

COMBILINE



GB SERVICE MANUAL




Medium Frequency
Sine-Wave-Filter

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1. Safety Instructions

Prior to performing any work on the unit the user must familiarize himself with the unit. This includes especially the knowledge and observance of the safety and warning directions. The pictographs used in this instruction manual have following meaning:

	Danger	Refers to danger of life by electric current.
	Warning	Refers to possible danger of injury or life.
	Note	Refers to tips and additional information.

1.1 Validity


The information contained in the technical documentation, as well as any user-specific advice in spoken and written and through tests, are made to best of our knowledge and information about the application. However, they are considered for information only without responsibility. This also applies to any violation of industrial property rights of a third-party. Inspection of our units in view of their suitability for the intended use must be done generally by the user. Inspections are particularly necessary, if changes are executed, which serve for the further development or adaption of our products to the applications (hardware, software or download lists). Inspections must be repeated completely, even if only parts of hardware, software or download lists are modified.

	Controlling by the user	Application and use of our units in the target products is outside of our control and therefore lies exclusively in the area of responsibility of the user.
	Use under special conditions	The used semiconductors and components of KEB are developed and dimensioned for the use in industrial products. If the KEB COMBIVERT is used in machines, which work under exceptional conditions or if essential functions, life-supporting measures or an extraordinary safety step must be fulfilled, the necessary reliability and security must be ensured by the machine builder.

1.2 Qualification

All operations serving transport, installation and commissioning as well as maintenance are to be carried out by skilled technical personnel (observe IEC 364 or CENELEC HD 384 or DIN VDE 0100 and national accident prevention rules!). According to this manual qualified staff means:

- those who are able to recognise and judge the possible dangers based on their technical training and experience
- those with knowledge of the relevant standards and who are familiar with the field of power transmission (VDE 0100, VDE 0160 (EN 50178), VDE 0113 (EN 60204) as well as the appropriate regulations for your area.

	<p>Danger by high voltage</p>	<p>KEB electronics components contain dangerous voltages which can cause death or serious injury. In operation, drive converters, depending on their degree of protection, may have live, uninsulated, and possibly also moving and hot surfaces.</p> <p>In case of inadmissible removal of the required covers, of improper use, wrong installation or maloperation, there is the danger of serious personal injury and damage to property.</p>
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2. Service notes

2.1 General

The present service manual describes necessary steps at maintenance and repair of medium frequency sine-wave filters.

The following checks must be done.

- Capacity test of the capacitors
- Insulation test of the choke

2.2 Required tool

- Torque spanner with diverse uses
- Capacity measuring device
- High voltage tester

Additional equipment for the change of the capacitors

- Knife
- Hot-air fan
- Heat-shrinkable tube


2.3 Life expectancy - exchange of the capacitors

The maximum life expectancy of the capacitors amounts to 100,000 operating hours. After that the capacitors must be exchanged.

This information can deviate downwards dependent on the respective operating mode. Whether an exchange is necessary results by the following measurement.

2.4 Checking of the sine-wave filter

2.4.1 Preparations

	• switch system de-energized
	• secure against restart
	• await five minutes for discharge of the capacitors
	• clean sine-wave filter from dust and other contaminations

2.4.2 Measurements at the capacitor

	Unscrew and mark connections of the capacitor at the terminal strip.
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The capacity measurement must be executed as follows:

	<ul style="list-style-type: none"> It is measured between two phases of the delta-connected capacitors.
	<ul style="list-style-type: none"> The following capacity value C_{Meas} must result.
	$C_{Meas} = 1,5 \cdot C_{rated} \pm 7,5\%$
	<ul style="list-style-type: none"> A failure may occur if one of this three measured values differs to the other. The capacitor must be exchanged in accordance with chapter 3.

The high-voltage test is made dependent on the insulation tester with the following test voltages:

Test voltage phase <-> ground
2,5 kV ac
3,5 kV dc

2.4.3 Measurement of the insulation strength

The choke can be checked with a high-voltage test on its insulation strength. The test is done without capacitor.

	Unscrew connections of the capacitor at the terminal strip
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The high-voltage test is made dependent on the insulation tester with the following test voltages:

Test voltage phase <-> phase	Test voltage phase <-> housing
2,5 kV ac	2,5 kV ac
3,5 kV dc	3,5 kV dc

2.4.4 Connection of the capacitor lines

The capacitor lines must be connected again in accordance with the marking if the tests are without complaint. The terminals must be tightened with the following tightening torque:

Terminal strip	Tightening torque terminal strip
WFF 35	3,0...6,0 Nm
WFF 70	6,0...12 Nm
WFF 120	10...20 Nm
WFF 185	14...31 Nm
WFF 300	25...60 Nm

2.5 Exchange of the capacitors


2.5.1 Spare parts list

If the result of the test requires an exchange of the capacitors, they can be ordered from KEB by the following material number:

Capacitor	Rated capacitance	Tightening torque	
0090339-1061	3 x 10,0 μ F	3 x screw terminal M10 => 10 Nm M12 => 15 Nm	Connection M12 => 7 Nm
0090339-1260	3 x 12,0 μ F		
0090339-1561	3 x 15,0 μ F		
0090339-3651	3 x 3,6 μ F		
0090339-3361	3 x 33,0 μ F		
0090339-4751	3 x 4,7 μ F		
0090339-0860	3 x 8,0 μ F		

2.5.2 Preparations

If not be done before measurement the following steps are necessary:

	• switch system de-energized
	• secure against restart
	• await one minute for discharge of the capacitors
	• clean sine-wave filter from dust and other contaminations

2.5.3 Disassembly of the old capacitors

• remove heat-shrinkable tube with knife
• unscrew connection cable
• remove fixing bolts
• remove capacitor
• execute insulation test in accordance with 2.4.3 (if required)

2.5.4 Installation of new capacitors

• insert capacitor
• tighten fixing bolt in accordance with table 2.5.1
• pull heat-shrinkable tube over the connection cables
• tighten connection cable in accordance with table 2.5.1
• lock heat-shrinkable tube with hot-air fan

2.6 Disposal

The capacitors are lead-free and use M-DBT as dielectric. Disposal of old capacitors must be done in accordance with the local regulations.



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