MGE model F

(GB) **Service instructions**

Preface

These service instructions describe fault finding of pumps with Grundfos motors, type MGE model F (hereafter called MGE-F).

The service instructions are aimed at specially trained staff who are familiar with the service of electrotechnical products.

The use of these service instructions presupposes knowledge of these documents:

- Installation and operating instructions for MGE-F 11-22 kW, frame sizes 160 and 180.
- Installation and operating instructions for the pump system incorporating the motor.

Note ***These service instructions include only MGE-F and its user interfaces (control panel, R100 and PC Tool E-products). If the application includes other Grundfos products or systems, please refer to the service instructions of these products.***

If the fault cannot be remedied by means of these instructions, or you require spare parts or technical assistance, contact your nearest Grundfos partner or company. (See the back of these service instructions).

Please state these pieces of information when you contact Grundfos to get help for fault finding:

- Nameplate data of the pump the MGE-F is fitted to
- Nameplate data of the MGE-F
- Status for indicator lights on the control panel
- Any alarm or warning and the corresponding fault code read with the Grundfos R100 remote control.

These service instructions are published and updated in the Grundfos GTI database.

Symbols used in this document

Warning
If these safety instructions are not observed, it may result in personal injury.

Warning
If these instructions are not observed, it may lead to electric shock with consequent risk of serious personal injury or death.

Warning
One or more components may be so hot that it may cause personal injury.

Caution ***If these safety instructions are not observed, it may result in malfunction or damage to the equipment.***

Note ***Notes or instructions that make the job easier and ensure safe operation.***

Contents

1. Identification

1.1 Nameplates

The MGE-F nameplate (fig. 1) is fitted on the side of the terminal box (fig. 2).

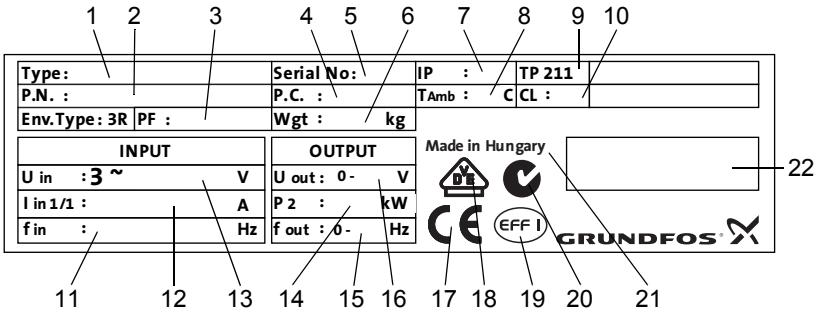


Fig. 1 Nameplate for MGE-F, efficiency 1 motor

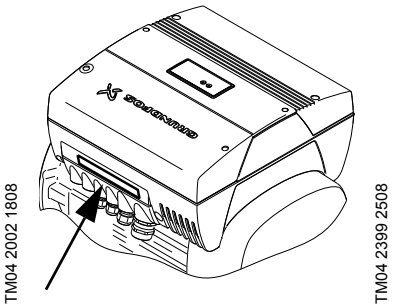


Fig. 2 Position of nameplate

Pos.	Description	Pos.	Description
1	Type designation	12	Max. supply current at min. and max. supply voltage
2	Product number	13	Supply voltage
3	Power factor	14	Rated power
4	Production code, year/week	15	Output frequency
5	Serial number	16	Output voltage
6	Weight	17	CE mark
7	Enclosure class according to IEC 34-5	18	VDE mark
8	Maximum ambient temperature	19	Standard motor efficiency according to CEMEP
9	Motor protection according to IEC 34-11	20	C-Tick mark
10	Insulation class according to IEC 62114	21	Country of manufacture
11	Frequency	22	Bar code

The motor nameplates (fig. 3) are fitted under the terminal box (fig. 4).

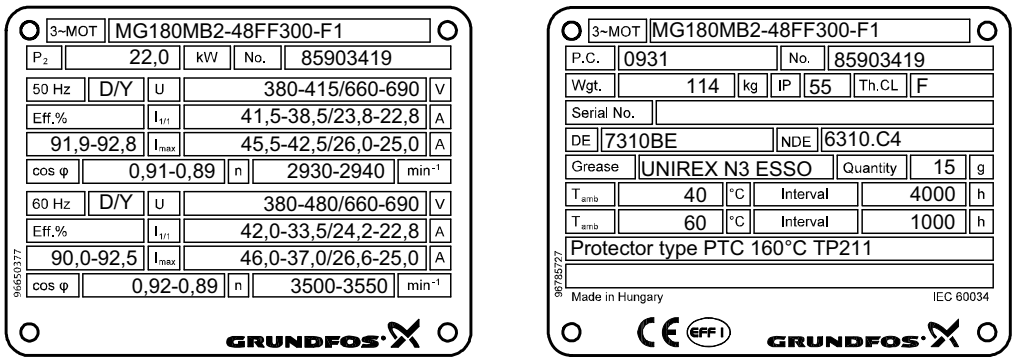


Fig. 3 Nameplates for standard motors with CE and UL approvals

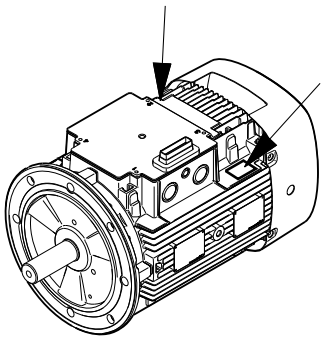


Fig. 4 Position of motor nameplates

1.2 Type key

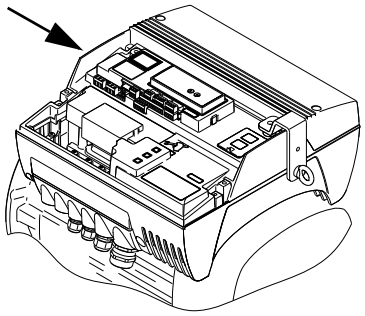
Example	MG	E	160	M	D	2-	42	FF	300	-F	1
Motor Grundfos											
Electronically controlled											
Frame size according to IEC (centre line height of shaft of foot motor) [mm] 160 180											
Size of foot M L											
Length of stator core B D											
Number of poles 2 4											
Diameter of shaft end [mm]											
Flange version FF (free-hole flange)											
Pitch circle diameter, flange version [mm]											
Model designation for motor F											
Efficiency class for standard motor [ ] = not stated 1 = EFF 1 motor 2 = EFF 2 motor											

1.3 Configuration

The terminal box is configured from factory for the application and the pump type the motor is to be used for. The configuration file number appears from the terminal box configuration label which is placed inside the terminal box on the frame of the control panel. See figs 5 and 6.

TM04 2305 2308

Fig. 5 Configuration label

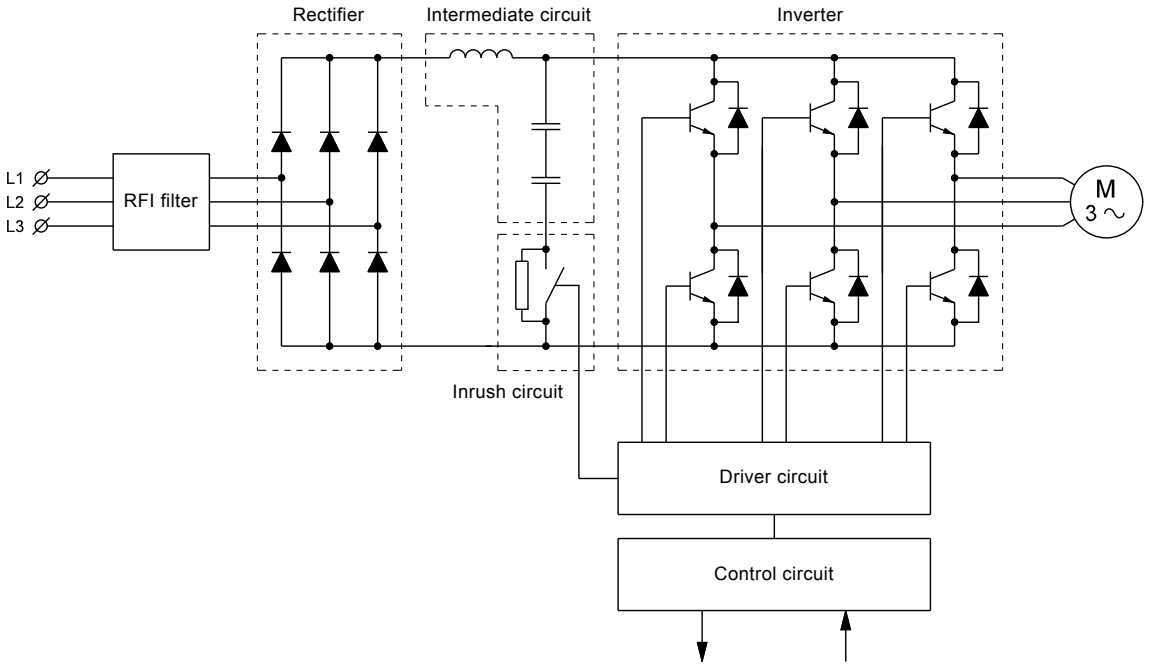


TM04 2400 2508

Fig. 6 Position of configuration label

If the terminal box is replaced or mounted on another motor, it must be reconfigured. Contact Grundfos Service.

2. General description

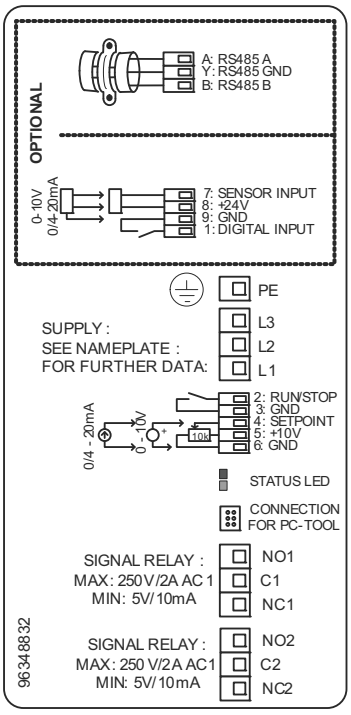


TM00 8679 4206

Fig. 7 Block diagram showing the functional blocks of the frequency converter

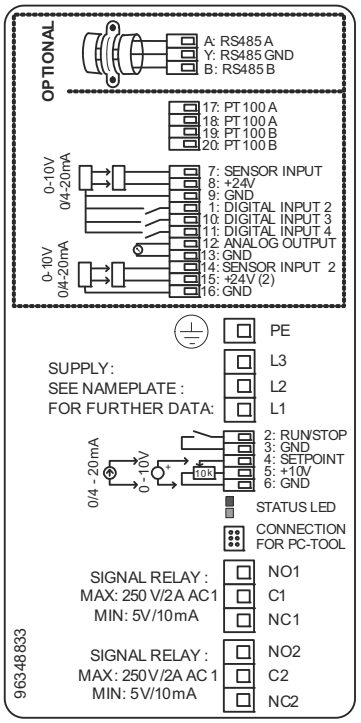
2.1 Wiring diagrams and signal terminals

The wiring diagram and the signal terminals depend on the pump application. Figures 8 to 11 are examples of the different functional modules available. Refer to the figure corresponding to the functional module fitted.



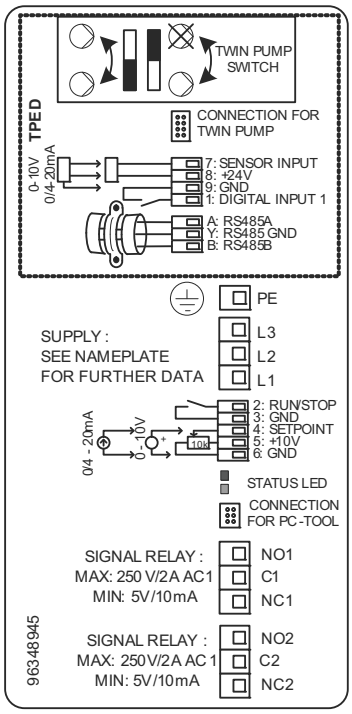
TM04 2071 1908

Fig. 8 I/O module and GENIbus



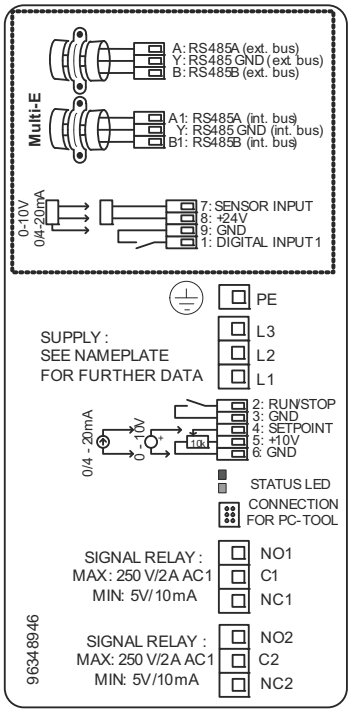
TM04 2072 1908

Fig. 9 Extended I/O module and GENIbus



TM04 2073 1908

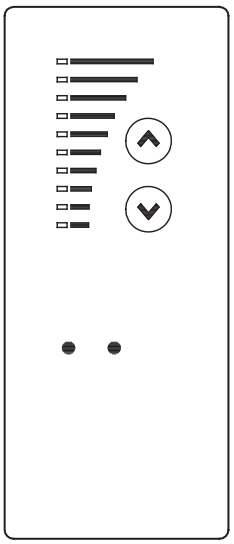
Fig. 10 TPED module



TM04 2074 1908

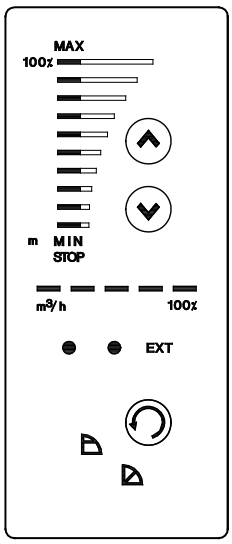
Fig. 11 Multi-E module

2.2 Control panel



TM02 8513 0304

Fig. 12 CRE and TPE, TPED



TM03 0126 4104

Fig. 13 TPE, TPED Series 2000

2.2.1 Operation

The motor control panel has the following buttons and indicator lights:

- Buttons ⊛ and ⊛ for setting of setpoint.
- Light fields, yellow, for indication of setpoint.
- Indicator lights, green (operation) and red (fault).

Switch control mode by pressing ⊛ in this sequence:

- constant pressure,
- proportional pressure,

Set the pump head by pressing ⊛ or ⊛.

The light fields of the control panel will indicate the set head (setpoint).

2.3 Indicator lights

2.3.1 Indicator lights on the control panel

The indicator lights on the control panel show the MGE-F motor's operating and alarm condition.

2.3.2 Indicator lights inside the terminal box

The indicator lights beside the terminal block on the control board normally have the same functions as the indicator lights on the control panel. See fig. 14.

Note ***In case of certain faults in the electronics, the indicator lights on the control panel may indicate differently from the indicator lights on the control board. In these cases, the indicator lights on the control board indicate the current operating and alarm condition.***

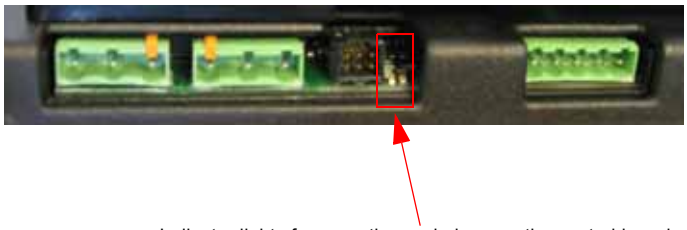


Fig. 14 Indicator lights inside the terminal box

See section 3.5 Fault finding using the indicator lights on the control panel to get an overview of the meaning of the indicator lights.

2.4 Setting using the R100 remote control

The Grundfos R100 remote control is designed for wireless (IR) communication with the Grundfos E-products, including the MGE-F.

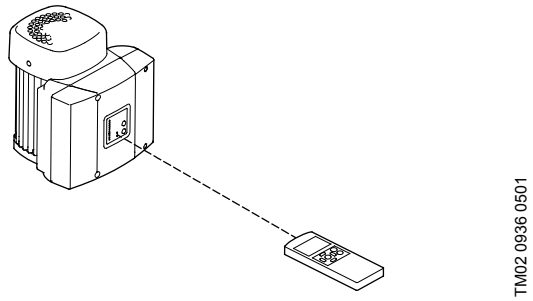


Fig. 15 The R100 communicates with the motor via infrared light

During communication, the R100 must be pointed at the control panel. When the R100 communicates with the motor, the red indicator light will flash rapidly. Keep pointing the R100 towards the control panel until the red indicator light stops flashing.

The R100 gives access to settings and status displays for the motor.

The displays are divided into four parallel menus. See fig. 16:

0. **GENERAL** (see operating instructions for the R100)
1. **OPERATION**
2. **STATUS**
3. **INSTALLATION**.

2.5 R100 menu structure

Figure 16 shows an overview of all the R100 displays available for the MGE-F.

Note

The R100 menus will adapt to the application set and possible functional modules. The menu structure below applies to a CRE pump. To see the correct menu structure, see installation and operating instructions for the pump on which the MGE-F motor is mounted.

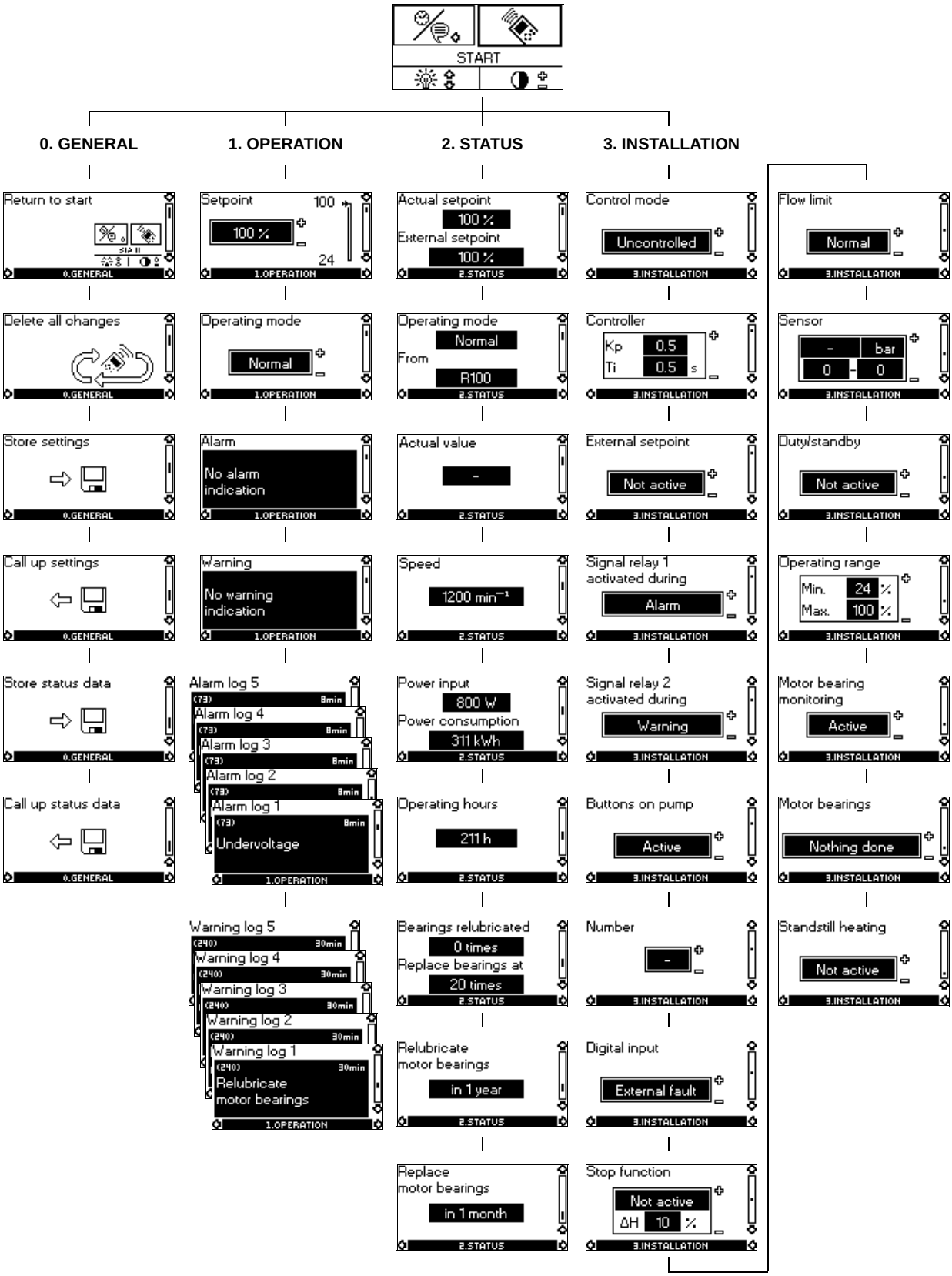
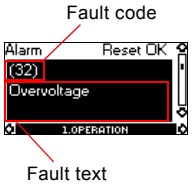


Fig. 16 R100 menu structure (for CRE pump)

2.6 Alarms and warnings

An alarm or a warning is indicated by a red indicator light on the control panel and inside the terminal box. The alarm and warning indication can be read with the R100.



Actual alarm and warning

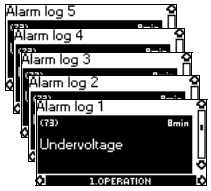
Alarms and warnings are shown at the bottom of the **OPERATION** menu.

The first line shows the fault code. See section 3.6.1 Alarm and warning list.

The second line shows the fault text.

Reset the alarm or warning by pressing [OK].

If there are no alarms or warnings, the display will show "No alarm indication" or "No warning indication".



Alarm and warning logs

In case of alarm or warning, the latest five alarms and warnings appear from the alarm and warning logs.
"Alarm log 1" and "Warning log 1" show the latest alarm and warning, respectively.
"Alarm log 2" and "Warning log 2" show the latest alarm and warning but one, respectively, etc.

The display shows the logged alarm or warning with fault code and fault text.

The top right corner shows how long ago the alarm or warning occurred.

If the log in question is empty, the display will show "No alarm indication" or "No warning indication".

2.7 Alarm overview

In section 3.6.1 Alarm and warning list, you will find an overview of the MGE-F alarms and warnings.

3. Fault finding

3.1 Safety instructions

Warning

All service work must be carried out by specially trained staff.

Warning

Due to the capacitors of the MGE-F, touching live electrical parts may be fatal, even after the mains supply has been switched off.

Disconnect the mains supply, and as a minimum wait the amount of time stated on the warning label under the terminal box cover before touching any live parts.

Note that the relay may be connected to an external power supply and still be live after the mains supply to the motor has been disconnected.

Warning

The MGE-F may be hot!

3.2 Fault finding procedure

Fault finding is based on these sections in this order:

- 3.3 Operating conditions
- 3.4 Fault observations
- 3.5 Fault finding using the indicator lights on the control panel
- 3.6 Fault finding using alarm and warning codes
- 7. Tightening torques and lubrication.

The necessary tools for the fault finding can be seen in section 8. Service tools.

3.3 Operating conditions

Correct functioning of the MGE-F depends on these points:

Mains supply

- Check nameplate data, and measure the actual supply voltage with a digital voltmeter (true RMS).
- Check the earth leakage circuit breaker and the backup fuses. The MGE-F has no internal fuses.

Pump and motor load

- Check nameplate data, and measure the actual current consumption with a digital amperemeter (true RMS). Do the pump and the MGE-F match?

External signals, for instance from another controller

- Check that the external signals are suitable for the MGE-F. See section 2.1 Wiring diagrams and signal terminals and installation and operating instructions for MGE 160 and MGE 180.
- Check that terminals 2 and 3 are connected and that the MGE-F has been started via the control panel.

Sensors connected

- Check that the sensor measuring range matches the pump application.
- Check that the settings of the MGE-F match the sensors (current, voltage, minimum and maximum values) (requires an R100).

Condensation

- Check whether condensation occurs in the terminal box. This may happen if the ambient temperature becomes very low. The problem may be overcome by enabling the standstill heating function and by removing the drain plug in the motor. See installation and operating instructions for MGE 160 and MGE 180.

Electromagnetic disturbances

- Check that the wiring complies with the EMC Directive. See installation and operating instructions for MGE 160 and MGE 180.

Start-up, installation and operating settings via the control panel or the R100

- Check that the green indicator light on the control panel (or inside the terminal box) is on.
- Check that the settings in the **INSTALLATION** menu match the pump application (requires an R100). The menu displays are described in detail in the installation and operating instructions for MGE 160 and MGE 180.

If the above points are according to the installation and operating instructions for MGE 160 and MGE 180 and the pump application, but a fault still exists and the red indicator light is on, continue the fault finding in sections 3.5 Fault finding using the indicator lights on the control panel and 3.6 Fault finding using alarm and warning codes.

3.4 Fault observations

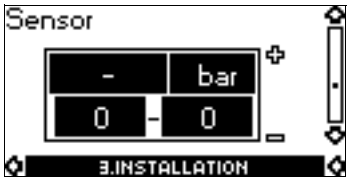
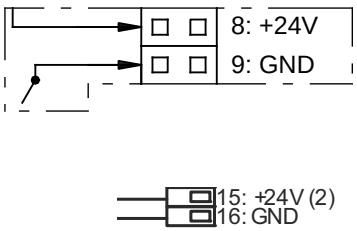
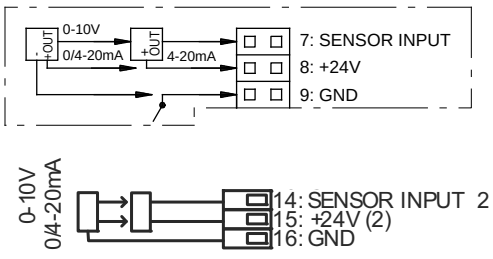
3.4.1 Condensation in the terminal box

Description	Condensation in the terminal box.
Explanation	During standstill, the motor temperature will fall below the dew point of the surrounding air. Then the humidity in the air may condensate and settle on the surface of the terminal box.
Check/remedy	Activate *Standstill heating* with the R100 in the **INSTALLATION** menu. 

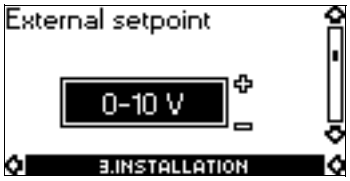
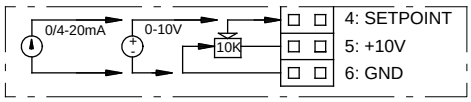
3.5 Fault finding using the indicator lights on the control panel

The operational state of the motor incl. possible faults can be read via the indicator lights on the control panel.
If an R100 remote control is available, we recommend you to start fault finding via the R100 fault code.
See section 3.6 Fault finding using alarm and warning codes.

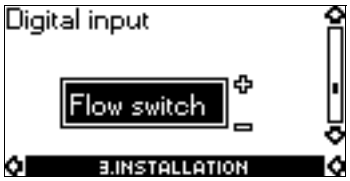
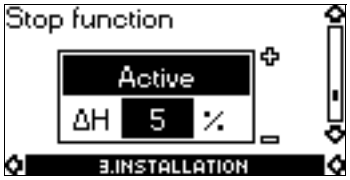
Note ***In case of certain faults in the electronics, the indicator lights on the control panel may indicate differently from the indicator lights on the control board. In these cases, the indicator lights on the control board indicate the current operating and alarm condition.***

Indicator lights		Condition/cause	Remedy
Green	Red		
On	On	**Normal operation + indication of previous fault**	
		1. The pump is running at normal performance. – The pump's duty/standby function has been activated, but there is no communication with the standby pump.	a) Has the power supply to the standby pump been switched off? YES: Re-establish the power supply. NO: Proceed to point b). b) Has the communication cable been disconnected? YES: Check the communication cable. NO: Contact Grundfos Service.
		2. The pump is running at maximum speed. – The sensor signal is outside the set signal range.	a) Does the sensor setting correspond to the sensor type installed? (0-10 V, 0-20 mA, 4-20 mA)  NO: Correct the setting using the R100. YES: Proceed to point b). b) Is the voltage to the sensor connection 24 VDC?  TM04 2072 1908 TM02 1606 1601 NO: Replace the I/O module. YES: Proceed to point c). c) Is the sensor signal – below 10 V (type 0-10 V sensor)? – below 20 mA (type 0-20 mA sensor)? – between 4 and 20 mA (type 4-20 mA sensor)?  TM04 2072 1908 TM02 1604 1601 NO: Replace the sensor. YES: Proceed to point d). d) Has the sensor been connected correctly, and does the sensor signal correspond to the system pressure? NO: Connect the sensor signal correctly. YES: Replace the I/O module or the terminal box. If the sensor is defective, replace it.

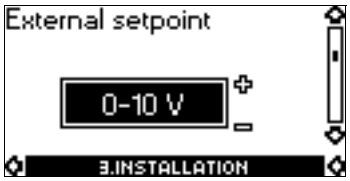
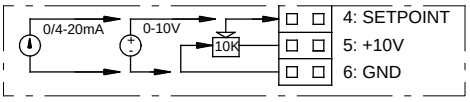
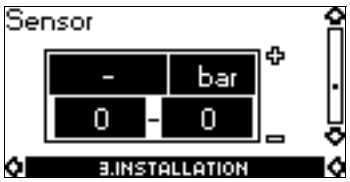
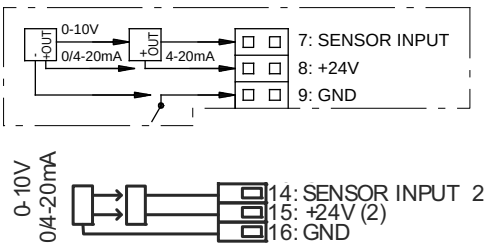
[To be continued on the next page]

Indicator lights		Condition/cause	Remedy
Green	Red		
On	On	3. The pump is running at minimum speed. – The setpoint signal is outside the set signal range.	a) Set the pump to "open loop" operation, and connect 10 V supply to the setpoint input. Does the pump switch to maximum speed? NO: Proceed to point b). YES: The pump is OK. b) Does the setpoint setting correspond to the setpoint type installed? (0-10 V, 0-20 mA, 4-20 mA)  NO: Correct the setting using the R100. YES: Proceed to point c). c) Is the voltage to the setpoint connection 10 VDC?  TM02 1607 1601 NO: Replace the terminal box. YES: Proceed to point d). d) Is the setpoint signal – below 10 V (type 0-10 V sensor)? – below 20 mA (type 0-20 mA sensor)? – between 4 and 20 mA (type 4-20 mA sensor)? NO: Check for fault in the external setpoint signal. YES: Re-establish the correct setpoint signal, if necessary. If the pump still does not run correctly, replace the terminal box.

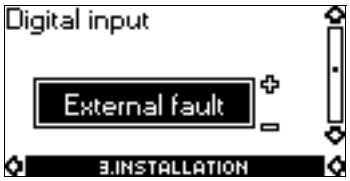
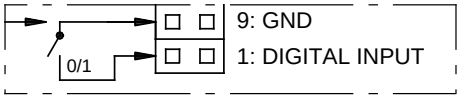
[To be continued on the next page]

Indicator lights		Condition/cause	Remedy
Green	Red		
On	Off	**Normal operation** 1. The pump is running. – Normal operational state.	
On	Off	2. The pump is not running. Operational stop which may be caused by – the flow switch connected – the pump stop function.	a) The flow switch is closed.  The connection of a flow switch depends on the MGE functional modules. See the wiring diagrams in figs 8 to 11. Is there 5 VDC across terminals 1-9? (If an extended I/O module is installed, the flow switch may be connected to DI3 (terminals 9-10) or DI4 (terminals 9-11)). NO: Flow switch closed = Pump is not supposed to run. YES: Flow switch open = Pump must be running. If the flow switch is defective, replace it. Does the pump start when the connection between the flow switch terminals is cut? NO: Replace the I/O module. YES: The digital input is OK. The flow switch is defective. Replace it. b) The stop function has stopped the pump.  Does the pump start when you increase the flow and/or reduce the pressure in the system? NO: If the sensor is OK, replace the terminal box. YES: The input is OK.

[To be continued on the next page]

Indicator lights		Condition/cause	Remedy
Green	Red		
On	Off	3. The pump is running at unexpectedly high or low speed. – Can be caused by fault in installation, setting or signal from setpoint/ sensor or that the sensor input has been set to "active".	a) Has the correct setpoint type been set in the motor? (0-10 V, 0-20 mA, 4-20 mA)  NO: Correct the setting using the R100. YES: Proceed to point b). b) Has the external setpoint signal from potentiometer or external controller been connected correctly?  TM02 1606 1601 NO: Connect the setpoint signal correctly. YES: Proceed to point c). c) Has the correct sensor type been set in the motor? (0-10 V, 0-20 mA, 4-20 mA)  NO: Correct the setting using the R100. YES: Proceed to point d). d) Has the sensor been connected correctly, and does the sensor signal correspond to the system pressure?  TM04 2072 1908 TM02 1604 0601 NO: Connect the sensor signal correctly. YES: If the pump does not run correctly, replace the I/O module or the terminal box. If the sensor is defective, replace it.
Off	Off	**The pump is not running**	
		1. The power supply to the motor has been cut.	Re-establish correct power supply.
		2. The control panel or one of the functional modules is defective.	Switch off the power supply. Then remove the control panel and the functional modules, one at a time, and switch on the power supply every time a component has been removed. When the fault has disappeared after switching on the power supply, the defective component has been localised and can be replaced.
		3. The terminal box is defective.	Replace the terminal box, or contact Grundfos Service.

[To be continued on the next page]

Indicator lights		Condition/cause	Remedy
Green	**Red**		
Off	**On**	**The pump has stopped due to a fault**	
		The pump has been stopped due to one of the following causes:	See the fault indication on the R100 or PC Tool E-products.
		1. The pump is blocked or overloaded.	Remove the blockage, or reduce the load.
		2. The ambient temperature is too high, or the cooling is insufficient.	Re-establish sufficient cooling.
		3. Power supply fault: – undervoltage – overvoltage – phase failure – mains supply failure.	Check that the supply voltage is within the stated voltage range. If not, re-establish correct power supply.
		4. External fault.	a) Has the R100 been set to external fault?  NO: Correct the setting using the R100. YES: Proceed to point b). b) Can 5 VDC be measured across terminals 1-9?  TTM02 1605 0601 NO: Contact between terminals 1 and 9 is closed. Seek the cause of fault in external signal transmitter. YES: Contact between terminals 1 and 9 is open. The E-pump is OK. Proceed to the next fault possibility.
		5. Other faults: – wrong terminal box – wrong configuration – fatal fault.	• Replace the terminal box. • Reconfigure the terminal box. • Replace the terminal box.
Flashing, 1 Hz	**Off**	**Normal operational stop** The pump has been stopped • with the ⓥ button • with the R100 • using the Grundfos GENIbus • by the motor start/stop function. (Input on terminal 2-3 is open).	
Flashing, 1 Hz	**On**	**Normal operational stop + indication of previous fault** The pump has been stopped • with the ⓥ button • with the R100 • using the Grundfos GENIbus • by the motor start/stop function, but was previously stopped due to a fault which has now disappeared.	
Flashing, 5 Hz	**On**	**The pump has been stopped due to a fault in the product**	
		Pump is not running and • communication with the R100 is not possible. • no reaction when you press ⓥ or ⓐ. • fatal internal communication fault in the pump.	Try resetting the fault by • disconnecting the power supply. • waiting until all diodes are off. • re-establishing the power supply. If this does not remedy the fault, the terminal box is defective. Replace the terminal box.

3.6 Fault finding using alarm and warning codes

Apart from being indicated by the indicator lights on the control panel, alarms, warnings and their fault codes can be read using the R100.

3.6.1 Alarm and warning list

The list below gives you an overview of the possible alarms and warnings and a description of their causes and suggestions for remedy.

These abbreviations are used in the column "Fault type":

W: Warning.

A: Alarm.

1): The alarm can be configured to Warn/Max/Min/Stop/User using the PC Tool E-products.

Fault code	Fault reading in the R100	Fault reading in PC Tool E-products	Fault type
Explanation/cause		**Remedy**	
3	**External fault**	**External fault signal**	**A**
The digital input set for "External fault" was or is closed (terminal 1, 10 or 11).		When the digital input is no longer closed, the fault indication can be reset either with the R100 or by pressing ⊛ or ⊛.	
4	**Too many restarts**	**Too many restarts (from standby mode per 24 hours)**	**A**
• The number of attempted restarts at 10-second intervals after a fault has exceeded four within one minute. • The number of attempted restarts at five-minute intervals after a fault has exceeded 16 within 24 hours.		Seek the cause under the fault log code numbers in the R100. The pump will automatically attempt to restart after 24 hours. The fault indication can be reset either with the R100 or by pressing ⊛ or ⊛.	
30	**Replace motor bearings**	**Motor bearings need change (service information)**	**W**
The motor has reached the number of operating hours for the bearing service life that is stated in the configuration.		Replace the bearings. See section 4.2 Replacement of motor bearings.	
31	**Replace varistor**	**Motor varistor(s) need change (service information)**	**W**
The varistor has been exposed to the allowable number of transients and needs replacing.		Contact Grundfos Service.	
32	**Overvoltage**	**Overvoltage**	**A**
The supply voltage has been or is too high.		Reduce the voltage to the specified level (see the nameplate).	
40	**Undervoltage**	**Undervoltage**	**A**
The supply voltage has been or is too low.		Increase the voltage to the specified level (see the nameplate).	
41	**Undervoltage**	**Undervoltage transient**	**A**
There has been a voltage drop in the supply voltage caused by one of the following: • Supply cable too small. • Another big user is supplied from the same panel.			
45	**Mains voltage asymmetry**	**Voltage asymmetry**	**A**
The supply voltage has been or is asymmetric.		Check the supply voltage while the motor is loaded.	
49	**Overload**	**Overcurrent (i_line, i_dc, i_mo)**	**A**
The terminal box or the motor is heavily overloaded. Cause:			
• Blocked pump.		• Remove the blockage.	
• Blocked rotor.		• Remove the blockage.	
• Continued overload.		• Reduce the load.	
• Incorrect configuration of the terminal box.		• Contact Grundfos Service.	
• Wrong terminal box.		• Contact Grundfos Service.	
• Fault in stator windings.		• Contact Grundfos Service.	
• Power supply failure (phase failure).		• Re-establish correct power supply.	
51	**Overload**	**Blocked motor/pump**	**A**
The pump is blocked during start-up which causes a heavy overload. The input current is very high; the motor P > 120 % for 60 seconds.		Remove the blockage.	

Fault code	Fault reading in the R100	Fault reading in PC Tool E-products	Fault type
Explanation/cause		**Remedy**	
55	**Overload**	**Motor current protection activated (MCP)**	**A**
The built-in motor-current protection function has registered a continued overload of more than 125 % of rated current for 60 seconds. Cause:			
• Continued overload.		• Reduce the load by limiting the pump flow.	
• Incorrect configuration of the terminal box.		• Contact Grundfos Service.	
• Fault in stator windings.		• Contact Grundfos Service.	
56	**Underload**	**Underload**	**A**
The motor is underloaded. Cause:			
• Incorrect configuration of the terminal box.		• Check the settings of the terminal box.	
• The pump has run dry.		• Make sure that all valves in the piping system are open and that there is water in the piping system.	
57	**Dry running**	**Dry running**	**A**
The pump has run dry.		Make sure that all valves in the piping system are open and that there is water in the piping system.	
65	**Too high motor temperature**	**Motor temperature**	**A**
The temperature sensor in the motor has measured a too high winding temperature. Cause:			
• Dust and dirt in the cooling fins.		• Clean the cooling fins.	
• Too high ambient temperature.		• Improve the cooling.	
• Fault in stator windings.		• Contact Grundfos Service.	
73	**Undervoltage**	**Hardware shutdown (HSD)**	**A**
The current limit of the electronic module has been exceeded. Cause:			
• Incorrect configuration of the terminal box.		• Contact Grundfos Service.	
• Fault in stator windings.		• Contact Grundfos Service.	
• Terminal box defective.		• Contact Grundfos Service.	
77	**Duty/standby, Communication fault**	**Twin pump communication fault**	**W**
Communication between the two pumps which have been set to duty/standby function has been interrupted. Cause:			
• Power supply to standby pump has been cut.		• Re-establish the power supply.	
• Communication cable has been cut.		• Check the communication cable.	
• Communication module defective.		• Replace communication module.	
85	**Other fault**	**Freq. conv. parameter verification error (EEPROM)**	**A**
The EEPROM has lost its contents.		Contact Grundfos Service.	
88	**Sensor 1 signal outside signal range**	**General sensor signal fault / feedback sensor signal fault**	**1)**
Sensor signal type 4-20 mA: signal below 2 mA or above 22 mA. Sensor signal type 0-20 mA: signal above 22 mA. Sensor signal type 0-10 V: signal above 11 V.			
• Signal range set incorrectly.		• Correct the signal range setting.	
• Sensor incorrectly connected.		• Connect the sensor correctly.	
• Incorrect power supply to sensor.		• Check the power supply from the terminal box. If it is not 24 V ± 1 V, replace the terminal box.	
• Sensor defective.		• Replace the sensor.	
• Sensor cable defective.		• Check the sensor cable.	
91	**Temperature sensor 1 signal outside signal range**	**Temperature sensor 1 signal fault**	**1)**
The sensor signal has been short-circuited or cut.		Replace the temperature sensor.	

Fault code	Fault reading in the R100	Fault reading in PC Tool E-products	Fault type
Explanation/cause		**Remedy**	
93	**Sensor 2 signal outside signal range**	**Sensor 2 signal fault**	**1)**
Same as fault 88.		Same as fault 88.	
96	**Setpoint signal outside signal range**	**Reference input signal fault**	**1)**
Sensor signal type 4-20 mA: signal below 2 mA or above 22 mA. Sensor signal type 0-20 mA: signal above 22 mA. Sensor signal type 0-10 V: signal above 11 V.			
• Signal range set incorrectly.		• Correct the signal range setting.	
• Setpoint signal incorrectly connected.		• Connect the setpoint signal correctly.	
• Incorrect supply voltage to the setpoint.		• Check the supply voltage from the terminal box. If it is not 10 V, replace the terminal box.	
105	**Overload**	**Electronic rectifier protection activated (ERP)**	**A**
The electronic module/motor is heavily overloaded, and the temperature of the electronics is above 100 °C. The measured temperature can be read via PC Tool E-products. Cause:			
• Temperature sensor defective.		• Contact Grundfos Service.	
• Continued overload.		• Reduce the load.	
• The ambient temperature is too high, or the cooling is insufficient.		• Improve the cooling.	
• Incorrect configuration of the terminal box.		• Contact Grundfos Service.	
106	**Overload**	**Electronic inverter protection activated (EIP)**	**A**
The electronic module/motor is heavily overloaded, and the temperature of the electronics is above 100 °C. The measured temperature can be read via PC Tool E-products. Cause:			
• Temperature sensor defective.		• Contact Grundfos Service.	
• Continued overload.		• Reduce the load.	
• The ambient temperature is too high, or the cooling is insufficient.		• Improve the cooling.	
• Incorrect configuration of the terminal box.		• Contact Grundfos Service.	
148	**DE bearing temperature high**	**Motor drive-end (DE) bearing temp. warning limit** **Motor drive-end (DE) bearing temp. alarm limit**	**W** **A**
The drive-end motor bearing has become too hot. Cause:			
• The bearing is worn.		• Replace the bearing. See section 4.2 Replacement of motor bearings.	
• The motor is dirty.		• Check and clean, if necessary, – the fan – the motor cooling fins.	
149	**NDE bearing temperature high**	**Motor non-drive-end (NDE) bearing temp. warn. limit** **Motor non-drive-end (NDE) bearing temp. alarm limit**	**W** **A**
The non-drive-end motor bearing has become too hot. Cause:			
• The bearing is worn.		• Replace the bearing. See section 4.2 Replacement of motor bearings.	
• The motor is dirty.		• Check and clean, if necessary, – the fan – the motor cooling fins.	
155	**Undervoltage**	**Inrush fault**	**A**
The terminal box voltage is outside the alarm limit. Cause:			
• Fault in the voltage supply.		• Re-establish the voltage supply.	
• Transients in the voltage supply during operation.		• Contact Grundfos Service.	

Fault code	Fault reading in the R100	Fault reading in PC Tool E-products	Fault type
Explanation/cause		**Remedy**	
156	**Other fault**	**Internal communication failure in frequency converter**	**A**
Internal communication fault in the pump due to defect in the terminal box.		Contact Grundfos Service.	
175	**Temperature sensor 2 signal outside signal range**	**Temperature sensor 2 signal fault**	**1)**
Same as fault 91.		Same as fault 91.	
190 **191**	**Limit 1 exceeded** **Limit 2 exceeded**	**Limit 1 exceeded** **Limit 2 exceeded**	**1)**
This is a monitoring function offering information, alarm or warning if a low or high limit is exceeded. The function can only be set with the PC Tool E-products. The limit set has been exceeded either upwards or downwards.		The function can be set to monitor • sensor 1 or 2 • Pt100 sensor 1 or 2 • external setpoint • the feedback signal. Procedure: 1. Using PC Tool E-products, check which function is being monitored. 2. Check in the pump system whether the alarm or warning is real. If it is real, remedy the fault. 3. If the alarm or warning seems to be wrong for the pump system, troubleshoot according to the selected sensor using these service instructions.	
240	**Relubricate motor bearings**	**Motor bearings need lubrication (service information)**	**W**
The motor has reached the number of operating hours stated in the configuration for the bearing lubrication.		Lubricate the bearings. See section 4.1 Lubrication of motor bearings.	

4. Maintenance

Warning

All service work must be carried out by specially trained staff.

Follow these instructions when it is necessary to maintain the motor or the terminal box.

Position numbers of components (numbers in brackets) refer to section 6. Drawings and diagrams.

Position letters of tools (letters in brackets) refer to section 8. Service tools.

Prior to dismantling

Disconnect the mains supply in accordance with local regulations.

Warning

Due to the capacitors of the MGE-F, touching live electrical parts may be fatal, even after the mains supply has been switched off.

Disconnect the mains supply, and as a minimum wait the amount of time stated on the warning label under the terminal box cover before touching any live parts.

Note that the relay may be connected to an external power supply and still be live after the mains supply to the motor has been disconnected.

Warning

The MGE-F may be hot!

During assembly

Tighten screws and nuts to the correct torque. See section 7.1 Tightening torques.

4.1 Lubrication of motor bearings

4.1.1 Grease and lubrication intervals

The recommended grease type and quantity and the recommended lubrication intervals in hours appear from the lubricating plate fitted to the motor. When the MGE-F has reached the prescribed number of operating hours, it will give a lubrication warning (fig. 17) that will appear on the R100 or PC Tool E-products. See section 2.6 Alarms and warnings.

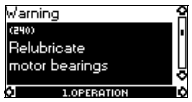


Fig. 17 Bearings need to be lubricated

4.1.2 Lubrication procedure

Caution ***The motor must be running during the lubrication. This ensures that new grease is distributed evenly and that old grease is pressed out of the bearing.***

1. Connect the grease gun to the lubricating nipples, and apply the prescribed quantity of grease.
2. Confirm the lubrication in the **INSTALLATION** menu of the R100. See fig. 18. Confirmation can also be made via PC Tool E-products.

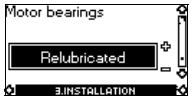


Fig. 18 Confirmation of bearing lubrication

4.2 Replacement of motor bearings

When the MGE-F has reached the prescribed number of operating hours, it will give a warning about replacement of bearings (fig. 19) that will appear on the R100 or PC Tool E-products. See section 2.6 Alarms and warnings.

Fig. 19 Bearings need to be replaced

4.2.1 Removing the bearings

1. Remove the screws (pos. 152) holding the fan cover (pos. 151), and remove the fan cover.
2. Remove the retaining ring (pos. 156c) holding the fan (pos. 156).
3. Pull off the fan.
4. Remove the three screws (pos. 182a) holding the bearing cover (pos. 155d).
5. Remove the screws (pos. 185a) holding the bearing end shield in the non-drive end (pos. 156a).
6. Remove the bearing end shield in the non-drive end and the spring (pos. 158).
7. Remove the screws (pos. 185) holding the bearing end shield in the drive end (pos. 156b).
8. Carefully pull the bearing end shield in the drive end and the shaft/rotor (pos. 172) out of the stator housing. Take care not to damage the stator windings.
9. Remove the three screws (pos. 182) holding the bearing cover (pos. 155a).
10. Remove the bearing end shield in the drive end using a puller (pos. B).
11. Pull bearings (pos. 153 and 154) off the shaft using a puller. If the drive end bearing is stuck in the bearing end shield, heat up the bearing end shield, and press the bearing out by pushing at it through the shaft hole.
12. Clean and check the bearing journals of the shaft and the bearing seats of the bearing end shields.

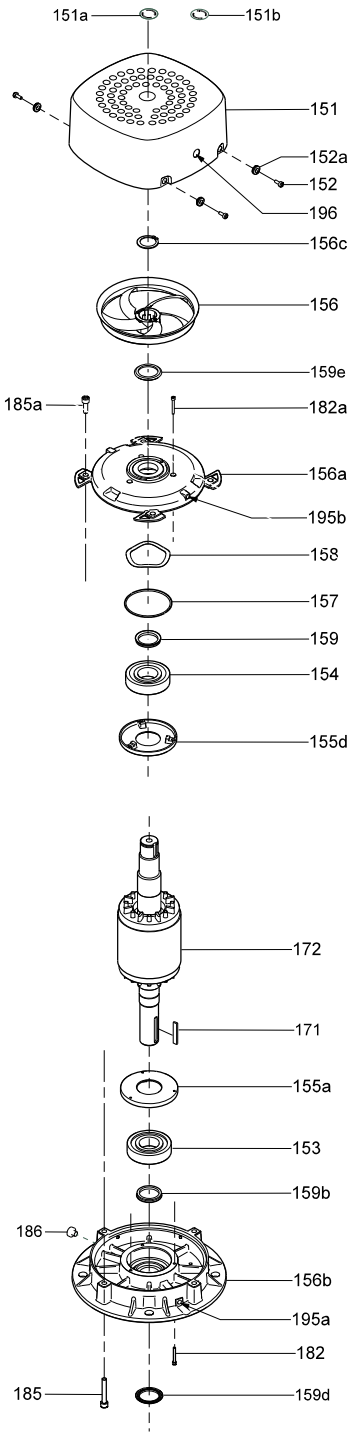


Fig. 20 Detail from fig. 29, exploded view of the MGE-F

4.2.2 Fitting the bearings

1. Fit bearing covers (pos. 155a and 155d) on the shaft (pos. 172).
2. Heat up the bearings (pos. 153 and 154) to 90 °C, and fit them on the shaft (pos. 172).
   An induction heater is the most suitable heating method for greased-for-life bearings (2Z and 2RZ).
   Note: Remember to demagnetise the components, if necessary.
   Alternatively, heat up the components using a heating plate or an oil bath.
   If it is not possible to heat up the bearings before fitting them, press or tap them into position by applying the force to the inner ring of the bearing.
3. Replace V-ring (pos. 159b) in the bearing seat of the bearing end shield in the drive end (pos. 156b).
4. Fit the bearing end shield in the drive end on the bearing. If necessary, heat up the bearing end shield to approx. 80 °C to ensure that the bearing seat is large enough for an easy and safe fitting of the bearing.
5. Fit the three screws (pos. 182) holding the bearing cover (pos. 155a), and **tighten them to 8 Nm**.
6. Carefully move the bearing end shield in the drive end and the shaft/rotor to their position inside the stator housing. Take care not to damage the stator windings.
7. Fasten the bearing end shield in the drive end with the screws (pos. 185), and **cross-tighten them to 27 Nm**.
8. Replace V-ring (pos. 159e) and O-ring (pos. 157) in the bearing seat of the bearing end shield in the non-drive end (pos. 156a).
9. Fit spring (pos. 158) in the bearing seat of the bearing end shield in the non-drive end.
10. Fit the three screws (pos. 182a) holding the bearing cover (pos. 155d), and **tighten them to 8 Nm**.
11. Fasten the bearing end shield in the non-drive end with the screws (pos. 185a), and **cross-tighten them to 27 Nm**.
12. Fit fan (pos. 156) and retaining ring (pos. 156c).
13. Fit fan cover (pos. 151), and fasten it with the screws (pos. 152) and the rubber bushes.
    Tighten the screws to 10 Nm.
14. If the bearings are not prelubricated, lubricate the bearings according to instructions. See section 7.2 Lubricating intervals and grease.
15. Confirm the replacement of the bearings in the **INSTALLATION** menu of the R100 (or via PC Tool E-products). See fig. 21.

Fig. 21 Confirmation of bearing lubrication

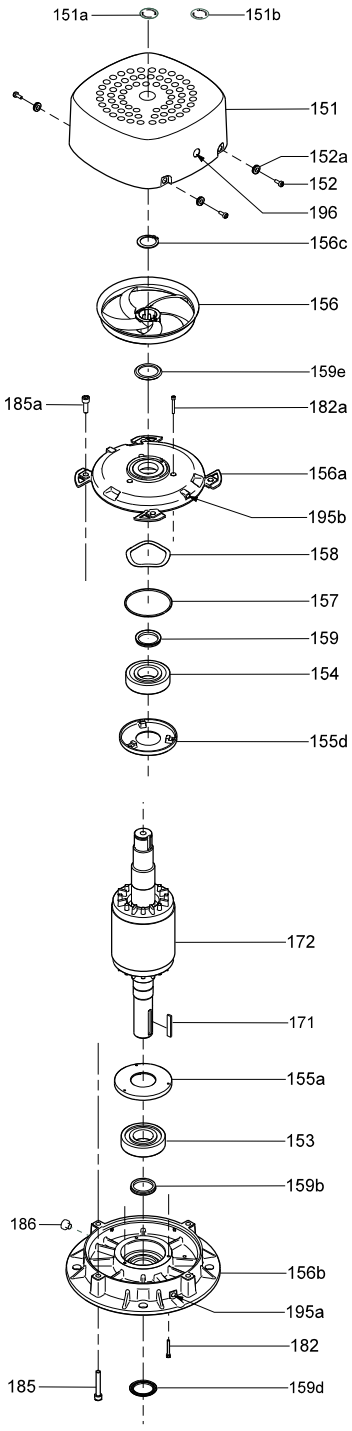


Fig. 22 Detail from fig. 29, exploded view of the MGE-F

5. Emergency operation (bypass)

If it is necessary to continue pump operation even if replacement or repair of the terminal box is not possible, establish emergency operation by connecting the motor direct to the mains supply.

Caution ***Before establishing emergency operation of the pump, make sure that the motor is OK. You may for instance meg the motor.***

Note ***The starting current will increase when the frequency converter is bypassed.***

Note ***When emergency operation has been established, the motor is only protected by its backup fuse. Normal operation must therefore be re-established as quickly as possible.***

Emergency operation is illustrated on a label on the cover over the motor terminals. See fig. 25.

5.1 Establishing emergency operation

1. Loosen the four screws in the terminal box cover, and remove the cover from the terminal box.
2. Remove the cover over the supply terminals. See fig. 23. Remove the three mains supply conductors from the supply terminals, but leave the protective earth conductor in the PE terminal.
3. Remove the cover over the motor terminals. See fig. 24. Unscrew the nuts from the motor terminals.

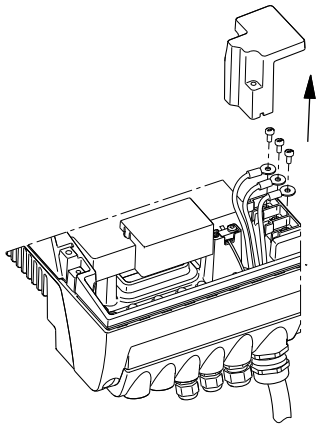


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Fig. 23 Cover over the supply terminals

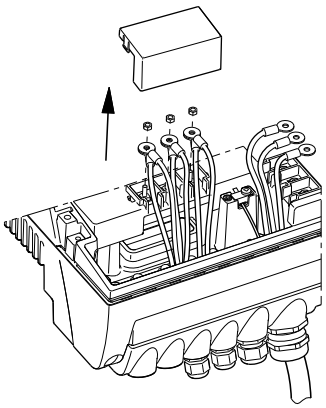

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Fig. 24 Cover over the motor terminals

4. Connect the conductors as shown on the label on the cover over the motor terminals. See fig. 25. Use the screws from the supply terminals and the nuts from the motor terminals. See fig. 26.

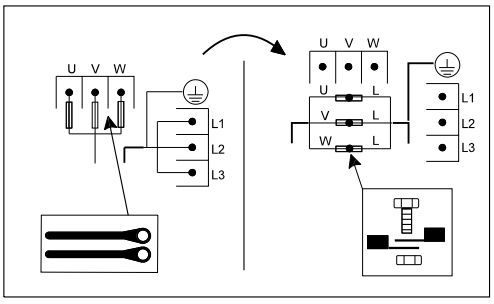

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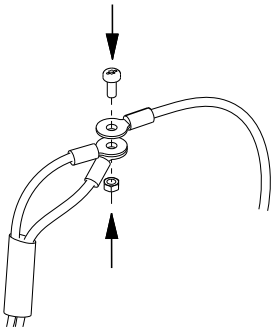
Fig. 25 Emergency label on the cover over the motor terminals



TM03 9121 3407

Fig. 26 Joining the motor conductors (two) and the supply conductor

5. Pull the insulating hose around the motor conductors up over the joint. Wind insulating tape or similar around the ends of the insulating hose in order to fasten it over the joint. See figs 27 and 28.

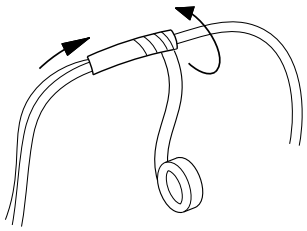


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Fig. 27 Insulating the joint

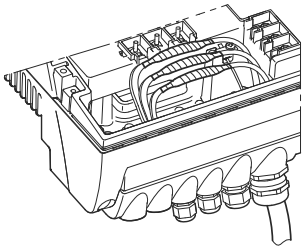

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Fig. 28 The joints placed in the terminal box

6. Briefly start the motor, and observe the direction of rotation.

Note ***It is important to check (and change, if necessary) the motor's direction of rotation in order to ensure that the pump is not running backwards.***

7. If the motor's direction of rotation is wrong, interchange two of the supply conductors (phases).
8. Put the terminal box cover (pos. 164) back on, and fasten it with the four screws (pos. 166). **Tighten the screws to 7 Nm**.

5.2 Re-establishment of frequency converter operation

1. Loosen the four screws in the terminal box cover, and remove the cover from the terminal box.
2. Remove the insulating tape, and separate one of the joints of motor conductors and supply conductor. Push the insulating hose down over the motor conductors again.
3. Fit the motor conductors on the correct motor terminal: Blue/black to U1/W2, white/grey to V1/U2 and orange/yellow to W1/V2. **Tighten them to 2.2 Nm**.
4. Fit the supply conductor to one of the supply terminals, and **tighten it to 2.2 Nm**.
5. Repeat steps 2 to 4 for the remaining two joints.
6. Fit the cover over the motor terminals.
7. Fit the cover over the supply terminals (pos. 284), and **tighten the screw to 7 Nm**.
8. Put the terminal box cover (pos. 164) back on, and fasten it with the four screws (pos. 166). **Tighten the screws to 7 Nm**.

6. Drawings and diagrams

The position numbers in fig. 29 refer to the list on page 27.

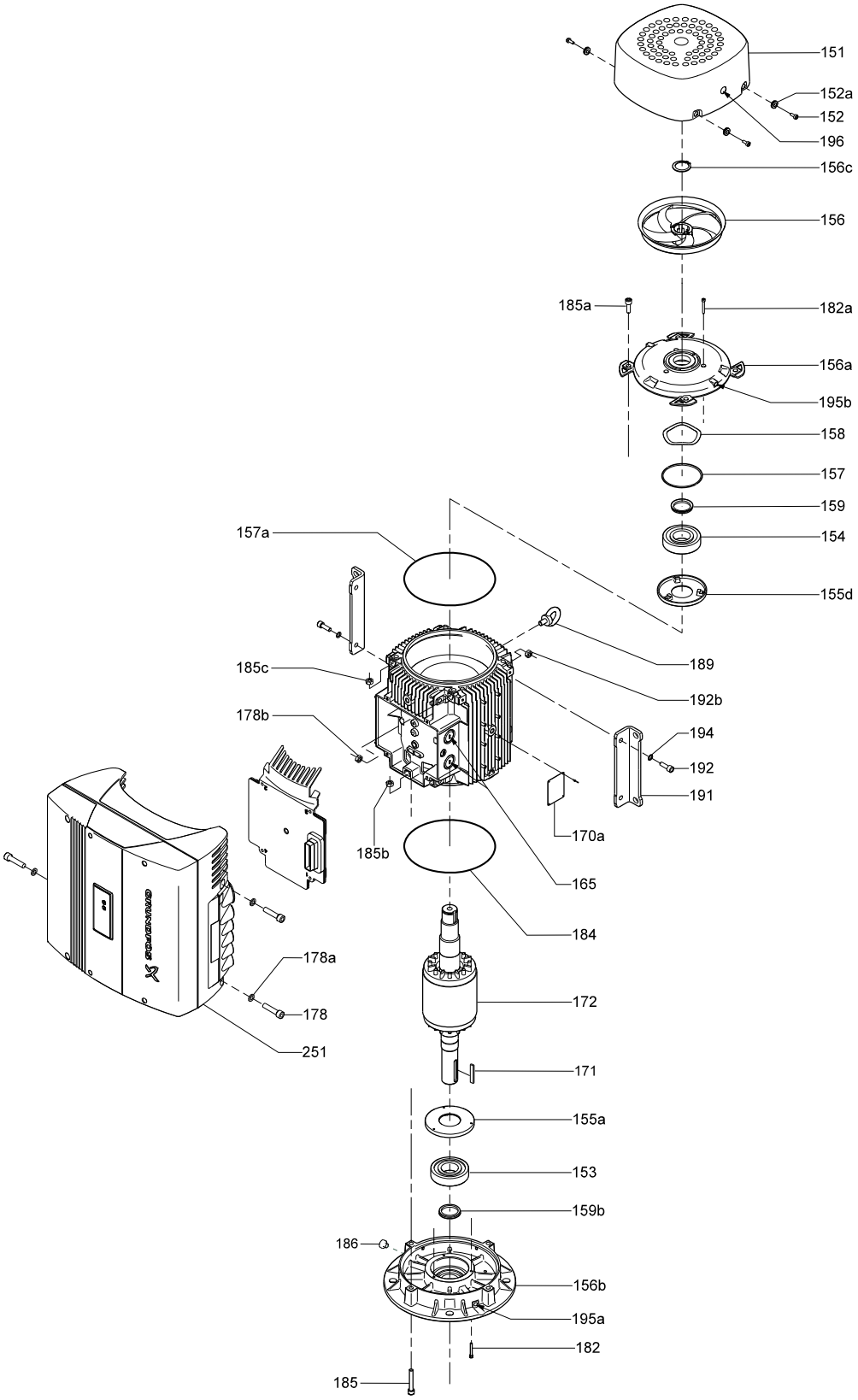
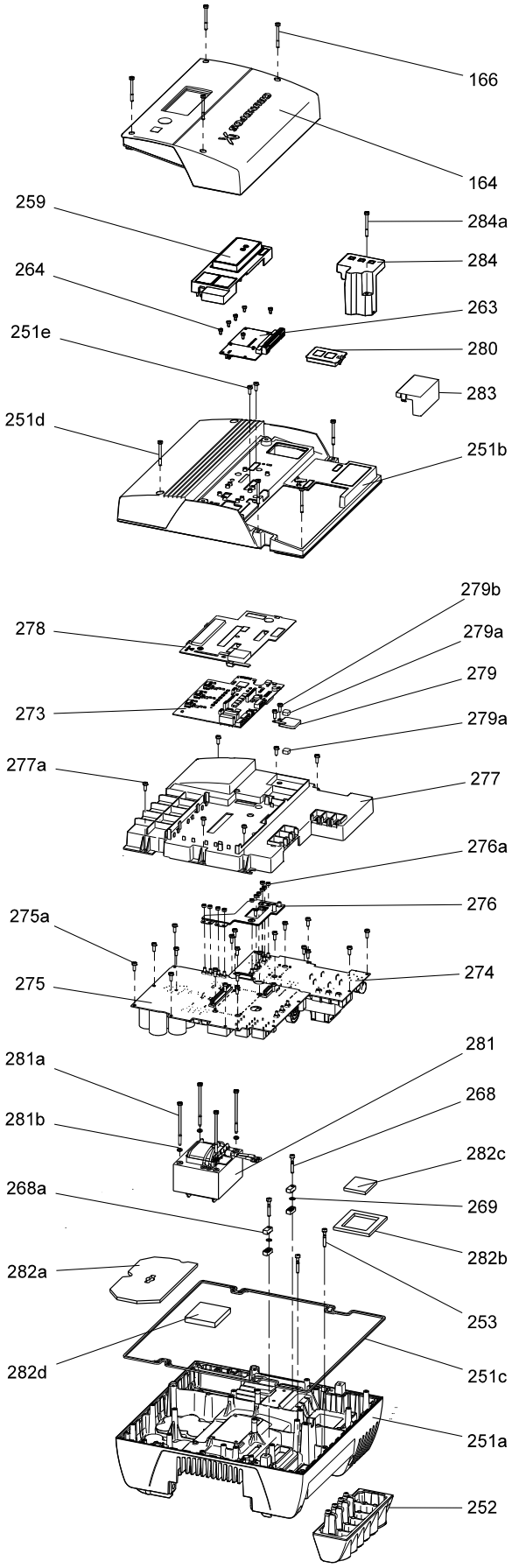


Fig. 29 Exploded view, MGE-F

Position numbers

Pos.	Description
151	Fan cover
152	Screw, fan cover
152a	Rubber bushing
153	Ball bearing, drive end
154	Ball bearing, non-drive end
155a	Inner bearing cover, drive end
155d	Inner bearing cover, non-drive end
156	Fan
156a	Bearing end shield, non-drive end
156b	Bearing end shield, drive end
156c	Circlip for fan
157	O-ring, bearing, non-drive end flange
157a	Gasket, non-drive end
158	Corrugated spring
159	V-ring, non-drive end
159b	V-ring, drive end
165	Knock-out cable entry
170a	Nameplate
171	Key
172	Shaft with rotor
178	Screw, terminal box
178a	Lock washer, D10.5/D16 x 1 A2
178b	Nut, M10 DIN 934 A2, waxed
182	Screw, bearing cover
182a	Screw, bearing cover, non-drive end
184	Gasket, drive end
185	Screw, drive end
185a	Screw, non-drive end
185b	Nut, drive end
185c	Nut, non-drive end
186	Plug for drain hole
189	Eyebolt
191	Foot
192	Screw for foot
192b	Nut for foot
194	Lock washer
195a	Lubricating nipple, drive end flange
195b	Lubricating nipple, non-drive end flange
196	Protective cover for lubricating nipple, non-drive end
251	Terminal box with integrated frequency converter

The position numbers in fig. 30 refer to the list on page 29.



TM04 2593 2708

Fig. 30 Exploded view, terminal box

Position numbers

Pos.	Description
164	Terminal box cover
166	Screw for terminal box cover
251a	Terminal box, lower part
251b	Terminal box top
251c	Gasket for terminal box top
251d	Screw for terminal box top
251e	Screw for terminal box top
252	Cable entry block, complete
253	Screw for cable entry block,
259	Control panel
263	Functional module, complete with plugs
264	Screw, functional module
268	Earth screw
268a	Earth clamp
269	Washer, earth screw
273	Control board
274	Rectifier board
275	Inverter board
275a	Screw for inverter board and rectifier board
276	Busbar
276a	Nut for busbar
277	Insulation cover
277a	Screw for insulation cover
278	Cover over control board
279	Varistor
279a	Shock absorber for varistor
279b	Screw for varistor
280	Cover for varistor
281	DC choke
281a	Screw for DC choke
281b	Washer for DC choke
282a	Gap filler for inverter board
282b	Gap filler for RFI choke part 1
282c	Gap filler for RFI choke part 2
282d	Gap filler for DC choke
283	Cover over motor terminals
284	Cover over supply terminals
284a	Screw for cover over supply terminals

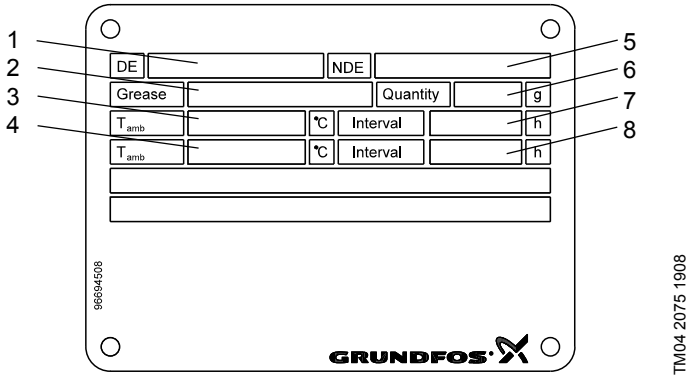
7. Tightening torques and lubrication

7.1 Tightening torques

Pos.	Description	Torque [Nm]
Terminal box		
166	Screws for terminal box cover	4
251d	Screws for terminal box top	4
251e	Screws for terminal box top	4
284a	Screw for cover over supply terminals	4
277a	Screws for cover	4
253	Screws for cable entry block	4
	Terminals for supply conductors	2.2
	Terminals for motor conductors	2.2
268	Terminal for PE conductor	4
279b	Terminal for varistor	1.5
276a	Nuts for busbar	2.2
281a	Screws for coil	4
275a	Screws for rectifier board and inverter board	4
	Screws for inverter and IGBT (step 1/step 2)	4 / 4
264	Screws for modules	2 - 2.5
Motor		
152	Screws for fan cover	8
178	Screws for terminal box	27
182	Screws for bearing cover in the drive end	8
182a	Screws for bearing cover in the non-drive end	
185	Screws for bearing end shield in the drive end	27
185a	Screws for bearing end shield in the non-drive end	

7.2 Lubricating intervals and grease

Lubricating intervals, grease quantity and type appear from the motor lubricating plate.

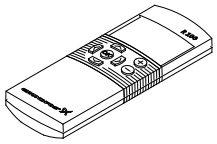


Pos.	Description
1	Bearing, drive end
2	Grease type
3	Ambient temperature
4	Ambient temperature
5	Bearing, non-drive end
6	Quantity of grease
7	Lubricating interval
8	Lubricating interval

Fig. 31 Lubricating plate of MGE-F

8. Service tools

A



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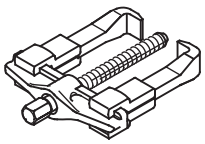

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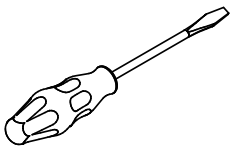

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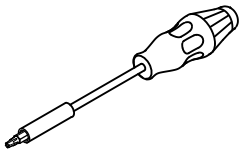

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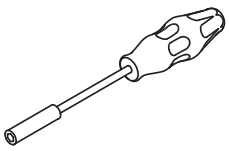

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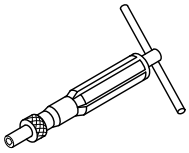

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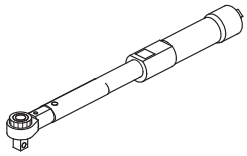
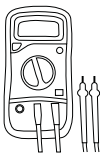


H

I

J

K



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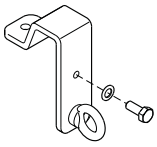

M

Special tools

Pos.	Designation	Supplementary information	Product number
A	R100 PC Tool E-products		96615297 96562869

Standard tools

Pos.	Designation	Supplementary information	Product number
B	Puller		
C	Slotted screwdriver		
D	Torx® screwdrivers (set)	T20, T25	96884908
E	Hexagon socket screwdriver	8 mm	

Torque tools

Pos.	Designation	Supplementary information	Product number
F	Torque screwdriver	1-6 Nm	SV0438
G	Torque wrench		
H	Hexagon head driver		
I	Hexagon socket		
J	Torx® bits (set)	T20, T25	96884936

Measuring tools

Pos.	Designation	Supplementary information	Product number
K	Digital multimeter, type RMS with diode test function	CAT III / 1000 V	

Lifting equipment

Pos.	Designation	Supplementary information	Product number
L	Lifting bracket		
M	Eye bolt	M8	

Subject to alterations.

Argentina
Bombas GRUNDFOS de Argentina S.A.
Ruta Panamericana km. 37.500 Lote 34A
1619 - Garin
Pcia. de Buenos Aires
Phone: +54-3327 414 444
Telefax: +54-3327 411 111

Australia
GRUNDFOS Pumps Pty. Ltd.
P.O. Box 2040
Regency Park
South Australia 5942
Phone: +61-8-8461-4611
Telefax: +61-8-8340 0155

Austria
GRUNDFOS Pumpen Vertrieb Ges.m.b.H.
Grundfosstraße 2
A-5082 Grödig/Salzburg
Tel.: +43-6246-883-0
Telefax: +43-6246-883-30

Belgium
N.V. GRUNDFOS Bellux S.A.
Boomsesteenweg 81-83
B-2630 Aartselaar
Tél.: +32-3-870 7300
Télécopie: +32-3-870 7301

Belorussia
Представительство ГРУНДФОС в Минске
220123, Минск,
ул. В. Хоружей, 22, оф. 1105
Тел.: +(37517) 233 97 65,
Факс: +(37517) 233 97 69
E-mail: grundfos_minsk@mail.ru

Bosnia/Herzegovina
GRUNDFOS Sarajevo
Trg Heroja 16,
BiH-71000 Sarajevo
Phone: +387 33 713 290
Telefax: +387 33 659 079
e-mail: grundfos@bih.net.ba

Brazil
Mark GRUNDFOS Ltda.
Av. Humberto de Alencar Castelo Branco, 630
CEP 09850 - 300
São Bernardo do Campo - SP
Phone: +55-11 4393 5533
Telefax: +55-11 4343 5015

Bulgaria
GRUNDFOS Pumpen Vertrieb
Representative Office - Bulgaria
Bulgaria, 1421 Sofia
Lozenetz District
105-107 Arsenalski blvd.
Phone: +359 2963 3820, 2963 5653
Telefax: +359 2963 1305

Canada
GRUNDFOS Canada Inc.
2941 Brighton Road
Oakville, Ontario
L6H 6C9
Phone: +1-905 829 9533
Telefax: +1-905 829 9512

China
GRUNDFOS Pumps (Shanghai) Co. Ltd.
51 Floor, Raffles City
No. 268 Xi Zang Road. (M)
Shanghai 200001
PRC
Phone: +86-021-612 252 22
Telefax: +86-021-612 253 33

Croatia
GRUNDFOS CROATIA d.o.o.
Cebini 37, Buzin
HR-10010 Zagreb
Phone: +385 1 6595 400
Telefax: +385 1 6595 499
www.grundfos.hr

Czech Republic
GRUNDFOS s.r.o.
Čajkovského 21
779 00 Olomouc
Phone: +420-585-716 111
Telefax: +420-585-716 299

Denmark
GRUNDFOS DK A/S
Martin Bachs Vej 3
DK-8850 Bjerringbro
Tlf.: +45-87 50 50 50
Telefax: +45-87 50 51 51
E-mail: info_GDK@grundfos.com
www.grundfos.com/DK

Estonia
GRUNDFOS Pumps Eesti OÜ
Peterburi tee 92G
11415 Tallinn
Tel: + 372 606 1690
Fax: + 372 606 1691

Finland
OY GRUNDFOS Pumput AB
Mestarintie 11
FIN-01730 Vantaa
Phone: +358-3066 5650
Telefax: +358-3066 56550

France
Pompes GRUNDFOS Distribution S.A.
Parc d'Activités de Chesnes
57, rue de Malacombe
F-38290 St. Quentin Fallavier (Lyon)
Tél.: +33-4 74 82 15 15
Télécopie: +33-4 74 94 10 51

Germany
GRUNDFOS GMBH
Schlüterstr. 33
40699 Erkrath
Tel.: +49-(0) 211 929 69-0
Telefax: +49-(0) 211 929 69-3799
e-mail: infoservice@grundfos.de
Service in Deutschland:
e-mail: kundendienst@grundfos.de

Greece
GRUNDFOS Hellas A.E.B.E.
20th km. Athinon-Markopoulou Av.
P.O. Box 71
GR-19002 Peania
Phone: +0030-210-66 83 400
Telefax: +0030-210-66 46 273

Hong Kong
GRUNDFOS Pumps (Hong Kong) Ltd.
Unit 1, Ground floor
Siu Wai Industrial Centre
29-33 Wing Hong Street &
68 King Lam Street, Cheung Sha Wan
Kowloon
Phone: +852-27861706 / 27861741
Telefax: +852-27858664

Hungary
GRUNDFOS Hungária Kft.
Park u. 8
H-2045 Törökbálint,
Phone: +36-23 511 110
Telefax: +36-23 511 111

India
GRUNDFOS Pumps India Private Limited
118 Old Mahabalipuram Road
Thoraipakkam
Chennai 600 096
Phone: +91-44 2496 6800

Indonesia
PT GRUNDFOS Pompa
Jl. Rawa Sumur III, Blok III / CC-1
Kawasan Industri, Pulogadung
Jakarta 13930
Phone: +62-21-460 6909
Telefax: +62-21-460 6910 / 460 6901

Ireland
GRUNDFOS (Ireland) Ltd.
Unit A, Merrywell Business Park
Ballymount Road Lower
Dublin 12
Phone: +353-1-4089 800
Telefax: +353-1-4089 830

Italy
GRUNDFOS Pompe Italia S.r.l.
Via Gran Sasso 4
I-20060 Truccazzano (Milano)
Tel.: +39-02-95838112
Telefax: +39-02-95309290 / 95838461

Japan
GRUNDFOS Pumps K.K.
Gotanda Metalion Bldg., 5F,
5-21-15, Higashi-gotanda
Shiagawa-ku, Tokyo
141-0022 Japan
Phone: +81 35 448 1391
Telefax: +81 35 448 9619

Korea
GRUNDFOS Pumps Korea Ltd.
6th Floor, Aju Building 679-5
Yeoksam-dong, Kangnam-ku, 135-916
Seoul, Korea
Phone: +82-2-5317 600
Telefax: +82-2-5633 725

Latvia
SIA GRUNDFOS Pumps Latvia
Deglava biznesa centrs
Augusta Deglava ielā 60, LV-1035, Rīga,
Tālr.: + 371 714 9640, 7 149 641
Fakss: + 371 914 9646

Lithuania
GRUNDFOS Pumps UAB
Smolensko g. 6
LT-03201 Vilnius
Tel: + 370 52 395 430
Fax: + 370 52 395 431

Malaysia
GRUNDFOS Pumps Sdn. Bhd.
7 Jalan Peguam U1/25
Glenmarie Industrial Park
40150 Shah Alam
Selangor
Phone: +60-3-5569 2922
Telefax: +60-3-5569 2866

México
Bombas GRUNDFOS de México S.A. de C.V.
Boulevard TLC No. 15
Parque Industrial Stiva Aeropuerto
Apodaca, N.L. 66600
Phone: +52-81-8144 4000
Telefax: +52-81-8144 4010

Netherlands
GRUNDFOS Netherlands
Veluwezoom 35
1326 AE Almere
Postbus 22015
1302 CA ALMERE
Tel.: +31-88-478 6336
Telefax: +31-88-478 6332
e-mail: info_gnl@grundfos.com

New Zealand
GRUNDFOS Pumps NZ Ltd.
17 Beatrice Tinsley Crescent
North Harbour Industrial Estate
Albany, Auckland
Phone: +64-9-415 3240
Telefax: +64-9-415 3250

Norway
GRUNDFOS Pumper A/S
Strømsveien 344
Postboks 235, Leirdal
N-1011 Oslo
Tlf.: +47-22 90 47 00
Telefax: +47-22 32 21 50

Poland
GRUNDFOS Pompy Sp. z o.o.
ul. Klonowa 23
Baranowo k. Poznania
PL-62-081 Przeźmierowo
Tel: (+48-61) 650 13 00
Fax: (+48-61) 650 13 50

Portugal
Bombas GRUNDFOS Portugal, S.A.
Rua Calvet de Magalhães, 241
Apartado 1079
P-2770-153 Paço de Arcos
Tel.: +351-21-440 76 00
Telefax: +351-21-440 76 90

România
GRUNDFOS Pompe România SRL
Bd. Biruintei, nr 103
Pantelimon county Ilfov
Phone: +40 21 200 4100
Telefax: +40 21 200 4101
E-mail: romania@grundfos.ro

Russia
ООО Грундфос
Россия, 109544 Москва, ул. Школьная 39
Тел. (+7) 495 737 30 00, 564 88 00
Факс (+7) 495 737 75 36, 564 88 11
E-mail grundfos.moscow@grundfos.com

Serbia
GRUNDFOS Predstavništvo Beograd
Dr. Milutina Ivkovića 2a/29
YU-11000 Beograd
Phone: +381 11 26 47 877 / 11 26 47 496
Telefax: +381 11 26 48 340

Singapore
GRUNDFOS (Singapore) Pte. Ltd.
24 Tuas West Road
Jurong Town
Singapore 638381
Phone: +65-6865 1222
Telefax: +65-6861 8402

Slovenia
GRUNDFOS PUMPEN VERTRIEB
Ges.m.b.H.,
Podružnica Ljubljana
Šlandrova 8b, SI-1231 Ljubljana-Črnuče
Phone: +386 1 568 0610
Telefax: +386 1 568 0619
E-mail: slovenia@grundfos.si

Spain
Bombas GRUNDFOS España S.A.
Camino de la Fuentecilla, s/n
E-28110 Algete (Madrid)
Tel.: +34-91-848 8800
Telefax: +34-91-628 0465

Sweden
GRUNDFOS AB
Box 333 (Lunnagårdsgatan 6)
431 24 Mölndal
Tel.: +46(0)771-32 23 00
Telefax: +46(0)31-331 94 60

Switzerland
GRUNDFOS Pumpen AG
Bruggacherstrasse 10
CH-8117 Fällanden/ZH
Tel.: +41-1-806 8111
Telefax: +41-1-806 8115

Taiwan
GRUNDFOS Pumps (Taiwan) Ltd.
7 Floor, 219 Min-Chuan Road
Taichung, Taiwan, R.O.C.
Phone: +886-4-2305 0868
Telefax: +886-4-2305 0878

Thailand
GRUNDFOS (Thailand) Ltd.
92 Chaloem Phrakiat Rama 9 Road,
Dokmai, Pravej, Bangkok 10250
Phone: +66-2-725 8999
Telefax: +66-2-725 8998

Turkey
GRUNDFOS POMPA San. ve Tic. Ltd. Sti.
Gebze Organize Sanayi Bölgesi
Ihsan dede Caddesi,
2. yol 200. Sokak No. 204
41490 Gebze/ Kocaeli
Phone: +90 - 262-679 7979
Telefax: +90 - 262-679 7905
E-mail: satis@grundfos.com

Ukraine
ТОВ ГРУНДФОС УКРАЇНА
01010 Київ, Вул. Московська 8б,
Тел.:(+38 044) 390 40 50
Фах.: (+38 044) 390 40 59
E-mail: ukraine@grundfos.com

United Arab Emirates
GRUNDFOS Gulf Distribution
P.O. Box 16768
Jebel Ali Free Zone
Dubai
Phone: +971-4- 8815 166
Telefax: +971-4-8815 136

United Kingdom
GRUNDFOS Pumps Ltd.
Grovebury Road
Leighton Buzzard/Beds. LU7 8TL
Phone: +44-1525-850000
Telefax: +44-1525-850011

U.S.A.
GRUNDFOS Pumps Corporation
17100 West 118th Terrace
Olathe, Kansas 66061
Phone: +1-913-227-3400
Telefax: +1-913-227-3500

Usbekistan
Представительство ГРУНДФОС в Ташкенте
700000 Ташкент ул.Усмана Носира 1-й тупик 5
Телефон: (3712) 55-68-15
Факс: (3712) 53-36-35

Addresses revised 15.06.2009