Operating manual

Manual control unit

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Legal notice

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General note on gender equality
BRINKMANN is aware of how language impacts gender equality and always makes an effort to reflect this in documentation. Nevertheless, for the sake of readability, we are unable to use non-gender-specific terms throughout and use the masculine form instead.

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1 Important information
This chapter contains important information on safe handling of the product and the operating manual.

1.1 Information about documentation
The following information explains how to navigate through the documentation.
Read this manual carefully in its entirety. It contains important information for operating the FKO MMI.
We assume no liability for any damage resulting from non-observance of this manual.
This manual is a part of the product and should be stored in a safe place. It applies exclusively to the FKO MMI from K.H. Brinkmann GmbH & Co. KG. Provide the operator of the system with this manual so it is available when needed.

1.1.1 Other applicable documents
This refers to all manuals that describe how to operate the drive control system and any other manuals for the equipment used.

1.1.2 Storing the documentation
Store this manual and all other applicable documents safely so they are available when needed.
1.2 Symbols

1.2.1 Warnings

⚠️
General warnings are labelled by a warning triangle with exclamation points.

⚠️
A warning triangle with a lightning bolt indicates the risk of hazardous voltage.

1.2.2 Signal words
Signal words in warnings indicate the type and severity of the consequences if measures to avoid danger are not followed.

- **DANGER** means that life-threatening personal injury can occur.
- **WARNING** means that severe personal injuries can occur.
- **CAUTION** means that mild to moderate personal injuries can occur.
- **NOTE** means that material damage can occur.

1.2.3 Information

❗️
*Important information without risks to persons or property is represented by the symbol on the left.*

1.2.4 Text symbols

<table>
<thead>
<tr>
<th>1, 2, 3, etc.</th>
<th>Sequential steps of an instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>🔴</td>
<td>Effect of an instruction</td>
</tr>
<tr>
<td>✔️</td>
<td>Final result of an instruction</td>
</tr>
</tbody>
</table>
1.3 Qualified staff

In the context of this operating manual and the information relating to the product itself, qualified staff refers to electronics specialists who are familiar with the installation, assembly, start-up and operation of the drive control and the dangers involved, and whose specialist training and knowledge of relevant standards and regulations provide them with the necessary abilities.

1.4 CE marking

With the CE marking, we, as the manufacturer of the device, confirm that the basic requirements of the following guidelines are met:


See page 20 EC declaration of conformity.

1.5 Safety instructions

The following warnings, precautionary measures and comments are provided for your safety and serve to prevent damage to the drive control and the components connected to it. This chapter contains warnings and information that are generally applicable when handling drive controls. They are split into general information, transport & storage and dismantling & disposal.

Specific warnings and comments that apply to specific activities can be found at the start of the appropriate chapters and are repeated or added at various critical points in these chapters.

Please read this information carefully as it is provided for your personal safety and will also prolong the life of the drive control and connected devices.
1.5.1 General information

⚠️ DANGER!
RISK OF DEATH DUE TO ROTATING PARTS!
The motor can rotate during the programming. Depending on the equipment, this can cause a dangerous situation for persons and the equipment.
Make sure that no one is located in hazardous zones and that the motor is disconnected.

⚠️ DANGER!
RISK OF DEATH DUE TO ELECTRIC SHOCK!
Hazardous currents are present on the motor and drive control. These can lead to injury or death.
When working on the device, de-energize the device and secure it from being switched on again.

NOTE
This operating manual must be kept near the device and available to all users.

1.5.2 Disassembly & disposal

Components with electronic parts may not be disposed of along with normal household waste. They have to be collected separately with waste electrical and electronic equipment in accordance with applicable legislation.
1.6 Proper use

The application and performance parameters of the FKO drive control from BRINKMANN are displayed and programmed with the FKO MMI. This device may only be used for the FKO drive control.

This device may only be used under the allowed environmental conditions. Incorrect use may cause damage to the device. The FKO MMI may only be used for its intended purpose. Any use that differs from or goes beyond the stated intended purpose is considered non-intended use. The manufacturer accepts no liability for any damage resulting from such non-intended use. Modifications to the FKO MMI are prohibited.

Any instance of misuse of the FKO MMI will result in the termination of the guarantee, warranty and general liability of the manufacturer.

The FKO MMI may not be operated in areas where there is a danger of explosion.

Repairs may only be performed by authorised repair bodies. Independent and unauthorised intervention may result in death, injury or property damage. The warranty provided by BRINKMANN will be invalidated in such cases.

1.7 Responsibility

As a basic principle, electronic devices are not fail-safe. The operator and/or the contractor setting up the machine or system is responsible for ensuring that the drive switches to a safe state if the device fails.

The “Electrical equipment of machines” section in DIN EN 60204-1; VDE 0113-1:2007-06, “Safety of machinery” describes the safety requirements for electrical control units. These are provided for the safety of people and machines and must be observed in order to retain the functional capability of the machine or system.

An emergency stop feature does not have to result in the power supply to the drive being switched off. To avoid dangerous situations, it may be useful for individual drives to remain operational or for specific safety procedures to be initiated. The effectiveness of emergency stop measures is evaluated by means of a risk assessment for the machine or system and its electrical equipment, and is determined by selecting a circuit category according to DIN EN 13849 “Safety of machinery – Safety-related parts of control systems”.

2 Overview of FKO MMI

This chapter contains information on the scope of delivery and the function description.

2.1 Scope of delivery

Compare your product with the scope of delivery provided below.

Fig. 1: Scope of delivery

1 FKO MMI manual control unit (part no. 6UMZU0AA-K07323)
2 Communication cable with RJ11 and M12 plug
3 Brief instruction (Download from the BRINKMANN homepage at)
   www.brinkmannpumps.de/Support/Downloads/Frequenzumrichter
2.2 Description of FKO MMI

The FKO MMI is connected to the FKO M12 interface. The FKO MMI displays the parameters. The parameters are programmed with the function buttons.

Up to eight data records can be stored in an MMI. The data records can be copied to other FKO s. The FKO MMI receives all signals for programming from the FKO drive control.

The FKO MMI may only be operated with the FKO drive control!
Any other connection is not allowed.

Fig. 2: FKO MMI with FKO drive control

1 FKO drive control
2 FKO MMI manual control unit
3 RJ11 socket
4 Communication cable
5 M12 socket

2.2.1 Functions

The following functions are possible with the FKO MMI:
- Parametrisation of device configuration
- Control (e.g. locking and releasing)
- Display of various process values
- Saving parameter sets (max. 8)
- Transferring parameter sets to different FKO s
3 Operation

3.1 Function of buttons

Fig. 3: Button functions

1  Confirm buttons
2  "UP"/"DOWN" buttons
   "LEFT" / "RIGHT" buttons
3  Start button
4  Stop button
### 3.2 Navigation and input

<table>
<thead>
<tr>
<th>Buttons</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;UP&quot;/&quot;DOWN&quot; buttons</td>
<td>Selecting parameters, changing values</td>
</tr>
<tr>
<td>&quot;LEFT&quot;/&quot;RIGHT&quot; arrows</td>
<td>Navigating cursor</td>
</tr>
<tr>
<td>Confirm buttons</td>
<td>With these buttons, the command showed in the display is activated via the button</td>
</tr>
<tr>
<td>&quot;START&quot;/&quot;STOP&quot; buttons</td>
<td>With these buttons, the motor is started or stopped</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Commands</th>
<th>Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next</td>
<td>Calling up parameters and submenu</td>
</tr>
<tr>
<td>Back</td>
<td>One menu level higher</td>
</tr>
<tr>
<td>Cancel</td>
<td>End entry without saving</td>
</tr>
<tr>
<td>Change</td>
<td>Call up edit mode (cursor blinks)</td>
</tr>
<tr>
<td>Save</td>
<td>Save selection, entry or change</td>
</tr>
<tr>
<td>Enter</td>
<td>Confirm the selected parameter set</td>
</tr>
<tr>
<td>Start</td>
<td>Command for motor detection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enter procedures</th>
<th>Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displaying tens, hundreds, thousands place</td>
<td>Press &quot;LEFT&quot; arrow until the desired tens, hundreds or thousands place is displayed.</td>
</tr>
<tr>
<td>Displaying decimal places</td>
<td>Press &quot;RIGHT&quot; arrow until the desired decimal places are displayed.</td>
</tr>
<tr>
<td>Entering negative values</td>
<td>Place cursor on the plus sign, select the minus sign with the &quot;UP&quot; arrow and save.</td>
</tr>
</tbody>
</table>
3.3 Menu
If the FKO MMI is connected to the FKO and the FKO is switched on, the menu appears on the display of the MMI.

For the Parameter groups menu, there are two modes:

- Standard mode
  contains all necessary parameters for standard application from the factory.

- Expert mode (see menu overview in Chapter 3.5)
  Contains advanced parameters for special uses. The expert mode is activated in the main menu (see Fig 4 View of main menu).

The FKO MMI always starts in standard mode. If the FKO MMI is de-energized, the standard mode is active again.

![Menu](image)

Fig. 4: View of main menu

The entire menu is mapped in the FKO operating manual.
3.4 Specifying nominal value for the rotation speed

With the FKO MMI, a nominal value (in %) can be specified for the rotation speed. This nominal value is specified as a percentage of the nominal motor rotation speed.

The ACTUAL rotation speed can be read on the display. With the "START" and "STOP" button, the motor is switched on and off.

If the minimum frequency is > 0, the motor continues to rotate at the minimum frequency after switching off the nominal value. (02.Parameter group (Expert mode)>Basic parameter>Low speed)

Procedures

1. As the nominal value source, set "3: MMI/PC" (02.Parameter groups > Basic parameter > Reference channel)
2. As the software enable signal, set "9: "Autostart" and save (02.Parameter groups > Basic parameter > Enable software )
3. Under the menu item "40.Control", set a nominal value in %. Using the "UP", "DOWN", "LEFT" or "RIGHT" arrows, set the desired percentage.

A negative nominal value causes a change in direction of rotation.

4. Press the "START" button and start the motor.
   - The motor rotates. The actual rotation speed is displayed in the MMI.
   - With the FKO MMI, the motor can be switched on and off and a nominal rotation speed can be specified.
3.5 Parameter group menu (expert mode)

In expert mode, the "0.2 Parameter group" menu contains advanced parameters for special applications. The expert mode is activated in the main menu (see Fig 4  View of main menu).

<table>
<thead>
<tr>
<th>01.Actual values</th>
<th>02.Parameter groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic parameter</td>
<td>Control mode</td>
</tr>
<tr>
<td>Low speed</td>
<td>Preset speed mode</td>
</tr>
<tr>
<td>High speed</td>
<td>Preset speed 1</td>
</tr>
<tr>
<td>Deceleration 1</td>
<td>…</td>
</tr>
<tr>
<td>Acceleration 1</td>
<td>Preset speed 7</td>
</tr>
<tr>
<td>Deceleration 2</td>
<td>MOP digital in.</td>
</tr>
<tr>
<td>Acceleration 2</td>
<td>MOP step range</td>
</tr>
<tr>
<td>Ramp selection</td>
<td>MOP step time</td>
</tr>
<tr>
<td>Ref.channel</td>
<td>MOP resp.time</td>
</tr>
<tr>
<td>Enable software</td>
<td>MOP ref.memory</td>
</tr>
<tr>
<td>Start protect</td>
<td></td>
</tr>
<tr>
<td>Rotation direction</td>
<td></td>
</tr>
<tr>
<td>Reset</td>
<td></td>
</tr>
<tr>
<td>Automatic reset</td>
<td></td>
</tr>
<tr>
<td>Quan.auto.reset</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PID prop.gain
PID prop.gain
PID prop.gain
PID feedback
PID inverted
PID preset ref. 1
PID preset ref. 1
PID ref.mode
PID std.by hyst.

Fig. 5: View of parameter group (expert mode) – Part 1
### Fig. 6: View of parameter group (expert mode) – Part 2
*) These values are automatically determined and entered during motor detection.

Fig. 7: View of parameter group (expert mode) – Part 3
4  Technical data

<table>
<thead>
<tr>
<th>Article number</th>
<th>10004768</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection cable</td>
<td>3m RJ11 on M12 plug</td>
</tr>
<tr>
<td>Measurement (L / W / H)</td>
<td>105/50/25 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>83 g</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP21</td>
</tr>
</tbody>
</table>

Tab. 1:  Technical data

5  Approvals, standards and guidelines

This chapter contains information about the respective approvals, standards and guidelines. For binding information about the particular approvals, please refer to the relevant type plate!

5.1  Standards and guidelines

The following specifically apply:

# 6 List of key words

<table>
<thead>
<tr>
<th>Letter</th>
<th>Key Word</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>CE marking</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Configuring nominal value</td>
<td>14</td>
</tr>
<tr>
<td>D</td>
<td>Disposal</td>
<td>7</td>
</tr>
<tr>
<td>E</td>
<td>EC Declaration of Conformity</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>EMC limit classes</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>EMC standard</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Expert mode</td>
<td>15</td>
</tr>
<tr>
<td>F</td>
<td>Functions of buttons</td>
<td>11</td>
</tr>
<tr>
<td>L</td>
<td>Legal notice</td>
<td>2</td>
</tr>
<tr>
<td>M</td>
<td>Menu</td>
<td>13</td>
</tr>
<tr>
<td>N</td>
<td>Navigation</td>
<td>12</td>
</tr>
<tr>
<td>O</td>
<td>Operation</td>
<td>11</td>
</tr>
<tr>
<td>P</td>
<td>Parameter group (expert mode)</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Proper use</td>
<td>8</td>
</tr>
<tr>
<td>R</td>
<td>Regulations</td>
<td>8</td>
</tr>
<tr>
<td>S</td>
<td>Safety instructions</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Standard mode</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Standards</td>
<td>18</td>
</tr>
<tr>
<td>T</td>
<td>Technical data</td>
<td>18</td>
</tr>
</tbody>
</table>
## 7 EC declaration of conformity

<table>
<thead>
<tr>
<th>Typ / Type / Tipo</th>
<th>FKO MMI</th>
</tr>
</thead>
</table>

Das bezeichnete Produkt stimmt mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EG-Mitgliedsstaaten überein:

The named product conforms to the following Council Directives on approximation of laws of the EEC Member States:

Le produit sus-mentionné est conforme aux Directives du Conseil concernant le rapprochement des législations des États membres CEE:

El producto designado cumple con las Directivas del Consejo relativas a la aproximación de las legislaciones de los Estados Miembros de la CEE:

<table>
<thead>
<tr>
<th>Directive / Directiva</th>
<th>Title / Título</th>
<th>Number / Número</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014/30/EU</td>
<td>Richtlinie für elektromagnetische Verträglichkeit</td>
<td>EU Directive for Electromagnetic Compatibility</td>
</tr>
<tr>
<td>2014/30/UE</td>
<td>Directivas del Consejo para Compatibilidad electromagnética</td>
<td>European Directive for Electromagnetic Compatibility</td>
</tr>
</tbody>
</table>

Die Übereinstimmung mit den Vorschriften dieser Richtlinien wird nachgewiesen durch die vollständige Einhaltung folgender Normen:

Conformity with the requirements of this Directives is testified by complete adherence to the following standards:

La conformité aux prescriptions de ces Directives est démontrée par la conformité intégrale avec les normes suivantes:

La conformidad con las prescripciones de estas directivas queda justificada por haber cumplido totalmente las siguientes normas:

Harmonisierte Europ. Normen / Harmonised Europ. Standards / Normes europ. harmonisées / Normas europeas armonizadas


Die Hinweise in der Betriebsanleitung für den Einbau und die Inbetriebnahme des Antriebsreglers sind zu beachten.

The instructions contained in the operating manual for installation and start up the drive control have to be followed.

Les indications d’installation / montage et de mise en service du convertisseur de fréquence prévues dans l’instruction d’emploi doivent être suivies.

Tenga en cuenta las instrucciones en el manual para la instalación y puesta en marcha del regulador de accionamiento.

Brinkmann Pumpen, K. H. Brinkmann GmbH & Co. KG
Werdohl, 16.01.2017

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8 Notes