

Gear unit

H.SH, H.VH, H.HH, H.DH, H.KH, H.FH,
H.HM, H.DM, H.KM, H.FM,
B.SH, B.VH, B.HH, B.DH, B.KH, B.FH,
B.HM, B.DM, B.KM, B.FM

Sizes 3 to 22

Equipment category M2

Assembly and operating instructions
BA 5032 en 04/2014



FLENDER gear units

SIEMENS

Gear unit

H.SH, H.VH, H.HH, H.DH, H.KH, H.FH,
H.HM, H.DM, H.KM, H.FM,
B.SH, B.VH, B.HH, B.DH, B.KH, B.FH,
B.HM, B.DM, B.KM, B.FM
Sizes 3 to 22
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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 level		red	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

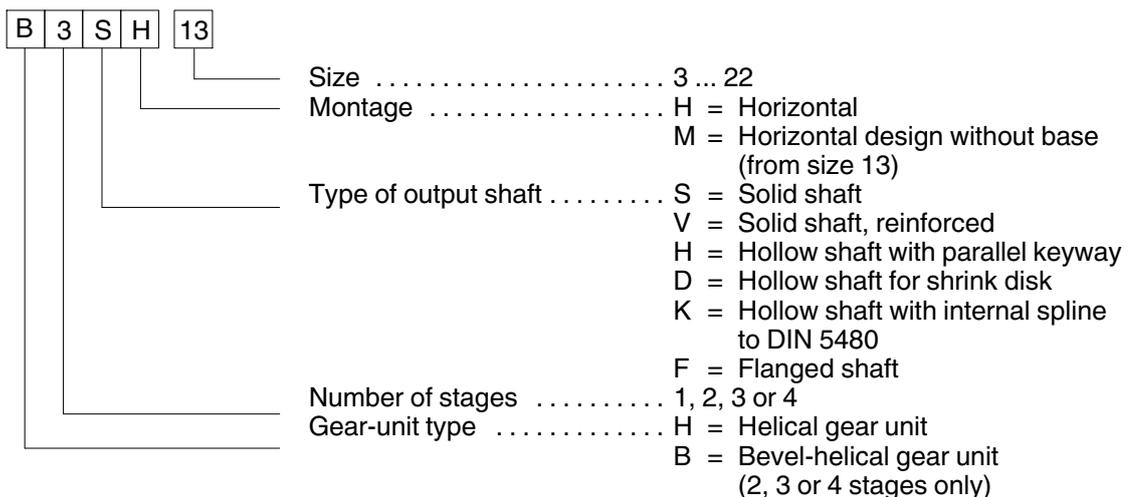
The most important technical data are shown on the rating plate. These data and the contractual agreements between Siemens and the customer for the gear unit determine the limits of its correct use.

①	
②	
③	④
⑤	⑥
⑦	⑧
⑨	
⑩	
(See item 1.2)	
⑪	
⑫	

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 1.3.2 and/or 1.3.3.

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

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

Table 1: ATEX marking

Equip-ment group	Equipment category	Marking
I	M2	  I M2 bck T _a .. ¹⁾

- 1) $T_{a \text{ min.}} \leq T_a \leq T_{a \text{ max.}}$ = 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



Category M2 equipment must be switched off on occurring of an explosible atmosphere!

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 Configurations and weights

1.3.1 Gear-unit types

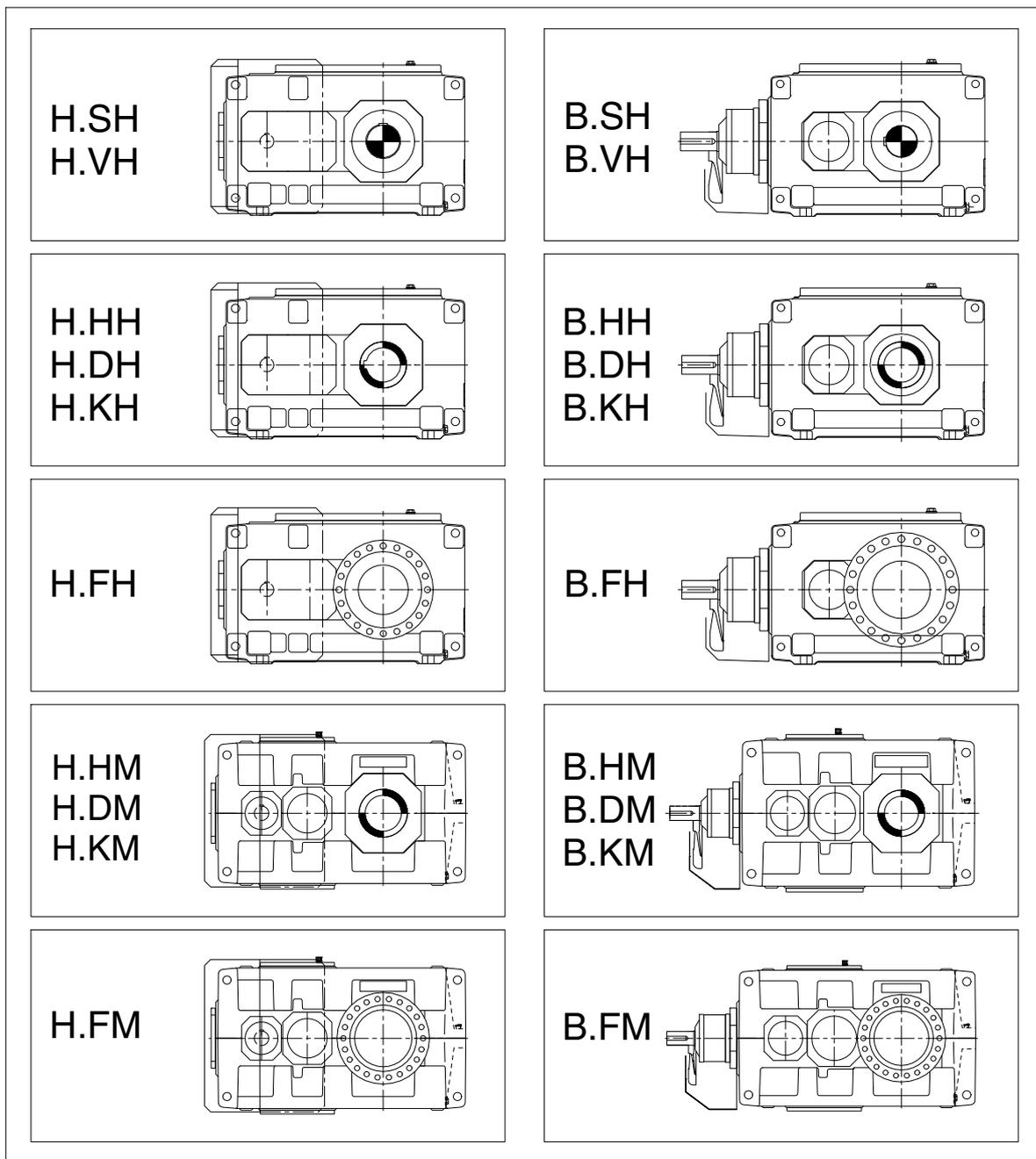


Fig. 2: Types

1.3.2 Weights

Table 2: Weights (approximate values)

Type	Approx. weight (kg) for size											
	3	4	5	6	7	8	9	10	11	12	13	14
H1SH	128	-	302	-	547	-	862	-	1515	-	2395	-
H2.H	115	190	300	355	505	590	830	960	1335	1615	2000	2570
H2.M	-	-	-	-	-	-	-	-	-	-	1880	2430
H3.H	-	-	320	365	540	625	875	1020	1400	1675	2295	2625
H3.M	-	-	-	-	-	-	-	-	-	-	2155	2490
H4.H	-	-	-	-	550	645	875	1010	1460	1725	2390	2730
H4.M	-	-	-	-	-	-	-	-	-	-	2270	2600
B2.H	140	235	360	410	615	700	1000	1155	1640	1910	2450	2825
B2.M	-	-	-	-	-	-	-	-	-	-	2350	2725
B3.H	130	210	325	380	550	635	890	1020	1455	1730	2380	2750
B3.M	-	-	-	-	-	-	-	-	-	-	2260	2615
B4.H	-	-	335	385	555	655	890	1025	1485	1750	2395	2735
B4.M	-	-	-	-	-	-	-	-	-	-	2280	2605

Type	Approx. weight (kg) for size							
	15	16	17	18	19	20	21	22
H1SH	3200	-	4250	-	5800	-	-	-
H2.H	3430	3655	4650	5125	6600	7500	8900	9600
H2.M	3240	3465	4420	4870	6300	7200	8400	9200
H3.H	3475	3875	4560	5030	6700	8100	9100	9800
H3.M	3260	3625	4250	4740	6200	7600	8500	9300
H4.H	3635	3965	4680	5185	6800	8200	9200	9900
H4.M	3440	3740	4445	4915	6300	7700	8600	9400
B2.H	3990	4345	5620	6150	-	-	-	-
B2.M	3795	4160	5320	5860	-	-	-	-
B3.H	3730	3955	4990	5495	7000	8100	9200	9900
B3.M	3540	3765	4760	5240	6500	7600	8600	9400
B4.H	3630	3985	4695	5200	6800	8200	9200	9900
B4.M	3435	3765	4460	4930	6300	7700	8600	9400



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.

1.3.3 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 tables 3 to 6.

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.

1.3.3.1 Measuring-surface sound-pressure level for bevel-helical gear units (B...) with fan

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

Type	i_N	n_1 1/min	Gear-unit size																				
			3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
B2	5	1500	73	76	79	81	83	84	85	87	88	89	91	92	94	-	-	-	-	-	-	-	
		1000	67	71	73	74	77	78	79	80	82	83	84	85	87	89	90	-	-	-	-	-	-
	8	750	61	64	66	67	70	71	72	73	75	76	77	78	81	82	83	85	-	-	-	-	-
		1500	70	73	75	76	78	81	82	83	84	85	86	87	88	90	-	-	-	-	-	-	-
	9	1000	63	67	68	70	73	74	75	77	79	80	81	82	83	84	86	87	-	-	-	-	-
		750	1)	61	62	64	66	67	68	70	72	73	74	75	77	78	79	80	-	-	-	-	-
	14	1500	67	71	74	76	78	79	80	81	83	84	87	88	89	90	-	-	-	-	-	-	-
		1000	60	64	67	68	70	72	73	74	78	79	80	81	82	83	84	84	-	-	-	-	-
	22.4	750	1)	1)	61	63	65	67	68	69	71	72	73	73	74	74	75	76	-	-	-	-	-
		12.5	1500	69	72	75	77	79	80	81	82	83	85	88	89	90	91	93	93	93	93	95	95
B3	12.5	1000	62	65	68	69	71	72	73	74	77	78	80	82	83	83	84	85	86	86	88	88	
		31.5	750	1)	1)	63	64	66	68	69	70	71	73	74	75	76	77	78	78	79	79	81	81
	35.5	1500	67	69	72	73	74	75	77	79	82	84	86	87	88	89	90	91	92	92	93	93	
		1000	1)	63	65	66	67	69	71	72	73	75	77	78	79	80	81	82	83	84	85	86	
	56	750	1)	1)	1)	1)	62	64	65	67	69	70	71	72	73	74	75	76	77	78	79	79	
		63	1500	66	68	70	71	73	74	76	78	81	83	85	86	87	88	89	90	91	91	92	92
	63	1000	1)	61	63	64	66	68	69	71	73	75	77	78	79	80	81	81	82	82	83	84	
		90	750	1)	1)	1)	1)	61	63	64	66	67	68	70	71	72	73	74	75	75	76	77	77

1) $L_{pA} < 60$ dB(A)

1.3.3.2 Measuring-surface sound-pressure level for bevel-helical gear units (B...) without fan

Table 4: Measuring-surface sound-pressure level L_{pA} in dB(A)

Type	i_N	n_1 1/min	Gear-unit size																			
			3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
B2	5	1500	72	75	78	80	82	83	84	86	87	88	89	90	93	-	-	-	-	-	-	-
	.	1000	66	70	72	73	76	77	78	79	81	82	83	84	86	88	89	-	-	-	-	-
	8	750	1)	63	65	66	69	71	72	73	74	75	77	78	80	82	83	84	-	-	-	-
	9	1500	67	71	74	75	77	79	80	81	83	84	85	86	87	89	-	-	-	-	-	-
	.	1000	61	65	67	69	72	73	74	76	77	78	80	81	82	83	85	86	-	-	-	-
	14	750	1)	1)	60	63	65	66	67	69	71	72	73	74	76	77	78	79	-	-	-	-
	16	1500	63	66	69	71	72	74	75	77	78	80	81	82	85	85	-	-	-	-	-	-
	.	1000	1)	61	63	65	67	68	69	71	72	74	75	77	79	80	81	81	-	-	-	-
	22.4	750	1)	1)	1)	1)	60	62	63	64	66	67	68	70	72	73	74	75	-	-	-	-
	B3	12.5	1500	65	68	71	74	75	76	77	79	81	83	84	85	86	87	87	88	89	90	91
.		1000	1)	63	66	68	69	70	72	73	75	77	78	80	80	81	82	82	84	85	86	86
31.5		750	1)	1)	1)	61	62	64	65	66	68	71	71	73	73	74	75	75	77	78	79	79
35.5		1500	60	65	67	70	71	71	72	74	77	79	80	81	82	83	83	84	86	86	88	88
.		1000	1)	1)	62	65	65	66	66	69	71	73	75	76	76	77	77	78	80	81	82	83
56		750	1)	1)	1)	1)	1)	1)	1)	62	65	67	68	69	70	70	71	72	74	74	75	76
63		1500	1)	61	64	70	67	68	68	70	73	75	76	78	78	79	79	80	82	83	84	84
.		1000	1)	1)	1)	63	62	62	62	65	68	70	71	72	73	73	74	75	76	77	78	79
90		750	1)	1)	1)	1)	1)	1)	1)	1)	61	63	64	65	66	67	67	68	70	70	72	72
B4		80	1500	-	-	64	65	67	68	70	72	75	76	77	79	80	81	82	83	84	85	86
	.	1000	-	-	1)	1)	61	63	64	67	69	70	72	73	74	75	76	77	78	79	80	80
	125	750	-	-	1)	1)	1)	1)	1)	1)	62	64	65	66	68	68	69	71	71	72	73	74
	140	1500	-	-	60	61	63	65	66	68	71	72	73	75	76	77	78	79	80	81	82	82
	.	1000	-	-	1)	1)	1)	1)	61	63	65	67	68	69	71	71	72	74	75	75	76	77
	224	750	-	-	1)	1)	1)	1)	1)	1)	1)	61	62	64	65	66	67	68	69	69	70	70
	250	1500	-	-	1)	1)	1)	62	63	65	67	69	70	71	73	73	75	76	77	77	78	79
	.	1000	-	-	1)	1)	1)	1)	1)	1)	62	63	64	66	67	68	69	70	71	72	73	73
	400	750	-	-	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	61	62	63	64	65	66	66

1) $L_{pA} < 60$ dB(A)

1.3.3.3 Measuring-surface sound-pressure level for helical-gear units (H...) with fan

Table 5: Measuring-surface sound-pressure level L_{pA} in dB(A)

Type	i_N	n_1 1/min	Gear-unit size																			
			3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
H1	1.25	1500	76	-	81	-	84	-	87	-	91	-	-	-	-	-	-	-	-	-	-	-
	.	1000	71	-	76	-	79	-	81	-	83	-	85	-	-	-	-	-	-	-	-	-
	2	750	67	-	72	-	75	-	78	-	80	-	82	-	85	-	-	-	-	-	-	-
	2.24	1500	73	-	79	-	82	-	84	-	89	-	90	-	-	-	-	-	-	-	-	-
	.	1000	68	-	74	-	77	-	79	-	82	-	84	-	87	-	-	-	-	-	-	-
	3.55	750	64	-	70	-	72	-	75	-	78	-	80	-	83	-	84	-	-	-	-	-
	4	1500	70	-	77	-	81	-	83	-	86	-	89	-	93	-	-	-	-	-	-	-
	.	1000	65	-	71	-	75	-	77	-	80	-	82	-	84	-	85	-	87	-	-	-
5.6	750	61	-	68	-	71	-	72	-	75	-	77	-	79	-	81	-	83	-	-	-	
H2	6.3	1500	-	75	76	77	80	81	82	84	85	86	88	90	92	94	96	96	-	-	-	-
	.	1000	-	69	71	72	74	75	77	79	80	81	83	84	85	86	87	88	88	89	90	-
	10	750	-	66	68	69	70	72	73	75	76	77	79	80	81	82	83	83	84	84	85	85
	11.2	1500	-	73	75	77	79	80	81	82	85	88	90	91	92	93	95	95	-	-	-	-
	.	1000	-	68	69	70	72	73	75	77	79	80	82	83	84	85	85	86	86	87	87	87
	16	750	-	64	66	67	69	70	71	73	74	76	78	79	79	80	81	81	82	82	83	83
	18	1500	-	71	73	75	77	78	80	82	84	86	87	90	91	92	93	94	94	95	95	95
	.	1000	-	65	67	68	71	72	73	75	77	78	80	81	82	83	83	84	85	85	86	86
28	750	-	62	64	65	67	68	69	71	73	74	75	77	78	79	79	80	80	81	81	81	
H3	22.4	1500	-	-	71	72	75	75	77	77	80	80	81	81	84	84	84	85	-	-	-	-
	.	1000	-	-	65	66	69	70	71	72	74	75	75	75	78	78	78	79	-	-	-	-
	35.5	750	-	-	62	62	66	67	67	68	70	70	71	72	74	74	75	76	-	-	-	-
	40	1500	-	-	70	71	73	74	76	76	79	79	80	80	83	82	83	83	-	-	-	-
	.	1000	-	-	64	65	67	68	69	70	73	73	73	74	77	77	77	77	-	-	-	-
	63	750	-	-	62	62	63	64	65	66	69	69	69	70	72	73	73	73	-	-	-	-
	71	1500	-	-	70	70	72	72	75	75	78	78	78	78	82	82	82	82	-	-	-	-
	.	1000	-	-	64	64	65	66	68	69	71	72	72	72	75	75	75	76	-	-	-	-
112	750	-	-	61	61	62	62	64	65	67	67	68	68	71	71	71	72	-	-	-	-	

1) $L_{pA} < 60$ dB(A)

1.3.3.4 Measuring-surface sound-pressure level for helical-gear units (H...) without fan

Table 6: Measuring-surface sound-pressure level L_{pA} in dB(A)

Type	i_N	n_1 1/min	Gear-unit size																			
			3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
H1	1.25	1500	73	-	77	-	79	-	81	-	83	-	-	-	-	-	-	-	-	-	-	-
	.	1000	69	-	72	-	75	-	76	-	78	-	80	-	-	-	-	-	-	-	-	-
	2	750	65	-	69	-	71	-	73	-	75	-	77	-	79	-	-	-	-	-	-	-
	2.24	1500	70	-	75	-	77	-	79	-	81	-	83	-	-	-	-	-	-	-	-	-
	.	1000	66	-	70	-	72	-	74	-	76	-	78	-	80	-	-	-	-	-	-	-
	3.55	750	62	-	67	-	68	-	71	-	73	-	75	-	77	-	79	-	-	-	-	-
	4	1500	67	-	72	-	74	-	76	-	78	-	79	-	82	-	-	-	-	-	-	-
	.	1000	1)	-	67	-	70	-	71	-	73	-	75	-	77	-	79	-	81	-	-	-
	5.6	750	1)	-	63	-	66	-	67	-	70	-	71	-	74	-	76	-	78	-	-	-
H2	6.3	1500	-	71	74	75	76	77	79	79	80	81	81	82	84	85	85	86	-	-	-	-
	.	1000	-	66	69	70	71	72	74	74	75	76	76	77	80	80	80	81	83	83	84	-
	10	750	-	63	66	67	67	69	70	71	72	73	73	74	76	77	77	78	80	80	81	81
	11.2	1500	-	69	72	73	74	75	77	77	78	79	79	80	82	83	83	84	-	-	-	-
	.	1000	-	64	67	68	69	70	72	72	73	74	74	75	77	78	78	79	81	81	82	82
	16	750	-	61	64	65	66	67	69	69	70	71	71	72	74	75	75	76	77	78	79	79
	18	1500	-	66	69	70	71	72	74	74	75	76	77	78	80	80	81	82	83	84	84	85
	.	1000	-	61	64	65	66	68	69	69	70	71	72	73	75	75	76	77	78	79	79	80
	28	750	-	1)	61	62	63	64	66	66	67	68	69	70	72	72	73	73	75	75	76	76
H3	22.4	1500	-	-	68	69	73	74	74	75	77	77	78	79	81	81	82	83	83	84	85	86
	.	1000	-	-	63	65	68	69	69	71	72	73	73	74	76	77	77	78	79	79	81	81
	35.5	750	-	-	60	61	65	66	65	67	69	69	70	71	73	73	74	75	75	76	77	78
	35.5	1500	-	-	65	67	70	71	71	73	74	75	76	76	78	79	79	80	81	81	83	83
	.	1000	-	-	1)	62	65	66	66	68	69	70	71	72	73	74	75	75	76	77	78	78
	63	750	-	-	1)	1)	62	63	63	65	66	67	68	70	71	71	72	73	73	75	75	
	71	1500	-	-	62	64	67	68	68	70	71	72	73	74	76	76	77	78	78	79	80	81
	.	1000	-	-	1)	1)	62	63	63	65	66	67	68	69	71	71	72	73	73	74	75	76
	112	750	-	-	1)	1)	1)	1)	1)	62	63	64	65	66	68	68	69	70	70	71	72	72
H4	100	1500	-	-	-	-	66	67	68	69	70	71	72	73	75	75	76	76	77	78	78	78
	.	1000	-	-	-	-	62	63	63	64	65	66	67	68	70	70	71	72	72	73	73	74
	140	750	-	-	-	-	1)	1)	1)	61	62	63	64	64	66	67	68	68	69	69	70	70
	160	1500	-	-	-	-	64	65	66	66	68	68	69	70	72	73	73	74	74	75	75	76
	.	1000	-	-	-	-	1)	60	61	62	63	64	64	65	67	68	68	69	70	70	71	71
	250	750	-	-	-	-	1)	1)	1)	1)	60	61	61	62	64	64	65	66	66	67	67	68
	280	1500	-	-	-	-	61	62	63	64	65	66	67	67	69	70	70	71	72	72	73	73
	.	1000	-	-	-	-	1)	1)	1)	1)	60	61	62	63	64	65	66	66	67	68	68	68
	450	750	-	-	-	-	1)	1)	1)	1)	1)	1)	1)	1)	61	62	62	63	64	64	65	65

1) $L_{pA} < 60$ dB(A)

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 gear unit**" described in these instructions has been developed for driving machines in general engineering applications and in mining (underground applications equipment category M2) and complies with the requirements in Directive 94/9/EC.

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

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

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

The gear unit described in these instructions reflects the state of technical development at the time these instructions went to print.

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

2.2 Copyright

The copyright to these instructions is held by **Siemens AG**.

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

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

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09322 Penig

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3. Safety instructions



**Entry to the gear unit and its add-on components is not permitted!
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 and danger of life of operator and third parties,
 - ensure the safety and reliability of the unit,
 - avoid disruptions and environmental damage through incorrect use.
- During transport, assembly and dismantling, operation and maintenance of the system, the relevant safety and environmental regulations must be complied with at all times.
- The gear unit may only be operated, maintained and/or repaired by persons qualified for the work concerned (see "Qualified personnel" on page 3 of this manual).
- The outside of the gear unit must not be cleaned with high-pressure cleaning equipment.
- All work must be carried out with great care and with due regard to safety.



All work on the gear unit must be carried out only when it is at a standstill. The drive unit must be secured against being switched on accidentally (e.g. by locking the key switch or removing the fuses from the power supply). A notice should be attached to the start switch stating clearly that work is in progress.

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



**A potential equalisation in accordance with the applying regulations and directives must be carried out!
On the gear units threaded holes are available for establishing an earth connection. This work must always be done by specialist electricians.**



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



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



When the gear unit is incorporated in plant or machinery, the manufacturer of such plant or machinery must ensure that the prescriptions, notes and descriptions contained in these instructions are incorporated in his own instructions.



All add-on parts must satisfy the requirements in Directive 94/9/EC and must be at least category M2 equipment.

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.



**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.**

- Removed safety equipment must be re-installed prior to starting up.
- Notices attached to the gear unit, such as rating plate, direction arrows, 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 must always be obtained from Siemens (see section 11, "Spare parts, customer service").

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



On occurring of an explosible atmosphere, the gear unit must be switched off immediately!

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



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



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



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



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



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



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

4. Transport and storage

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

4.1 Scope of supply

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



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

4.2 Transport



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

The gear unit is delivered in the fully assembled condition. Additional items 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. They have the following meanings:

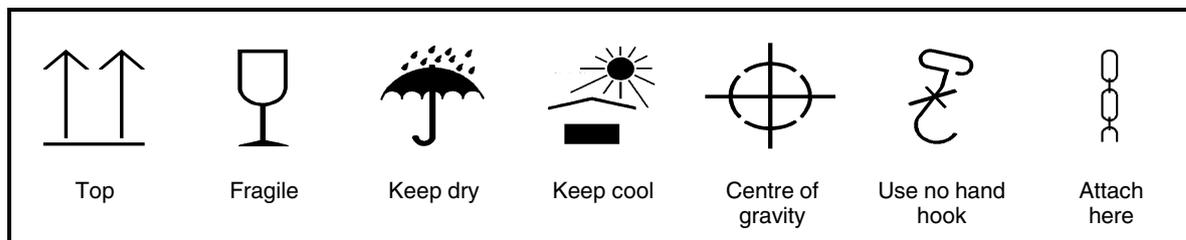


Fig. 3: Transport symbols



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



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



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

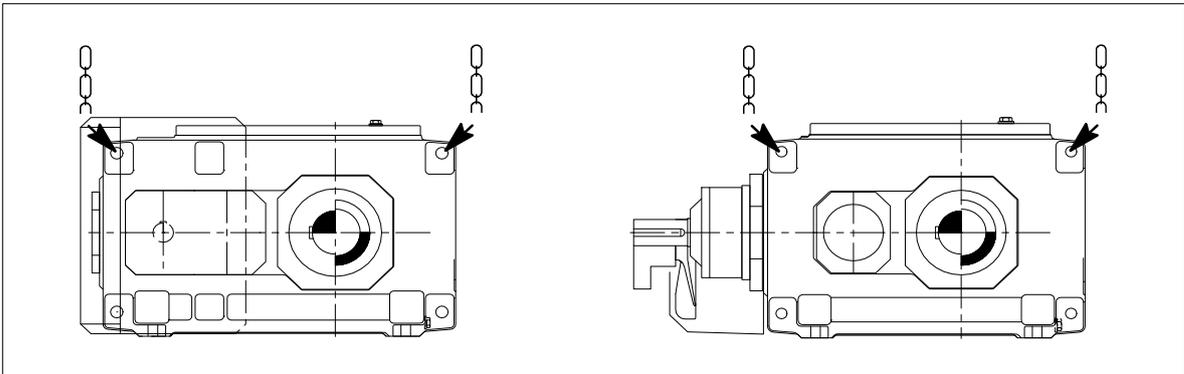


Fig. 4: Attachment points on gear units types H... and B...

For drive units where add-on parts such as motor, add-on coupling etc. are fitted on the gear unit an additional attachment point may be required because of the shift in the centre of gravity.



Units which are slung by eyebolts must not be tilted.

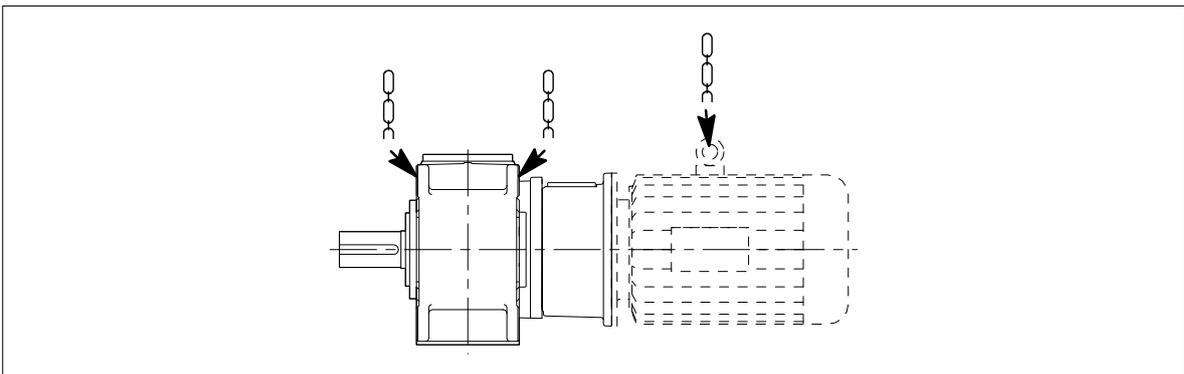


Fig. 5: Attachment points on gear units types H... with motor

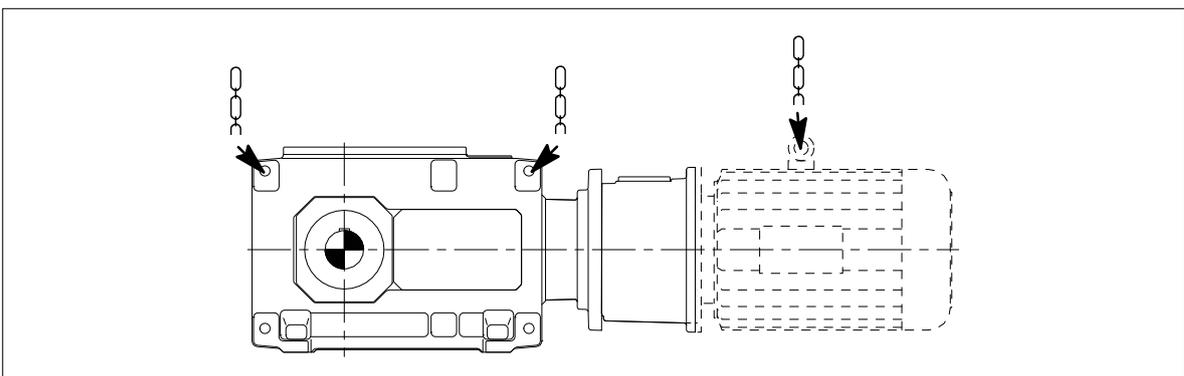


Fig. 6: Attachment points on gear units types B... with motor

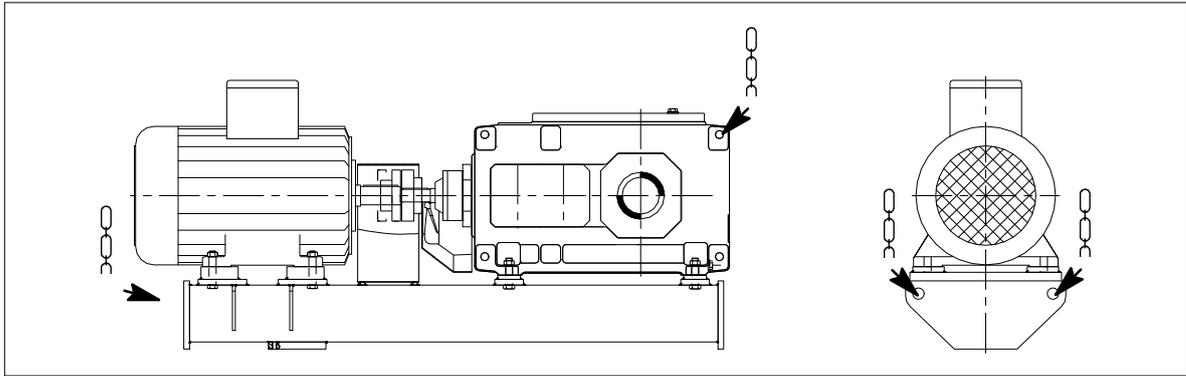


Fig. 7: Attachment points on gear units types B... with gear-unit swing base



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

4.3 Storing the gear unit

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



When 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 charge-generating 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 or 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 6 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 (> 6 months) we advise regular checking and, if necessary, renewal of the interior and exterior preservation (see items 7.3.1 and 7.3.2).

4.4.1 Interior preservation with preservative agent

Table 7: 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 the air filter with the screw plug. (Prior to start-up replace screw plug with air filter.)
For storage periods longer than 24 months, renew the preservative agent. For storage periods longer than 36 months, Siemens should be consulted before.		

Table 8: 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 the air filter with the screw plug. (Prior to start-up replace screw plug with air filter.)
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 9: 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 7.3.1.3 and 7.3.2.1).

5. Technical description

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

5.1 General description

The helical gear unit is supplied as a one-, two-, three- or four-stage gear unit. The bevel-helical gear unit is supplied as a two-, three- or four-stage gear unit. It is designed for installation in the horizontal 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; this will require consultation with Siemens.

The gear units are characterised by a low noise level, which is achieved by helical gears with a high contact ratio and a sound-damping housing.

The good temperature characteristics of the gear unit are achieved by its high degree of efficiency, large housing surface and performance-related cooling system.

A number of shaft configurations (types and rotation directions) are possible. These are shown in the following table as solid shafts:

Table 10: Types and rotation directions

Type	Version								
	A	B	C	D	E	F	G	H	I
H1SH									
H2SH H2HM H2HH H2DM H2DH H2KM H2KH H2FM H2FH H2VH									
H3SH H3HM H3HH H3DM H3DH H3KM H3KH H3FM H3FH H3VH									
H4SH H4HM H4HH H4DM H4DH H4KM H4KH H4FM H4FH H4VH									
B2SH B2HM B2HH B2DM B2DH B2KM B2KH B2FM B2FH B2VH									
B3SH B3HM B3HH B3DM B3DH B3KM B3KH B3FM B3FH B3VH									
B4SH B4HM B4HH B4DM B4DH B4KM B4KH B4FM B4FH B4VH									

5.2 Output versions

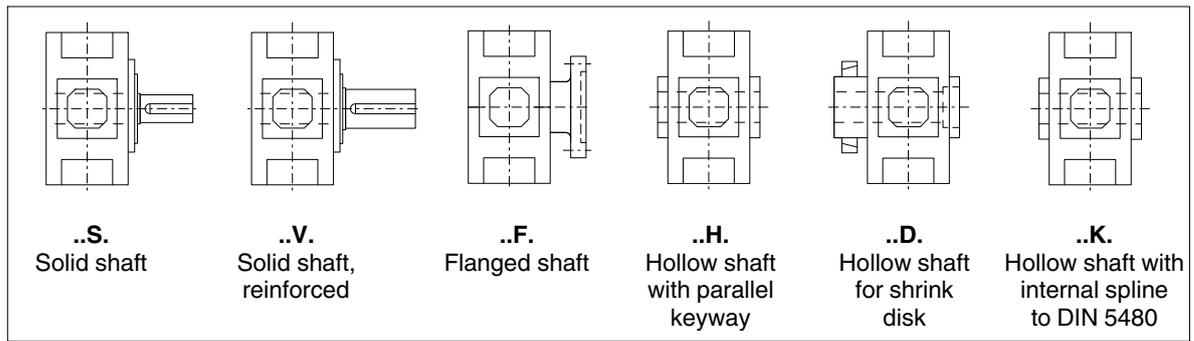


Fig. 8: Output versions

5.3 Housing

The housing is made of cast iron; if necessary, it may also be made of steel.

Housings up to size 12 are made in one part. The exception is type H1SH, which has a two-part housing similar to those of sizes 13 to 22. The housing is rigid in design and due to its form has excellent noise and temperature characteristics.

The gear unit comes with the following equipment:

- Lifting eyes (adequately dimensioned for transport)
- Inspection and/or assembly cover (for oil filling and/or inspection)
- Oil dipstick (to check the oil level)
- Oil drain plug (to change the oil)
- Air filter (for venting)

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

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

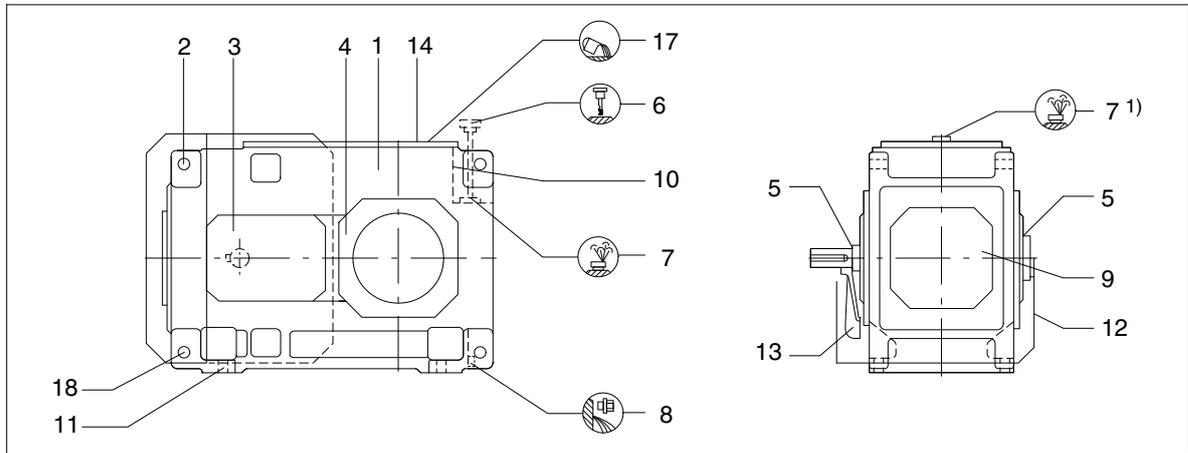


Fig. 9: Gear-unit features on gear units type H..H ≤ 12

1) for H1SH only

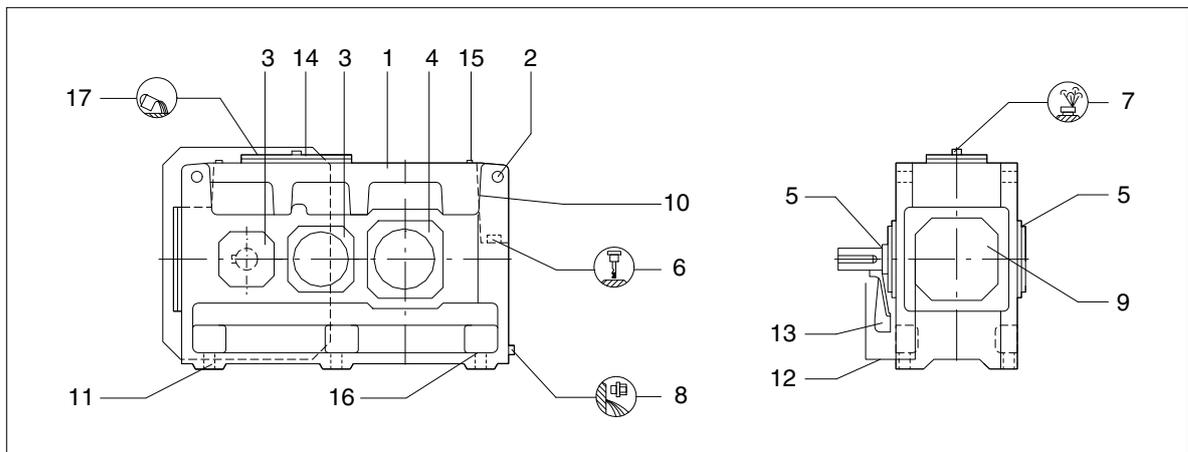


Fig. 10: Gear-unit features on gear units type H..H ≥ 13

1 Housing	10 Rating plate
2 Lifting eyes	11 Gear-unit fastening
3 Cover	12 Air-guide cover
4 Cover	13 Fan
5 Shaft seals	14 Inspection and/or assembly cover
6 Oil dipstick	15 Alignment surfaces
7 Housing ventilation	16 Alignment thread
8 Oil-drain plug	17 Oil inlet
9 Cover and/or bearing journal	18 Fastening for torque arm

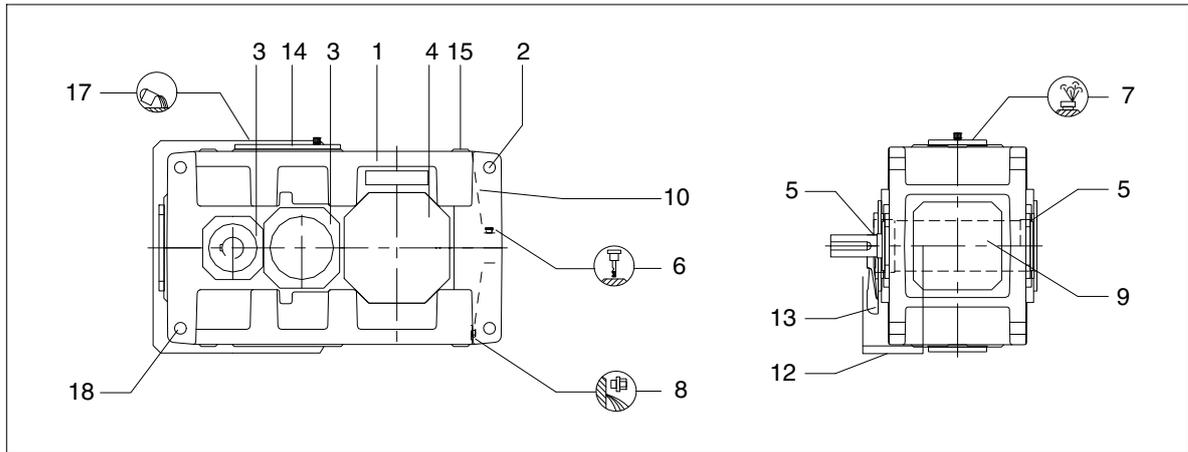


Fig. 11: Gear-unit features on gear units type H..M ≥ 13

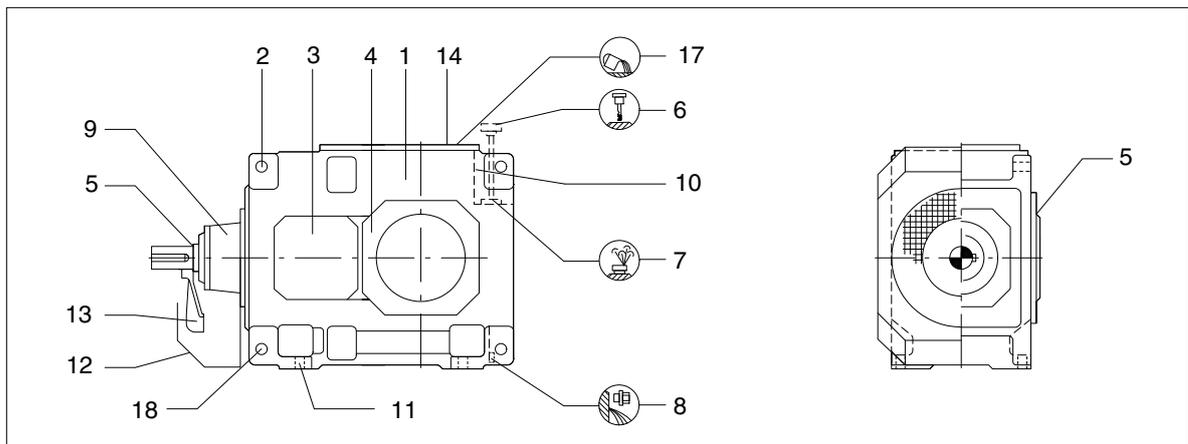


Fig. 12: Gear-unit features on gear units type B..H ≤ 12

- | | | | |
|---|------------------------------|----|----------------------------------|
| 1 | Housing | 10 | Rating plate |
| 2 | Lifting eyes | 11 | Gear-unit fastening |
| 3 | Cover | 12 | Air-guide cover |
| 4 | Cover | 13 | Fan |
| 5 | Shaft seals | 14 | Inspection and/or assembly cover |
| 6 | Oil dipstick | 15 | Alignment surfaces |
| 7 | Housing ventilation | 16 | Alignment thread |
| 8 | Oil-drain plug | 17 | Oil inlet |
| 9 | Cover and/or bearing journal | 18 | Fastening for torque arm |

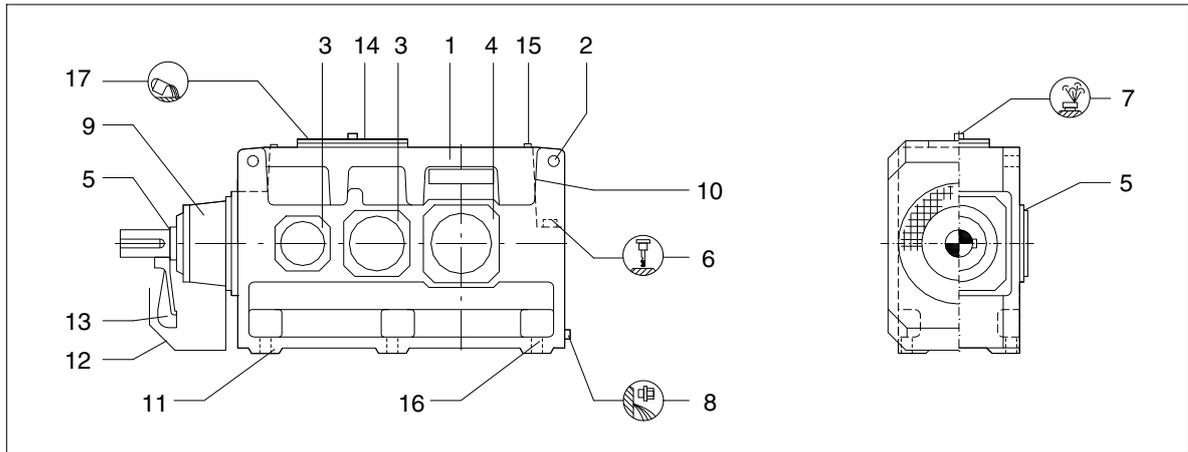


Fig. 13: Gear-unit features on gear units type B..H ≥ 13

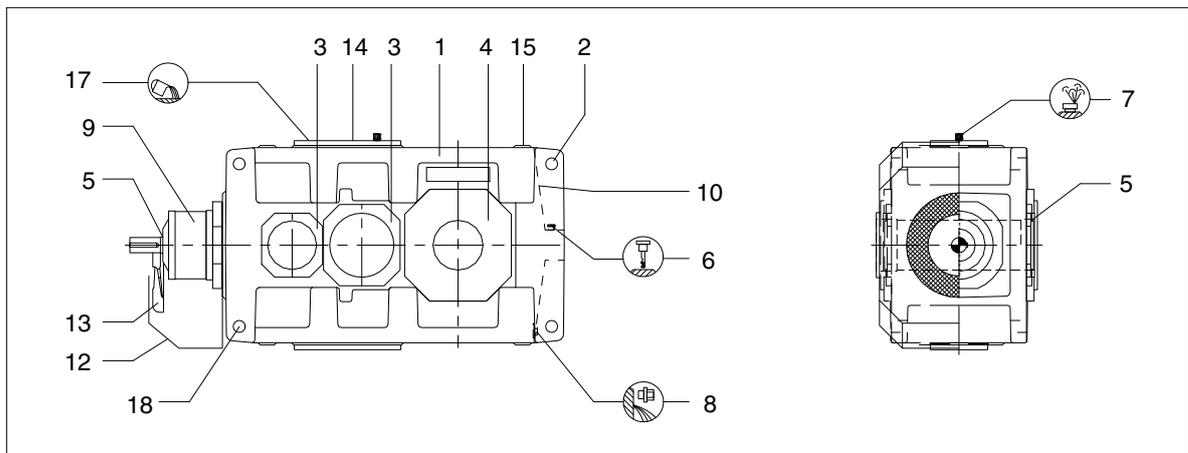


Fig. 14: Gear-unit features on gear units type B..M ≥ 13

- | | | | |
|---|------------------------------|----|----------------------------------|
| 1 | Housing | 10 | Rating plate |
| 2 | Lifting eyes | 11 | Gear-unit fastening |
| 3 | Cover | 12 | Air-guide cover |
| 4 | Cover | 13 | Fan |
| 5 | Shaft seals | 14 | Inspection and/or assembly cover |
| 6 | Oil dipstick | 15 | Alignment surfaces |
| 7 | Housing ventilation | 16 | Alignment thread |
| 8 | Oil-drain plug | 17 | Oil inlet |
| 9 | Cover and/or bearing journal | 18 | Fastening for torque arm |

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

5.4 Toothed components

The toothed components of the gear unit are case-hardened. The helical gear teeth are ground; depending on their size and transmission ratio, bevel-helical gear teeth are lapped, ground or HPG-gear-cut. The high quality of the teeth leads to a significant noise reduction and ensures safe and reliable running.

The gear wheels are joined to the shafts by interference fits and parallel keys. These types of joints transmit with adequate reliability the torques generated.

5.5 Lubrication

5.5.1 Splash lubrication

Unless otherwise agreed in the order, the teeth and bearings are adequately splash-lubricated with oil by the gearwheels. This means that the gear units require very little maintenance.

5.5.2 Forced lubrication

The gear unit can be fitted with an additional forced-lubrication system. In case of forced-feed lubrication teeth are additionally supplied with oil by an external oil-supply system (separately fitted) by way of pipework.



In case of gear units with an additional forced-lubrication system, before starting the unit up all monitors must be connected so as to be ready for operation. All oil-supply system in use must satisfy the requirements in Directive 94/9/EC and must be at least category M2 equipment.



Be sure to observe the operating instructions relating to the oil-supply system for operation and maintenance of the oil-supply system.

5.6 Shaft bearings

All shafts are mounted in rolling bearings.

5.7 Shaft seals

Taconite seals at the shaft outlets prevent oil from escaping from or dirt from entering the gear unit.

5.7.1 Taconite seal



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

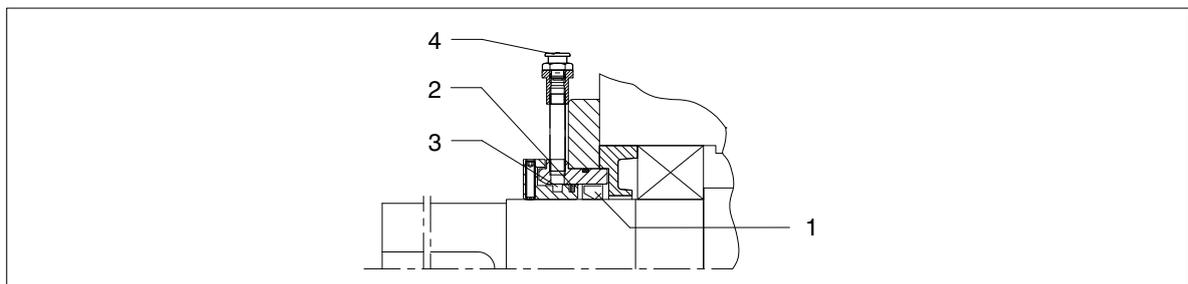


Fig. 15: Taconite seal

1 Radial shaft-sealing ring
2 Lamellar seal

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

Taconite seals are divided into the following types:

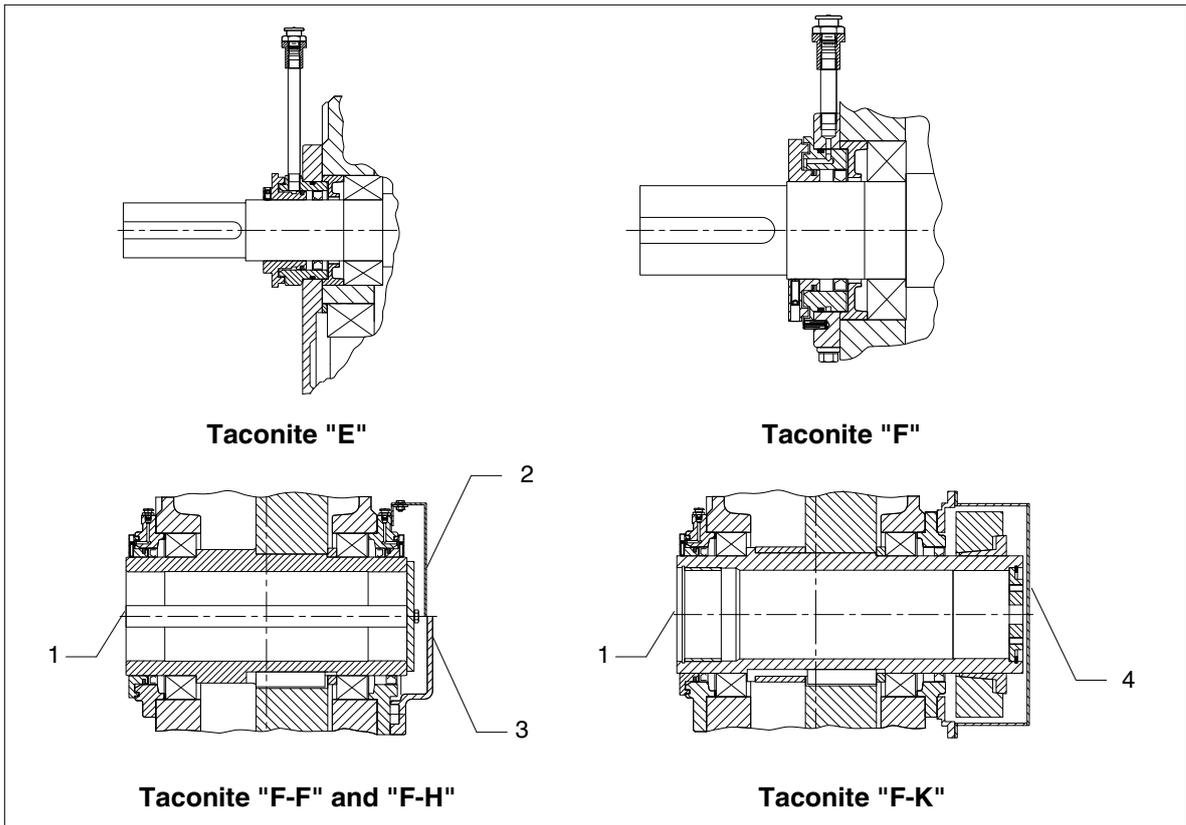


Fig. 16: Taconite seal, variants E, F, F-F, F-H and F-K

- | | | | |
|---|----------------|---|----------------|
| 1 | Output | 3 | Taconite "F-H" |
| 2 | Taconite "F-F" | 4 | Taconite "F-K" |

Table 11: Variant description Taconite seal

Taconite type variant	Application	Remarks
"E"	All input shafts with or without fan	Re-chargeable labyrinth
"F"	Output shaft Type S (solid shaft) Type V (solid shaft, reinforced) Type F (flanged shaft)	
"F-F"	Output shaft Type H (hollow shaft with parallel keyway) Type K (hollow shaft with internal spline to DIN 5480)	Labyrinth re-chargeable on both sides, incl. dustproof cowl to prevent contact on gear-unit side facing away from output
"F-H"	Output shaft Type H (hollow shaft with parallel keyway) Type K (hollow shaft with internal spline to DIN 5480)	Labyrinth re-chargeable on output side; dustproof cowl on opposite side
"F-K"	Output shaft Type D (hollow shaft for shrink disk)	



For re-charging the labyrinth seals with grease, the specified frequencies (see table 27 in item 10.1) must be observed.

5.8 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 mounted 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.

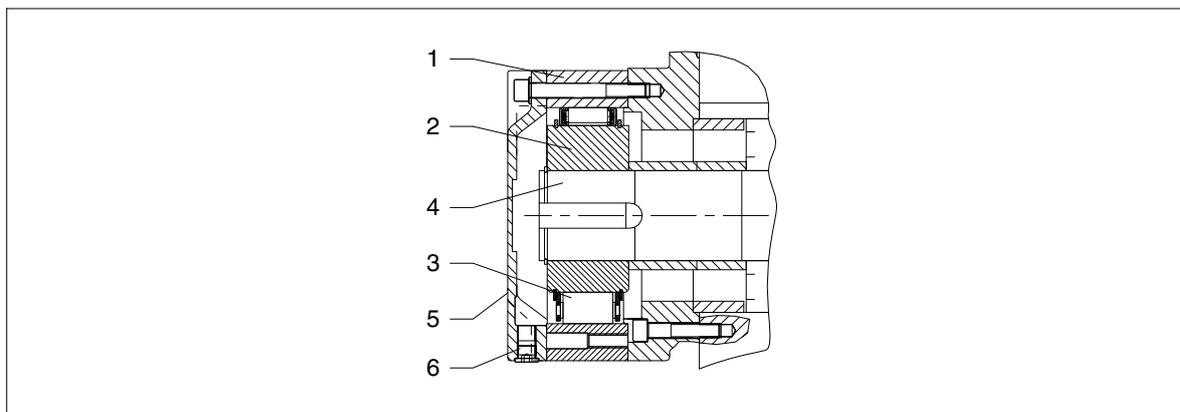


Fig. 17: Backstop

- | | | | |
|---|------------------|---|--------------------|
| 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.

5.8.1 Torque-limiting backstop

A torque-limiting backstop is available for special uses, e.g. dual drives. The backstop is a combination of a backstop with centrifugally operated sprags and a brake. The slipping torque is set by a number of compression springs.

This "slipping" will protect the gear unit and the sprags of the backstop from inadmissibly high stresses during negative rotation. In addition, a uniform load distribution onto both gear units is achieved during negative rotation when using dual drives.

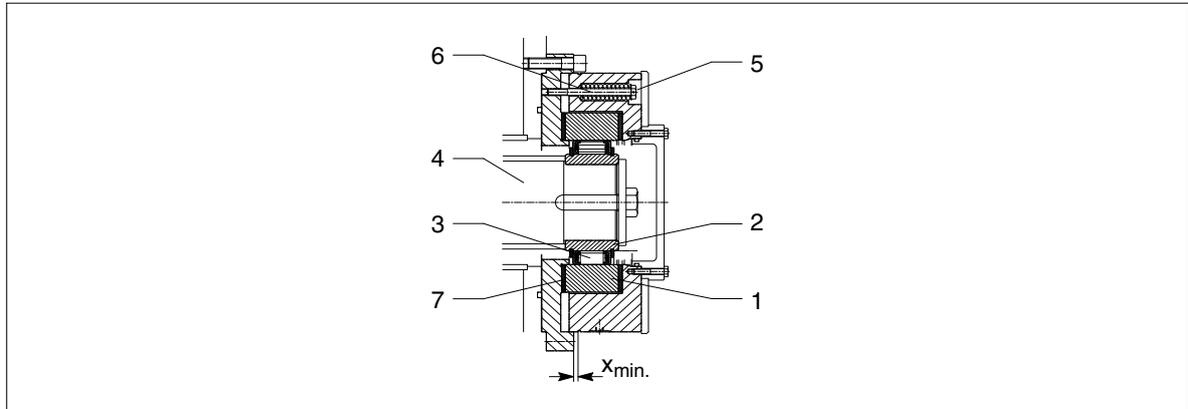


Fig. 18: Torque-limiting backstop

- | | | | |
|---|------------------------|---|------------------------------------|
| 1 | Outer ring | 5 | Locking wire |
| 2 | Inner ring | 6 | Lead screw with compression spring |
| 3 | Cage with sprags | 7 | Friction lining |
| 4 | Shaft (adapter flange) | | |

The torque-limiting backstop is attached to the gear unit by means of an adapter flange to form an oiltight seal and is integrated in its oil-circulation system.



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



The slipping torque was set at the correct value during the manufacturing process; resetting during startup is not permissible.

To safeguard the set slipping torque, the lead screws of the compression springs are secured with locking wire. The warranty will expire if the locking wire for the screws is missing or has been damaged.



For safety reasons, it is absolutely prohibited to change the slipping torque. After having stopped the motor, there is a danger that the load is not safely held in its position and can run in reverse direction at high speed.



As a rule, the backstop operates without wear. As a precaution, the dimension " $x_{min.}$ " must be checked once yearly and after every releasing operation (type FXRT only).



The dimension " $x_{min.}$ " for the backstop must not be smaller than that stated on the rating plate of the backstop. When this value is reached, Siemens must be consulted.



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.



If a potentially explosive atmosphere develops, the release mechanism must not be operated (type FXRT only). If this type is used with a release device, the operating instructions for this backstop must also be followed.

5.9 Cooling



Depending on requirements, the gear unit is fitted with a fan, a cooling coil or a separately provided oil-supply system. In case of a separate oil-supply system, the specific instructions for this oil-supply system must be observed.



The oil-supply system must have been designed and manufactured for use in accordance with Directive 94/9/EC. It must be equipment of at least category M2.

5.9.1 Fan

The fan is fitted on the high-speed shaft of the gear unit and is protected from accidental contact by an air guide cover. The fan sucks air through the grid of the air-guide cover and blows it along the air ducts on the side of the gear-unit housing. It thereby dissipates a certain amount of heat from the housing.

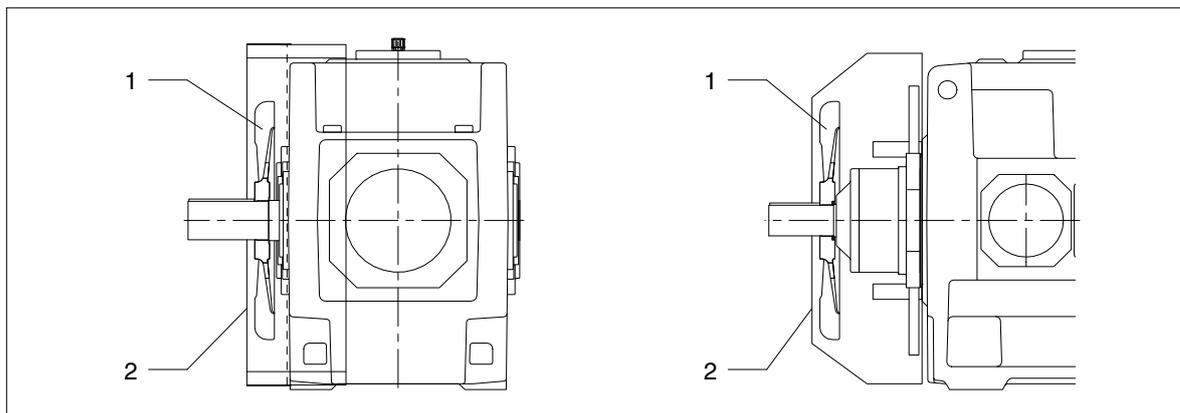


Fig. 19: Fan on gear units types H... and B...

1 Fan

2 Air-guide cover

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



For gear units fitted with a fan, sufficient space must be allowed for air intake when mounting the safety guards for the coupling or other components. The correct distance is given in the dimensioned drawing in the gear-unit documentation.

It must be ensured that the air-guide cover is correctly fastened. The fan must not come into contact with the air-guide cover. Only air-conducting cowls are used which have passed the impact test to DIN EN 13463-1.



The applied fans have been balanced! This must be taken in consideration when repairing or replacing the fans. Only duly balanced fans are permissible!



The cooling effect is considerably reduced if the fan or the housing surface are dirty (see section 10, "Maintenance and repair").

5.9.2 Cooling coil

Depending on the order specification, the gear unit may be fitted with a cooling coil in the oil sump. Cooling water is supplied by way of a water connection. The operator must ensure this.

Either fresh water, sea water or brackish water can be used for cooling purposes.

When water is flowing through the cooling coil, a certain amount of heat is transferred from the oil to the water and thereby removed from the system.

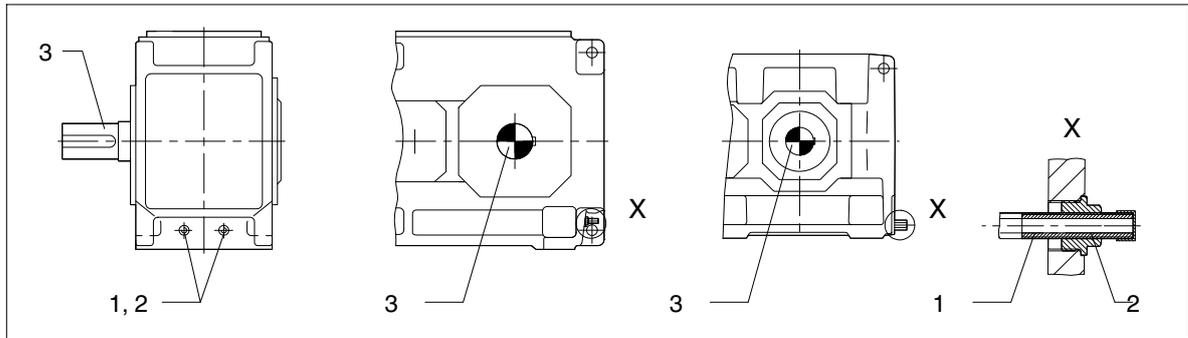


Fig. 20: Cooling coil on gear units types H... and B...

1 Cooling-water connection 2 Reducing screw 3 Output shaft

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



The water can flow through the gear unit in either direction. 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.

The ends of the cooling coil must never be twisted because this could destroy the cooling coil.

The reducing bolt must not be tightened or removed because this may result in damage to the cooling coil.



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



Avoid too high pressure on the cooling-water entry. For this a cooling-water flow control must be used (e.g. a pressure reducer or a suitable valve).

Table 12: Cooling-water quantities for cooling coils

Type	Cooling-water quantity required (l/min)																	
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20 to 22
H1SH	4	-	4	-	4	-	8	-	8	-	8	-	8	-	8	-	1)	-
H2.H	-	4	4	4	4	4	8	8	8	8	8	8	8	8	8	8	1)	1)
H2.M	-	-	-	-	-	-	-	-	-	-	8	8	8	8	8	8	1)	1)
H3.H	-	-	4	4	4	4	4	4	8	8	8	8	8	8	8	8	1)	1)
H3.M	-	-	-	-	-	-	-	-	-	-	8	8	8	8	8	8	1)	1)
B2.H	-	4	8	4	8	4	8	8	8	8	8	8	8	8	8	8	-	-
B3.H	-	4	4	4	4	4	8	8	8	8	8	8	8	8	8	8	1)	1)
B2.M	-	-	-	-	-	-	-	-	-	-	8	8	8	8	8	8	-	-
B3.M	-	-	-	-	-	-	-	-	-	-	8	8	8	8	8	8	1)	1)

1) on request



Cooling performance and connecting dimensions can be taken from the order-specific dimensioned drawing.

5.10 Oil-temperature monitoring system

The gear unit is fitted with a Pt 100 resistance thermometer for measuring the oil temperature in the oil sump. In order to measure the temperatures or temperature differences, the Pt 100 resistance thermometer should be connected to a suitable instrument provided by the customer.



The Pt 100 resistance thermometer complies with the requirements in Directive 94/9/EC for equipment in category "M2".

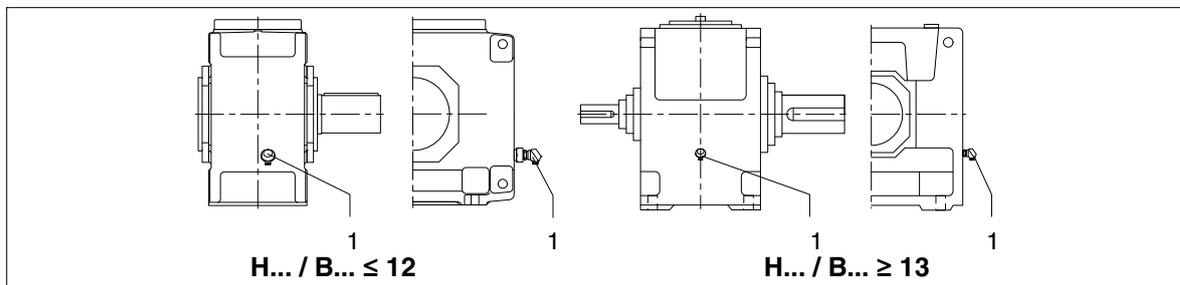


Fig. 21: Oil-temperature measurement on gear units types H... and B...

- 1 Pt 100 resistance thermometer

For a detailed illustration of the gear unit and the position of the add-on parts, please refer to the drawings in the gear-unit documentation.



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.

5.11 Bearing-monitoring system

The gear unit is standard-fitted with a bearing monitoring system by attaching measuring nipples. These nipples are intended for attachment of shock-pulse sensors with rapid-action coupling and are located in the vicinity of the bearings to be monitored. Depending on the order, the gear unit may also be set up for temperature monitoring at the bearing points. The gear unit is then equipped with tapped holes for fitting Pt 100 resistance thermometers.



For this version Siemens must be consulted. Only Pt 100 resistance thermometer which comply with the requirements in Directive 94/9/EC for equipment in category "M2" must be used.

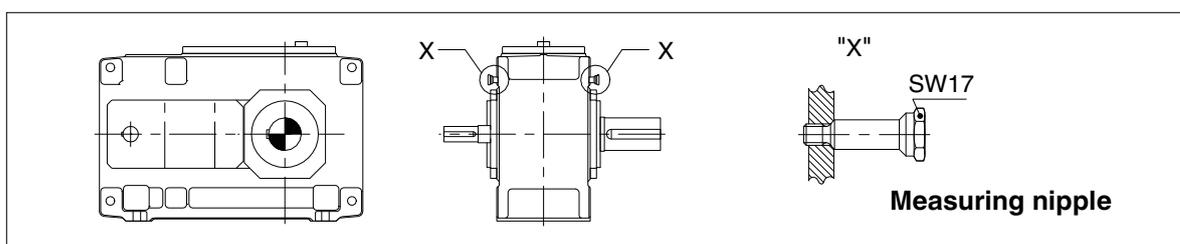


Fig. 22: Bearing monitoring on gear units type H...

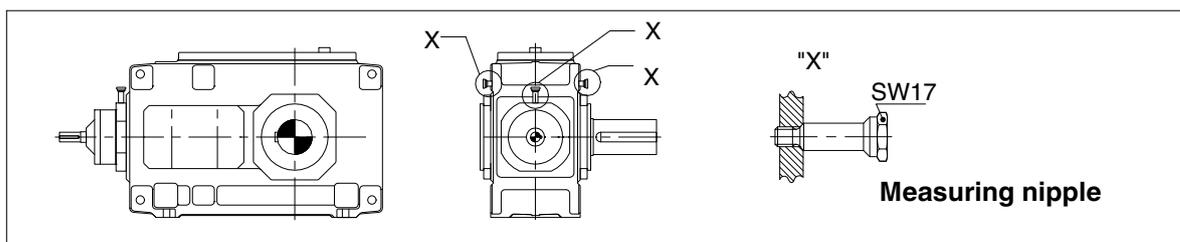


Fig. 23: Bearing monitoring on gear units type B...

For a detailed illustration of the gear unit and the position of the add-on parts, please refer to the drawings in the gear-unit documentation.

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

Fitting work must be done with great care by 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.

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

If the gear unit is fitted with a fan, there should be sufficient space for air intake.



In case of installation above ground the unit must not be allowed to heat up through exposure to heat from external sources such as direct sunlight or other heat sources, and suitable measures must be taken to prevent this!

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



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



**All the fastening points provided by the design of the unit must be used.
A means of potential equalisation must be ensured. Points are provided on the gear unit for attaching a suitable connecting cable.**

Screws which have been damaged during assembly or disassembly work must be replaced with new ones of the same strength class and type.



**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 charge-generating 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 or rubbing with cleaning cloths)

To ensure proper lubrication, the installation position specified in the order 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 Installation of gear unit on housing base

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.

Careful alignment with the units on the in- and output sides must be ensured. Any elastic deformation through operating forces must be taken into consideration.



Fastening bolts or nuts must be tightened to the prescribed torque. For the correct torque, refer to item 6.18. Bolts of the minimum strength class 8.8 must be used.

If external forces are acting upon the gear unit, it is advisable to prevent the unit from displacement by means of lateral stops.



For dimensions, space requirement and arrangement of supply connections, 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 corrosion-preventive agent on the shafts using a suitable cleaning agent.



The cleaning agent must not be allowed to come into contact with the shaft-sealing rings.



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

- Fit and secure input drive elements (e.g. coupling parts) on shafts.
If these are to be heated before fitting, refer to the dimensioned drawings in the coupling documentation for the correct joining temperatures.

Unless specified otherwise, the components may be heated inductively, with a burner, or in a furnace.



**Take precautions to avoid burns from hot parts!
Wear suitable protective gloves!**



Protect shaft-sealing rings from damage and heating to over + 100 °C (use heat-protective screens to protect against radiant heat).

The elements must be pulled smartly onto the shaft as far as stated in the dimensioned drawing prepared in accordance with the order.



Fit the coupling with the aid of suitable fitting equipment. The parts must not be driven on by abrupt force, as this may damage the gear unit. The shaft-sealing rings and running surfaces of the shaft must not be damaged when pulling in the coupling parts.



When installing the drives, make absolutely certain that the individual components are accurately aligned in relation to each other. Inadmissibly large errors in the alignment of the shaft ends to be connected due to angular and/or axial misalignments result in premature wear and/or material damage. Insufficiently rigid base frames or sub-structures can also during operation cause a radial and/or axial misalignment, which cannot be measured when the unit is at a standstill.



Gear units whose weight requires the use of lifting gear must be attached at the points shown in section 4, "Transport and storage". If the gear unit is to be transported with add-on parts, additional attachment points may be required. The position of these attachment points is shown in the order related dimensioned drawing.

6.3.2.1 Alignment

Preliminary alignment of the gear units (sizes 3 to 12) in a horizontal direction is done by the surfaces of the inspection and/or assembly cover.

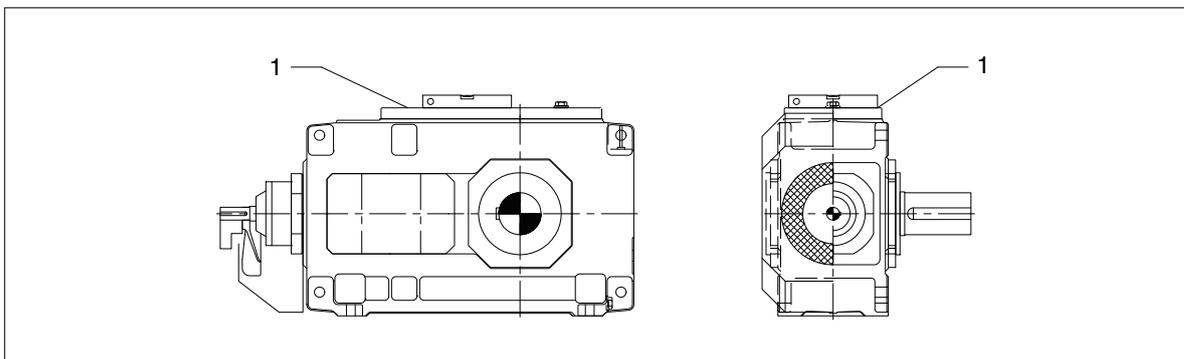


Fig. 24: Alignment surfaces on gear units types H... and B... up to size 12

Gear units of sizes 13 to 22 have additional special alignment surfaces on the top of the housing for preliminary alignment of the gear unit. To facilitate alignment of gear units of these sizes, alignment threads are provided in the housing base.

Alignment surface:



For the exact position of the alignment surfaces please refer to the drawings in the gear-unit documentation.

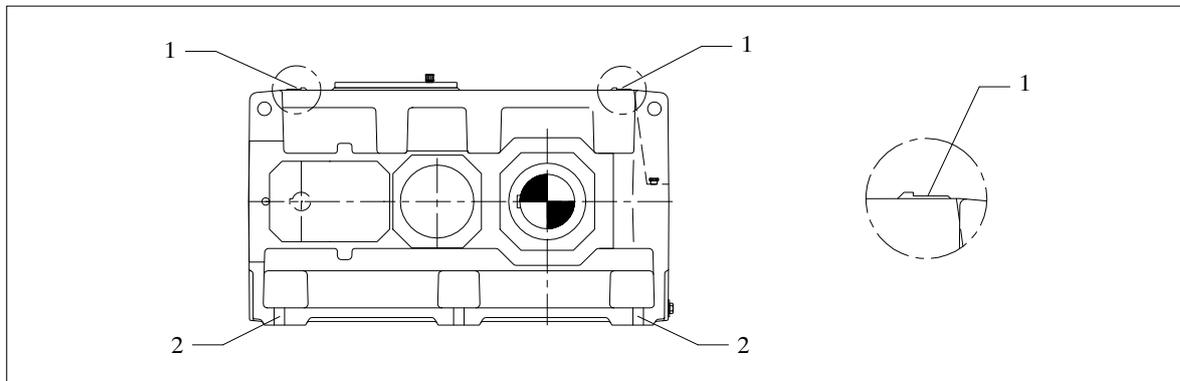


Fig. 25: Additional alignment surfaces on gear units types H... and B... up from size 13

1 Alignment surfaces

2 Alignment thread

The final fine alignment with the assemblies on the in- and output side must be carried out accurately by the shaft axes, using:

- rulers
- spirit level
- dial gauge
- feeler gauge, etc.

Only then should the gear unit be fastened and then the alignment should be checked once again.

- Record alignment dimensions.



The report must be kept with these instructions.



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



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

6.3.2.2 Fitting on a foundation frame

- Clean the undersurface of the gear-unit base.
- Using suitable lifting gear, place the gear unit on the foundation frame.
- Tighten the foundation bolts to the specified torque (see tables 22 and 23 in item 6.18); if necessary, use stops to prevent displacement.



The gear unit must not be excessively stressed when tensioning the fastening bolts.

6.3.2.3 Fitting on a concrete foundation by means of stone bolts or foundation blocks

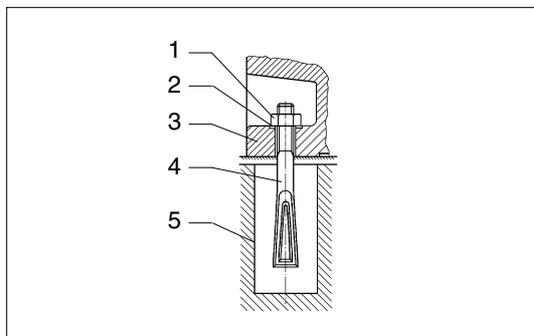
- Clean the undersurface of the gear-unit base.

If using stone bolts:

- Hook stone bolts with washers and hexagon nuts into the foundation fastening points on the gear-unit housing (see fig. 26).



The hexagon nuts must only be tightened when the concrete has set.



- 1 Hexagon nut
- 2 Washer
- 3 Gear-unit base
- 4 Stone bolt
- 5 Foundation

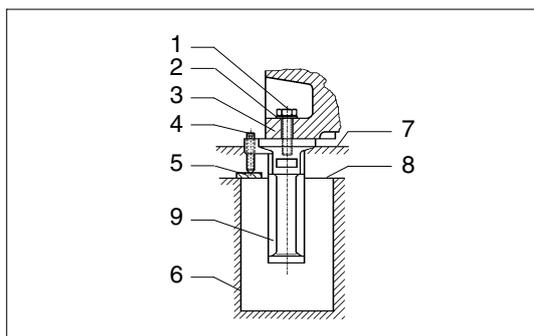
Fig. 26: Stone bolt

If using foundation blocks:

- Hook the foundation blocks with washers and fastening bolts into the foundation-fastening points on the gear-unit housing (see fig. 27).



The fastening bolts must only be tightened when the concrete has set.



- 1 Fastening bolt
- 2 Washer
- 3 Gear-unit base
- 4 Set screw
- 5 Flat steel plate
- 6 Foundation
- 7 Final foundation height
- 8 Prepared foundation height
- 9 Foundation block

Fig. 27: Foundation block

- Using suitable lifting gear, place the gear unit on the concrete foundation.
- Align gear unit horizontally by in- and output shafts.
 - if using stone bolts, with shims.
 - if using foundation blocks, with the aid of the set screws (if available).
- If considerable forces may apply, use stops to prevent the unit from displacement.



Before pouring the concrete foundation, fill up the openings in the foundation blocks with adequate material such as polystyrene.

- Pour concrete into the recesses of the stone bolts or foundation blocks.



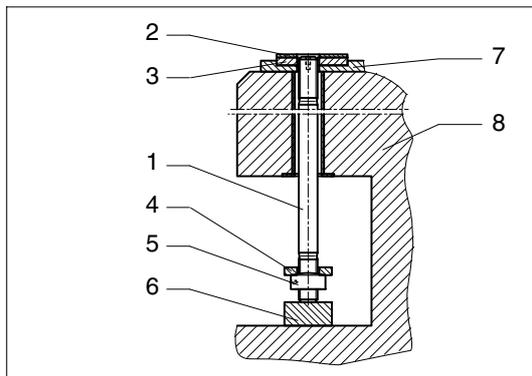
**When the concrete has set, tighten the hexagon nuts of the stone bolts or fastening bolts to the specified torque (see tables 22 and 23 in item 6.18).
With types H1 and H2, remove the air-conducting cowl before tightening the foundation bolts and then bolt it back into position.**



The gear unit must not be excessively stressed when tensioning the hexagon nuts or fastening bolts.

6.3.2.4 Fitting on a concrete foundation by means of anchor bolts

- Clean the undersurface of the gear-unit base.
- Place support on the base plate in the fine grout.
- Insert anchor bolts.
- Place pressure plates in position and screw nuts on.
- Place wood under the anchor bolts so that they are about 10 mm from the upper edge of the support (see fig. 28).



- 1 Anchor bolt
- 2 Support
- 3 Base plate
- 4 Pressure plate
- 5 Hexagon nut
- 6 Wood
- 7 Fine-grout concrete
- 8 Raw foundation

Fig. 28: Anchor bolt

- Place gear unit on foundation.

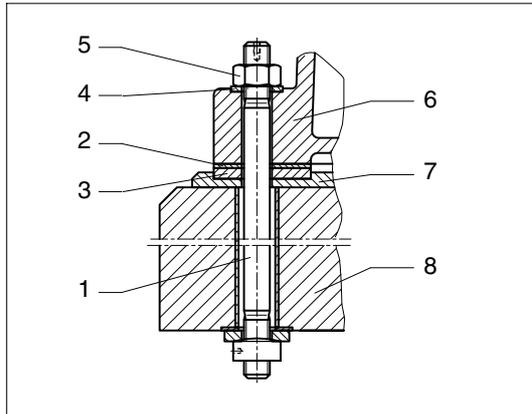


**Use only the eyes provided to attach lifting equipment to the unit.
Do not use the front threads at the shaft ends to attach slinging and lifting gear for transport.**

- Pull anchor bolts up (for this a bolt or threaded rod can be screwed into the thread on the front face).
- Fit washer.
- Screw on hexagon nut a few turns by hand.
- Align gear unit with supports (see fig. 29).
 - The values punched into the screeds must always be observed.
 - Alignment tolerances in relation to the units on the input and output sides are to be in accordance with the permissible angular and axial displacements of the couplings (see coupling drawings).
- Record alignment dimensions.



The report must be kept with these instructions.



- 1 Anchor bolt
- 2 Support
- 3 Base plate
- 4 Washer
- 5 Hexagon nut
- 6 Housing base
- 7 Fine-grout concrete
- 8 Raw foundation

Fig. 29: Anchor bolt



Prior to tensioning the anchor bolts, the fine-grout concrete must have set for at least 28 days.

- Keep anchor bolts in their position by tightening the nut with your fingers.
- Place the protective sleeve.
- Place hydraulic tensioning device in position.
- Initially tension the bolts alternately (for initial-tensioning forces, see item 6.18).
- Using a suitable tool, screw hexagon nuts on as far as the stop.



To ensure correct handling and adjustment of the pretensioning tool, the manufacturer's operating instructions must be adhered to.

The tensioning pressures and/or the initial-tensioning forces should be recorded, see also item 7.2.6.

6.4 Couplings, clutches

Generally speaking, flexible couplings or hydraulic couplings combined with flexible couplings should be provided for the input drive.



In case of gear units with fan, the hydraulic unit of the hydraulic coupling should be located on the motor shaft to ensure that sufficient space is available for intake of cooling air (see item 5.9.1).

In case of gear-unit types with solid output shaft, flexible couplings are, likewise, ordinarily used for the output shaft.

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



Couplings must be balanced in accordance with the specifications in the pertinent instructions manual!



For maintenance and operation of the couplings, refer to the specific operating instructions for the couplings.



When installing the drives, make absolutely certain that the individual components are accurately aligned in relation to each other. Inadmissibly large errors in the alignment of the shaft ends to be connected due to angular and/or axial misalignments result in premature wear and/or material damage. Insufficiently rigid base frames or sub-structures can also during operation cause a radial and/or axial misalignment, which cannot be measured when the unit is at a standstill.



For permissible alignment errors in case of couplings supplied by Siemens, please refer to the operating instruction manuals for the couplings. If you use couplings manufactured by other manufacturers, ask these manufacturers which alignment errors are permissible, stating the radial loads occurring.



Increased system-service life and reliability and reduced running noise can be achieved through the least possible radial and angular misalignment.

The coupling parts may get out of alignment:

- due to imprecise alignment during assembly or installation
- during operation of the system due to:
 - heat expansion,
 - shaft flexure,
 - too weak machine frames, etc.

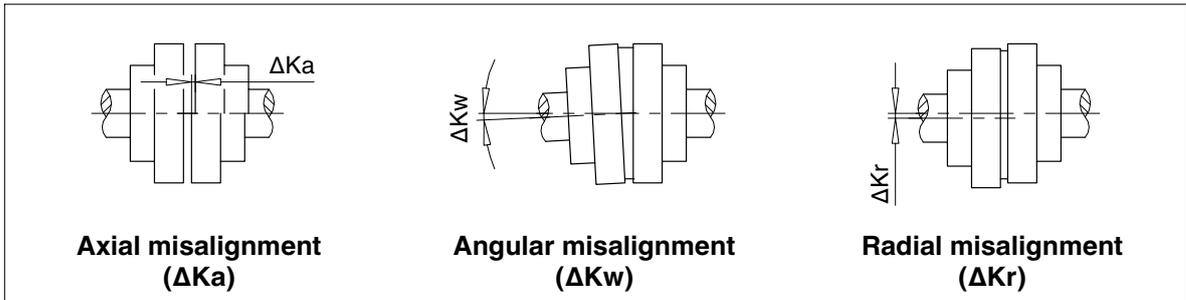


Fig. 30: Possible misalignments

Alignment has to be done in two axial planes arranged perpendicularly to each other. This can be done by means of a ruler (radial misalignment) and feeler gauge (angular misalignment), as shown in the illustration. The aligning accuracy can be increased by using a dial gauge or a laser alignment system.

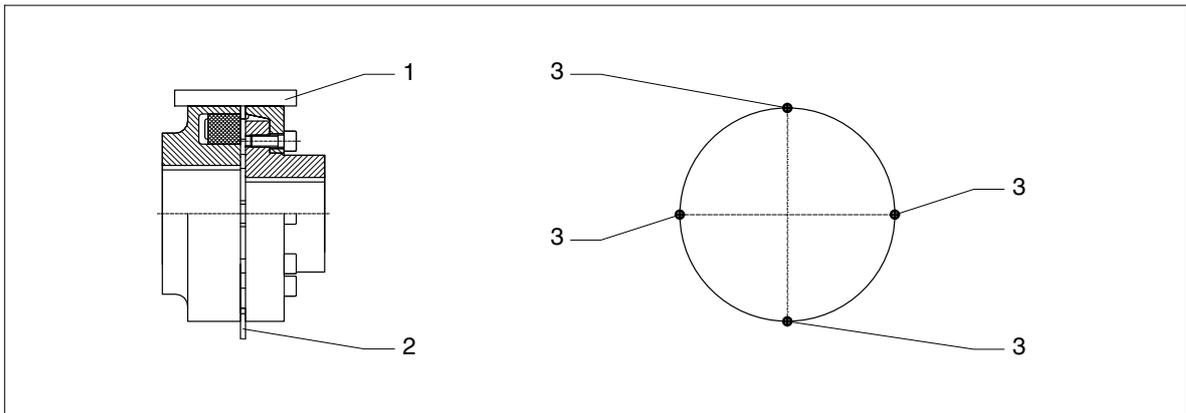


Fig. 31: Example of alignment on a flexible coupling

- | | | |
|-------|--------------|------------------|
| 1 | 2 | 3 |
| Ruler | Feeler gauge | Measuring points |



The maximum permissible misalignment values are specified in the operating instructions for the coupling; they must under no circumstances be exceeded during operation.

Angular and radial misalignments may occur at the same time. The sum of both misalignments must not exceed the maximum permissible value of the angular or radial misalignment.

If you use couplings manufactured by other manufacturers, ask these manufacturers which alignment errors are permissible, stating the radial loads occurring.



For alignment of the drive components (vertical direction), it is recommended to use packing or foil plates underneath the mounting feet. The use of claws with set screws on the foundation for lateral adjustment of the drive components is also advantageous.

In 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 fitted 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.

6.5 Shaft-mounted gear unit with hollow shaft and parallel keyway

The end of the driven-machine shaft (material C60+N or higher strength) must be provided with a parallel key to DIN 6885 Part 1 Form A. Furthermore, a centring hole to DIN 332 Form DS (tapped) should be provided (for the connection dimensions of the driven machine shaft, see dimensioned drawing in the gear unit documentation).

6.5.1 Preparatory work

To facilitate demounting (see also item 6.5.3.), we recommend providing a connection for pressure oil on the end of the driven machine shaft. For this a hole must be drilled through to the hollow shaft bore (see figure 32). This connection may also be used for supplying rust-releasing agent.

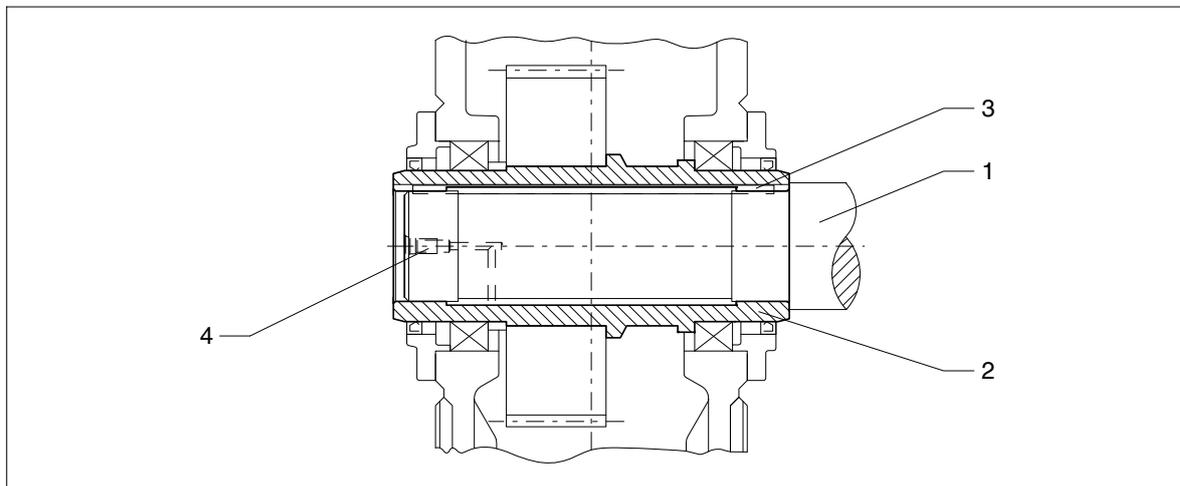


Fig. 32: Hollow shaft with parallel keyway, preparation

- | | | | |
|---|---------------|---|-------------------------|
| 1 | Machine shaft | 3 | Parallel key |
| 2 | Hollow shaft | 4 | Pressure-oil connection |

6.5.2 Fitting



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

- Remove the corrosion protection from the hollow shaft and machine shaft with a suitable cleaning agent.



The cleaning agent must not be allowed to come into contact with the shaft-sealing rings.



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

- Check the hollow and machine shafts to ensure that seats and edges are not damaged. If necessary, rework the parts with a suitable tool and clean them again.



Coat with a suitable lubricant to prevent frictional corrosion of the contact surfaces.

6.5.2.1 Fitting

- Fit the gear unit by means of nut and threaded spindle. The counterforce is provided by the hollow shaft.



The hollow shaft must be exactly aligned with the machine shaft to avoid canting.

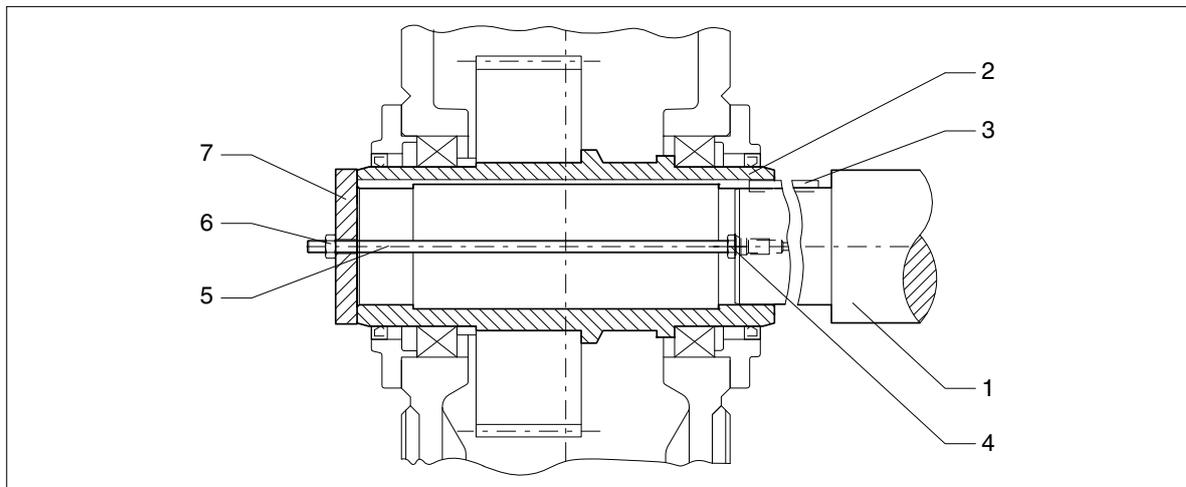


Fig. 33: Hollow shaft with parallel keyway, fitting with threaded spindle

1	Machine shaft	4	Nut	7	End plate
2	Hollow shaft	5	Threaded spindle		
3	Parallel key	6	Nut		

Instead of the nut and threaded spindle shown in the diagram, other types of equipment such as a hydraulic lifting unit ("Lukas") may be used.



The hollow shaft may be tightened against a machine-shaft collar only if the gear-unit configuration is one of the following:

- Torque arm
- Support with gear-unit swing base

With a different arrangement the bearings may be excessively stressed.

6.5.2.2 Axial fastening

Depending on type, secure the hollow shaft axially on the machine shaft (e.g. with locking ring, end plate, set screw).

6.5.3 Demounting

- Remove the axial securing device from the hollow shaft.
- If frictional corrosion has occurred on the seating surfaces, rust-releasing agent may be used in order to facilitate forcing off the gear unit. The rust releaser can be injected through the pressure-oil connection (see figure 32), e.g. using a pump.
- When the rust-releasing agent has taken effect, pull the gear unit off with the device (see figures 34 and 35).
- Removing the gear unit from the driven-machine shaft can be done, depending on local possibilities, as follows:
 - using forcing screws in an end plate (see figure 35) or
 - using a central threaded spindle or
 - preferably using a hydraulic lifting unit.



The end plate and/or the auxiliary plate for forcing off the gear unit are not included in our delivery.

Each of the two end faces of the hollow shaft is provided with 2 threaded holes (for dimensions, see fig. 36) for fastening the end plate to the hollow shaft.

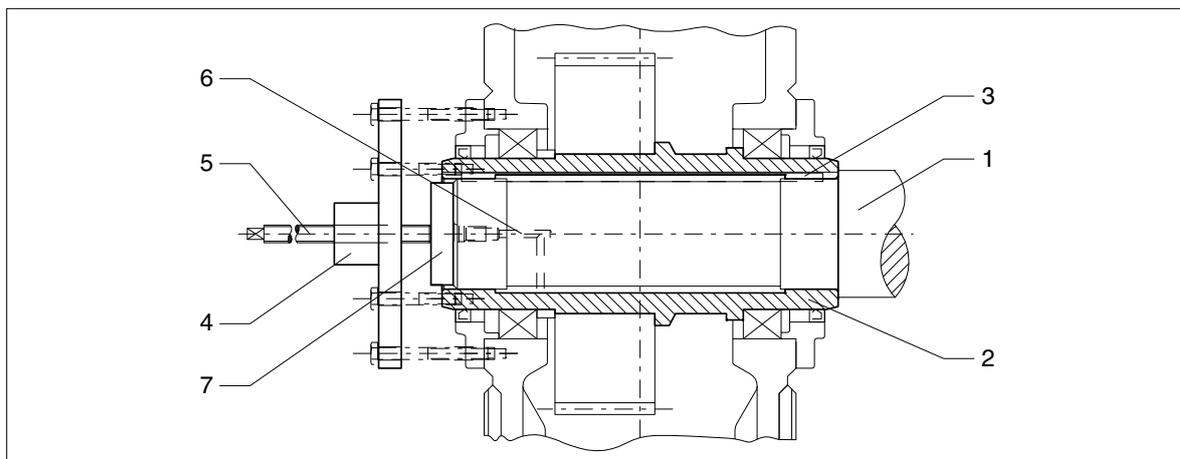


Fig. 34: Hollow shaft with parallel keyway, demounting with hydraulic lifting unit

- | | | | |
|---|------------------------|---|-------------------------|
| 1 | Machine shaft | 5 | Threaded spindle |
| 2 | Hollow shaft | 6 | Pressure-oil connection |
| 3 | Parallel key | 7 | Plate for forcing out |
| 4 | Hydraulic lifting unit | | |

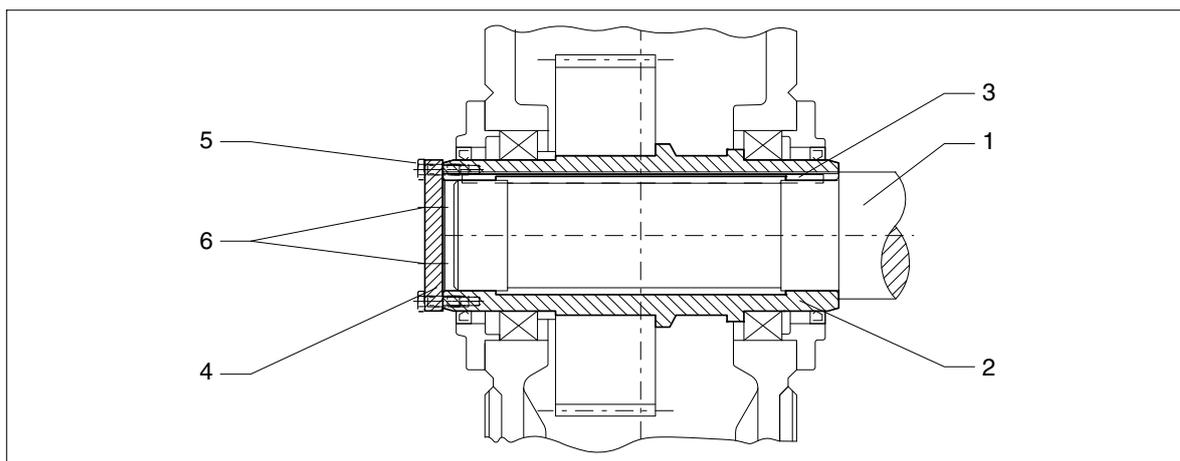


Fig. 35: Hollow shaft with parallel keyway, demounting with end plate

- | | | | |
|---|---------------|---|---------------------------|
| 1 | Machine shaft | 4 | End plate for forcing out |
| 2 | Hollow shaft | 5 | Screws |
| 3 | Parallel key | 6 | Forcing-off screws |



Avoid canting when pulling the unit off.



The plate for forcing-out is not included in our delivery.

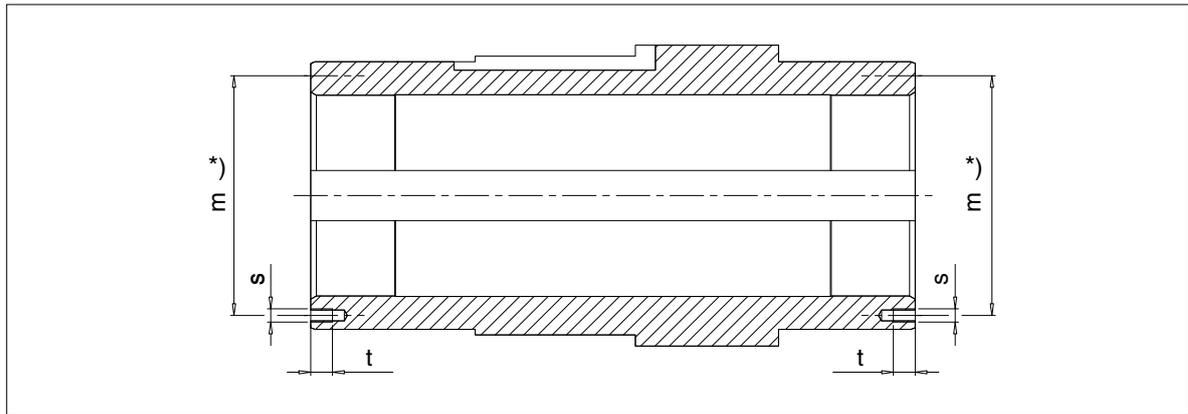


Fig. 36: Hollow shaft with parallel keyway

*) 2 threads offset 180°

Table 13: Threaded holes on the end faces of the gear-unit hollow shafts

Gear-unit size	m mm	s	t mm	Gear-unit size	m mm	s	t mm
4	95	M 8	14.5	12	215	M 12	19.5
5	115	M 8	14.5	13	230	M 12	19.5
6	125	M 8	14.5	14	250	M 12	19.5
7	140	M 10	17	15	270	M 16	24
8	150	M 10	17	16	280	M 16	24
9	160	M 10	17	17	300	M 16	24
10	180	M 12	19.5	18	320	M 16	24
11	195	M 12	19.5	19 ... 22	on request		



If the support is provided not only by the hollow shaft, but also by the housing, as shown in figure 34, the forces used must not exceed the values given in the following table 14.

Table 14: Maximum forcing pressures

Gear-unit size	Maximum forcing pressure N	Gear-unit size	Maximum forcing pressure N
4	22600	12	113600
5	33000	13	140000
6	37500	14	160000
7	50000	15	193000
8	56000	16	215000
9	65000	17	240000
10	82000	18	266000
11	97200	19 ... 22	on request



If the above values are exceeded, the housing, the hollow-shaft bearings or other gear-unit components may be irreparably damaged. Before replacing the gear unit on the machine shaft, always check the bearings for any signs of damage.



When using forcing-off screws or threaded spindles, the head of the thread pressing against the driven machine should be rounded and well greased to reduce the risk of seizing at this point.

6.6 Shaft-mounted gear unit with hollow shaft and internal spline to DIN 5480

The shaft end of the driven machine must be designed with internal splines to DIN 5480. Furthermore, a centring hole to DIN 332 Form DS (tapped) should be provided (for the connection dimensions of the driven machine shaft, see dimensioned drawing in the gear unit documentation).

6.6.1 Preparatory work

To facilitate demounting (see also item 6.6.3), we recommend providing a connection for pressure oil on the end of the driven machine shaft. For this a hole must be drilled through to the hollow shaft bore (see figure 37). This connection may also be used for supplying rust-releasing agent.

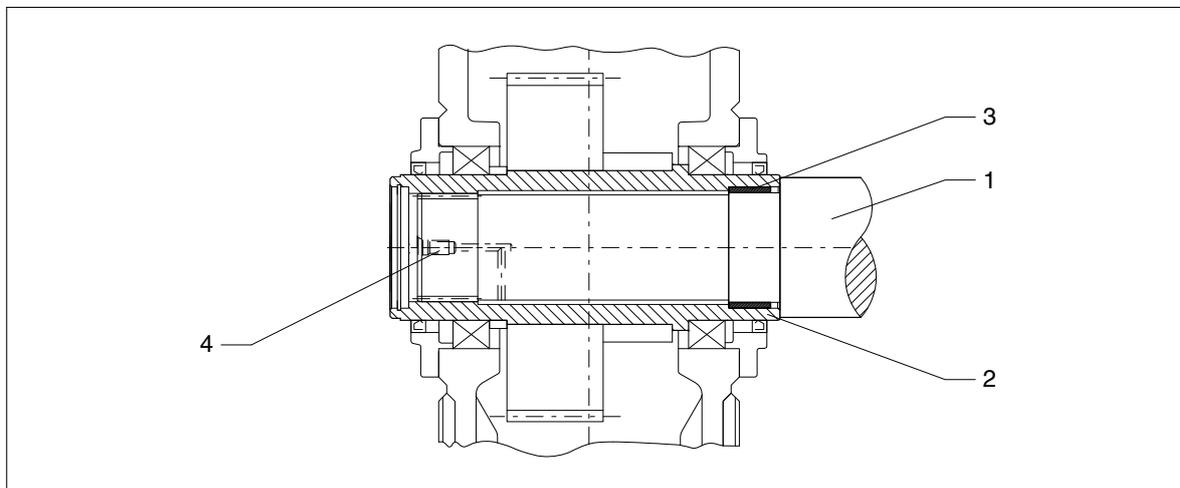


Fig. 37: Hollow shaft with internal spline, preparation

- | | | | |
|---|---------------|---|-------------------------|
| 1 | Machine shaft | 3 | DU bush |
| 2 | Hollow shaft | 4 | Pressure-oil connection |

6.6.2 Fitting



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

- Remove the corrosion protection from the hollow shaft and machine shaft with a suitable cleaning agent.



The cleaning agent must not be allowed to come into contact with the shaft-sealing rings.



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

- Check the hollow and machine shafts to ensure that seats, teeth or edges are not damaged. If necessary, rework the parts with a suitable tool and clean them again.



Coat with a suitable lubricant to prevent frictional corrosion of the contact surfaces.

6.6.2.1 Fitting with integrated DU bush

- Fit the gear unit by means of nut and threaded spindle. The counterforce is provided by the hollow shaft.



The hollow shaft must be exactly aligned with the machine shaft to avoid canting. When fitting, ensure that the position of the teeth between the machine shaft and hollow shaft is correct. The correct position can be determined by turning the input shaft or by swivelling the gear unit lightly around the hollow shaft.

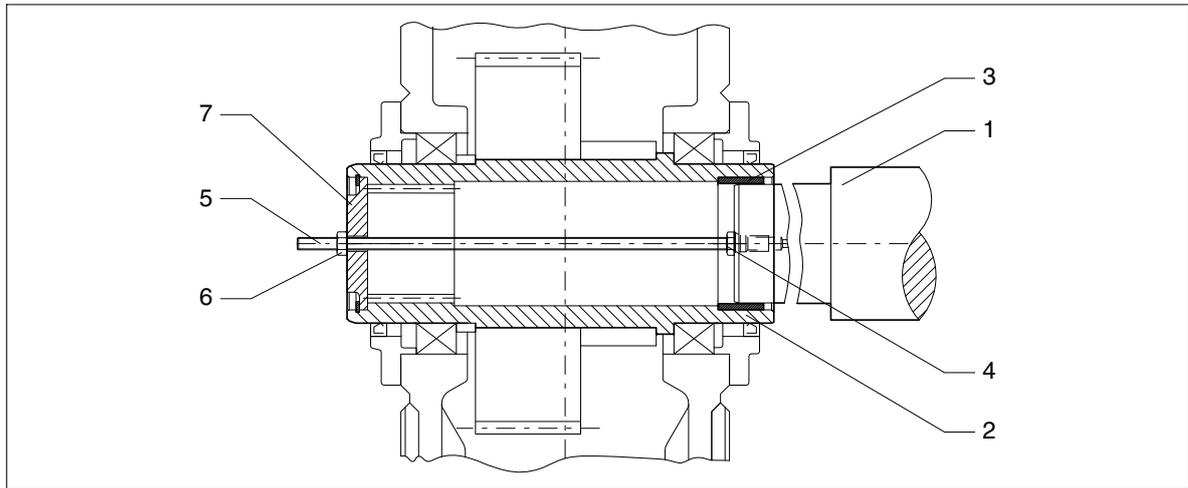


Fig. 38: Hollow shaft with internal spline, fitting with DU bush

1	Machine shaft	4	Nut	7	End plate
2	Hollow shaft	5	Threaded spindle		
3	DU bush	6	Nut		

6.6.2.2 Fitting with loose DU bush

The loose DU bush is pushed onto the machine shaft, fixed rigidly in position with a locating tie and then pulled into the hollow shaft of the gearunit along with the machine shaft (see figure 38).



The hollow shaft must be exactly aligned with the machine shaft to avoid canting. When fitting, ensure that the position of the teeth between the machine shaft and hollow shaft is correct. The correct position can be determined by turning the input shaft or by swivelling the gear unit lightly around the hollow shaft.

Instead of the nut and threaded spindle shown in the diagram, other types of equipment such as a hydraulic lifting unit may be used.



The hollow shaft may be tightened against a machine-shaft collar only if the gear-unit configuration is one of the following:

- Torque arm
- Support with gear-unit swing base

With a different arrangement the bearings may be excessively stressed.

6.6.2.3 Axial fastening

Depending on type, secure the hollow shaft axially on the machine shaft (e.g. with locking ring, end plate, set screw).

6.6.3 Demounting

- Remove the axial securing device from the hollow shaft.
- If frictional corrosion has occurred on the seating surfaces, rust-releasing agent may be used in order to facilitate forcing off the gear unit. The rust releaser can be injected through the pressure-oil connection (see figure 39), e.g. using a pump.
- The end plate and the locking ring must first be removed.
- When the rust-releasing agent has taken effect, pull the gear unit off using the device (see figures 39 and/or 40).

- Removing the gear unit from the driven-machine shaft can be done, depending on local possibilities, as follows:
 - using forcing screws in an end plate (see figure 40) or
 - using a central threaded spindle or
 - preferably using a hydraulic lifting unit

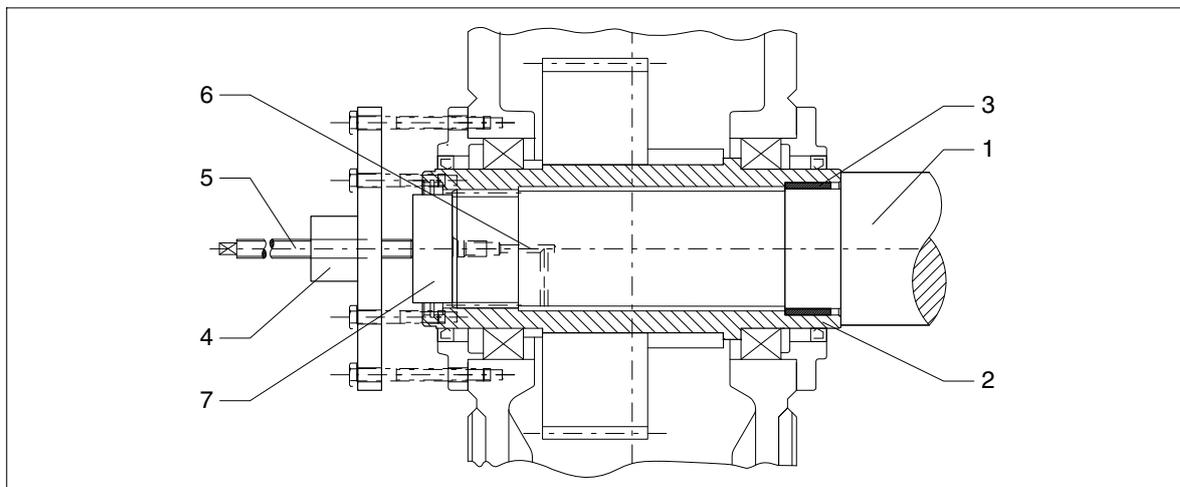


Fig. 39: Hollow shaft with internal spline, demounting with hydraulic lifting unit

- | | | | |
|---|------------------------|---|-------------------------|
| 1 | Machine shaft | 5 | Threaded spindle |
| 2 | Hollow shaft | 6 | Pressure-oil connection |
| 3 | DU bush | 7 | Plate for forcing out |
| 4 | Hydraulic lifting unit | | |

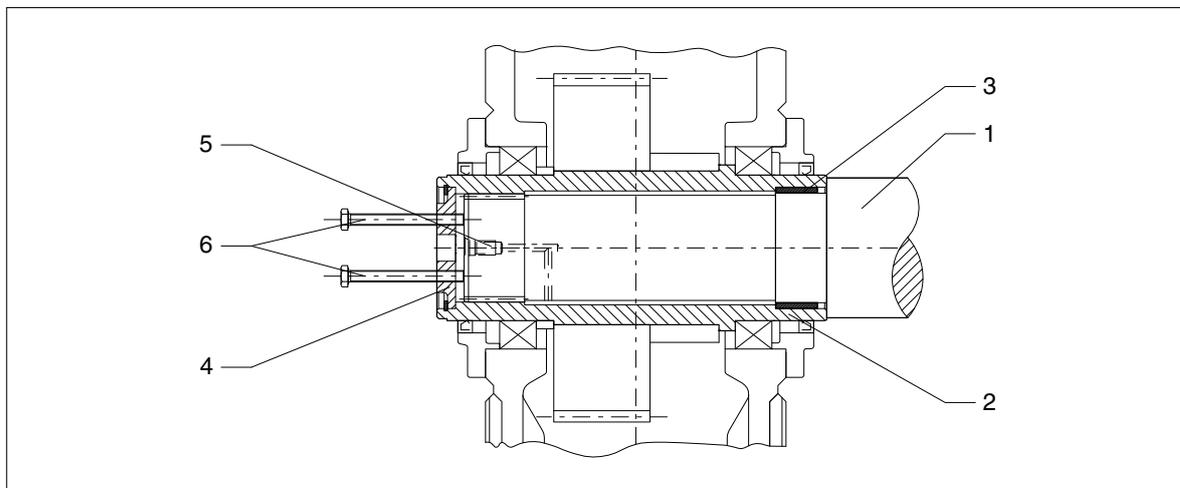


Fig. 40: Hollow shaft with internal spline, demounting with end plate

- | | | | |
|---|---------------|---|-------------------------|
| 1 | Machine shaft | 4 | End plate |
| 2 | Hollow shaft | 5 | Pressure-oil connection |
| 3 | DU bush | 6 | Forcing-off screws |



Avoid canting when pulling the unit off.



The plate for forcing-out is not included in our delivery.



If the support is provided not only by the hollow shaft, but also by the housing, as shown in figure 39, the forces used must not exceed the values given in the following table 15.

Table 15: Maximum forcing pressures

Gear-unit size	Maximum forcing pressure N	Gear-unit size	Maximum forcing pressure N
4	22600	12	113600
5	33000	13	140000
6	37500	14	160000
7	50000	15	193000
8	56000	16	215000
9	65000	17	240000
10	82000	18	266000
11	97200	19 ... 22	on request



If the above values are exceeded, the housing, the hollow-shaft bearings or other gear-unit components may be irreparably damaged. Before replacing the gear unit on the machine shaft, always check the bearings for any signs of damage.



When using forcing-off screws or threaded spindles, the head of the thread pressing against the driven machine should be rounded and well greased to reduce the risk of seizing at this point.

6.7 Shaft-mounted gear unit with hollow shaft and shrink disk

The end of the driven-machine shaft (material C60+N or higher strength) should have a centring means to DIN 332 Form DS (with thread) in its end face (for connecting dimensions of the driven-machine shaft, see dimensioned drawing in the gear-unit documentation).

6.7.1 Fitting



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

- Remove the corrosion protection from the hollow shaft and machine shaft with a suitable cleaning agent.



The cleaning agent must not be allowed to come into contact with the shaft-sealing rings.



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

- Check the hollow and machine shafts to ensure that seats and edges are not damaged. If necessary, rework the parts with a suitable tool and clean them again.



**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.**

6.7.1.1 Fitting with integrated DU bush

- Fit the gear unit by means of nut and threaded spindle. The counterforce is provided by the hollow shaft.



The hollow shaft must be exactly aligned with the machine shaft to avoid canting.

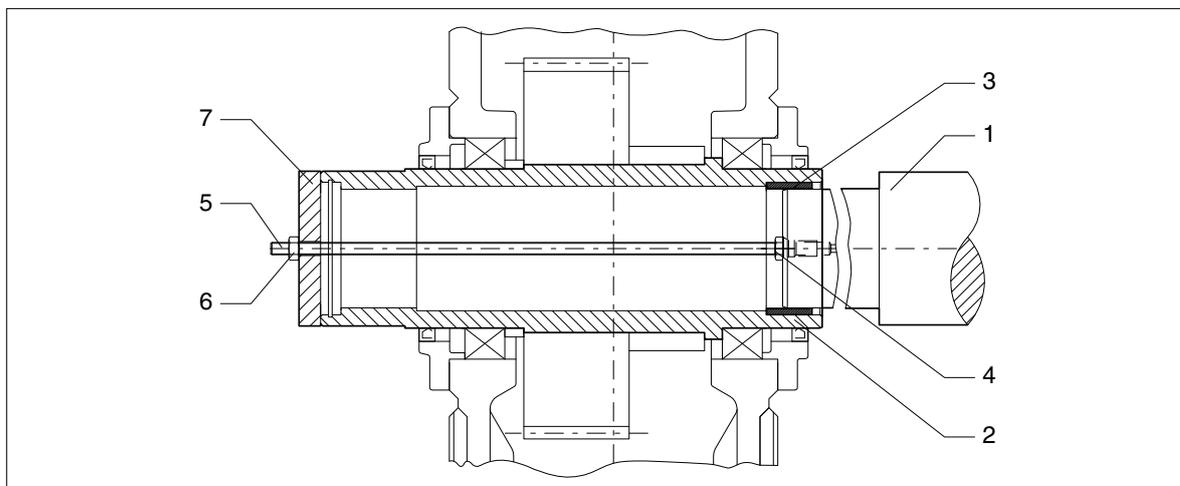


Fig. 41: Hollow shaft in shrink-disk design, mounting with DU bush

- | | | | | | |
|---|---------------|---|------------------|---|-----------|
| 1 | Machine shaft | 4 | Nut | 7 | End plate |
| 2 | Hollow shaft | 5 | Threaded spindle | | |
| 3 | DU bush | 6 | Nut | | |

6.7.1.2 Fitting with loose DU bush

The loose DU bush is pushed onto the machine shaft, fixed rigidly in position with a locating tie and then pulled into the hollow shaft along with the machine shaft of the gear unit (see figure 41).



The hollow shaft must be exactly aligned with the machine shaft to avoid canting.

Instead of the nut and threaded spindle shown in the diagram, other types of equipment such as a hydraulic lifting unit may be used.



The hollow shaft may be tightened against a machine-shaft collar only if the gear-unit configuration is one of the following:

- Torque arm
- Support with gear-unit swing base

With a different arrangement the bearings may be excessively stressed.

6.7.1.3 Axial fastening

If the shrink disk is fitted according to instructions (see item 6.8), the gear unit is fixed securely in the axial direction. Additional axial fastening is not required.

6.8 Shrink disk

The shrink disk realizes a press-fit connection between a hollow shaft and a stub or 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/or 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.

6.8.1 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 cleaning 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 cleaning agents containing oil (such as paraffin or turpentine) for removing grease.

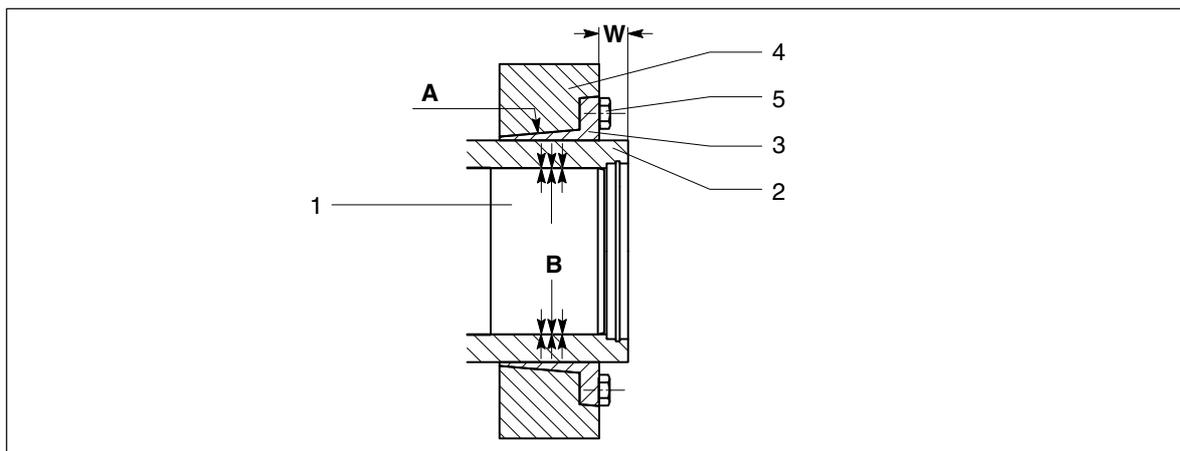


Fig. 42: Fitting the shrink disk

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



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 16) 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 16: 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 components from different shrink disks is not permitted.



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

6.8.2 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 releasing 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!

6.8.3 Cleaning and greasing the shrink disk



Only dirty shrink disks must be disassembled and cleaned.

- Check all parts for any damage.



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



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

- Thoroughly clean all parts.



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

- The conical surfaces of the inner and outer rings (3 and 4, see figure 42) 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 figure 42).
 - Provide the tensioning bolts (5, see figure 42) 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 17: 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.

6.8.4 Re-fitting the shrink disk



For re-mounting the shrink disk the procedure described in item 6.8.1 must be adhered to.

6.8.5 Inspection of the shrink disk



In all cases the examination of 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)

6.8.6 Demounting

- If frictional corrosion has occurred on the seating surfaces, inject rust-releasing or other agent (e.g. with a pump) into the bore cavity to reach the seats in order to facilitate forcing off. The rust releaser can be injected through a bore in the machine shaft (see fig. 43).
- Depending on the facilities available on site, the gear unit may be forced off the shaft using forcing screws in an end plate (see fig. 44), a central threaded spindle or preferably a hydraulic lifting unit ("Lukas").
- When the rust-releasing agent has taken effect, pull the gear unit off with the device (see figures 43 and/or 44).

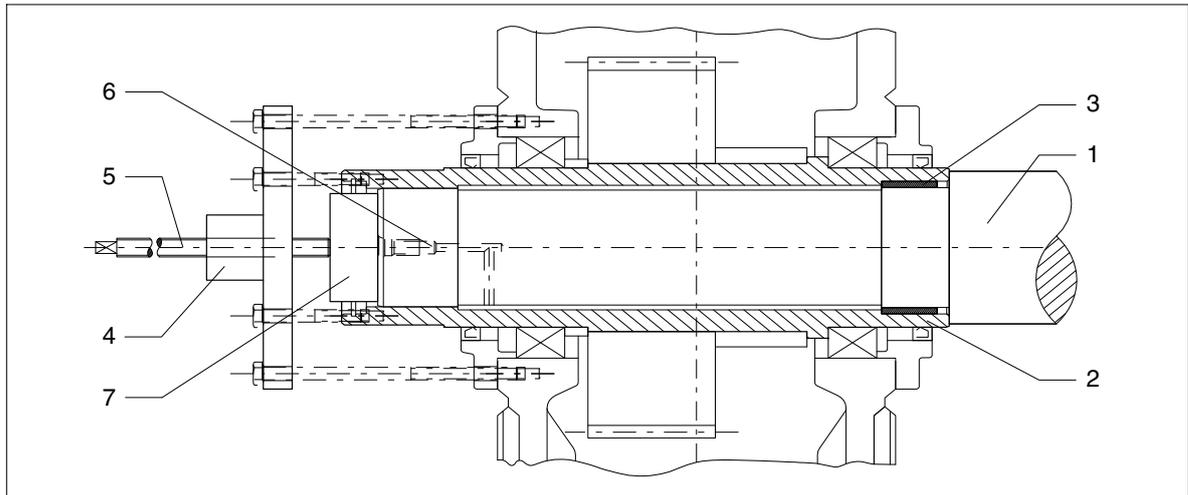


Fig. 43: Hollow shaft with shrink disk, demounting with hydraulic lifting unit

- | | | | |
|---|------------------------|---|------------------------------------|
| 1 | Machine shaft | 5 | Threaded spindle |
| 2 | Hollow shaft | 6 | Bore for rust-releasing agent feed |
| 3 | DU bush | 7 | Plate for forcing out |
| 4 | Hydraulic lifting unit | | |

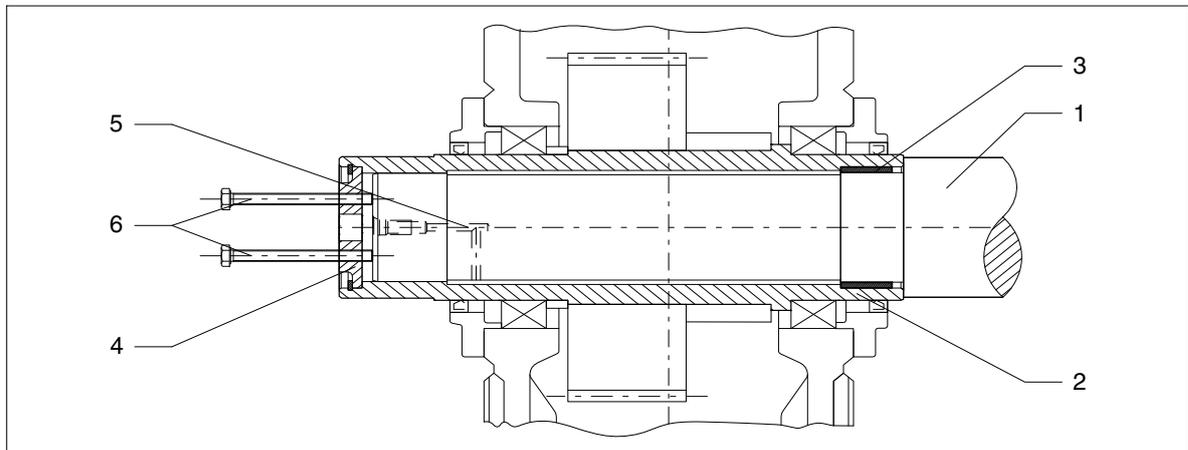


Fig. 44: Hollow shaft with shrink disk, demounting with end plate

- | | | | |
|---|---------------|---|------------------------------------|
| 1 | Machine shaft | 4 | End plate |
| 2 | Hollow shaft | 5 | Bore for rust-releasing agent feed |
| 3 | DU bush | 6 | Forcing-off screws |



Avoid canting when pulling the unit off.



The plate for forcing-out is not included in our delivery.



If the counterforce is provided not only by the hollow shaft, but also by the housing, as shown in fig. 43, the forces used must not exceed the values given in the following table.

Table 18: Maximum forcing pressures

Gear-unit size	Maximum forcing pressure N	Gear-unit size	Maximum forcing pressure N
4	22600	12	113600
5	33000	13	140000
6	37500	14	160000
7	50000	15	193000
8	56000	16	215000
9	65000	17	240000
10	82000	18	266000
11	97200	19 ... 22	on request



If the above values are exceeded, the housing, the hollow-shaft bearings or other gear-unit components may be irreparably damaged. Before replacing the gear unit on the machine shaft, always check the bearings for any signs of damage.



When using forcing-off screws or threaded spindles, the head of the thread pressing against the driven machine should be rounded and well greased to reduce the risk of seizing at this point.

6.9 Shaft-mounted gear unit with flanged shaft



The front area of the flanged shaft must be absolutely free of grease. This is essential for safe and reliable torque transmission. Do not use contaminated solvents or dirty cloths for removing grease.



Before tightening the tensioning bolts it must be ensured that the flange centring means are inserted one inside the other. Then tighten diametrically opposed tensioning bolts to full torque.



The following tightening torque of flange bolts apply to gear units:

Table 19: Tightening torques for flange connections

Gear-unit size	Strength class		Tightening torque
	Bolt DIN 931	Nut DIN 934	
5 ... 6	10.9	10	610 Nm
7 ... 10	10.9	10	1050 Nm
11 ... 16	10.9	10	2100 Nm
17 ... 20	10.9	10	3560 Nm
21 ... 22	10.9	10	5720 Nm

6.10 Torque arm for gear-unit housing

6.10.1 Attaching the torque arm



The torque arm must be fitted stress-free on the machine side

On helical gear units with a motor bell housing the torque arm is located opposite the motor bell housing.

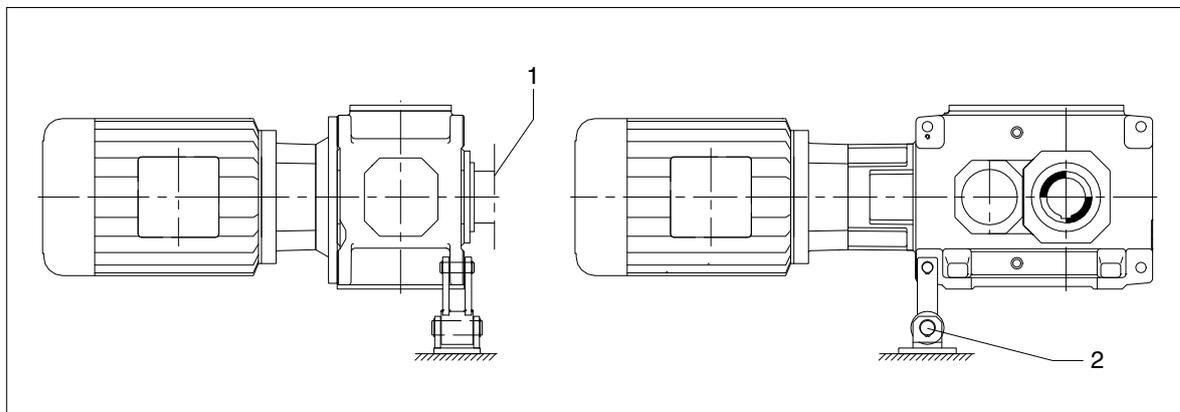


Fig. 45: Torque arm for gear-unit housing

1 Machine side

2 Flexible support block

Table 20: Motor types and torque arms

Gear-unit size	Max. permissible standard-motor size					
	Gear type			Gear type		
	H2	H3	H4	B2	B3	B4
4	200	-	-	200	200	-
5 ... 6	225	225	-	225	225	160
7 ... 8	280	280	180	280	280	200
9 ... 10	280	280	225	280	280	225
11 ... 12	315M	315M	250	315M	315M	280
13 ... 14	-	355	315M	355	355	315M
15 ... 16	-	355	315	-	355	355M
17 ... 18	-	355	355M	-	355	355
19 ... 22	on request					



Larger motors should be used only with approval of Siemens.

- Foundation type for fastening the torque arm, see item 6.3.1, "Foundation".
- If the customer fits a torque arm, connection to the foundation must be by means of a flexible element.

6.11 Support for gear-unit swing base

6.11.1 Attaching the support



The support for the gear-unit swing base must be mounted free of stress.

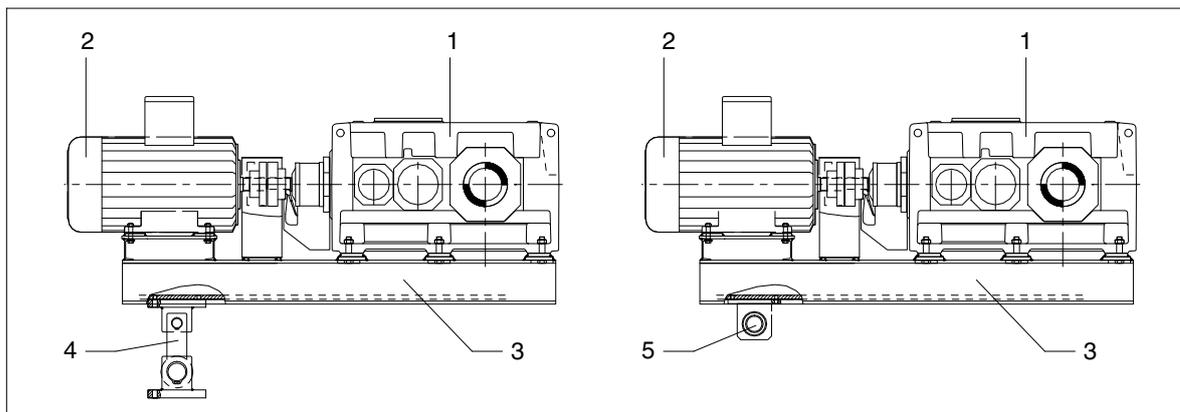


Fig. 46: Support for gear-unit swing base

- | | | | |
|---|----------------------|---|------------------------|
| 1 | Gear unit | 4 | Torque arm |
| 2 | Motor | 5 | Flexible support block |
| 3 | Gear-unit swing base | | |

Table 21: Motor assignment gear-unit swing base

Gear-unit size	Max. permissible standard-motor size		
	Gear type		
	B2	B3	B4
4	on request	200	-
5 ... 6		225M	160
7 ... 8		280M	200
9 ... 10		315	225M
11 ... 12		355	280S
13 ... 14		400M	315M
15 ... 16		400M	315
17 ... 18		400M	355L
19 ... 22	on request		



Larger motors should be used only with approval of Siemens.

- Foundation type for fastening the torque arm, see item 6.3.1, "Foundation".
- If the customer fits a torque arm, connection to the foundation must be by means of a flexible element.

6.12 Gear unit with cooling coil

- Before connecting the cooling coil the screw plugs must be removed from the connecting bushes.
- Flush the cooling coil (in order to remove any contamination).
- Connect the cooling-water in- and outflow pipes (for exact position of the connections, see dimensioned drawing).



Observe also item 5.9.2.

6.13 Gear unit with separate oil-supply system

- Remove the sockets of the suction and delivery lines prior to connecting the system.
- The installation must be fitted separately observing the drawings in the gear-unit documentation.
- The pipework must not be overstressed during the mounting procedure.



Consult operating instructions for oil-supply system.

6.14 Gear unit with add-on components

- For the technical data to the add-on components, as stated in item 6.15 to 6.16, refer to the order-specific list of equipment.
- 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 and the specifications in item 5.9.2 to 5.11 must be observed.

6.15 Gear unit with bearing monitoring

- Wire the vibration monitoring system with evaluating instrument (to be provided by customer) electrically.

or

- Wire the resistance thermometer with evaluating instrument (to be provided by customer) electrically.

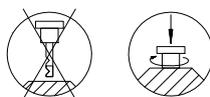
6.16 Gear unit with oil-temperature measurement

- Wire the resistance thermometer with evaluating instrument (to be provided by customer) electrically.

6.17 Final work



Oil drain cocks, if any, must be secured against accidental opening.



**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.**

- After installation of the gear unit check all screw connections for tight fit.
- Check the alignment after tightening the fastening elements (the alignment must not have been changed).
- Check that all the devices which have been demounted for transport reasons have been refitted.



For this refer to the details in the data sheet, the list of equipment and the associated drawings.

- The gear unit must be protected against falling objects.
- Protective devices for rotating parts must be checked for correct seating. Contact with rotating parts is not permitted.



A potential equalisation in accordance with the applying regulations and directives must be carried out!

On the gear units threaded holes are available for establishing an earth connection. This work must always be done by specialist electricians.

- Cable entries should be protected against moisture.
- Check that protective measures have been taken!

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

6.18.1 Screw-connection classes

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

Table 22: 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 % up 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

6.18.2 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 23: 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 bolt	Initial-tensioning force for screw-connection classes from table 22			Tightening torque for screw-connection classes from table 22		
		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

Nominal thread diameter d mm	Strength class of the bolt	Initial-tensioning force for screw-connection classes from table 22			Tightening torque for screw-connection classes from table 22		
		C	D $F_{M \min.}$ N	E	C	D M_A Nm	E
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
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 available.



**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.**

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.



**Any oil spillage must be removed 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.

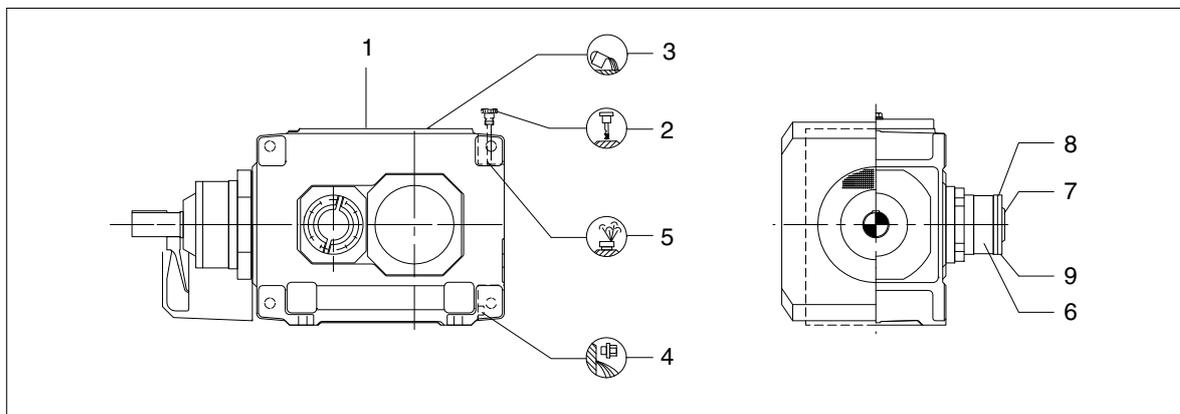


Fig. 47: Oil inlet / oil drain on gear units type B... ≤ 12

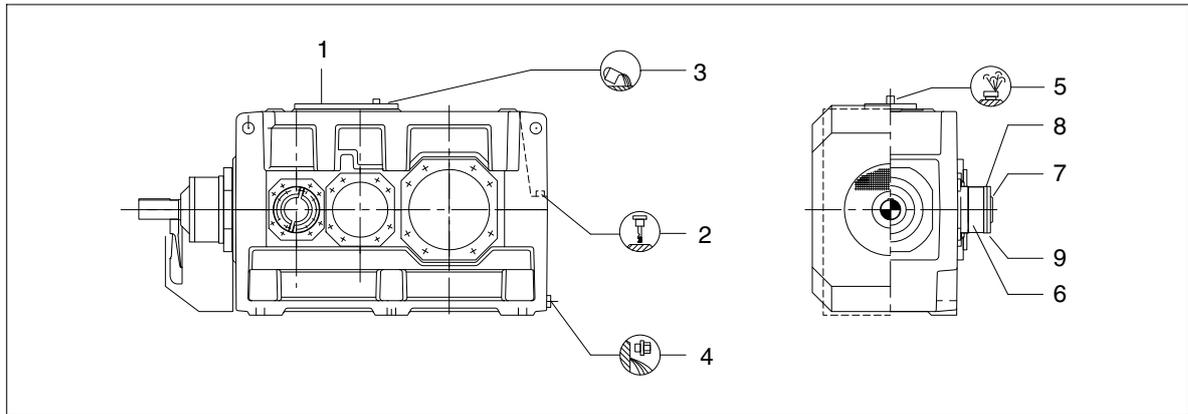


Fig. 48: Oil inlet / oil drain on gear units type B... ≥ 13

- | | | | |
|---|----------------------------------|---|---|
| 1 | Inspection and/or assembly cover | 6 | Backstop |
| 2 | Oil dipstick | 7 | Cover for backstop |
| 3 | Oil inlet | 8 | Screw plug for oil inlet backstop |
| 4 | Oil-drain plug | 9 | Screw plug for residual-oil drainage backstop |
| 5 | Breather screw or screw plug | | |

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

7.1.2 Filling with lubricant

- Release the fastening bolts on the inspection and/or assembly cover and remove the cover (including seal) from the housing or use the marked oil-filler plug. Do not discard the seal.
- In case of gear units with add-on backstop, release the screw plug on the backstop cover and pour in approx. 0.5 l fresh oil of the total oil quantity via a filter (max. filter mesh 25 μm).
- Screw in the screw plug.



**Using a filter, fill the gear unit with fresh oil (max. mesh 25 μm) up to the MAX mark on the oil dipstick.
Remember to fill the oil pockets above the bearings and (with bevel-gear units) at the input shaft on the inside.**



The sealing surfaces must not be contaminated nor damaged.



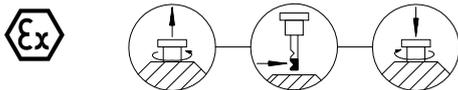
The quality of the oil used must meet the requirements of the separately supplied BA 7300 instructions manual, otherwise the guarantee given by Siemens will lapse. We urgently recommend using one of the oils listed in table "T 7300" (for a link, see the BA 7300 instructions manual supplied separately), 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 marks on the oil dipstick or oil-sight glass are decisive for the amount of oil to be filled in.



In case of gear units with forced-lubrication system the oil circuit must additionally be topped up.

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



The oil level must be at the upper mark on the oil dipstick.



Any oil spillage must be removed immediately with an oil-binding agent.

- Place the inspection and/or assembly cover including the seal on the housing.
- Screw in the fastening bolts of the cover and tighten them to the specified torque (see item 6.18).

7.1.2.1 Oil quantities

Table 24: Approximate figures for required oil quantities in horizontal gear units with **Taconite seals**

Type	Oil quantity (approximate value) in litres for size											
	3	4	5	6	7	8	9	10	11	12	13	14
H1SH	8	-	25	-	48	-	79	-	137	-	199	-
H2.H	-	12	17	18	31	35	49	52	82	88	154	160
H2.M	-	-	-	-	-	-	-	-	-	-	129	135
H3.H	-	-	18	20	32	36	54	56	96	102	181	187
H3.M	-	-	-	-	-	-	-	-	-	-	147	153
H4.H	-	-	-	-	28	30	53	55	88	96	144	155
H4.M	-	-	-	-	-	-	-	-	-	-	137	143
B2.H	-	12	18	22	36	39	56	58	92	110	164	181
B2.M	-	-	-	-	-	-	-	-	-	-	147	160
B3.H	-	10	17	18	30	34	47	51	80	86	147	158
B3.M	-	-	-	-	-	-	-	-	-	-	129	135
B4.H	-	-	18	20	33	36	53	66	88	99	161	166
B4.M	-	-	-	-	-	-	-	-	-	-	138	144

Type	Oil quantity (approximate value) in litres for size								
	15	16	17	18	19	20	21	22	
H1SH	223	-	on request						
H2.H	243	249							
H2.M	194	200							
H3.H	269	280							
H3.M	227	233							
H4.H	255	262							
H4.M	197	203							
B2.H	259	271							
B2.M	223	235							
B3.H	240	251							
B3.M	191	197							
B4.H	258	263							
B4.M	198	203							

7.2 Start-up



In an explosible atmosphere, the gear unit must not be put into operation!



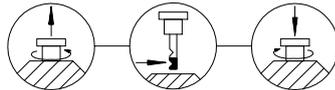
Before start-up, replace the yellow plastic screw plug with the air filter (see also notice on gear unit).

- Check the oil level in the gear unit.

7.2.1 Oil level

The oil level must be monitored by means of the existing oil-level monitoring equipment. To do so, the gear unit must be shut down.

When the oil is cool, the level should be at the upper mark on the oil dipstick. When the oil is warm it may slightly exceed this mark.



It must in no case be allowed to fall below the mark. If necessary, top up to the correct level.

7.2.2 Gear unit with cooling coil and/or external oil-supply system



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

After starting up the external oil-supply system for the first time the oil level must be once more checked in accordance with item 7.2.1.

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

7.2.3 Gear unit with backstop



Observe details at item 5.8, "Backstop"!

Before start-up, check whether the backstop can be turned manually in the free-wheeling direction without exerting undue force. Observe the direction-of-rotation arrows on the housing.



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.



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 prepared in accordance with the order and on a plate on the gear unit. This plate is attached to the gear-unit housing close to the backstop.



If a backstop with release mechanism is used, the operating instructions for this backstop must be followed. Moreover, the dimension " $x_{min.}$ " must be checked; " $x_{min.}$ " must not be smaller than that stated on the backstop rating plate.

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.



The unit can be started up once the amount of oil indicated on the notice has been poured in through the oil-filler plug screw of the backstop. Always use oil of the same type and viscosity as for the gear unit.

7.2.4 Temperature measurement



During the first start-up and after maintenance work, the oil-sump temperature must be measured during correct use (maximum machine performance) after appropriate running in.

The maximum permissible oil-sump temperature is 95 °C.

At higher temperatures the gear unit must be shut down and Siemens Customer Service should be consulted.

7.2.5 Bearing monitoring (vibration measurement)



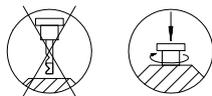
If the necessary measures have been made for vibration measurement as bearing monitoring (see item 5.11), vibration measurements must be taken in order to obtain initial values and/or standard values for the diagnosis. These measurements must be recorded and filed.

7.2.6 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

The tension pressures and/or initial-tensioning forces in accordance with item 6.3.2.4 must also be recorded in this document.



The document must be kept with the instructions.

7.3 Removal from service

- Switch off the drive unit.



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

- In case of gear units fitted with cooling coil or water oil-cooler, close the stop valves on the cooling-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 preservative, see items 7.3.1 and 7.3.2 (before a shut-down period exceeding 6 months).

7.3.1 Interior preservation for longer disuse

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

7.3.1.1 Interior preservation with gear oil

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

7.3.1.2 Interior preservation with preservative agent

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

7.3.1.3 Interior-preservation procedure

- Stop the gear unit.
- Drain the oil into a suitable container (see section 10, "Maintenance and Repair").
- Unscrew the air filter including the reducing screw.
- Pour in the preservation agent through the hole of the reducing screw up to the upper mark on the oil-level dipstick.



For preservative agent see table 7 or 8 in item 4.4.1.

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



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

7.3.2 Exterior preservation

7.3.2.1 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 9 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"!



On occurring of an explosible atmosphere, the gear unit must be switched off immediately!



**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.**

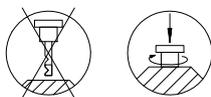
During operation the gear unit must be monitored for:



Oil temperature

**The maximum permitted temperature is:
95 °C (applies to synthetic oil)
At higher temperatures the gear unit must be shut down and Siemens Customer Service should be consulted.**

Correct oil level (see item 7.2.1 and section 7, "Start-up")



Changes in gear noise

Possible oil leakage at the housing and shaft seals

Bearing vibrations with present measuring sequence.

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

8.1 Oil level



**To check the oil level, stop operation of the gear unit.
Depending on the type the following oil levels apply when the motor has cooled down:
– Upper mark on the oil dipstick
When the oil is hot, the oil-level 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.**



The oil level in the oil-supply system must be checked.
For this, the operating instructions of the oil-supply system must be observed!

8.2 Irregularities



The drive unit must be switched off at once,

- if irregularities are found during the operation**

or

- if the pressure monitoring device in the oil-cooling system triggers alarm (only with correspondingly equipped gear units).**

Determine the cause of the fault, using table 25, "Faults, causes and remedy" (see item 9.2).

Table 25, "Faults, causes and remedy", contains a list of possible faults, their causes and suggested remedies.

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

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 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 Siemens' agreement or use of spare parts not supplied by Siemens.



To remedy faults and malfunctions, the gear unit must always be taken out of service. Secure the drive unit to prevent it from being started up unintentionally. Attach a warning notice to the start switch!

9.2 Possible faults

Table 25: Faults, causes and remedy

Faults	Causes	Remedy
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.
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.
Increased temperature at the bearing points.	Oil level in gear-unit housing too low or too high.	Check oil level at room temperature and, if necessary, top up oil.
	Oil too old.	Contact Customer Service. - Check date of last oil change.
	Oil-supply system defective.	Check the oil-supply system, replace any defective parts. Consult operating instructions for oil-supply system.
	Bearing defective.	Contact Customer Service. - Consult values obtained during vibration measurement by the operator. - Check and, if necessary, replace bearings.

Faults	Causes	Remedy
Increased operating temperature.	<p>Oil level in housing too high.</p> <p>Oil too old.</p> <p>Oil badly contaminated.</p> <p>In case of gear units with extern oil-supply system</p> <p>On gear units with fan: Suction opening in air guide cover and/or gear-unit housing badly contaminated.</p> <p>Gear unit with cooling coil: Deposits in cooling coil.</p> <p>Coolant temperature too high.</p>	<p>Check oil level and, if necessary, adjust.</p> <p>Contact Customer Service. - Check date of last oil change.</p> <p>Contact Customer Service. - Change oil.</p> <p>Consult operating instructions for oil-supply system.</p> <p>Clean air-guide cover and gear-unit housing.</p> <p>Contact Customer Service. - Clean or replace cooling coil.</p> <p>Check temperature and, if necessary, adjust.</p>
Increased vibration amplitudes at the bearing points.	<p>Bearing defective.</p> <p>Gears defective.</p>	<p>Contact Customer Service. - Check and, if necessary, replace bearings.</p> <p>Contact Customer Service. - Check and, if necessary, replace gears.</p>
Temperature at backstop too high. Locking function fails.	Damage to backstop.	<p>Contact Customer Service. - Check backstop and, if necessary, replace.</p>
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 housing cover and/or joints.</p> <p>Contact Customer Service. - Replace radial shaft-sealing rings.</p>
Water in oil.	<p>Oil foams in sump.</p> <p>Cooling coil defective.</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 a chemical laboratory.</p> <p>Contact Customer Service. - Look for and repair any leaks. - Replace cooling coil.</p> <p>Protect gear unit with suitable heat insulation. Close air outlet or alter its direction by structural measures.</p>

Faults	Causes	Remedy
Main drive motor does not start.	Wrong direction of rotation of motor. Incorrect installation and/or defect of cage with sprags of the backstop .	Change polarity of motor. Contact Customer Service. - Install cage of the backstop turned by 180° or replace.
Fault in oil-supply system.		Consult operating instructions for oil-supply system.

9.2.1 Leakage / leaktightness

In DIN 3761 information is given on the subject of leakage on gear units. Based on this and building on the extensive experience gained at Siemens MD and other FVA member companies, brief descriptions, required measures and notes on this subject are listed in the following overview.

Table 26: Notes on the leaktightness of radial shaft-sealing rings (RWDR)

Condition	Description	Measures	Notes
leaktight, dry	no moisture to be seen on radial shaft-sealing ring	none	
leaktight, damp	film of moisture formed functionally in the area of the sealing edge but not extending beyond the bottom side of the radial shaft-sealing ring	clean carefully only, if dirt adheres; observe	the radial shaft-sealing ring often dries by itself in further operation no reason for complaint
leaktight, wet	moisture film extending beyond the bottom side of the radial shaft-sealing ring but not dripping	wipe down with clean cloth; observe	the radial shaft-sealing ring often dries by itself in further operation no reason for complaint
measurable leak	small trickle to be seen on the bottom side of the radial shaft-sealing ring, dripping	If necessary, change radial shaft-sealing ring; identify and rectify possible cause of radial shaft-sealing ring failure	may be a reason for complaint; one drop of oil a day is acceptable
temporary leak	short-term failure of the sealing system	wipe down with clean cloth; observe	e.g. through small particles on the seal edge, which can be removed again in further operation no reason for complaint
apparent leak	temporary leak	wipe down with clean cloth	due mostly to excessive grease filling between seal and dust lip or oil secretions from the grease filling of labyrinth seals no reason for complaint



Oil mist escaping from a ventilation valve or a labyrinth seal is functional and therefore **not a reason for complaint**.

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 periods indicated in table 27 largely 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
max. operating temperature of 95 °C (applies to synthetic oil)

**The operator must ensure that the intervals stated in table 27 are adhered to.
This also applies if the maintenance work is included in the operator's internal maintenance schedules.**

Table 27: Maintenance and repair work

Measures	Periods	Remarks
Check the oil temperature	Daily	
Check for unusual gear-unit noise	Daily	
Check gear unit for leaks	Daily	
Check the oil level	Each time before starting up the gear unit	
Comparison of vibration values for bearing monitoring with initial values (reference values) on starting up	Every 3000 operating hours	See item 5.11.
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!
Test the oil for water content	After approx. 400 operating hours, at least once per year	See item 10.2.1.
First oil change	400 operating hours following start-up	See item 10.2.2.
Subsequent oil changes	Every 2 years or after max. 10 000 operating hours	See item 10.2.2.
Clean the oil filter	Every 3 months	

Measures	Periods	Remarks
Refill the Taconite seals with grease	Every 3000 operating hours or at least every 6 months	See item 10.2.5.
Clean fan, air-guide cover and gear-unit housing	Depending on requirements, at least every 2 years	See item 10.2.4.
Check the shrink disk	Yearly	See item 6.8.5.
Check cooling coil for deposits	Every 2 years	See item 10.2.6.
Replacing backstop		See item 5.8.
Checking friction linings of torque-limiting backstop	Yearly	See item 5.8.1.
Check tightness of fastening bolts	After approx. 400 operating hours, thereafter every 2 years	See item 10.2.9.
Complete inspection of gear unit	Every 2 years	See item 10.4.



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 oil manufacturers, the following are the expected 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, such as rape seed oils**).
- 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 works

10.2.1 Examine water content of oil, conduct 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 27 (see item 10.1) it is possible to have an oil sample tested at regular intervals by the Technical Service of the relevant oil company and to have it released for further use.

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



Observe the separately attached operating instructions BA 7300.

- The instructions in item 7.1 must be observed!
- Close the stop valves in the coolant in- and outflow pipes (gear units with cooling coil or 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-draining point of the gear-unit housing.
- Unscrew the air filter including reducing screw at the housing top.
- Unscrew the oil-drain plug or the open oil-drain cock and drain the oil into the collecting container.
- Drain the oil from the oil-supply system (see operating instructions to the oil-supply system).



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



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 in the oil-drain plug or close oil-drain cock.
- Clean the oil filter in the oil-cooling system (see operating instructions of the oil-supply system).
- Clean the air filter (see item 10.2.3).
- Screw in the air filter including reducing screw.
- Fill fresh oil into the gear unit (see item 7.1.2).

10.2.3 Clean the air filter



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

- Unscrew the air filter including the reducing screw.
- Clean the air filter using a suitable cleaning agent.
- Dry the air filter 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 fan and gear unit



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

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

- The instructions in item 5.9.1 must be observed!
- Demount the air-guide cover.
- Using a stiff brush, remove any dirt adhering to the fan wheel, air-guide cover and safety grid.
- Remove any corrosion.
- Screw safety grid with fastening screws back onto the air guide cover.



It must be ensured that the air-guide cover is correctly fastened. The fan must not come into contact with the air-guide cover.

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 lubricating points are fitted with flat grease nipples type AM10x1 to DIN 3404.



Remove and dispose of any old grease escaping.

10.2.6 Check cooling coil

- Shut off the cooling-water supply.
- Disconnect the cooling-water in- and outflow pipes from the cooling coil.
- Check the inside walls of the cooling coil for deposits.



If the cooling coil is dirty, heat is no longer withdrawn effectively from the gear unit. Any dirt adhering to the inside of the coil should be removed by chemical cleaning or the cooling coil should be replaced with a new one.

- If thick deposits have formed on the inside of the cooling coil, the cooling water and/or the deposits themselves should be chemically analysed. These analyses are carried out by companies which specialise in chemical cleaning. They also supply the special cleaning agents required.
- Before using these cleaning agents, ensure that they will not damage the cooling coil materials (consult Siemens). Observe the manufacturer's instructions at all times when using different cleaning agents by several manufacturers.



Avoid burns when working with corrosive cleaning agents. Always observe the manufacturers' instructions for safety and use.

Wear personal protective equipment (gloves, safety glasses)!

- Seriously contaminated cooling coils must be replaced. Consult our Customer Service.
- Re-connect the water in- and outflow pipes.

10.2.7 Top up oil

- The instructions in item 7.1.2 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 Checking friction linings of torque-limiting backstop

- The instructions in item 5.8.1 must be observed!

10.2.9 Check tightness of fastening bolts

- The instructions in item 10.1 must be observed!
- Check 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 instructions 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 6.17.



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

10.4 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.

10.5 Lubricants

The quality of the oil used must meet the requirements of the separately supplied BA 7300 instructions manual, otherwise the guarantee given by Siemens will lapse. We urgently recommend using one of the oils listed in table "T 7300" (for a link, see the BA 7300 instructions manual supplied separately), 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, viscosity and required quantity 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 oil dipstick or oil-sight glass are decisive for the amount of oil to be filled in.

The BA 7300 instructions manual relating to the gear-unit lubrication and table "T 7300" containing the current lubricant recommendations of 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

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

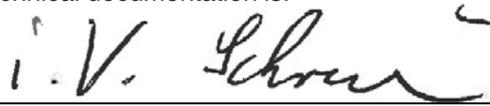
The manufacturer, Siemens AG, 46393 Bocholt, Germany, declares with regard to the partly completed machinery

Gear unit
H.SH, H.VH, H.HH, H.DH, H.KH, H.FH,
H.HM, H.DM, H.KM, H.FM,
B.SH, B.VH, B.HH, B.DH, B.KH, B.FH,
B.HM, B.DM, B.KM, B.FM
Sizes 3 to 22
Equipment category M2

developed for driving machines in general engineering applications and in mining
(underground applications equipment category M2):

- 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; 1.2.6; 1.3.1 - 1.3.4, 1.3.6 - 1.3.8.1; 1.4.1, 1.4.2.1;
1.5.1, 1.5.2, 1.5.4 - 1.5.11, 1.5.13; 1.6.1, 1.6.2; 1.7.1 - 1.7.2, 1.7.4 - 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 to be 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:
Friedheim Schreier (Director Engineering SGU)

Penig, 2014-04-29



Friedheim Schreier (Director Engineering SGU)

Penig, 2014-04-29



Christian Tyburski (Director Business Subsegment SGU)



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, D - 46393 Bocholt, declares that the equipment described in these assembly and operating instructions

Gear unit
H.SH, H.VH, H.HH, H.DH, H.KH, H.FH,
H.HM, H.DM, H.KM, H.FM,
B.SH, B.VH, B.HH, B.DH, B.KH, B.FH,
B.HM, B.DM, B.KM, B.FM
Sizes 3 to 22
Equipment category M2

is in conformity with Article 1 and Article 8, Paragraph 1 b) ii) 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 1127-2 : 07-2010
- 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.

Penig, 2014-04-29

Friedheim Schreier (Director Engineering SGU)

Penig, 2014-04-29

Christian Tyburski (Director Business Subsegment SGU)

Further Information:

"FLENDER gear units" on the Internet

www.siemens.com/gearunits

"FLENDER couplings" on the Internet

www.siemens.com/couplings

Service & Support:

<http://support.automation.siemens.com/WW/view/en/10803928/133300>

Lubricants:

<http://support.automation.siemens.com/WW/view/en/42961591/133000>

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Subject to modifications

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www.siemens.com/drive-technologies