



7 Design and Operating Notes

7.1 Lubricants

General information

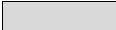
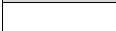
Unless a special arrangement is made, SEW-EURODRIVE supplies the drives with a lubricant fill adapted for the specific gear unit and mounting position. The decisive factor is the mounting position (M1...M6, → section "Mounting positions and important order information") specified when ordering the drive. You must adapt the lubricant fill in case of any subsequent changes made to the mounting position (→ Lubricant fill quantities).

Lubricant table

The lubricant table on the following page shows the permitted lubricants for SEW-EURODRIVE gear units. Observe the following legend with regards to the lubricant table.

Key to the lubricant table

Abbreviations, meaning of shading and notes:

- CLP = Mineral oil
- CLP PG = Polyglycol (W gear units, conforms to USDA-H1)
- CLP HC = synthetic hydrocarbons
- E = Ester oil (water hazard class 1 (German regulation))
- HCE = synthetic hydrocarbons + ester oil (USDA - H1 certification)
- HLP = Hydraulic oil
-  = synthetic lubricant (= synthetic-based roller bearing grease)
-  = mineral lubricant (= mineral-based rolling bearing grease)
- 1) Helical-worm gear units with PG oil: consult SEW-EURODRIVE.
- 2) Special lubricant for Spiroplan® gear units only
- 3) $SEW-f_B \geq 1.2$ required
- 4) Pay attention to critical starting behavior at low temperatures!
- 5) Low-viscosity grease
- 6) Ambient temperature
-  Lubricant for the food industry (food grade oil)
-  Biodegradable oil (lubricant for agriculture, forestry, and fisheries)

Rolling bearing greases

The anti-friction bearings in gear units and motors are given a factory-fill with the greases listed below. SEW-EURODRIVE recommends regreasing rolling bearings with a grease fill at the same time as changing the oil or replacing the rolling bearings.

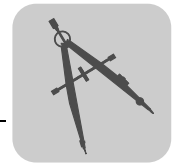
	Ambient temperature	Manufacturer	Type
Gear unit rolling bearings	-40 °C ... +80 °C	Fuchs	Renolit CX-TOM15 ¹⁾
Motor rolling bearings²⁾	-20 °C ... +80 °C	Esso	Polyrex EM
	+20 °C ... +100 °C	Klüber	Barrierta L55/2
	-40 °C ... +60 °C	Kyodo Yushi	Multemp SRL ³⁾
Special greases for gear unit rolling bearings:			
	-30 °C ... +40 °C	Aral	Aral Eural Grease EP 2
	-20 °C ... +40 °C	Aral	Aral Aralube BAB EP2

- 1) Rolling bearing grease based on semi-synthetic base oil.
- 2) The motor rolling bearings are covered on both sides and cannot be regreased.
- 3) Recommended for continuous operation at ambient temperatures below 0 °C, for example in a cold storage.

The following grease quantities are required:

- For fast-running bearings (gear unit input end): Fill the cavities between the rolling elements one-third full with grease.
- For slow-running bearings (in gear units and at gear unit output end): Fill the cavities between the rolling elements two-thirds full with grease.





Lubricant table

01 805 12 92

	6) °C -50 0 +50 +100 Standard -10 +40	DIN (ISO) CLP (CC)	ISO, NLGI	Mobil®	Shell	KLÜBER	ARAL	bp	TEACCO	Castrol	FUCHS	TOTAL
R...		CLP PG	VG 220	Mobilgear 600 XP 220	Shell Omala 220	Klüberoil GEM 1-220 N	Aral Degol BG 220	BP Energol GR-XP 220	Meropa 220	Tribol 1100/220	Renolin CLP 220	Carter EP 220
K... (HK...)	-25 +80	CLP PG	VG 220	Mobil Glygoyle 220	Shell Tivela S 220	Klüberoil GH 6-220	Aral Degol GS 220	BP Energol SG-XP 220	Synlube CLP 220	Tribol 800/220	Renolin PG 220	Carter SY 220
F...	-40 +80	CLP HC	VG 220	Mobil SHC 630	Shell Omala HD 220	Klüberoil GEM 4-220 N	Aral Degol PAS 220		Pinnacle EP 220	Tribol 1510/220	Renolin Unisyn CLP 220	
	-40 +40	CLP HC	VG 150	Mobil SHC 629	Shell Omala HD 150	Klüberoil GEM 4-150 N			Pinnacle EP 150		Renolin Unisyn CLP 150	Carter SH 150
	-20 +25	CLP (CC)	VG 150	Mobilgear 600 XP 100	Shell Omala 100	Klüberoil GEM 1-150 N	Aral Degol BG 100	BP Energol GR-XP 100	Meropa 150	Tribol 1100/100	Renolin CLP 150	Carter EP 100
	-30 +10	HLP (HM)	VG 68-46 VG 32	Mobil D.T.E. 13M	Shell Tellus T 32	Klüberoil GEM 1-68 N	Aral Degol BG 46		Rando EP Ashless 46	Tribol 1100/68	Renolin B 46 HVI	Equivis ZS 46
	-40 +20	CLP HC	VG 68	Mobil SHC 626					Cetus PAO 46		Renolin Unisyn CLP 68	
	-40 +10	CLP HC	VG 32	Mobil SHC 624	Shell Tellus T 15	Klüber-Summit HySyn FG-32		BP Energol HLP-HM 15	Rando HDZ 15		Renolin Unisyn OL 32	Dacnis SH 32
	-40 -20	HLP (HM)	VG 22 VG 15	Mobil D.T.E. 11M		Isoflex MT 30 ROT					Renolin MR 310	Equivis ZS 15
S... (HS...)	Standard 0 +40	CLP (CC)	VG 680	Mobilgear 600 XP 680	Shell Omala 680	Klüberoil GEM 1-680 N	Aral Degol BG 680	BP Energol GR-XP 680	Meropa 680	Tribol 1100/680	Renolin SEW 680	Carter EP 680
	-20 +60	CLP PG	VG 680 1)		Shell Tivela S 680	Klüberoil GH 6-680		BP Energol SG-XP 680	Synlube CLP 680	Tribol 800/680	Renolin PG 680	
	-30 +80	CLP HC	VG 460	Mobil SHC 634	Shell Omala HD 460	Klüberoil GEM 4-460 N			Pinnacle EP 460		Renolin Unisyn CLP 460	
	-40 +10	CLP HC	VG 150	Mobil SHC 629	Shell Omala HD 150	Klüberoil GEM 4-150 N			Pinnacle EP 150		Renolin Unisyn CLP 150	Carter SH 150
	-20 +10	CLP (CC)	VG 150 VG 100	Mobilgear 600 XP 100	Shell Omala 100	Klüberoil GEM 1-150 N	Aral Degol BG 100	BP Energol GR-XP 100	Meropa 150	Tribol 1100/100	Renolin CLP 150	Carter EP 100
	-25 +20	CLP PG	VG 220 1)	Mobil Glygoyle 220	Shell Tivela S 220	Klüberoil GH 6-220	Aral Degol GS 220	BP Energol SG-XP 220	Synlube CLP 220	Tribol 800/220	Renolin PG 220	Carter SY 220
	-40 +20	CLP HC	VG 68	Mobil SHC 626		Klüber-Summit HySyn FG-32			Cetus PAO 46		Renolin Unisyn CLP 68	
	-40 0	CLP HC	VG 32	Mobil SHC 624		Klüber-Summit HySyn FG-32					Renolin Unisyn OL 32	Dacnis SH 32
R... K... (HK...), F... S... (HS...)	4) 0 +40	CLPHC NSF H1	VG 460		Shell Cassida Fluid GL 460	Klüberoil 4UH1-460 N				Optileb GT 460	Geralyn SF 460	
	-25 +25		VG 220		Shell Cassida Fluid GL 220	Klüberoil 4UH1-220 N				Optileb GT 220		
	-40 0		VG 68		Shell Cassida Fluid HF 68	Klüberoil 4UH1-68 N				Optileb HY 68		
	-20 +40	E	VG 460			Klüberbio CA2-460	Aral Degol BAB 460			Tribol Bio Top 1418/460	Plantogear 460 S	
W... (HW...)	Standard -20 +40	SEW PG	VG 460 2)			Klüber SEW HT-460-5						
	-40 +10	API GL5	SAE 75W90 (-VG 100)	Mobil Synthetic Gear Oil 75 W90								
	-20 +40	H1 PG	VG 460 2) VG 460 3)			Klüberoil UH1 6-460						
R32 R302	-25 +60	DIN 51 818 5)	00 000 - 0	Glygoyle Grease 00 Mobilux EP 004	Shell Tivela GL 00	Klüberoil GE 46-1200	Aralub MFL 00	BP Energol LS-EP 00	Multifak 6833 EP 00		Spheerol EPL 0	Marson SY 00
	Standard -15 +40				Shell Alvania GL 00	Klüberoil UH1 6-460			Multifak EP 000		Renolin SF 7 - 041	Multis EP 00



Lubricant fill quantities

The specified fill quantities are **recommended values**. The precise values vary depending on the number of stages and gear ratio. When filling, it is essential to check the **oil level plug** since it indicates the precise oil capacity.

The following tables show guide values for lubricant fill quantities in relation to the mounting position M1 ... M6.

Helical (R) gear units

RX..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
RX57	0.60	0.80	1.30	1.30	0.90	0.90
RX67	0.80	0.80	1.70	1.90	1.10	1.10
RX77	1.10	1.50	2.60	2.70	1.60	1.60
RX87	1.70	2.50	4.80	4.80	2.90	2.90
RX97	2.10	3.40	7.4	7.0	4.80	4.80
RX107	3.90	5.6	11.6	11.9	7.7	7.7

RXF..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
RXF57	0.50	0.80	1.10	1.10	0.70	0.70
RXF67	0.70	0.80	1.50	1.40	1.00	1.00
RXF77	0.90	1.30	2.40	2.00	1.60	1.60
RXF87	1.60	1.95	4.90	3.95	2.90	2.90
RXF97	2.10	3.70	7.1	6.3	4.80	4.80
RXF107	3.10	5.7	11.2	9.3	7.2	7.2



R.., R..F

Gear unit	Fill quantity in liters					
	M1 ¹⁾	M2 ¹⁾	M3	M4	M5	M6
R07	0.12	0.20	0.20	0.20	0.20	0.20
R17	0.25	0.55	0.35	0.55	0.35	0.40
R27	0.25/0.40	0.70	0.50	0.70	0.50	0.50
R37	0.30/0.95	0.85	0.95	1.05	0.75	0.95
R47	0.70/1.50	1.60	1.50	1.65	1.50	1.50
R57	0.80/1.70	1.90	1.70	2.10	1.70	1.70
R67	1.10/2.30	2.40/3.20	2.80	2.90	1.80	2.00
R77	1.20/3.00	3.30/4.20	3.60	3.80	2.50	3.40
R87	2.30/6.0	6.4/8.1	7.2	7.2	6.3	6.5
R97	4.60/9.8	11.7/14.0	11.7	13.4	11.3	11.7
R107	6.0/13.7	16.3	16.9	19.2	13.2	15.9
R137	10.0/25.0	28.0	29.5	31.5	25.0	25.0
R147	15.4/40.0	46.5	48.0	52.0	39.5	41.0
R167	27.0/70.0	82.0	78.0	88.0	66.0	69.0

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.

RF..

Gear unit	Fill quantity in liters					
	M1 ¹⁾	M2 ¹⁾	M3	M4	M5	M6
RF07	0.12	0.20	0.20	0.20	0.20	0.20
RF17	0.25	0.55	0.35	0.55	0.35	0.40
RF27	0.25/0.40	0.70	0.50	0.70	0.50	0.50
RF37	0.35/0.95	0.90	0.95	1.05	0.75	0.95
RF47	0.65/1.50	1.60	1.50	1.65	1.50	1.50
RF57	0.80/1.70	1.80	1.70	2.00	1.70	1.70
RF67	1.20/2.50	2.50/3.20	2.70	2.80	1.90	2.10
RF77	1.20/2.60	3.10/4.10	3.30	3.60	2.40	3.00
RF87	2.40/6.0	6.4/8.2	7.1	7.2	6.3	6.4
RF97	5.1/10.2	11.9/14.0	11.2	14.0	11.2	11.8
RF107	6.3/14.9	15.9	17.0	19.2	13.1	15.9
RF137	9.5/25.0	27.0	29.0	32.5	25.0	25.0
RF147	16.4/42.0	47.0	48.0	52.0	42.0	42.0
RF167	26.0/70.0	82.0	78.0	88.0	65.0	71.0

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.



Parallel-shaft heli-
cal (F) gear units

F.., FA..B, FH..B, FV..B

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
F..27	0.60	0.80	0.65	0.70	0.60	0.60
F..37	0.95	1.25	0.70	1.25	1.00	1.10
F..47	1.50	1.80	1.10	1.90	1.50	1.70
F..57	2.60	3.50	2.10	3.50	2.80	2.90
F..67	2.70	3.80	1.90	3.80	2.90	3.20
F..77	5.9	7.3	4.30	8.0	6.0	6.3
F..87	10.8	13.0	7.7	13.8	10.8	11.0
F..97	18.5	22.5	12.6	25.2	18.5	20.0
F..107	24.5	32.0	19.5	37.5	27.0	27.0
F..127	40.5	54.5	34.0	61.0	46.3	47.0
F..157	69.0	104.0	63.0	105.0	86.0	78.0

FF..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
FF27	0.60	0.80	0.65	0.70	0.60	0.60
FF37	1.00	1.25	0.70	1.30	1.00	1.10
FF47	1.60	1.85	1.10	1.90	1.50	1.70
FF57	2.80	3.50	2.10	3.70	2.90	3.00
FF67	2.70	3.80	1.90	3.80	2.90	3.20
FF77	5.9	7.3	4.30	8.1	6.0	6.3
FF87	10.8	13.2	7.8	14.1	11.0	11.2
FF97	19.0	22.5	12.6	25.6	18.9	20.5
FF107	25.5	32.0	19.5	38.5	27.5	28.0
FF127	41.5	55.5	34.0	63.0	46.3	49.0
FF157	72.0	105.0	64.0	106.0	87.0	79.0

FA.., FH.., FV.., FAF.., FAZ.., FHF.., FHZ.., FVF.., FVZ.., FT..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
F..27	0.60	0.80	0.65	0.70	0.60	0.60
F..37	0.95	1.25	0.70	1.25	1.00	1.10
F..47	1.50	1.80	1.10	1.90	1.50	1.70
F..57	2.70	3.50	2.10	3.40	2.90	3.00
F..67	2.70	3.80	1.90	3.80	2.90	3.20
F..77	5.9	7.3	4.30	8.0	6.0	6.3
F..87	10.8	13.0	7.7	13.8	10.8	11.0
F..97	18.5	22.5	12.6	25.2	18.5	20.0
F..107	24.5	32.0	19.5	37.5	27.0	27.0
F..127	39.0	54.5	34.0	61.0	45.0	46.5
F..157	68.0	103.0	62.0	104.0	85.0	77.0



Helical-bevel (K)
gear units

K.., KA..B, KH..B, KV..B

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
K..37	0.50	1.00	1.00	1.25	0.95	0.95
K..47	0.80	1.30	1.50	2.00	1.60	1.60
K..57	1.10	2.20	2.20	2.80	2.30	2.10
K..67	1.10	2.40	2.60	3.45	2.60	2.60
K..77	2.20	4.10	4.40	5.8	4.20	4.40
K..87	3.70	8.0	8.7	10.9	8.0	8.0
K..97	7.0	14.0	15.7	20.0	15.7	15.5
K..107	10.0	21.0	25.5	33.5	24.0	24.0
K..127	21.0	41.5	44.0	54.0	40.0	41.0
K..157	31.0	62.0	65.0	90.0	58.0	62.0
K..167	33.0	95.0	105.0	123.0	85.0	84.0
K..187	53.0	152.0	167.0	200	143.0	143.0

KF..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
KF37	0.50	1.10	1.10	1.50	1.00	1.00
KF47	0.80	1.30	1.70	2.20	1.60	1.60
KF57	1.20	2.20	2.40	3.15	2.50	2.30
KF67	1.10	2.40	2.80	3.70	2.70	2.70
KF77	2.10	4.10	4.40	5.9	4.50	4.50
KF87	3.70	8.2	9.0	11.9	8.4	8.4
KF97	7.0	14.7	17.3	21.5	15.7	16.5
KF107	10.0	21.8	25.8	35.1	25.2	25.2
KF127	21.0	41.5	46.0	55.0	41.0	41.0
KF157	31.0	66.0	69.0	92.0	62.0	62.0

KA.., KH.., KV.., KAF.., KHF.., KVF.., KAZ.., KHZ.., KVZ.., KT..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
K..37	0.50	1.00	1.00	1.40	1.00	1.00
K..47	0.80	1.30	1.60	2.15	1.60	1.60
K..57	1.20	2.20	2.40	3.15	2.70	2.40
K..67	1.10	2.40	2.70	3.70	2.60	2.60
K..77	2.10	4.10	4.60	5.9	4.40	4.40
K..87	3.70	8.2	8.8	11.1	8.0	8.0
K..97	7.0	14.7	15.7	20.0	15.7	15.7
K..107	10.0	20.5	24.0	32.4	24.0	24.0
K..127	21.0	41.5	43.0	52.0	40.0	40.0
K..157	31.0	66.0	67.0	87.0	62.0	62.0



Helical-worm (S) gear units

S

Gear unit	Fill quantity in liters					
	M1	M2	M3 ¹⁾	M4	M5	M6
S..37	0.25	0.40	0.50	0.55	0.40	0.40
S..47	0.35	0.80	0.70/0.90	1.00	0.80	0.80
S..57	0.50	1.20	1.00/1.20	1.45	1.30	1.30
S..67	1.00	2.00	2.20/3.10	3.10	2.60	2.60
S..77	1.90	4.20	3.70/5.4	5.9	4.40	4.40
S..87	3.30	8.1	6.9/10.4	11.3	8.4	8.4
S..97	6.8	15.0	13.4/18.0	21.8	17.0	17.0

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.

SF..

Gear unit	Fill quantity in liters					
	M1	M2	M3 ¹⁾	M4	M5	M6
SF37	0.25	0.40	0.50	0.55	0.40	0.40
SF47	0.40	0.90	0.90/1.05	1.05	1.00	1.00
SF57	0.50	1.20	1.00/1.50	1.55	1.40	1.40
SF67	1.00	2.20	2.30/3.00	3.20	2.70	2.70
SF77	1.90	4.10	3.90/5.8	6.5	4.90	4.90
SF87	3.80	8.0	7.1/10.1	12.0	9.1	9.1
SF97	7.4	15.0	13.8/18.8	22.6	18.0	18.0

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.

SA..., SH..., SAF..., SHZ..., SAZ..., SHF..., ST..

Gear unit	Fill quantity in liters					
	M1	M2	M3 ¹⁾	M4	M5	M6
S..37	0.25	0.40	0.50	0.50	0.40	0.40
S..47	0.40	0.80	0.70/0.90	1.00	0.80	0.80
S..57	0.50	1.10	1.00/1.50	1.50	1.20	1.20
S..67	1.00	2.00	1.80/2.60	2.90	2.50	2.50
S..77	1.80	3.90	3.60/5.0	5.8	4.50	4.50
S..87	3.80	7.4	6.0/8.7	10.8	8.0	8.0
S..97	7.0	14.0	11.4/16.0	20.5	15.7	15.7

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.



Spiroplan® (W)
gear units

W.., WF.., WA..B, WH..B

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
W..10	0.16					
W..20	0.24					
W..30	0.40					
W..37	0.50			0.70	0.50	
W..47	0.90			1.40	0.90	

WA.., WAF.., WT.., WH.., WHF..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
W..10	0.16					
W..20	0.24					
W..30	0.40					
W..37	0.50			0.70	0.50	
W..47	0.80			1.25	0.80	



7.2 Reduced backlash gear units

Helical, parallel-shaft helical and helical-bevel gear units with reduced backlash are available as of gear unit size 37. The circumferential backlash of these gear units is considerably less than that of the standard versions so that positioning tasks can be solved with great precision. The circumferential backlash is specified in angular minutes ['] in the technical data. The circumferential backlash for the output shaft is specified without load (max. 1% of the rated output torque); the gear unit input end is blocked.

The reduced backlash variant is available for the following gear units:

- Helical gear units (R) sizes 37 to 167
- Parallel-shaft gear units (F) sizes 37 to 157
- Helical-bevel gear units (K) sizes 37 to 187

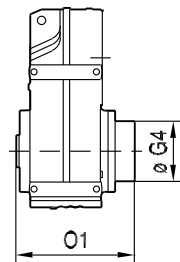
Multi-stage gear units are not available in reduced backlash variants.

Apart from the parallel-shaft gear units FH.87 and FH.97 with reduced backlash, the dimensions of the reduced backlash variants correspond to the dimensions of the standard designs.

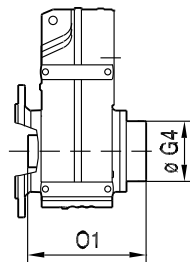
The following figure shows the dimensions of the FH.87 and FH.97 gear units with reduced backlash:

42 020 00 09

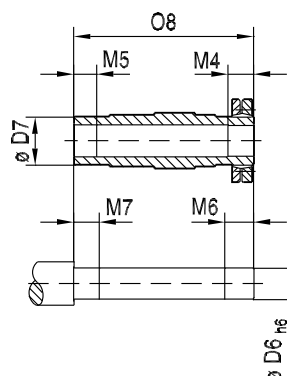
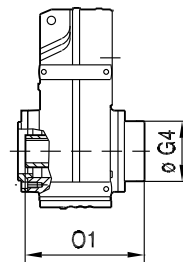
FH../R
FH..B/R



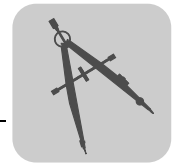
FHF../R



FHZ../R



Type	D6	D7	G4	M4	M5	M6	M7	O1	O8
FH.87/R	Ø 65 _{h6}	Ø 85	Ø 163	41	40	46	45	312.5	299.5
FH.97/R	Ø 75 _{h6}	Ø 95	Ø 184	55	50	60	55	382.5	367



7.3 Installation/removal of gear units with hollow shafts and keys



- Always use the supplied NOCO® Fluid for assembly. The fluid prevents contact corrosion and facilitates subsequent disassembly.
- The keyway dimension X is specified by the customers, but X must be $> DK$.

Assembly

SEW-EURODRIVE recommends two variants for mounting gear units with hollow shaft and key onto the input shaft of the driven machine (= customer shaft):

1. Use the provided fastening parts for installation.
2. Use the optional installation/removal kit for installation.

1. Provided fastening parts

The following fastening parts are supplied as standard:

- Retaining screw with washer (2)
- Retaining ring (3)

Note the following points concerning the customer shaft:

- The installation length of the customer shaft with contact shoulder (A) must be $L8 - 1 \text{ mm}$.
- The installation length of the customer shaft without contact shoulder (B) must equal $L8$.



Design and Operating Notes

Installation/removal of gear units with hollow shafts and keys

00 001 00 02

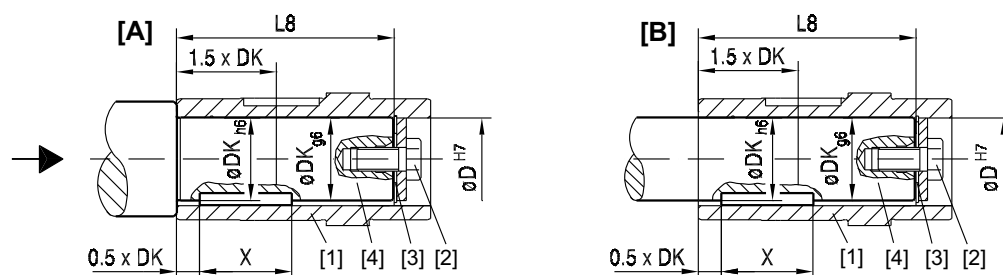


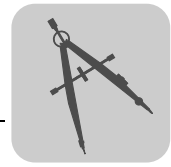
Figure 15: Customer shaft with contact shoulder (A) and without contact shoulder (B)

- (1) Hollow shaft
- (2) Retaining screw with washer
- (3) Retaining ring
- (4) Customer shaft

Dimensions and tightening torque:

The retaining screw (2) must be tightened to the tightening torque MS given in the following table.

Gear unit type	D ^{H7} [mm]	DK [mm]	L8 [mm]	MS [Nm]
WA..10	16	16	69	8
WA..20	18	18	8484	
WA..20	20	20		
FA..27	25	25	88	20
WA..30, WA..37	20	20	105	8
SA..37			104	
FA..37, KA..37, SA..47	30	30	105	20
SA..47, WA..37	25	25	105	
SAF402	30	30	138	
FA..47, KA..47, SA..57	35	35	132	
WA..47	30	30	122	
SA..57			132	
FA..57, KA..57	40	40	142	40
FA..67, KA..67			156	
SA..67			144	
SA..67	45	45	144	40
FA..77, KA..77, SA..77	50	50	183	
SA..77	60	60	180	80
FA..87, KA..87			210	
SA..87			220	
SA..87	70	70	220	
FA..97, KA..97	70	70	270	
SA..97			260	
SA..97	90	90	255	200
FA..107			313	
KA..107			313	
FA..127, KA..127	100	100	373	
FA..157, KA..157	120	120	460	



2. Installation/removal kit

You can also use the optional installation/removal kit for installation. You can order the kit for the specific gear unit type(s) by quoting the part numbers in the table below. The delivery includes:

- Spacer tube for installation without contact shoulder (5)
- Retaining screw for installation (2)
- Forcing washer for removal (7)
- Locked nut for removal (8)

The short retaining screw delivered as standard is not required.

Note the following points concerning the customer shaft:

- The installation length of the customer shaft must be LK2. Do not use the spacer if the customer shaft **has a contact shoulder (A)**.
- The installation length of the customer shaft must be LK2. Use the spacer if the customer shaft **has a contact shoulder (B)**.



Design and Operating Notes

Installation/removal of gear units with hollow shafts and keys

00 002 00 02

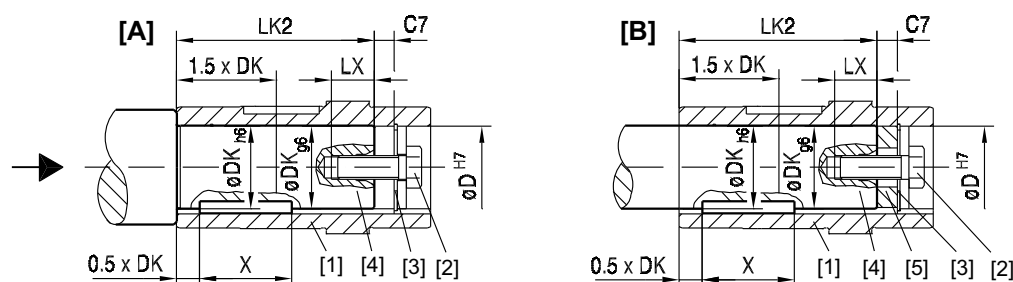


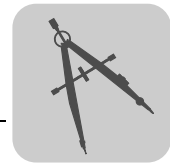
Figure 16: Customer shaft with contact shoulder (A) and without contact shoulder (B)

- (1) Hollow shaft
- (2) Retaining screw with washer
- (3) Retaining ring
- (4) Customer shaft
- (5) Spacer tube

Dimensions, tightening torque and part numbers:

The retaining screw (2) must be tightened to the tightening torque MS given in the following table.

Type	D ^{H7} [mm]	DK [mm]	LK2 [mm]	LX ⁺² [mm]	C7 [mm]	MS [Nm]	Part number of installation- removal set
WA..10	16	16	57	12.5	11	8	643 712 5
WA..20	18	18	72	16	12		643 682 X
WA..20, WA..30, WA..37	20	20	72, 93				643 683 8
SA..37	20	20	92	16	12	8	643 683 8
FA..27	25	25	72	22	16	20	643 684 6
SA..47			89				
WA..47	30	30	106				
FA..37, KA..37			89				
SA..47			89				
SA..57			116				
FA..47, KA..47, SA..57	35	35	114	28	18	40	643 686 2
FA..57, KA..57	40	40	124	36			643 687 0
FA..67			138				
KA..67			138				
SA..67			126				
SA..67	45	45	126	42	22	80	643 688 9
FA..77, KA..77, SA..77	50	50	165				643 689 7
FA..87, KA..87	60	60	188				643 690 0
SA..77			158				
SA..87			198				
FA..97, KA..97	70	70	248				643 691 9
SA..87			198				
SA..97			238				
FA..107, KA..107	90	90	287	50	26	200	643 692 7
SA..97			229				643 693 5
FA..127, KA..127	100	100	347				
FA..157, KA..157	120	120	434				



Removal

Applies only if installation/removal kit was previously used for installation (→ Figure 16).

Proceed as follows to remove the gear unit:

1. Loosen the retaining screw (6).
2. Remove the circlip (3) and, if used, the spacer tube (5).
3. According to Figure 17 place the forcing washer (7) and the locked nut (8) between the customer shaft (4) and circlip (3).
4. Re-install the circlip (3).
5. Re-install the retaining screw (6). Now you can force the gear unit off the shaft.

00 003 00 02

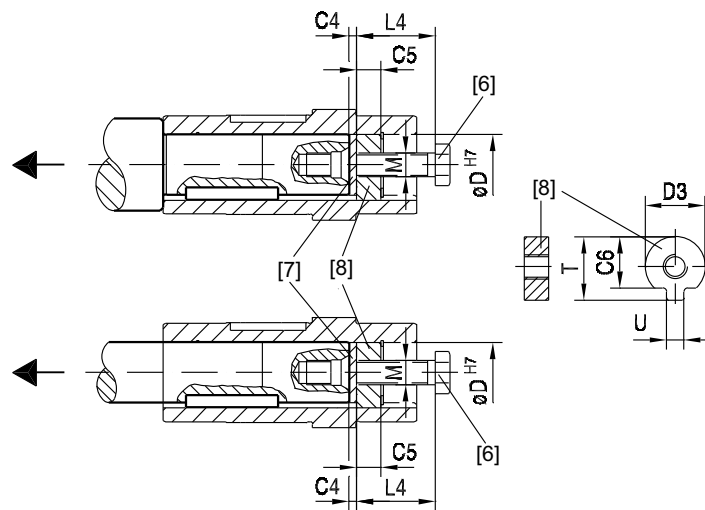


Figure 17: Removal

- (6) Retaining screw
- (7) Forcing washer
- (8) Locked nut for removal

Dimensions and part numbers:

Type	D ^{H7} [mm]	M	C4 [mm]	C5 [mm]	C6 [mm]	U ^{-0.5} [mm]	T ^{-0.5} [mm]	D3 ^{-0.5} [mm]	L4 [mm]	Part number of installa- tion/removal kit
WA..10	16	M5	5	5	12	4.5	18	15.7	50	643 712 5
WA..20	18	M6		6	13.5	5.5	20.5	17.7	25	643 682 X
WA..20, WA..30, WA..37, SA..37	20				15.5	5.5	22.5	19.7		643 683 8
FA27..., SA..47	25	M10		10	20	7.5	28	24.7	35	643 684 6
FA..37, KA..37, SA..47, SA..57, WA..47	30				25	7.5	33	29.7		643 685 4
FA..47, KA..47, SA..57	35	M12		12	29	9.5	38	34.7	45	643 686 2
FA..57, KA..57, FA..67, KA..67, SA..67	40	M16			34	11.5	41.9	39.7	50	643 687 0
SA..67	45				38.5	13.5	48.5	44.7		643 688 9
FA..77, KA..77, SA..77	50				43.5	13.5	53.5	49.7		643 689 7
FA..87, KA..87, SA..77, SA..87	60	M20		16	56	17.5	64	59.7	60	643 690 0
FA..97, KA..97, SA..87, SA..97	70				65.5	19.5	74.5	69.7		643 691 9
FA..107, KA..107, SA..97	90	M24		20	80	24.5	95	89.7	70	643 692 7
FA..127, KA..127	100				89	27.5	106	99.7		643 693 5
FA..157, KA..157	120				107	31	127	119.7		643 694 3

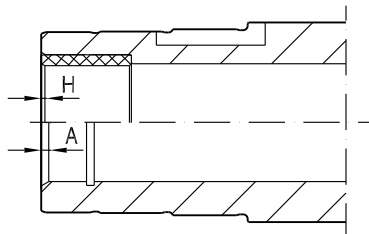


7.4 Gear units with hollow shaft

Chamfers on hollow shafts

The following illustration shows the chamfers on parallel-shaft helical, helical-bevel, helical-worm and Spiroplan® gear units with hollow shaft:

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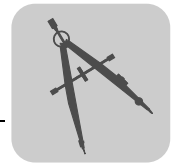
Figure 18: Chamfers on hollow shafts

Gear unit	Variant	
	with hollow shaft (A)	with hollow shaft and shrink disk (H)
W..10 - W..30	2 × 30°	-
F..27	2 × 30°	0.5 × 45°
F../K../S../W..37	2 × 30°	0.5 × 45°
F../K../S../W..47	2 × 30°	0.5 × 45°
S..57	2 × 30°	0.5 × 45°
F../K../S..57	2 × 30°	0.5 × 45°
F../K../S..67	2 × 30°	0.5 × 45°
F../K../S..77	2 × 30°	0.5 × 45°
F../K../S..87	3 × 30°	0.5 × 45°
F../K../S..97	3 × 30°	0.5 × 45°
F../K../107	3 × 30°	3 × 2°
F../K../127	5 × 30°	1.5 × 30°
F../K../157	5 × 30°	1.5 × 30°
KH167	-	1.5 × 30°
KH187	-	1.5 × 30°

Special motor/gear unit combinations

Please note for parallel-shaft helical gearmotors with hollow shaft (FA..B, FV..B, FH..B, FAF, FVF, FHF, FA, FV, FH, FT, FAZ, FVZ, FHZ):

- If you are using a customer shaft pushed through on the motor end, there may be a collision when a "small gear unit" is used in combination with a "large motor".
- Check the motor dimension AC to decide whether there will be a collision with a pushed-through customer shaft.



7.5 TorqLOC® mounting system for gear units with hollow shaft

Description of TorqLOC®

The TorqLOC® hollow shaft mounting system is used for achieving a non-positive connection between customer shaft and the hollow shaft in the gear unit. As a result, the TorqLOC® hollow shaft mounting system is an alternative to the hollow shaft with shrink disk, the hollow shaft with key and the splined hollow shaft.

The TorqLOC® hollow shaft mounting system consists of the following components:

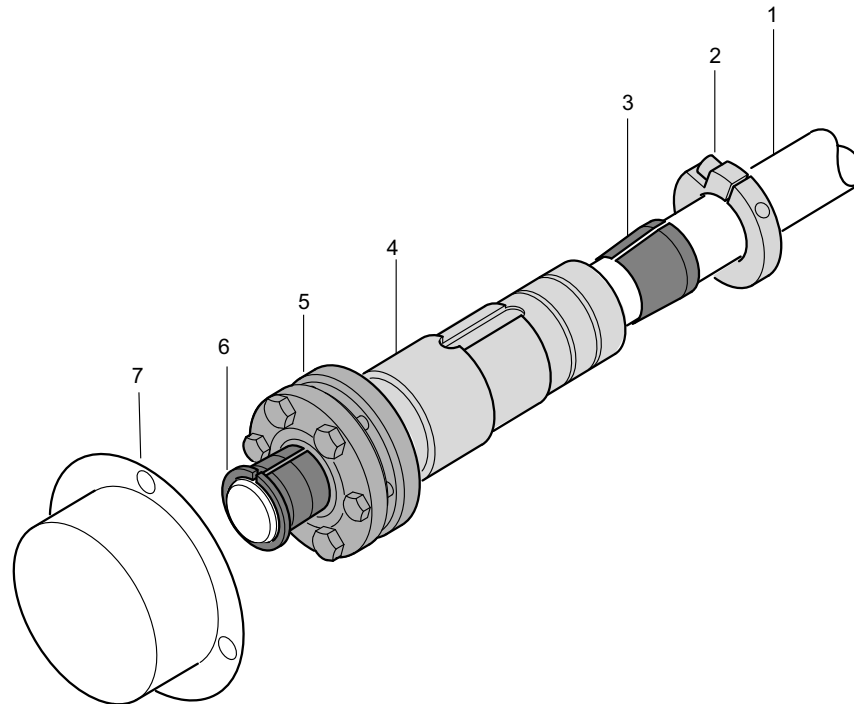


Figure 19: Components of the TorqLOC® hollow shaft mounting system

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1. Customer shaft
2. Clamping ring
3. Conical bronze bushing
4. Hollow shaft in gear unit
5. Shrink disk
6. Conical steel bushing
7. Fixed cover

Advantages of TorqLOC®

The TorqLOC® hollow shaft mounting system provides the following advantages:

- Cost saving as the customer shaft can be made from drawn material up to quality h11.
- Cost saving as different customer shaft diameters can be realized with one hollow shaft diameter and different bushings.
- Simple installation as there is no need to accommodate any shaft connections.
- Simple removal even after many hours of operation as the formation of contact corrosion has been reduced and the conical connections can easily be released.



Design and Operating Notes

TorqLOC® mounting system for gear units with hollow shaft

Technical data

The TorqLOC® hollow shaft mounting system is approved for input torques of 92 Nm to 18000 Nm.

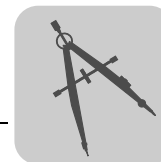
The following gear units are available with TorqLOC® hollow shaft mounting system:

- Parallel-shaft helical gear units in gear unit sizes 37 to 157 (FT37 to FT157)
- Helical-bevel gear units in gear unit sizes 37 to 157 (KT37 to KT157)
- Helical-worm gear units in gear unit sizes 37 to 97 (ST37 to ST97)
- Spiroplan® gear unit sizes 37 and 47 (WT37 and WT47)

Available options

The following options are available for gear units with a TorqLOC® hollow shaft mounting system:

- Helical-bevel, helical-worm and Spiroplan® gear units with TorqLOC® (KT..., ST..., WT37, WT47): The "torque arm" (../T) option is available.
- Parallel-shaft helical gear units with TorqLOC® (FT...): The "rubber buffer" (../G) option is available.



7.6 Shouldered hollow shaft with shrink disk option

As an option, gear units with hollow shaft and shrink disk (parallel-shaft helical gear units FH/FHF/FHZ37-157, helical-bevel gear units KH/KHF/KHZ37-157 and helical-worm gear units SH/SHF/SHZ47-97) can be supplied with a larger bore diameter D' .

$D' = D$ as standard.

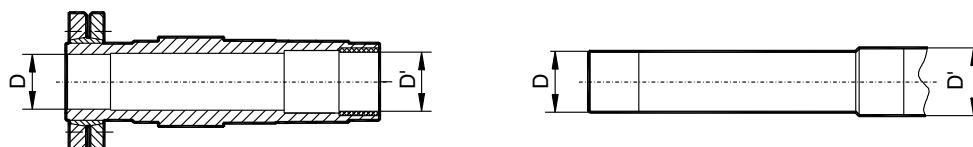


Figure 20: Optional hole diameter D'

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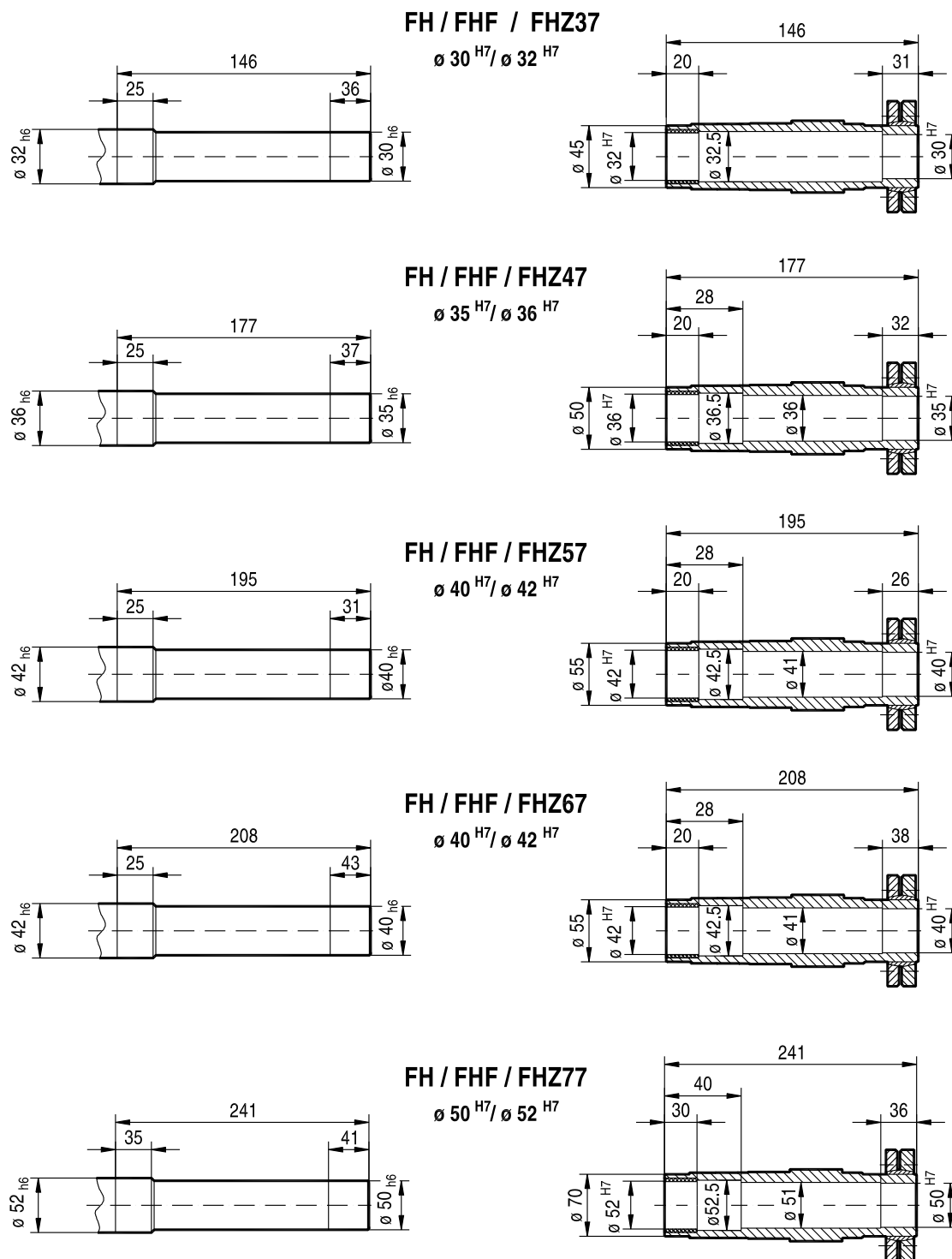
Gear unit	Bore diameter D / optionally D' [mm]
FH/FHF/FHZ37, KH/KHF/KHZ37, SH/SHF/SHZ47	30 / 32
FH/FHF/FHZ47, KH/KHF/KHZ47, SH/SHF/SHZ57	35 / 36
FH/FHF/FHZ57, KH/KHF/KHZ57	40 / 42
FH/FHF/FHZ67, KH/KHF/KHZ67, SH/SHF/SHZ67	40 / 42
FH/FHF/FHZ77, KH/KHF/KHZ77, SH/SHF/SHZ77	50 / 52
FH/FHF/FHZ87, KH/KHF/KHZ87, SH/SHF/SHZ87	65 / 66
FH/FHF/FHZ97, KH/KHF/KHZ97, SH/SHF/SHZ97	75 / 76
FH/FHF/FHZ107, KH/KHF/KHZ107	95 / 96
FH/FHF/FHZ127, KH/KHF/KHZ127	105 / 106
FH/FHF/FHZ157, KH/KHF/KHZ157	125 / 126

Diameter D/D' must be specified when ordering gear units with a shouldered hollow shaft (optional bore diameter D').

Sample order FH37 DRS80M4 with hollow shaft 30/32 mm

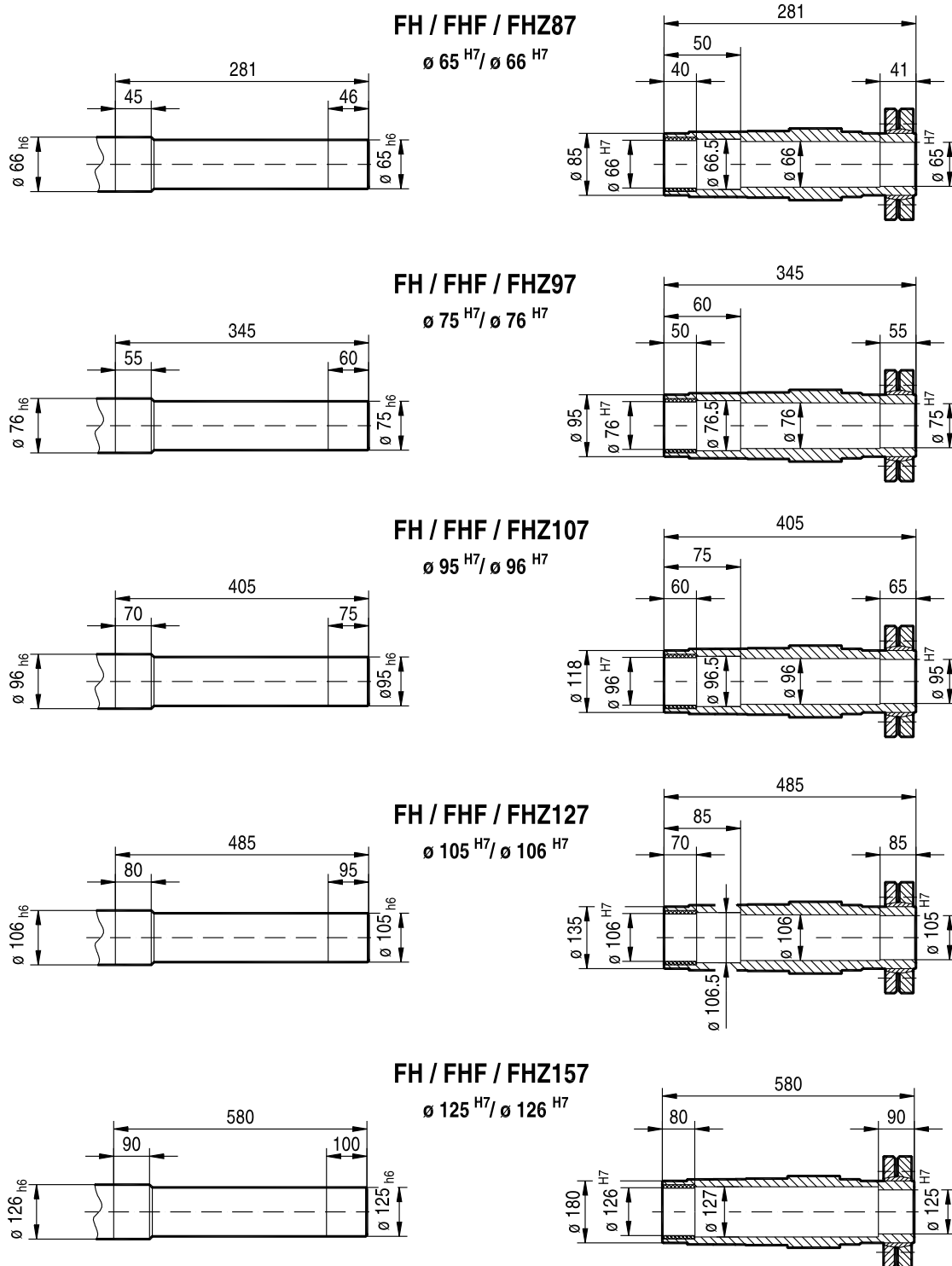


Parallel-shaft helical gear units with shouldered hollow shaft (dimensions in mm):



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Figure 21: Shouldered hollow shaft FH/FHF/FHZ37...77



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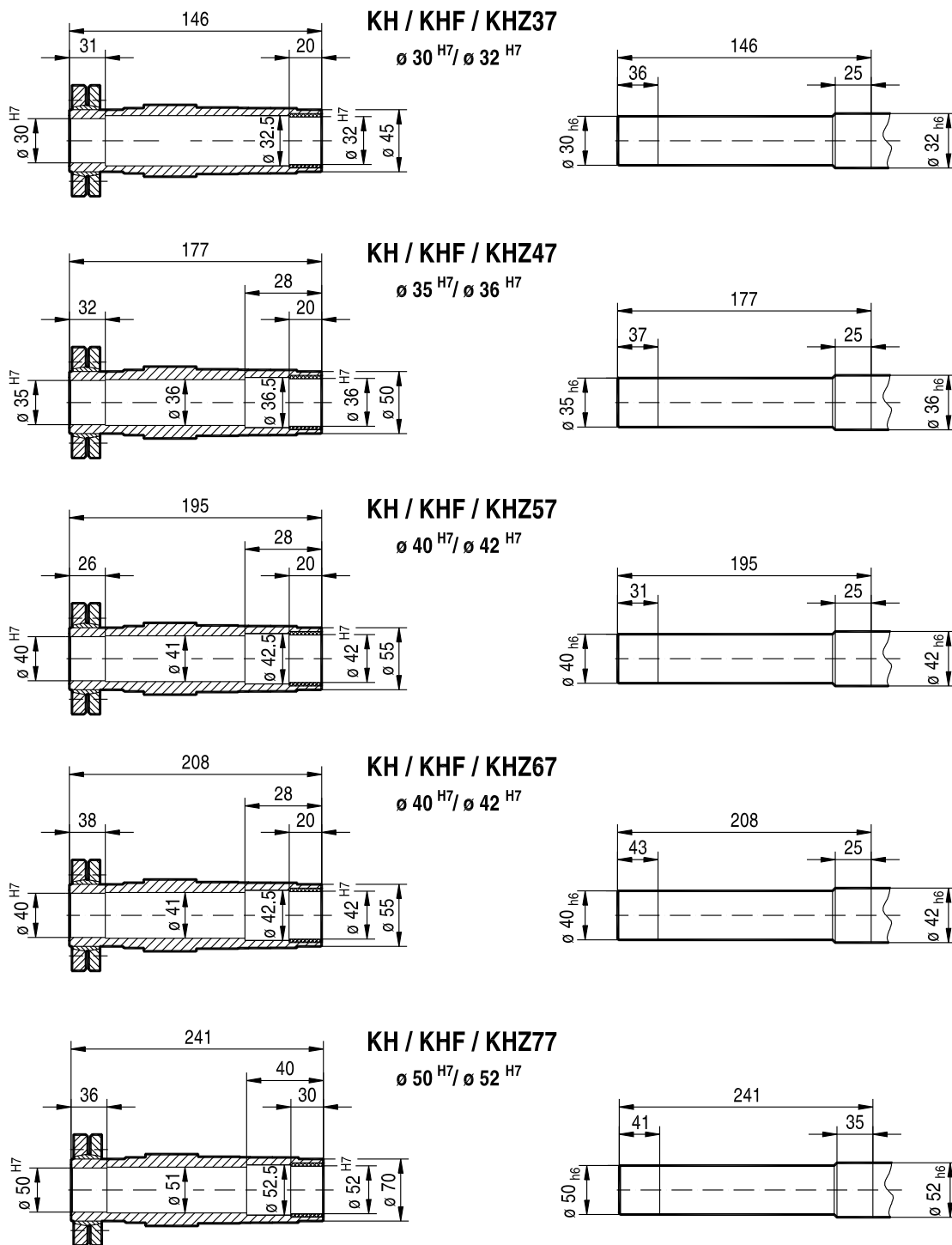
Figure 22: Shouldered hollow shaft FH/FHF/FHZ87...157



Design and Operating Notes

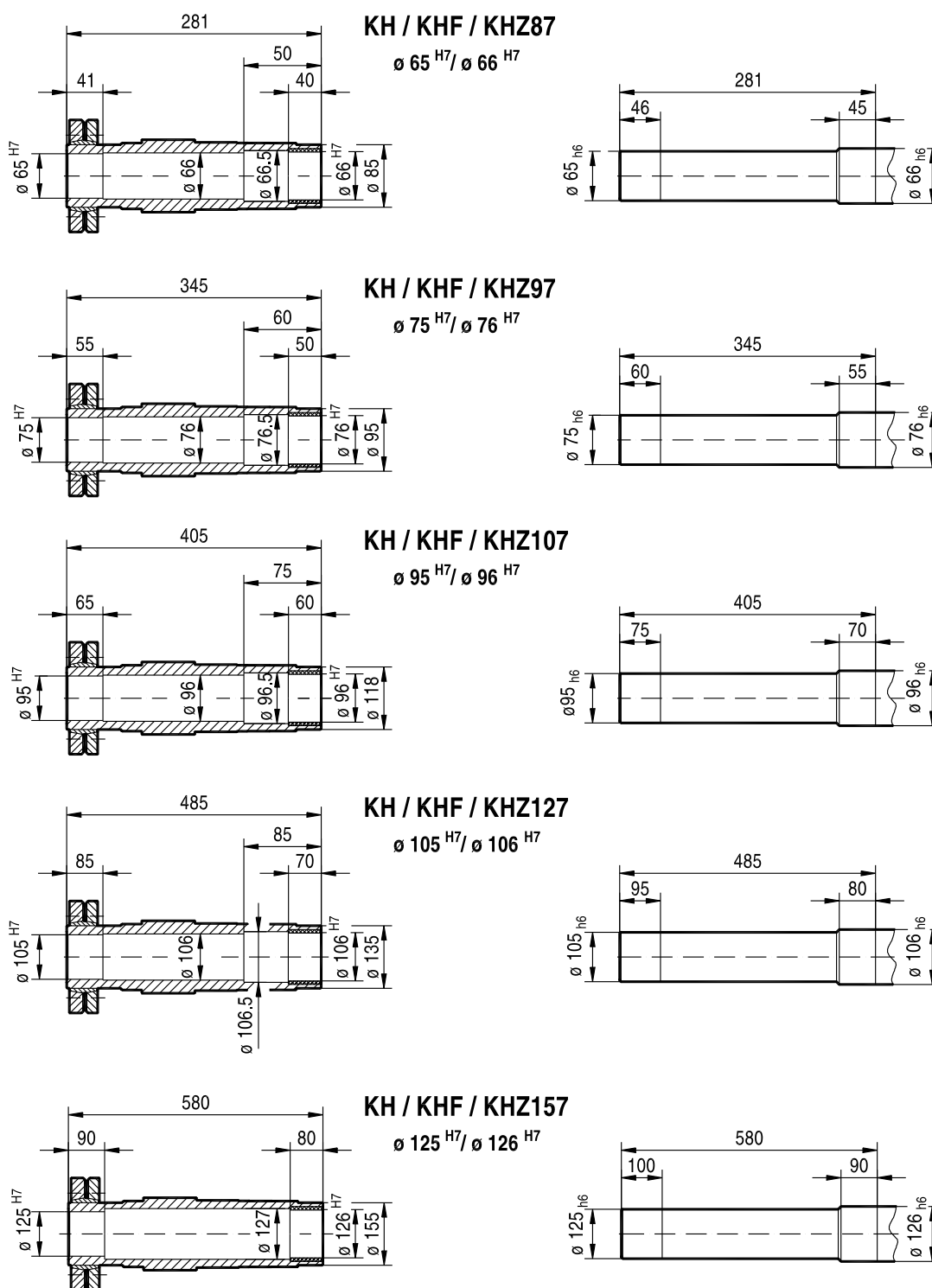
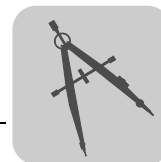
Shouldered hollow shaft with shrink disk option

Helical-bevel gear units with shouldered hollow shaft (dimensions in mm):



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Figure 23: Shouldered hollow shaft KH/KHF/KHZ37...77



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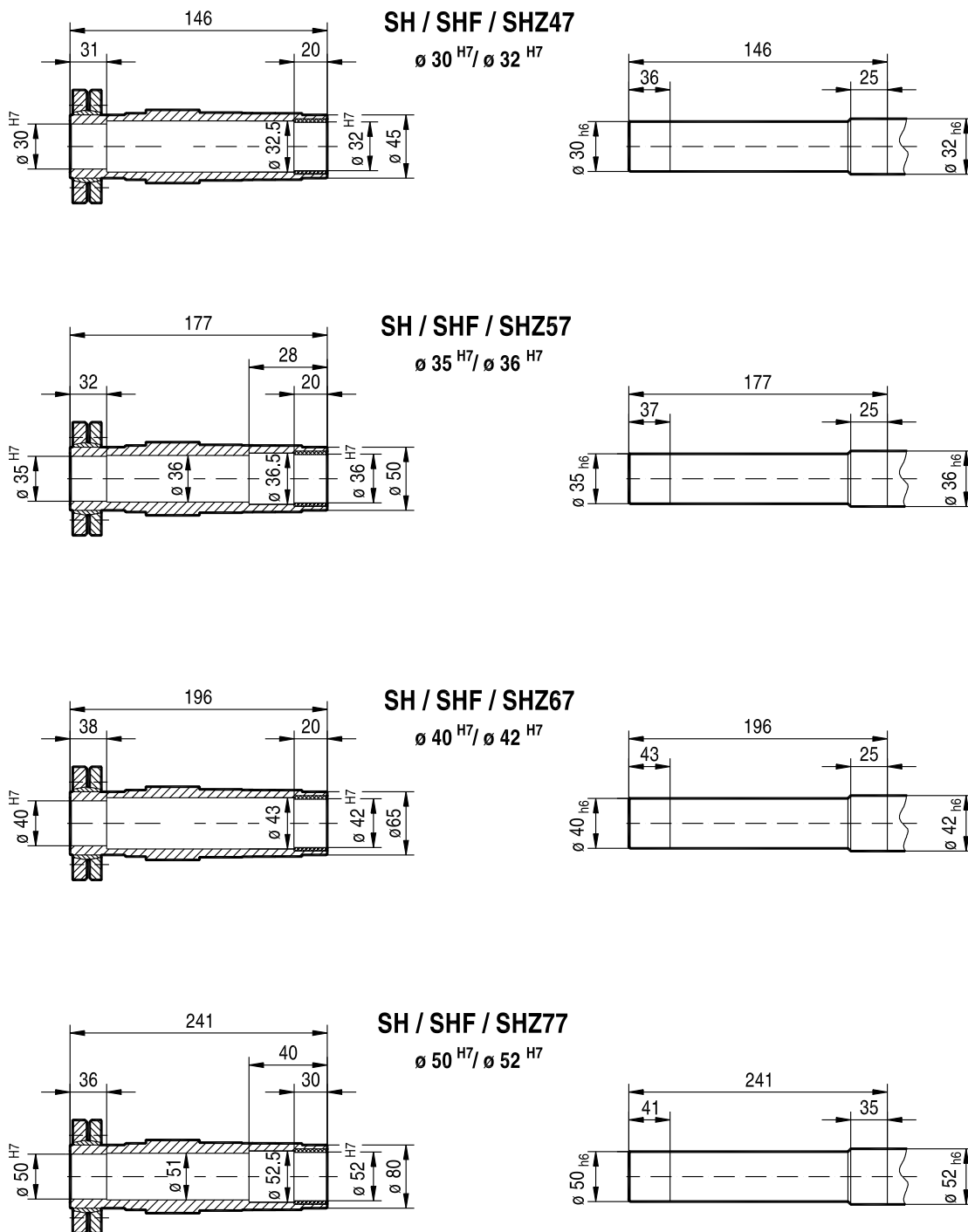
Figure 24: Shouldered hollow shaft KH/KHF/KHZ87...157



Design and Operating Notes

Shouldered hollow shaft with shrink disk option

Helical-worm gear units with shouldered hollow shaft (dimensions in mm):



04345AXX

Figure 25: Shouldered hollow shaft SH/SHF/SHZ47...77

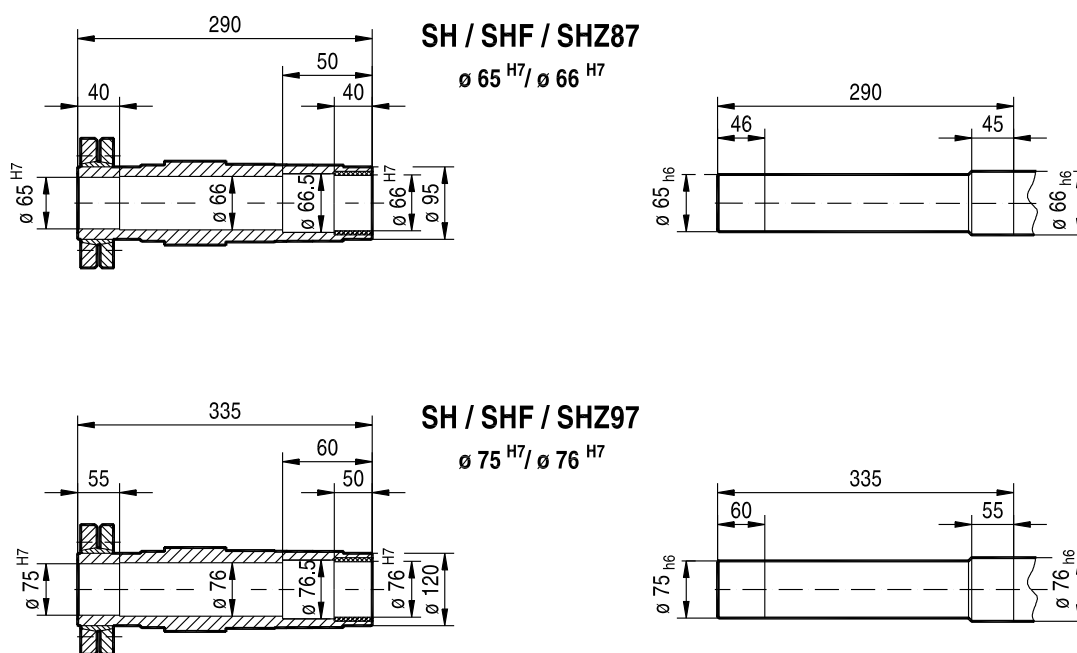
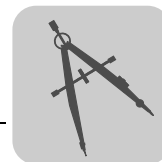
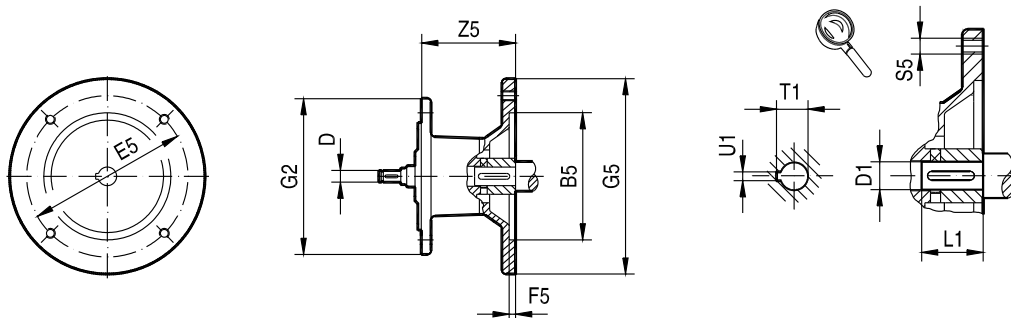


Figure 26: Shouldered hollow shaft SH/SHF/SHZ87...97



7.7 Adapters for mounting IEC motors

23 002 100

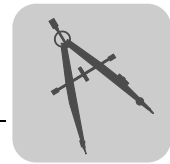


Gear unit type	Adapter type	Dimensions in mm											
		B5	D	E5	F5	G2	G5	S5	Z5	D1	L1	T1	U1
R..27, R..37 F..27, F..37, F..47 K..37 S..37, S..47, S..57 W..37	AM63	95	10	115	3.5	120	140	M8	72	11	23	12.8	4
	AM71 ¹⁾	110		130	4		160			14	30	16.3	5
	AM80 ¹⁾	130	12	165	4.5		200	M10	106	19	40	21.8	6
	AM90 ¹⁾		14							24	50	27.3	8
R..47 ²⁾ , R..57, R..67 F..57, F..67 K..47 ²⁾ , K..57, K..67 S..67 W..47	AM63	95	10	115	3.5	160	140	M8	66	11	23	12.8	4
	AM71	110		130	4		160			14	30	16.3	5
	AM80	130	12	165	4.5		200	M10	99	19	40	21.8	6
	AM90		14							24	50	27.3	8
	AM100 ¹⁾	180	16	215	5		250	M12	134	28	60	31.3	8
	AM112 ¹⁾		18							28	60	31.3	8
	AM132S/M ¹⁾	230	22	265	300		191	38	80	41.3	10		
R..77 F..77 K..77 S..77	AM63	95	10	115	3.5	200	140	M8	60	11	23	12.8	4
	AM71	110		130	4		160			14	30	16.3	5
	AM80	130	12	165	4.5		200	M10	92	19	40	21.8	6
	AM90		14							24	50	27.3	8
	AM100 ¹⁾	180	16	215	5		250	M12	126	28	60	31.3	8
	AM112 ¹⁾		18							28	60	31.3	8
	AM132S/M ¹⁾	230	22	265	5		300	M12	179	38	80	41.3	10
AM132ML ¹⁾	28		38			80				41.3	10		
R..87 F..87 K..87 S..87 ³⁾	AM80	130	12	165	4.5	250	200	M10	87	19	40	21.8	6
	AM90		14							24	50	27.3	8
	AM100	180	16	215	5		250	M12	121	28	60	31.3	8
	AM112		18							28	60	31.3	8
	AM132S/M	230	22	265	5		300	M12	174	38	80	41.3	10
	AM132ML		28							38	80	41.3	10
	AM160 ¹⁾	250	28	300	6		350	M16	232	42	110	45.3	12
AM180 ¹⁾	32		48			51.8				14			

1) Check dimension 1/2 G5 because component may protrude past foot-mounting surface if installed on R, K, S or W foot-mounted gear unit.

2) not with AM112

3) not with AM180



23 003 100

Fig.1

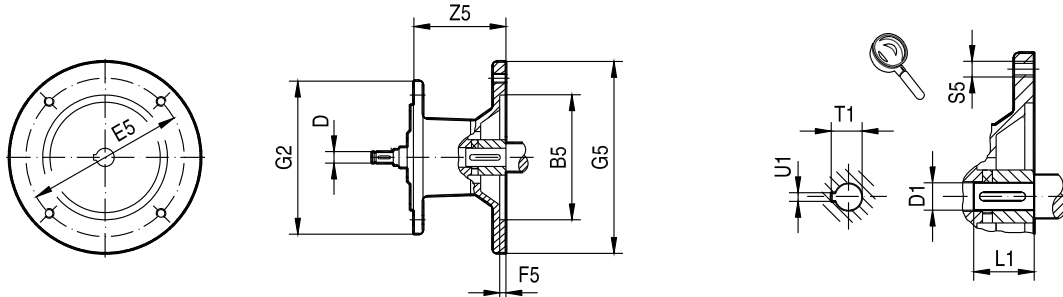
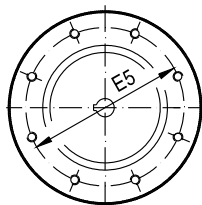


Fig.2

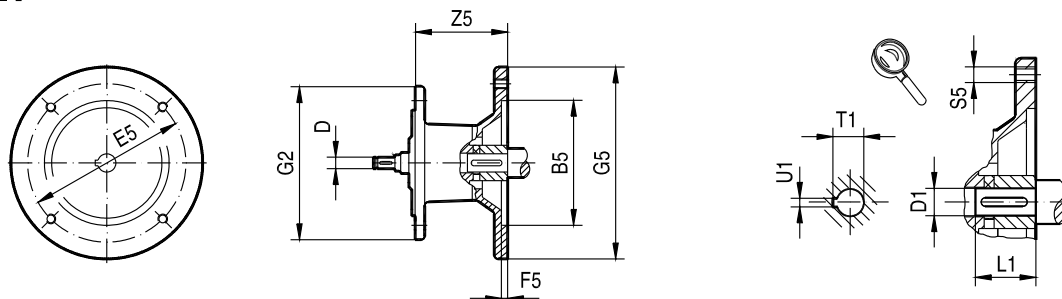
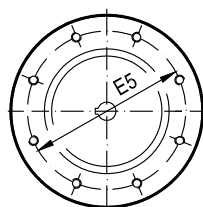


Gear unit type	Adapter type	Fig.	Dimensions in mm												
			B5	D	E5	F5	G2	G5	S5	Z5	D1	L1	T1	U1	
R..97 F..97 K..97 S..97 ¹⁾	AM100	1	180	16	215	5	300	250	M12	116	28	60	31.3	8	
	AM112			18											
	AM132S/M		230	22	265	300		M12	169	38	80	41.3	10		
	AM132ML			28											
	AM160		250	28	300	6		350	M16	227	42	110	45.3	12	
	AM180			32							48		51.8	14	
	AM200		300	38	350	7		400	268	55	59.3	16			
R..107 F..107 K..107	AM100	1	180	16	215	5	350	250	M12	110	28	60	31.3	8	
	AM112			18											
	AM132S/M		230	22	265	300		6	350	M12	163	38	80	41.3	10
	AM132ML			28											
	AM160		250	28	300	7		400	M16	221	42	110	45.3	12	
	AM180			32							48		51.8	14	
	AM200		300	38	350	450		262	55	59.3	16				
	AM225	2	350	38	400	450		277	60	140	64.4	18			
R..137	AM132S/M	1	230	22	265	5	400	300	M12	156	38	80	41.3	10	
	AM132ML			28											
	AM160		250	28	300	6		350	M16	214	42	110	45.3	12	
	AM180			32							48		51.8	14	
	AM200	300	38	350	7	400		M16	255	55	140	59.3	16		
	AM225	2	350	38										400	450

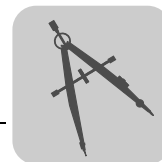
1) Not with AM200



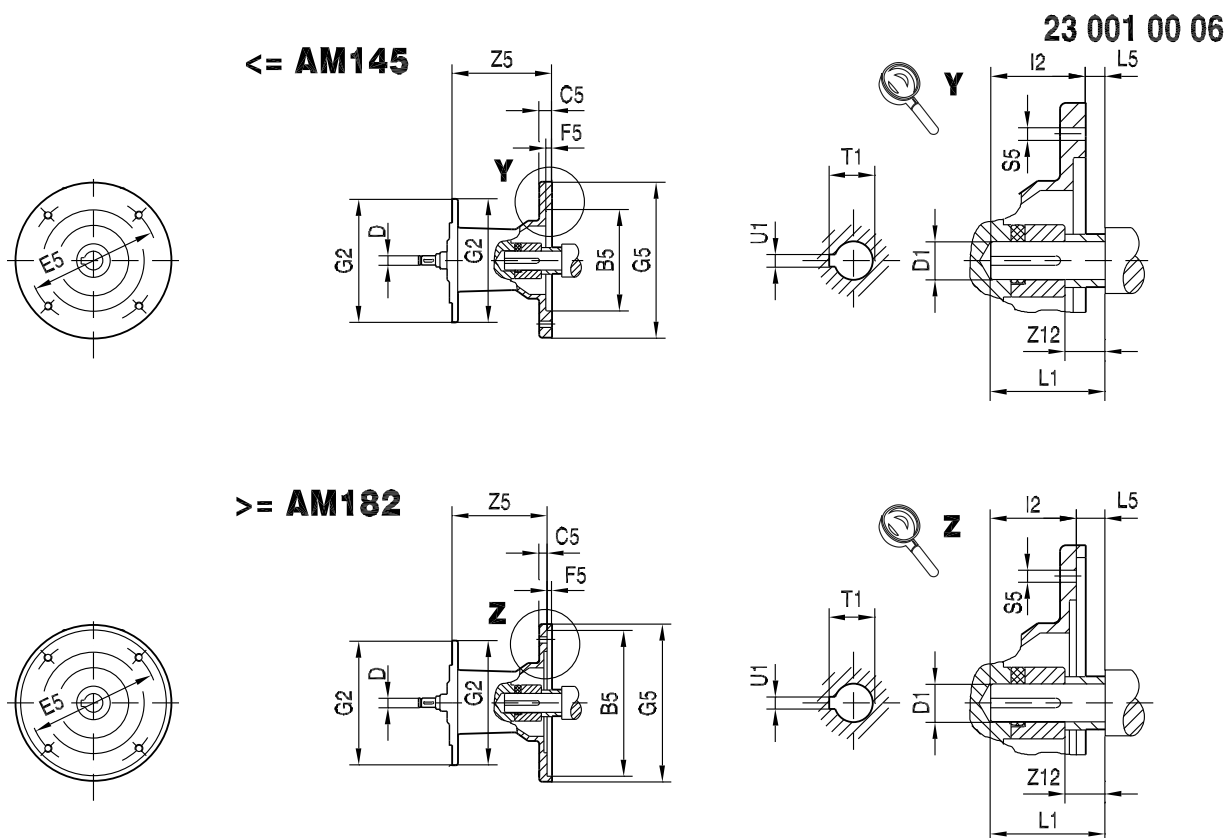
23 004 100

Fig.1**Fig.2**

Gear unit type	Adapter type	Fig.	Dimensions in mm											
			B5	D	E5	F5	G2	G5	S5	Z5	D1	L1	T1	U1
R..147 F..127 K..127	AM132S/M	1	230	22	265	5	450	300	M12	148	38	80	41.3	10
	AM132ML			28							38			
	AM160		250	28	300	6		350	M16	206	42	110	45.3	12
	AM180			32							48		51.8	14
	AM200	300	38	350	7	400		247		55	59.3	16		
	AM225	2	350	38		400		450		262	60	140	64.4	18
	AM250		450	48		500		550		336	65		69.4	
	AM280									75	79.9		20	
R..167 F..157 K..157 K..167 K..187	AM160	1	250	28	300	6	550	350	M16	198	42	110	45.3	12
	AM180			32							48		51.8	14
	AM200		300	38	350	7		400		239	55	59.3	16	
	AM225	2	350	38	400			450		254	60	140	64.4	18
	AM250		450	48	500			550		328	65		69.4	
	AM280					75				79.9	20			



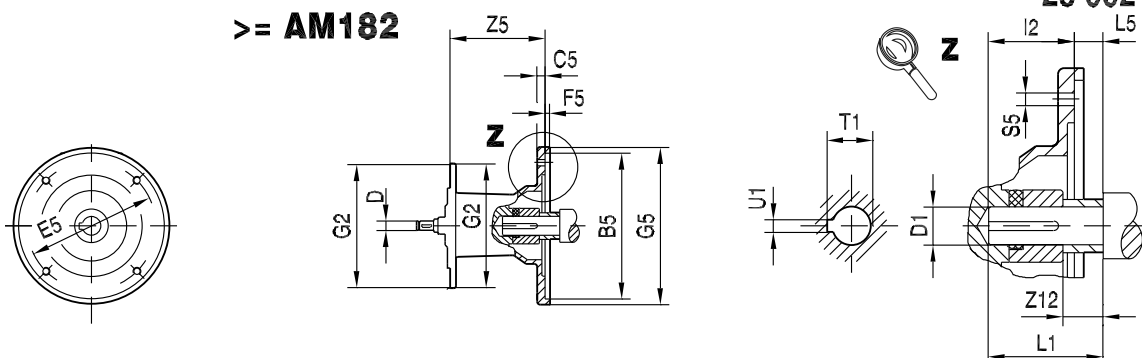
7.8 Adapters for mounting NEMA motors



Gear unit type	Adapter type	Dimensions in mm															
		B5	C5	D	E5	F5	G2	G5	I2	L5	S5	Z5	Z12	D1	L1	T1	U1
R..27, R..37 F..27, F..37, F..47 K..37 S..37, S..47, S..57 W..37	AM56	114.3	11	10	149.2	4.5	120	170	52.55	-4.8	10.5	93.5	16.5	15.875	47	18.1	4.76
	AM143		12	12					54.1	3		117	14.5	22.225	57	24.7	
	AM145		12	14					54.1	3		117	14.5	22.225	57	24.7	
R..47, R..57, R..67 F..57, F..67 K..47, K..57, K..67 S..67 W..47	AM56	114.3	11	10	149.2	4.5	160	170	52.55	-4.8	10.5	87	16.5	15.875	47	18.1	4.76
	AM143		12	12					54.1	3		110.5	14.5	22.225	57	24.7	
	AM145		12	14					54.1	3		110.5	14.5	22.225	57	24.7	
	AM182	215.9	10	16	184	5		228	66.85	3	15	147.5	16.5	28.575	69	31.7	6.35
	AM184		18	79.55					6.3	200.5		15.8	34.925	85	38.7	7.94	
	AM213/215		11	22					79.55	6.3		200.5	15.8	34.925	85	38.7	7.94
R..77 F..77 K..77 S..77	AM56	114.3	11	10	149.2	4.5	200	170	52.55	-4.8	10.5	81	16.5	15.875	47	18.1	4.76
	AM143		12	12					54.1	3		103.5	14.5	22.225	57	24.7	
	AM145		12	14					54.1	3		103.5	14.5	22.225	57	24.7	
	AM182	215.9	10	16	184	5		228	66.85	3	15	139.5	16.5	28.575	69	31.7	6.35
	AM184		18	79.55					6.3	188.5		15.8	34.925	85	38.7	7.94	
	AM213/215		11	22					79.55	6.3		188.5	15.8	34.925	85	38.7	7.94
R..87 F..87 K..87 S..87	AM143	114.3	12	12	149.2	4.5	250	170	54.1	3	10.5	98.5	14.5	22.225	57	24.7	4.76
	AM145		12	14					54.1	3		98.5	14.5	22.225	57	24.7	
	AM182	215.9	10	16	184	5		228	66.85	3	15	134.5	16.5	28.575	69	31.7	6.35
	AM184		18	79.55					6.3	183.5		15.8	34.925	85	38.7	7.94	
	AM213/215		11	22					95.3	6.3		234	8.8	41.275	101	45.8	9.53
	AM254/256		12	28					95.3	6.3		234	8.8	41.275	101	45.8	9.53
	AM284/286	266.7	15	32	228.6	5		286	111.05	6.3	15	241	15.8	47.625	117	53.4	12.7



23 002 00 06

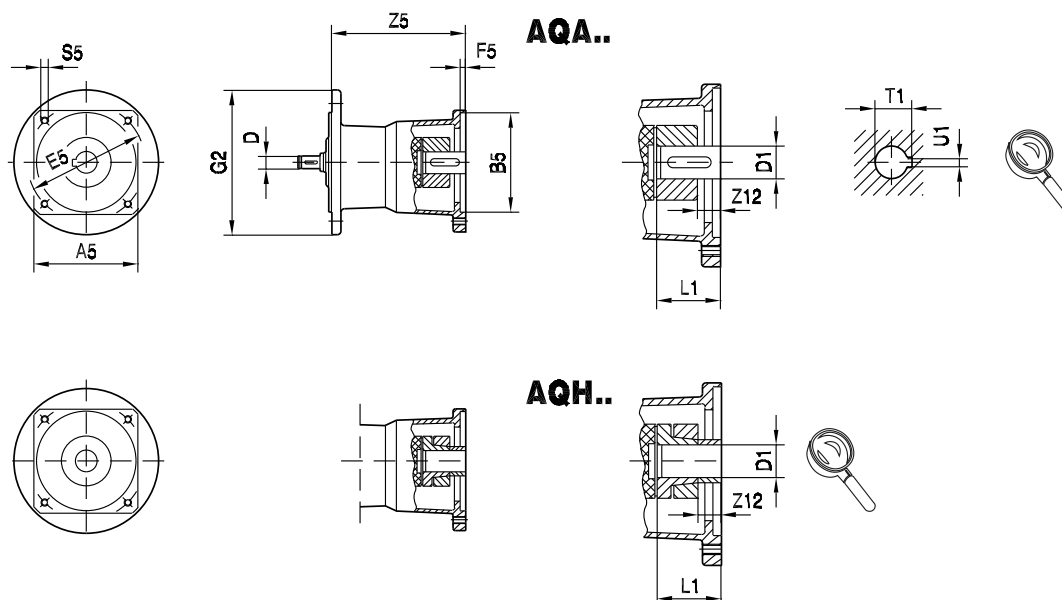


Gear unit type	Adapter type	Dimensions in mm																
		B5	C5	D	E5	F5	G2	G5	I2	L5	S5	Z5	Z12	D1	L1	T1	U1	
R..97 F..97 K..97 S..97	AM182	215.9	10	16	184	5	300	228	66.85	3	15	129.5	16.5	28.575	69	31.7	6.35	
	AM184			18						79.55		6.3	178.5	15.8	34.925	85	38.7	7.94
	AM213/215			11					22	95.3		6.3	229	8.8	41.275	101	45.8	9.53
	AM254/256	266.7	12	28	228.6	5		286	111.05	6.3	15	236	15.8	47.625	117	53.4	12.7	
	AM284/286		20	32					127.05	6.3	296	34.8	53.975	133	60	12.7		
	AM324/326		17	38					143.05	6.3			60.325	149	67.6	15.875		
	AM364/365	38																
R..107 F..107 K..107	AM182	215.9	10	16	184	5	350	228	66,85	3	15	123.5	16.5	28.575	69.85	31.7	6.35	
	AM184			18						79.55		6.3	172.5	15.8	34.925	85.85	38.7	7.94
	AM213/215			11					22	95.3		6.3	223	8.8	41.275	101.6	45.8	9.53
	AM254/256	266.7	12	28	228.6	5		286	111.05	6.3	15	230	15.8	47.625	117.35	53.4	12.7	
	AM284/286		15	32					127.05	6.3	290	34.8	53.975	133.35	60	12.7		
	AM324/326		17	38					143.05	6.3			60.325	149.35	67.6	15.875		
	AM364/365	38																
R..137	AM213/215	215.9	11	22	184	5	400	228	79.55	6.3	15	165.5	15.8	34.925	85.85	38.7	7.94	
	AM254/256		12	28					95.3	6.3		216	8.8	41.275	101.6	45.8	9.53	
	AM284/286	266.7	15	32	228.6	5		286	111.05	6.3	15	223	15.8	47.625	117.35	53.4	12.7	
	AM324/326		17	38					127.05	6.3	283	34.8	53.975	133.35	60	12.7		
	AM364/365		38						143.05	6.3			60.325	149.35	67.6	15.875		
R..147 F..127 K..127	AM213/215	215.9	11	22	184	5	450	228	79.55	6.3	15	157.5	15.8	34.925	85.85	38.7	7.94	
	AM254/256		12	28					95.3	6.3		208	8.8	41.275	101.6	45.8	9.53	
	AM284/286	266.7	15	32	228.6	5		286	111.05	6.3	15	215	15.8	47.625	117.35	53.4	12.7	
	AM324/326		17	38					127.05	6.3	275	34.8	53.975	133.35	60	12.7		
	AM364/365		38						143.05	6.3			60.325	149.35	67.6	15.875		
R..167 F..157 K..157 K..167 K..187	AM254/256	215.9	12	28	184	5	550	228	95.3	6.3	15	200	8.8	41.275	101.6	45.8	9.53	
	AM284/286	266.7	15	32	228.6	5		286	111.05	6.3	15	207	15.8	47.625	117.35	53.4	12.7	
	AM324/326	317.5	17	38	279.4	5		356	127.05	6.3	17.5	267	34.8	53.975	133.35	60	12.7	
	AM364/365		38						143.05	6.3				60.325	149.35	67.6	15.875	



7.9 Adapters for mounting servomotors

23 005 01 00



7

Gear unit type	Adapter type	Dimensions in mm																																					
		A5	B5	D	E5	F5	G2	S5	Z5	Z12 ¹⁾	Z12 ²⁾	D1	L1	T1 ¹⁾	U1 ¹⁾																								
R..27, R..37 F..27, F..37, F..47 K..37 S..37, S..47, S..57 W..37	AQ..80/1	82	60	10 12	75	3	120	M5	104.5	5.5	5.5	11	23	12.8	4																								
	AQ..80/2		50		95							14	30	16.3	5																								
	AQ..80/3																																						
	AQ..100/1	100		80		10 12 14 16		100	4	M6	129.5	-	-	14	30	16.3	5																						
	AQ..100/2		95	115	M6			143.5		2				14	19	40	21.8	6																					
	AQ..100/3		80	100	M6			143.5		2				14	19	40	21.8	6																					
	AQ..100/4		95	115	M8			143.5		2				14	19	40	21.8	6																					
	AQ..115/1	115	95	130	4	120		M8	152.5	11	23	19	40	21.8	6																								
	AQ..115/2		110									130	4	120	M8	152.5	11	23	19	40	21.8	6																	
	AQ..115/3																		16	16	24	50	27.3	8															
R..47, R..57, R..67 F..57, F..67 K..47 ³⁾ , K..57, K..67 S..67 W..47	AQ..80/1	82	60	10 12	75	3	160	M5	98	5.5	5.5	11	23	12.8	4																								
	AQ..80/2		50		95							14	30	16.3	5																								
	AQ..80/3																																						
	AQ..100/1	100		80		10 12 14 16		100	4	M6	122.5	-	-	14	30	16.3	5																						
	AQ..100/2		95	115	M6			136.5		2				14	19	40	21.8	6																					
	AQ..100/3		80	100	M6			136.5		2				14	19	40	21.8	6																					
	AQ..100/4		95	115	M8			136.5		2				14	19	40	21.8	6																					
	AQ..115/1	115	95	130	4	160		M8	145.5	11	23	19	40	21.8	6																								
	AQ..115/2		110									130	4	160	M8	145.5	11	23	19	40	21.8	6																	
	AQ..115/3																		16	16	24	50	27.3	8															
	AQ..140/1	140	110	16 18 22	165	5		160	M10	175	16	16	24						50	27.3	8																		
	AQ..140/2		130										165	5	160	M10	175	16	16	32	60	35.5	10																
	AQ..140/3																			28		31.3	8																
	AQ..140/4																			32		35.3	10																
	AQ..160/1	162	155	22 28	190	5		160	M12	237.5	24	24	32							60	35.3	10																	
	AQ..190/1	190	130		215								5	160	M12	237.5	24	24	32	60	35.3	10																	
	AQ..190/2		180																215	5	160	M12	237.5	24	24	32	60	35.3	10										
	AQ..190/3																									180	215	5	160	M12	237.5	24	24	32	60	35.3	10		
	AQ..190/3	180	215		5														160							M12	237.5							24	24	32	60	35.3	10
	AQ..190/3	180	215																																	5	160	M12	237.5
AQ..190/3	180	215	5	160		M12	237.5	24	24	32	60	35.3																											
AQ..190/3	180	215								5	160	M12	237.5	24	24	32	60	35.3																					
AQ..190/3	180	215														5	160	M12		237.5	24	24	32	60	35.3														
AQ..190/3	180	215																					5	160	M12			237.5	24	24	32	60	35.3						
AQ..190/3	180	215			5														160							M12	237.5				24	24	32	60	35.3				
AQ..190/3	180	215																															5	160	M12	237.5	24	24	32
AQ..190/3	180	215	5	160		M12	237.5	24	24																														32
AQ..190/3	180	215								5	160	M12	237.5	24	24																								32
AQ..190/3	180	215														5	160	M12		237.5	24	24																	32
AQ..190/3	180	215																					5	160	M12			237.5	24	24									32
AQ..190/3	180	215			5														160							M12	237.5				24	24							32
AQ..190/3	180	215																															5	160	M12	237.5	24	24	32
AQ..190/3	180	215	5	160		M12	237.5	24	24																														32
AQ..190/3	180	215								5	160	M12	237.5	24	24																								32
AQ..190/3	180	215														5	160	M12		237.5	24	24																	32
AQ..190/3	180	215																					5	160	M12			237.5	24	24									32
AQ..190/3	180	215			5														160							M12	237.5				24	24							32
AQ..190/3	180	215																															5	160	M12	237.5	24	24	32
AQ..190/3	180	215	5	160		M12	237.5	24	24																														32
AQ..190/3	180	215								5	160	M12	237.5	24	24																								32
AQ..190/3	180	215														5	160	M12		237.5	24	24																	32
AQ..190/3	180	215																					5	160	M12			237.5	24	24									32
AQ..190/3	180	215			5														160							M12	237.5				24	24							32
AQ..190/3	180	215																															5	160	M12	237.5	24	24	32
AQ..190/3	180	215	5	160		M12	237.5	2																															

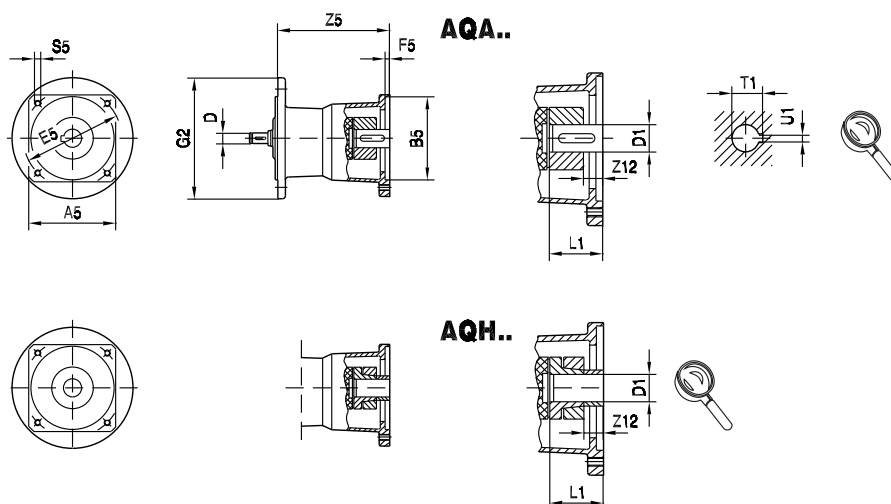
1) For versions with keyway (AQA..).

2) For version with clamping ring hub (AQH..).

3) Not with AQ190



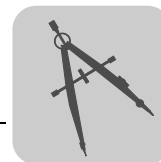
23 006 01 00



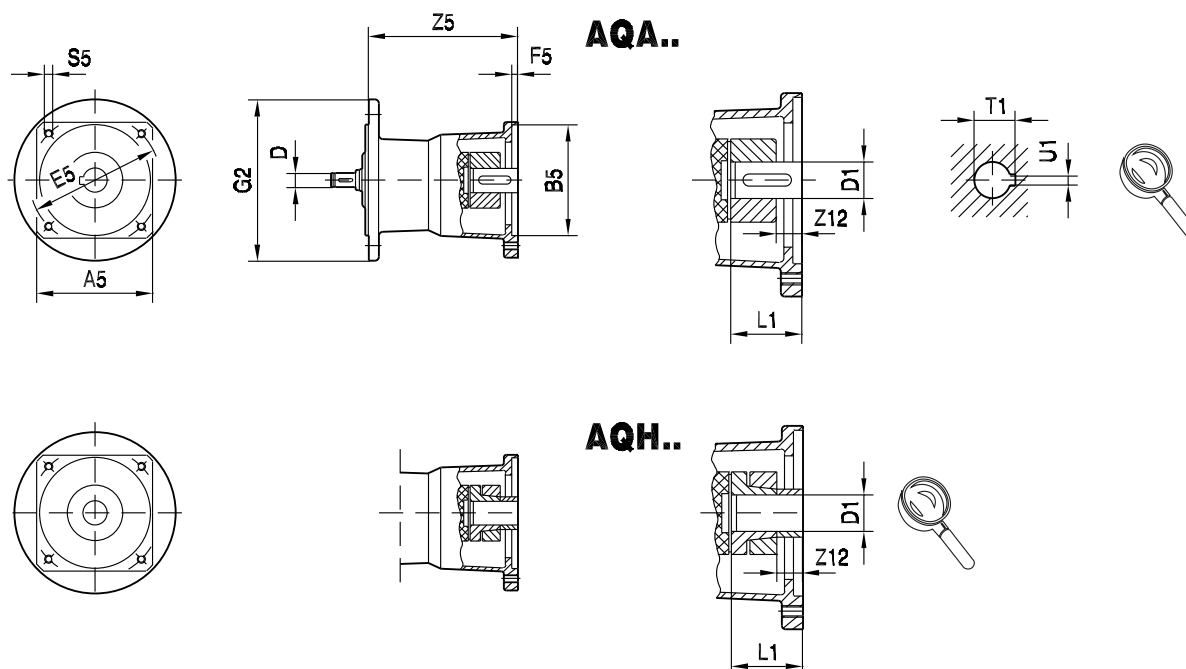
Gear unit type	Adapter type	Dimensions in mm														
		A5	B5	D	E5	F5	G2	S5	Z5	Z12 ¹⁾	Z12 ²⁾	D1	L1	T1 ¹⁾	U1 ¹⁾	
R..77 F..77 K..77 S..77	AQ..80/1	82	60	10 12	75	3	200	M5	92	5.5	5.5	11	23	12.8	4	
	AQ..80/2		50		75			M6				14	30	16.3	5	
	AQ..80/3				95							M6	14	30	16.3	5
	AQ..100/1	100		80	10 12 14 16	100			4	M6	115.5		-	-	14	30
	AQ..100/2		95	115		M8		14		30					16.3	5
	AQ..100/3		80	100		M6		129.5		2	14	19	40	21.8	6	
	AQ..100/4		95	115		M8						19	40	21.8	6	
	AQ..115/1	115	95	130		5		M8	138.5	11	23	19	40	21.8	6	
	AQ..115/2		110									16	16	24	50	27.3
	AQ..115/3									24	50			27.3	8	
	AQ..140/1	140	110	16 18 22	165	5		M10	167	16	16	24	50	27.3	8	
	AQ..140/2		130									32	60	35.3	10	
	AQ..140/3								180	22	22			28	31.3	8
	AQ..140/4		32									35.3	10			
	AQ..160/1	162	155	22 28	190	5		M12	225.5	24	24	32	60	35.3	10	
	AQ..190/1	190	130		215							249.5	34	34	38	80
	AQ..190/2		180						38	80	41.3				10	
	AQ..190/3											180	38	80		41.3
R..87 F..87 K..87 S..87	AQ..100/1	100	80	12 14 16	100	4	250	M6	110.5	-	-	14	30	16.3	5	
	AQ..100/2		95		115			M8				14	30	16.3	5	
	AQ..100/3		80		100			M6	124.5	2	14	19	40	21.8	6	
	AQ..100/4		95		115			M8				19	40	21.8	6	
	AQ..115/1	115	95	130	5	M8		133.5	11	23	19	40	21.8	6		
	AQ..115/2		110								16	16	24	50	27.3	8
	AQ..115/3												24	50	27.3	8
	AQ..140/1	140	110	16 18 22	165	5		M10	162	16	16	24	50	27.3	8	
	AQ..140/2		130									32	60	35.3	10	
	AQ..140/3								175	22	22			28	31.3	8
	AQ..140/4		32									35.3	10			
	AQ..160/1	162	155	22 28	190	5		M12	220.5	24	24	32	60	35.3	10	
	AQ..190/1	190	130		215							244.5	34	34	38	80
	AQ..190/2		180						38	80	41.3				10	
	AQ..190/3											180	38	80		41.3

1) For versions with keyway (AQA..).

2) For version with clamping ring hub (AQH..).



23 007 01 00



7

Gear unit type	Adapter type	Dimensions in mm																	
		A5	B5	D	E5	F5	G2	S5	Z5	Z12 ¹⁾	Z12 ²⁾	D1	L1	T1 ¹⁾	U1 ¹⁾				
R..97 F..97 K..97 S..97	AQ..140/1	140	110	16 18 22	165	5	300	M10	157	16	16	24	50	27.3	8				
	AQ..140/2		130									32		60	35.3	10			
	AQ..140/3											28			31.3	8			
	AQ..140/4											32			35.3	10			
	AQ..160/1	162	155	22 28	215			M12	215.5	24	24	32	60	35.3	10				
	AQ..190/1	190	130									38		80		41.3			
	AQ..190/2		180									32		35.3					
	AQ..190/3		239.5									34		34		38	80	41.3	
R..107 F..107 K..107	AQ..140/1	140	110	16 18 22	165	5	350	M10	151	16	16	24	50	27.3	8				
	AQ..140/2		130									32		60	35.3	10			
	AQ..140/3											28			31.3	8			
	AQ..140/4											32			35.3	10			
	AQ..160/1	162	155	22 28	215			M12	209.5	24	24	32	60	35.3	10				
	AQ..190/1	190	130									38		80		41.3			
	AQ..190/2		180									32		35.3					
	AQ..190/3		233.5									34		34		38	80	41.3	
R..137	AQ..190/1	190	130	22 28	215	5	400	M12	202.5	24	24	32	60	35.3	10				
	AQ..190/2		180									38		80		41.3			
	AQ..190/3		130									32		35.3					
R..147 F..127 K..127	AQ..190/1		180	22 28			5		450	M12	194.5	24	24	32		60	35.3		
	AQ..190/2													180			38	80	41.3
	AQ..190/3																		

1) For versions with keyway (AQA..).

2) For version with clamping ring hub (AQH..).



7.10 Fastening the gear unit

Use bolts of quality 8.8 to fasten gear units and gearmotors.

Exception

Use bolts of **quality 10.9** to fasten the customer flange to transmit the rated torques for the following flange-mounted (RF ../RZ..) and foot/flange-mounted helical gearmotors (R..F):

- RF37, R37F with flange $\varnothing$ 120 mm
- RF47, R47F with flange $\varnothing$ 140 mm
- RF57, R57F with flange $\varnothing$ 160 mm
- RZ37 ... RZ87

7.11 Torque arms

Available torque arms

Gear unit	Size					
	27	37	47	57	67	77
KA, KH, KV, KT	-	643 425 8	643 428 2	643 431 2	643 431 2	643 434 7
SA, SH, ST	-	126 994 1	644 237 4	644 240 4	644 243 9	644 246 3
FA, FH, FV, FT Rubber buffer (2 pieces)	013 348 5	013 348 5	013 348 5	013 348 5	013 348 5	013 349 3

Gear unit	Size				
	87	97	107	127	157
KA, KH, KV, KT	643 437 1	643 440 1	643 443 6	643 294 8	-
SA, SH, ST	644 249 8	644 252 8	-	-	-
FA, FH, FV, FT Rubber buffer (2 pieces)	013 349 3	013 350 7	013 350 7	013 351 5	013 347 7

Gear unit	Size				
	10	20	30	37	47
WA	1 061 021 9	1 68 073 0	1 68 011 0	1 061 129 0	1 061 187 8

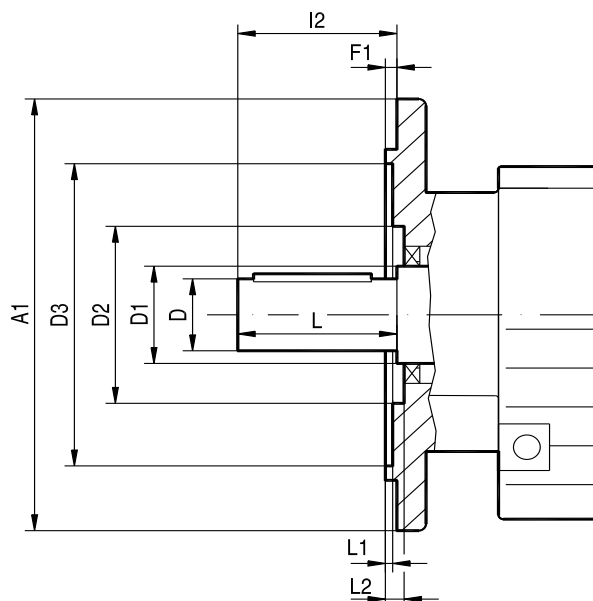
Torque arms for KH167.., KH187..

As standard, torque arms are not available for gear unit sizes KH167.. and KH187... Consult SEW-EURODRIVE for design proposals if you require torque arms for these gear units.



7.12 Flange contours of RF.. and R..F gear units

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Check dimensions L1 and L2 for selection and installation of output elements.

7

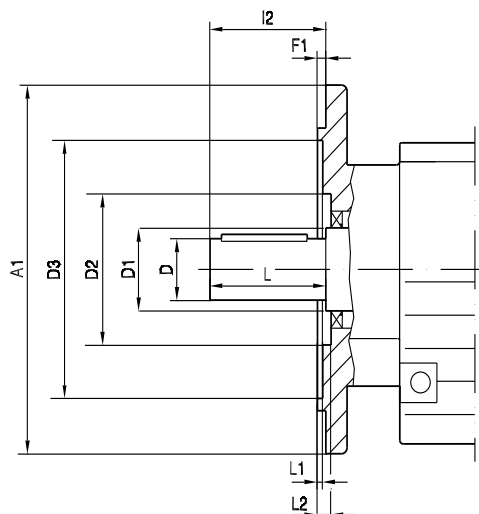
Type	Dimensions in mm											
	A1	D	D1	D2	RF	R..F	D3	F1	I2	L	L1	L2
RF07, R07F	120	20	22	38	38	72	3	40	40	2	2	6
	140 ¹⁾											
	160 ¹⁾											
RF17, R17F	120	20	25	46	46	65	3	40	40	1	1	5
	140											
	160 ¹⁾											
RF27, R27F	120	25	30	54	54	66	3	50	50	1	1	6
	140											
	160											
RF37, R37F	120	25	35	60	63	70	3	50	50	5	4	7
	160											
	200 ¹⁾											
RF47, R47F	140	30	35	72	64	82	3	60	60	4	1	6
	160											
	200											
RF57, R57F	160	35	40	76	75	96	3.5	70	70	4	2.5	5
	200											
	250 ¹⁾											
RF67, R67F	200	35	50	90	90	118	3.5	70	70	2	4	7
	250											
	300 ¹⁾											
RF77, R77F	250	40	52	112	100	160	4	80	80	0.5	2.5	7
	300 ¹⁾											
	350											
RF87, R87F	300	50	62	123	122	210	4	100	100	0	1.5	8
	350											
	450											
RF97	350	60	72	136	236	320	5	120	120	0		9
	450											
	550											
RF107	350	70	82	157	232	316	5	140	140	0		11
	450											
	550											
RF137	450	90	108	180	316	416	5	170	170	0		10
	550											
	660											
RF147	450	110	125	210	316	416	5	210	210	0		10
	550											
	660											
RF167	550	120	145	290	416	517	5	210	210	1		10
	660											

1) The flange contour protrudes from under the base surface.



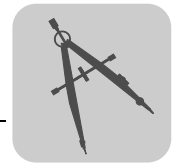
7.13 Flange contours of FF., KF., SF. and WF. gear units

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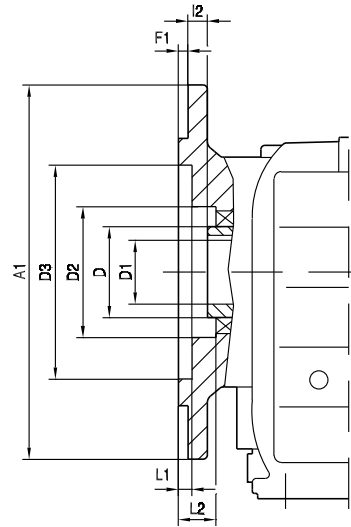
Check dimensions L1 and L2 for selection and installation of output elements.

Type	Dimensions in mm									
	A1	D	D1	D2	D3	F1	I2	L	L1	L2
FF27	160	25	40	66	96	3.5	50	50	3	18.5
FF37	160	25	30	70	94	3.5	50	50	2	6
FF47	200	30	40	72	115	3.5	60	60	3.5	7.5
FF57	250	35	40	84	155	4	70	70	4	9
FF67	250	40	50	84	155	4	80	80	4	9
FF77	300	50	55	82	205	4	100	100	5	9
FF87	350	60	65	115	220	5	120	120	5	9
FF97	450	70	75	112	320	5	140	140	8	10
FF107	450	90	100	159	318	5	170	170	16	9
FF127	550	110	118	-	420	5	210	210	10	-
FF157	660	120	135	190	520	6	210	210	8	14
KF37	160	25	30	70	94	3.5	50	50	2	6
KF47	200	30	40	72	115	3.5	60	60	3.5	7.5
KF57	250	35	40	84	155	4	70	70	4	9
KF67	250	40	50	84	155	4	80	80	4	9
KF77	300	50	55	82	205	4	100	100	5	9
KF87	350	60	65	115	220	5	120	120	5	9
KF97	450	70	75	112	320	5	140	140	8	10
KF107	450	90	100	159	318	5	170	170	16	9
KF127	550	110	118	-	420	5	210	210	10	-
KF157	660	120	135	190	520	6	210	210	8	14
SF37	120	20	25	-	68	3	40	40	6	-
SF37	160	20	25	-	96	3.5	40	40	5.5	-
SF47	160	25	30	70	94	3.5	50	50	2	6
SF57	200	30	40	72	115	3.5	60	60	3.5	7.5
SF67	200	35	45	-	115	3.5	70	70	8.5	-
SF77	250	45	55	108	160	4	90	90	8	9
SF87	350	60	65	130	220	5	120	120	6	10
SF97	450	70	75	150	320	5	140	140	8.5	10
WF10	80	16	25	-	39	2.5	40	40	30	-
WF10	120	16	25	39	74	3	40	40	5	30
WF20	110	20	30	44	53	-4	40	40	27	35
WF20	120	20	30	-	45	2.5	40	40	37.5	-
WF30	120	20	30	48	63	2.5	40	40	18	27
WF30	160	20	30	48	63	2.5	40	40	33	42
WF37	120	20	30	-	70	2.5	40	40	-	10.5
WF37	160	20	30	-	70	2.5	40	40	-	25.5
WF47	160	30	35	-	92	3.5	10	60	6	-



7.14 Flange contours of FAF.., KAF.., SAF.. and WAF.. gear units

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Check dimensions L1 and L2 for selection and installation of output elements.

Type	Dimensions in mm								
	A1	D	D1	D2	D3	F1	I2	L1	L2
FAF27	160	40	25	66	96	3.5	20	3	18.5
FAF37	160	45	30	62	94	3.5	24	2	30
FAF47	200	50	35	70	115	3.5	25	3.5	31.5
FAF57	250	55	40	76	155	4	23.5	4	31
FAF67	250	55	40	76	155	4	23	4	31
FAF77	300	70	50	95	205	4	37	5	45
FAF87	350	85	60	120	220	5	30	5	39
FAF97	450	95	70	135	320	5	41.5	5.5	51
FAF107	450	118	90	224	320	5	41	16	52
FAF127	550	135	100	185	420	5	51	6	63
FAF157	660	155	120	200	520	6	60	10	74
KAF37	160	45	30	62	94	3.5	24	2	30
KAF47	200	50	35	70	115	3.5	25	3.5	8.5
KAF57	250	55	40	76	155	4	23.5	4	31
KAF67	250	55	40	76	155	4	23	4	31
KAF77	300	70	50	95	205	4	37	5	45
KAF87	350	85	60	120	220	5	30	5	39
KAF97	450	95	70	135	320	5	41.5	5.5	51
KAF107	450	118	90	224	320	5	41	16	52
KAF127	550	135	100	185	420	5	51	6	63
KAF157	660	155	120	200	520	6	60	10	74
SAF37	120	35	20	-	68	3	15	6	-
SAF37	160	35	20	-	96	3.5	15	5.5	-
SAF47	160	45	30 / 25	62	94	3.5	24	2	30
SAF57	200	50	35 / 30	70	115	3.5	25	3.5	31.5
SAF67	200	65	45 / 40	91	115	3.5	42.5	4	48.5
SAF77	250	80	60 / 50	112	164	4	45.5	5	53.5
SAF87	350	95	70 / 60	131	220	5	52.5	6	62.5
SAF97	450	120	90 / 70	160	320	5	60	6.5	69
WAF10	80	25	16	-	39	2.5	23	30	-
WAF10	120	25	16	39	74	3	23	5	30
WAF20	110	30	18 / 20	44	53	-4	30	27	35
WAF20	120	30	18 / 20	-	45	2.5	30	37.5	-
WAF30	120	30	20	48	63	2.5	19.5	18	27
WAF30	160	30	20	48	63	2.5	34.5	33	42
WAF37	120	35	20 / 25	54	70	2.5	19.5	10.5	27
WAF37	160	35	20 / 25	54	70	2.5	34.5	25.5	42
WAF47	160	45	25 / 30	72	92	3.5	10	6	45



7.15 Fixed covers

Parallel-shaft helical gear units, helical-bevel gear units, helical-worm and Spiroplan® gear units with hollow shafts and shrink disks of size 37 up to size 97 come equipped with a rotating cover as standard. If, for safety reasons, fixed covers are required for these gear units, you can order them for the respective gear unit types by quoting the part numbers in the following tables. As standard, size 107 parallel-shaft helical gear units and helical-bevel gear units with hollow shafts and shrink disks and size 27 parallel-shaft helical gear units come equipped with a fixed cover.

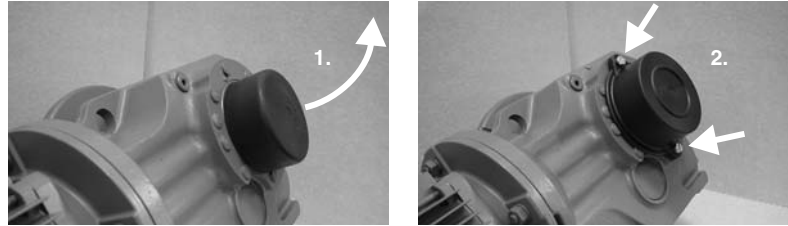


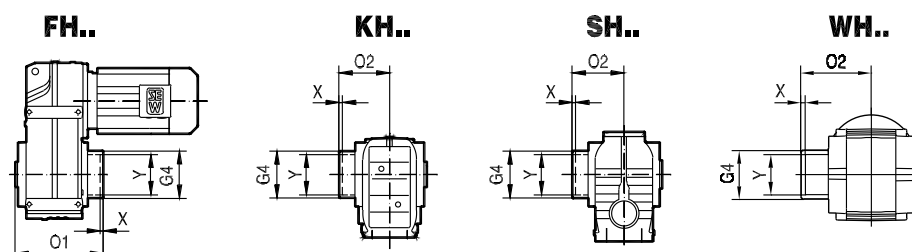
Figure 27: Replacing a rotating cover with a fixed cover

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1. Pull off the rotating cover.
2. Install and fasten fixed cover.



Part numbers and dimensions



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Parallel-shaft helical gearmotors	FH..37	FH..47	FH..57	FH..67	FH..77	FH..87	FH..97
Part number	643 513 0	643 514 9	643 515 7	643 515 7	643 516 5	643 517 3	643 518 1
Max. size of motor that can be mounted	DR80	DR80	DR80	DR132	DR160	DR180..	DR180..
G4 [mm]	78	88	100	100	121	164	185
O1 [mm]	157	188.5	207.5	221.5	255	295	363.5
X [mm]	2	4.5	7.5	6	6	4	6.5
Y [mm]	75	83	83	93	114	159	174

Helical-bevel gearmotors ¹⁾	KH..37	KH..47	KH..57	KH..67	KH..77	KH..87	KH..97
Part number	643 513 0	643 514 9	643 515 7	643 515 7	643 516 5	643 517 3	643 518 1
G4 [mm]	78	88	100	100	121	164	185
O2 [mm]	95	111.5	122.5	129	147	172	210.5
X [mm]	0	1.5	5.5	3	1	2	4.5
Y [mm]	75	83	83	93	114	159	174

1) Not possible in foot-mounted helical-bevel gear units with hollow shaft and shrink disk (KH..B).

Helical-worm gearmotors	SH..37	SH..47	SH..57	SH..67	SH..77	SH..87	SH..97
Part number	643 512 2	643 513 0	643 514 9	643 515 7	643 516 5	643 517 3	643 518 1
G4 [mm]	59	78	88	100	121	164	185
O2 [mm]	88	95	111.5	123	147	176	204.5
X [mm]	1	0	1.5	3	1	0	0.5
Y [mm]	53	75	83	93	114	159	174

Spiroplan® gearmotors	WH..37	WH..47					
Part number	1 061 136 3	1 061 194 0					
G4 [mm]	68	80.5					
O2 [mm]	95.5	109.5					
X [mm]	11	12.5					
Y [mm]	50	72					



7.16 Condition monitoring: Oil aging and vibration sensor

Oil aging sensor – technical data

DUO10A diagnostic unit

/DUO10A	Technical data		
Preset oil grades	OIL1	CLP mineral oil	$T_{\max} = 100\text{ °C}$
		Bio oil	$T_{\max} = 100\text{ °C}$
	OIL2	CLP HC synthetic oil	$T_{\max} = 130\text{ °C}$
		CLP PAO oil	$T_{\max} = 130\text{ °C}$
	OIL3	CLP PG polyglycol	$T_{\max} = 130\text{ °C}$
	OIL4	Food grade oil	$T_{\max} = 100\text{ °C}$
Switch outputs	1: Early warning (time to next oil change can be set to between 2 and 100 days) 2: Main alarm (time to oil change 0 days) 3: Exceeded temperature $T_{\max}$ 4: DUO10A is ready for operation		
Permitted oil temperature	-40 °C to +130 °C		
Permitted temperature sensors	PT1000		
EMC	IEC1000-4-2/3/4/6		
Ambient temperature	-25 °C to +70 °C		
Operating voltage	DC 18-28 V		
Current consumption at DC 24 V	< 90 mA		
Protection class	III		
Degree of protection	IP67 (optionally IP69K)		
Housing materials	Evaluation unit: V2A, EPDM/X, PBT, FPM Temperature sensor: V4A		
Electrical connection	Evaluation unit: M12 plug connector PT1000 temperature sensor: M12 plug connector		

Designations and part numbers

Designation	Description	Part number
DUO10A	Evaluation unit (basic unit)	1 343 875 1
		
DUO10A-PUR-M12-5m	5 m PUR cable with 1 connector	1 343 877 8
DUO10A-PVC-M12-5m	5 m PVC cable with 1 connector	1 343 878 6
DUO10A	Angle bracket	1 343 880 8
DUO10A D = 34	Mounting clamp	1 343 879 4



Designation	Description	Part number
W4843 PT1000 	PT1000 temperature sensor	1 343 881 6
W4843_4x0.34-2m-PUR	2 m PUR cable for PT1000 ¹⁾	1 343 882 4
W4843_4x0.34-2m-PVC	2 m PVC cable for PT1000 ²⁾	1 343 883 2
DUO10A 	Protection cap (for aseptic design, IP69K)	1 343 902 2

- 1) PUR cables are particularly suited for use in oil-contaminated environments.
 2) PVC cables are particularly suited for use in wet environments.

Mounting on standard gear units (R, F, K, S)

Adapter for mounting the PT1000 temperature sensor in screw plug holes:

Complete adapter for PT1000 sensor	Part number
M10 × 1	1 343 903 0
M12 × 1.5	1 343 904 9
M22 × 1.5	1 343 905 7
M33 × 2	1 343 906 5
M42 × 2	1 343 907 3

Mounting base for installing the diagnostic unit at the gear unit with an angle bracket:

Mounting base with sealing ring	Part number
M10 × 1	1 343 441 1
M12 × 1.5	1 343 827 1
M22 × 1.5	1 343 829 8
M33 × 2	1 343 830 1
M42 × 2	1 343 832 8



Design and Operating Notes

Condition monitoring: Oil aging and vibration sensor

Vibration sensor technical data

DUV10A and
DUV30A diagnos-
tics units

/DUV10A and DUV30A	Technical data
Measuring range	± 20 g
Frequency range	0.125 ... 500 Hz
Spectral resolution	0.125 Hz
Diagnostic processes	FFT, envelope-FFT, trend analysis
Minimum measuring period	8.0 s
Speed range	12 ... 3500 min ⁻¹
Switch outputs	1: Early warning 2: Main alarm
Operating voltage	DC 10-32 V
Current consumption at DC 24 V	100 mA
Protection class	III
EMC	IEC1000-4-2/3/4/6
Overload capacity	100 g
Ambient temperature	-30 °C to +60 °C
Degree of protection	IP67
Housing materials	Zinc die-casting, coating based on epoxy finish, polyester membrane keypad
Electrical connection for supply and switching output	M12 plug connector
Electrical connection RS-232 for communication	M8 plug connector
Certificates and standards	CE, UL

Designations and part numbers

Designation	Description	Part number
DUV10A 	Diagnostic unit (basic unit)	1 406 629 7
DUV10A-S	Configuration software	1 406 630 0
DUV10A-K-RS232-M8	Communication cable	1 406 631 9
DUV10A-N24DC	DC 24 V power supply unit	1 406 632 7
DUV10A-I	Pulse tester	1 406 633 5
DUV10A-K-M12-2m PUR	2 m PUR cable with 1 connector ¹⁾	1 406 634 3
DUV10A-K-M12-5m PUR	5 m PUR cable with 1 connector ¹⁾	1 406 635 1
DUV10A-K-M12-2m PVC	2 m PVC cable with 1 connector ²⁾	1 326 620 9
DUV10A-K-M12-5m PVC	5 m PVC cable with 1 connector ²⁾	1 326 621 7

1) PUR cables are particularly suited for use in oil-contaminated environments.

2) PVC cables are particularly suited for use in wet environments.



Mounting on standard gear units (R, F, K, S)

Mounting base for installing the diagnostic unit at the gear unit:

Mounting base with sealing ring	Part number
M10 × 1	1 343 441 1
M12 × 1.5	1 343 827 1
M22 × 1.5	1 343 829 8
M33 × 2	1 343 830 1
M42 × 2	1 343 832 8

Mounted on motor

Mounting base for installing the diagnostic unit at the motor:

Fastening element	Part number
M12, for motor sizes 132M to 180	1 343 842 5
M16, for motor sizes 200 to 280	1 343 844 1