



**Operation Manual**

## **Mains filter AX2090-NF50-xxxx**

**Accessories for Beckhoff servo drives AX5000**

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**BECKHOFF**



# Table of content

<b>1 Foreword</b> .....	<b>5</b>
1.1 Notes on the documentation.....	5
1.2 Documentation issue status .....	6
1.3 Appropriate use .....	6
<b>2 Safety</b> .....	<b>7</b>
2.1 General safety instructions .....	7
2.1.1 Personel qualification.....	7
2.1.2 Description of safety symbols .....	7
2.2 Special safety instructions for AX2090-NF50 .....	8
<b>3 Installing the mains filter</b> .....	<b>9</b>
3.1 Circuit diagram .....	10
3.2 Dimensions and dimensional drawings .....	10
<b>4 Technical data</b> .....	<b>12</b>
<b>5 Support and Service</b> .....	<b>13</b>



# 1 Foreword

## 1.1 Notes on the documentation

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 the 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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## 1.2 Documentation issue status

### Origin of the document

This documentation was originally written in German. All other languages are derived from the German original.

### Product features

Only the product features specified in the current user documentation are valid. Further information given on the product pages of the Beckhoff homepage, in emails or in other publications is not authoritative.

Version	Comment
1.2	<b>Chapter update:</b> Documentation issue status <b>1.2</b> ;Technical data <b>4</b>
1.1	General update
1.0	First published

## 1.3 Appropriate use

The mains filters of the series "AX2090-NF50" are exclusively intended for application in the control cabinet as power supply unit of the AX5000. The filters are installed together with the servo drive as components in electrical systems and machinery and may only be used in this way.

## 2 Safety

### 2.1 General safety instructions

#### 2.1.1 Personel qualification

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

#### 2.1.2 Description of safety symbols

The following safety symbols and associated safety instructions are used in this document. These safety instructions must be read and followed.

<b>⚠ DANGER</b>
<p><b>Serious risk of injury!</b></p> <p>Failure to follow the safety instructions associated with this symbol directly endangers the life and health of persons.</p>
<b>⚠ WARNING</b>
<p><b>Caution – Risk of injury!</b></p> <p>Failure to follow the safety instructions associated with this symbol endangers the life and health of persons.</p>
<b>⚠ CAUTION</b>
<p><b>Personal injuries!</b></p> <p>Failure to follow the safety instructions associated with this symbol can be lead to injuries to persons.</p>
<b>NOTE</b>
<p><b>Damage to the enviroment or devices!</b></p> <p>Failure to follow the safety instructions associated with this symbol can be lead to damage to the environment or equipment.</p>



**Tip or pointer**

This symbol indicates information that contributes to better understanding.

	<p><b>UL note</b></p> <p>This symbol indicates important information regarding UL certification.</p>
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## 2.2 Special safety instructions for AX2090-NF50

The safety instructions are designed to avert danger and must be followed during installation, commissioning, production, troubleshooting, maintenance and trial or test assemblies.

The mains filter series AX2090-NF50 are not designed for stand-alone operation and must always be installed in a machine or system. After installation the additional documentation and safety instructions provided by the machine manufacturer must be read and followed.

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

#### **Serious risk of injury through electric shock!**

Due to the DC link capacitors dangerous voltage ( $> 890V_{DC}$ ) 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

#### **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.



### 3 Installing the mains filter

#### ⚠ WARNING

##### Caution - Risk of injury through electric shock!

De-energize all electrical components (servo drive, control cabinet etc.) before commencing the installation or deinstallation of the mains filter.

#### ⚠ WARNING

##### Caution - Risk of injury through electric shock!

Mains filters contain components that can store electrical charge. Wait 5 minutes after disconnecting the filters and measure the voltage on conductors L1 to L3. The device is safe once the voltage has fallen below 50 V.

#### ⚠ CAUTION

##### Personal injuries!

When installing the mains filter, the protective earth cables must be connected first as a matter of principle. They must be disconnected last when deinstalling. Depending on the size of the leakage current, the special regulations for the implementation of the protective earth connection must be observed. Minimum requirement for the protective conductor KU-value <sup>1)</sup> = 4.5 for leakage currents  $I_L < 10 \text{ mA}$  or  $KU = 6$  for  $I_L > 10 \text{ mA}$ .

<sup>1)</sup> The KU-value is a variable for the classification of safety-related types of failure for protection against dangerous shock current and excessive heating. A value of  $KU = 4.5$  in relation to interruption is attained:

- with a permanently attached protective conductor  $\geq 1.5 \text{ mm}^2$
- for protective conductor connection  $\geq 2.5 \text{ mm}^2$  with plug connector for industrial systems (IEC 60309-2).

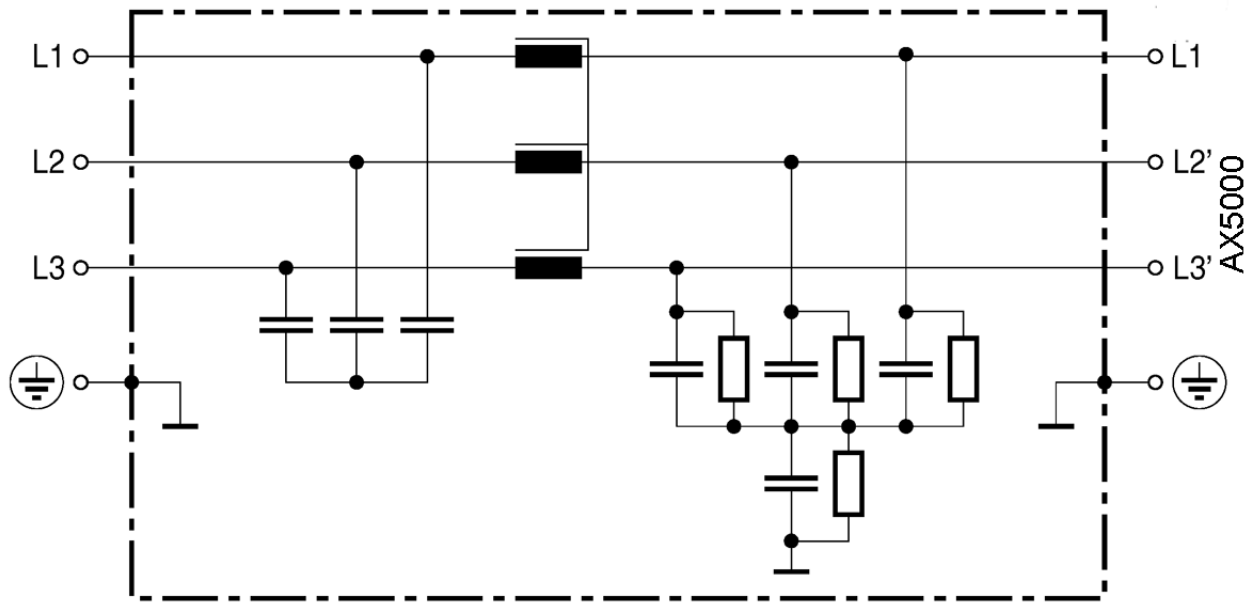
$KU = 6$  in relation to interruption is attained with permanently connected conductors  $\geq 10 \text{ mm}^2$ , wherein the type of connection and routing must comply with the standards applicable to PEN conductors.

#### NOTE

##### Destruction of the mains filter

The mains filters must be protected by means of an appropriate overcurrent protection device against the impermissible exceeding of the rated current.

### 3.1 Circuit diagram



#### Connection cables

The length of the connecting cable from the mains filter to the AX5000 must not exceed 0.4 m. Use exclusively shielded connecting cables.

### 3.2 Dimensions and dimensional drawings

Dimensions	AX2090-NF50-					
	0014	0032	0063	0100	0150	0180
B1 [mm]	38 <sub>.0.3</sub>	35 <sub>.0.3</sub>	40	45	60	180
B2 [mm]	46.4	58	62	75	90	200
B3 [mm]	Ø 4.5		Ø 7			Ø 8.5
H1 [mm]	70	90	180	200	220	120
H2 [mm]	1.5		--	--	--	--
K [mm <sup>2</sup> ]	4	10	0.6-16	16-50	35-95	Busbars
K1 [mm]	--	--	--	--	--	45
K2 [mm]	--	--	--	--	--	86
K3 [mm]	--	--	--	--	--	91
L1 [mm]	200		240	250	280	160
L2 [mm]	231	265	280	290	320	310
L3 [mm]	221 <sub>.0.5</sub>	255 <sub>.0.5</sub>	270		300	180
L4 [mm]	--	--	305	336	380	410
PE1 [mm]	60	70	--	--	--	30
PE2 [mm]	9	8	--	--	--	--
PE [mm <sup>2</sup> ]	M5		M6	M8		M10
T [Nm]	0.5 – 0.6	1.2 – 1.5	--	--	--	--

Figure	Mains filter
	<p>AX2090-NF50-0014 AX2090-NF50-0032</p>
	<p>AX2090-NF50-0063 AX2090-NF50-0100 AX2090-NF50-0150</p>
	<p>AX2090-NF50-0180</p>

## 4 Technical data

	AX2090-NF-50-					
Data	0014	0032	0063	0100	0150	0180
Rated voltage [V <sub>AC</sub> ]	480					
Rated frequency [Hz]	50 / 60					
Rated current [A]	14.6	32.8	63	100	150	180
Voltage cable/cable for 2 sec. [V <sub>DC</sub> ]	2236		--	--	--	--
Voltage cable/housing for 2 sec. [V <sub>DC</sub> ]	2720		--	--	--	--
Rated temperature [°C]	50		40			
Climate category (IEC 60068-1)	25/100/21		--	--	--	--
Resistance [mΩ]	9	4	0.577	0.817	0.477	0.113
Leakage current [mA]	15		6.8	9.8		
Overload capability (thermal)	1.5 x Rated current for 3 min per hour or 2.5 x Rated current for 30 s per hour					
Weight [kg]	0.9	1.75	5.0	6.0	6.8	7.0
Approvals	EN 133200, UL 1283, CSA C22.2 No.8		--	--	--	--

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