

Planetary Gear Unit Types

P.NA, P.SA, P.KA, P.LA

P.NB, P.SB, P.KB, P.LB

Sizes 9 to 40

Assembly and operating instructions

BA 9234 EN 03/2011



FLENDER gear units

SIEMENS

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Sizes 9 to 40

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

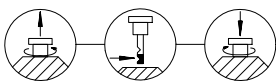
All designations indicated with the registered industrial property mark ® are registered trademarks of Siemens AG. Other designations used in these instructions may be trademarks the use of which by third parties for their own purposes may infringe holders' rights.

Exclusion of liability

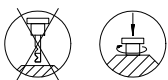
We have checked the content of the instructions for compliance with the hard- and software described. Nevertheless, variances may occur, and so we can offer no warranty for complete agreement. The information given in these instructions is regularly checked, and any necessary corrections are included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

The most important technical data are shown on the rating plate. For further data please refer to the drawings, these operating instructions and a Technical Data Sheet, if any.

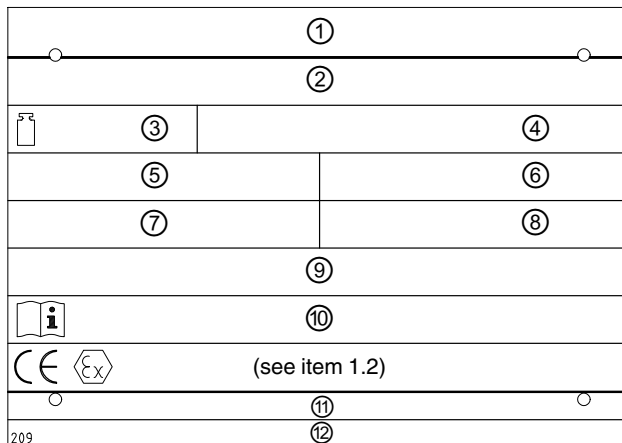
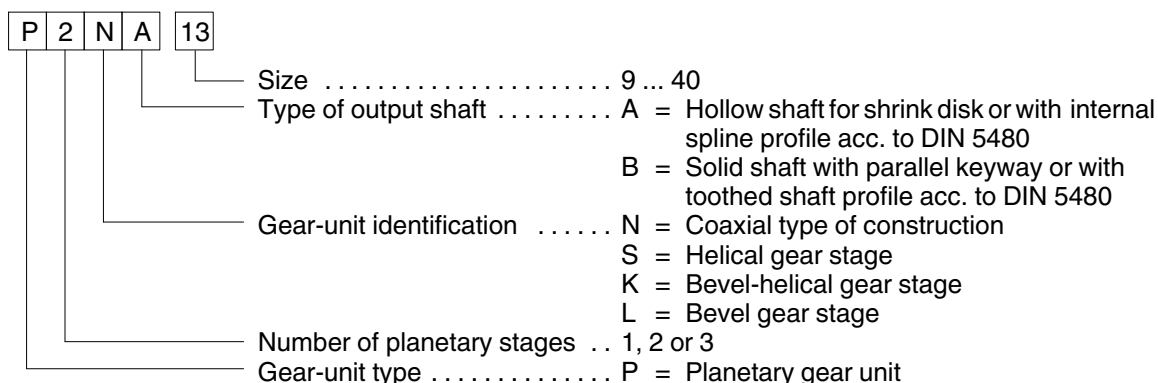


Fig. 1: ATEX rating plate gear unit

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

*) Example







Data on weights and measuring-surface sound-pressure levels of the various gear types are given in items 1.3 and 1.4.

For further technical data, please refer to the drawings in the gear-unit documentation and the order-specific data sheet.

1.2 Marking of the gear unit designed in accordance with Directive 94/9/EC

Table 1: ATEX identification

Equipment group	Equipment category ¹⁾	"Ex" atmosphere	Explosion group ²⁾	Temperature class ³⁾	Identification marking ⁵⁾
II	2, 3	Gas (G)	IIA, IIB, IIC	T4	  II 2 G IIA T4 bck T _a .. ⁴⁾
		Gas (G) and dust (D)	IIA, IIB, IIC	T4	  II 2 G IIA T4 D 120 °C bck T _a . ⁴⁾

1) Always only one equipment category can be indicated.

2) The explosion groups relate to the gaseous atmosphere (G). Always only one explosion group can be indicated.

3) Always only one temperature class can be indicated.

4) $T_{a \text{ min.}} \leq T_a \leq T_{a \text{ max.}}$ = permissible ambient temperature range in °C:
 $T_{a \text{ min.}}$ = minimum permissible ambient temperature
 $T_{a \text{ max.}}$ = maximum permissible ambient temperature
 T_a = symbol for ambient temperature in °C

5) The indications relating to equipment category, explosion group and temperature class are to be understood as an example.



With gear units without electrical explosion hazard monitoring device (such as temperature, oil level) no ignition protection "b" is available.



The rating plate on the gear unit indicates the marking for the applicable case of application.

1.2.1 Ambient temperature

The specifications of Directive 94/9/EC apply to the ambient temperature range of from - 20 °C to + 40 °C. By adopting various suitable measures the gear unit may be used at ambient temperatures of between - 40 °C and + 60 °C. However, this must always be approved by Siemens. In individual cases the permissible ambient temperature range specified on the rating plate always applies.

1.3 Types and weights

1.3.1 Standard designs

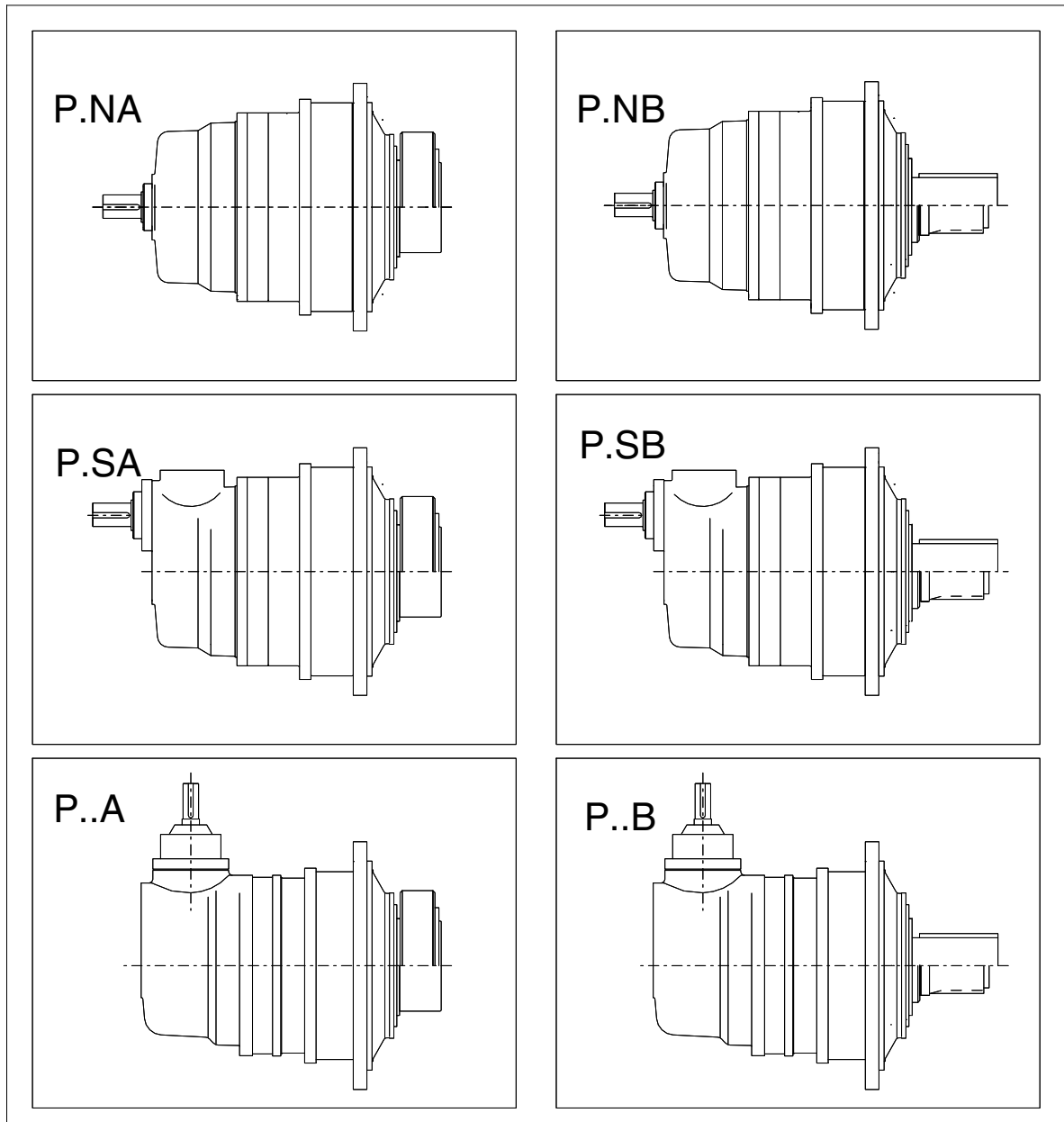


Table 2: Weights (approx. values for 3-stage gear unit)

Type	Approx. weight (kg) for size (including shrink disk)															
	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25
P..A, P..B	300	350	450	600	750	1050	1300	1800	2150	2650	2800	3150	3400	4300	4700	5800

Type	Approx. weight (kg) for size (including shrink disk)														
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
P..A, P..B	6200	7500	8000	9300	9900	11800	12400	14400	15400	19200	20600	27000	28200	34500	36500



All weights are for units without oil filling and add-on parts. For the exact weights, refer to the drawings in the gear-unit documentation.

1.4 Measuring-surface sound-pressure level

The gear unit has a measuring-surface sound-pressure level at a distance of 1 m, which can be found in table 3.

The measurement is carried out to DIN EN ISO 9614 Part 2, using the sound-intensity method.

The workplace of the operating personnel is defined as the area on the measuring-surface at a distance of 1 metre in the vicinity of which persons may be present.

The sound-pressure level applies to the warmed-up gear unit at input speed n_1 and output power P_2 stated on the rating plate, as measurement obtained on the Siemens test bench. If several figures are given, the highest speed and power values apply.

The measuring-surface sound-pressure level includes add-on lubrication units, if applicable. With outgoing and incoming pipes, the interfaces are the flanges.

The sound-pressure levels stated in the table were obtained by statistical calculation by our Quality Control Dept. The gear unit can be statistically expected to comply with these sound-pressure levels.

Table 3: Measuring-surface sound-pressure level L_{pA} in dB(A)

Type	i_N	Gear-unit size																																						
		9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40								
P2N.	25 ... 40	83	83	84	84	84	85	85	85	86	86	86	87	87	87	87	87	87	87	87	87	88	88	88	88	88	88	88	88	89	89	90	90							
P3N.	140 ... 280	80	80	80	80	81	81	81	81	82	82	82	83	83	83	83	84	84	84	84	84	84	85	85	85	85	85	85	86	86	87	87								
P2S.	45 ... 56	83	84	85	87	88	90	92	93	94	95	95	97	97	98	98	99	99	100	100	101	101	102	102	103	103	104	104	105	105	105	105								
	63 ... 80	81	82	83	85	86	88	90	91	92	93	93	95	95	96	96	97	97	98	98	99	99	100	100	101	101	102	102	109	109	110	110								
	90 ... 125	79	81	82	84	85	86	89	89	90	91	91	93	93	94	94	95	95	96	96	97	97	98	98	99	99	100	100	102	102	103	103								
P3S.	280 ... 355	74	75	76	78	79	81	82	83	84	85	86	87	87	88	88	89	89	90	90	91	91	92	92	93	93	94	94	96	96	98	98								
	400 ... 560	72	73	74	76	78	79	80	81	82	83	84	85	85	86	86	87	87	88	88	89	89	90	90	91	91	92	92	93	93	95	95								
	630 ... 900	70	71	72	74	76	77	78	79	80	81	82	83	83	84	84	85	85	86	86	87	87	88	88	89	89	90	90	92	92	93	93								
P2K.	112 ... 160	79	81	83	85	87	89	91	92	94	95	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
	180 ... 250	76	78	80	82	84	86	88	89	91	92	93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
	280 ... 560	73	75	77	79	81	83	85	86	88	89	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
P3K.	560 ... 900	70	70	72	74	76	78	80	81	82	84	85	86	87	88	88	90	90	91	91	92	92	-	-	-	-	-	-	-	-	-	-								
	1000 ... 1600	68	68	69	71	73	75	76	77	78	80	81	82	83	84	84	86	86	87	87	88	88	-	-	-	-	-	-	-	-	-	-								
	1800 ... 4000	65	65	66	68	70	72	73	74	75	77	78	79	80	81	81	82	82	83	84	85	85	-	-	-	-	-	-	-	-	-	-								



The measuring-surface sound-pressure levels shown apply with a tolerance of + 3 dB(A) for $n_1 = 1500$ 1/min.
In the case of gear units with flanged foot, the values will be approx. 2 dB(A) higher.
At $n_1 = 750$ 1/min, the values will be appr. 2 to 3 dB(A) lower.

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 planetary gear unit**" dealt with in these instructions has been developed for driven machines in the most various industry areas. Possible areas of use for gear units of this type are (e.g.) sewage treatment, excavators, chemical industry, iron and steel industry, conveyor systems, crane systems, foodstuffs industry, paper machinery, cableways, cement industry, etc.

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. It complies with the requirements in Directive 94/9/EC.

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.

Technical enquiries should be addressed to the following works or to one of our customer services:

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46562 Voerde

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Fax: +49 (0)2871 / 92-1544

3. Safety instructions



**Entry to the gear unit 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 must be operated, maintained and/or repaired only by authorised, properly trained and qualified personnel.
- 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 not in operation.
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/or directives must be carried out, if it is not possible to ensure, that voltages possibly occurring can be equalised by way of the complete machinery, the machine frame, or the like. To this purpose free threaded holes on the gear unit must be used.
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 electrotechnical specialists.



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.

Only belts with adequate leakage resistance ($< 10^9 \Omega$) must be used. Before fitting a protective cover a risk analysis must be carried out to ensure that it cannot represent a fire or explosion hazard. The risk analysis must be carried out by the manufacturer of the protective cover.

On belt pulleys the correct belt tension must be adhered to (see order-specific dimensioned drawing). The operator is responsible that the belt drive is used in compliance with Directive 94/9/EC.



All add-on parts must satisfy the requirements in Directive 94/9/EC.

Simple electrical means (such as monitoring devices, switches, Pt 100 resistance) without identification in accordance with Directive 94/9/EC are to be connected intrinsically safely by suitable isolation amplifiers.



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.



**The coating must not carry an electrostatic charge!
The operator must ensure that highly effective mechanisms which can set up a charge in the coating are safely avoided.**

- When removing the safety equipment the fixation means should be stored for later use. 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 (see also 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



The gear unit complies with the requirements in Directive 94/9/EC.



When carrying out assembly and disassembly work, ensure that no explosive gas mixtures and dust concentrations are present.

- 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**!

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.

If the unit is fitted with a shrink disk, this will be shipped as a loose component.

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.
Wedges and/or rails must be used to prevent rolling.**

The gear unit is delivered in the fully assembled condition. Additional items are delivered separately packaged, if applicable.

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:

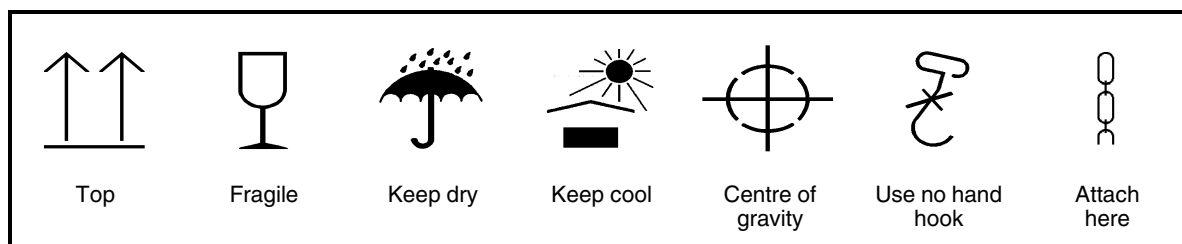


Fig. 2: Transport symbols



**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 eyes and/or twirls provided to attach lifting equipment to the gear unit or combined gear unit. All the attachment points must be used.
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 equipment for the transport.
Slinging equipment must be adequate for the weight of the gear unit or combined gear unit.**



If fitted with a shrink disk, the shrink disk must be secured axially before handling.

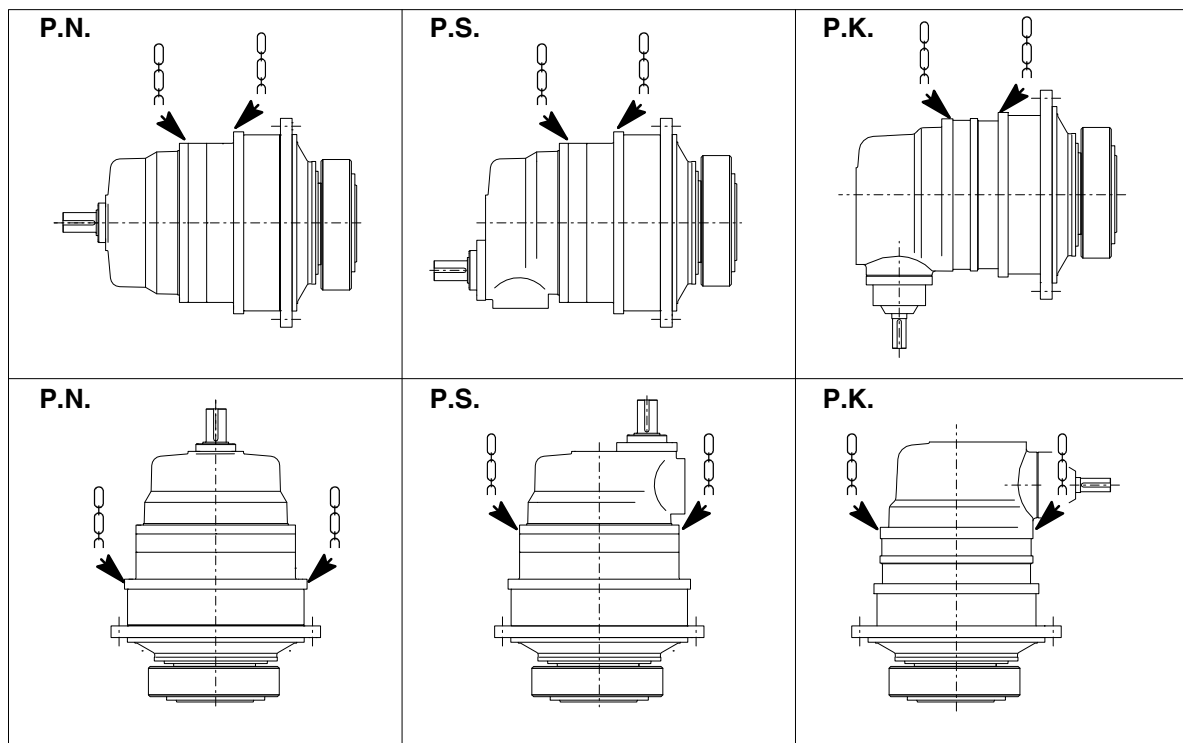


Fig. 3: Attachment points



A detailed view of the gear unit can be obtained from the drawings in the gear-unit documentation.

4.3 Storing the gear unit

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



When temporarily 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.



Unless otherwise agreed by contract, the gear unit must not be exposed to harmful environmental factors such as chemically aggressive products.

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 characteristics of the external coat depend on the ambient conditions stipulated in the order relating to method of transport and area of application.



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

The coating complies with the requirements for the conductivity of the coating and the limitation of the layer thickness of the applied coating in accordance with DIN EN 13463-1. The permissible maximum coating thickness depends on the indicated explosion group (IIA or IIB or IIC). Where lacquer coatings have a thickness less than 200 µm, no electrostatic charge is to be expected.

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



The coating must not carry an electrostatic charge!

The operator must ensure that highly effective mechanisms which can set up a charge in the coating are safely avoided.



Examples of highly effective mechanisms are:

- the rapid passage of heavily dust-laden air near by
- the sudden escape of particle-laden compressed gases
- other heavy friction action (not manual cleaning/rubbing with cleaning cloths)



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 exterior preservation for 24 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 (> 24 months) we advise regular checking and, if necessary, renewal of the interior and exterior preservation (see items 7.4.1 and 7.4.2).

The output shaft must then be rotated at least one turn to change the position of the rolling element in the bearings. The input shaft must not be in the same position as before rotation.

This procedure must be repeated and documented every 24 months until start-up.

4.4.1 Interior preservation with preservative agent

Table 4: Durability period and measures for interior preservation when using mineral oil or PAO-based synthetic oil

Duration of protection	Preservative agent	Special measures
up to 6 months	Castrol Alpha SP 220 S	none
up to 24 months		<ul style="list-style-type: none"> - Close all holes in the gear unit - Replace air filter or breather screw with screw plug. (replace screw plug with air filter or breather screw before start-up)
For storage periods longer than 24 months, renew the preservative agent. For storage periods longer than 36 months, Siemens should be consulted before.		

Table 5: Durability period and measures for interior preservation when using PG-based synthetic oil

Duration of protection	Preservative agent	Special measures
up to 6 months	Special anti-corrosion oil TRIBOL 1390 ¹⁾	none
up to 36 months		<ul style="list-style-type: none"> - Close all holes in the gear unit - Replace air filter or breather screw with screw plug. (replace screw plug with air filter or breather screw before start-up)
For storage periods longer than 36 months, Siemens should be consulted before.		

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

4.4.2 Exterior preservation

Table 6: Durability period for exterior preservation of shaft ends and other bright machined surfaces

Duration of protection	Preservative agent	Layer thickness	Remarks
in case of indoor storage up to 36 months ¹⁾	Tectyl 846 K19	approx. 50 µm	Long-term wax-based preservative agent: <ul style="list-style-type: none"> - resistant to seawater - resistant to tropical conditions - (soluble with CH compounds)
in case of outdoor storage up to 12 months ²⁾			

¹⁾ The gear unit must be stored in the position of use in a sheltered place; it must be placed on a vibration-free, dry base and covered over.

²⁾ 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.



The procedure for interior and exterior preservation treatment is described in section 7 (see items 7.4.1 and 7.4.2)!

5. Technical description

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

5.1 General description

The gear unit is supplied as a single-, two- or three-stage planetary gear unit. It is designed for a horizontal and vertical mounting position. If necessary, it can also be designed for installation in a different position.



The gear unit can be operated in both directions of rotation. However, it is possible that a certain direction of rotation has been specified in the order which is realised by adding-on a backstop or overrunning clutch.

Depending on type and size, the gear units of the standard range can be fitted with motor bell housing, oil cooler, angular oil level indicator, temperature sensor, backstop etc.

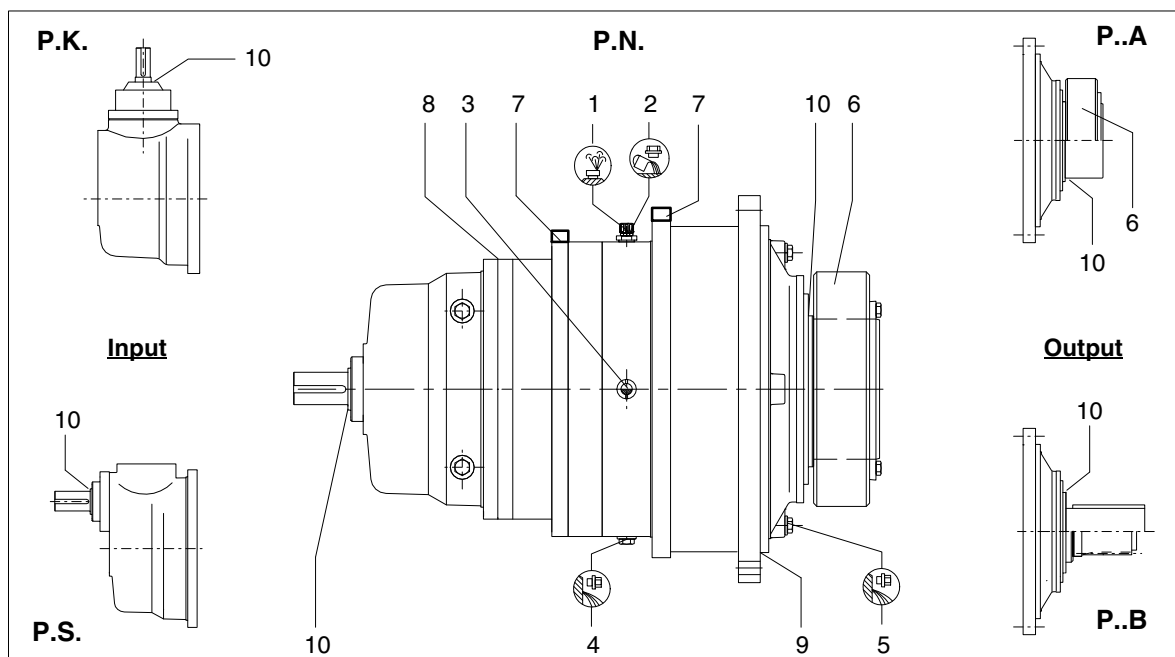


Fig. 4: In- and output types

- | | | | |
|---|-----------------------------|----|----------------------------------|
| 1 | Housing ventilation | 6 | Shrink disk |
| 2 | Oil inlet | 7 | Lifting eyes |
| 3 | Oil sight glass / oil level | 8 | Rating plate |
| 4 | Oil drain | 9 | Mounting position for torque arm |
| 5 | Residual-oil drain | 10 | Shaft seal |

A detailed view of the gear unit can be obtained from the drawings in the gear-unit documentation.

5.2 Identification of gear-unit mounting position

Table 7: Marking of the possible gear-unit shaft positions (shown diagrammatically as solid shaft and provided with an identification number).

		Horizontal gear-unit mounting position 5..		Vertical gear-unit mounting position ¹⁾	
				9..	6..
Coaxial planetary gear unit P.N..	0				
		500		900	600
Planetary helical gear unit P.S.	1				
		514			
Planetary bevel-helical gear units P.K.	2				
		524			
Planetary bevel gear unit P.L..	3				
		534			
Torque arm	5				
		551	552	553	554

¹⁾ Identification number when looking at shaft d_1 .
The lubricant supply must be checked. An enquiry is necessary.







5.3 Housing

The gear-unit housing is made of cast iron; the housing flange is made of nodular cast iron. If necessary, the housing may also be made of nodular cast iron or steel.

The gear-unit housing comes with the following equipment:

- Lifting eyes (adequately dimensioned for transport)
- Inspection and/or assembly cover (for oil filling and/or inspection)
- Oil sight glass, angular oil-level indicator or oil-level dipstick (to check the oil level)
- Oil-drain plug (for oil drain)
- Air filter or breather screw (for aeration and ventilation)

Colour codes for ventilating, oil inlet, oil level and oil drainage:

Air relief point:	yellow		Oil-draining point:	white	
Oil-filling point:	yellow		Lubrication point:	red	
Oil level:	red		Oil level:	red	

5.4 Toothed components

The externally toothed components of the gear unit are case-hardened. Helical-gear teeth are ground. The high quality of the teeth leads to a significant noise reduction and ensures safe and reliable running.

Depending on size, the internal gear teeth are made of heat-treatable steel or bainitic nodular cast iron. The teeth are shaped, milled or ground (depending on size).

5.5 Lubrication

The teeth and rolling bearings of the gear units are adequately supplied with oil by splash lubrication. For special mounting positions and/or gear units requiring additional cooling it may be necessary to provide pressure-feed or oil circuit lubrication.



For safety reasons, the gear unit is supplied without oil filling for transport.

Depending on the mounting position, it is possible that the bearings are not lubricated by the gear-unit oil. In such cases, these bearings are lubricated with lithium-base grease.



Do not mix greases of different soap bases when relubricating.

5.6 Shaft bearings

All shafts are mounted in rolling bearings.

5.7 Shaft seals, static seals

As a rule radial shaft-sealing rings are used as standard seals. They are fitted preferably with an additional dust lip to protect the actual sealing lip from external contamination.



For special mounting positions the radial shaft-sealing ring is used with a grease filling in combination with a ring.

Where large quantities of dust occur as specified by the requirements in Directive 94/9/EC, use is provided only in combination with the Taconite seal (see item 5.7.1).

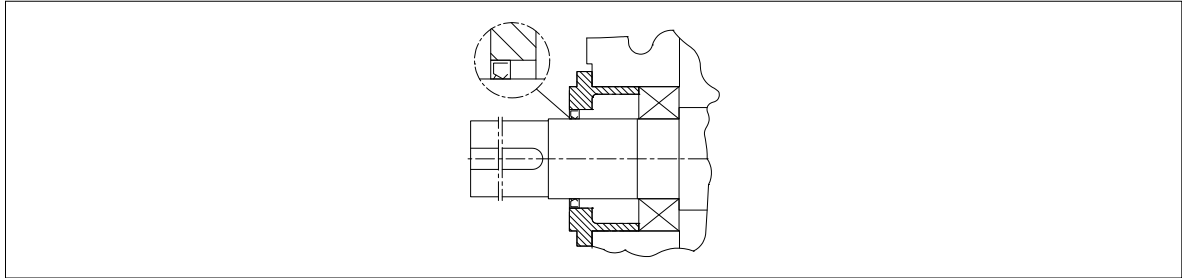


Fig. 5: Radial shaft-sealing ring

Alternatively it is also possible to provide the gear units with regreasable labyrinth seals to prevent the ingress of dust (Taconite seal).

The individual housing components are sealed statically with Loctite 640 to prevent leakages.

5.7.1 Taconite seals



Taconite seals were specially developed for use in a dusty environment. The penetration of dust is prevented by a combination of three seal elements (radial shaft-sealing ring, lamellar seal and grease-charged labyrinth seal).

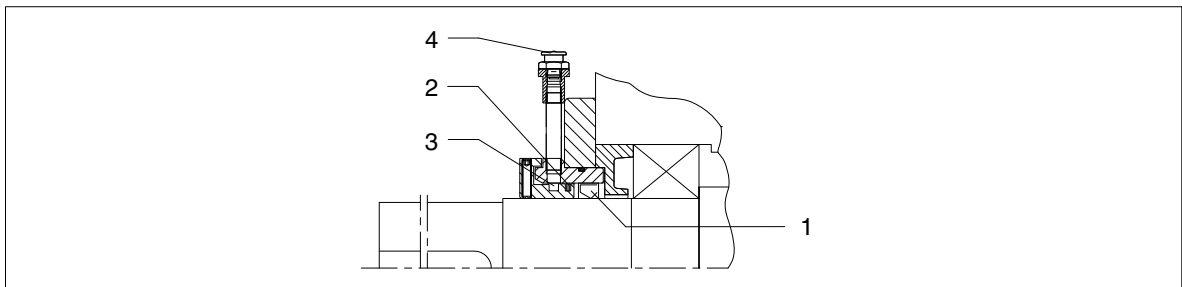


Fig. 6: Taconite seal

- 1 Radial shaft-sealing ring
- 2 Lamellar seal

- 3 Grease-charged labyrinth seal (re-chargeable)
- 4 Flat grease nipple AM10x1 to DIN 3404



For re-charging the labyrinth seals with grease, the specified frequency must be observed (see Table 15 in item 10.1).

5.8 Cooling



If required, planetary gear units are fitted either with a water oil-cooler or an air oil-cooler.

5.8.1 Water oil-cooler

The water oil-cooler is an essential part of the oil-cooling system and dissipates a certain heat quantity of the warm gear-unit oil.



The operation is monitored by a temperature monitor in the oil sump or by a pressure monitor.

The required water connection must be provided by the user.



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



Be especially careful when blowing with compressed air. Wear protective glasses!



For operation and maintenance, always observe the operating instructions indicated in the order-specific appendix. For technical data, refer to the order-specific list of equipment.



Alternatively, it is possible to use air oil-coolers.

5.9 Oil-temperature measurement



Depending on the order specification, the gear unit may be fitted with a Pt 100 resistance thermometer for monitoring the oil temperature in the sump. In order to measure the temperatures and/or temperature differences, the Pt 100 resistance thermometer, which should comply with the requirements of Directive 94/9/EC, must be connected to a suitable evaluating instrument provided by the customer. The resistance thermometer has a connection head (protection type IP65) for the wiring.



For operation and maintenance, always observe the operating instructions indicated in the order-specific appendix. For technical data, refer to the order-specific list of equipment.

5.10 Couplings, clutches

As a rule, flexible couplings must be provided for the input and output drive sides of the gear unit.

If rigid couplings or other in and/or output elements, which create additional radial or axial forces, (e.g. gear wheels, belt pulleys, disk flywheels, hydraulic couplings) are used, these must be agreed by contract.

In the case of gear units with hollow output shafts or flange output shafts, the coupling on the output side is not required. Gear units with hollow output shafts must be mounted on the shafts of the customer's machinery. Gear units with flanged output shafts must be mounted on the customer's shaft via a counterflange.

5.11 Shrink disk

In the case of a shaft-mounting gear unit, a shrink disk should be used as a frictional clamping connection between the gear-unit hollow shaft and machine.

5.12 Backstop

For certain requirements, the gear unit can be fitted with a mechanical backstop. This backstop permits only the specified direction of rotation during the operation of the unit. The direction of rotation is marked by a corresponding arrow on the input and output side of the gear unit.

The backstop is fitted oiltight on an adapter flange on the gear unit and integrated in its oil-circulation system.

The backstop is fitted with centrifugally operated sprags. If the gear unit rotates in the prescribed direction, the inner ring rotates with the sprag cage in the direction of shaft rotation, while the outer ring remains stationary. From a specific speed up (disengagement speed) the sprags disengage from the outer ring. In this operating condition the backstop operates wearfreely.

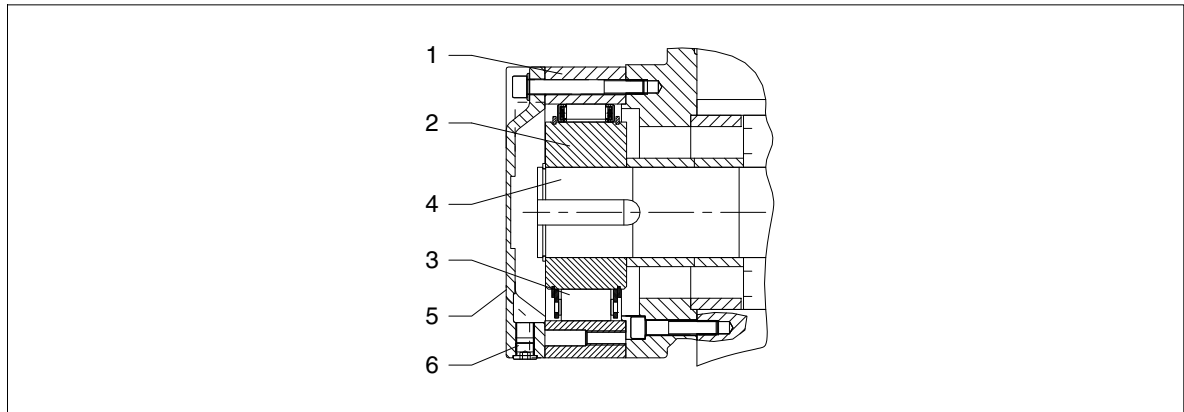


Fig. 7: Backstop

- | | | | |
|---|------------------|---|--------------------|
| 1 | Outer ring | 4 | Shaft |
| 2 | Inner ring | 5 | Cover |
| 3 | Cage with sprags | 6 | Residual-oil drain |



The stop direction can be changed by turning the cage around. If a change in stop direction is required, Siemens should be consulted beforehand.



To avoid damaging the backstop or the gear unit, the motor must not be run adversely to the stop direction of the gear unit. Observe the notice fixed to the gear unit.

Before connecting the motor, determine the direction of rotation of the three-phase current supply using a phase-sequence indicator, and connect the motor in accordance with the pre-determined direction of rotation.



If the gear unit is operated at speeds below the speed at which the backstop disengages, the backstops must be regularly renewed. The frequency of change is stated on the dimensioned drawing of the gear unit and on a plate on the gear unit. This plate is attached to the gear-unit housing close to the backstop.

6. Fitting

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



The gear unit must not be installed whilst the environment is explosive.

6.1 General information on fitting

When transporting the gear unit observe the notes in section 4.

Fitting work must be done with great care by authorised, trained and qualified personnel. The manufacturer cannot be held liable for damage caused by incorrect assembly and installation.

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



Free convection through the surface of the housing must be ensured by suitable measures.

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



During operation the unit must not be allowed to heat up through exposure to heat from external sources such as sunlight, and suitable measures must be taken to prevent this!

Such measures may be:

- fitting a sunshade roof,
- or
- fitting an additional cooling unit,
- or
- fitting the oil sump with a temperature-monitoring device with a cut-out function.

The ambient-temperature range indicated on the rating plate must be adhered to!



**If a sunshade roof is fitted, heat must be prevented from building up!
If a temperature-monitoring device is fitted, a warning signal must be emitted when the maximum permitted oil-sump temperature is reached. If the maximum permitted oil-sump temperature is exceeded, the drive must be shut off.
Such shutting off may cause the operator's system to stop!**



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

**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.**



**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.**



To ensure proper lubrication during operation, the mounting position specified on the drawings must always be observed.

6.2 Unpacking

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.



The packaging must not be opened or damaged, when this is part of the preservation method!

- Remove packaging material and transporting equipment and dispose of in accordance with regulations.
- Perform a visual check for any damage and contamination.



If there is any visible damage, the gear unit must not be put into operation. The instructions in section 4, "Transport and storage", must be observed.

6.3 Gear-unit installation

6.3.1 Foundation



The foundation must be horizontal and level. The gear unit must not be excessively stressed when tensioning the fastening bolts.

The foundation should be designed in such a way that no resonance vibrations are created and that no vibrations are transmitted from adjacent foundations. The structure on which the unit is to be mounted must be rigid. It must be designed according to the weight and torque, taking into account the forces acting on the gear unit.



Fastening bolts or nuts must be tightened to the prescribed torque. For the correct torque, refer to item 6.14. Bolts of the minimum strength class 8.8 must be used.



For dimensions, space requirement, arrangement of supply connections (e.g. with separate oil-cooling units), refer to the drawings in the gear-unit documentation.

6.3.2 Description of installation work



The gear unit must not be cleaned in an explosive environment.

- Remove the preservative agent from the solid shaft, hollow shaft and the machined add-on-surfaces using a suitable cleaning agent (such as benzine).



Do not allow the cleaning agent (e.g. benzine) to contact the shaft sealing rings.



**Ensure adequate ventilation. Do not smoke!
Danger of explosion!**

6.4 Couplings, clutches

As a rule, flexible couplings are provided for the input and output drive sides of the gear unit.

If rigid couplings or other in and/or output elements, which create additional radial or axial forces, (e.g. gear wheels, belt pulleys, disk flywheels, hydraulic couplings) are used, these must be agreed by contract.

6.5 Attachment of IEC Motors

When attaching IEC motors, the operating instructions for the motor are to be observed.



Do not use a motor with a motor speed exceeding the specified speeds of the gear unit shown on the rating plate, as otherwise the gear unit may be damaged.

6.6 Attachment of torque arms or flanges on the output side

Before fitting, the screw-on faces of these parts must be degreased and smeared with Loctite 640. This Loctite 640 agent increases the friction coefficient of the torque-carrying faces and protects against corrosion at the same time.

Before connecting the motor, determine the direction of rotation of the three-phase current supply using a phase-sequence indicator, and connect the motor in accordance with the pre-determined direction of rotation.



If the gear unit is operated at speeds below the speed at which the backstop disengages, the backstops must be regularly renewed. The frequency of change is stated on the dimensioned drawing of the gear unit and on a plate on the gear unit. This plate is attached to the gear unit housing close to the backstop.

6.7 Shrink disk

The shrink disk realizes a press-fit connection between a hollow shaft and a stub/machine shaft (in the following called "stub shaft"). The interference fit can transfer torques, bending moments and forces. The jointing pressure between the hollow and stub shafts generated by the shrink disk is essential for the torque and force transmission.

The shrink disk is delivered ready for installation.



The shrink disk must not be dismantled before mounting for the first time.

Fitting and start-up must be carried out by properly trained specialist personnel. Prior to start-up these instructions must be read, understood and adhered to. We accept no liability for personal injury or damage due to non-observance.

6.7.1 Fitting the shrink disk

- Before beginning installation, the hollow shaft and the stub shaft must be carefully cleaned.



Observe manufacturer's instructions for handling lubricants and solvents.



Do not allow cleansing agent or solvent to affect surfaces with paint coating.



The bore of the hollow shaft and the stub shaft must be absolutely clean, free of grease and oil in the area of the shrink disk seat.

This is essential for safe and reliable torque transmission.

Do not use contaminated solvents or dirty cloths nor cleansing agents containing oil (such as paraffin or terpentine) for removing grease.

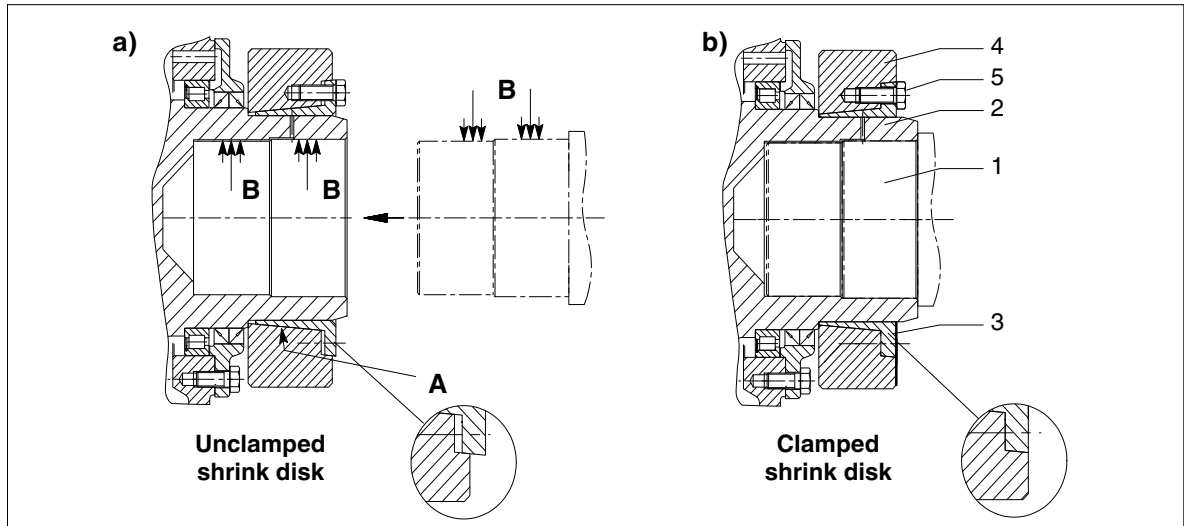


Fig. 8: Fitting the shrink disk

A	Greased	B	Absolutely grease- and oil-free
1	Stub shaft	3	Inner ring
2	Hollow shaft	4	Outer ring
		5	Tensioning bolt



The outer surface of the hollow shaft must be lightly greased in the area of the shrink-disk seat.

For a detailed view, refer to the dimensioned drawing in the gear-unit documentation.

- Place the shrink disk on the hollow shaft and fasten, if required. For the exact installation height (W) of the shrink disk, refer to the dimensioned drawing.



For transporting and lifting the shrink disk it may be required to use a suitable lifting device!

Make sure that the shrink disk cannot slip off the hollow shaft.



Do not tighten the tensioning bolts (5) until the stub shaft is installed too.

- Tighten the tensioning bolts (5) gradually one after the other, working round several times by quarter turns.
- Tighten all tensioning bolts (5) until the end faces of the inner ring (3) and the outer ring (4) are flush and the maximum tightening torque of the tensioning bolts has been achieved. The correct alignment is to be checked using a ruler. The max. tolerance is ± 0.2 mm.



The correct clamping condition can thus be checked visually.



To avoid overloading the individual bolts, the maximum tightening torque (see table 8) must not be exceeded. If, when tightening the clamping bolts at max. tightening torque, the inner and outer ring are not aligned, Siemens must be consulted.

Table 8: Maximum torques for tensioning bolts

Tensioning-bolt thread	max. tightening torque per bolt Strength class 12.9 Nm	Tensioning-bolt thread	max. tightening torque per bolt Strength class 12.9 Nm
M 8	35	M 20	570
M 10	70	M 24	980
M 12	120	M 27	1450
M 14	193	M 30	1970
M 16	295	M 33	2650



The shrink disk has been identity-marked on the outer ring (4). In case of contacting Siemens this identification must be referred to.



For safety reasons, a protective cover should be mounted to prevent contact! This cover must be applied after completion of all works on the shrink disk.



Only the complete shrink disks supplied by the manufacturer may be used. Combining of components from different shrink disks is not permitted.



Tightening the fastening bolts using an impact screwdriver is not permitted!

6.7.2 Demounting the shrink disk

- Remove the protective cover.
- Remove any rust deposits from the shaft and the hollow shaft.



Under no circumstances must the tensioning bolts be unscrewed one after the other.

- Undo all tensioning bolts one after the other by approx. 1/4 turn.



The stored energy of the outer ring is slowly loosened during disassembly via the bolts to be loosened. In order that this is carried out correctly, the procedure described here must be carefully adhered to!

- All tensioning bolts should now be further loosened one after the other by approx. 1 turn.



The outer ring should now release of its own accord from the inner ring. If this is not the case, the outer ring can be detensioned with the forcing threads. To this purpose screw some of the adjacent fastening bolts into the forcing threads. The now loosening outer ring is braced against the remaining bolts. This operation must be carried out until the outer ring completely releases of its own accord.

- The shrink disk is to be secured against axial shifting.
- Draw the stub shaft out of the hollow shaft.
- Pull the shrink disk off the hollow shaft.



For transporting and lifting the shrink disk it may be required to use a suitable lifting device!

6.7.3 Cleaning and greasing the shrink disk



Only dirty shrink disks must be disassembled and cleaned.

- Inspection of all parts for any damage.



Damaged parts must be replaced with new ones! The use of damaged parts is not permissible!



Only the complete shrink disks supplied by the manufacturer may be used. Combining of components from different shrink disks is not permitted.

- Thoroughly clean all parts.



Do not use contaminated solvents or dirty cloths nor cleansing agents containing oil (such as paraffin or terpentine) for removing grease.

- The conical surfaces of the inner and outer rings (3 and 4, see Fig. 8) must be free of grease and oil.
 - A thin layer of grease must be applied evenly to the conical surfaces of the inner and outer rings (3 and 4, see Fig. 8).
 - Provide the tensioning bolts (5, see Fig. 8) on the contact surface and on the thread with lubricant.
 - Use a solid lubricant paste with a **high MoS₂-based molybdenum disulphide content** which will not slide during fitting work and which shows the following characteristics:
 - friction coefficient “ μ ” = 0.04
 - resistant to pressure up to a maximum pressure of 300 N/mm²
 - ageing-resistant

Table 9: Recommended lubricants for shrink disks after their cleaning ¹⁾

Lubricant	Form	Manufacturer
Molykote G Rapid	Spray or paste	DOW Corning
Aemasol MO 19 P	Spray or paste	A. C. Matthes
Unimoly P 5	Powder	Klüber Lubrication
gleitmo 100	Spray or paste	Fuchs Lubritec

¹⁾ Other lubricants may be used if they have the same characteristics.

- Join inner ring (3) and outer ring (4).
- Place the tensioning bolts and screw in some threads by your fingers.



Observe the manufacturer’s instructions for handling lubricants!

Fitting and start-up must be carried out by properly trained specialist personnel.

6.7.4 Re-fitting the shrink disk



For re-fitting the shrink disk the procedure described in item 6.7.1 must be adhered to.

6.7.5 Inspection of the shrink disk



In all cases the inspection relating to the shrink disk should be carried out simultaneously with the examination of the gear unit, **however at least every 12 months.**

Inspection of the shrink disk is limited to a visual assessment of its condition. The following must be observed when carrying out this work:

- loose screws
- damage caused by force
- flush position of the inner ring (3) in relation to outer ring (4)

6.8 Shrink disk type HYD (HYD = hydraulic)

6.8.1 Fitting

The shrink disk is delivered ready for installation.



The shrink disk must not be dismantled before mounting for the first time.



The bore of the hollow shaft and the machine shaft must be absolutely free of grease in the area of the shrink disk seat.

This is essential for safe and reliable torque transmission.

Do not use contaminated solvents or dirty cloths for removing grease.

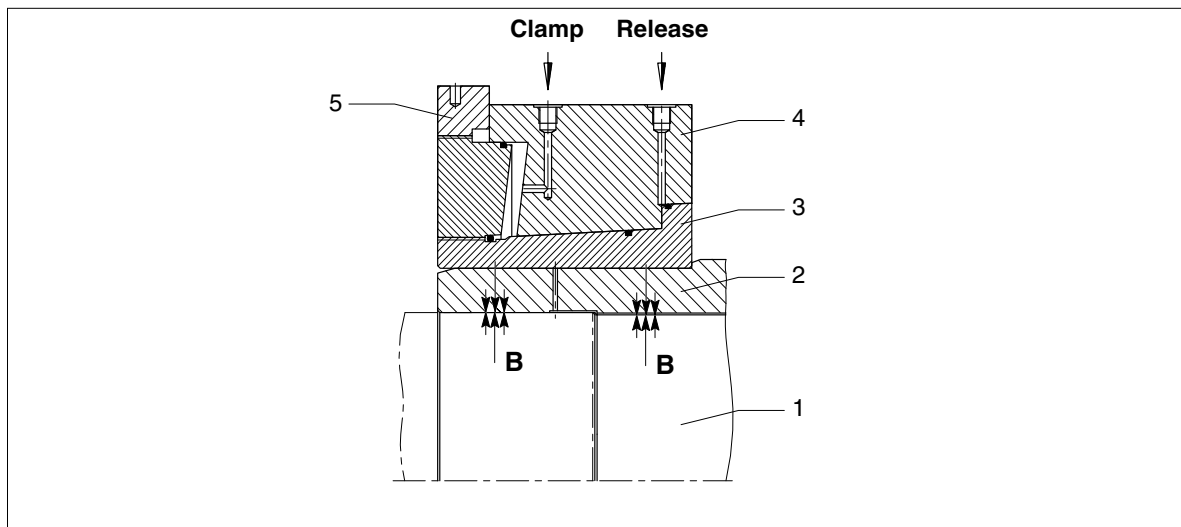


Fig. 9: Assembly of the type HYD shrink disk

B Absolutely grease- and oil-free

1 Machine shaft

3 Inner ring

5 Lock nut

2 Hollow shaft

4 Outer ring

- Mounting the shaft or fitting the shrink disk on the shaft.



If the gear unit is fitted in a vertical position with the output shaft down, the fitted shrink disk must be protected from dropping.



The outer surface of the hollow shaft may be greased in the area of the shrink disk seat.



Never clamp the shrink disk until the machine shaft has been mounted.

- Remove screw plugs from the "**Clamp**" and "**Release**" connections.



Collect any hydraulic fluid that may run out!



Connect the pressure line to the connection marked "Clamp".



Clamping of the shrink disk.

The correct clamping condition has been reached as soon as the faces of the outer and inner rings are flush.

The maximum permissible clamping pressure is 450 bar!



This allows the clamping condition to be checked visually.



If alignment cannot be achieved by clamping, consult Siemens.

- Turn lock nut finger-tight against the outer ring.
- Relieve oil pressure. This will cause the outer ring to be forced firmly against the lock nut by the previously stored energy.
- Screw the screw plugs back into the "**Clamp**" and "**Release**" connections. Leave the hydraulic fluid in the shrink disk.



For safety reasons, a protective cover should be mounted above the shrink disk.

6.8.2 Demounting the type HYD shrink disk

- Remove the protective cover.
- Remove the screw plugs from the "**Clamp**" and "**Release**" connections.



Collect any hydraulic fluid that may run out!

- Connect the oil pressure pump to the connection marked "**Clamp**".
- Increase the oil pressure (**max. 450 bar**) until the lock nut can be loosened by hand.
- Relieve pressure and attach pump to connection marked "**Release**".
- While the oil pressure is increasing, the outer ring will slip off the cone of the inner ring. The connection is disengaged again.
- Leave hydraulic fluid in the released shrink disk and firmly reseal the "**Clamp**" and "**Release**" connections with the screw plugs.
- Remove the machine shaft or slide the gear unit off the machine shaft. Rust deposits which may have formed on the shaft must be removed before performing this operation.
- Pull the shrink disk off the hollow shaft.

6.8.2.1 Cleaning and greasing the type HYD shrink disk

Released shrink disks do not have to be disassembled and re-greased before being re-clamped.

The shrink disk should only be disassembled and cleaned if it is dirty.



Following cleaning, only the inner sliding surfaces of the shrink disk should be re-greased.

Use a solid lubricant with a high MoS₂-based molybdenum disulphide content and with a coefficient of friction of $\mu = 0.04$ according to the following table.

Table 10: Lubricants for shrink disk after cleaning

Lubricant	Form	Manufacturer
Molykote 321 R (lubricating paint)	Spray	DOW Corning
Molykote Spray (powder spray)	Spray	DOW Corning
Molykote G Rapid	Spray or paste	DOW Corning
Aemasol MO 19 P	Spray or paste	A. C. Matthes
Molykombin UMFT 1	Spray	Klüber Lubrication
Unimoly P 5	Powder	Klüber Lubrication

6.9 Fitting a torque arm



For all shaft-mounting gear units, the reaction torque corresponding to the torque of the machine and acting in an opposite direction on the housing must be absorbed.

6.9.1 One-sided torque arm

In the case of a one-sided torque arm, a ball and socket joint (see figure 10) or a flexible bush should be provided.



The screw-on surface of the torque arm on the gear-unit housing must be degreased and smeared with Loctite 640. This increases the reliability of the torque transmission and protects against corrosion.

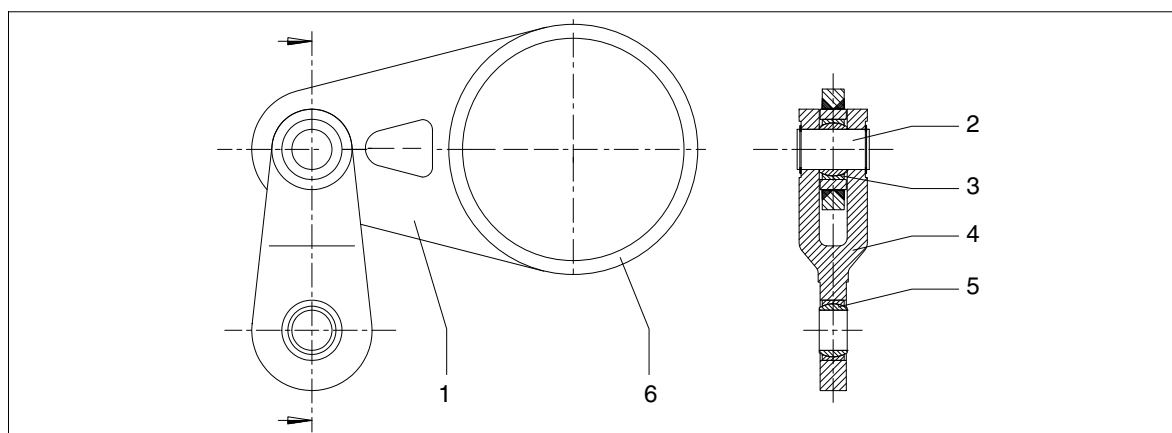


Fig. 10: One-sided torque arm

- | | | | | | |
|---|----------------------|---|-----------------------|---|-----------------------|
| 1 | One-sided torque arm | 3 | Ball and socket joint | 5 | Ball and socket joint |
| 2 | Axle | 4 | Lever | 6 | Gear-unit connection |

6.9.2 Double-sided torque arm

In the case of a double-sided torque arm, if any, the torque is supported by bars and joints on a torsion shaft. The screw-on surface of the torque arm on the gear unit should be treated as described under 6.9.1.

This type of construction ensures that the machine bearings are freed from any shearing forces, except for the weights. Figure 11 shows a possible variant.

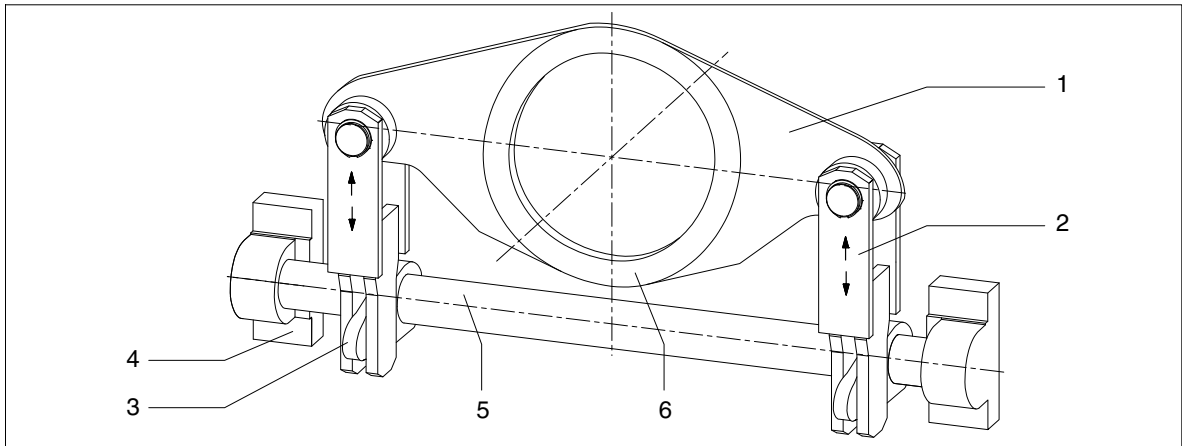


Fig. 11: Double-sided torque arm

- | | | |
|---------------------------|--------------------|------------------------|
| 1 Double-sided torque arm | 3 Joint component | 5 Torsion shaft |
| 2 Bar | 4 Bearing pedestal | 6 Gear-unit connection |

The bearing pedestals may be mounted both to a vertical wall (as illustrated) and on a horizontal foundation.

6.10 Tightening torques in case of flange connection and foot-mounted design

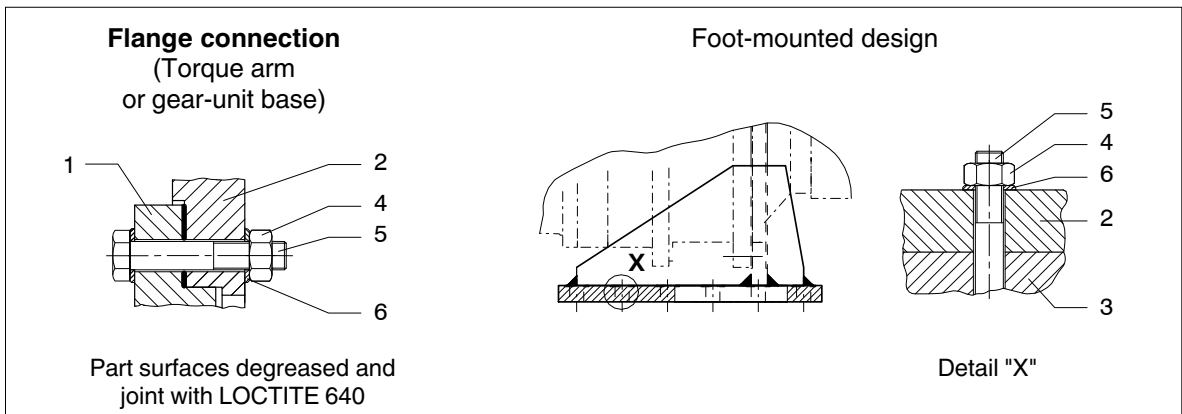


Fig. 12: Flange connection and foot-mounted design

- | | | |
|---|--------------|---|
| 1 Gear-unit flange | 3 Foundation | 6 Washer to DIN 125 Form B, hardness class 300 HV |
| 2 Torque-reaction arm or gear-unit base | 4 Nut | |
| | 5 Bolt | |

Table 11: Tightening torques in case of flange connection and foot-mounted design

Gear-unit size	Flange connection		Foot-mounted design ¹⁾	
	Strength class 10.9 Nm	Tightening torque ²⁾ Nm	Strength class 8.8 Nm	Tightening torque ²⁾ Nm
9	M 16	295	M 24	710
10	M 16	295	M 24	710
11	M 20	580	M 24	710
12	M 24	1000	M 24	710
13	M 24	1000	M 24	710
14	M 24	1000	M 30	1450
16	M 24	1000	M 30	1450
17	M 30	2000	M 36	2530
18	M 30	2000	M 36	2530
19 / 20	M 30	2000	M 42	4070
21 / 22	M 36	3560	M 48	6140
23 / 24	M 36	3560	M 48	6140
25 / 26	M 42	5720	M 56	9840
27 / 28	M 48	8640	M 56	9840
29 / 30	M 48	8640	M 64	14300
31 / 32	M 56	13850	M 64	14300
33 / 34	M 56	13850	M 64	14300
35 / 36	M 56	13850	M 72 x 6	20800

1) The bolts are to be checked by the user depending on the structure on which the unit is to be mounted.

2) The tightening torques relate to friction value 0.14 in the thread and 90 % utilisation of the tensile yield strength.

6.11 Gear unit with add-on components

- For technical data to the add-on parts, see the list of equipment for the specific order.



The electrical equipment for regulation and control must be wired in accordance with the equipment suppliers' instructions and Directive 94/9/EC.

For operation and maintenance the operating instructions provided specifically for the order must be observed.

6.12 Gear unit with oil-temperature measurement



Connect resistance thermometer with evaluating instrument (to be provided by customer) electrically.

6.13 Final work



After installation of the gear unit check all screw connections for tight fit.

In addition, after tightening the fixings a check must be made to see that the alignment has not changed.

Check by means of the order-specific list of equipment as well as the associated drawings whether all units which may have been removed for transport have been refitted.

Any oil drain cocks must be secured against accidental opening.

If an oil sight glass is used for monitoring the oil level, it must be protected against damage.

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.

Check that protective measures have been taken!

Execute EARTH acc. to DIN EN 60079-0!

6.14 Screw-connection classes, tightening torques and initial-tensioning forces

6.14.1 Screw-connection classes

The specified screw connections are to be fastened applying the tightening torques specified in the table below:

Table 12: Screw-connection classes

Screw-connection class	Distribution of emitted torque on the tool	Tightening procedure (Usually the tightening processes lie within the stated tool distribution)
C	± 5 % up to ± 10 %	<ul style="list-style-type: none"> - Hydraulic tightening with mechanical screwdriver - Torque-controlled tightening with torque wrench, signal-emitting torque wrench - Tightening with precision mechanical screwdriver with dynamic torque measuring
D	± 10 % to ± 20 %	<ul style="list-style-type: none"> - Torque-controlled tightening with mechanical screwdriver
E	± 20 % up to ± 50 %	<ul style="list-style-type: none"> - Tightening with pulse screwdriver or impact wrench without adjustment checking device - Tightening by hand, using a spanner without torque measuring device



Foundation bolts, hub bolts and bearing-cover bolts must always be tightened in accordance with screw-connection class "C"!

6.14.2 Tightening torques and initial-tensioning forces



The tightening torques apply to friction coefficients of $\mu_{\text{total}} = 0.14$. The friction coefficient $\mu_{\text{total}} = 0.14$ applies here to lightly oiled steel bolts, black-annealed or phosphatised and dry, cut mating threads in steel or cast iron. Lubricants which alter the friction coefficient must not be used and may overload the screw connection.

Table 13: Initial-tensioning forces and tightening torques for screw connections of strength classes **8.8; 10.9; 12.9** with a common friction coefficient of $\mu_{\text{total}} = 0.14$

Nominal thread diameter d mm	Strength class of the screw	Initial-tensioning force for screw-connection classes from table 12			Tightening torque for screw-connection classes from table 12		
		C	D	E	C	D	E
		$F_{M \text{ min.}}$ N			M_A Nm		
M10	8.8	18000	11500	7200	44.6	38.4	34.3
	10.9	26400	16900	10600	65.4	56.4	50.4
	12.9	30900	19800	12400	76.5	66.0	58.9
M12	8.8	26300	16800	10500	76.7	66.1	59.0
	10.9	38600	24700	15400	113	97.1	86.6
	12.9	45100	28900	18100	132	114	101
M16	8.8	49300	31600	19800	186	160	143
	10.9	72500	46400	29000	273	235	210
	12.9	85000	54400	34000	320	276	246
M20	8.8	77000	49200	30800	364	313	280
	10.9	110000	70400	44000	520	450	400
	12.9	129000	82400	51500	609	525	468
M24	8.8	109000	69600	43500	614	530	470
	10.9	155000	99200	62000	875	755	675
	12.9	181000	116000	72500	1020	880	790
M30	8.8	170000	109000	68000	1210	1040	930
	10.9	243000	155000	97000	1720	1480	1330
	12.9	284000	182000	114000	2010	1740	1550
M36	8.8	246000	157000	98300	2080	1790	1600
	10.9	350000	224000	140000	2960	2550	2280
	12.9	409000	262000	164000	3460	2980	2670
M42	8.8	331000	212000	132000	3260	2810	2510
	10.9	471000	301000	188000	4640	4000	3750
	12.9	551000	352000	220000	5430	4680	4180
M48	8.8	421000	269000	168000	4750	4090	3650
	10.9	599000	383000	240000	6760	5820	5200
	12.9	700000	448000	280000	7900	6810	6080
M56	8.8	568000	363000	227000	7430	6400	5710
	10.9	806000	516000	323000	10500	9090	8120
	12.9	944000	604000	378000	12300	10600	9500
M64	8.8	744000	476000	298000	11000	9480	8460
	10.9	1060000	676000	423000	15600	13500	12000
	12.9	1240000	792000	495000	18300	15800	14100
M72x6	8.8	944000	604000	378000	15500	13400	11900
	10.9	1340000	856000	535000	22000	18900	16900
	12.9	1570000	1000000	628000	25800	22200	19800

Nominal thread diameter d mm	Strength class of the screw	Initial-tensioning force for screw-connection classes from table 12			Tightening torque for screw-connection classes from table 12		
		C	D	E	C	D	E
		$F_{M \min.}$ N			M_A Nm		
M80x6	8.8	1190000	760000	475000	21500	18500	16500
	10.9	1690000	1100000	675000	30500	26400	23400
	12.9	1980000	1360000	790000	35700	31400	27400
M90x6	8.8	1510000	968000	605000	30600	26300	23500
	10.9	2150000	1380000	860000	43500	37500	33400
	12.9	2520000	1600000	1010000	51000	43800	39200
M100x6	8.8	1880000	1200000	750000	42100	36200	32300
	10.9	2670000	1710000	1070000	60000	51600	46100
	12.9	3130000	2000000	1250000	70000	60400	53900



Damaged bolts must be replaced with new bolts of the same type and strength class.

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.

7.1 Procedure before start-up

7.1.1 Removal of preservative agent

The location of the oil-draining points is marked by an appropriate symbol in the dimensioned drawing in the gear-unit documentation.

Oil-draining point:



- Place suitable containers under the oil-draining points.
- Unscrew the oil-drain plug or open the oil-drain cock.
- Remove remaining preservative agent and/or running-in oil from the gear unit using a suitable container, unscrew any existing residual-oil drain plugs, to do so.
- Dispose of remaining preservative agent and/or running-in oil in accordance with regulations.



**Remove any oil spillage immediately with an oil-binding agent.
The oil must not come into contact with the skin (e.g. the operator's hands).
The safety notes on the data sheets for the oil used must be observed here!**

- Screw in oil-drain plug or reclose oil-drain cock.
- Screw in any unscrewed residual-oil drain plugs again.

A detailed view of the gear unit can be obtained from the drawings in the gear-unit documentation.

7.2 Filling with lubricant

- Unscrew oil-filler screw.



Fill the gear unit with fresh oil of the grade specified on the rating plate, using a filter (max. mesh 25 µm).



The quality of the oil used must meet the requirements of the separately enclosed 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.

Information on the type, quantity and viscosity of the oil is given on the rating plate on the gear unit.

The oil quantity shown on the rating plate is to be understood as an approximate quantity. The actual oil quantity to be put in is shown by the marks on the oil sight glass, on the angular oil level indicator or on the oil dipstick.



In the case of gear units with an oil-cooling system, the oil circuit should also be filled up. To do so, the gear unit should be started and then run briefly, as described in section 8.

- Check the oil level in the gear-unit housing.

Depending on the type the following oil levels apply:

- Middle of the oil-sight glass.
- Middle markings on the angular oil-level indicator.
- Upper mark on the oil dipstick.



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

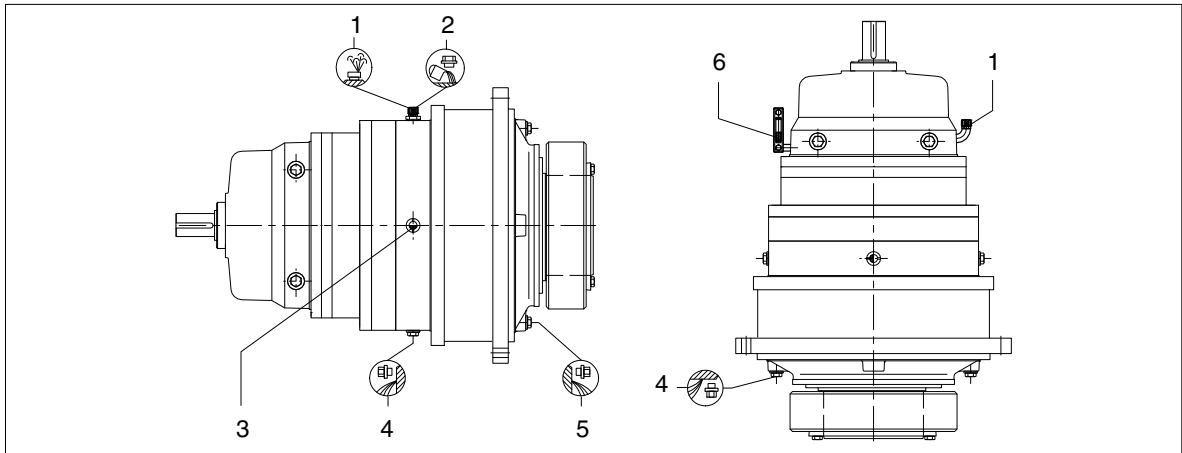


Fig. 13: Oil inlet, oil drain, oil level, ventilation and venting on standard design

1	Housing ventilation	3	Oil-sight glass	5	Residual-oil drain
2	Oil-filler plug	4	Oil drain	6	Angular oil-level indicator/oil dipstick

A detailed view of the gear unit can be obtained from the drawings in the gear-unit documentation.

- Screw in oil-filler plug.

7.3 Start-up



Before start-up, replace the yellow plastic screw plug with the air filter or breather screw with cap(see also notice on the gear unit).

- Check the oil level in the gear unit.



The oil level specified in item 7.2 should be adhered to. If the oil is hot, the marks may be slightly exceeded. It must in no case be allowed to fall below the mark. If necessary, top up to the correct level.

Gear unit with water oil-cooling systems:

- Fully open the stop valves in the coolant in- and outflow pipes of the cooling system.



For technical data, refer to the order-specific list of equipment.

7.3.1 Checking procedure

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



Presence of explosion-protection marking

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

7.4 Removal from service

- Switch off drive unit.



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

- With gear units fitted with water oil-coolers, close the stop valves on the water in- and outflow pipes. To prevent freezing, drain the water from the cooling coil or the water oil-cooler.
- Start the gear unit and allow it to run briefly (5 to 10 minutes) approx. every 3 weeks (during a shut-down period no longer than 6 months).
- Treat the gear unit with preservation, see items 7.4.1 and 7.4.2 (before a shut-down period exceeding 6 months).

7.4.1 Interior preservation during longer disuse

Depending on the type of lubrication and/or shaft sealing, the following types of interior preservation can be applied.

7.4.1.1 Interior preservation with gear oil

Gear units with splash lubrication systems and contacting shaft seals can be filled with the correct type of oil up to a point just below the breather screw.

7.4.1.2 Interior preservation with preservative agent

Before longer shut-down periods gear units with pressure lubrication systems, oil circulation cooling and/or non-contacting shaft seals should be filled with preservative agent and run without load.

7.4.1.3 Interior-preservation procedure

- Stop the gear unit.
- Drain oil into a suitable container (see section 10, "Maintenance and Repair").
- Unscrew breather screw.
- Pour in the preservative agent through the hole of the reducing screw up to the upper mark on the oil-sight glass.



For preservative agent see table 4 or 5 in item 4.4.1!

- Screw in the venting screw.
- Start the gear unit and allow it to idle briefly.
- Unscrew the oil-drain plug.
- Drain preservative agent into a suitable container.
- Dispose of preservative agent in accordance with regulations.



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

- Screw in the oil-drain plug.
- Replace breather screw with the plug screw.



**Before re-starting the gear unit, replace the screw plug with the breather screw.
Observe the instructions in item 7.1.1.**

7.4.2 Exterior preservation

7.4.2.1 Exterior-preservation procedure

- Clean the surfaces.



For separation between the sealing lip of the shaft-sealing ring and the preservative agent, the shaft should be brushed with grease in way of the sealing lip.

- Apply preservative agent.



For preservative agent see table 6 in item 4.4.2!

8. Operation

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

8.1 General



**The coating must not carry an electrostatic charge!
The operator must ensure that highly effective mechanisms which can set up a charge in the coating are safely avoided.**

During operation the gear unit must be monitored for:



Oil temperature

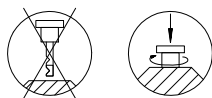
**The gear unit is designed for an continuous operation in the operating-temperature range of: 40 °C to 70 °C (applies to mineral oil)
The maximum permitted temperature is:
90 °C (applies to mineral oil)
100 °C (applies to synthetic oil)
At higher temperatures the gear unit must be shut down immediately and Siemens after-sales service consulted.**

Changes in gear noise

Possible oil leakage at the housing and shaft seals

Bearing vibrations with present measuring sequence

Correct oil level (see section 7, "Start-up")



If any safety device has triggered, it must only be possible to start the drive again after releasing the reclosing interlock.

If any irregularities are noticed during operation, switch the drive assembly off at once. Determine the cause of the fault, using the table in section 9.

The trouble-shooting table 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).

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 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.



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 the agreement of Siemens 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 14: Faults, causes and remedies

Faults	Causes	Remedy
Changes in gear 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.
	Labyrinth rings dragging.	Readjust labyrinth rings.
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.
Increased temperature at the bearing points.	Oil level in housing too low.	Check oil level at room temperature and, if necessary, top up oil.
	Oil too old.	Check date of last oil change and, if necessary, change oil. See section 10.
	Bearing defective.	Contact Customer Service. Check and, if necessary, replace bearings.
Exterior of gear unit is oiled up.	Inadequate sealing of housing covers and/or joints.	Seal joints.
	Labyrinth seals oiled up.	Check oil charge. If necessary, clean labyrinths.

Faults	Causes	Remedy
Oil leakage from gear unit.	<p>Inadequate sealing of housing covers and/or joints.</p> <p>Radial shaft-sealing rings defective.</p>	<p>Check and, if necessary, replace sealings. Seal joints.</p> <p>Check radial shaft-sealing rings and, if necessary, replace.</p>
Oil foaming in the gear unit.	<p>Water in oil.</p> <p>Oil too old. (defoaming agent used up)</p> <p>Unsuitable oils mixed up.</p>	<p>Test the oil, change oil if necessary.</p> <p>Test the oil, change oil if necessary.</p> <p>Test the oil, change oil if necessary.</p>
Water in oil.	<p>Oil foams in sump.</p> <p>Defective oil cooler.</p> <p>Gear unit exposed to cold air from machine-room ventilator: water condensing.</p>	<p>Check state of oil by the test-tube method for water contamination. Have oil analysed by laboratory.</p> <p>Repair or, if necessary, replace oil cooler. Fill with oil, look for and repair any leaks.</p> <p>Protect gear unit with suitable heat insulation. Close air outlet or alter its direction by structural measures.</p>
Increased operating temperature.	<p>Oil level in housing too high.</p> <p>Oil too old.</p> <p>Oil badly contaminated.</p> <p>On gear units with oil-cooling system: Coolant flow too low.</p> <p>Coolant temperature too high.</p> <p>Oil flow through water oil-cooler too low due to: Badly clogged oil filter.</p>	<p>Check oil level and, if necessary, adjust.</p> <p>Check date of last oil change and, if necessary, change oil. See section 10.</p> <p>Change oil. See section 10.</p> <p>Fully open valves in in- and outflow pipes. Check for free flow through water oil-cooler.</p> <p>Check temperature and, if necessary, adjust.</p> <p>Clean the oil filter. See section 10.</p>
Fault in oil-supply system.		Consult operating instructions for oil-supply system.

10. Maintenance and repair

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

10.1 General notes on maintenance

All maintenance and repair work must be done with care and by duly trained and qualified personnel only.

The following applies to all work in item 10.2:



Switch the gear unit and add-on components off.

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



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.



The periods indicated in table 15 depend on the conditions under which the gear unit is operated. Only average periods can therefore be stated here. These refer to:

a daily operating time of	24 h
a duty factor "ED" of	100 %
an input-drive speed of	1500 1/min
an operating temperature of	90 °C (applies to mineral oil)

The operator must ensure that the intervals stated in table 15 are adhered to. This also applies if the maintenance work is included in the operator's internal maintenance schedules.

Table 15: Maintenance and repair work

Measures	Periods	Remarks
The proper function and measurement accuracy of the ignition-protection system for the temperature monitoring should be checked at regular intervals according to the instructions of the manufacturer of the ignition-protection device.	See instructions of the manufacturer.	The operator must ensure this!
Check oil temperature	Daily	
Check for unusual gear-unit noise	Daily	
Check oil level	Daily and before every starting up the gear unit	<ul style="list-style-type: none"> - Middle of the oil-sight glass - Middle of the markings on the angular oil-level indicator - Top mark on the oil dipstick
Check gear unit for leaks	Daily	
Test the water content of the oil	Approx. 400 operating hours after start-up, at least once per year	see item 10.1.1

Measures	Periods	Remarks
Perform the first oil change	Approx. 400 operating hours after start-up	see item 10.2.2
Perform subsequent oil changes	Every 18 months or 5000 operating hours ¹⁾	see item 10.2.2
Clean the breather screw	Every 3 months	see item 10.2.3
Refill Taconite seals with grease	Every 3000 operating hours or at least every 6 months	see item 10.2.5
Clean the gear unit	Depending on requirements, at least every 2 years	See item 10.2.4
Check condition of water oil-cooler	Depending on requirements, at least once a year	see item 10.2.6
Check hose lines	Yearly	see item 10.2.8
Change the hose lines	6 years from the manufacturing date impressed	see item 10.2.8
Check tightness of fastening bolts	After first oil change, then every 2 years	see item 6.13
Check the preservation of the free shaft ends	Every 3 years	see item 7.4.2
General inspection of the gear unit	Every 2 years	see item 10.3.1

1) When using synthetic oils and depending on the individual application, the periods can be extended.



**The coating must not carry an electrostatic charge!
The operator must ensure that highly effective mechanisms which can set up a charge in the coating are safely avoided.**

10.1.1 General oil-service lives

According to the manufacturers, the following are the minimum periods during which the oils can be used without undergoing any significant change in quality. They are calculated on the basis of an average oil temperature of 80 °C:

- for mineral oils, biologically degradable oils and physiologically safe (synthetic esters) oils 2 years or 10 000 operating hours (**does not apply to natural esters - rape seed oils, etc. -**).
- for poly- α olefins and polyglycols: 4 years or 20 000 operating hours.



The actual service lives may differ. The general rule is that an increase in temperature of 10 K will halve the service life and a temperature decrease of 10 K will approximately double the service life.

10.2 Description of maintenance and repair work

10.2.1 Examine water content of oil / conducting oil analyses

More information about examining the oil for water content or conducting oil analyses is obtainable from your lubricant manufacturer or our customer service.

- For reference purposes, a fresh sample of the operating lubricating oil used must be sent with the used oil sample to the analysing institute for analysis.
- The oil sample must be taken downstream of the filter of the oil-supply system while the gear unit is running. A suitable connection point is normally located upstream of the gear unit input (e.g. oil drain cock in the pressure line).
- A special sample container should be filled with the specified quantity of oil. If there is no such sample container available, at least one litre of oil must be put in a **clean**, transportworthy, sealable vessel.

10.2.2 Change oil

As an alternative to the oil change intervals indicated in Table 15 (see item 10.1) it is possible to have the oil sample tested at regular intervals by the Technical Service of the relevant oil company and to have it released for further use.

If re-usability has been confirmed, no oil change will be necessary.



Please observe the separately attached operating instructions BA 7300 EN.

- The instructions in item 7.1 must be observed!
- Close the stop valves in the coolant in- and outflow pipes (for gear units with water oil-cooling system).
- Drain the oil while the gear unit is still warm, i.e. immediately after shutting down the machinery.



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.



When changing the oil, the housing and the oil-supply system, if available, must be flushed with oil to remove sludge, metal particles and oil residue. Use the same type of oil as is used for normal operation. High-viscosity oils must be heated beforehand using suitable means. Ensure that all residues have been removed before filling with fresh oil.

- Place a suitable container under the oil-drain plug of the gear-unit housing.
- Unscrew the air filter and/or breather screw from the housing top.
- Unscrew the oil-drain plug and allow the oil to drain into the container.



There is a danger of scalding from the hot oil emerging from the housing. Wear protective gloves! Remove any oil spillage immediately with an oil-binding agent.

- Clean the permanent magnet of the oil-drain plug thoroughly.



Check the condition of the sealing ring (the sealing ring is vulcanised onto the oil drain plug). If necessary, use a new oil drain plug.

- Screw the oil-drain plug in.
- Unscrew oil-filler screw.



Check the condition of the sealing ring (the sealing ring is vulcanised onto the oil-filler plug); if necessary, use a new oil-filler plug.

- Fill with lubricant according to item 7.2.
- Screw in oil-filler plug.

10.2.3 Clean the breather screw



If a layer of dust has built up, the breather screw must be cleaned, whether or not the minimum period of 3 months has expired.

- Unscrew the breather screw.
- Clean the breather screw using benzine or a similar cleanser.
- Dry the breather screw and/or blow with compressed air.



**Be especially careful when blowing with compressed air.
Wear protective glasses!**



Foreign bodies must be prevented from entering the gear unit.

10.2.4 Clean the gear unit



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

- Remove any dirt adhering to the housing with a hard brush.
- Remove any corrosion.



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

10.2.5 Refill Taconite seals with grease

- Inject approx. 30 g lithium-based bearing grease into each of the lubrication points of the Taconite seal. The lubrication points are fitted with flat grease nipples type AM10x1 to DIN 3404.



Remove and dispose of any old grease escaping.

10.2.6 Check the oil-cooling system

- Close the stop valves in the coolant in- and outflow pipes.
- Inspect cooler for leaks in the water conducting piping.
- Check the condition of screw connections and, if necessary, replace.



For operation and maintenance, always observe the operating instructions indicated in the order-specific appendix.
For technical data, refer to the order-specific list of equipment.

10.2.7 Top up oil

- The instructions in item 7.2 must be observed!
- Always top up with the same type of oil as already used in the unit (see also item 10.2.2).

10.2.8 Check the hose lines

Even when adequately stored and subjected to permissible loads, hoses and hose lines are subject to a natural ageing process. This limits their period of use.



The period of use of the hose lines must not exceed 6 years from the manufacturing date stamped on them.

The period of use can be determined using available test and empirical values, taking into account the conditions of use.



The operator of the system must ensure that hose lines are replaced at suitable intervals of time, even if no defects which may affect their safe operation are identifiable on them.

Hose lines must be inspected for safe working condition by an expert before the plant is first put into operation and thereafter at least once a year.



If during inspections faults are found, these must be rectified immediately or suitable countermeasures taken.

10.2.9 Check the tightness of the fastening bolts

- The instructions in item 10.1 must be observed!
- Check the tightness of all fastening bolts.



Damaged bolts must be replaced with new bolts of the same type and strength class.

10.3 Final work



For operating and servicing the components, the pertinent instruction manuals and the specifications in sections 5 and 7 must be observed.
For technical data, refer to the data sheet and/or the list of equipment.



Observe also item 6.13.



Damaged bolts must be replaced with new bolts of the same type and strength class.

10.3.1 General inspection of the gear unit

The general inspection of the gear unit should be carried out by the Siemens Customer Service, as our engineers have the experience and training necessary to identify any components requiring replacement.

10.4 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).

12. Declarations

12.1 Declaration of incorporation

Declaration of incorporation

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

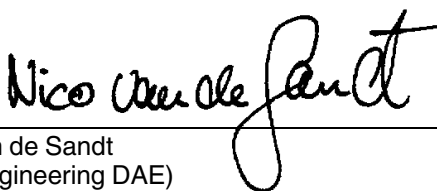
The manufacturer, Siemens AG, 46393 Bocholt, declares with regard to the partly completed machinery,

Planetary Gear Unit Types P.NA, P.SA, P.KA, P.LA P.NB, P.SB, P.KB, P.LB Sizes 9 to 40

developed for driven machines in the most various industry areas:

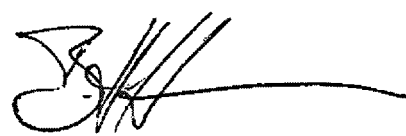
- The special technical documents described in Annex VII B have been prepared.
- The following basic health and safety requirements set out in Directive 2006/42/EC, Annex I, are applied and are satisfied:
1.1, 1.1.2, 1.1.3, 1.1.5; 1.2.4.4, 1.2.6; 1.3.1 - 1.3.4, 1.3.6 - 1.3.8.1; 1.4.1, 1.4.2.1;
1.5.1 - 1.5.11, 1.5.13, 1.5.15, 1.5.16; 1.6.1 - 1.6.3; 1.7.1, 1.7.1.1, 1.7.2, 1.7.3 - 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 partly completed machinery is in conformity with the provisions of the Directive(s): 94/9/EC
- 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, 2011-03-31



Dr. Nico van de Sandt
(Head of Engineering DAE)

Voerde, 2011-03-31



Dr. Bernhard Hoffmann
(Vice-President Business Subsegment DA)

Declaration of conformity

within the meaning of EC Directive 94/9/EC of 23.03.1994 and the legal requirements laid down for its implementation

The manufacturer, Siemens AG, 46393 Bocholt, declares that the equipment described in these assembly and operating instructions,

Planetary Gear Unit Types P.NA, P.SA, P.KA, P.LA P.NB, P.SB, P.KB, P.LB Sizes 9 to 40

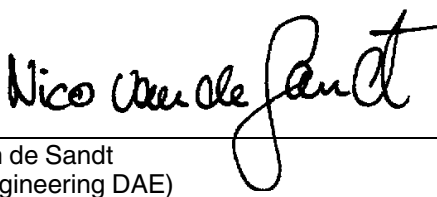
is in conformity with Article 1 and Article 8, Paragraph 1 b) ii) or 1 c) of Directive 94/9/EC and complies with the requirements of Directive 94/9/EC and the following standards:

- DIN EN 1127-1 : 02-2008
- DIN EN 13463-1 : 07-2009
- DIN EN 13463-5 : 03-2004
- DIN EN 13463-6 : 07-2005
- DIN EN 13463-8 : 01-2004
- DIN EN 60079-0 : 05-2007

The technical documentation has been delivered to the body named below:

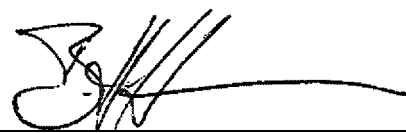
DEKRA EXAM GmbH, D - 44727 Bochum, code number: 0158.

Voerde, 2011-03-31



Dr. Nico van de Sandt
(Head of Engineering DAE)

Voerde, 2011-03-31



Dr. Bernhard Hoffmann
(Vice-President Business Subsegment DA)

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Subject to modifications

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www.siemens.com/drivetechnologie