



**Instruction manual**  
**EPA mains chokes**  
**motor chokes / sinusoidal filters**

#### EPA GmbH

Fliederstraße 8, D-63486 Bruchköbel  
 Deutschland / Germany  
 Telefon / Phone: +49 (0) 6181 9704-0  
 Telefax / Fax: +49 (0) 6181 9704-99  
 E-Mail: info@epa.de  
 Internet: www.epa.de

UID DE 113545686  
 HRB 3891 Hanau  
 Geschäftsführer:  
 Dipl.-Ing. Thorsten Pemsel  
 WEEE-Reg.-Nr.: DE 64732845

## Instruction manual: EPA mains chokes / motor chokes / sinusoidal filters

### Warning and safety instructions

Please read through all the warnings and safety instructions carefully before installing and starting to use the chokes. Because mains chokes, motor chokes and sinusoidal filters are all subject to roughly the same operating conditions, in the following text they are referred to simply as 'chokes' (▲/▲/▲). This also applies to the warning signs attached to the chokes. Please make sure that the signs are not removed, or that their legibility is impaired by external influences. If appropriate precautions are not taken or the instructions in the text are not followed, the result may be death, serious injury and considerable damage to property.



All works such as transport, installation, commissioning and maintenance must only be carried out by qualified personnel i.e. designated persons, who due to their technical training, experience, knowledge of the relevant standards, as well as instruction in the specialist field of drive engineering, are thus able to assess the tasks assigned to them, recognise possible hazards and observe the applicable local regulations.

When using chokes, the standard series DIN EN 61558 and DIN EN 61800 must be observed. Also applicable are the BetrSichV (Ordinance on Industrial Safety and Health), the rules of the DGUV (German Statutory Accident Insurance Association), and the general VDE, DIN, EN and IEC regulations. In order to ensure proper functioning of the equipment, the basic principles of an EMC-compliant installation must be observed.

### Intended use

The chokes may only be used for their intended purpose in low-voltage networks within the specified values and in compliance with instructions contained in the data sheets. The conditions at the application site must correspond in all respects with those for the choke being used.

### Safety instructions

	<b>Caution: Danger to life!</b> Before working on the choke, it must be checked that it is voltage-free. It must be ensured that the energy stored in the components was reduced to low values within a short period of time so that the voltage applied to the connections dropped to permissible values. Otherwise, a life-threatening shock can be caused when touched.
	Chokes generate a voltage drop depending on inductance, frequency and current. This voltage drop must be taken into account when dimensioning the motor and the frequency inverter, because reducing the voltage requires a higher current if the power is to be kept constant.
	The power loss of a choke leads to a relatively large heating of the surface of the choke. The choice of installation location (radiant heat) and the ventilation of the choke must be given special attention here.
	The installation position of the choke must be observed to prevent thermal overload.
	The choke is not short-circuit proof. Suitable protection and fuse protection measures must be provided.
	The inputs and outputs of the choke must not be interchanged, as damage to choke and frequency inverter may occur.
	Operation of the choke without load is not permitted because damage to the frequency inverter and the choke may occur.
	The specifications of the permissible motor frequencies, clock frequencies and motor cable lengths must be observed.
	The current must be reduced if the nominal ambient temperature is exceeded (derating).
	With motor choke and sinusoidal filter, automatic clock frequency switching, undercutting of the minimum clock frequency and "2-phase modulation" are not permitted. These must be switched off via the parameterisation of the frequency inverter.
	For the operation of a choke, frame parameters according to the data sheet and type plate apply and must not be exceeded.
	Continuous operation of the choke outside the nominal frequency can lead to increased heating.

### Environmental conditions

- Unless stated otherwise, the maximum permitted ambient temperature is 40 °C.
- Sufficient air supply and ventilation must be provided (higher temperature only with reduced current)
- In order to achieve sufficient ventilation and uninterrupted thermal radiation, it is necessary to leave an all-round clearance between the choke and the surrounding fixtures or side walls.
- The chokes can reach peak temperatures of over 130 °C. It is imperative to take account of the thermal radiation emitted by the choke.
- The chokes have protection class IP00 and must be protected against contact and other influences (water, dust).

### Funktion

**Mains chokes** are used between the mains supply and the frequency inverter. They reduce mains perturbations and the absorbed mains current of the frequency inverter. In addition, they protect the frequency inverter. By reducing the reactive current, the dimensioning of the upstream components (fuses, motor-protective circuit-breakers, contactors, RFI filters) and supply cables can be made more efficient.

**Motor chokes** are used between the frequency inverter and the motor. They reduce capacitive transfer currents of the motor cables and limit the edge steepness of the motor voltage. The service life of the motor is extended by the reduced voltage load on the insulation system.

**Sinusoidal filters** are used between the frequency inverter and the motor. They filter the pulse-width modulated output voltage and thus simulate almost mains-like conditions for the motor. By limiting the edge steepness of the motor voltage, it is possible to use longer or unshielded motor cables. Noise generation at the motor is greatly reduced and shifted to the sine filter. The service life of the motor is extended by the reduced voltage load on the insulation system.

**Mounting and installation, connection, commissioning, maintenance and disposal** follow on the reverse.

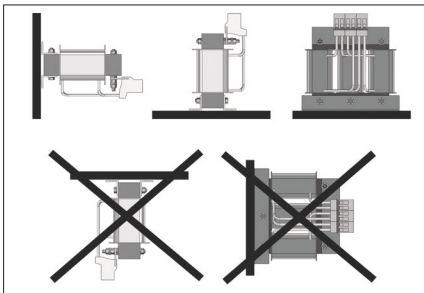
## Mounting and installation

The choke is to be **mounted** on a bare metal plate in the control cabinet as follows:

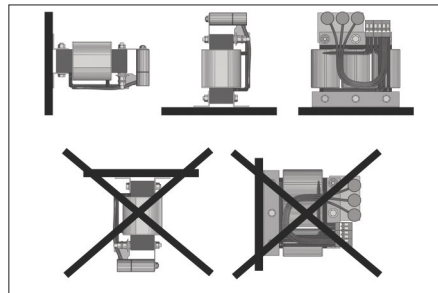
- Position the choke close to the frequency inverter (bear in mind radiant heat!)
- Keep the cable runs as short as possible.
- Lay the motor leads separate from the other cables (such as the mains or signal cables) to prevent interference.
- Each choke is mounted with 4 screws through the fixing holes provided in the base plate.

The **installation** of the chokes must be selected as follows to prevent a thermal overload:

- Where applicable, cooling ducts must be arranged vertically.
- The cool airflow (natural convection) must not be obstructed by adjacent components, connecting cables etc. The capacitors must not be loaded by the waste heat of another choke or heat source.



Mounting position mains choke / motor choke

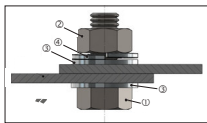
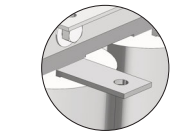


Mounting position sinusoidal filter

## Connection

The chokes must only be connected and put into operation by qualified electricians. In particular, the following conditions must be met:

- It is essential to connect the **PE connection** of the choke to the protective conductor system.
- The **protective conductor connections** must be made in accordance with the applicable regulations.
- The **tightening torques** can be found in the following tables:



Copper busbar

Connection		ø 8 mm	ø 11 mm
Screw ①		M8	M10
Nut ②		M8	M10
Washer ③		8.4 x 16.0	10.5 x 20.0
Spring washer ④		8.2 x 14.4	10.5 x 17.4

Thread	Tightening torque [Nm]
M4	1.3 .... 1.5
M5	2.0 .... 2.3
M6	4.0 .... 4.5
M8	6.0 .... 8.0
M10	18.0 .... 20.0
M12	40.0 .... 42.0
M14	50.0 .... 52.0

Thread bolt

Cable cross-section [mm <sup>2</sup> ]	Tightening torque [Nm]
4	0.6 .... 0.8
6	1.5 .... 1.8
10	1.5 .... 1.8
16	2.0 .... 2.2
25	4.0 .... 4.5
50	6.0 .... 8.0
95	15.0 .... 20.0

Screw terminal

- The following applies to connections via **copper busbars**:

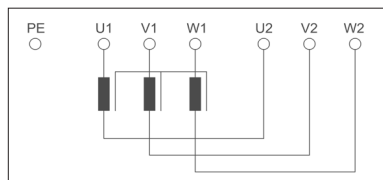
The connection is effected by cable lugs or external busbars using the parts listed in the table. The flat contact surfaces of the flat terminals must be metallically bright. Alignment of the cable lugs after the screws have been tightened is prohibited (risk of loosening).

- Where the connections are via **screw terminals**, the following applies:

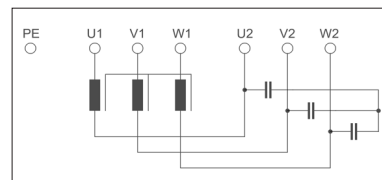
The cables must be insulated such that the stripped part of the cable can be inserted completely into the contact part of the clamps without misalignment. The cable insulation should lie on the contact part of the clamp without being pinched when the screws are tightened.

- **Terminal assignment** is as follows:

- **Mains choke:** The terminals U1/V1/W1 must be connected to the mains side. The terminals U2/V2/W2 must be connected to the load side.
- **Motor chokes:** The terminals U1/V1/W1 must be connected to the frequency inverter output. The terminals U2/V2/W2 must be connected to the motor. The cable between the choke and the frequency inverter should be as short as possible.
- **Sinusoidal filters:** The terminals U1/V1/W1 must be connected to the frequency inverter output. The terminals U2/V2/W2 must be connected to the motor. The cable between the filter and the inverter should be as short as possible.



Connection example mains choke / motor choke



Connection example sinusoidal filter

## Commissioning

The parameters in the respective data sheet must be observed for **commissioning**.

Whenever changes in normal operation become apparent: (higher power consumption, temperatures or vibrations, unusual noises or smells, tripping of monitoring equipment etc.), it can be assumed that the **function** of the device has been impaired.


In diesem Fall muss das zuständige Fachpersonal umgehend verständigt werden, um Störungen zu verhindern, die Personen- oder Sachschäden bewirken können. Im Zweifelsfall ist das entsprechende Betriebsmittel sofort abzuschalten.

## Maintenance

Our chokes are maintenance-free. It is recommended that the following **work** be carried out regularly:

- General visual inspection
- Remove excessive dust deposits with compressed air (max. 2.5 bar) and a suitable Hoover
- Check the connection elements with the specified torque
- For sinusoidal filters, the following also applies: Replace the condensers 3 - 5 years, depending on the load

## Disposal

 Electrical and electronic devices must not be disposed in the garbage. At the end of their service life, the chokes must be disposed of in accordance with the statutory regulations.