AX5805
Lifetime [a]	20
Prooftest Intervall [a]	not required [1]
PFH_D	see following tables
$MTTF_d$	High
DC	High

[1] Special proof tests during the entire service life of the TwinSAFE drive option card are not required.

⚠️ CAUTION	**Supported AX5000 devices**
	The following motor types can be used with suitable servo drives of type AX5101 to AX5140 or AX5201 to AX5206, together with the AX5805. Other combinations are not permitted.

3.1 Permissible motor types AM30xx

3.1.1 AM30xx with resolver (Harowe)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM3011-xx0x	3.87E-9	4	e	1	Type B
AM3012-xx0x					
AM3013-xx0x					
AM3021-xx0x					
AM3022-xx0x					
AM3023-xx0x					
AM3024-xx0x					
AM3031-xx0x					
AM3032-xx0x					
AM3033-xx0x					
AM3041-xx0x					
AM3042-xx0x					
AM3043-xx0x					
AM3044-xx0x					
AM3051-xx0x					
AM3052-xx0x					
AM3053-xx0x					
AM3054-xx0x					
AM3062-xx0x					
AM3063-xx0x					
AM3064-xx0x					
AM3065-xx0x					
AM3072-xx0x					
AM3073-xx0x					
AM3074-xx0x					
AM3082-xx0x					
AM3083-xx0x					
AM3084-xx0x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.1.2 AM30xx with EnDAT Single-Turn Encoder (ECN1113)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM3021-xx1x	8.76E-09	4	e	1	Type B
AM3022-xx1x					
AM3023-xx1x					
AM3024-xx1x					
AM3031-xx1x					
AM3032-xx1x					
AM3033-xx1x					
AM3041-xx1x					
AM3042-xx1x					
AM3043-xx1x					
AM3044-xx1x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.1.3 AM30xx with EnDAT Single-Turn Encoder (ECN1313)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM3051-xx1x	5.07E-09	4	e	1	Type B
AM3052-xx1x					
AM3053-xx1x					
AM3054-xx1x					
AM3062-xx1x					
AM3063-xx1x					
AM3064-xx1x					
AM3065-xx1x					
AM3072-xx1x					
AM3073-xx1x					
AM3074-xx1x					
AM3082-xx1x					
AM3083-xx1x					
AM3084-xx1x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.1.4 AM30xx with EnDAT Multi-Turn Encoder (EQN1125)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM3021-xx2x	8.76E-09	4	e	1	Type B
AM3022-xx2x					
AM3023-xx2x					
AM3024-xx2x					
AM3031-xx2x					
AM3032-xx2x					
AM3033-xx2x					
AM3041-xx2x					
AM3042-xx2x					
AM3043-xx2x					
AM3044-xx2x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.1.5 AM30xx with EnDAT Multi-Turn Encoder (EQN1325)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM3051-xx2x	5.07E-09	4	e	1	Type B
AM3052-xx2x					
AM3053-xx2x					
AM3054-xx2x					
AM3062-xx2x					
AM3063-xx2x					
AM3064-xx2x					
AM3065-xx2x					
AM3072-xx2x					
AM3073-xx2x					
AM3074-xx2x					
AM3082-xx2x					
AM3083-xx2x					
AM3084-xx2x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.1.6 AM30xx with BISS Single-Turn Encoder (AD36/0019AF)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM3021-xx3x	11.64E-09	4	e	1	Type B
AM3022-xx3x					
AM3023-xx3x					
AM3024-xx3x					
AM3031-xx3x					
AM3032-xx3x					
AM3033-xx3x					
AM3041-xx3x					
AM3042-xx3x					
AM3043-xx3x					
AM3044-xx3x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.1.7 AM30xx with BISS Single-Turn Encoder (AD58/0022AX)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM3051-xx3x	15.08E-09	4	e	1	Type B
AM3052-xx3x					
AM3053-xx3x					
AM3054-xx3x					
AM3062-xx3x					
AM3063-xx3x					
AM3064-xx3x					
AM3065-xx3x					
AM3072-xx3x					
AM3073-xx3x					
AM3074-xx3x					
AM3082-xx3x					
AM3083-xx3x					
AM3084-xx3x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.1.8 AM30xx with BISS Multi-Turn Encoder (AD36/1219AF)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM3021-xx4x	14.54E-09	4	e	1	Type B
AM3022-xx4x					
AM3023-xx4x					
AM3024-xx4x					
AM3031-xx4x					
AM3032-xx4x					
AM3033-xx4x					
AM3041-xx4x					
AM3042-xx4x					
AM3043-xx4x					
AM3044-xx4x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.1.9 AM30xx with BISS Multi-Turn Encoder (AD58/1222AX)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM3051-xx4x	12.38E-09	4	e	1	Type B
AM3052-xx4x					
AM3053-xx4x					
AM3054-xx4x					
AM3062-xx4x					
AM3063-xx4x					
AM3064-xx4x					
AM3065-xx4x					
AM3072-xx4x					
AM3073-xx4x					
AM3074-xx4x					
AM3082-xx4x					
AM3083-xx4x					
AM3084-xx4x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.2 Permissible motor types AM35xx

3.2.1 AM35xx with BISS Single-Turn Encoder (AD34/0019AU)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM3541-xx3x	11.61E-09	4	e	1	Type B
AM3542-xx3x					
AM3543-xx3x					
AM3551-xx3x					
AM3552-xx3x					
AM3553-xx3x					
AM3562-xx3x					
AM3563-xx3x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.2.2 AM35xx with BISS Multi-Turn Encoder (AD34/1219AU)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM3541-xx4x	14.54E-09	4	e	1	Type B
AM3542-xx4x					
AM3543-xx4x					
AM3551-xx4x					
AM3552-xx4x					
AM3553-xx4x					
AM3562-xx4x					
AM3563-xx4x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.3 Permissible motor types AM80xx/AM85xx

3.3.1 AM80xx/AM85xx with resolver (TE / LTN)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 8021-xx0x	7.25E-09	4	e	1	Type B
AM 8022-xx0x					
AM 8023-xx0x					
AM 8031-xx0x					
AM 8032-xx0x					
AM 8033-xx0x					
AM 8041-xx0x					
AM 8042-xx0x					
AM 8043-xx0x					
AM 8051-xx0x					
AM 8052-xx0x					
AM 8053-xx0x					
AM 8061-xx0x					
AM 8062-xx0x					
AM 8063-xx0x					
AM 8071-xx0x					
AM 8072-xx0x					
AM 8073-xx0x					
AM 8531-xx0x					
AM 8532-xx0x					
AM 8533-xx0x					
AM 8541-xx0x					
AM 8542-xx0x					
AM 8543-xx0x					
AM 8551-xx0x					
AM 8552-xx0x					
AM 8553-xx0x					
AM 8561-xx0x					
AM 8562-xx0x					
AM 8563-xx0x					
AM 8571-xx0x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.3.2 AM80xx/AM85xx with Single-Turn Encoder OCT (EKS36)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 8011-xx1x	22.28E-09	4	e	1	Type B
AM 8012-xx1x					
AM 8013-xx1x					
AM 8021-xx1x					
AM 8022-xx1x					
AM 8023-xx1x					
AM 8031-xx1x					
AM 8032-xx1x					
AM 8033-xx1x					
AM 8041-xx1x					
AM 8042-xx1x					
AM 8043-xx1x					
AM 8051-xx1x					
AM 8052-xx1x					
AM 8053-xx1x					
AM 8061-xx1x					
AM 8062-xx1x					
AM 8063-xx1x					
AM 8071-xx1x					
AM 8072-xx1x					
AM 8073-xx1x					
AM 8531-xx1x					
AM 8532-xx1x					
AM 8533-xx1x					
AM 8541-xx1x					
AM 8542-xx1x					
AM 8543-xx1x					
AM 8551-xx1x					
AM 8552-xx1x					
AM 8553-xx1x					
AM 8561-xx1x					
AM 8562-xx1x					
AM 8563-xx1x					
AM 8571-xx1x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.3.3 AM80xx/AM85xx with Multi-Turn Encoder OCT (EKM36)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 8011-xx2x	22.28E-09	4	e	1	Type B
AM 8012-xx2x					
AM 8013-xx2x					
AM 8021-xx2x					
AM 8022-xx2x					
AM 8023-xx2x					
AM 8031-xx2x					
AM 8032-xx2x					
AM 8033-xx2x					
AM 8041-xx2x					
AM 8042-xx2x					
AM 8043-xx2x					
AM 8051-xx2x					
AM 8052-xx2x					
AM 8053-xx2x					
AM 8061-xx2x					
AM 8062-xx2x					
AM 8063-xx2x					
AM 8071-xx2x					
AM 8072-xx2x					
AM 8073-xx2x					
AM 8531-xx2x					
AM 8532-xx2x					
AM 8533-xx2x					
AM 8541-xx2x					
AM 8542-xx2x					
AM 8543-xx2x					
AM 8551-xx2x					
AM 8552-xx2x					
AM 8553-xx2x					
AM 8561-xx2x					
AM 8562-xx2x					
AM 8563-xx2x					
AM 8571-xx2x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.3.4 AM80xx/AM85xx with Single-Turn Encoder (SKS36)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 8011-xx3x	15.04E-09	4	e	1	Type B
AM 8012-xx3x					
AM 8013-xx3x					
AM 8021-xx3x					
AM 8022-xx3x					
AM 8023-xx3x					
AM 8031-xx3x					
AM 8032-xx3x					
AM 8033-xx3x					
AM 8041-xx3x					
AM 8042-xx3x					
AM 8043-xx3x					
AM 8051-xx3x					
AM 8052-xx3x					
AM 8053-xx3x					
AM 8061-xx3x					
AM 8062-xx3x					
AM 8063-xx3x					
AM 8071-xx3x					
AM 8072-xx3x					
AM 8073-xx3x					
AM 8531-xx3x					
AM 8532-xx3x					
AM 8533-xx3x					
AM 8541-xx3x					
AM 8542-xx3x					
AM 8543-xx3x					
AM 8551-xx3x					
AM 8552-xx3x					
AM 8553-xx3x					
AM 8561-xx3x					
AM 8562-xx3x					
AM 8563-xx3x					
AM 8571-xx3x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.3.5 AM80xx/AM85xx with Multi-Turn Encoder (SKM36)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 8011-xx4x	17.79E-09	4	e	1	Type B
AM 8012-xx4x					
AM 8013-xx4x					
AM 8021-xx4x					
AM 8022-xx4x					
AM 8023-xx4x					
AM 8031-xx4x					
AM 8032-xx4x					
AM 8033-xx4x					
AM 8041-xx4x					
AM 8042-xx4x					
AM 8043-xx4x					
AM 8051-xx4x					
AM 8052-xx4x					
AM 8053-xx4x					
AM 8061-xx4x					
AM 8062-xx4x					
AM 8063-xx4x					
AM 8071-xx4x					
AM 8072-xx4x					
AM 8073-xx4x					
AM 8531-xx4x					
AM 8532-xx4x					
AM 8533-xx4x					
AM 8541-xx4x					
AM 8542-xx4x					
AM 8543-xx4x					
AM 8551-xx4x					
AM 8552-xx4x					
AM 8553-xx4x					
AM 8561-xx4x					
AM 8562-xx4x					
AM 8563-xx4x					
AM 8571-xx4x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.3.6 AM80xx/AM85xx with SingleTurn Encoder OCT (EFS50)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 803x-xxAx	9.54E-09	4	e	1	Type B
AM 804x-xxAx					
AM 805x-xxAx					
AM 806x-xxAx					
AM 807x-xxAx					
AM 853x-xxAx					
AM 854x-xxAx					
AM 855x-xxAx					
AM 856x-xxAx					
AM 857x-xxAx					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.3.7 AM80xx/AM85xx with MultiTurn Encoder OCT (EFM50)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 803x-xxBx	9.54E-09	4	e	1	Type B
AM 804x-xxBx					
AM 805x-xxBx					
AM 806x-xxBx					
AM 807x-xxBx					
AM 853x-xxBx					
AM 854x-xxBx					
AM 855x-xxBx					
AM 856x-xxBx					
AM 857x-xxBx					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.3.8 AM80xx/AM85xx with SingleTurn Encoder OCT (EDS35)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 801x-xxGx	18.58E-09	4	e	1	Type B
AM 802x-xxGx					
AM 803x-xxGx					
AM 804x-xxGx					
AM 805x-xxGx					
AM 806x-xxGx					
AM 807x-xxGx					
AM 853x-xxGx					
AM 854x-xxGx					
AM 855x-xxGx					
AM 856x-xxGx					
AM 857x-xxGx					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.3.9 AM80xx/AM85xx with MultiTurn Encoder OCT (EDM35)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 801x-xxHx	18.58E-09	4	e	1	Type B
AM 802x-xxHx					
AM 803x-xxHx					
AM 804x-xxHx					
AM 805x-xxHx					
AM 806x-xxHx					
AM 807x-xxHx					
AM 853x-xxHx					
AM 854x-xxHx					
AM 855x-xxHx					
AM 856x-xxHx					
AM 857x-xxHx					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.4 Permissible motor types AM87xx / AM88xx

3.4.1 AM87xx with resolver (TE / LTN)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 8731-xx0x	7.25E-09	4	e	1	Type B
AM 8732-xx0x					
AM 8733-xx0x					
AM 8741-xx0x					
AM 8742-xx0x					
AM 8743-xx0x					
AM 8751-xx0x					
AM 8752-xx0x					
AM 8753-xx0x					
AM 8761-xx0x					
AM 8762-xx0x					
AM 8763-xx0x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.4.2 AM88xx with resolver (TE / LTN)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 8831-xx0x	7.25E-09	4	e	1	Type B
AM 8832-xx0x					
AM 8833-xx0x					
AM 8841-xx0x					
AM 8842-xx0x					
AM 8843-xx0x					
AM 8851-xx0x					
AM 8852-xx0x					
AM 8853-xx0x					
AM 8861-xx0x					
AM 8862-xx0x					
AM 8863-xx0x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.4.3 AM88xx with Single-Turn Encoder OCT (EKS36)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 8831-xx1x	22.28E-09	4	e	1	Type B
AM 8832-xx1x					
AM 8833-xx1x					
AM 8841-xx1x					
AM 8842-xx1x					
AM 8843-xx1x					
AM 8851-xx1x					
AM 8852-xx1x					
AM 8853-xx1x					
AM 8861-xx1x					
AM 8862-xx1x					
AM 8863-xx1x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.4.4 AM88xx with Multi-Turn Encoder OCT (EKM36)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 8831-xx2x	22.28E-09	4	e	1	Type B
AM 8832-xx2x					
AM 8833-xx2x					
AM 8841-xx2x					
AM 8842-xx2x					
AM 8843-xx2x					
AM 8851-xx2x					
AM 8852-xx2x					
AM 8853-xx2x					
AM 8861-xx2x					
AM 8862-xx2x					
AM 8863-xx2x					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.4.5 AM88xx with SingleTurn Encoder OCT (EFS50)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 883x-xxAx	9.54E-09	4	e	1	Type B
AM 884x-xxAx					
AM 885x-xxAx					
AM 886x-xxAx					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.4.6 AM88xx with MultiTurn Encoder OCT (EFM50)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 883x-xxBx	9.54E-09	4	e	1	Type B
AM 884x-xxBx					
AM 885x-xxBx					
AM 886x-xxBx					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.4.7   AM87xx with SingleTurn Encoder OCT (EDS35)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 873x-xxGx	18.58E-09	4	e	1	Type B
AM 874x-xxGx					
AM 875x-xxGx					
AM 876x-xxGx					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.4.8   AM87xx with MultiTurn Encoder OCT (EDM35)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 873x-xxHx	18.58E-09	4	e	1	Type B
AM 874x-xxHx					
AM 875x-xxHx					
AM 876x-xxHx					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.4.9   AM88xx with SingleTurn Encoder OCT (EDS35)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 883x-xxGx	18.58E-09	4	e	1	Type B
AM 884x-xxGx					
AM 885x-xxGx					
AM 886x-xxGx					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

3.4.10 AM88xx with MultiTurn Encoder OCT (EDM35)

Motor type	PFH$_D$	Category	Performance Level	HFT	Element classification*
AM 883x-xxHx	18.58E-09	4	e	1	Type B
AM 884x-xxHx					
AM 885x-xxHx					
AM 886x-xxHx					

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

4 Requirements for third-party motors and their feedback systems

⚠️ **WARNING**	**Certification**
	The certificate for the AX5805/5806 does not cover any motors or linear drives that are not included in the list. The customer must provide proof of the safety level attained for applications with third-party motors.

4.1 AX5805 in STO mode

If the AX5805 is operated in STO mode (Safe Torque Off function only) together with an AX5xxx and a third-party motor or linear drive, there are no special requirements for the motor and the feedback system.

Activation of the STO function is described in the user guide for the AX5805.

If the feedback system has a FIT value (failure in time) of less than or equal to 10000, taking into account the actual maximum operating temperature of the system, the PFH value for the combination of AX5xxx, AX5805, motor and feedback system listed in the following table can be used.

Motor type	PFH_D	Category	Performance Level	HFT	Element classification*
Any (STO mode only)	29.79E-09	4	e	1	Type B

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

4.2 AX5805 with SafeMotion functions

If the AX5805 is used in SafeMotion mode (full AX5805 functionality) together with an AX5xxx and a third-party motor or linear drive, note the following requirement:

A Failure Mode and Effect Analysis (FMEA) for the motor/feedback combination according to the specifications of DIN EN 61800-5-2 must be carried out. For installing the encoder on the motor shaft (or the read head for linear encoders), note in particular the table for motion and position sensors in Appendix D.

⚠️ **WARNING**	**FMEA procedure** The machine manufacturer or user is solely responsible for carrying out the FMEA and for compliance with the requirements of DIN EN 61800-5-2. The FIT value (failure in time) of the encoder used for the calculation is usually provided by the manufacturer of the feedback systems.

Only the standard AX5xxx feedback connection via the front ports is supported. This connection allows the following feedback types: resolver, BiSS C with sin/cos 1Vss, EnDat 2.1, EnDat 2.2 with sin/cos 1Vss and incremental sin/cos 1Vss encoder.

If the feedback system (encoder) has a FIT value of less than or equal to 10000, taking into account the actual maximum operating temperature of the system, the PFH value for the combination of AX5xxx, AX5805, motor and feedback system listed in the following table can be used.

Motor type	PFH_D	Category	Performance Level	HFT	Element classification*
Any (SafeMotion mode) Feedback only supported via front connection	29.79E-09	4	e	1	Type B

*) Classification according to EN 61508-2:2010 (see chapter 7.4.4.1.2 and 7.4.4.1.3)

5 Appendix

5.1 Beckhoff 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.

5.1.1 Beckhoff branches and partner companies Beckhoff Support

Please contact your Beckhoff branch office or partner company for local support and service on Beckhoff products!
The contact addresses for your country can be found in the list of Beckhoff branches and partner companies: www.beckhoff.com. You will also find further documentation for Beckhoff components there.

5.1.2 Beckhoff company headquarters

Beckhoff Automation GmbH & Co.KG
Huelshorstweg 20
33415 Verl
Germany

Phone: + 49 (0) 5246/963-0
Fax: + 49 (0) 5246/963-198
E-mail: info@beckhoff.com
Web: www.beckhoff.com

Beckhoff Support
Support offers you comprehensive technical assistance, helping you not only with the application of individual Beckhoff products, but also with other, wide-ranging services:
- world-wide support
- design, programming and commissioning of complex automation systems
- and extensive training program for Beckhoff system components

Hotline: + 49 (0) 5246/963-157
Fax: + 49 (0) 5246/963-9157
E-mail: support@beckhoff.com

Beckhoff Service
The Beckhoff Service Center supports you in all matters of after-sales service:
- on-site service
- repair service
- spare parts service
- hotline service

Hotline: + 49 (0) 5246/963-460
Fax: + 49 (0) 5246/963-479
E-mail: service@beckhoff.com

5.2 Certificate

Reliability of AX5805

Test and Certification body

TÜV SÜD Rail GmbH
Rail Automation - IQSE
Barthstraße 16
D-80339 Munich

Manufacturer

Beckhoff Automation GmbH & Co. KG
Huelshorstweg 20
D-33415 Verl

Safety parameters AX5805

Key figures	AX5805
Lifetime [a]	20
Prooftest Intervall [a]	not required [1]
PFH_D	see document "AX5805 List of permitted motors"
%SIL3	see document "AX5805 List of permitted motors"
$MTTF_d$	High
$B10_d$ (cycles)	-
DC	High
Performance level	PL e
Category	4
HFT	1
Element classification*	Type B

*) Classification according to IEC 61508-2:2010 (see chapters 7.4.4.1.2 and 7.4.4.1.3)

The AX5805 drive option card can be used for safety-related applications within the meaning of
IEC 61508:2010 up to SIL3 and EN ISO 13849-1 up to PL e (Cat4).

[1] Special proof tests for the product are not required during the lifetime of the AX5805 drive option card
as a result of the high diagnostic coverage of the system.

Munich, 2016-03-07

Günter Greil

Digital unterschrieben von
Guenter Greil
DN: c=DE, o=TUEV SUED Rail
GmbH, ou=Rail &
Automation, cn=Guenter
Greil,
email=guenter.greil@tuev-
sued.de
Datum: 2016.03.07 17:52:49
+01'07'

C E R T I F I C A T E

No.   Z10 18 03 62386 050

Holder of Certificate: **Beckhoff Automation GmbH & Co. KG**
Hülshorstweg 20
33415 Verl
GERMANY

Factory(ies):   62386

Certification Mark:

Product: **Safety components**

Model(s):   **AX5805/5806 for use in AX5000-0000-0200-Series**

Parameters: Safety Functions:
STO, SS1, SS2, SOS,
SLS, SSM, SSR, SMS,
SLP, SCA, SLI, SAR,
SMA, SDI
PL e, CAT 4 (EN ISO 13849)
SIL 3 (EN 61508)
SILCL 3 (EN 62061)

Tested
according to: 2006/42/EC
EN ISO 13849-1:2015 (Cat.4, PL e)
EN 61508-1:2010 (SIL 3)
EN 61508-2:2010 (SIL 3)
EN 61508-3:2010 (SIL 3)
EN 61508-4:2010 (SIL 3)
EN 62061:2005/A2:2015 (SILCL 3)
EN 61800-5-2:2017

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition the certification holder must not transfer the certificate to third parties. See also notes overleaf.

Test report no.:   BV83877T

Valid until: 2023-03-26

Date,   2018-03-27   (Guido Neumann)

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