

# Operating Instructions

**BA 9704 EN 02.06**

Oil supply systems of type **OWGM**



**FLENDER**

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## Contents

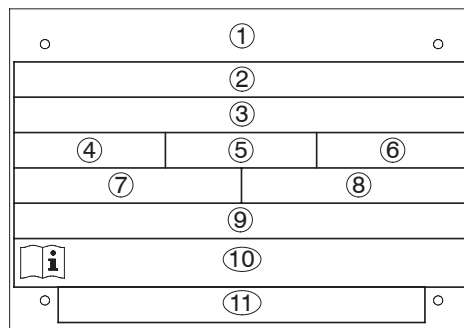
<b>1.</b>	<b>Technical data</b>	<b>4</b>
1.1	General technical data	4
1.2	Oil viscosity / oil type	4
<b>2.</b>	<b>General notes</b>	<b>5</b>
2.1	Introduction	5
2.2	Copyright	5
<b>3.</b>	<b>Safety notes</b>	<b>5</b>
3.1	Proper use	5
3.2	Obligations of the user	6
3.3	Environmental protection	6
3.4	Special dangers	6
3.5	Warnings and symbols used in these Instructions	7
<b>4.</b>	<b>Handling and storage</b>	<b>7</b>
4.1	Scope of supply	7
4.2	Handling	7
4.3	Storage of the oil supply system	8
4.4	Standard corrosion protection	8
<b>5.</b>	<b>Technical description</b>	<b>9</b>
5.1	General	9
5.2	Measures required as a function of the start condition	10
<b>6.</b>	<b>Assembly</b>	<b>11</b>
6.1	General	11
6.2	Check before start-up	12
6.3	General notes on add-on components	12
6.4	Final installation work	12
<b>7.</b>	<b>Start-up</b>	<b>12</b>
7.1	Oil viscosity / oil type	12
7.2	Oil filling	13
7.3	Pumps	13
7.4	Water oil-cooler	13
7.5	General notes on add-on components	14
7.6	Start-up	14
7.7	Removal from service	15
7.7.1	Interior protection with preservative agent	15
7.7.2	Interior preservation procedure	15
<b>8.</b>	<b>Operation</b>	<b>16</b>
8.1	Lubrication diagram	16
8.2	Control information	16
8.2.1	Low-pressure lubrication circuit	16
8.2.1.1	Pump (10)	16
8.2.1.2	Filter (20)	16
8.2.1.3	Temperature control valve (32)	16
8.2.1.4	Pressure gauge (45)	16
8.2.1.5	Pressure gauge (46)	16
8.2.1.6	Thermometer (60)	16
8.2.1.7	Resistance thermometer (65)	16
8.2.1.8	Volumetric flow meter (80)	17
8.2.1.9	Volumetric flow meter (81)	17
8.2.1.10	Volumetric flow meter (82)	17
8.2.1.11	Volumetric flow meter (83)	17
8.2.1.12	Control valve (85, 86)	17
8.2.1.13	Cooling-water flow regulator (500)	17
8.2.1.14	Stop valve (510)	17

8.2.1.15	Stop valve (515)	17
8.2.1.16	Pipe filter (520)	17
8.2.1.17	General	17
8.2.2	High-pressure lubrication circuit	17
8.2.2.1	Radial piston pump (310)	17
8.2.2.2	Pressure relief valve (316)	17
8.2.2.3	Pressure release valve (338)	18
8.2.2.4	Pressure gauge (345)	18
8.2.2.5	Pressure gauge (348)	18
8.2.2.6	Pressure measuring transducer (350)	18
8.2.2.7	Pressure measuring transducer (358)	18
8.2.3	Heating circuit	18
8.2.3.1	Three-way cock (207, 217)	18
8.2.3.2	Heating circuit pump (210)	18
8.2.3.3	Oil preheater (290)	18
8.2.4	By-flow filtration	18
8.2.4.1	Filter (620)	18
8.2.4.2	Temperature control valve (632)	18
8.2.5	Filling and emptying circuit	19
8.2.5.1	Three-way cock (707, 717)	19
8.2.5.2	Pump (710)	19
8.2.6	Other	19
8.2.6.1	Drain cock (3)	19
8.3	Interlocking instructions	19
8.3.1	Main circuit	19
8.3.2	Heating circuit / By-flow filtration / Filling and Emptying circuit	20
8.3.2.1	Variant 2	20
8.3.2.2	Variant 3	20
8.3.2.3	Variant 4	21
8.3.3	Enable gear unit	21
8.3.4	Warning gear unit	22
8.3.5	Stop gear unit	22
8.4	Response to malfunctions	22
8.5	Shut-down	23
<b>9.</b>	<b>Faults, causes and remedy</b>	<b>23</b>
9.1	General information on faults and malfunctions	23
9.2	Possible faults	23
9.2.1	Possible faults when installing the oil supply system	25
9.2.2	Possible faults in maintenance	25
<b>10.</b>	<b>Maintenance and repair</b>	<b>25</b>
10.1	Oils	25
10.2	General notes on add-on components	25
10.3	Preservation	25
10.4	Cleaning	25
<b>11.</b>	<b>Spare parts, customer-service addresses</b>	<b>26</b>
11.1	Stocking spare parts	26
11.2	Spare-part and customer service addresses	26
<b>12.</b>	<b>Declaration by the manufacturer</b>	<b>32</b>

## 1. Technical data

### 1.1 General technical data

The most important technical data on the oil supply system are shown on the rating plate. These data and the contractual agreements between FLENDER and the customer for the oil supply system determine the limits of its correct use.



- ① Company logo and production location
- ② Material No.
- ③ Production order no.
- ④ Type
- ⑤ Size
- ⑥ Variant
- ⑦  $p_{\text{Oil max}}$  = max. permissible oil operating overpressure
- ⑧  $t_{\text{min}}$  = minimum starting temperature
- ⑨ perm. operating pressure of the water:  $P_{\text{Water max.}}$  ... bar / ... PSI
- ⑩ Operating Instructions number
- ⑪ Special data (eg. total weight)

**Note:** These operating instructions generally include a list of equipment including the drawings to the oil supply system and the operating instructions for the accessory components.

For further technical data, refer to the list of equipment and the drawings.

### 1.2 Oil viscosity / oil type

For the oil viscosity and oil type, refer to the operating instructions (BA) or the gear unit rating plate.

The oil supply systems are designed for oil viscosities  $< 2200 \text{ mm}^2/\text{s}$  (installations with heating circuit up to  $7500 \text{ mm}^2/\text{s}$ ) at minimum starting temperature (see rating plate ⑧).

## 2. General notes

### 2.1 Introduction

These Operating Instructions (BA) are an integral part of the delivery of the oil supply system and must be kept in its vicinity for reference at all times.

**Note:** The operating instructions (BA) for the gear unit must be observed.

<b>Caution!</b>
-----------------

**All persons involved in the installation, operation, maintenance and repair of the oil supply system must have read and understood these Operating Instructions and must comply with them at all times. We accept no responsibility for damage or disruption caused by disregard of these Instructions.**

The "FLENDER oil supply system" dealt with in these Operating Instructions (BA) has been developed for use as an oil supply system of gear units. Possible areas of use for oil supply system of this type include the cement industry and others.

The oil supply system is designed only for the application described in section 1, "Technical data" and the List of Equipment.

The oil supply system described in these Instructions reflects the state of technical development at the time these Instructions (BA) went to print.

In the interest of technical progress we reserve the right to make changes to the individual assemblies and accessories which we regard as necessary to preserve their essential characteristics and improve their efficiency and safety.

### 2.2 Copyright

The copyright to these Operating Instructions is held by **FLENDER AG**.

These Operating Instructions (BA) must not be wholly or partly reproduced for competitive purposes, used in any unauthorised way or made available to third parties without our agreement.

Technical enquiries should be addressed to the following works

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or to one of our customer-service addresses. A list of our customer-service addresses is given in section 11, "Spare parts, customer-service addresses".

## 3. Safety notes

**Note:** The operating instructions (BA) for the gear unit must be observed.

### 3.1 Proper use

- The oil supply system has been manufactured in accordance with the state of the art and is delivered in a condition for safe and reliable use. Any changes on the part of the user are not permitted. This applies equally to safety features designed to prevent accidental contact.
- The oil supply system must be used and operated strictly in accordance with the conditions laid down in the contract governing performance and supply agreed by FLENDER and the customer.
- The cooling water temperature at the entry of the cooler must be between + 4 °C and + 35 °C. Another max. temperature is possible (see details in the list of equipment).

## 3.2 Obligations of the user

- The operator must ensure that all persons involved in installation, operation, maintenance and repair have read and understood these Operating Instructions (BA) and comply with them at all times in order to:
  - avoid injury or damage,
  - ensure the safety and reliability of the oil supply system,

and

- avoid disruptions and environmental damage through incorrect use.
- During transport, assembly, installation, dismantling, operation and maintenance of the unit, the relevant safety and environmental regulations must be complied with at all times.
- The oil supply system must be operated, maintained or repaired only by authorised, duly trained and qualified personnel.
- The gear unit must not be cleaned using high-pressure cleaning equipment.
- All work must be carried out with great care and with due regard to safety.
- All work on the oil supply system must be carried out only when it is at a standstill. The drive unit must be secured against being switched on accidentally (e.g. by locking the key switch or removing the fuses from the power supply). A notice should be attached to the ON switch stating clearly that work on the oil supply system is in progress.
- If any changes are noticed during operation of the oil supply system (e.g. increased operating temperature or unusual noises), the drive assembly must be switched off immediately.
- If the oil supply system is intended for mounting on plant or equipment, the manufacturer of such plant or equipment must ensure that the contents of the present Operating Instructions are incorporated in his own instructions.
- Notices attached to the oil supply system, e.g. rating plate, direction arrows etc. must always be observed. They must be kept free from dirt and paint at all times. Missing plates must be replaced.
- Screws which have been damaged during assembly or disassembly work must be replaced with new ones of the same strength class and type.
- All spare parts must be obtained from FLENDER.

## 3.3 Environmental protection

- When changing oil, the used oil must be collected in suitable containers. Any spillage of oil must be removed immediately.
- Preservative agent should be stored separately from used oil.
- Used oil, preservative agent, oil-binding agents and oil-soaked cloths must be disposed of in accordance with environmental legislation.

## 3.4 Special dangers

- Depending on operating conditions, the surface of the oil supply system may heat up considerably.  
**Danger of burns!**
- When changing oil, take care to prevent scalding by hot oil.

## 3.5 Warnings and symbols used in these Instructions



This symbol indicates safety measures which must be observed to avoid **personal injury**.

### Caution!

This symbol refers to safety measures which must be observed to avoid **damage to the oil supply system**.

### Note:

This symbol indicates general **operating instructions** which are of particular importance.

## 4. Handling and storage

Observe the "Safety instructions" in section 3.

### 4.1 Scope of supply

The products supplied are listed in the despatch papers. Check immediately on receipt to ensure that all the products listed have actually been delivered. Parts damaged during transport or missing parts must be reported in writing immediately to FLENDER AG.

### Caution!

**If damage has occurred, the oil supply system must not be put into operation.**

### 4.2 Handling

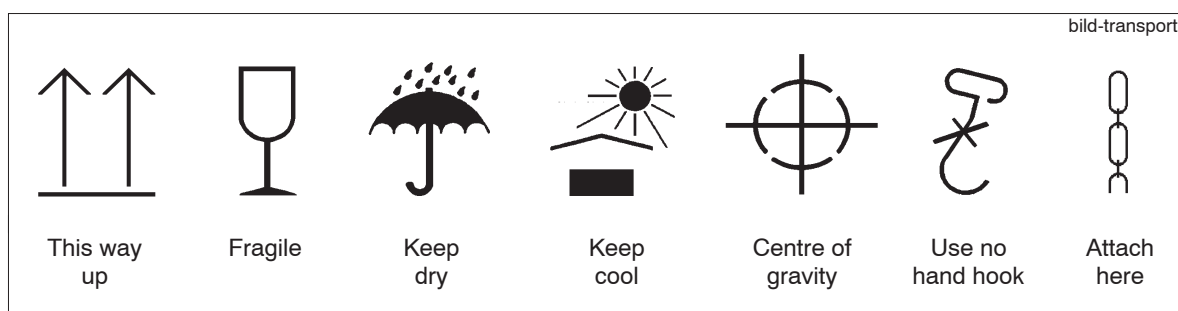


**When handling FLENDER products, use only lifting and handling equipment of sufficient load-bearing capacity!**  
**Observe the notes regarding load distribution on the packaging.**

The oil supply system is delivered in the fully assembled condition. Additional items are delivered separately packaged.

Different forms of packaging may be used depending on the size of the oil supply system and method of transport. Unless otherwise agreed, the packaging complies with the **HPE Packaging Guidelines**.

The symbols marked on the packaging must be observed at all times. These have the following meanings:



**Caution!**

The oil supply system must always be transported with due care to avoid injury to persons and damage to the oil supply system.

**Note:**

The oil supply system must be transported with suitable equipment only. During transport the oil supply system should be left without oil filling and on the transport packaging.

**Caution!**

When handling the oil supply system, exercise special care to avoid damage due to the use of force or careless loading and unloading.

To transport and handle the oil supply system, use ropes or chains. Only the designated lifting eyes on the base frame must be used for fastening.

Care must be taken that the carrier ropes do not damage fittings and piping. A cross-beam is therefore required for protection. The lengths of the ropes must be set to ensure that the base frame is suspended horizontally.

#### 4.3 Storage of the oil supply system

The oil supply system must be stored in its position of use in a sheltered place; it must be placed on a vibration-free, dry wooden base and covered over.



**Do not stack oil supply systems one on top of another.**

**Caution!**

If the oil supply system is being stored out of doors, it must be particularly carefully covered, and care must be taken that neither moisture nor foreign material can collect on the oil supply system (consult FLENDER in any case).

**Note:**

Unless otherwise agreed by contract, the oil supply system must not be exposed to harmful environmental factors such as chemical products, high air pollution, air humidity, and ambient temperatures outside the range 0 to + 20 °C.

Provision for special environmental conditions during transport (e.g. transport by ship) and storage (climate, termites, etc.) must be contractually agreed.

The openings must be sealed with plugs or flanged covers.

#### 4.4 Standard corrosion protection

The properties of the outer paint coat are as follows: Resistant to acids, weak alkalis, solvents, atmospheric action, temperatures up to 120 °C (temporarily up to 140 °C) and to tropical conditions.

**Note:**

Ensure that the paint is not damaged!

Mechanical damage (scratches), chemical damage (acids, alkalis) and thermal damage (sparks, welding beads, heat) cause corrosion which may cause failure of the external protective coating.

Unless otherwise contractually agreed, the interior preservation is guaranteed for 6 months, provided that storage is in dry, frostfree sheds. The guarantee period starts on the date of delivery.

For longer periods of storage (> 6 months) we advise regular checking and, if necessary, renewal of the interior and exterior preservation (see section 7, "Start-up").

## 5. Technical description

Observe the "Safety instructions" in section 3.

### 5.1 General

**Note:** The operating instructions (BA) for the gear unit must be observed.

The oil supply system specified below serves to cool the oil and/or lubricate gear units (see section 1, "Technical Data").

As an option to the standard variant 1 the variants 2 to 5 are available.

Main functions	Variant				
	1	2	3	4	5
Pump group					
Double change-over filter					
Water oil-cooler					
Pressure line		Tilting pad thrust bearing			
		Gear unit supply			
Low-pressure lubrication circuit					
High-pressure lubrication circuit					
Heating circuit					
By-flow filtration					
Filling / Emptying circuit		1)	1)	1)	

1) The filling / emptying circuit is functioning by the pump (210).

**Note:** For control instructions, refer to section 8, "Operation".

Observe for this the drawings and the list of equipment. The components specified in the list of equipment can also be found on the drawings with the part number.

**Caution!**

**Before starting up all monitoring devices must in all cases be connected.**

**Note:**

The direction of discharge of the pump used is **dependent upon the direction of rotation**.

**Caution!**

**To ensure optimum cooling performance, the specified direction of flow in the water oil-cooler must be observed. The cooling-water inlet and outlet must not be reversed.**

**The pressure of the cooling water must not exceed 8 bars.**

**If the gear unit is being withdrawn from service for a longer period or if there is a danger of freezing, the cooling water must be drained off. Remove any remaining water with compressed air.**

## 5.2 Measures required as a function of the start condition

Depending on the required starting temperature the following measures must be taken:

Start conditions			Measures			
Oil viscosity  mm <sup>2</sup> /s	equivalent when using mineral oil VG 320 approx.  °C	length of intermediate pipework  m	Oil-supply system	Intermediate pipework		Gear unit
				Low-pressure lubrication circuit	High-pressure lubrication circuit	
≦ 2000	≧ 15	35	without heating circuit	–	–	–
≧ 3100	≧ 10	20	with heating circuit	–	–	–
≧ 3100	≧ 10	35	with heating circuit	insulate commonly		–
≧ 7500	≧ 0	6	with heating circuit	–	–	–
≧ 7500	≧ 0	35	with heating circuit	insulate commonly		–
> 7500	< 0	35	with heating circuit and heat shroud <sup>1)</sup>	insulate commonly and heating strips <sup>1)</sup>		Heating elements <sup>1)</sup>

- 1) • The heating output must be sufficient to heat the oil up to min. 0 °C.  
 • The plant must not be operated before achieving 0 °C in all pipes.  
 • The heat shroud is not included in the delivery of the oil-supply system.  
 • Heating strips are not included in the delivery of the pipework.

## 6. Assembly

Observe the "Safety instructions" in section 3.

### 6.1 General

**Note:** The operating instructions (BA) for the gear unit must be observed.

All preserved flange surfaces must be washed down with a solvent, e.g. petroleum ether.



**Environmental protection requirements must be observed.**

- The base frame must be set up horizontally.
- The system must be secured to prevent slippage (screws and plugs are included in FLENDER's delivery, fixing holes are provided in the base frame).
- On the version with a drain cock on the base frame the drain cock must, depending on conditions at the site, be fitted before setting the system down. For reasons of space fitting may not be possible later without raising the system.
- If connection pipes are not supplied with the system, seamlessly drawn and bright normalised (NBK) pipes of ST 35.4 in accordance with DIN 2391 c (hydraulic tubing, quality grade C) must be used.
- The interfaces must be provided with the appropriate flanges or screw connections.
- For connection pipes we recommend using compensators to insulate against vibration and compensate for stretching.
- Pipe fastenings (plastic clips) must be used to install piping. The distance between clips must be less than 2 m / 78.7".
- Make sure the piping is not twisted.
- After installation the pipes must be flushed out. Welded pipes must be pickled.
- The motors and monitoring equipment must be connected up electrically in accordance with terminal diagrams, equipment lists and regulations. Check voltage and circuits.
- Before connecting the water oil-cooler remove the plugs from the water connection and flush the water oil-cooler well to remove any dirt.
- Install the cooling-water in- and outflow pipes. For the flow direction of the cooling water and the location of the connections please refer to the dimensioned drawing.

## 6.2 Check before start-up

- Observe rating plate indication!
- Check whether voltage and frequency of the motors correspond to the mains supply values and whether the motors are duly protected to prescriptions!
- Check that the electrical connections are properly tightened and the monitoring equipment is properly connected and set!
- Check that air inlet holes and cooling surfaces are clean!
- Check that protective measures have been taken!
- Check that the terminal box cover is closed and the line inlets are properly sealed!

**Caution!**

**Connections must be carried out by a specialist in accordance with the current safety regulations. The relevant installation and operating requirements and the usual national and international requirements must be observed.**

## 6.3 General notes on add-on components

**Note:** For operation and maintenance of the components specified in the equipment list, observe the specified operating instructions.  
For technical data, refer to the list of equipment.

## 6.4 Final installation work

After the gear unit has been installed with the oil supply system, check that all visible screw connections are correctly tightened and, if necessary, retighten.

## 7. Start-up

**Caution!**

**The oil supply system must not be started up without the required operating instructions being available.**

**If damage has occurred, the oil supply system must not be put into operation.**

Observe the "Safety instructions" in section 3.

### 7.1 Oil viscosity / oil type

For the oil viscosity and oil type, refer to the operating instructions (BA) or the gear unit rating plate.

The oil supply systems are designed for oil viscosities  $< 2200 \text{ mm}^2/\text{s}$  (installations with heating circuit up to  $7500 \text{ mm}^2/\text{s}$ ) at minimum starting temperature (see rating plate ⑧).

## 7.2 Oil filling

**Note:** The operating instructions (BA) for the gear unit must be observed.

To remove preservative residues, which could cause the oil to foam, the oil supply system must be flushed out together with the gear unit before starting up.

Before starting up the gear unit/oil supply system must be filled with oil. After filling the filling holes must be correctly closed and sealed.

The oil must then be carefully drained out of the oil supply system, the monitoring equipment and the oil chambers in the gear unit, while it is warm. It may be re-used only as flushing oil. The flushing oil must be cleaned before re-use.



**There is a danger of scalding from the hot oil emerging from the housing. Wear protective gloves to avoid scalding.**

### **Caution!**

**Remove any oil spillage immediately with an oil-binding agent.**

Oil must be put into the oil supply system via the gear unit (see operating instructions for "Gear Unit"). Care must be taken that no dirt can get into the oil circuit.

Oil must be poured in until it is level with the mark on the oil level indicator, while the pump is not operating (see operating instructions for "Gear Unit"). The pump can then be started.

### **Caution!**

**Start oil supply system 1 minute before the gear unit. Never operate the gear unit without the oil supply system!**

Before starting up the gear unit for the first time the oil supply system must be run for at least 15 minutes to fill all the oil chambers (see operating instructions for "Gear Unit"). Then shut down the oil supply system and, if necessary, correct the oil level).

All piping - particularly suction pipes (inadmissible air intake) - as well as all screw connections and flanges must be retightened. Leaks must be resealed.

## 7.3 Pumps

### **Caution!**

**The direction of discharge of the pumps used is dependent upon the direction of rotation.**

**The direction of rotation of the motors must correspond to the direction of the arrow on the pumps.**

Observe our supplier's specific operating instructions for the pumps.

## 7.4 Water oil-cooler

The necessary water connections must be manufactured by the customer/operator for the water oil-cooler.

If the oil supply system is shut down for a longer period or if there is a danger of freezing, the cooling water must be drained off.

As regards the water oil-cooler, the specific Operating Instructions of the manufacturer must be observed.

## 7.5 General notes on add-on components

**Note:** For operation and maintenance of the components specified in the equipment list, observe the specified operating instructions.  
For technical data, refer to the list of equipment.

## 7.6 Start-up

Before starting up the oil supply system check whether these operating instructions and the operating instructions for the gear unit have been correctly adhered to.

### **Caution!**

**In all cases oil must be put in before starting up.  
The cooling water circuit must be checked before starting up!  
Shut-off valves must be secured against unintentional closing.**

All impurities must be removed from the oil supply system before starting up and after repair and maintenance work. This applies particularly to water (e.g. rainwater and leakage from the water oil-cooler) to prevent an oil-water mixture.

The three-way cocks must be checked for plausibility before start-up.

All pumps, filters and coolers must be ventilated.



**Pressure relief valve/safety valve pressure settings made by FLENDER at its works must not be altered, as they are not used to control the pressure and the flow rate. They serve only as a protection against overload.**

The regulator valves (85, 86) are supplied in a preset condition. The final setting must be done while they are warm from operating (mill under operating load).

### **Sequence:**

- 1) Nominal widths of the suction and pressure lines must be adhered to.
- 2) It must be ensured before start-up that both valves (85, 86) are fully open.
- 3) Then start up pump (10).
- 4) The tuning valve on the pump (10), if provided, must be set in accordance with the manufacturer's instructions for setting and start-up.
- 5) If the actual flow rate in the pressure line for supplying the bearings, either to be read off (device with display and switch (81) or to be calculated from the output signal (analog device with 4-20 mA output (83)), is lower than specified in the equipment list, the regulator valve (85) must be closed until the required volumetric flow is obtained. For this see also information in the equipment list of the oil supply system.  
If the actual flow rate is higher, however, the required rate must be set by closing the regulator valve (86). The remaining procedure remains unchanged.

### **Caution!**

**Setting must always be done on one valve only. The other valve must be left fully open. Closing both valves will cause the pressure relief valve of the pump to act and so reduce the flow rate. Moreover, a higher noise level can then be expected.**

- 6) The volumetric flow in the second pressure line then results from the actual pump output and must not be adjusted or reduced. Specifications for the corresponding flow rate must be regarded as guide values only.
- 7) After the flow rate has been set, both valves (85, 86) must be locked with the locking screw to prevent them getting out of adjustment.

## 7.7 Removal from service

- To remove the oil supply system from service, it must be shut off.



**Secure the oil supply system to prevent it from being started up unintentionally. Attach a warning notice to the start switch!**

- With oil supply systems fitted with water oil-coolers, close the stop valves on the water in- and outflow pipes. To prevent freezing, drain the water from the water oil-cooler.

### 7.7.1 Interior protection with preservative agent

Oil supply systems with forced lubrication should be run idle with preservative prior to any long-term storage.

Duration of protection	Preservative agent	Special measures
up to <b>6</b> months	Castrol Alpha SP 220 S	None
up to <b>24</b> months		Close connection pipes
For storage periods longer than 24 months the oil supply system must be re-preserved. For storage periods longer than 36 months, FLENDER should be consulted before.		

Table 7.1: Preservation procedure when using mineral oil or PAO-based synthetic oil

Duration of protection	Preservative agent	Special measures
up to <b>6</b> months	Special anti-corrosion oil TRIBOL 1390 1)	None
up to <b>36</b> months		Close connection pipes
For storage periods longer than 36 months, FLENDER should be consulted before.		

Table 7.2: Preservation procedure when using PG-based synthetic oil

1) Resistant to tropical conditions and sea water. Max. ambient temperature 50°C

### 7.7.2 Interior preservation procedure

- Remove the oil supply system from service and drain off the oil.
- Fill the oil supply system (if necessary, via the connected gear unit) with a sufficient quantity of preservative agent as indicated in Table 7.1 or 7.2.
- Start the oil supply system and allow it to idle for a short time.
- Drain off the preservative agent into a suitable receptacle and dispose of the oil in accordance with the regulations.



**There is a risk of scalding from the hot preservative agent draining from the gear unit. Wear protective gloves to avoid scalding.**

## 8. Operation

Observe the "Safety instructions" in section 3.

**Note:** The operating instructions (BA) for the gear unit must be observed.

The part numbers (...) given in the following text have been taken from the list of equipment, assembly drawing and the lubrication diagram.

The following control information and/or locking instructions must be noted for the individual components:

**Note:** In addition to this control information and/or locking instructions, the specifications in the list of equipment must always be observed.

Only the control information and/or locking instructions of the part numbers shown in the list of equipment applies to the delivered oil supply system.  
For the specific switching points and/or values, refer to the list of equipment.

Further control information and/or locking instructions are given in the operating instructions (BA) "Gear Unit".

### 8.1 Lubrication diagram

For the relevant lubrication diagram drawing number, refer to the list of equipment.

### 8.2 Control information

#### 8.2.1 Low-pressure lubrication circuit

##### 8.2.1.1 Pump (10)

When the pump is operating, the system pressure is limited by a pressure relief valve integrated into the pump.

**Caution!** The factory adjustment of this valve must not be changed!

##### 8.2.1.2 Filter (20)

The filter (20) is monitored visually by means of a differential pressure indicator and electrically by means of a differential pressure monitor.

##### 8.2.1.3 Temperature control valve (32)

A temperature control valve is located in the by-pass of the cooler.

##### 8.2.1.4 Pressure gauge (45)

The oil pressure in the pressure line to the gear unit is indicated visually by means of a pressure gauge.

##### 8.2.1.5 Pressure gauge (46)

The oil pressure downstream of the pump is indicated visually by means of a pressure gauge.

##### 8.2.1.6 Thermometer (60)

The oil temperature is indicated visually by means of a thermometer.

##### 8.2.1.7 Resistance thermometer (65)

The temperature of the system is monitored by means of a resistance thermometer with a transmitter. The transmitter sends an output signal proportional to the oil temperature.

## 8.2.1.8 Volumetric flow meter (80)

The oil flow to the tilting pad thrust bearing is monitored by means of a volumetric flow meter.

## 8.2.1.9 Volumetric flow meter (81)

The oil flow to the gear unit is monitored by means of a volumetric flow meter.

## 8.2.1.10 Volumetric flow meter (82)

The oil flow to the tilting pad thrust bearing is monitored by means of a volumetric flow meter. The volumetric flow meter sends an output signal in proportion to the square of the oil flow volume.

## 8.2.1.11 Volumetric flow meter (83)

The oil flow to the gear unit is monitored by means of a volumetric flow meter. The volumetric flow meter sends an output signal in proportion to the square of the oil flow volume.

## 8.2.1.12 Control valve (85, 86)

Setting these valves influences the distribution of the oil flow.

**Caution!** Setting, see item 7.6!

## 8.2.1.13 Cooling-water flow regulator (500)

The cooling water flow is regulated to suit the required cooling performance.

## 8.2.1.14 Stop valve (510)

The cooling water inflow can be stopped by this stop valve. 2 limiting switches are used for the electrical control of the opening condition.

## 8.2.1.15 Stop valve (515)

The cooling water inflow can be stopped by this stop valve.

## 8.2.1.16 Pipe filter (520)

The cooling water is filtered by this pipe filter.

## 8.2.1.17 General

After switching off the main drive the oil supply system must continue to run until the drive has come to a complete standstill.

## 8.2.2 High-pressure lubrication circuit

### 8.2.2.1 Radial piston pump (310)

These pumps draw the oil for the high-pressure lubrication circuit from the low-pressure lubrication circuit.

### 8.2.2.2 Pressure relief valve (316)

These valves limit the pressure in systems with a heating circuit.

**Caution!** The factory adjustment of these valves must not be changed!

## 8.2.2.3 Pressure release valve (338)

This valve limits the pressure on the suction side of the high-pressure lubrication circuit.

**Caution!** The factory adjustment of this valve must not be changed!

## 8.2.2.4 Pressure gauge (345)

The oil pressure is indicated visually by means of a pressure gauge.

## 8.2.2.5 Pressure gauge (348)

This pressure gauge is connected to the high-pressure lines by a connector and indicates the corresponding pressure.

## 8.2.2.6 Pressure measuring transducer (350)

The pressure on the suction side of the high-pressure circuit is monitored by means of this pressure measuring transducer. It sends an output signal in proportion to the pressure.

## 8.2.2.7 Pressure measuring transducer (358)

The pressure on the pressure side of the high-pressure circuit is monitored by means of these pressure measuring transducers. They send an output signal in proportion to the pressure.

## 8.2.3 Heating circuit

### 8.2.3.1 Three-way cock (207, 217)

For filling and emptying, one three-way cock is provided upstream and another downstream of the heating circuit pump. Each cock setting must be adjusted to suit the respective function (see position symbol on the three-way cock and the oil flow path on the lubrication diagram).

**Caution!** During the filling/draining process the main pump must not be operating. After the process the cocks must be set in operating position again.

### 8.2.3.2 Heating circuit pump (210)

When the pump is operating, the system pressure is limited by a pressure relief valve integrated into the pump.

**Caution!** The factory adjustment of this valve must not be changed! It must be ensured that the pump is pumping oil and will not run dry.

### 8.2.3.3 Oil preheater (290)

This oil preheater is provided for heating the oil. A temperature monitor with reclosing interlock is integrated.

## 8.2.4 By-flow filtration

### 8.2.4.1 Filter (620)

The filter is monitored visually by means of a differential pressure indicator and electrically by means of a differential pressure monitor. When changing the filter during operation of the main pump the setting of the 3-way cocks (207, 217) must prevent any drawing in air.

**Caution!** During the process the pump (210) must not be operating. After the process the cocks must be set in operating position again.

### 8.2.4.2 Temperature control valve (632)

A temperature control valve is provided in the bypass.

## 8.2.5 Filling and emptying circuit

### 8.2.5.1 Three-way cock (707, 717)

For filling and emptying, a three-way cock is provided each upstream and downstream of the filling / emptying pump. Each cock setting must be adjusted to suit the respective function (see position symbol on the three-way cock and the oil flow path on the lubrication diagram).

**Caution!**

**During the filling/draining process the main pump must not be operating. After the process the cocks must be set in operating position again.**

### 8.2.5.2 Pump (710)

When the pump is operating, the system pressure is limited by a pressure relief valve integrated into the pump.

**Caution!**

**The factory adjustment of this valve must not be changed! It must be ensured that the pump is pumping oil and will not run dry.**

## 8.2.6 Other

### 8.2.6.1 Drain cock (3)

This drain cock may be used to conduct liquids out of the catching area of the base frame.

## 8.3 Interlocking instructions

If not specified specially a dealy time of 30 seconds applies.

**Note:** When enabling and determining starting condition for pumps, it must be ensured that temperature values are based on VG 320 mineral oil.  
If other oils are used, the viscosity of the oil for that temperature value must not be higher.

### 8.3.1 Main circuit

**ENABLE** for the low-pressure pump (10) if:

Oil temperature > temperature value (265.1)

**ENABLE** for filter differential pressure monitor (20) if:

Oil temperature > temperature value (65.1)

**ENABLE** for the HP pumps (310) when all the following conditions are fulfilled:

Main pump (10) in operation

Oil pressure on suction side  
upstream of HP pumps > pressure value (350.1) and < pressure value (350.2)

**STOP** for HP pump (310) if at least one of the following conditions is fulfilled:

Oil pressure on suction  
side upstream of HP pumps < pressure value (350.1)

Oil pressure of a segment line  
supplied by the pump  
(refer to lubrication schedule) > pressure value (358.3), since 2 seconds

## 8.3.2 Heating circuit / By-flow filtration / Filling and Emptying circuit

The interlocking instructions depend on the type (refer to equipment list for type specification) of the oil supply system.

### 8.3.2.1 Variant 2

**ENABLE** for the heating circuit pump (210) if:

Oil temperature > temperature value (265.2)

**START** for the heating circuit pump (210) if:

Oil temperature < temperature value (265.3)

**STOP** for the heating circuit pump (210) if at least one of the following conditions is fulfilled:

Oil preheater (290) has been out of operation for 3 minutes

Oil temperature < temperature value (265.2)

**ENABLE** for the oil preheater (290) if:

Heating circuit pump (210) has been in operation for 2 minutes

**START** for the oil preheater (290) if:

Oil temperature < temperature value (265.3)

**STOP** for the oil preheater (290) if at least one of the following conditions is fulfilled:

Heating circuit pump (210) out of operation

Oil temperature > temperature value (265.4)

Oil temperature > switching point (290)

### 8.3.2.2 Variant 3

**ENABLE** for the by-flow pump (210) if:

Main pump (10) in operation

**ENABLE** for filter differential-pressure monitor (620) if:

Oil temperature > temperature value (265.5)

**ENABLE** for the by-flow pump (210) if:

Oil temperature > temperature value (265.5)

**WARNING** for the by-flow pump (210) if:

Filter differential pressure > switching point (620)

**STOP** for the by-flow pump (210) if at least one of the following conditions is fulfilled:

Main pump (10) out of operation

Oil temperature < temperature value (265.5) longer than 2 minutes

## 8.3.2.3 Variant 4

**ENABLE** for the heating circuit / by-flow pump (210) if:

Oil temperature > temperature value (265.2)

**ENABLE** for filter differential-pressure monitor (620) if:

Oil temperature > temperature value (265.5)

**START** for the heating circuit / by-flow pump (210) if at least one of the following conditions is fulfilled:

Oil temperature < temperature value (265.3)

Oil temperature > temperature value (265.5)

**WARNING** for the heating circuit / by-flow pump (210) if:

Filter differential pressure > switching point (620)

**STOP** for the heating circuit / by-flow punmp (210) if:

Oil temperature < temperature value (265.2)

**ENABLE** for the oil preheater (290) if:

Heating circuit- / by-flow pump (210) has been in operation for 2 minutes

**START** for the oil preheater (290) if:

Oil temperature < temperature value (265.3)

**STOP** for the oil preheater (290) if at least one of the following conditions is fulfilled:

Heating circuit pump (210) out of operation

Oil temperature > temperature value (265.4)

Oil temperature > switching point (290), since 1 second

## 8.3.3 Enable gear unit

**ENABLE** mill drive when all the following conditions are fulfilled:

Filter differential pressure < switching point (20)

Oil temperature < temperature value (65.2)

Oil flow quantity > volumetric flow value (82.1) or > switching point (80.1)

Oil flow quantity > volumetric flow value (83.1) or > switching point (81.1)

Oil pressure on pressure side downstream of HP pumps

- of all segments < pressure value (358.2)
- no 2 adjacent segments < pressure value (358.1)
- and in case of installations with:
  - 10 segments: on at least 8 segments > pressure value (358.1)
  - 12 segments: on at least 9 segments > pressure value (358.1)
  - 14 segments: on at least 10 segments > pressure value (358.1)
  - 15 segments: on at least 12 segments > pressure value (358.1)
  - 17 segments: on at least 13 segments > pressure value (358.1)
  - 18 segments: on at least 13 segments > pressure value (358.1)

Number of installation segments see quantity indication Item no. 358 in the equipment list.

## 8.3.4 Warning gear unit

**WARNING** for the mill drive when at least one of the following conditions is fulfilled:

Filter differential pressure	> switching point (20)
Oil temperature	> temperature value (65.2)
Oil flow quantity	< volumetric flow value (82.1) or < switching point (80.1)
Oil flow quantity	< volumetric flow value (83.1) or < switching point (81.1)
Oil pressure on suction side upstream of HP pump	> pressure value (350.2)

## 8.3.5 Stop gear unit

**STOP** for mill drive when at least one of the following conditions is fulfilled:

Oil temperature	> temperature value (65.3)
Oil flow quantity	< volumetric flow value (82.2) or < switching point (80.2)
Oil flow quantity	< volumetric flow value (83.2) or < switching point (81.2)
Oil pressure on pressure side downstream of HP pumps	<ul style="list-style-type: none"><li>• on 2 adjacent segment &lt; pressure value (358.1)</li><li>• or in case of installations with:<ul style="list-style-type: none"><li>10 segments: on at least 3 segments &lt; pressure value (358.1)</li><li>12 segments: on at least 4 segments &lt; pressure value (358.1)</li><li>14 segments: on at least 5 segments &lt; pressure value (358.1)</li><li>15 segments: on at least 4 segments &lt; pressure value (358.1)</li><li>17 segments: on at least 5 segments &lt; pressure value (358.1)</li><li>18 segments: on at least 6 segments &lt; pressure value (358.1)</li></ul></li></ul>

Number of installation segments see quantity indication Item no. 358 in the equipment list.

If the oil temperature with **STOP gear unit** is higher than temperature value (65.3), the pump must remain switched on until the oil temperature has decreased to a value < (65.2).

## 8.4 Response to malfunctions



**Irrespective of the following information, the local safety requirements will apply in all cases for operation of the oil supply system.**

Monitoring during operation is essential to identify any malfunctions occurring (see Section 9, "Disturbances, reasons and remedy") and thus to implement preventive measures. The operating pressures and oil temperatures should be recorded regularly.

If irregularities at variance with the normal condition are noticed during operation, or if the operating data change, it is essential that the cause be identified immediately. If necessary, shut the system off. If the causes cannot be identified, even with the aid of the Troubleshooting List, inform FLENDER at once (see Section 11, "Stocking spare parts, service facility addresses").



**We URGENTLY recommend that a lockable emergency switch be provided to ensure that the system is secured to prevent accidental switch-on during maintenance, repairs, or malfunctions. In addition, we would draw attention to the relevant accident prevention regulations on site!**

For restart after malfunction, the information in Section 7, "Start-up" should be noted.

## 8.5 Shut-down

If the gear unit and oil supply system are shut down for longer periods, the following measures are necessary:

- a) Gear unit and oil supply system should remain filled with oil. Every 4 weeks gear unit and oil supply system must be run for 1 hour. The necessary prelubrication and lubrication times should be observed.
- b) If the measures listed under a) are not possible, the gear unit and the oil supply system (see section 7, "Start-up") must be preserved.

The operating instructions (BA) for the gear unit must be observed.

**Note:** If the oil supply system is shut down for a longer period or if there is a danger of freezing, the cooling water must be drained off.

## 9. Faults, causes and remedy

Observe the "Safety instructions" in section 3.

### 9.1 General information on faults and malfunctions

**Note:** The operating instructions (BA) for the gear unit must be observed.

**Note:** Faults and malfunctions occurring during the guarantee period and requiring repair work on the oil supply system must be carried out only by the FLENDER Customer Service.

In the case of faults and malfunctions occurring after the guarantee period and whose cause cannot be precisely identified, we advise our customers to contact our customer service.

**Caution!**

**FLENDER will not be bound by the terms of the guarantee or warranty or otherwise be responsible in cases of improper use of the oil supply system, modifications on the oil supply system carried out without FLENDER's agreement, or use of spare parts not supplied by FLENDER.**



**When remedying faults and malfunctions, the oil supply system must always be taken out of service.**

**Secure the drive unit to prevent it from being started up unintentionally.**

**Attach a warning notice to the start switch!**

### 9.2 Possible faults

Malfunctions	Causes	Remedy
Oil temperature too high.	No cooling water. Insufficient cooling water. Cooling water too warm.  Water oil-cooler has air in it.  Water oil-cooler contaminated.	Rectify cooling water supply. Increase cooling water supply.  Ventilate the water oil-cooler.  Clean clogged cooler in accordance with manufacturer's maintenance instructions, or replace. See separate Operating Instructions (BA).
Oil temperature too low.	Gear unit has not heated up.  Too much cooling water. Cooling water too cold.	Wait.  Reduce cooling water supply.

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Malfunctions	Causes	Remedy
Oil pressure too low.	Filter clogged.  Suction line clogged.  Pump is drawing in air.  Oil temperature too high.  Oil viscosity too low.  Pump defective, pump drive defective.  Pressure relief valve incorrectly set.  Pressure relief valve defective.	Clean or replace filter element, or switch to clean filter and clean or replace filter element. See separate Operating Instructions (BA).  Clean suction pipe.  Check suction pipe and, if necessary, repair leaks.  See there.  Check oil viscosity and, if necessary, put in correct oil.  Repair or replace pump. See separate Operating Instructions (BA).  Contact FLENDER.  Repair or replace pressure relief valve. See separate Operating Instructions (BA).
Oil pressure too high.	Gear unit has not yet heated up.  Oil pipes to and on gear unit blocked.  Oil viscosity too high.  Pressure relief valve incorrectly set.  Pressure relief valve defective.	Wait.  Find and clean blocked line.  Check oil viscosity and, if necessary, put in correct oil.  Contact FLENDER.  Repair or replace pressure relief valve. See separate Operating Instructions (BA).
Filter contaminated. (unusual or increased filter residues)	Filter contaminated.  Pipes dirty. (Scale, welding residues)  Oil contaminated.  Abraded material from defective pump.  Abraded material from gear unit.	Clean or replace filter.  Clean the pipes.  Change oil.  Repair or replace pump. See separate Operating Instructions (BA).  Check gear unit (bearings, teeth, alignment) and repair defects.
Oil consumption too high.	Leak in pipes, connections, valves or gear unit.  Shaft outlets on gear unit leaky.  Water oil-cooler leaky.  Filter leaky.	Tighten screws. Reseal.  Replace sealing rings.  Seal or replace water oil-cooler. See separate Operating Instructions (BA).  Seal filter.

Table 9.1: Faults, causes and remedies

## 9.2.1 Possible faults when installing the oil supply system

- Important information for describing the drive and the environment will not be communicated to others.
- Performance data too high.
- Cooling water not available or contaminated.
- Chemically aggressive environment not taken into consideration.
- The ambient temperature is not permissible.
- Components with transport or other damage are being fitted.
- Loosely supplied parts are interchanged.
- Prescribed tightening torques are not being adhered to.
- Operating instructions are being changed without authorisation.

## 9.2.2 Possible faults in maintenance

- Maintenance intervals are not being adhered to.
- Leakage in the vicinity of the oil supply system is not being identified and as a result chemically aggressive media are damaging the oil supply system.

## 10. Maintenance and repair

Observe the "Safety instructions" in section 3.

**Note:** The operating instructions (BA) for the gear unit must be observed.

### 10.1 Oils

For the oil viscosity and oil type, refer to the operating instructions (BA) or the gear unit rating plate.

The oil supply systems are designed for oil viscosities  $< 2200 \text{ mm}^2/\text{s}$  (installations with heating circuit up to  $7500 \text{ mm}^2/\text{s}$ ) at minimum starting temperature (see rating plate ⑧).

For the oil change intervals, please refer to the operating instructions (BA) for the gear unit.

### 10.2 General notes on add-on components

**Note:** For operation and maintenance of the components specified in the equipment list, observe the specified operating instructions.  
For technical data, refer to the list of equipment.

### 10.3 Preservation

Refer to Section 7, "Start-up" and Section 8, "Operation".

### 10.4 Cleaning

**Caution!**

To prevent the build-up of dust on the oil supply unit, cleaning must be done in accordance with operating conditions.

## 11. Spare parts, customer-service addresses

### 11.1 Stocking spare parts

By stocking the most important spare and wearing parts on site you can ensure that the oil supply system is ready for use at any time.

To order spare parts, refer to the list of equipment.

We guarantee only the original spare parts supplied by us.

<b>Caution!</b>
-----------------

**Please note that spare parts and accessories not supplied by us have not been tested or approved by us. The installation and/or use of such products may therefore impair essential characteristics of the oil supply system, thereby posing an active or passive risk to safety. FLENDER will assume no liability or guarantee for damage caused by spare parts and accessories not supplied by FLENDER.**

Please note that certain components often have special production and supply specifications and that we supply you with spare parts which comply fully with the current state of technical development as well as current legislation.

When ordering spare parts, always state the following:

Material no.	Type / Size	Part no.	Quantity
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### 11.2 Spare-part and customer service addresses

When ordering spare parts or the services of our specialist engineers, apply first to FLENDER AG.

## Adressen - Deutschland

(2006-06)

<b>A. FRIEDR. FLENDER AG</b>	<b>Alfred-Flender-Straße 77</b> 46395 Bocholt	<b>Postfach 1364</b> 46393 Bocholt	<b>Tel.: (0 28 71) 92 - 0</b> <b>Fax: (0 28 71) 92 - 25 96</b>	<b>contact@flender.com</b> <b>www.flender.com</b>
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<b>A. FRIEDR. FLENDER AG</b> Kundenservice Center Süd	Bahnhofstraße 40 - 44 72072 Tübingen	Postfach 1709 72007 Tübingen	Tel.: (0 70 71) 7 07 - 0 Fax: (0 70 71) 7 07 - 3 40	ksc.sued@flender.com www.flender.com
<b>A. FRIEDR. FLENDER AG</b> Kundenservice Center Süd (Außenstelle München)	Liebigstraße 14	85757 Karlsfeld	Tel.: (0 81 31) 90 03 - 0 Fax: (0 81 31) 90 03 - 33	ksc.sued@flender.com www.flender.com
<b>A. FRIEDR. FLENDER AG</b> Kundenservice Center Ost / Osteuropa	Schlossallee 8	13156 Berlin	Tel.: (0 30) 91 42 50 58 Fax: (0 30) 47 48 79 30	ksc.ost@flender.com www.flender.com
<b>A. FRIEDR. FLENDER AG</b> Werk Friedrichsfeld	Am Industriepark 2	46562 Voerde	Tel.: (0 28 71) 92 - 0 Fax: (0 28 71) 92 - 25 96	contact@flender.com www.flender.com
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<b>A. FRIEDR. FLENDER AG</b> Kupplungswerk Mussum	Industriepark Bocholt Schlavenhorst 100	46395 Bocholt	Tel.: (0 28 71) 92 - 28 68 Fax: (0 28 71) 92 - 25 79	couplings@flender.com www.flender.com
<b>A. FRIEDR. FLENDER AG</b> FLENDER GUSS	Obere Hauptstraße 228 - 230	09228 Chemnitz/ Wittgensdorf	Tel.: (0 37 22) 64 - 0 Fax: (0 37 22) 94 - 1 38	flender.guss@flender- guss.com www.flender-guss.de
<b>WINERGY AG</b>	Am Industriepark 2 46562 Voerde	Postfach 201160 46553 Voerde	Tel.: (0 28 71) 9 24 Fax: (0 28 71) 92 - 24 87	info@winergy-ag.com www.winergy-ag.com
<b>FLENDER TÜBINGEN GMBH</b>	Bahnhofstraße 40 - 44 72072 Tübingen	Postfach 1709 72007 Tübingen	Tel.: (0 70 71) 7 07 - 0 Fax: (0 70 71) 7 07 - 4 00	sales-motox@flender- motox.com www.flender.com
<b>LOHER GMBH</b>	Hans-Loher-Straße 32 94099 Ruhstorf	Postfach 1164 94095 Ruhstorf	Tel.: (0 85 31) 3 90 Fax: (0 85 31) 3 94 37	info@loher.de www.loher.de
<b>A. FRIEDR. FLENDER AG</b> FLENDER SERVICE INTERNATIONAL	Am Industriepark 2 46562 Voerde	Postfach 201160 46553 Voerde	Tel.: (0 28 71) 92 - 22 10 Fax: (0 28 71) 92 - 13 47	infos@flender-service.com www.flender-service.com
	<b>Werk Herne</b> Südstraße 111 44625 Herne	Postfach 101720 44607 Herne	Tel.: (0 23 23) 9 40 - 0 Fax: (0 23 23) 9 40 - 3 33	infos@flender-service.com www.flender-service.com
	24h Service Hotline		+49 (0) 17 22 81 01 00	
	<b>Vertriebsbüro Penig</b> Thierbacher Straße 24 09322 Penig	Postfach 44/45 09320 Penig	Tel.: (03 73 81) 61 - 5 20 Fax: (03 73 81) 61 - 4 88	infos@flender-service.com www.flender-service.com

## Addresses - International

(2006-06)

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	Flender S.a.r.l.	Sales Office Agence de Lyon Parc Inopolis, Route de Vourles	69230 Saint Genis Laval	Phone: +33 (0) 4 - 72 83 95 20 Fax: +33 (0) 4 - 72 83 95 39	sales@flender.fr
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## 12. Declaration by the manufacturer

### Declaration by the manufacturer

in accordance with EC Engineering Guideline 98/37/EC, Appendix II B

We hereby declare that the

### Oil supply systems of type **OWGM**

described in these Operating Instructions are intended for incorporation in a machine, and that it is prohibited to put them into service before verifying that the machine into which they are incorporated complies with the EC Guidelines (original edition 98/37/EC including any subsequent amendments thereto).

This Manufacturer's Declaration takes into account all the unified standards (inasmuch as they apply to our products) published by the European Commission in the Official Journal of the European Community.

Bocholt, 2006-02-28



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Signature (Manager Engineering TFE)