

# Operating Instructions

Hand-Held Unit MMI 2FX4520-0ER00



**G-Serie**  
**G-Series**  
Seitenkanal  
Side Channel



**C-Serie**  
**C-Series**  
Klaue  
Claw



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## 1.1 Storing the documentation

Store this manual and all other applicable documents safely so they are available as and when required.

Provide the operator of the system with this manual so it is available as and when required.

## 1.2 Explanation of the terms and symbols

In these instructions symbols and terms will be used to mean the following.

Symbol	Explanation
!	Requirement, pre-requisite
①	One-step handling instructions
1 2 3	Multi-step handling instructions
✓	Result
[→ 54]	Cross reference with page reference
	Additional information, tips
	General warning sign (warns of risk of injury)
	Electrical voltage warning
	Observe the instructions

Term	Explanation
Plant	Part provided by the user in which the vacuum pump/compressor is installed.
Vacuum pump/compressor	Ready to connect machine for the generation of a vacuum and/or overpressure. The vacuum pump/compressor consists of a compressor part and motor, as well as other accessories where applicable.
Motor	Asynchronous motor for driving the vacuum pump/compressor.
Compressor	Mechanical part of the vacuum pump/compressor without motor.
Assembly environment	Space in which the vacuum pump/compressor is set up and operated (this may differ from the suction environment).
Drive control	Device for rotation speed control of the vacuum pump/compressor. The drive control can be mounted close to the motor (wall assembly) or integrated into the vacuum pump/compressor

## 1.3 Changes in comparison to the previous version

This document has been completely revised in comparison to the version 02.2014 in terms of the writing and the content.

## 1.4 Other valid documents

All instructions that describe the use of the drive control and if applicable, further instructions of all accessory parts used, e.g.

<b>Document number</b>	<b>Purpose</b>
—	Vacuum pump/compressor operating manual
610.00260.02.000	Operating Instructions 2FC4...-1ST/PB/PN/SC/CB
610.00260.40.010 *	Operating Instructions 2FC4...-1PB <b>OR</b>
610.00260.40.020 *	Operating Instructions 2FC4...-1PN <b>OR</b>
610.00260.40.030 *	Operating Instructions 2FC4...-1SC <b>OR</b>
610.00260.40.040 *	Operating Instructions 2FC4...-1CB

\*according to the model option or accessories

Download of 3D files (.stp) for drive control and adapter plates under [www.gd-elmorietschle.com](http://www.gd-elmorietschle.com).

To parameterise the drive control, the parameter description is ready to be downloaded ([www.gd-elmorietschle.com](http://www.gd-elmorietschle.com)). The download contains all necessary information for correct parameterisation.

The manufacturer is not liable for damage caused by the failure to observe these instructions and the related documents [→ 4].

## 2.1 Explanation of warning signs

Warning sign	Explanation
⚠ <b>DANGER</b>	Danger that failure to observe the measures could lead to death or serious physical injuries.
⚠ <b>WARNING</b>	Danger that failure to observe the measures could lead to death or serious physical injuries.
⚠ <b>CAUTION</b>	Danger that failure to observe the measures could lead to minor physical injuries.
<i>NOTICE</i>	Danger that failure to observe the measures could lead to material damage.

## 2.2 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 and storage, start-up, operation, repairs 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 and added to 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.

### 2.2.1 General information



#### ⚠ **DANGER**

##### **Risk of fatal injury from electric shock**

**Dangerous voltages are connected to the motor and drive controller. These may lead to injuries or death.**

- ① When working on the device, switch off the device and secure it from being switched back on.



#### ⚠ **DANGER**

##### **Danger to life due to rotating parts**

**The motor may rotate during programming. Depending on the system, a dangerous situation for man and machine could arise thereby.**

- ① Make sure that no person is located within the danger zones and the motor is disconnected.

#### *NOTICE*

**This operating manual must be kept in the vicinity of the equipment, so as to be readily accessible to all users.**

### 2.2.2 Disassembly and Disposal

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**The assemblies with electrical components may not be disposed of with household waste. They must be collected separately with electrical- and electronic equipment according to applicable legislation.**

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### 2.3 Correct use of the equipment

The manual control unit MMI displays and programs the application- and performance indicators of the drive controller of the company Gardner Denver Deutschland GmbH. This device may only be used for this drive controller.

The device may only be used under the specified environmental conditions. Improper use may damage the device. The manual control unit MMI may only be used for its intended use. Any other use or extended use is considered to be improper. The manufacturer is not liable for damages resulting thereof. Changes to the manual control unit MMI are prohibited.

Any improper use of the manual control unit MMI will invalidate the guarantee, warranty and general liability of the manufacturer.

Commissioning (i.e. starting intended operation) is only permitted if complied with the EMC Directive (2004/108/EC).

This manual control unit MMI is not approved for operation in potentially explosive areas!

Repairs may only be carried out by authorised repair workshops. Unauthorised interventions can lead to death, bodily injury and property damage. The warranty provided by Gardner Denver expires in this case.

### 2.4 Staff qualifications and training



All those who will work with the must have read and understood these instructions and the related documents [→ 4].

Personnel in training may only work with the under supervision of personnel who have the **required knowledge**.

Only personnel with the following knowledge may carry out the work described in these instructions:

Qualified personnel, as understood in these operating instructions and product labels, are qualified electricians who are familiar with the installation, assembly, commissioning and operation of the drive controller, as well as the risks associated therewith and have the respective skills on account of their professional training and knowledge of the relevant standards.

## 2.5 Requirements of the operator

As a basic principle, electronic devices are not fail-proof. 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 EN 60204-1, “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 EN 13849 “Safety of machinery – Safety-related parts of control systems”.

The operator ensures that:

- All work on the is carried out by:
  - personnel that have the necessary Staff qualifications and training [→ 6]
  - personnel that have been sufficiently informed of these instructions and all related documents [→ 4]
- Assignment, responsibility and supervision of personnel is regulated.
- The content of these and locally applicable instructions are always available to personnel.
- All local and plant-specific safety measures are adhered to, such as:
  - Prevention of accidents
  - safety and operating regulations
  - Utility company regulations
  - Standards and laws
- Dangers due to electrical energy are not possible.

## 2.6 CE marking

With the CE marking, we, as the manufacturer of the device, confirm that the drive control meets the basic requirements of the following guidelines:

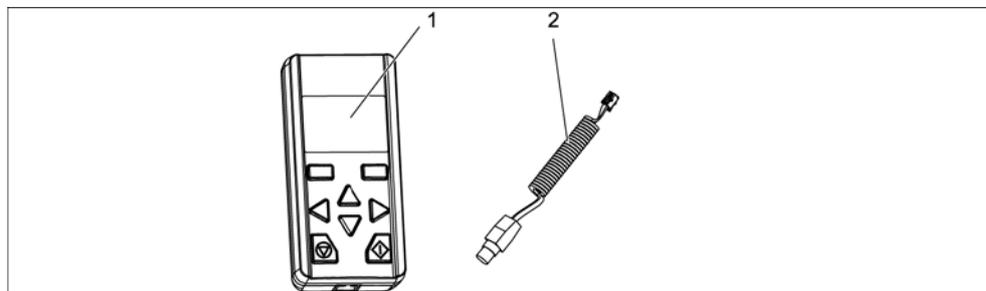
- Directive on Electromagnetic Compatibility (Directive 2004/108/EC)
- Low Voltage Directive (Directive 2006/95/EC)

You can download the declaration of conformity from [www.gd-elmorietschle.com](http://www.gd-elmorietschle.com).

This chapter refers to the information on the scope of delivery, as well as function description.

### 3.1 Scope of delivery

Compare your product with the scope of delivery listed below.



Scope of delivery

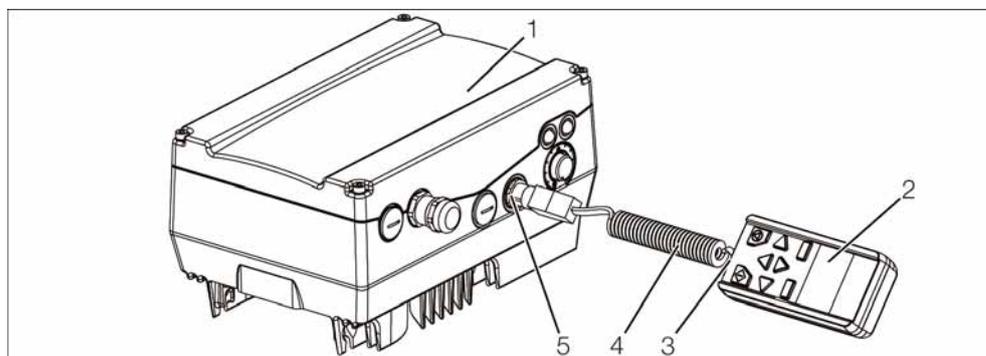
- |                           |  |
|---------------------------|--|
| 1 Manual control unit MMI | 2 Communication cable RJ11 and M12 connector |
|---------------------------|--|

### 3.2 Description of manual control unit MMI

The manual control unit MMI is connected to the M12 interface of the drive controller. The manual control unit MMI displays the parameters. The parameter programming is carried out with the function keys.

Up to eight records can be stored in an MMI. The records can be copied to other drive controllers. The drive controller forwards all signals for the programming to the manual control unit MMI.

**The manual control unit MMI may only be operated with the drive controller!  
Any other connection is inadmissible.**



Manual control unit MMI with drive controller

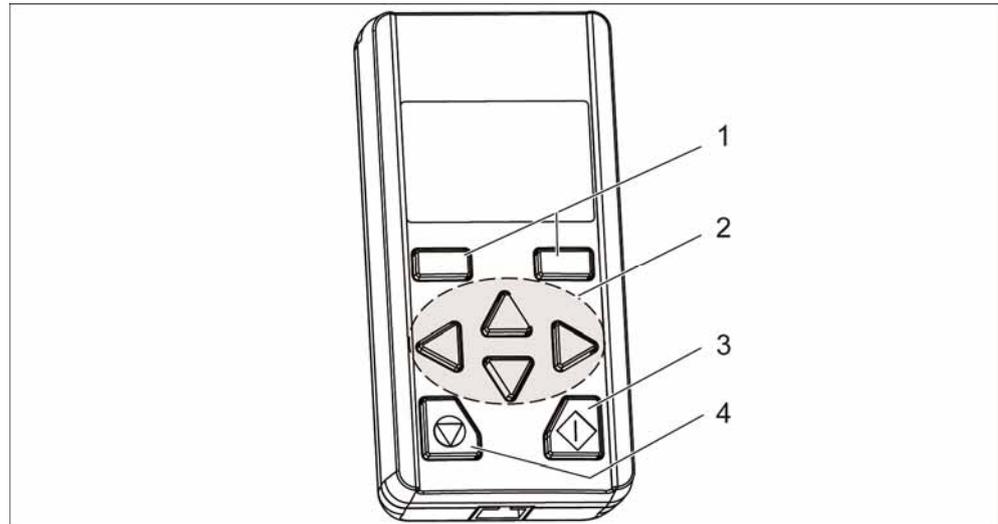
- |                           |                       |
|---------------------------|-----------------------|
| 1 Drive control           | 4 Communication cable |
| 2 Manual control unit MMI | 5 M12 socket          |
| 3 RJ11 socket             |                       |

### 3.3 Functions of the manual control unit MMI

The following functions are possible with the manual control unit MMI:

- Parameterization of the device setting
- Control (e.g. block and release)
- Display of various process variables
- Storing of parameter sets (max. 8)
- Transfer parameter sets to other drive controller

### 4.1 The function of the keys



Key functions

- |   |             |
|---|-------------|
| 1 Acknowledgement keys                                | 3 Start key |
| 2 Arrow keys "UP"/"DOWN"<br>Arrow keys "LEFT"/"RIGHT" | 4 Stop key  |

### 4.2 Navigation and input

Keys	Function
Arrow keys "UP"/"DOWN"	Select parameter, change values
Arrow keys "LEFT"/"RIGHT"	Navigate cursor
Acknowledgement keys	These keys activate the displayed command in the display above the key
Keys „START“/“STOP“	These keys start resp. stop the engine

Commands	Procedures
Continue	Call up parameter and submenu
Return	Up one menu level
Abort	Terminate input without saving
Change	Call up change mode (cursor blinks)
Save	Save selection, input and change
Confirm	Confirm selected parameter set
Start	Command for motor recognition

Input	Procedures
Insert tens-, hundreds- and thousands position	Press arrow key "LEFT" until the desired tens-, hundreds- and thousands position is inserted.
Insert decimal places	Press arrow key "RIGHT" until the desired decimal places are inserted.
Enter minus values	Place cursor on the plus and select and save the minus sign with the arrow key "UP".

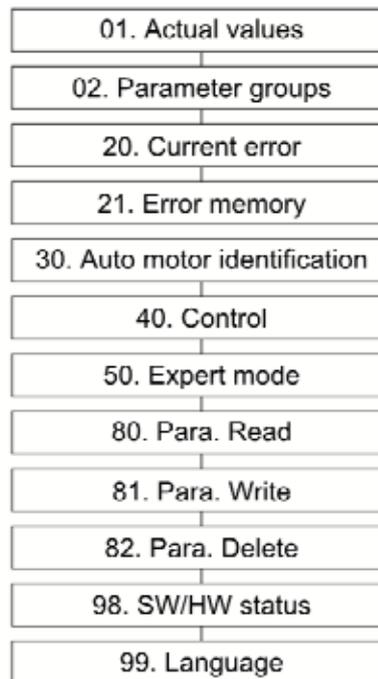
### 4.3 Menu

When the manual control unit MMI is connected to the drive controller and the drive controller is switched on, the menu appears on the MMI display.

There are two modes for the menu *Parameter groups*:

- Default mode  
Contains all necessary factory settings for standard applications.
- Expert mode Menu parameter group (expert mode) [→ 14]  
Contains additional parameters for special applications. The expert mode is activated in the main menu.

The manual control unit MMI always start in the default mode. If the drive controller becomes unstressed, the default mode is active again.



*View in main menu*

The entire menu is shown in the operating manual of the drive controller 2FC4-1ST.

### 4.4 Motor recognition



**⚠ DANGER**

**Danger of electric shock!**

! Before beginning electrical work, carry out the following measures:

1. Switch off/disconnect supply.
2. Secure to prevent it from being switched back on.
3. Make sure that it is de-energised.
4. Earth and bypass it.
5. Cover or block off adjacent parts that are still supplied with voltage.



**⚠ DANGER**

**Hazard presented by moving parts!**

**The motor may rotate during programming. Depending on the system, a dangerous situation for man and machine could arise thereby.**

- ① Make sure that no person is located within the danger zones and the motor is disconnected.

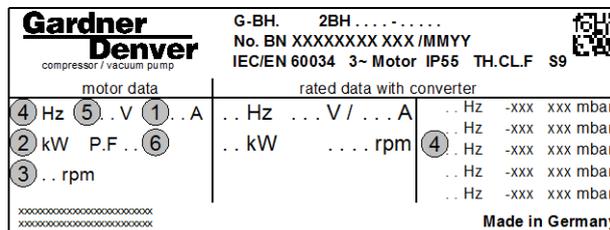
Procedures:

1. Switch off drive controller.
2. Unscrew the four screws from the housing cover of the drive controller and remove the cover.
3. For the hardware release, connect 24 Volt DC on the drive controller application card to terminal „En.HW“.
4. Screw the cover on the housing of the drive controller
5. Connect the communication cable to the manual control unit MMI and drive controller.
6. Switch on the power supply for the drive controller.
  - ✓ On the display of the manual control unit MM, the start-up screen appears first and then the menu.

**NOTICE! This voltage can be supplied externally or from the terminal „24V Out“. See the operating instructions for the drive controller.**

**NOTICE! The motor type is set by default for asynchronous motors (value 1). The value has to be changed to 2 for synchronous motors. (02 parameter groups (expert mode) > motor data > motor type)**

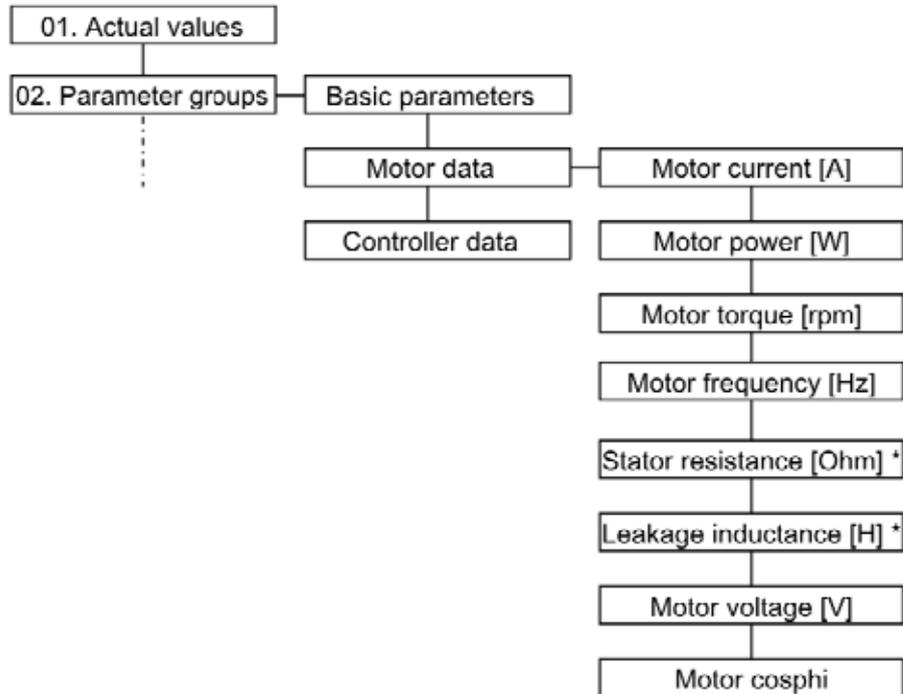
7. Determine the following six motor data from the rating plate (see example)



Rating plate motor data

No.	Menu item in MMI	No.	Menu item in MMI
1.	Motor current	4	Motor frequency
2.	Motor power	5	Motor voltage
3.	Motor speed	6	Motor cosφ

1. Menu 02. Call up parameter groups > motor data.
2. Enter and save the six motor data of the rating plate with the manual control unit MMI under the appropriate menu items. (The values for "stator resistance" and "leakage inductance" are determined during motor recognition.)



*View in motor data menu structure*

\* These values are determined and registered automatically with the motor recognition.

**NOTICE! Must be observed during motor recognition! Asynchronous motor: The shaft may not rotate during motor recognition. Synchronous motor: The shaft must be load-free since the shaft rotates during the motor recognition.**

1. Menu 30. Call up motor identification and start the motor recognition
  - ✓ Red and green LED light up during the motor recognition
2. **NOTICE! The motor recognition lasts 30 to 60 seconds. The motor recognition is completed once the drive controller has been restarted and the green LED on the drive controller lights up permanently.**
3. **NOTICE! If the M12 interface marks out the manual control unit MMI during the active control process, the drive controller stops with error 21 (bus time-out) and the red LED lights up permanently.**
  - ✓ The motor recognition is completed.

## 4.5 Preset setpoint for the speed

A setpoint (in %) can be preset with the manual control unit MMI for the speed. This setpoint will be indicated as a percentage of the rated motor speed.

The actual speed can be read on the display. The motor is switched on and-off with the "START" and "STOP" key.

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**If the minimum frequency is > 0, the motor continues to rotate after switching off the setpoint at minimum frequency. (02.Parameter group (expert mode) > default parameter > minimum frequency)**

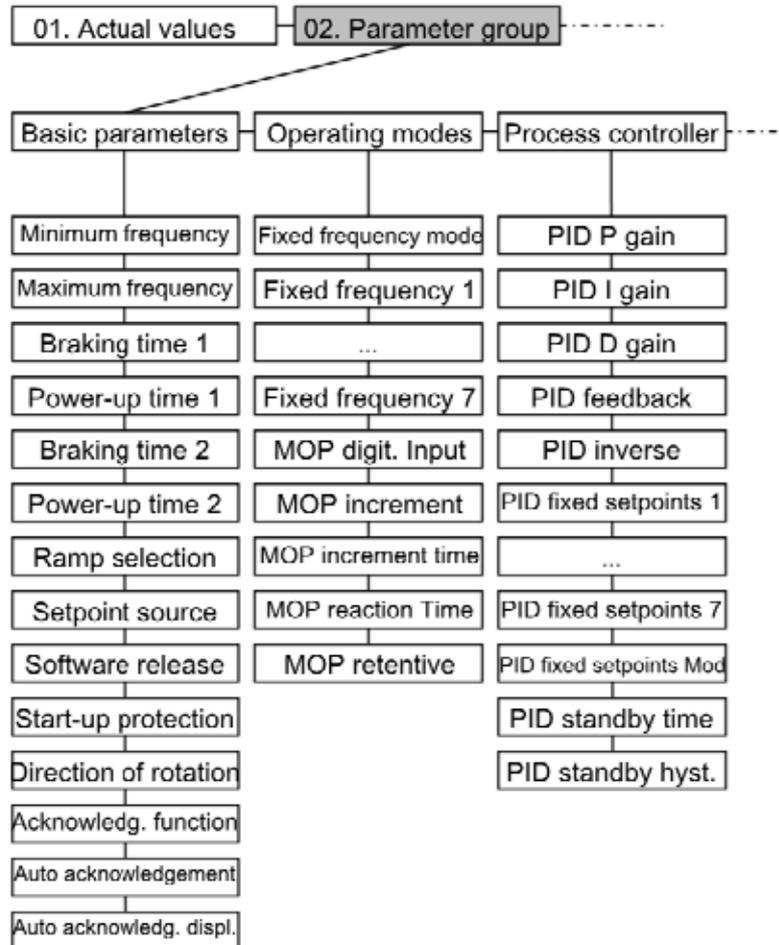
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### Procedures

1. Set and save as setpoint source „3: MMI/PC" (02.Parameter group > default parameter > setpoint source)
2. Set and save as setpoint source „9: Auto start" (02.Parameter group > default parameter > SW release)
3. Set a setpoint in % under menu item "40.control". Set the desired percentage with the arrow keys "UP", "DOWN", "LEFT" or "RIGHT".  
**NOTICE! A negative setpoint causes a change of direction of rotation.**
4. Press the "START" key and the motor starts
  - ✓ The motor rotates. The actual speed is displayed in MMI.
  - ✓ The motor can be switched on and -off and a setpoint speed can be preset with the manual control unit MMI.

### 4.6 Menu parameter group (expert mode)

In the expert mode, the menu "0.2 parameter group" contains additional parameters for special applications. The expert mode is activated in the main menu [→ 10].



View parameter group (expert mode) - part 1





Article number	2FX4520-0ER00
Connection cable	3m RJ11 to connector M12
Dimensions (L/W/H)	105/50/25 mm
Weight	83 g
Protection class	IP21

This chapter contains the information about the prevailing standards and approvals.

For binding information on the respective approvals, please refer to the corresponding rating plate!

### 6.1 Standards and guidelines

Specifically agreed:

- is the Directive on electro magnetic compatibility (Directive 2004/108/EC of the Council EN 61800-3:2004)
- is the Directive on low voltage (Directive 2006/95/EC of the Council EN 61800-5-1:2003)





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