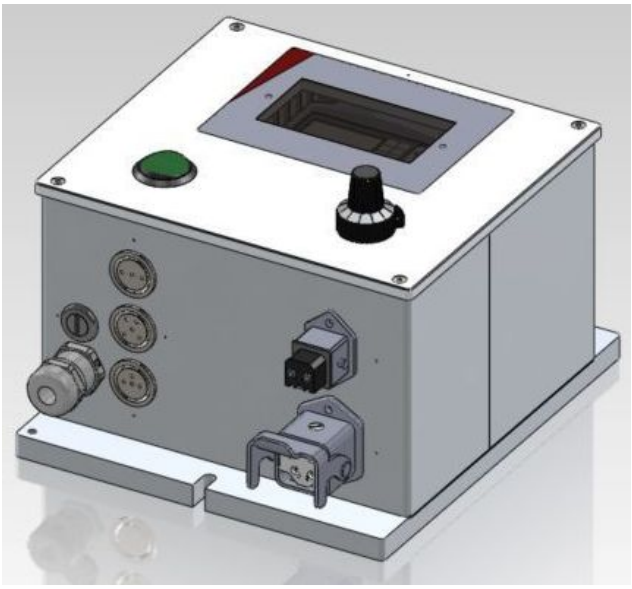
Operating instructions

fimotec – fischer
Montagetechnik

3-phase frequency converter FSM-137 for three-phase motors

Art. no.: 90.0010.56



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Information and explanations

Target group

These operating instructions will help you to use the described product safely and as intended.– **They are directed toward qualified skilled personnel*.**

Qualified personnel are people who have been authorized by persons responsible for the safety of the system to execute the required activities and are able to recognize potential dangers and avoid them based on their training, experience and instruction, as well as their knowledge of standards, regulations, accident prevention regulations and operating conditions (definition of skilled personnel according to IEC 364).

- Read these operating instructions before you install the device, use it or carry out work on it.
- Also pass on these operating instructions to other users.

Definition of the warnings and symbols

Warnings are indicated by danger symbols and signal words. The table shows what hazards and possible consequences the symbols, signal words and colours indicate.

Signal word	Definition	Consequences
⚠ GEFAHR	Directly threatening danger	Death or extremely serious injuries
⚠ WARNUNG	Dangerous situation	Potential death or extremely serious injuries
⚠ VORSICHT	Dangerous situation	Minor to moderately serious injuries
ATTENTION	Risk of property damage	Damage to the machine, its environment and the product
	Warnings can also have other warning signs: Example: Warning of electrical current! These symbols indicate the type of hazard.	

Term definitions

Term	Definition
User	Persons who use the device installed by the manufacturer in its ready-to-use version.
Screen	Designation for the image visible within the touchscreen.
Button	Designation for key fields on the user interface
EMC	Electromagnetic compatibility with electrical and electromagnetic influences.
Skilled personnel	Qualified personnel with the appropriate education, training and experience.
Device	Designation (in these operating instructions) for the frequency converter FS137.
Machine manufacturer	Persons who install the device in the intended construction (machine) and who manufacture the ready-to-use version.
Menu	Designation for the structural layout of the user interface.

Table of contents

1 Product overview

1.1 Scope of delivery

- FSM-137
- Operating instructions

1.2 Device versions

The FSM-137 device is a 3-phase frequency converter for the sinusoidal actuation of consumers with variable frequency.

1.3 Properties

1.3.1 General

- Consumer output
- Parameterization via parameter blocks
- Operation via parameters
- Mains input voltage monitoring
- Type of protection IP54

1.3.2 Output data

- Frequency range 10 Hz to 60 Hz
  The frequency range is adjustable in steps of 0.01 Hz for all variants.
- Adjustable soft start ramp / soft stop ramp
- Adjustable switch-on/off delay

1.3.3 Inputs

- Enable input for switching on/off without power
- Sensor input with switch-on/off delays in range of 0 to 20 seconds

1.3.4 Outputs

- Consumer output for three-phase motor
- Operating notification relay contact max. 230 V AC / 1 A (changeover contact).

2 Safety information

2.1 Intended use

The FSM-137 device is a piece of electrical equipment intended for use in supply mechanisms or automation systems. The device is designed for regulating and controlling three-phase motors.

The electrical components listed here are called "devices" in the industrial parlance, but are not devices which can be used or connected or machines in the sense of the "Device safety law", the "EMC law" or the "EC Machinery Directive", but components. Only when these components are integrated in the construction of the machine manufacturer is the ultimate mode of operation defined.

The machine manufacturer is responsible for making sure that the construction meets the existing legal regulations.

2.2 Basic safety information

The following warnings both serve for the personal safety of the user as well as the safety of the described products and the devices connected to them.

Non-observance can lead to death, serious bodily injury or property damage.

DANGER 	**Life-threatening danger due to electric shock!** Even after the device is put out of operation by disconnecting the voltage, there is still dangerous electrical voltage on the internal circuit parts. – Disconnect the device from the supply voltage before any intervention. – Before opening the device, wait for at least 5 minutes until the residual voltage has dissipated. – Check to make sure there is no voltage before any intervention.

- Only skilled electricians may work on electrical equipment.
- Before commissioning, make sure that the voltage supply agrees with the nominal values of the device.
- Check the electrical equipment of the machine regularly. Deficiencies, such as loose connections, damaged or scorched lines, must be fixed immediately.
- Observe the valid accident prevention and safety regulations for your application.
- In particular, observe both the general and the regional installation and safety regulations for working with dangerous voltages (e.g. EN 50178) as well as the regulations having to do with the proper use of tools and the use of personal safety equipment.
- The Emergency Stop mechanisms must remain in effect in all operating modes. Unlocking the Emergency Stop mechanisms must not result in uncontrolled reactivation.

2.2.1 Transport and storage

Problem-free and safe operation of this device require proper transport, storage, setup and installation, as well as careful operation and maintenance.

The device must be protected against mechanical impacts and vibrations during transport and storage. Protection against moisture, water and impermissible temperatures (see chapter 6 "Technical data") must also be guaranteed.

3 Installation

ATTENTION	If the device is not correctly connected, this can lead to the failure or complete destruction of the device (and the connected load).

3.1 Hardware installation

The FSM-137 device is designed for external installation (outside of the control cabinet) and has IP54 protection.

If the device is mounted on a mounting plate made of metal, it can be installed with its entire area in contact with the plate or with spacers. If the device is mounted to a thermally non-conductive surface, it is to be mounted at a distance of at least 10 mm from its surface.

3.2 Mains connection

The mains must be connected according to the valid regulations.

It is connected via the attached Schuko "**power**" plug.

All touchable, electrically conductive housing parts must be grounded according to the valid regulations.

The connection must be made with at least a 1.0 mm² line cross-section.

3.3 Oscillating conveyor connection

This is connected via the "X11" socket.

The pin assignments are as follows:
Pin 1 Connection for load (U)
Pin 2 Connection for load (V)
Pin 3 Connection for load (W)
PE Connection for the ground protection conductor

The three-phase motor is connected to this connection.

3.4 Fuse protection

The fuse protection on the primary side depends on the line cross-section. However, it must be designed to have a D10 line protection switch at minimum.

The devices are also protected with internal fuses.

Caution!:
Leakage currents against PE might occur due to EMC-related suppressor components. These are harmless, however, when an industry-standard RCD switch is used with a tripping current of 0.3 A.

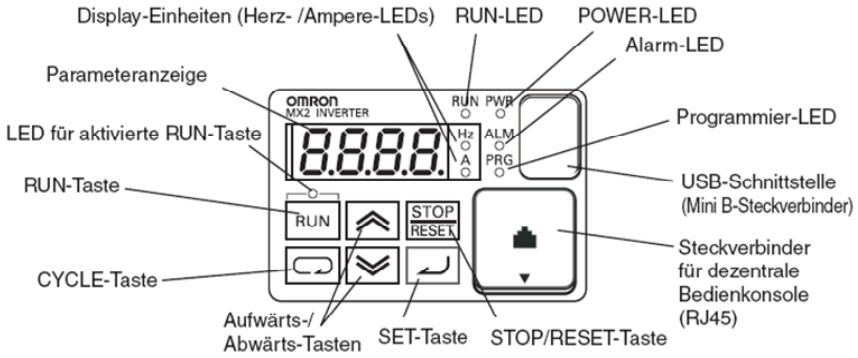
3.5 Parameterization

Within the control box FSM-137 the motor parameters has to be adjusted to the data of the connected motor. Especially the minimum output frequency as well as the maximum output current of the control box FSM-137 has to be adjusted in this way that the connected motor cannot be damaged.

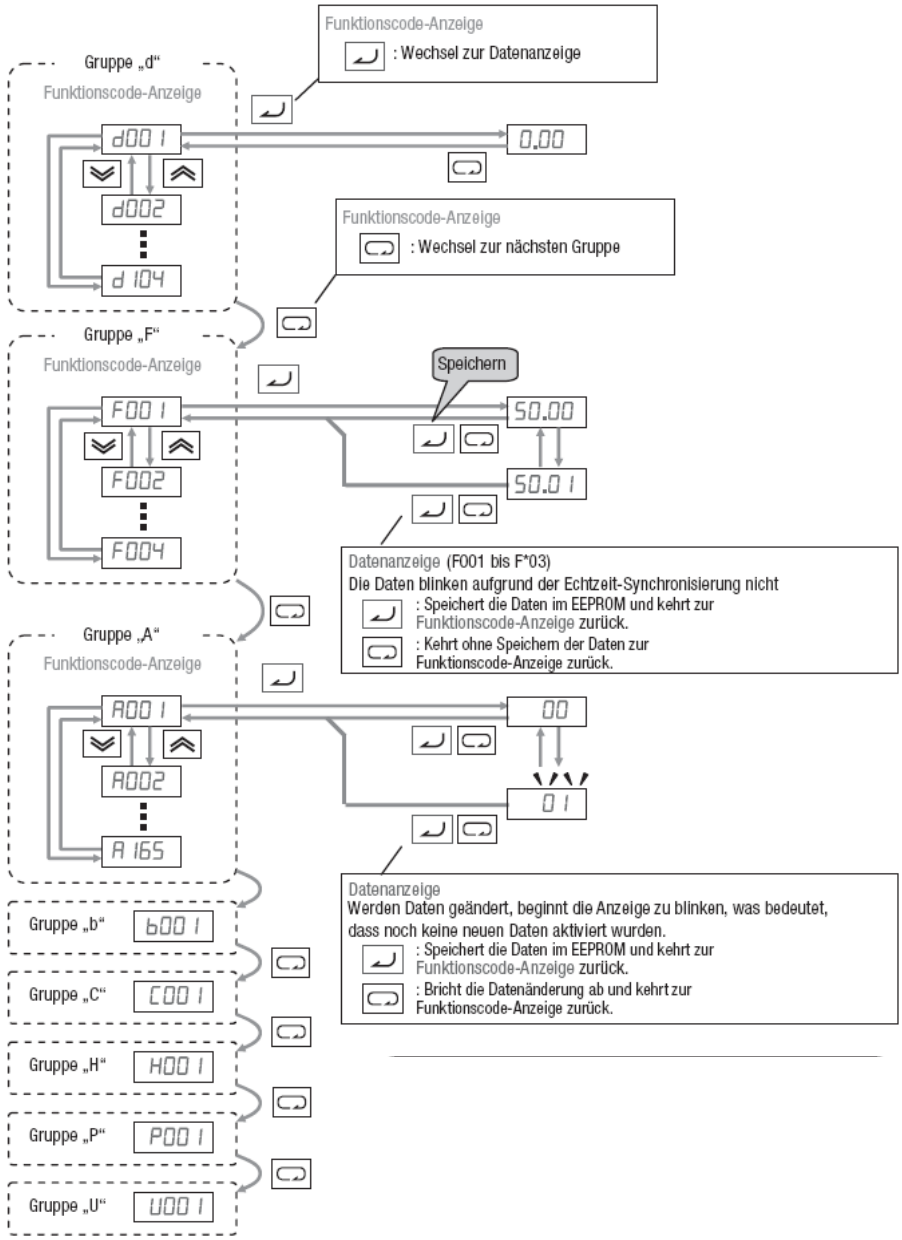
4 Operation

The device is operated via a power potentiometer and a user interface on the frequency converter.

User interface:

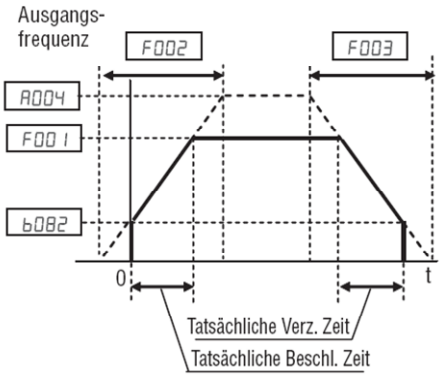


Key field navigation plan



4.1 Acceleration times

In parameter F002, the acceleration time for the motor can be set.
Setting range: 0.01 to 3600 s
In parameter F003, the delay time for the motor can be set.
Setting range: 0.01 to 3600 s



4.2 Direction of rotation, motor

Setting the direction of rotation for the motor

Fnct. code	Value	Designation	Factory settings
P100	0	Direction of rotation, clockwise	0
	1	Direction of rotation, counterclockwise	

4.3 External enable

Setting the external enable

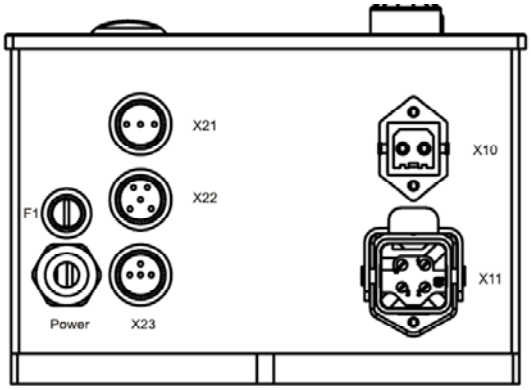
Fnct. code	Value	Designation	Factory settings
P110	0	External enable Switching status N.O. "normally open", active when contact closed	1
	1	External enable Switching status N.C. "normally closed", active when contact open	

4.4 Sensor input

Setting the sensor functions

Fnct. code	Value	Designation	Factory settings
P120	0	Sensor input Switching status N.O. "normally open", active when contact closed	0
	1	Sensor input Switching status N.C. "normally closed", active when contact open	
P121	0…200	Switch-off delay, setting range 0…200 → 0.0…20.0 s	10
P122	0…200	Switch-on delay, setting range 0…200 → 0.0…20.0 s	50

5 Description of the control I/Os



Plug connection	Designation	
X21	Enable	1: +24 V DC 2: Signal
X22	Sensor	1: +24 V DC 2: 0 V 4: Signal
X23	Operation status output	1: N.O. 2: Changer 3: N.C.

5.1 Operating status

The operating output is designed as a potential-free changeover contact with a maximum loadability of 250 V AC / 2.5 A.

5.2 Enable input

The enable input is for powerless switching of the motor connected to the FSM-137 on and off without power.
The enable must be designed via a potential-free contact. (e.g.: external switch)

5.3 Sensor input

The load output of the FS-137 can be switched on/off via a sensor, e.g. filling level sensor.
Via the menu, the on and off delay times can be set within a range between 0 – 20 sec. The resolution is 0.1 seconds. In the following Figure 1, the time curve is shown graphically.

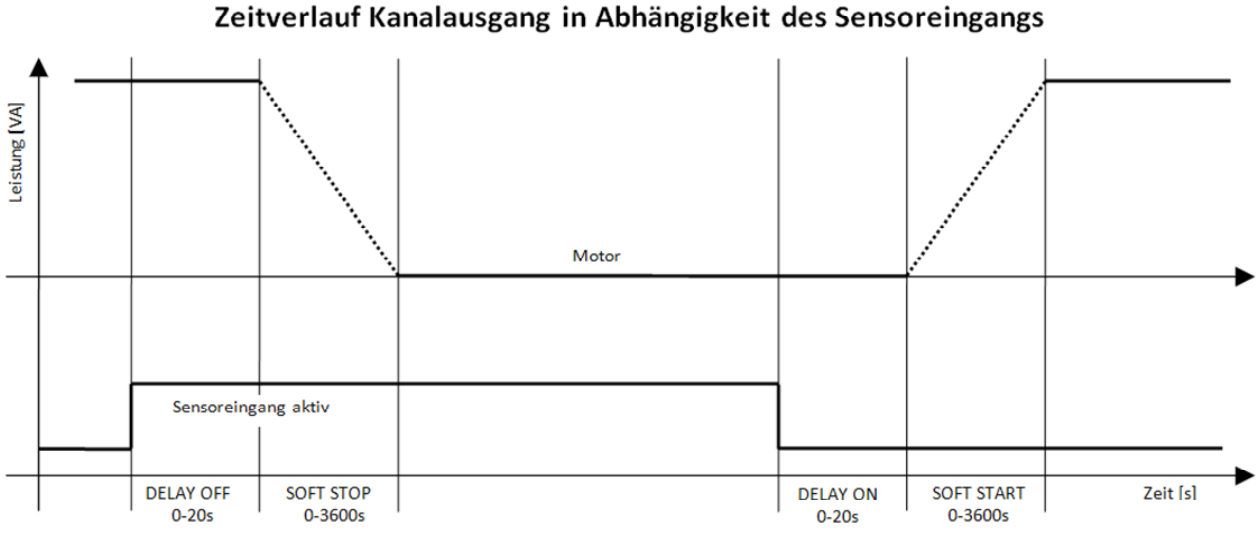


Figure 1: Time curve for load output, sensor input

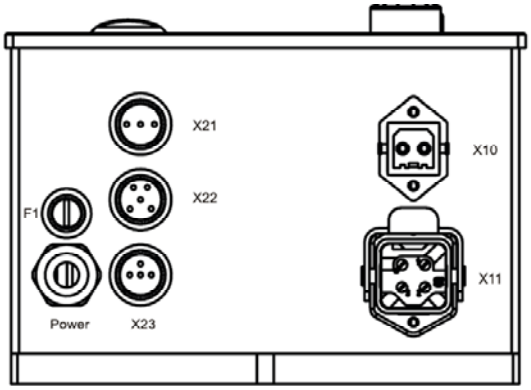
6 Technical data

Supply voltage:	200 - 240 V AC *(other voltages possible after consultation)*
Mains frequency:	50/60 Hz *(other frequencies possible after consultation)*
Output current "X11"	6.3 A
Power	0.37 kW
Enable / disable	24 V DC, trough potential-free change-over contact
Load current, sensor:	24 V DC each, max. 80 mA loadable
Status output,	potential-free Change-over contact, max. 230 V AC / 6 A loadable
Operation:	7 segment display and function keys
Type of protection:	IP54
Permissible ambient temperature	5°C to 45°C
Permissible relative humidity	max. 95 %, non-condensing.
Dimensions:	approx. (h)185 mm x (w)169 mm x (d)115 mm

7 Terminal assignments

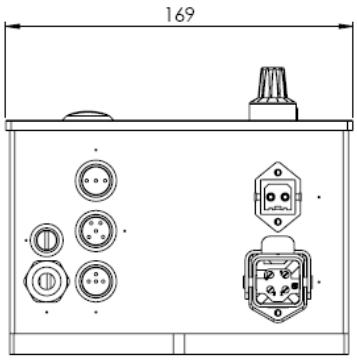
ATTENTION	If the device is not correctly connected, this can lead to the failure or complete destruction of the device (and the connected load).

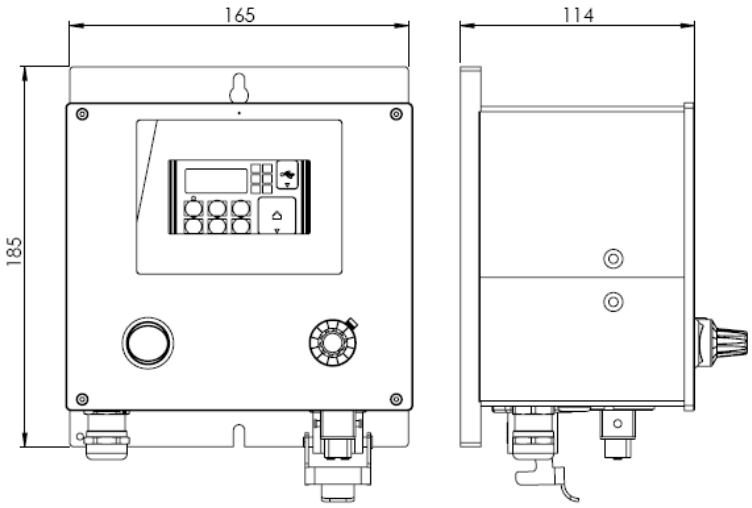
7.1 Power connection assignments



Plug connection	Designation	
Power	Supply voltage	200 V AC…240 V AC 50 Hz / 60 Hz
X10	Mains output	1: 230 V AC 2: 0 V PE: PE
X11	Consumer output	1: Load (U) 2: Load (V) 3: Load (W) PE: Protective ground conductor
F1	Fuse	6.3 A, slow-blow

8 Dimensions





9 Maintenance and care

9.1 Regular tests

The devices are usually maintenance-free. The electrical equipment of the machines are still to be checked regularly by skilled electricians.

9.2 Decommissioning and disposal

The device is to be decommissioned by skilled electrical personnel while complying with the valid safety regulations.

The packaging of the converter can be recycled. Please keep the packaging for later use.

Easily removable screw connections allow the device to be disassembled into its components. These individual components can be recycled. Please carry out disposal in agreement with the local regulations.

Problematic materials must not be thrown away in the normal waste!
Dispose of problematic materials properly, safely and in an environmentally-friendly manner.

10 Accessories and options

10.1 The plug connectors listed below are available as accessories:

Function	Slot	Article number
• Enable/disable connection	X21	91.3300.50
• Sensor connection	X22	91.3300.40
• Operating status output connection	X23	91.3200.60
• Mains output connection	X10	91.3300.20

10.2 The connection lines listed below are available as accessories:

Function	Length, line	Slot	Article number
• Mains output		X10	
• Belt conveyor connection		X11	