

# Girth gear unit for tubular mills

**DMG2**

**Sizes 18, 22, 25.4 and 30**

Assembly and operating instructions

BA 5150 EN 06/2010

**FLENDER gear units**

**SIEMENS**

## Girth gear unit for tubular mills

DMG2  
Sizes 18, 22, 25.4 and 30

### Assembly and operating instructions

Translation of the original assembly and operating instructions

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## Notes and symbols in these assembly and operating instructions

**Note:** The term "Assembly and operating instructions" will in the following also be shortened to "instructions" or "manual".

### Legal notes

#### Warning note concept

This manual comprises notes which must be observed for your personal safety and for preventing material damage. Notes for your personal safety are marked with a warning triangle or an "Ex" symbol (when applying Directive 94/9/EC), those only for preventing material damage with a "STOP" sign.



**WARNING! Imminent explosion!**

The notes indicated by this symbol are given to prevent **explosion damage**.  
Disregarding these notes may result in serious injury or death.



**WARNING! Imminent personal injury!**

The notes indicated by this symbol are given to prevent **personal injury**.  
Disregarding these notes may result in serious injury or death.



**WARNING! Imminent damage to the product!**

The notes indicated by this symbol are given to prevent **damage to the product**.  
Disregarding these notes may result in material damage.



**NOTE!**

The notes indicated by this symbol must be treated as general **operating information**.  
Disregarding these notes may result in undesirable results or conditions.



**WARNING! Hot surfaces!**

The notes indicated by this symbol are made to prevent **risk of burns due to hot surfaces** and must always be observed.  
Disregarding these notes may result in light or serious injury.

Where there is more than one hazard, the warning note for whichever hazard is the most serious is always used. If in a warning note a warning triangle is used to warn of possible personal injury, a warning of material damage may be added to the same warning note.

### Qualified personnel

The product or system to which these instructions relate may be handled only by persons qualified for the work concerned and in accordance with the instructions relating to the work concerned, particularly the safety and warning notes contained in those instructions. Qualified personnel must be specially trained and have the experience necessary to recognise risks associated with these products or systems and to avoid possible hazards.

# Intended use of Siemens products

## Observe also the following:



Siemens products must be used only for the applications provided for in the catalogue and the relevant technical documentation. If products and components of other makes are used, they must be recommended or approved by Siemens. The faultfree, safe operation of the products calls for proper transport, proper storage, erection, assembly, installation, start-up, operation and maintenance. The permissible ambient conditions must be adhered to. Notes in the relevant documentations must be observed.

## Trademarks

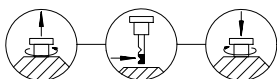
All designations indicated with the registered industrial property mark ® are registered trademarks of Siemens AG. Other designations used in these instructions may be trademarks the use of which by third parties for their own purposes may infringe holders' rights.

## Exclusion of liability

We have checked the content of the instructions for compliance with the hard- and software described. Nevertheless, variances may occur, and so we can offer no warranty for complete agreement. The information given in these instructions is regularly checked, and any necessary corrections are included in subsequent editions.

## Symbols

Earth connection point			Air relief point		yellow
Oil-filling point		yellow	Oil-draining point		white
Oil level		red	Oil level		red
Oil overflow			Connection for vibration-monitoring device		
Lubrication point		red	Apply grease		
Lifting eye			Eye bolt		
Do not unscrew					
Alignment surface, horizontal			Alignment surface, vertical		



These symbols indicate the oil-level checking procedure using the oil dipstick.



These symbols indicate that the oil dipstick must always be firmly screwed in.

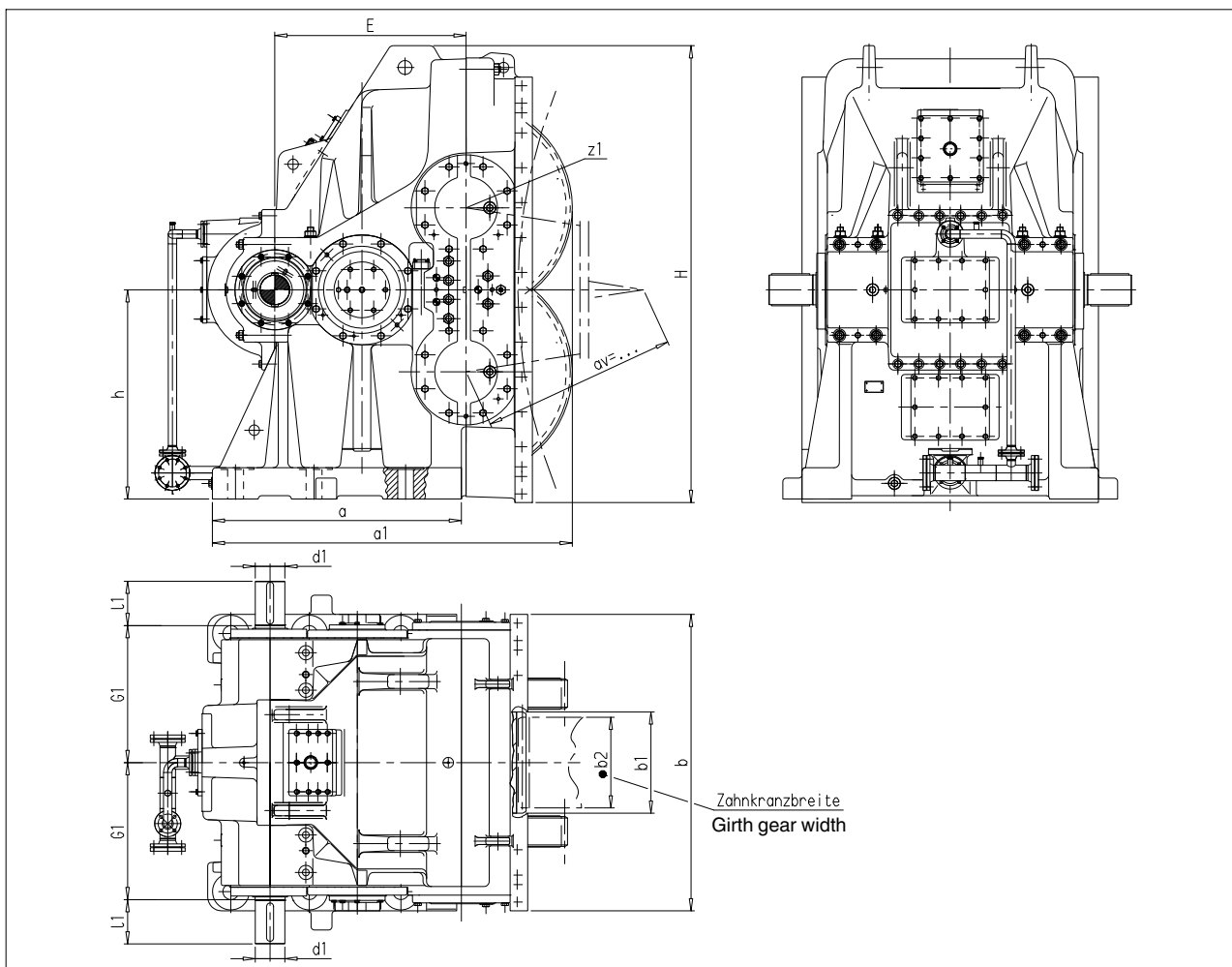
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# 1. Technical data

## 1.1 Dimensions, torques and weights



**Fig. 1:** Dimensions

**Table 1:** Dimensions, torques and weights DMG2

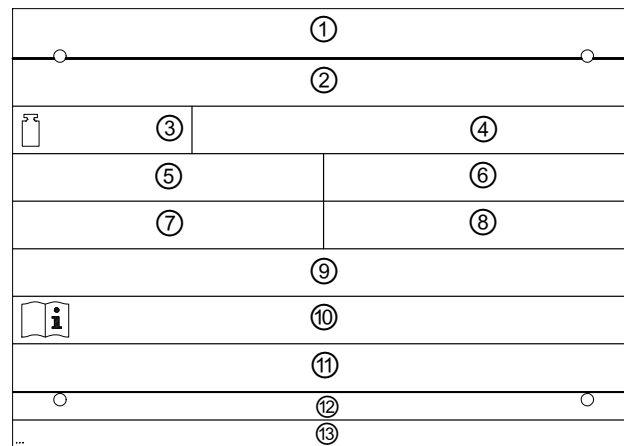
Gear-unit size	Gear unit			Output pinion			Gear rim		a	a <sub>1</sub>	b	d <sub>1</sub> (n6)	l <sub>1</sub>	E	G <sub>1</sub>	h	H
	Transmission ratio i	max. output torque T <sub>eff</sub> kNm	Wght. G t	Tooth width b <sub>1</sub> mm	Mo- dule m mm	Num. of teeth z <sub>1</sub>	max. tooth width b <sub>2max</sub> mm	max. tooth width z <sub>2max</sub>									
<b>18</b>	5.45 ... 11.65	173.5	16	480	18	31	475	600	1206	1768	1350	140	230	911	750	1060	2275
<b>22</b>	5.85 ... 11.42	270	23.5	580	22	31	575	600	1428	2065	1700	170	250	1097	790	1200	2620
<b>25.4</b>	6.17 ... 11.005	484	36	660	25.4	31	655	600	1600	2325	1900	190	295	1224	930	1450	3140
<b>30</b>	6.232 ... 10.32	700	69	780	30	31	770	600	1990	2870	2375	230	380	1555	1100	1845	3885



For the exact technical data, refer to the drawings in the gear-unit documentation.

## 1.2 General technical data

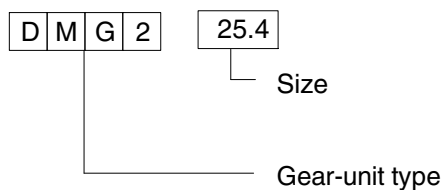
The most important technical data are shown on the rating plate. These data and the contractual agreements between Siemens and the customer for the gear unit determine the limits of its correct use.



**Fig. 2:** Rating plate gear unit

- |                                                    |                                                       |
|----------------------------------------------------|-------------------------------------------------------|
| ① Company logo                                     | ⑧ Speed $n_2$                                         |
| ② Order number, item, sequence number / Year built | ⑨ Oil data<br>(oil type, oil viscosity, oil quantity) |
| ③ Total weight in kg                               | ⑩ Instructions number(s)                              |
| ④ Special information                              | ⑪ Special information                                 |
| ⑤ Type / size *)                                   | ⑫ Manufacturer and place of manufacture               |
| ⑥ Power rating $P_2$ in kW or torque $T_2$ in Nm   | ⑬ Country of origin                                   |
| ⑦ Speed $n_1$                                      |                                                       |

\*) Example



Data on weights and measuring-surface sound-pressure levels of the various gear types are given in items 1.2 and 1.3.

For further technical data, refer to the drawings in the gear-unit documentation.

## 1.3 Measuring-surface sound-pressure level

A measuring-surface sound-pressure level cannot be specified, as during the test run the gear unit is operated on the Siemens test rig without load.



## 2. General notes

### 2.1 Introduction

These instructions are an integral part of the gear unit supplied and must be kept in its vicinity for reference at all times.



**All persons carrying out work on the gear unit must have read and understood these instructions and must adhere to them. Siemens accepts no responsibility for damage or disruption caused by disregard of these instructions.**

The "**FLENDER girth gear unit**" described in these Instructions has been designed for driving a tubular mill. Possible areas of application for gear units of this series are mainly the cement- and ore-processing industries.

The gear unit is designed only for the application specified in section 1, "Technical data". Other operating conditions must be contractually agreed.

The gear unit has been manufactured in accordance with the state of the art and is delivered in a condition for safe and reliable use.

The gear unit must be used and operated strictly in accordance with the conditions laid down in the contract governing performance and supply agreed by Siemens and the customer.

The gear unit described in these instructions reflects the state of technical development at the time these instructions 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 instructions is held by **Siemens AG**.

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

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### 3. Safety instructions



**Entry to the gear unit and its added components is not permitted during operation!  
Entry for maintenance and repair work is only permitted when the gear unit is at a standstill!  
Caution! Risk of falling!**



**Any changes on the part of the user are not permitted. This applies equally to safety features designed to prevent accidental contact.**

#### 3.1 Obligations of the user

- The operator must ensure that everyone carrying out work on the gear unit has read and understood these instructions and is adhering to them in every point in order to:
  - avoid injury or damage,
  - ensure the safety and reliability of the unit,
  - 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 gear unit may only be operated, maintained and/or repaired by persons qualified for the work concerned (see "Qualified personnel" on page 3 of this manual).
- The outside of the gear unit must not be cleaned with high-pressure cleaning equipment.
- All work must be carried out with great care and with due regard to safety.



**All work on the gear unit 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 start switch stating clearly that work is in progress.**

- No electrical welding work must be done at all on the drive.  
The drives must not be used as an earthing point for welding operations. Toothed parts and bearings may be irreparably damaged by welding.
- A potential equalisation in accordance with the applying regulations and directives must be carried out! If no threaded holes for earth connection are available on the gear unit, other appropriate measures must be taken. This work must always be done by specialist electricians.



**If any inexplicable changes are noticed during operation of the gear unit, such as an important increase in temperature or unusual noises, the drive assembly must be switched off immediately.**



**Rotating and/or movable drive components must be fitted with suitable safeguards to prevent contact.**



**When the gear unit is incorporated in plant or machinery, the manufacturer of such plant or machinery must ensure that the contents of these instructions are incorporated in his own instructions.**

- Removed safety equipment must be re-installed prior to starting up.
- Notices attached to the gear unit, 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.
- Spare parts should always be obtained from Siemens (refer also to section 11).

### 3.2 Environmental protection

- Dispose of any packing material in accordance with regulations or separate it for recycling.
- When changing oil, the used oil must be collected in suitable containers. Any pools of oil which may have collected should be removed at once with an oil-binding agent.
- Preservative agents should be stored separately from used oil.
- Used oil, preservative agents, oil-binding agents and oil-soaked cloths must be disposed of in accordance with environmental legislation.
- Disposal of the gear unit after its useful life:
  - Drain all the operating oil, preservative agent and/or cooling agent from the gear unit and dispose of in accordance with regulations.
  - Depending on national regulations, gear-unit components and/or add-on parts may have to be disposed of or sent for recycling separately.

### 3.3 Special dangers and personal protective equipment

- Depending on operating conditions, the surface of the gear unit may heat up or cool down to extreme temperatures.



**In the case of hot surfaces (> 55 °C) there is a risk of burns!**



**In the case of cold surfaces (< 0 °C) there is a risk of frost injury (pain, numbness, frostbite)!**



**During oil changes there is a risk of scalding from escaping oil!**



**Small foreign matter such as sand, dust, etc. can get into the cover plates of the rotating parts and be thrown back by these.  
Risk of eye injury!**



In addition to any generally prescribed personal safety equipment (such as safety shoes, safety clothing, helmet) handling the gear unit requires wearing **suitable safety gloves** and **suitable safety glasses**!



**The gear unit is not suitable for operation in explosion hazard locations. It must under no circumstances be used in such locations because of the risk to life and limb.**

## 4. Transport and storage

Observe the instructions in section 3, "Safety instructions"!

### 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 and/or missing parts must be reported to Siemens in writing immediately.



**If there is any visible damage, the gear unit must not be put into operation.**

### 4.2 Transport

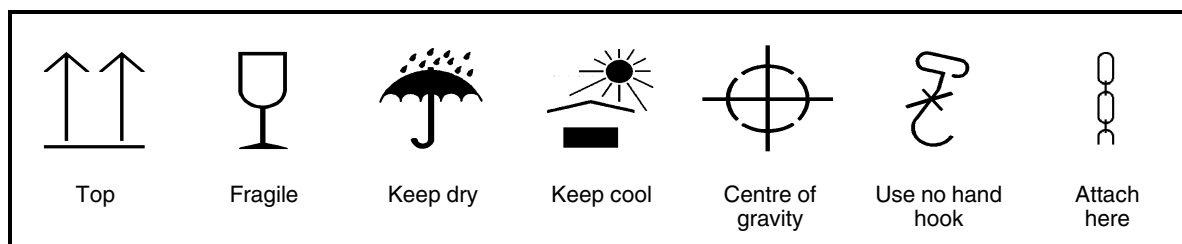


**When transporting Siemens products, use only lifting and handling equipment of sufficient load-bearing capacity!  
Observe the notes regarding load distribution on the packing.**

The gear unit is delivered in the fully assembled condition. Additional items may be delivered separately packaged.

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

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



**Fig. 3:** Transport symbols



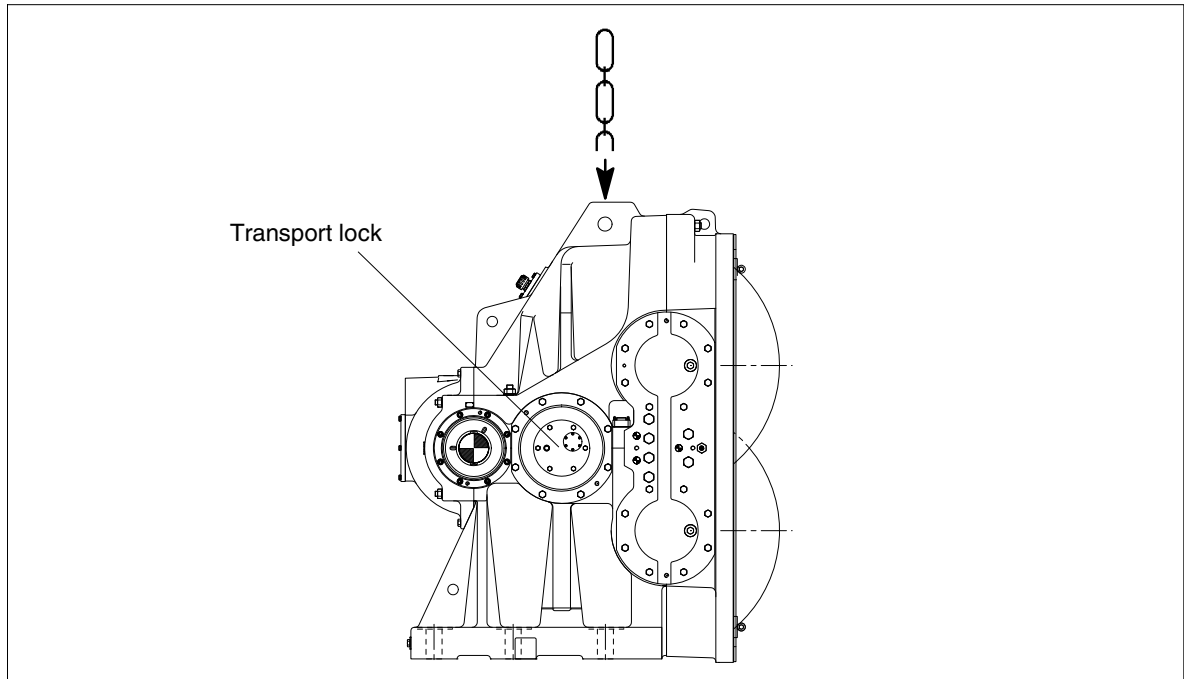
**Transport of the gear unit must be carried out so as to avoid personal damage and damage to the gear unit.  
If, for example, the free shaft ends are knocked, this may damage the gear unit.**



The gear unit must be transported using suitable equipment only. During transport the gear unit should be left without oil filling and on the transport packing.



**Use only the marked eyes provided to attach lifting equipment to the unit.  
Handling of the gear unit by attaching it to the piping is not permitted.  
The pipework must not be damaged.  
Do not use the front threads at the shaft ends to attach slinging and lifting gear for transport.  
Slinging and lifting gear must be adequate for the weight of the gear unit.**



**Fig. 4:** Attachment points



For a detailed illustration of the gear unit and the position of the attachment points, please refer to the drawings of the gear-unit documentation.

The floating intermediate shaft of the gear unit is retained axially by a transport lock.

The transport lock must be re-used for any further transport.

When transporting from the works to the customer, the transport conditions set out in table 2 must be observed.

**Table 2:** Transport conditions

<b>Gear-unit size</b>	<b>required transport vehicle</b>	<b>required number of chains for transport lock</b>	<b>material used for transport</b>
<b>18</b>	Low loader	4	Squared timber 4 x 10 x 12 cm attached to the gear unit
<b>22</b>		4	
<b>25.4</b>		6	
<b>30</b>	Low loader with special low bed (note height)	8	

#### 4.3 Storing the gear unit

The gear unit must be stored in a sheltered place in the position of the original packaging or in the position of use, placed on a vibration-free, dry base, and covered over.

When storing the gear unit and any single components supplied with it, the preservative agent should be left on them. It must not be damaged, otherwise there is a risk of corrosion.



**Do not stack gear units on top of one another.**



**If the gear unit 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 unit. Waterlogging should be avoided.  
(Siemens must be consulted.)**



Unless otherwise agreed by contract, the gear units must not be exposed to harmful environmental factors such as chemical products, high air pollution and ambient temperatures outside the range 0 to + 40 °C.  
Provision for special environmental conditions during transport (e.g. transport by ship) and storage (climate, termites, etc.) must be contractually agreed.

#### 4.4 Standard coating and preservation

The gear unit is provided with an interior preservative agent; the free shaft ends are painted for protection.

The properties of the standard paint coat for "FLENDER girth gear units" are as follows: Resistant to acids, weak alkalis, solvents, atmospheric action, temperatures up to 120 °C and to tropical conditions.



**To maintain the preservative effect, both the input shaft seals must be covered and the cover (transport cover) on the output be left in position.  
Any opening of the gear unit will result in loss of the preservative effect.**



**The gear unit is normally delivered completely ready, with a priming and a finish coat.**

**Where gear units are delivered with a priming coat only, it is necessary to apply a finish coat in accordance with directives applying to the specific application.  
The priming coat alone is not suitable to provide a sufficient long-term corrosion protection.**



**Ensure that the coat is not damaged!**

**Any damage may cause failure of the external protective coating and corrosion.**



Unless otherwise contractually agreed, the interior preservation is guaranteed for 24 months, and the preservation of the free shaft ends for 36 months, provided that storage is in dry, frostfree sheds.

The guarantee period starts on the date of delivery or that of the notice that the item is ready for shipment.

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").

In case of re-preservation the output shaft must be rotated at least one turn to change the position of the rolling element in the bearings. The input shaft must not come to a standstill in the same position as before rotation.

This procedure must be repeated and documented every 6 months until start-up.

## 5. Technical description

Observe the instructions in section 3, "Safety instructions"!

### 5.1 General description

The "FLENDER girth gear unit" is a load-sharing helical gear unit for driving a tubular mill via a girth gear. Its housing is not closed. Mounted on the shaft of the last stage is an output pinion. Both output pinions engage direct in the girth gear and are constructed to be able to compensate for unavoidable tilting and wrenching movements of the girth gear. This enables a good contact pattern over the whole teeth during operation.

The drive shaft of "FLENDER girth gear unit" is drawn out on both sides.



**Operation and maintenance must be in accordance with all operating instructions supplied.  
For technical data, refer to the order-specific documents.**

### 5.2 Lubrication

Both the teeth and the rolling bearings are force-lubricated by an oil supply unit. The lubricant is fed and distributed to the individual lubricating points by a suitably designed pipe system located on the inside of the gear unit. The nozzles and orifice plates used on it have large free cross-sections which have no tendency to blocking.

For an accurate view of the gear unit and oil-supply system, if any, please refer to the drawings in the gear unit documentation.



**Two pressure monitors must be fitted in the oil feed line on the gear unit.  
Interlocking of these pressure monitors:**

<b>WARNING</b>	<b>at 1.3 bar</b>
<b>SWITCH-OFF</b>	
<b>of the drive</b>	<b>at 1.0 bar</b>



**The main technical conditions for the oil-supply system are specified in the documentation (e.g. list of equipment) of the oil-supply system.  
When operating and servicing the components of the oil-supply system, observe the operating instructions of the oil-supply system.**

### 5.3 Shaft seals

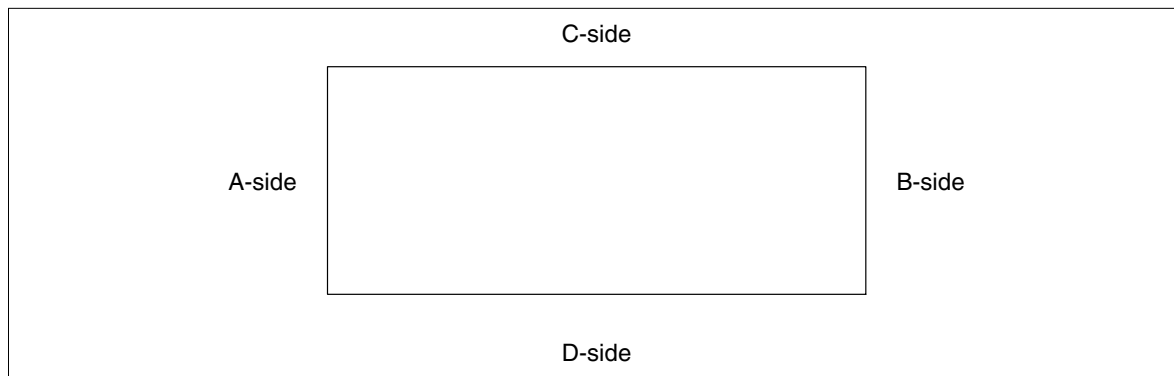
Labyrinth seals at the both shaft outlets at the input side prevent oil from escaping from the housing and dirt from entering the gear unit. Labyrinth seals are non-contacting and so prevent wear to the shaft and ensure favourable temperature characteristics.

As the housing is designed to be open at the output and the output pinion engages in the girth gear direct there, no shaft seals are required here. However, the gear unit housing must be tightly attached to the girth gear cover.

## 5.4 Terminal diagram

If necessary, 2 pressure monitors, 2 resistance thermometers and/or 1 displacement gauge can be mounted on the gear unit and wired in a terminal box. In this case the following description applies. If only one of the devices mentioned above is fitted and wired in the terminal box, only part of the description applies. In the case of additional installed devices the supplied documents of the operating instructions will apply.

### 5.4.1 Terminal diagram Type: 1515.210 (300 x 150 x 80)

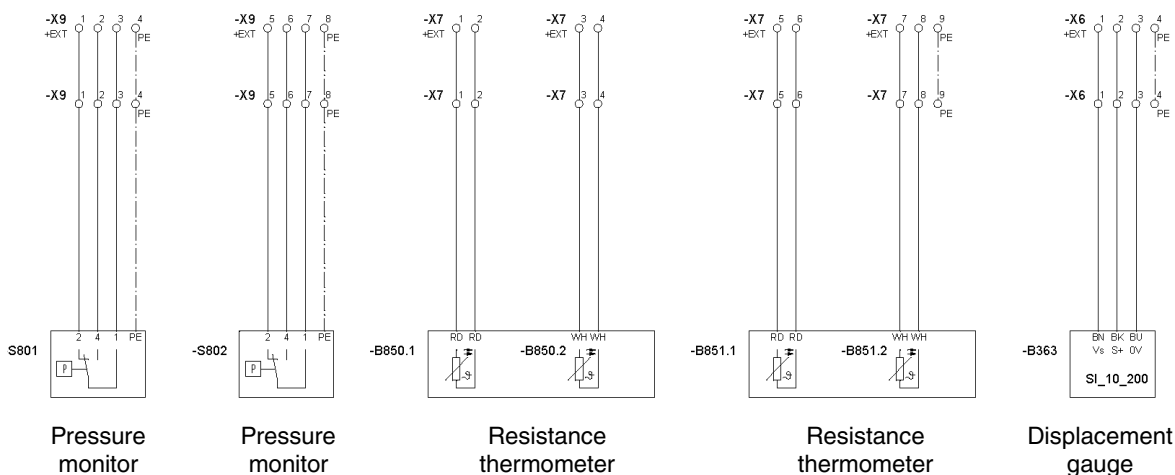


**Fig. 5:** Terminal diagram Type: 1515.210 (300 x 150 x 80)

**Table 3:** Screw connections and plugs

A-side	B-side	C-side	D-side	Size
Screw connections				
				M12
			5	M16
				M20
				M25
				M32
Plug				
				M12
				M16
			2	M20
				M25
				M32

### 5.4.2 Monitoring



**Fig. 6:** Monitoring



5.4.3 Terminal diagrams X6, X7 and X9

**Table 4:** Terminal diagram X6

Target designation Direction machine				Terminal strip <b>-X6</b>					Target designation Direction switch cabinet			
Identification mark		Con- nec- tion	Type	Bridge	Termi- nal	A mm <sup>2</sup>	Position in circuit diagram	Identification mark		Con- nec- tion		
=	+	-	:			max.	STR	=	+	-	:	
	+EXT	-X6	1	UK5N		1	4.0	STR/1.7			-B363	BN
	+EXT	-X6	2	UK5N		2	4.0	STR/1.7			-B363	BK
	+EXT	-X6	3	UK5N		3	4.0	STR/1.7			-B363	BU
	+EXT	-X6	4	USLKG5		4	4.0	STR/1.7				

**Table 5:** Terminal diagram X7

Target designation Direction machine				Terminal strip <b>-X7</b>					Target designation Direction switch cabinet			
Identification mark		Con- nec- tion	Type	Bridge	Termi- nal	A mm <sup>2</sup>	Position in circuit diagram	Identification mark		Con- nec- tion		
=	+	-	:			max.	STR	=	+	-	:	
	+EXT	-X7	1	UK5N		1	4.0	STR/1.3			-B850.1	RD
	+EXT	-X7	2	UK5N		2	4.0	STR/1.3			-B850.1	RD
	+EXT	-X7	3	UK5N		3	4.0	STR/1.4			-B850.2	WH
	+EXT	-X7	4	UK5N		4	4.0	STR/1.4			-B850.2	WH
	+EXT	-X7	5	UK5N		5	4.0	STR/1.5			-B851.1	RD
	+EXT	-X7	6	UK5N		6	4.0	STR/1.5			-B851.1	RD
	+EXT	-X7	7	UK5N		7	4.0	STR/1.6			-B851.2	WH
	+EXT	-X7	8	UK5N		8	4.0	STR/1.6			-B851.2	WH
	+EXT	-X7	9	USLKG5		9	4.0	STR/1.6				

**Table 6:** Terminal diagram X9

Target designation Direction machine				Terminal strip <b>-X9</b>					Target designation Direction switch cabinet			
Identification mark		Con- nec- tion	Type	Bridge	Termi- nal	A mm <sup>2</sup>	Position in circuit diagram	Identification mark		Con- nec- tion		
=	+	-	:			max.	STR	=	+	-	:	
	+EXT	-X9	1	UK5N		1	4.0	STR/1.1			-S801	2
	+EXT	-X9	2	UK5N		2	4.0	STR/1.1			-S801	4
	+EXT	-X9	3	UK5N		3	4.0	STR/1.2			-S801	1
	+EXT	-X9	4	USLKG5		4	4.0	STR/1.2			-S801	PE
	+EXT	-X9	5	UK5N		5	4.0	STR/1.2			-S802	2
	+EXT	-X9	6	UK5N		6	4.0	STR/1.2			-S802	4
	+EXT	-X9	7	UK5N		7	4.0	STR/1.3			-S802	1
	+EXT	-X9	8	USLKG5		8	4.0	STR/1.3			-S802	PE

## 6. Fitting

Observe the instructions in section 3, "Safety instructions"!

### 6.1 General information on fitting



**Fitting to the tubular mill must be undertaken under the supervision of Siemens specialists or by suitably trained specialists authorised by Siemens.**

The gear unit is delivered ready assembled for attachment to the girth gear.



The steel plate cover covering the open side of the gear unit and required during transport and the transport lock to prevent the intermediate shaft from being displaced must be removed during installation. For reasons of corrosion, removal must be left to the last possible moment.



**The operator should ensure that no foreign bodies affect the proper function of the gear unit (e.g. falling objects or heaping over).**



**No welding work must be done at all on the drive.  
The drives must not be used as an earthing point for welding operations. Toothed parts and bearings may be irreparably damaged by welding.**



**All the fastening points provided by the design of the unit must be used.  
Screws which have been damaged during assembly or disassembly work must be replaced with new ones of the same strength class and type.**



For selection of the most important tools needed for installing gear unit sizes 18 to 30, see table 7.

**Table 7:** Important tools for installation of size 18, 22, 25.4 and 30 DMG2 gear units

Tools	to be made available by	
	Installation specialist	Customer
Levelling instrument with planimeter micrometer	X	
2 clock gauges with magnet stator	X	
Spirit level 0.02 mm/m 200 mm long	X	
Straight-edge (for base plate alignment) for DMG2 18 approx. 2350 mm for DMG2 22 approx. 2710 mm for DMG2 25.4 approx. 3130 mm for DMG2 30 approx. 3770 mm		X
Material for casting frame (e.g. L profile or boards, 100 to 150 mm wide) for DMG2 18 Total length min. 8 m for DMG2 22 Total length min. 9 m for DMG2 25.4 Total length min. 10 m for DMG2 30 Total length min. 13 m if necessary, dowels for L profile. If required, sand for boards		X
Digital depth gauge or micrometer screw (variable lengths) up to a depth of 500 mm		X
Height measuring stand		Purchase or own manufacture
Base-bolt pretensioning tool min. 2500 bar, incl. hand lever pump and high-pressure hose for DMG2 18 (not required) for DMG2 22 M 80 x 4 for DMG2 25.4 M 90 x 4 for DMG2 30 (not required)		Purchase
Measuring rod for gear-unit alignment for DMG2 18 Diameter 35 to 40 x 1450 mm for DMG2 22 Diameter 45 to 50 x 1700 mm for DMG2 25.4 Diameter 50 to 60 x 2000 mm for DMG2 30 Diameter 65 to 75 x 2280 mm Lengths are minimum lengths, (material e.g. drawn steel)		X
Feeler gauge 0.05 mm to 2 mm	X	
2 x Lukas hydraulic cylinder 10 t		X
2 x pumps for hydraulic cylinder (Lukas)		X
Diverse material / tools: e.g. solvent for Tectyl, vessel for mixing grouting compound, stirring stick, drilling machine, M 30 hexagon spanner, steel cut-off grinder, plumb bob, measuring tape		X
If necessary, for piping: Cutting-off tool, welding equipment, 15 % HCl for acidification 15 % NaOH for neutralisation		X
1 kg grease		X

## 6.2 Installation conditions

During the planning phase sufficient space must be allowed around the gear unit for later care and maintenance work.

Machines located up- and downstream are to be arranged accordingly.



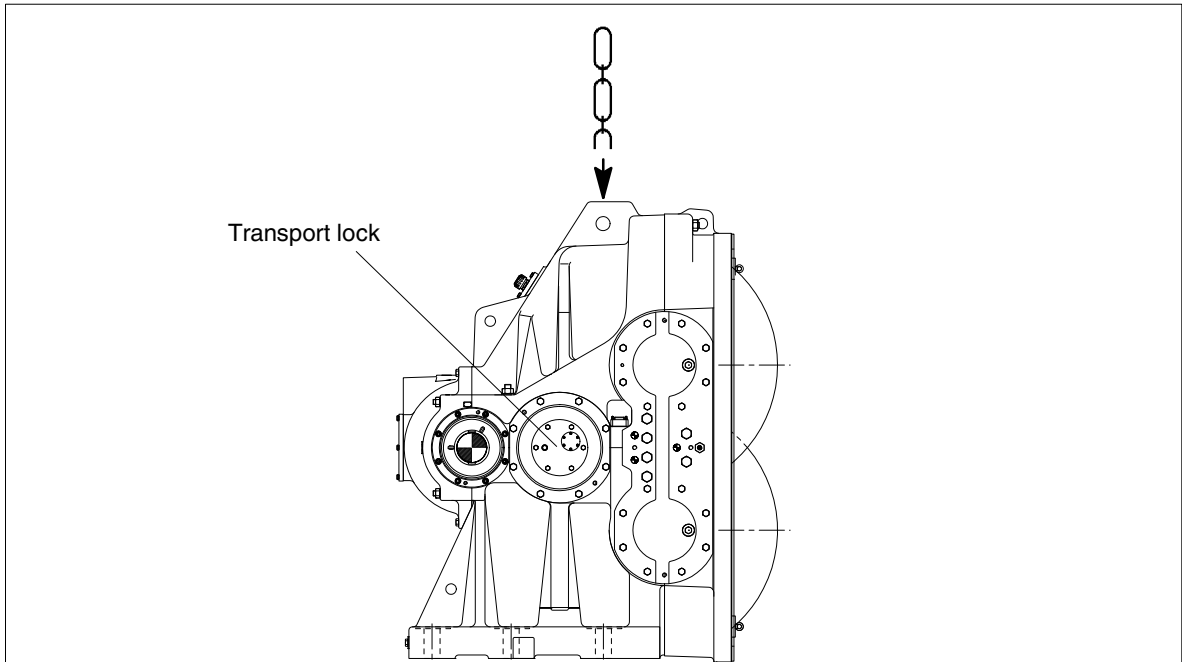
The foundation plan with dimension, weight, load, layout (connections), etc. specifications have already been handed over for approval. A further copy of this foundation plan is enclosed with the documentation.

Adequate lifting equipment must be available before beginning the fitting work.

The load-bearing capacity of the lifting gear to be installed and used must correspond at least to the weight of the gear unit (for details see section 1, "Technical data").



**The gear unit may be attached only at the points indicated.  
(see section 4, "Transport and storage")**



**Fig. 7:** Attachment points

### 6.3 Preparatory measures for installation of the gear unit

#### 6.3.1 Inspection of the girth gear

The girth gear must be inspected for radial and axial run-out. The highest point of radial run-out must be marked. For permitted values, please see table 8, unless lower values are requested in the documentation to the girth gear. If they are, they must be adhered to.

**Table 8:** Permissible radial and axial run-outs of girth gears in assembled condition

Tip circle diameter of the girth gear up to [m]	Permissible radial run-out [mm]	Permissible axial run-out [mm]
≤ 5.0	0.8	0.8
> 5.0	1.0	1.0

The radial run-out error is the difference between the highest and lowest points around the circumference of the girth gear. The values at the at least 16 measuring points must be recorded.



**A deviation of 0.2 mm from one point to the next (e.g. between points 4 and 5) is also not permitted.**

### 6.3.2 Determining the tubular mill centre

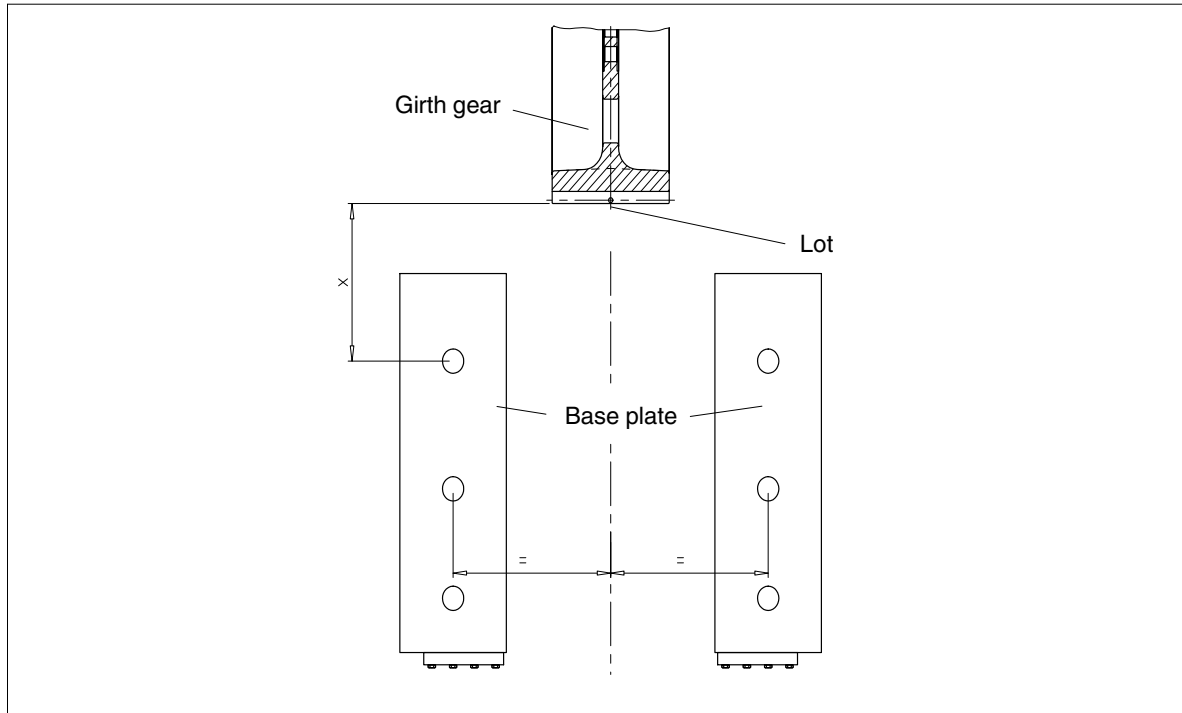
To assist measurement, two test prods set 180° apart can be mounted on the front reference face of the girth gear. The tubular mill centre must be determined and marked (e.g. on a wall).

### 6.3.3 Foundation inspection

The installation of the base plate to the girth gear is projected onto the available foundation and checked with the aid of the foundation plan (see Figure 8). Using a plumb bob, the outer diameter of the girth gear is transferred to the foundation. For mounting dimension "X", see the foundation plan.



**If the permitted girth gear production allowances (e.g. tooth width, tip circle diameter) are exceeded, mounting dimension "X" may change. In such cases Siemens must therefore be consulted.**



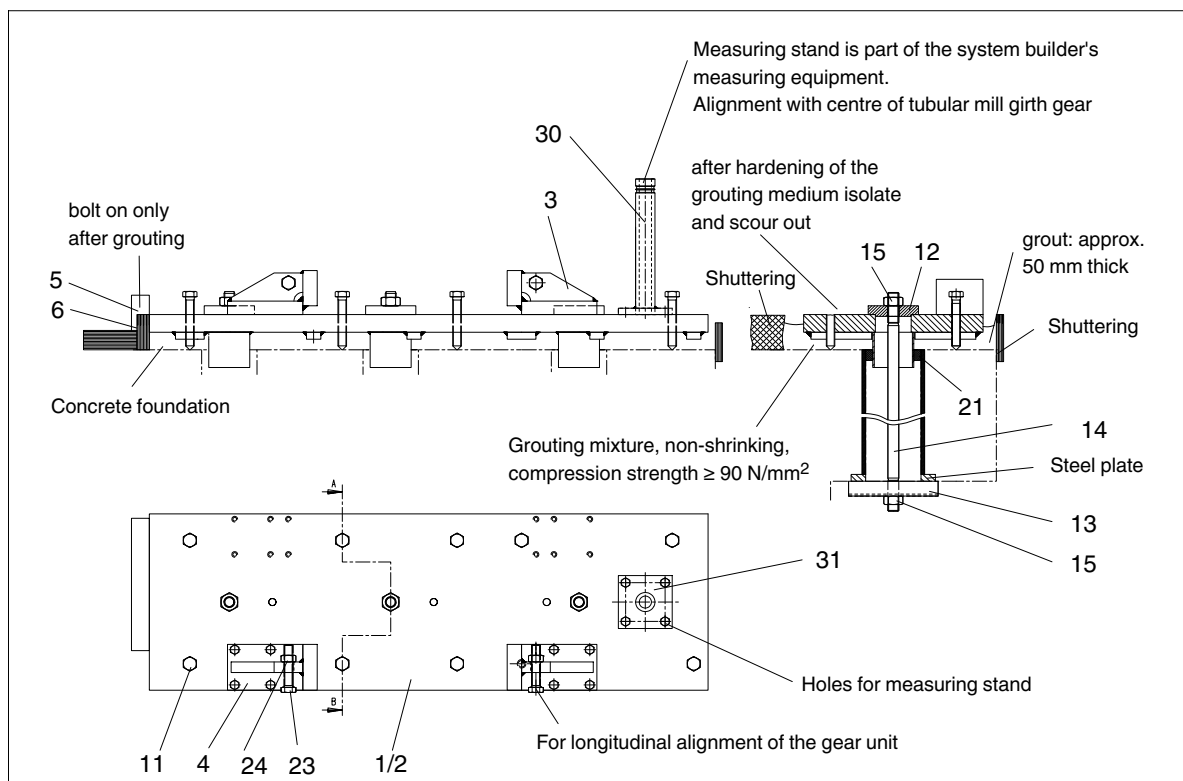
**Fig. 8:** Foundation plan

6.4 Fitting the base plate

The following parts must be placed ready for fitting the base plate:

**Table 9:** Parts for fitting the base plate

Part number	Quantity	Designation	Part number	Quantity	Designation
1	1	Base plate	12	6	Plate
2	1	Base plate	13	8	Plate for DMG2 30
3	4	Pedestal	13	6	U-section
4	24	Hexagon head screw	13	8	U-section for DMG2 30
5	2	Connecting plate	14	6	Threaded rod
6	8	Hexagon head screw for DMG2 30	14	8	Threaded rod for DMG2 18
	8	Hexagon head screw for DMG2 22	15	12	Hexagon nut
	16	Hexagon head screw for DMG2 25.4	15	16	Hexagon head screw for DMG2 30
	20	Hexagon head screw for DMG2 30	21		Sealing material
11	16	Hexagon head screw for DMG2 18	23	4	Hexagon head screw
	20	Hexagon head screw for DMG2 22	24	4	Hexagon nut
	16	Hexagon head screw for DMG2 25.4	30	1	Measuring stand
	16	Hexagon head screw for DMG2 30	31	4	Hexagon head screw



**Fig. 9:** Assembly drawing

The base plates are located and checked for fitting dimension.

The measuring stand is bolted onto the first base plate (1). The measuring stand has a mark corresponding precisely to the centre of the main gear unit (height) in the operating condition. The plate is clamped fast in the foundation with the threaded rods (14) and accessories (12, 13, 15) and aligned horizontally with the set screws (11). The horizontal position is checked with a spirit level. The precise height is checked with the levelling instrument via measuring stand/fixed point in the building (tubular mill axis).

The second base plate (2) is pre-aligned with a straight-edge and then laid by the same procedure.



**Both base plates must be precisely horizontal and level with each other. The maximum error must not exceed 0.1 mm/m.**

After alignment the base plates are enclosed in shuttering and grouted in with a non-shrinking material with specified properties (cf. foundation plan). The foundation holes must be sealed to prevent the entry of grouting medium. For this the threaded rods (14) must be loosened individually in order to carry out the sealing. The plates must then be checked once more with a spirit level. The specific instructions for the use of this grouting medium must be observed.



**After the grouting medium has hardened and the fixtures have been removed, the foundation bolts for the gear unit must be inserted in the foundation holes, as the bolts cannot be inserted later. The set screws (11) must be cut off.**

## 6.5 Installing the gear units



**The steel sheet hood must be removed now and no later.**

Before the gear unit is placed on the base plate, the support surfaces must be cleaned of preservative and dirt.

The marked point on the girth gear (for highest point of run-out measurement, see item 6.3) must be on a level with the tubular mill axis.

After the gear unit has been placed on the base plate, the height must be checked once more with the levelling instrument. Centricity to the girth gear across the width is determined via the helical gears (parts 216 and 217, see spare-parts drawing item 11.3 or 11.4) ( $J = K$ ).

A lever arm must be mounted on the input shaft to enable the pinions to be rotated.



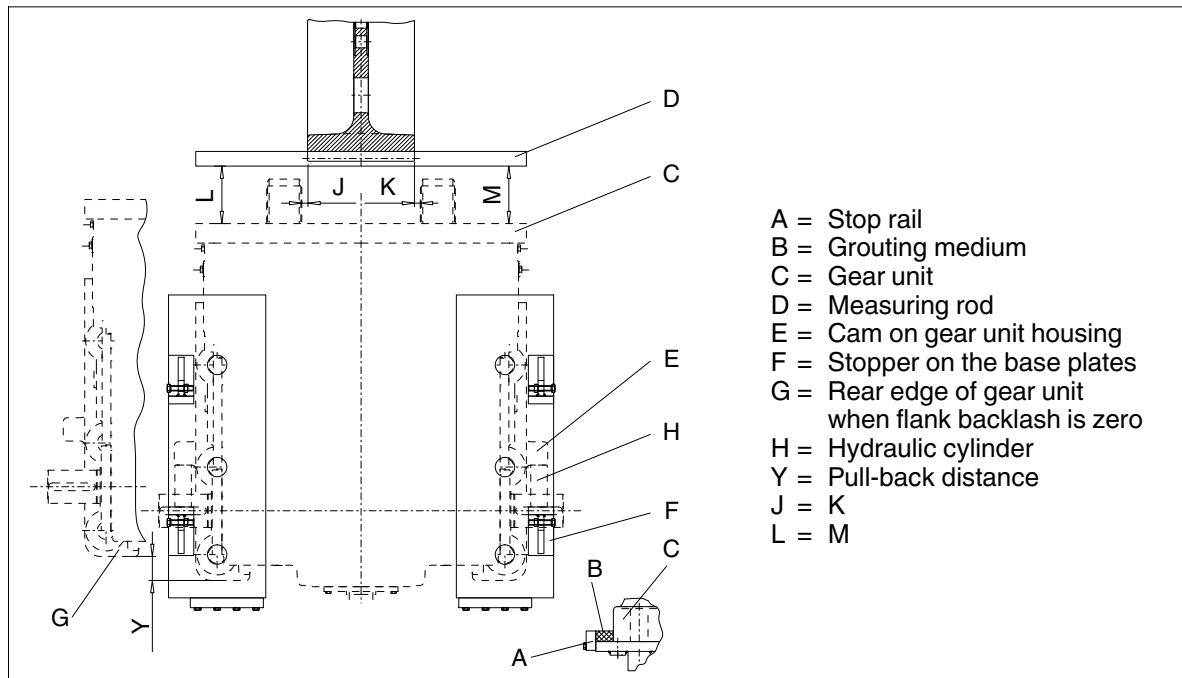
**The transport lock of the floating shaft must be removed now. To do this, undo the locknuts and remove the threaded rod on either side of the gear unit. After that seal the hole in the bearing cover with a plug.**

Using hydraulic cylinders, the main gear unit may now be shifted towards the girth gear, until "equal zero" backlash is achieved on the flanks. During this work care must be taken to ensure that the teeth of the pinions engage parallel with the girth gear teeth. In this position a measuring rod is placed between two girth gear teeth in order to determine the precisely parallel position of the main gear unit relative to the tubular mill axis. Measurement is made between the measuring rod and the flange on the main gear unit to which the seal is fixed ( $L = M$ ).



**When moving the teeth together, extreme care must be exercised until "nearly zero" flank backlash is achieved. The backlash at both meshing points must be continuously checked. If zero flank backlash is achieved at one meshing point, the gear unit must not under any circumstances be shifted any further, as otherwise damage may be caused to the teeth.**

After alignment the entire drive is pulled back the distance "Y" specified in the foundation plan. This will enable the flank backlash required in operation to be obtained. To guarantee even shifting back, two clock gauges are applied to the rear end of the gear unit feet while the gear unit is being pulled back by means of the hydraulic cylinders. The axial height of the gear unit and parallelism to the girth gear must then be rechecked. The clock gauges remain in position for checking.



**Fig. 10:** Installing the gear unit

#### 6.5.1 Fastening foundation bolts

The foundation bolts are pulled up and initially temporarily fastened with the associated nuts and washers. The bolts must then be tightened in accordance with the instructions for use.

After the foundation bolts have been tightened, the drive must once more be checked against the fixed point at the "centre of the tubular mill" in the building and the test prod in the housing. The reference points set up in the housing must be checked with the aid of a spirit level. The values must be recorded.

After all the work has been carried out, for additional security the space between the stop rail and the gear unit foot must likewise be grouted out with a non-shrinking medium.



**Fixing bolts or nuts must be tightened to the prescribed torque and/or pretensioned to the prescribed pretension, using an hydraulic pretensioning tool.  
For tightening torque and/or pretension for foundation bolts, see table 10 or the foundation plan.**

**Table 10:** Technical data of the foundation bolts/nuts.

Gear-unit size	Type of the foundation nuts	Diameter	Strength class	Initial-tensioning force	Tightening torque
				kN	Nm
18	Superbolt	M 72 x 4 - M 16	10.9	1750	265
22	Hexagon	M 80 x 4	10.9	1950	-
25.4	Hexagon	M 90 x 4	10.9	2550	-
30	Superbolt	M 110 x 6 - M 20	10.9	3900	800





**The accuracy of alignment of the shaft axis of the drive motor and the gear unit is an important factor in improving the life span of shafts, bearings and couplings. If possible, the deviation should be zero. For amongst others the special requirements for the couplings, refer to the specific operating instructions.**



**Non-observance can cause shaft rupture, resulting in serious injury or danger of life.**

#### 6.5.2 Adding-on the oil-supply system

The oil-supply system (incl. connecting piping, if any) must be connected to the gear unit by means of connecting flanges.



**The pipework must not be overstressed!**

**Consult operating instructions for oil-supply system.**

#### 6.6 Final work

- After installation of the gear unit check all screw connections for tight fit.
- Check the alignment after tightening the fastening elements (the alignment must not have been changed).
- Check that all the devices which have been demounted for transport reasons have been refitted.
  - For this refer to the details in the data sheet, the list of equipment and the associated drawings.
- Any oil-drain cocks must be secured against accidental opening.



**Any oil-drain cocks must be secured against accidental opening.**

- The gear unit must be protected against falling objects.
- Protective devices for rotating parts must be checked for correct seating. Contact with rotating parts is not permitted.
- A potential equalisation in accordance with the applying regulations and directives must be carried out! If no threaded holes for earth connection are available on the gear unit, other appropriate measures must be taken. This work must always be done by specialist electricians.
- Cable entries should be protected against moisture.
- Check that protective measures have been taken!

## 7. Start-up

Observe the instructions in section 3, "Safety instructions"!



**The gear unit must not be started up if the required instructions are not to hand.**

A precondition of the warranty is initial start-up by Siemens specialists or suitably trained specialists authorised by Siemens. Siemens urgently recommend initially driving the tubular mill via the main drive likewise under the supervision of the abovementioned specialists.



**Any setting of the drive in motion represents a start-up!**

For this reason the gear-unit instructions must be adhered to, particularly if maintenance work is carried out on the tubular mill during which this is rotated and the gear unit along with it.

### 7.1 Preparatory work

#### 7.1.1 Check

When the installation has been completed and before the first cold test run, all the drive parts must be inspected and all material residues, tools and installation aids removed.

If the Siemens delivery includes the oil-supply system, this must be checked for correct operation before delivery. Before test-running the tubular mill, the electric interlock between the oil-supply system and tubular mill drive motor must be inspected.

The entire drive must also be checked against the following check list:

- Have the base plates been fully grouted?
- Have the foundation bolts been properly tightened?
- Have the armature bolts of the main motor been tightened to requirement?
- Has the inside of the girth gear cover been cleaned, and is the return line clear?
- Has the girth gear been aligned in accordance with the installation requirements?
- Have the girth gear fixing bolts been tightened to the prescribed bolt tightening torque?
- Has the seal of the girth gear cover been correctly fitted and is it operational?
- Has the seal to the join between the housing and the girth gear cover been correctly fitted?
- Has all the pipework been fitted and cleaned in accordance with the installation instructions?



**Especial care must be taken to ensure that the oil-conducting pipework is clean, since any dirt in it would be conducted through the gear unit before it could be filtered out at the filter of the oil-supply system!**

- Have the pipework and the hoses been correctly fitted?
- Have the oil reservoirs been filled up to their marks? (check of the oil-supply system while it is running)
- Has all the monitoring equipment been connected up in accordance with the circuit diagram?
- Has the oil supply been checked for correct operation?

- The following checks must be recorded:
  - Height datum marks on foundations and position of tubular mill axes.
  - Level of the base plates.
  - Even-run errors on girth gear - axial and radial value.
  - Flank and tip backlash between girth gear and pinion?
  - Alignment of motor, coupling and gear unit
- Check that the interlocking system is operating in accordance with the interlocking plan and/or the description.
- Have the flow monitors, pressure switches and temperature sensors been set to the correct values?
- Has the cooling-water supply been opened?
- Has the transport lock to the floating shaft been removed?
- If our delivery includes an inductive sensor:  
Has the inductive sensor been correctly installed?
- Is the axial displacement of the floating shaft (300) within the permitted range?  
(During the measurement the gear unit should be clamped in the direction of the load. For permissible values see table 12 in item 7.4. <sup>1)</sup>).

For further checks, see the operating instructions for the couplings, motors, oil-supply system, girth gear and tubular mill.

## 7.1.2 Flushing

### 7.1.2.1 General

In all cases a distinction must be made between "flushing" prior to the initial start-up and "flushing" before and after repairs and overhauls.

### 7.1.2.2 Flushing before initial start-up

Flushing before initial start-up serves to minimise old lubricating oil residues which may cause the oil to foam and make necessary the removal of contamination resulting from installation.

Flushing should be carried out with the selected service lubricant. It is recommended that the oil be warmed up. The amount of flushing oil used must be selected to enable the oil pump to run continuously.

The length of flushing time depends on the temperature of the flushing oil:

**Table 11:** Oil temperature and flushing time

Oil temperature	Flushing time
20 °C / 68 °F	6 h
30 °C / 86 °F	5 h
40 °C / 104 °F	3.5 h
50 °C / 122 °F	2 h

After flushing the oil must be drained out of the oil-supply system.



**At a low temperature the oil in the girth gear cover runs back slowly. Before the oil is drained off, it must be checked to determine whether the original level on the oil-supply system has again been reached. It may be re-used only as flushing oil after thorough cleaning.**

### 7.1.2.3 Flushing before/after repair and maintenance work

Flushing before and after the repair and maintenance work serves mainly to remove any possible contamination. Flushing should be carried out with the selected service lubricant. It is recommended that the oil be warmed up. The flushing time depends on the level of contamination.

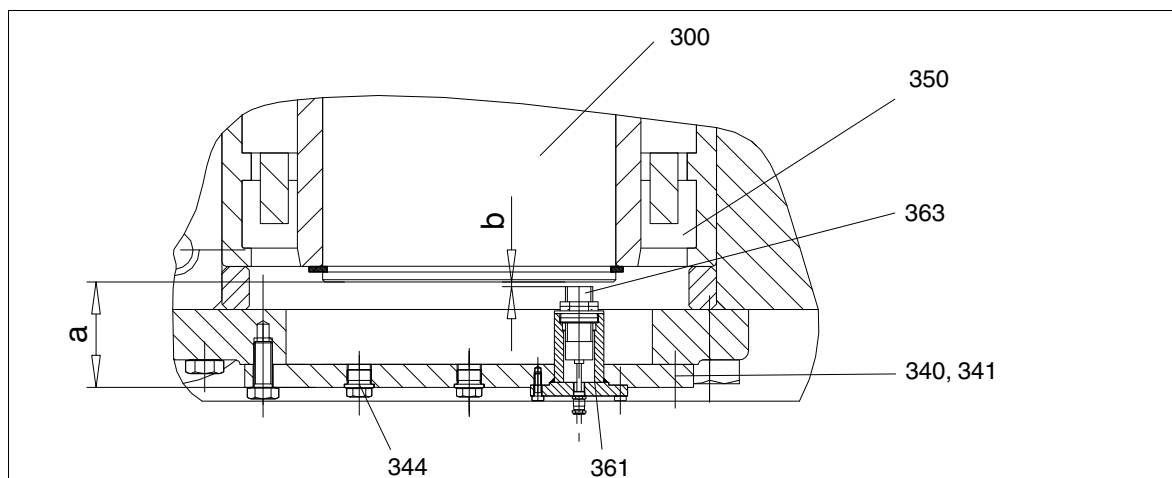


**At a low oil temperature, the oil in the girth gear cover runs back slowly. Before the oil is drained off, it must be checked to determine whether the original level on the oil-supply system has again been reached. It may be re-used only as flushing oil after thorough cleaning.**

### 7.2 Inductive sensor on the intermediate shaft (optional)

This item need be observed only, if an inductive sensor is used on the intermediate shaft.

During operation the axial displacement of the floating shaft (300) is monitored by means of an inductive sensor (363).



**Fig. 11:** Inductive sensor on the intermediate shaft (optional)

#### 7.2.1 Setting the inductive sensor

The girth gear unit has been completely installed in front of the mill and clamped in the direction of load.

The covers (340,341) have been marked with letter punches. These letter punches represent dimension "a" when the floating shaft (300) is in the central position.

Due to alignment and girth gear tooth errors the floating shaft (300) in the case of a gear unit installed in front of the girth gear may have been displaced from the central position. To check the displacement of the floating shaft (300) a check measurement must be carried out.

- Remove pick-up bush (361) and/or screw plug (344).
- Determine dimension "a" with a depth gauge.

The displacement from the central position is obtained from the difference between the measured dimension "a" and the values punched in. The permitted axial displacements of the floating shaft (300) are listed in the table below.

**Table 12:** Permitted axial displacements of the floating shaft (300) of the girth gear units from the central position

Gear-unit size	Permitted maximum axial displacement from the central position during operation including dynamic displacement	max. permissible dynamic displacement during the operation
18	± 4.5 mm	± 0,7 mm
22	± 5.5 mm	
25.4	± 6.0 mm	
30	± 7.5 mm	

**Example: size 25.4:**

Punched in value on cover (340):	115.9 mm
Measured value "a" on cover (340):	114.2 mm
Axial displacement from the central position:	- 1.7 mm
Punched in value on cover (341):	115.5 mm
Measured value "a" on cover (341):	117.2 mm
Axial displacement from the central position:	+ 1.7 mm
Permitted axial displacement from table 12:	± 6.0 mm

If the axial displacement of the floating shaft (300) is within the permitted range, the inductive sensor must be fitted at distance "b" (dimension "b": see list of equipment) from the shaft end face.



**The maximum permitted dynamic displacement of the floating shaft (300) during operation must not exceed ± 0.7 mm in an axial direction.**

**This must be carefully checked and any errors reported to Siemens.**

7.3 Filling



**The oil-supply system must be filled with the prescribed quantity of clean service lubricating oil (of a purity class higher than 20/18/15 in accordance with ISO 4406) of the selected type (note display on the oil-supply system). For the prescribed oil viscosity and type of oil (mineral oil, etc.), see Technical Data, the dimensioned drawing or the rating plate.**

**The quality of the oil used must meet the requirements of the separately supplied BA 7300 EN operating instructions, otherwise the guarantee given by Siemens will lapse. We urgently recommend using one of the oils listed in BA 7300 EN, because they have been tested and meet the requirements.**

**If level of fresh-oil contamination is higher than prescribed, the oil must be filtered with a nominal filter fineness of 10 µm during filling.**

## 7.4 Start-up

### 7.4.1 Pre-lubrication phase

Prior to first startup, the gear unit should be prelubricated for 30 to 60 minutes by means of the oil-supply system.

During this time, rolling bearings and gear teeth will be adequately supplied with lubricating oil for the first startup. All piping, filters, coolers and oil chambers are filled with oil.

### 7.4.2 Start-up

After due observance of the relevant operating instructions, the gear unit can be put into operation.

If a cold test run (partial load range without filling) is required, the gear unit must be operated via the auxiliary drive only.

When operating the system via the main motor, the tubular mill must be at least 80 % filled.

At 80 % tubular mill filling the contact patterns must be checked and should show a contact surface of at least 80 % over the tooth width. This must be carefully checked and any errors reported to Siemens.

If a carrying ratio greater than 80 % is achieved, more oil may be put in.

### 7.4.3 Checking procedure

The following visual checks must be conducted and recorded when starting up:



**Oil level**

**Leaktightness of the oil-cooling or oil-supply lines**

**Opening condition of the shut-off valves**

**Effectiveness of the shaft seals**

**Freedom of the rotating parts from contact.**

**Position of the floating shaft (300) from the zero-position including dynamic displacement.**



The document must be kept with the operating instructions.

## 7.5 Removal from service

- To take the gear unit out of service, first switch off the drive assembly.



**Secure the drive unit to prevent it from being started up unintentionally.  
Attach a warning notice to the start switch!**

- During longer periods of disuse but less than 6 months, the unit and oil-supply system should be started up briefly at intervals of approx. 3 weeks.
- If it is to remain out of service for longer than 6 months, the interior of the gear unit must be preservation treated. After internal preservation the gear unit must first be flushed out (see also item 7.1.2) before any further start-up.

## 8. Operation

Observe the instructions in section 3, "Safety instructions", in section 9, "Faults, causes and remedy", and in section 10, "Maintenance and repair"!

To achieve a satisfactory and trouble-free operation of the equipment, be certain to observe the operating values specified in section 1, "Technical Data", as well as the information given in the operating instructions of the oil-supply system.

During operation the gear unit must be monitored for:

- Operating temperature                      An oil-supply temperature with the following values should aimed for:  
**40 °C up to 45 °C.**  
The maximum permissible oil-supply temperature is:  
**55 °C** (applies to mineral oil)  
**60 °C** (applies to synthetic oil)  
At higher temperatures the gear unit must be shut down and Siemens consulted.

### 8.1 Irregularities



**The drive unit must be switched off at once,  
if irregularities are found during the operation**

**or**

**the pressure monitor triggers alarm (see Item 5.2)**

**Determine the cause of the fault, using table 13, "Faults, causes and remedy" (see item 9.2).**

**Table 13, "Faults, causes and remedy", contains a list of possible faults, their causes and suggested remedies.**

**If the cause cannot be found, a specialist from one of our customer-service centres should be called in (see section 2).**



**During operation the lubricating oil in the lubricating circuit must be filtered with a filter with at least 25 µm mesh at least.**

## 9. Faults, causes and remedy

Observe the instructions in section 3, "Safety instructions", and in section 10, "Maintenance and repair"!

### 9.1 General information on faults and malfunctions



Faults and malfunctions occurring during the guarantee period and requiring repair work on the gear unit must be carried out only by Siemens specialists.

For the case of faults and malfunctions occurring after the guarantee period and whose cause cannot be precisely identified or whose remedy requires intervention on the gear unit, we advise our customers to call in our Siemens specialists.



**Siemens will not be bound by the terms of the guarantee or otherwise be responsible in cases of improper use of the gear unit, modifications carried out without Siemens' agreement or use of spare parts not supplied by Siemens.**



**To remedy faults and malfunctions, the gear unit 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

**Table 13:** Faults, causes and remedy

Faults	Causes	Remedy
Increased temperature at the bearing points.	Oil too old.	Check date of last oil change and, if necessary, change oil. (See section 10.)
	Oil pump defective.	Check and, if necessary, replace oil pump.
	Bearing defective.	Contact Customer Service. - Check and, if necessary, replace bearings.
	Oil badly contaminated.	Change oil. (See also item 10.3).
Increased operating temperature.	Oil too old.	Check date of last oil change and, if necessary, change oil. (See section 10.)
	Oil badly contaminated.	Change oil. (See also item 10.3).
	Oil cooling system: Coolant flow too low.	Fully open valves in in- and outflow pipes. Check for free flow through water oil-cooler.
	Coolant temperature too high.	Check temperature and, if necessary, adjust.
	Oil flow through water oil-cooler too low due to: Badly clogged oil filter.	Clean the oil filter. (See section 10.)
Oil pump defective.	Check and, if necessary, replace oil pump.	



<b>Faults</b>	<b>Causes</b>	<b>Remedy</b>
Changes in gear-unit noise.	Damage to gear teeth.	Contact Customer Service. - Check all toothed components and replace any damaged parts.
	Excessive bearing play.	Contact Customer Service. - Adjust bearing backlash.
	Bearing defective.	Contact Customer Service. - Replace defective bearings.
Loud noises in the area of the gear-unit fastening.	Gear-unit fastening has worked loose.	Tighten bolts / nuts to specified torque. Replace damaged bolts / nuts. (See also item 6.5.1).
Oil leakage from the gear unit.	Inadequate sealing of housing covers and/or joints.	Check and, if necessary, replace sealings. Seal joints.
Pressure monitor triggers alarm.	Oil pressure (See item 5.2).	Check and, if necessary, replace oil pump. Check and, if necessary, clean oil filter.
Increased vibration.	Foundation bolts undone.	Retighten foundation bolts to required torque. (See also item 6.5.1).
	Bearing defective.	Contact Customer Service. - Replace defective bearings.
	Damage to gear teeth.	Contact Customer Service. - Check all toothed components and replace any damaged parts.
	Reaction due to fault on the tubular mill.	Observe operating instructions for tubular mill and consult tubular mill supplier's after-sales service.
	Damage to foundation.	Contact Customer Service. - Have foundation repaired.
Oil foaming in the gear unit.	Oil badly contaminated.	Oil change.
	Oil pump has been operated too long at low temperatures.	Stop oil-supply system. Allow the oil to degas.
	Gear unit too cold in operation.	Shut down gear unit and have oil degassed. Restart without cooling water.
	Water in oil.	Check state of oil by the test-tube method for water contamination. Have oil analysed by chemical laboratory. Oil change.
Fault in oil-supply system.		Consult operating instructions for oil-supply system.

## 10. Maintenance and repair

### 10.1 General

Observe the instructions in section 3, "Safety instructions", and in section 9, "Faults, causes and remedy"!

Maintenance comprises all measures for preserving and restoring the required condition and for ascertaining and assessing the actual condition of the technical means of a system.

In this sense maintenance is a comprehensive generic concept which can be subdivided into three areas: inspection; maintenance, including lubrication; and repair.



**Before starting any maintenance work, repairs or other work on the gear unit, the operator of the system must ensure that the drive motors (main and auxiliary drive motor) are secured against unintentional starting.  
The tubular mill must be swung out and secured with the holding brake!**



**The gear unit must be protected against falling objects.**

**Protective devices for rotating parts must be checked for correct seating. Contact with rotating parts is not permitted.**

**For operation and maintenance the technical data, lists of equipment and drawings prepared specifically under the order and appended to the operating instructions must be taken into consideration.**

### 10.2 Inspection

The inspection comprises all measures for ascertaining and assessing the actual condition.

**Table 14:** Inspection work

Measures	Periods	Remarks
General visual check for cracks, leaks and damage	Every 4 weeks	
Girth gear and main gear unit	Every 4 weeks	
Visual check of the condition of the tooth flank and contact pattern; check for extraneous noises.	Every 4 weeks	
Check oil filters of the oil-supply system for contamination	Weekly	Visual indication, see also operating instructions oil-supply system.
Check of the instruments installed on site (temperatures, oil pressures)	Weekly	
Inspection of the oil-conducting lines for leaks	Weekly	
Check the oil level in the oil reservoir of the oil supply unit	Weekly	See also operating instructions oil-supply system
Check - unusual noises, - temperature, - safety equipment.	Every 4 weeks	
Couplings: Visual and wear check	Every 26 weeks	See operating instructions for the individual components
Auxiliary drive: Check for correct operation.	Yearly	See operating instructions for the individual components
Double-shoe brake: Check friction pads for wear	Yearly	See operating instructions for the individual components

Experience shows that checking against a checklist (see item 10.2.1) is practical. For one thing, all the important checking items are listed, for another, the operating parameters are recorded.



The records must be retained with these operating instructions at the tubular mill.

### 10.2.1 Checklist

**Table 15:** Checklist

Month / year:	Day				
Time					
Operating hours					
Main-motor power requirement in kW (observation period 5 min.)	max.				
	min.				
Position of the floating shaft in mm (measurement possible only if appropriate sensors ordered)					
Vibration velocity at measuring point 1 in mm/s					
Bearing temperature at measuring point in °C (measuring point 1 main-motor side)	1				
	2				
	3				
Oil temperature in the piping of the gear unit oil-supply system in °C					
Oil pressure in the piping on the gear unit	bottom				
	top				
Signature					

Filter element changed				Particularities: (e.g. noises, machine damage, environmental conditions, etc.)
Oil change				
Last oil change				
Shutting down the system				
Starting the system				

**Table 16:** Maintenance and repair work

Measures	Periods	Remarks
Cleaning the filter elements	Every 2 weeks	See operating instructions for the individual components
Take oil sample from the oil-supply system and analyse for lubricity	Every 26 weeks	If the lubricity of the oil can no longer be guaranteed, the oil must be changed.
Maintenance work on the oil-supply system		See also operating instructions oil-supply system
Couplings: Check coupling packs. If the torsional backlash is too high, the coupling packs must be replaced.	Every 26 weeks	See operating instructions for the individual components.
Overrunning clutch: Cleaning	Yearly	
Total drive: Checking that the fastening bolts are properly tightened. Checking the drive for misalignments	Yearly	
Main motor: General overhaul	Yearly	Acc. to specification by manufacturer
Oil tank: Cleaning of the breathing filter	Every 12 weeks	Acc. to specification by manufacturer
Checking the seal on the girth gear cover	Every 26 weeks	Acc. to specification by manufacturer



**If following contamination limits or the purity class 20/18/15 in accordance with ISO 4406 is exceeded, the oil must be changed:**

**Table 17:** Contamination limits

Material	Contamination limit	Possible source
Iron	40 [mg/kg]	Girth gear, gear wheels, rolling bearings
Chromium	4 [mg/kg]	Bearings, gear wheels
Aluminium	4 [mg/kg]	Oil-pump bearing
Copper	4 [mg/kg]	Rolling bearing cages
Lead	6 [mg/kg]	Sliding bearings - pump / tubular mill
Tin	2 [mg/kg]	Sliding bearings - pump / tubular mill
Nickel	2 [mg/kg]	Gear wheels
Zinc	10 [mg/kg]	Priming coat contains zinc: If, as is sometimes the case, zinc is used as an additive, please consult Siemens.
Silicon	20 [mg/kg]	Dust, other environmental factors.
Water	0.1%	Condensation, faulty water oil-cooler.



The oil viscosity at 40 °C must not be more than 10 % lower than the rated viscosity.



When changing the oil, always re-fill the gear unit with the same type of oil. Never mix different types of oil and/or oils made by different manufacturers. Never mix synthetic oils with mineral-based oils or with other synthetic oils. When changing to any different oil type, the gear unit must be flushed thoroughly using the new oil type.

Before an oil change the inside bottom of the housing must be checked for foreign particle deposits. This check is carried out through the lower front inspection cover.

If there are any deposits at the bottom of the housing, they must be carefully flushed out until they have been completely removed from the housing bottom, from the girth-gear cowl, and the return line to the tank. Loose residues must have run off into the tank of the oil-supply system.

Flushing out must be done with the oil to be replaced and with the lubricating system running. For flushing, a suitable aid must be connected to an internal spray nozzle (e.g. attach hose with spray nozzle).

The condition of the filter must be continuously monitored and, if necessary, the filters cleaned.



**Care must be taken to ensure that during the flushing out operation the deposits do not get into the rolling bearings and onto the teeth.**

After flushing and draining the oil the tank of the oil-supply system must likewise be cleaned.



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

**The gear unit must not be cleaned with high-pressure cleaning equipment.**



**Damaged bolts must be replaced with new bolts of the same type and strength class (see also item 6.5.1).**

#### 10.4 Repair

Repair comprises all measures for restoring the required condition after faults.



**When carrying out repair work, especial care must be taken that, when doing electric welding work at any point on the unit, the welding current is not conducted through rolling bearings or other movable connections and measuring equipment. The welding current return wire must therefore be connected direct to the part to be welded.**

When replacing individual components and other subassemblies, these must be carefully fastened to lifting gear and secured to prevent hazards.



**Use only suitable, technically faultfree lifting gear and load-bearing equipment with sufficient carrying capacity!  
Do not stand or work under suspended loads!**

## 10.5 Lubricants

The quality of the oil used must meet the requirements of the separately supplied BA 7300 EN operating instructions, otherwise the guarantee given by Siemens will lapse. We urgently recommend using one of the oils listed in BA 7300 EN, because they have been tested and meet the requirements.



To avoid misunderstandings, we should like to point out that this recommendation is in no way intended as a guarantee of the quality of the lubricant supplied. Each lubricant manufacturer is responsible for the quality of his own product.

Information on the type, quantity and viscosity of the oil is given on the rating plate on the gear unit and/or in the supplied documentation.

The quantity of oil indicated on the rating plate is an approximation only. The marks on the dipstick or oil-sight glass are decisive for the amount of oil to be filled in.

The manual containing the current lubricants recommended by Siemens can also be consulted on the Internet (see back cover).

The oils listed there are subjected to continuous tests. Under certain circumstances the oils recommended there may therefore later be removed from the range or replaced with further developed oils.

We recommend regularly checking whether the selected lubricating oil is still recommended by Siemens. If it is not, the brand of oil should be changed.

## 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 gear unit is ready for use at any time.

To order spare parts, refer to the spare-parts list.

For further information refer to the spare-parts drawing stated in the spare parts list.



**We guarantee only the original spare parts supplied by us. Non-original spare parts have not been tested or approved by us. They may alter technical characteristics of the gear unit, thereby posing an active or passive risk to safety. Siemens will assume no liability or guarantee for damage caused by spare parts not supplied by Siemens. The same applies to any accessories not supplied by Siemens.**

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.

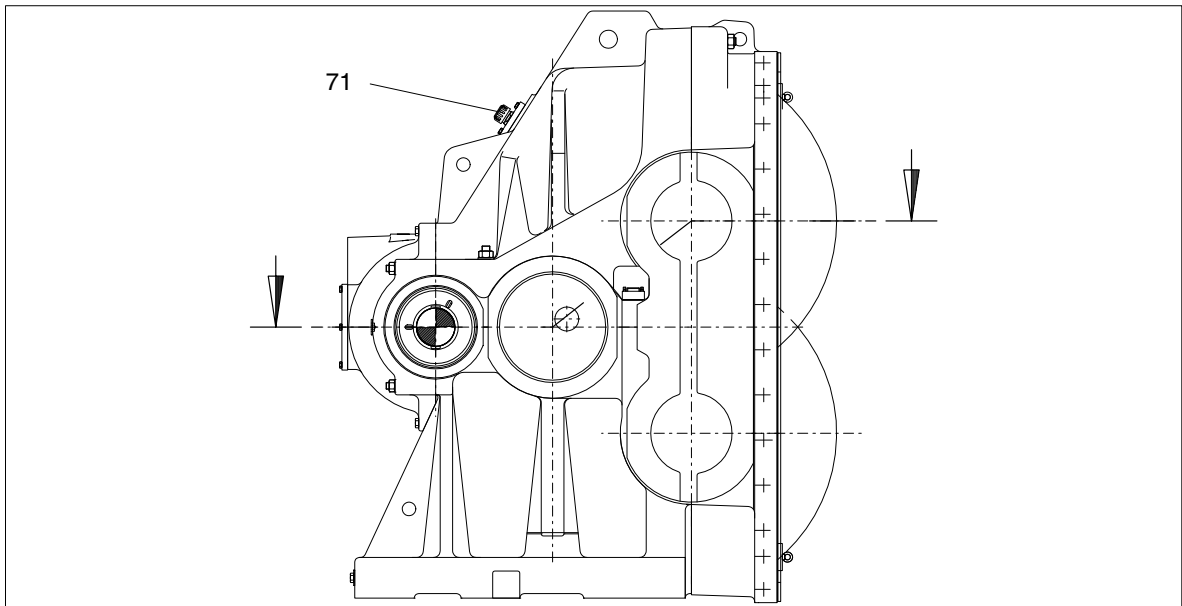
When ordering spare parts, always state the following:

Order number, item	Type, size	Part number	Quantity
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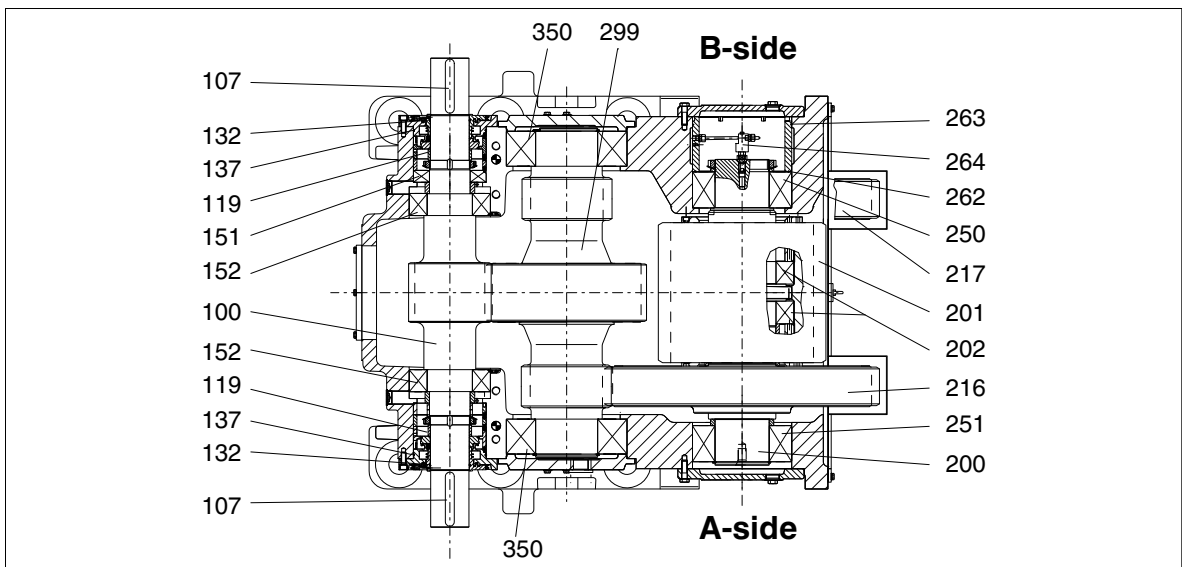
### 11.2 Spare parts and customer-service addresses

When ordering spare parts or requesting a service specialist, please contact Siemens first (see section 2).

11.3 Spare parts drawing, spare parts list, drive version A/x, B/x, C/x



**Fig. 12:** Spare-parts drawing 1/2 for drive version A/x, B/x, C/x

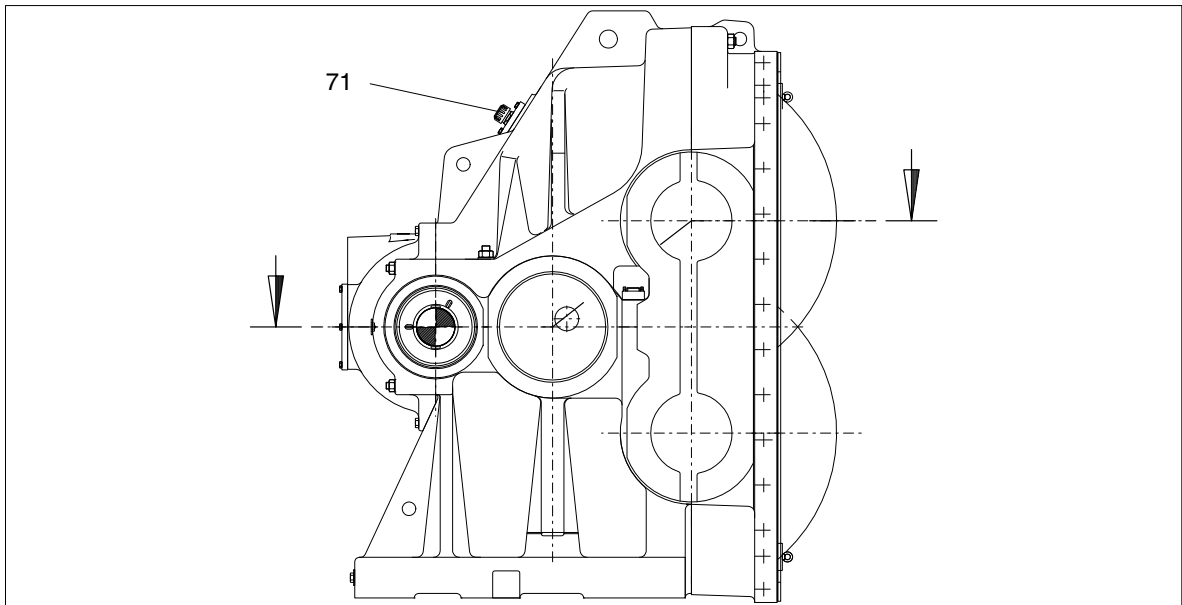


**Fig. 13:** Spare-parts drawing 2/2 for drive version A/x, B/x, C/x

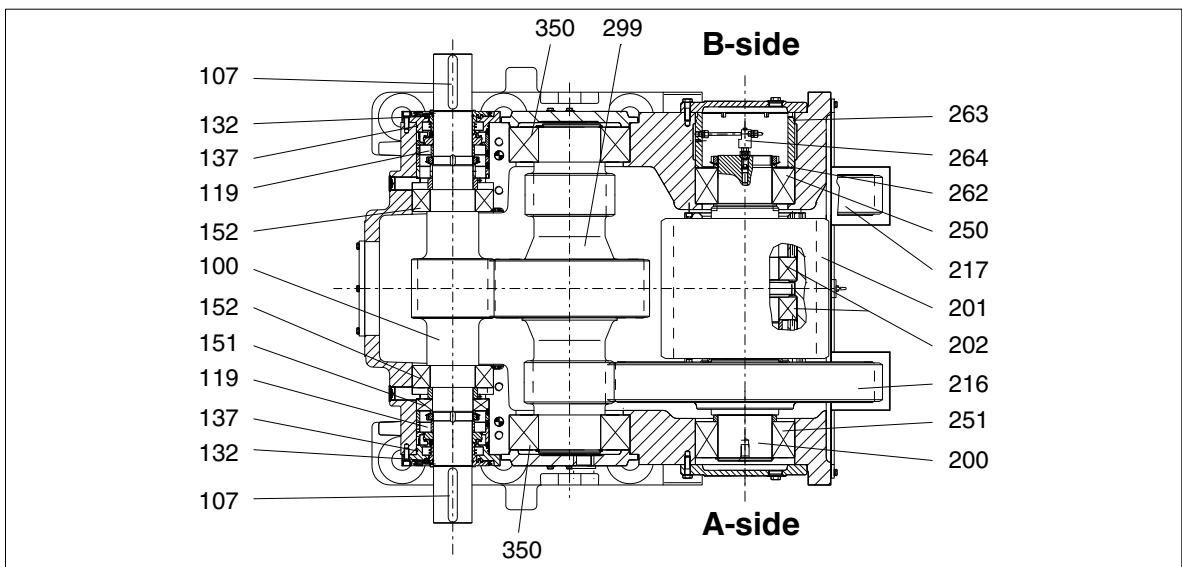
**Table 18:** Spare-parts list, drive version A/x, B/x, C/x

Part number	Quantity	Designation	Part number	Quantity	Designation
71	1	Air filter	202	4	Ball and socket joint
100	1	Helical-gear shaft	216	1	Helical gear
107	4	Parallel key	217	1	Helical gear
119	2	Shaft sealing ring (only with DMG2 30)	250	2	Rolling bearing
132	2	O-ring	251	2	Rolling bearing
137	2	O-ring	262	2	O-ring
151	1	Rolling bearing	263	2	O-ring
152	2	Rolling bearing	264	2	Rotor
200	2	Shaft	299	1	Helical gear shaft, complete
201	2	Helical gear	350	2	Rolling bearing

11.4 Spare parts drawing, spare parts list, drive version D/x, E/x, F/x



**Fig. 14:** Spare-parts drawing 1/2 for drive version D/x, E/x, F/x



**Fig. 15:** Spare-parts drawing 2/2 for drive version D/x, E/x, F/x

**Table 19:** Spare-parts list for spare-parts drawing 1/2 for drive version D/x, E/x, F/x

Part number	Quantity	Designation	Part number	Quantity	Designation
71	1	Air filter	202	4	Ball and socket joint
100	1	Helical-gear shaft	216	1	Helical gear
107	4	Parallel key	217	1	Helical gear
119	2	Shaft sealing ring (only with DMG2 30)	250	2	Rolling bearing
132	2	O-ring	251	2	Rolling bearing
137	2	O-ring	262	2	O-ring
151	1	Rolling bearing	263	2	O-ring
152	2	Rolling bearing	264	2	Rotor
200	2	Shaft	299	1	Helical gear shaft, complete
201	2	Helical gear	350	2	Rolling bearing



## 12. Declarations

### 12.1 Declaration of incorporation

#### Declaration of incorporation

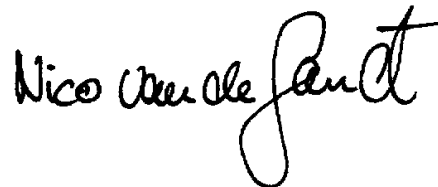
in accordance with Directive 2006/42/EC, Annex II 1 B

The manufacturer, Siemens AG, D - 46393 Bocholt, declares with regard to the partly completed machinery

#### Girth gear unit for tubular mills DMG2 Sizes 18, 22, 25.4 and 30


for driving a tubular mill:

- The special technical documents described in Annex VII B have been prepared.
- The following basic health and safety requirements set out in Directive 2006/42/EC, Annex I, are applied and are satisfied:  
1.1, 1.1.2, 1.1.3, 1.1.5; 1.2.4.4, 1.2.6; 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.6, 1.3.7, 1.3.8, 1.3.8.1; 1.4.1, 1.4.2.1; 1.5.1, 1.5.2, 1.5.4, 1.5.5, 1.5.6, 1.5.7, 1.5.8, 1.5.9, 1.5.10, 1.5.11, 1.5.13, 1.5.15; 1.6.1, 1.6.2; 1.7.1, 1.7.1.1, 1.7.2, 1.7.4, 1.7.4.1, 1.7.4.2, 1.7.4.3
- The partly completed machinery must not be put into service until it has been established that the machinery into which the partly completed machinery is to be incorporated has been declared in conformity with the provisions of Directive 2006/42/EC, as appropriate.
- The manufacturer undertakes, in response to a reasoned request by the national authorities, to transmit in electronic form relevant information about the partly completed machinery.
- The person authorised to compile the relevant technical documentation is:  
Dr. Nico van de Sandt (Director Engineering DAE)



Voerde, 2010-06-07

Dr. Nico van de Sandt (Director Engineering DAE)



Voerde, 2010-06-07

Dr. Bernhard Hoffmann (Director Business Subsegment DA)

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Subject to modifications

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