# OPERATION MANUAL

# ELECTRONIC FREQUENCY CONVERTER HFO-E

**Lievers Holland**
PO Box 103
3640 AC Mijdrecht
Tel: +31 (0)297-231900
Fax: +31 (0)297-231909
E-mail: info@lieversholland.nl - www.lieversholland.nl

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## Safety precautions

### Common

- Initial operation and repairs have to be performed by qualified personnel only (VDE 0100 und VDE 0110).
- Improper installation of the frequency converter or the vibrators can cause damage or deadly injuries.
- Please follow the instructions of this manual as well as the local and national safety requirements.
- After disconnecting the device of the mains supply, the capacitors remain charged. It can take more than 3 minutes to discharge. Before starting, it is mandatory to check that no voltage is applied.
- The actual valid warranty provisions at the date of purchase of the converter are applicable. Improper use of the converter leads to loss of warranty and manufacturer´s liability.
- Every unauthorised alteration of the converter, even the incorrect installation of vibrators or additional means leads to a deviation of the specified data, documentation and user´s manual and implies to loss of warranty and manufacturer´s liability.

### Warnings

- Do not remove the cover when input power is connected. Do not remove the cover except for routine inspections or wiring, even if the input power is not applied. The capacitors will remain charged for a long time even when the power is not applied. Make sure that the commuting capacitor is discharged.
- Do not apply voltage higher than the values specified in this manual. Doing so can damage the converter.
- Do not operate  the switch with wet hands. Doing so can result in electric shock.
- Disconnect the converter when it is damaged. Not doing so could lead to secondary accident and fire.
- The converter restarts after overload stop, 3 times within 1 second, so take caution.

**DO NOT CLEAN THE CONVERTER WITH HIGH PRESSURE WASHERS!!!**

**DO NOT OPERATE THE CONVERTER WITH MOTOR GENERATORS GENERATING THE INPUT VOLTAGE. THEY CAN PRODUCE OVERVOLTAGE, WHICH CAN DAMAGE THE CONVERTER.**

**RCD**

- Connect and operate converter with input voltage 230 V 1 phase only with power supplies including a RCD (type B) ≤ 30 mA.

- Connect and operate converter with input voltage 3 x 400 V only with power supplies including an AC/DC sensitive RCD (type B) ≤ 30 mA. If this is not feasible due to high stray current (because of EMC net filter), a differential current monitor must be employed.

**Caution:**
Due to the high stray current levels of the interference filter, make sure that the inverter is only connected to one fault current protective switch. This will prevent the fault current protective switch from being triggered inadvertently.

## Benefits of HFO-E

The HFO-E electronic frequency converter provide the following benefits:

- Strong output power
- Low weight compared to conventional rotating converters
- Optimal User Safety through galvanic isolation of the output
- Low noise
- Up to 4 sockets for vibrators
- Designed for rough conditions
- Overload protection – Turn off with automatic restart
- Phase Protection
- Automatic power control – Overload capacity of 150 %
- No wearing parts

# Technical data

## Type range and technical data

**Series HFO-E Input voltage 230V 50/60 Hz-1 Phase** **Output voltage 3 x 42 V 200 Hz**

| Type | Power | Current | Weight | Sockets |
|---|---|---|---|---|
| HFO-E 1,8/230/42/25 | 1,8kVA | 25A | 16kg | 2 |
| HFO-E 2,5/230/42/35 | 2,5kVA | 35A | 18kg | 2 |

**Serie HFO-E Input voltage 400V 50/60 Hz-3 Phasen** **Output voltage 3 x 42 V 200 Hz**

| Type | Power | Current | Weight | Sockets |
|---|---|---|---|---|
| HFO-E 3,6/400/42/50 | 3,6 kVA | 50 A | 26 kg | 3 |
| HFO-E 5,3/400/42/75 | 5,3 kVA | 75 A | 31 kg | 4 |

## Common technical data

| | | | |
|---|---|---|---|
| Electric supply | 1 x 230 V, 50/60 Hz ± 10 % | Working temperature range | 0 - 40 °C |
| or | 3 x 230 V, 50/60 Hz ± 10 % | Protection class | IP 54 |
| or | 3 x 400 V, 50/60 Hz ± 10 % | Sheet metal cover, powder-coated<br>Portable safety frame with vibration absorber | |
| Connecting cable | H07RN-F, 220 cm | | |

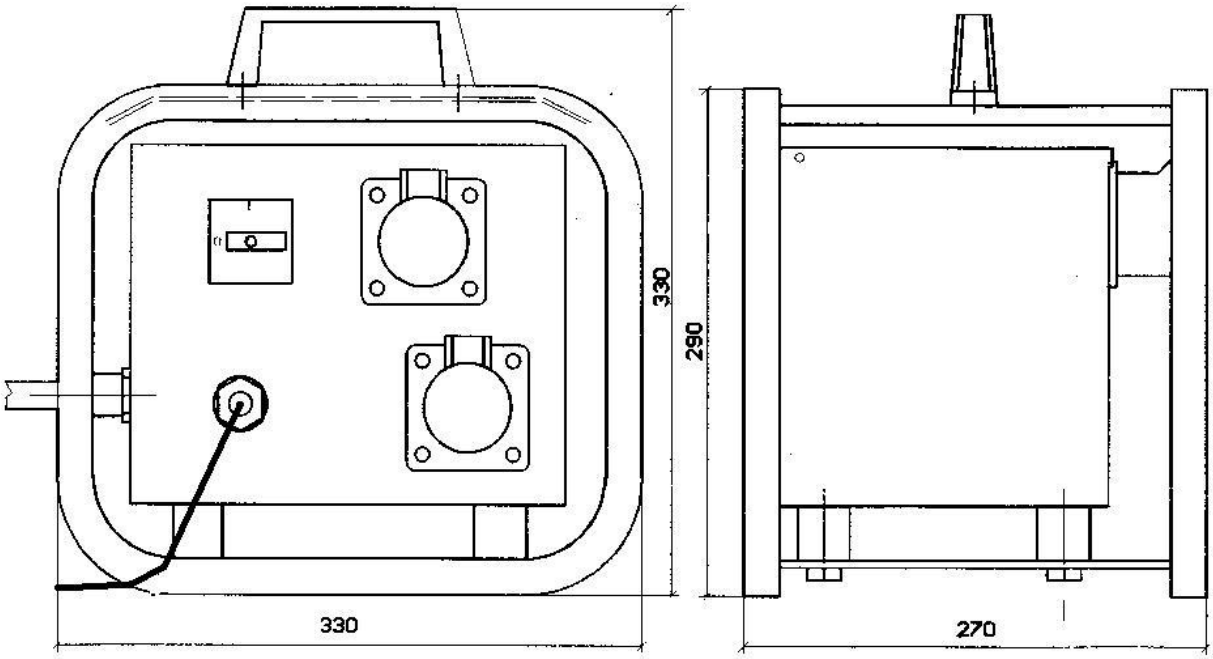


*Fig 1. Dimensional drawing HFO-E 1,8 and 2,5*

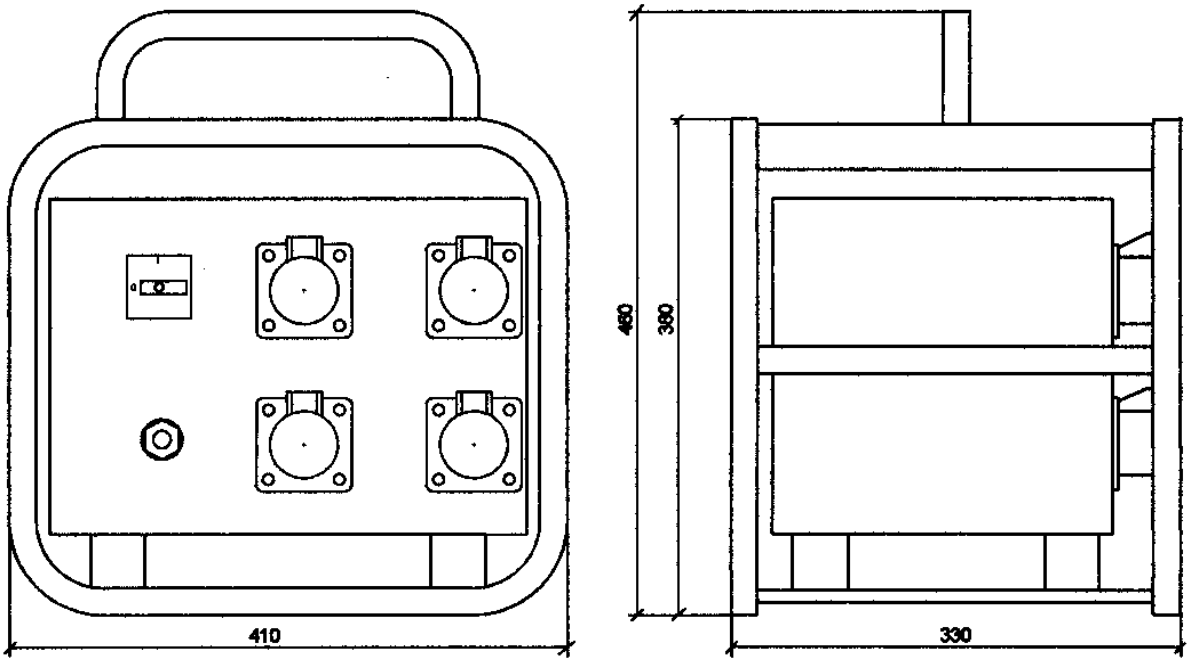


*Fig. 2 Dimensional drawing HFO-E 3,6 and 5,3*

## Installation

**Common:**

- The equipment is 100 % tested prior to delivery.
- Check the type plate of the converter, compare the rated voltage and rated current with the data of electrical means and the data of the high frequency vibrators.
- The user is responsible for the correct installation of the converter and the vibrators with regards to the officially recognized technical regulations of the locality, the local country and other regionally applicable rules. Dimensioning of cables, fuses, grounding, de-energization, isolation and over current protection have to be respected.

**Rating plate (Example)**

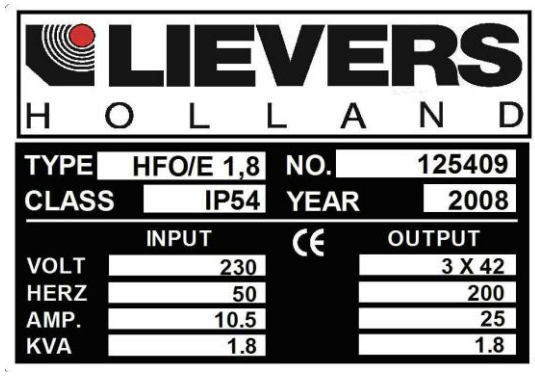


***Fig. 3 Rating plate HFO-E 1,8***

To connect the equipment and the vibrators, please follow the following instructions:

1. Connect the converter with the mains supply with the correct, specified input voltage.
2. Connect the vibrators with the frequency converter. Make sure, that the sum of the max. current usages of the vibrators does not exceed the specified output current of the frequency converter to prevent overload.
3. Turn the converter on. It starts and drives the vibrators continuously up to the required speed of 12.000 Rpm.

## Protection Devices

**Galvanic Isolation for maximal user safety**

The frequency converter consists of:

- the electronic frequency converter, which converts the input voltage of 230V 50/60 Hz or as shown in following principal sketch 3 x 400 V 50/60 Hz into the three phase AC voltage 3 x 230 V 200 Hz or 3 x 400 V 200 Hz and

- the safety transformer following DIN EN 61558, which transforms the output voltage of the frequency converter into the 3 x 42 V safety voltage and which isolates galvanically each phase to provide the maximal protection for the user against electric shock.

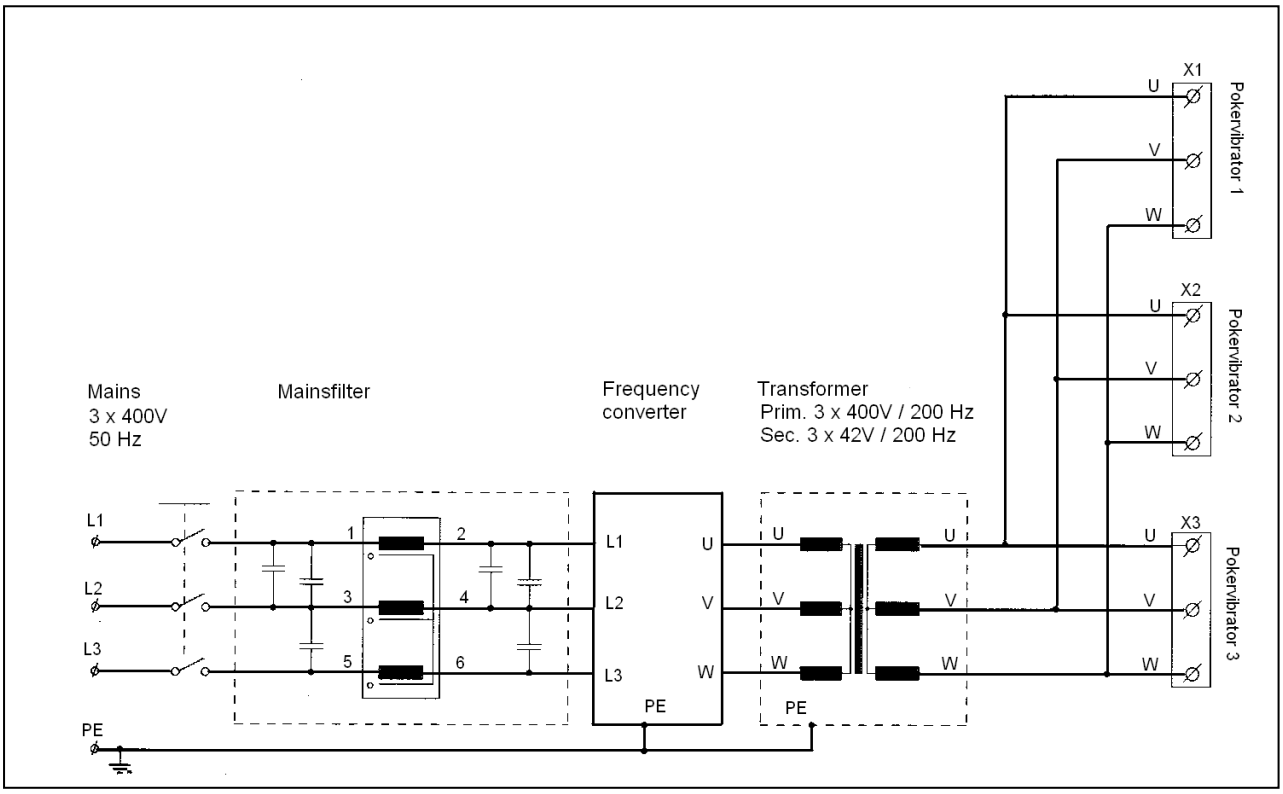


***Fig. 4 Principal sketch***

**Overload / Short circuit**

At overload, the converter turns off and restarts after approx. 1 second. After 5 restarts with still existing overload, the converter stays at hold-up. After removal of the overload and disconnecting of the mains supply for approx. 30 seconds, the converter is operational again. If there is a short circuit in one of the vibrators, do not restart the frequency converter again unless the short circuit is removed.

## Troubleshooting

General:

After switching on the electrical means, the frequency converter starts. A metallic / high frequent buzzing sound can be heard.

| | |
|---|---|
| **PROBLEM:** | **The converter does not start after initial installation. No metallic sound can be heard.** |
| **Solutions:** | Check, whether the electric means is correctly applied. Check, whether the RSD has been triggered. |

| | |
|---|---|
| **PROBLEM:** | **When switching on one or more vibrators on an already running converter, the converter may shut down and restart and drive the vibrators continuously up to the maximum speed.** |
| **Explanation:** | At the point of turning on the vibrators on a running converter, it may happen that the converter is shortly overloaded because the vibrators might require a higher starting energy than needed at maximum speed. It shuts down to protect itself, restarts and drives the vibrators ramp controlled up to the maximum speed. |

| | |
|---|---|
| **PROBLEM:** | **The converter does not manage to start the connected, switched on vibrators and shuts down. The metallic sound can not be heard.** |
| **Solution:** | Turn the electric means off at the converter and wait for approx. 30 seconds. Check the vibrators and the sum of the current usages of all connected vibrators. This sum must not exceed the specified current on the type plate. Turn the converter on with only one connected, switched on vibrator. In this case there should not be an overload. |

| | |
|---|---|
| **PROBLEM:** | **The converter stays after 5 attempts to restart without overload at failure and no metallic sound can be heard.** |
| **Solution:** | Do not try to restart, disconnect the converter from the electric means and contact your local dealer. |

## EC Declaration of Conformity of the Manufacturer

(Article 10 of EC Directive 73/23/CEE, Altered by the Means of Directive 93/68/CEE)

The electrical device: HFO-E

The control consists mainly of the following electrical devices:

- 3 Phase inverter for operation of AC-Motors
- Base line filter
- Safety Transformer

**are in agreement with following European standards:**

73/23/CEE
Directive of the EC Council for Adaptation to Effective the Provision of the Member States, referred to the application of electrical devices within certain voltage limits.
Altered by the means of Directive 93/68/CEE

89/336/EWG
Directive of the EC Council for Adaptation to Effective the Provision of the Member States, referred to the electromagnetic compatibility (EMC).
Altered by the means of directive 91/263/CEE, 92/31/CEE and 93/68/CEE.
The accordance to the provisions of these directives is shown by the observance of following standards:

European Standard

ENV 50140 (1993 & ENV 50204 (1995)
EN 61000-4-4 (1995)
EN 61000-4-5 (1995)
ENV 50141 (1993)
EN 61000-4-8 (1993)
EN 61000-4-11 (1994)

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**Lievers Holland**
PO Box 103
3640 AC Mijdrecht
Tel: +31 (0)297-231900
Fax: +31 (0)297-231909
E-mail: info@lieversholland.nl - www.lieversholland.com