

DIEQUA
Corporation



Standard
HW | HWS | HWK | HWZ
WV
HRZ
F
S | AS
W
HL
HL HW | HL HWS
EA | ZA | DA
VA

SPIRAL BEVEL GEARBOXES

COMPLETE PRODUCT CATALOG





DieQua Corporation is a manufacturer and supplier of a wide range of motion control and power transmission drive components. Our focus has always been to provide products that offer superior value, the highest quality, the most unique designs, and the most reliable performance. DieQua continues to develop innovative products to meet the changing technological needs of the industries and customers we serve.



The DieQua Process

DieQua has an enormous product offering. Making a proper selection, or even knowing what is possible can be daunting. Our staff is specifically trained to first listen, and then ask questions, to gain a thorough understanding of your specific and unique application. Then, we help you navigate to the specific product, or even a special design, that will meet or exceed your needs. It is through our consultative approach that we are most helpful to our customers in finding the best design solution.



We live for quality

The reliability and durability of our parts, combined with a high degree of flexibility in meeting individual requirements, are part of our guiding principles of quality. Our quality management defines the quality in planning, control and testing that we live by to meet ISO 9001 standards.




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Gearbox Range Overview




			Options for Input Shaft (d1)				Options for output shaft (d2)		
			Standard	HRZ	FS2	F	Standard	HW	HWS
			Input Shaft	Hollow Pinion with Internal Involute Spline	Input Flange	Input Flange	Output Shaft	Hollow Shaft with Keyway	Hollow Shaft with Shrink Disc
	Spiral Bevel Gearboxes	SK	●	○	○	○	●	○	○
	PowerMaster Gearboxes	HL	●	○	○	○	●	○	○

● Standard ○ Optional

Speed Modulation Gearboxes

	Spiral Bevel Planetary Speed Modulation Gearboxes	SP2	●				●	○	○
	Single Stage Planetary Speed modulation Gearboxes	PE2	●				●		
	Double Stage Planetary Speed modulation Gearboxes	PD2	●				●		
	Double Stage Planetary Speed Modulation Gearboxes	PDS	●				●		
	Inline Bevel Differential Speed Modulation Gearboxes	KD	●				●		

ServoFoxx Gearboxes

	Planetary Gearboxes	PL2 FS			●		●		
		PL2	●				●		
	Spiral Bevel Gearboxes	FS2			●		●	○	
	Planetary Spiral Bevel Gearboxes	PSK2 FS			●		●	○	
		PSK2	●				●	○	
	Spiral Bevel Planetary Gearboxes	SKP2 FS2			●		●		
		SKP2	●				●		
	Hypoid Gearboxes	HYP FS2	○		●		●	○	
	Planetary Gearboxes	P			●		●		

Gearbox Combinations and Special Gearboxes



The DieQua modular system of construction provides almost unlimited possibilities. Therefore, the various ranges of spiral bevel, speed modulation and Servo-Foxx® gearboxes can be combined together to provide the optimum solution.

Options for output shaft (d2), Continued				General Options				MORE INFO
HWK	HWZ	WV	RF/RF HW	S/AS	W	VA	EA/ZA/DA	
Hollow Shaft with Straight Splined	Hollow Shaft with Internal Involute Spline	Reinforced Shaft	Robotic Flange	Switchable Gearboxes	Reversing Gearboxes	Stainless Steel Gearboxes	Gear Wheel Arrgt. Auxilliary Outputs	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	See Page 6
<input type="radio"/>	<input type="radio"/>						<input type="radio"/>	See Page 42

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>			<input type="radio"/>	See Speed Modulation Gearboxes Catalog

								See ServoFoxx® Gearbox Catalog
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
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							<input type="radio"/>	
<input type="radio"/>			<input type="radio"/>					



We will work together with you to develop complete special gearboxes to meet your requirements, such as spur, helical, worm or special planetary gearboxes.

See Page 60

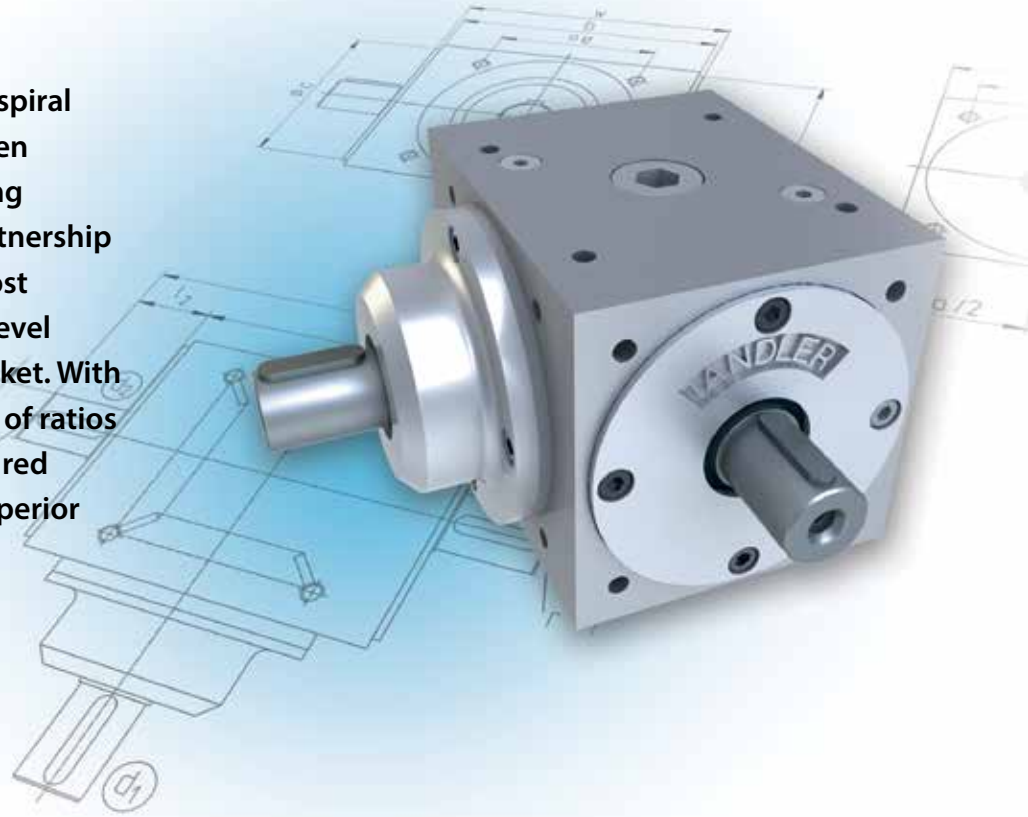


About Spiral Bevel Gearboxes

Precision is the name of the game

Our name stands for quality.

Tandler, the world leader in precision spiral bevel gearbox manufacturing, has been satisfying the most demanding gearing requirements for over 70 years. In partnership with DieQua, we are providing the most extensive and highest quality spiral bevel gearbox program available in the market. With the lowest backlash and widest range of ratios and specialty models, you can be assured of maximum design versatility and superior performance.



Just some of the many additional features that are available:

- Ground gear sets with highest gear tooth quality.
- Accuracy of gearing guaranteed by verifiable inspection reports (single flank test).
- Quiet in operation.
- Reduced backlash as low as 1 arc min.
- Highest transmission accuracy.
- Preloaded bearings, all gearbox faces machined, all faces with tapped mounting holes.
- Gear sets manufactured from case hardened steel with high surface hardness and core strength.
- High efficiency, up to 99%.
- Uses selected bearings with higher accuracy (SQ47).
- Precision manual assembly optimises tooth contact pattern for maximum load capacity.
- Hardened hollow shafts.
- Nine gearbox sizes for output torques up to 10,000 Nm.
- Almost unlimited ratio possibilities.
- Numerous special options available, such as reinforced bearings or cooling for operation at high temperatures.
- Various gearbox quality classes.
- Various corrosion resistant finishes: aluminum, stainless steel, painting or Tenifer 30 NO treatment.
- Modular system, combinations of various gearbox types are possible.
- One-off customized solutions to meet your specific application.
- Versions for special requirements such as ATEX or for use in the food industry.

About Spiral Bevel Gearboxes

About




The standard version of Tandler spiral bevel gearboxes are available with hollow shaft, hollow shaft with shrink disk, reinforced through shaft, hollow pinion and flange.

Features:

- Can be customized to meet your requirements.
- Additional drive shafts and a choice of internal gear arrangements make the standard version of our spiral bevel gearbox truly adaptable. From one to three additional shafts, you will find the perfect solution.



Models, Applications & Design Features

Model Standard		8 Sizes Available
Standard Right Angle		
Features <ul style="list-style-type: none">• 15 Ratios available• Can be used to either reduce or speed increase• Output torque upto 10,000Nr• Highly efficient up to 99%• High accuracy torque transmission• Low backlash (as low as 1 arc min available upon request)• ATEX compatible design		
Sizing & Selection: Pages 12-13		Installation Information: Pages 40-46
Model HW/HWS/HWK/HWZ		9 Sizes Available
Hollow Shaft		
Features <ul style="list-style-type: none">• 11 Ratios available• HW- Hollow shaft with keyway• HWK- Hollow shaft with straight sided splined bore• HWZ- Hollow shaft with internal involute spline• HWS- Hollow shaft with shrink disc• ATEX compatible design		
Sizing & Selection: Pages 14-15		Installation Information: Pages 40-46
Model WV		8 Sizes Available
Reinforced Shaft		
Features <ul style="list-style-type: none">• 11 Ratios available• Output torque upto 10,000Nm• Low backlash (as low as 1 arc min available upon request)• Larger cross shaft to drive entire machine torque• ATEX compatible design		
Sizing & Selection: Pages 16-17		Installation Information: Pages 40-46
Model HRZ		6 Sizes Available
Hollow Pinion		
Features <ul style="list-style-type: none">• 2 Ratios available• Direct connection to drive shafts with splines• Eliminates need for coupling• ATEX compatible design		
Sizing & Selection: Pages 18-19		Installation Information: Pages 40-46

Continued on next page

About Spiral Bevel Gearboxes

Models, Applications & Design Features

Model F

6 Sizes Available

Input Flange

Features

- 2 Ratios available
- Flange adapter mount to IEC, NEMA and SERVO motors.
- Hollow input shaft with keyway
- Compact design
- Alternative design is FS2-ServoFoxx series



Sizing & Selection:
Pages 20-21

Installation Information:
Pages 40-46

Model VA

5 Sizes Available

Stainless Steel

Features

- 3 Ratios available
- Mounting holes per customer request
- Stainless steel shafts and housing



Sizing & Selection:
Pages 26-29

Installation Information:
Pages 40-46

Model S/AS/W

7 Sizes Available

Switch Box

Features

- 5 Ratios available
- AS - Right-angle disengaging
- S- Reversal of output direction
- W - In-line disengaging or reversal of output direction
- Low backlash (as low as 6 arc min available upon request)



Sizing & Selection:
Pages 30-35

Installation Information:
Pages 36-39

Model HL/HL HW/HL HWS

5 Sizes Available

High Performance Power Gearboxes

Features

- 3 Ratios available
- High external loads for robust applications
- Up to 2000Nm torque
- Extremely high power density
- HL- Standard High Performance version high torque with small envelope size
- HL HW- Power version with Hollow shaft output
- HL HWS – Power version with shrink disc



Sizing & Selection:
Pages 48-52

Installation Information:
Pages 53-54

Model Auxiliary/EA/ZA/DA

4 Sizes Available

Branch off gearboxes

Features

- 14 Ratios available
- EA- One-way Auxiliary branch off
- ZA- Two-way Auxiliary branch off
- DA- Three-way Auxiliary branch off



Sizing & Selection:
Pages 22-25

Installation Information:
Pages 40-46

Performance Data

MFG	Size	Ratio	Special Design	Output torque M2	Output torque M2	Input n1	Comment	Additional Comment
				in-lbs	Nm	rpm		
DieQua Gearboxes	000	1:1		119	13.5	1750	See Catalog	
	AL 000	1:1		119	13.5	1750	See Catalog	
	000	1:1	S 522	124	14	1750	See Catalog	
	00	1:1		221	25	1750	See Catalog	
	AL 00	1:1		221	25	1750	See Catalog	
	AL 00	1:1	S 522	221	25	1750		
	AL 00	1:1	S 3213	221	25	1750		
	01	1:1		221	63	1750	See Catalog	
	01	1:1	S 522	558	63	1750		
	A1	1:1		1062	12	1750	See Catalog	
	HW A1	1:1		1062	120	1750	See Catalog	
	A1	1:1	S 522	1062	120	1750		
	B1	1:1		1593	180	1750	See Catalog	
	HW B1	1:1		1593	180	1750	See Catalog	
	B1	1:1	S 522	2036	230	1750		
	C1	1:1		3540	400	1750	See Catalog	
	C1	1:1	S 522	3894	440	1750		
	HL C1	1:1		6957	786	1250	See Catalog	Not available with S 522
	HL HW C1	1:1		6957	786	1250	See Catalog	Not available with S 522
	HL D1	1:1		11479	1297	1000	See Catalog	Not available with S 522
	HI HW D1	1:1		11479	1297	1000	See Catalog	Not available with S 522

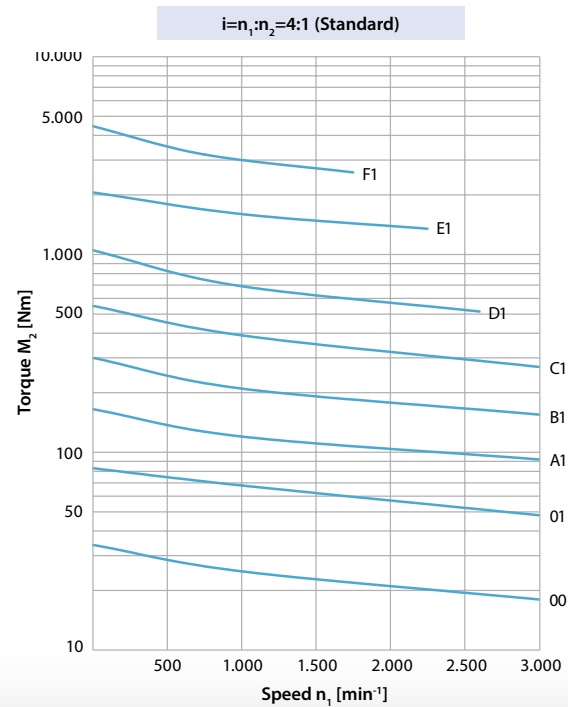
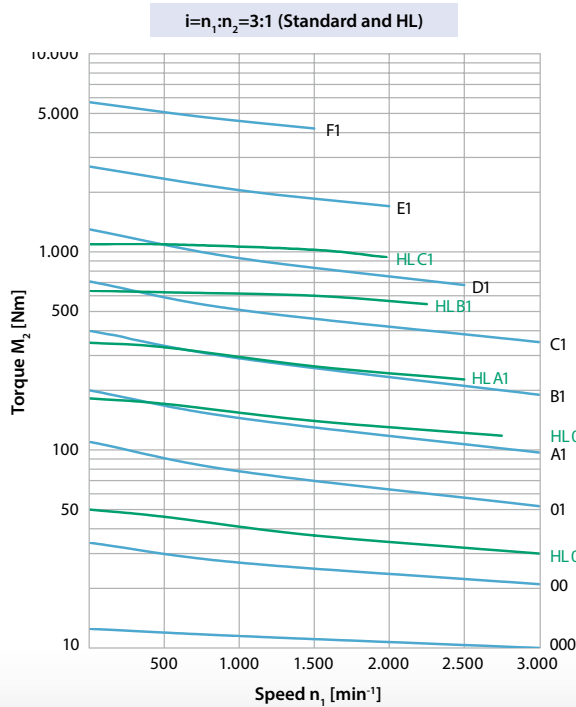
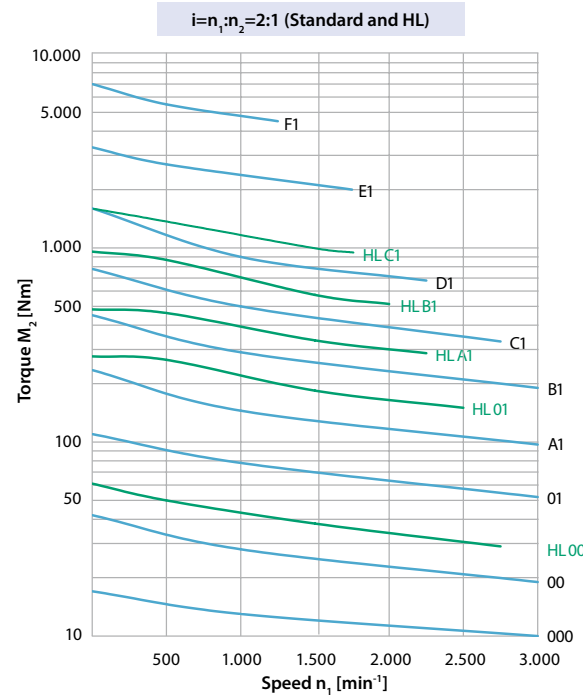
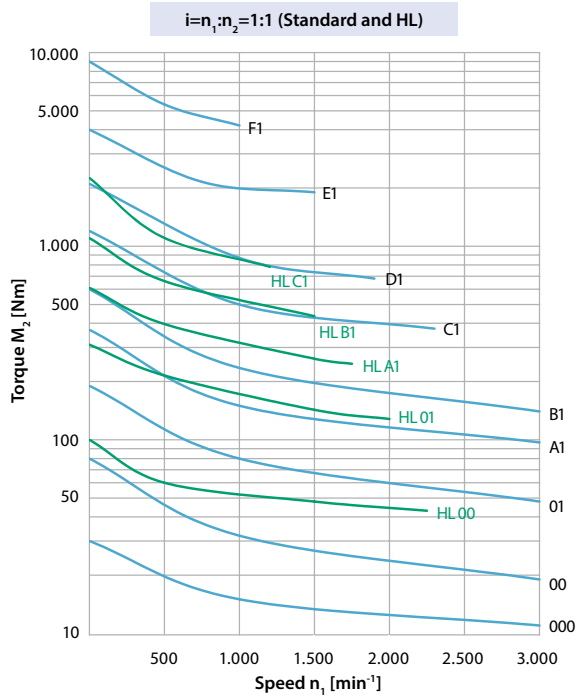
Note: These charts on the following pages indicate the size gearbox you will require as a function of output torque and input rpm for a specific range of gear ratios. Adding S522 will increase torque values as at times d1 is the limited factor, see next pages as reference.

Standard Version

Performance Data

Standard
HW / HWS / HWK / HWZ
WV
HRZ
F

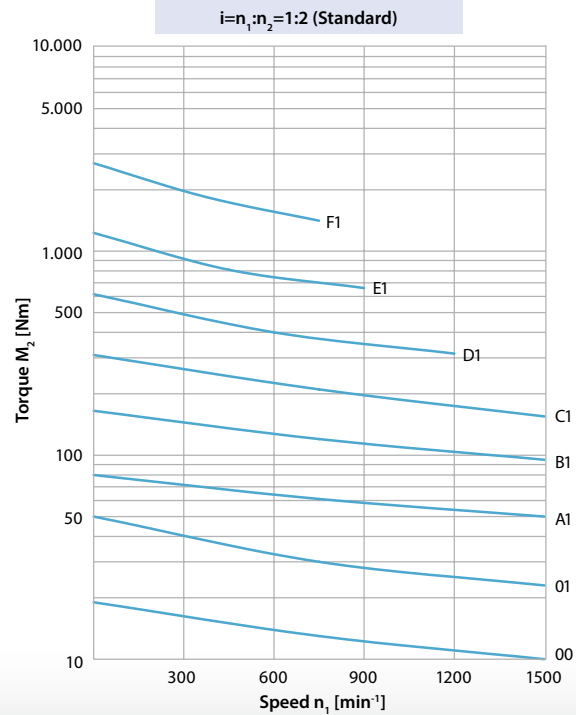
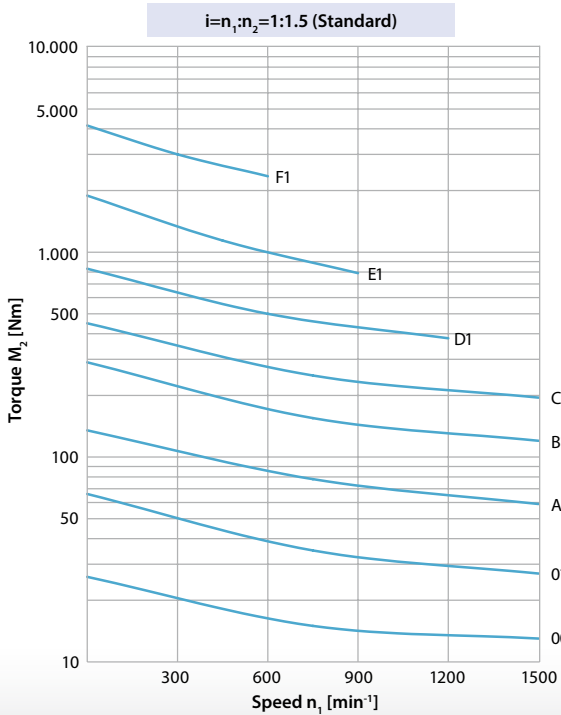
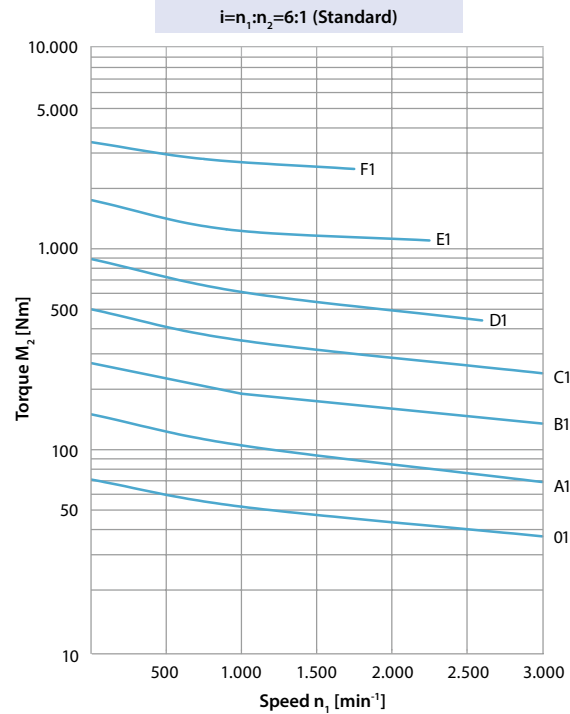
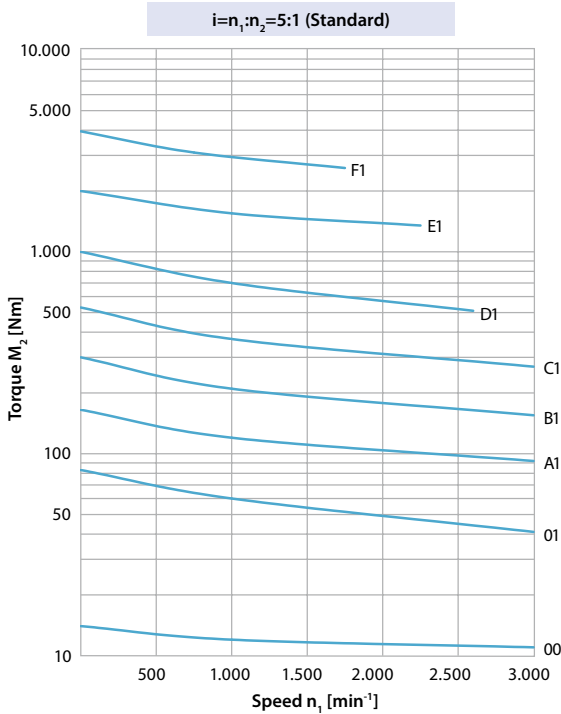
- Permissible Torques at Output Shaft d2
- HL = PowerMaster gearboxes, for more details see pages 42-47
- Torques for other ratios on request.
- Higher torques possible with reinforced bearings.



Performance Data, Continued

Standard
HW / HWS / HWK / HWZ
WV
HRZ
F

- Permissible Torques at Output Shaft d2
- HL = PowerMaster gearboxes, for more details see pages 42-47
- Torques for other ratios on request.
- Higher torques possible with reinforced bearings.



Standard Version

Spiral Bevel Gearboxes

DieQua Spiral Bevel Gearboxes provide highly efficient, high accuracy torque transmission with minimum backlash. They are quiet, resistant to shocks, highly reliable and compact.

- Application Data can be found on page 41
- When ordering, please specify the mounting position, see page 40
- Quality characteristics, backlash and specifications can be found on pages 44-46
- For permissible torques, see pages 10-11

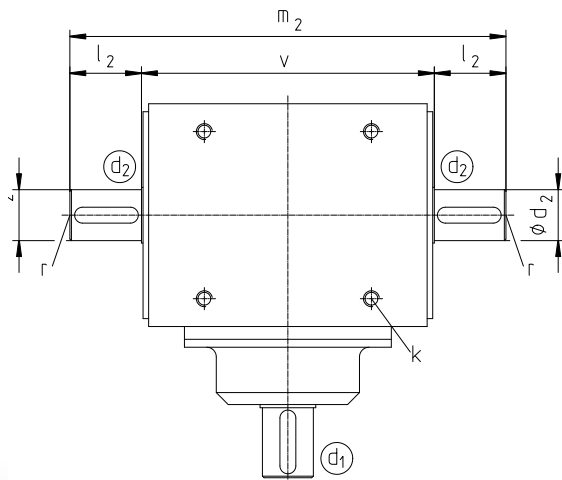
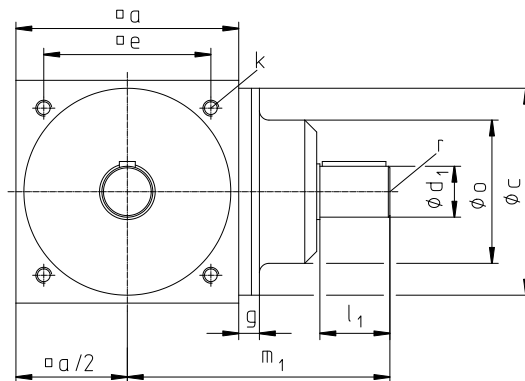
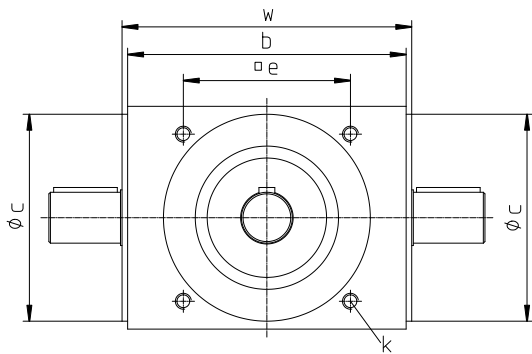
Ratios:

$i = n_1:n_2 = 1:1$ up to 6:1

$i = n_1:n_2 = 1:1$ up to 1:2

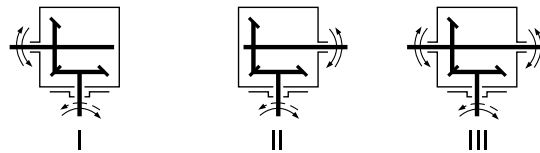
Depending on gearbox size

Please contact DieQua if alternative ratios are needed.



The angle of the keys relative to one another shown is only symbolic.
There is no defined reference position.

Internal Gear Arrangements



Standard Version

Dimensions Not Dependent on Ratio (except 1:1,75 and 1:2)										Output Shaft Dimensions d ₂		
Gearbox Size	a	b	c ₇	e	^k Depth = 1.5 • k	l ₂	m ₂	v	w	d _{2j6}	r	Key DIN 6885/1
000	60	73	59	46	M5	23	132	86	84	12	M5	4x4
00	80	110	74	60	M6	30	177	117	115	14	M6	5x5
01	110	145	102	82	M8	35	222	152	150	22	M8	6x6
A1	140	175	130	105	M10	45	274	184	182	32	M10	10x8
B1	170	215	160	130	M12	60	344	224	222	42	M12	12x8
C1	210	260	195	160	M16	85	440	270	268	55	M16	16x10
D1	260	330	245	200	M16	100	540	340	338	65	M16	18x11
E1	330	430	310	260	M20	120	680	440	438	75	M20	20x12
F1	400	530	380	320	M24	150	840	540	538	90	M24	25x14

Input Dimensions d ₁ 1:1 1.25:1 1.5:1 1.75:1 2:1 2.5:1 1:1.25 1:1.5							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
000	11	23	89	42	12	M5	4x4
00	13	30	110	52	14	M6	5x5
01	14	35	135	70	22	M8	6x6
A1	14	45	165	90	32	M10	10x8
B1	18	60	210	110	42	M12	12x8
C1	18	85	275	135	55	M16	16x10
D1	23	100	340	150	65	M16	18x11
E1	29	120	435	230	75	M20	20x12
F1	40	150	550	270	90	M24	25x14

Input Dimensions d ₁ 3:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
000	11	19	83	42	9	M4	3x3
00	13	25	105	52	12	M5	4x4
01	14	35	135	70	22	M8	6x6
A1	14	45	165	90	32	M10	10x8
B1	18	55	205	100	36	M10	10x8
C1	18	65	255	135	38	M10	10x8
D1	32	85	325	135	55	M16	16x10
E1	29	85	400	190	55	M16	16x10
F1	40	120	520	270	75	M20	20x12

Input dimensions d ₁ 3.5:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
00	13	25	105	52	12	M5	4x4
01	14	30	130	70	16	M6	5x5
A1	14	32	152	80	20	M8	6x6
B1	23	45	200	80	26	M8	8x7
C1	18	45	235	105	32	M10	10x8
D1	28	70	310	110	42	M12	12x8
E1	29	75	390	190	50	M16	14x9
F1	40	95	495	200	60	M16	18x11

Input dimensions d ₁ 4:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
00	13	20	100	47	9	M4	3x3
01	14	30	130	70	16	M6	5x5
A1	14	32	152	80	20	M8	6x6
B1	23	45	200	80	26	M8	8x7
C1	18	45	235	105	32	M10	10x8
D1	28	70	310	110	42	M12	12x8
E1	29	75	390	190	50	M16	14x9
F1	40	95	495	200	60	M16	18x11

Input dimensions d ₁ 5:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
00	13	20	100	47	9	M4	3x3
01	14	22	122	55	12	M5	4x4
A1	14	30	150	65	16	M6	5x5
B1	24	40	195	70	22	M8	6x6
C1	18	45	235	95	26	M8	8x7
D1	23	58	298	105	32	M10	10x8
E1	29	70	385	190	42	M12	12x8
F1	40	85	485	200	55	M16	16x10

Input dimensions d ₁ 6:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
00	-	-	-	-	-	-	-
01	14	22	122	50	10	M4	3x3
A1	14	30	150	55	12	M5	4x4
B1	24	30	185	70	16	M6	5x5
C1	18	45	235	95	20	M8	6x6
D1	23	45	285	105	26	M8	8x7
E1	29	70	385	190	40	M12	12x8
F1	40	85	485	200	55	M16	16x10

1:1.75 and 1:2														Input Dimensions d ₁			Output Dimensions d ₂		
Gearbox Size	a	b	c _{j7}	e	g	^k Depth = 1.5 · k	l ₁	l ₂	m ₁	m ₂	o	v	w	d _{1j6}	r	Key DIN 6885/1	d _{2j6}	r	Key DIN 6885/1
00	80	110	74	60	13	M 6	30	25	110	167	52	117	115	14	M 6	5×5	12	M 5	4×4
01	110	145	102	82	14	M 8	35	30	135	212	70	152	150	22	M 8	6×6	16	M 6	5×5
A1	140	175	130	105	14	M 10	45	42	165	268	90	184	182	32	M 10	10×8	24	M 8	8×7
B1	170	215	160	130	18	M 12	60	50	210	324	110	224	222	42	M 12	12×8	28	M 8	8×7
C1	210	260	195	160	18	M 16	85	60	275	390	135	270	268	55	M 16	16×10	38	M 10	10×8
D1	260	330	245	200	23	M 16	100	80	340	500	150	340	338	65	M 16	18×11	50	M 16	14×9
E1	330	430	310	260	29	M 20	120	90	435	620	230	440	438	75	M 20	20×12	50	M 16	14×9
F1	400	530	380	320	40	M 24	150	130	550	800	270	540	538	90	M 24	25×14	65	M 16	18×11

For ratios 1:1.75 and 1:2, the d₂ shaft diameter decreases in size.

Models HW / HWK / HWZ / HWS

Spiral Bevel Gearboxes with Hollow Shafts

Spiral bevel gearboxes with hollow shafts are ideal for direct connection of drive shafts and for the insertion of special connecting shafts. By eliminating couplings, they provide a compact solution to torque transmission in small spaces. Different versions with keyway, straight sided splines, involute splines and shrink disc are available.

- Application Data can be found on page 41
- When ordering, please specify the mounting position, see page 40
- Quality characteristics, backlash and specifications can be found on pages 44-46
- For permissible torques, see pages 10-11



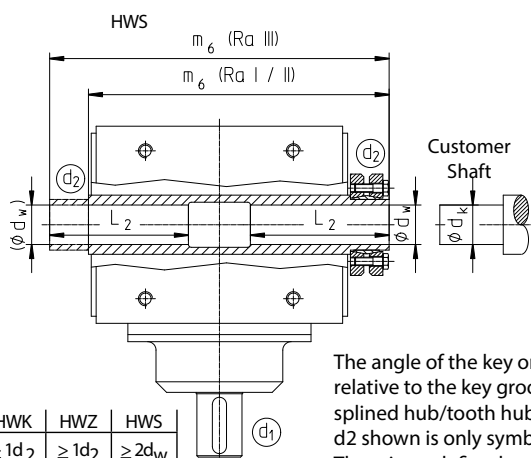
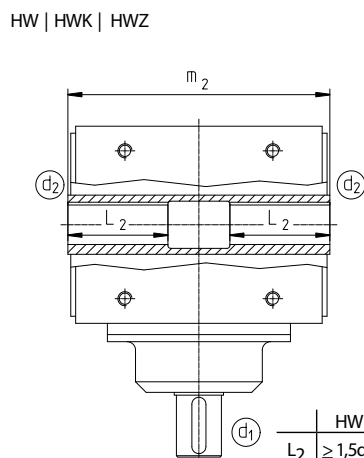
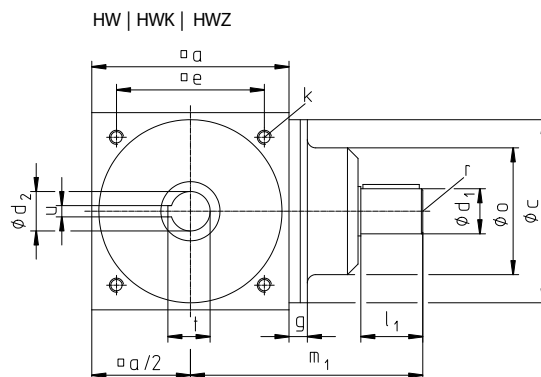
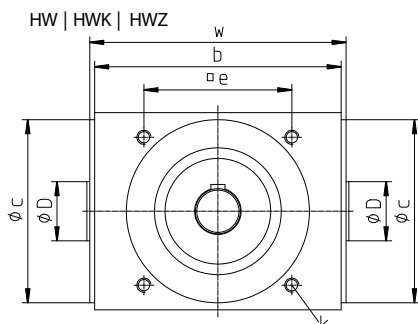
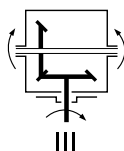
Ratios:

$i = n1:n2 = 1:1$ up to 6:1

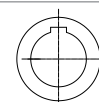
Depending on gearbox size

Please contact DieQua if alternative ratios are needed.

Internal Gear Arrangements



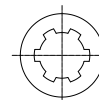
The angle of the key on d1 relative to the key groove/splined hub/tooth hub on d2 shown is only symbolic. There is no defined reference position.



HW

Hollow Shaft with Keyway
(Hardened, ground)

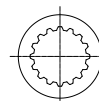
DIN 6885/3



HWK

Hollow Shaft with Straight
Sided Splined Bore
(Hardened, ground)

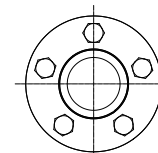
DIN 5462, 5463, 5472



HWZ

Hollow Shaft with Internal
Involute Spline
(Hardened)

DIN 5480, 5482







HWS

Hollow Shaft with Shrink Disc
(ground)

The shrink disc is always mounted to the extended hollow shaft d2. The standard version includes the delivery of one shrink disc. With gear wheel arrangements I and II (RA I and RA II) the diameter of the hollow shaft opposite the shrink disc = $d_w + 0.5 \text{ mm}$.

Gear arrangement III is shown, for more gear arrangements see page 22

Models HW / HWK / HWZ / HWS

Dimensions Not Dependent on Ratio									Output Shaft Dimensions d ₂									
Gearbox Size	a	b	c _{j7}	e	k Depth =1.5•k	w	D	m ₂	HW 			HWK 		HWZ 		HWS 		
									d ₂ H7	t	u ^{J59}	DIN	Straight Sided Spline	Internal Involute Spline DIN 5480 d _g x m	Internal Involute Spline DIN 5482	m ₆ Ra I, II	m ₆ Ra III	d _w H6
									DIN 6885/3 (HW 000 and HW E1 DIN 6885/1)									Customer Shaft d _k
HW 000	60	73	59	46	M5	84	20	86	12	13,8	4	-	-	-	-	101,5	117	12
HW 00	80	110	74	60	M6	115	22	117	14	15,2	5	-	-	-	-	133,5	150	14
HW 01	110	145	102	82	M8	150	38	152	22	23,6	6	5463*	21 x 25 x 5	25 x 1.5	A25 x 22	178,0	204	24
HW A1	140	175	130	105	M10	182	42	184	28	30,0	8	5462*	28 x 32 x 7	30 x 1.75	A30 x 27	212,5	241	28
HW B1	170	215	160	130	M12	222	55	224	35	37,4	10	5472	36 x 42 x 8	40 x 2	A40 x 36	254,5	285	35
HW C1	210	260	195	160	M16	268	65	270	45	47,1	14	5472	42 x 48 x 10	50 x 2	A50 x 45	305,0	340	45
HW D1	260	330	245	200	M16	338	80	340	55	57,4	16	5463*	46 x 54 x 9	60 x 2	A60 x 55	380,0	420	55
HW E1	330	430	310	260	M20	438	100	440	60	64,4	18	5472	58 x 65 x 14	65 x 2	A65 x 60	486,0	532	65
HW F1	400	530	380	320	M24	538	120	540	70	72,7 ¹⁾	20 ¹⁾	5472	68 x 78 x 16	75 x 2	A75 x 69	591,0	642	80

* DIN 5462 + DIN 5463 Identical to ISO 14

1) 2x120°

Input Dimensions d ₁ i = n ₁ : n ₂ = 1:1 1.25:1 1.5:1 1.75:1 2:1 2.5:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
HW 000	11	23	89	42	12	M5	4 x 4
HW 00	13	30	110	52	14	M6	5 x 5
HW 01	14	35	135	70	22	M8	6 x 6
HW A1	14	45	165	90	32	M10	10 x 8
HW B1	18	60	210	110	42	M12	12 x 8
HW C1	18	85	275	135	55	M16	16 x 10
HW D1	23	100	340	150	65	M16	18 x 11
HW E1	29	120	435	230	75	M20	20 x 12
HW F1	40	150	550	270	90	M24	25 x 14

Input Dimensions d ₁ i = n ₁ : n ₂ = 3:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
HW 000	11	19	83	42	9	M4	3 x 3
HW 00	13	25	105	52	12	M5	4 x 4
HW 01	14	35	135	70	22	M8	6 x 6
HW A1	14	45	165	90	32	M10	10 x 8
HW B1	18	55	205	100	36	M10	10 x 8
HW C1	18	65	255	135	38	M10	10 x 8
HW D1	32	85	325	135	55	M16	16 x 10
HW E1	29	85	400	190	55	M16	16 x 10
HW F1	40	120	520	270	75	M20	20 x 12

Input Dimensions d ₁ i = n ₁ : n ₂ = 3,5:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
HW 00	13	25	105	52	12	M5	4 x 4
HW 01	14	30	130	70	16	M6	5 x 5
HW A1	14	32	152	80	20	M8	6 x 6
HW B1	23	45	200	80	26	M8	8 x 7
HW C1	18	45	235	105	32	M10	10 x 8
HW D1	28	70	310	110	42	M12	12 x 8
HW E1	29	75	390	190	50	M16	14 x 9
HW F1	40	95	495	200	60	M16	18 x 11

Input Dimensions d ₁ i = n ₁ : n ₂ = 4:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
HW 00	13	20	100	47	9	M4	3 x 3
HW 01	14	30	130	70	16	M6	5 x 5
HW A1	14	32	152	80	20	M8	6 x 6
HW B1	23	45	200	80	26	M8	8 x 7
HW C1	18	45	235	105	32	M10	10 x 8
HW D1	28	70	310	110	42	M12	12 x 8
HW E1	29	75	390	190	50	M16	14 x 9
HW F1	40	95	495	200	60	M16	18 x 11

Input Dimensions d ₁ i = n ₁ : n ₂ = 5:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
HW 00	13	20	100	47	9	M4	3 x 3
HW 01	14	22	122	55	12	M5	4 x 4
HW A1	14	30	150	65	16	M6	5 x 5
HW B1	24	40	195	70	22	M8	6 x 6
HW C1	18	45	235	95	26	M8	8 x 7
HW D1	23	58	298	105	32	M10	10 x 8
HW E1	29	70	385	190	42	M12	12 x 8
HW F1	40	85	485	200	55	M16	16 x 10

Input Dimensions d ₁ i = n ₁ : n ₂ = 6:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
HW 00	-	-	-	-	-	-	-
HW 01	14	22	122	50	10	M4	3 x 3
HW A1	14	30	150	55	12	M5	4 x 4
HW B1	24	30	185	70	16	M6	5 x 5
HW C1	18	45	235	95	20	M8	6 x 6
HW D1	23	45	285	105	26	M8	8 x 7
HW E1	29	70	385	190	40	M12	12 x 8
HW F1	40	85	485	200	55	M16	16 x 10

Model WV

Spiral Bevel Gearboxes with Reinforced Shaft d_2

Spiral bevel gearboxes with reinforced shafts are commonly used in line-shaft drive applications where only a proportion of the full torque is taken off the main drive shaft at various intervals. Because the full torque is not transmitted through the gears, smaller more cost effective gearboxes can be utilized.

- Application Data can be found on page 41
- When ordering, please specify the mounting position, see page 40
- Quality characteristics, backlash and specifications can be found on pages 44-46
- For permissible torques, see pages 10-11



Ratios:

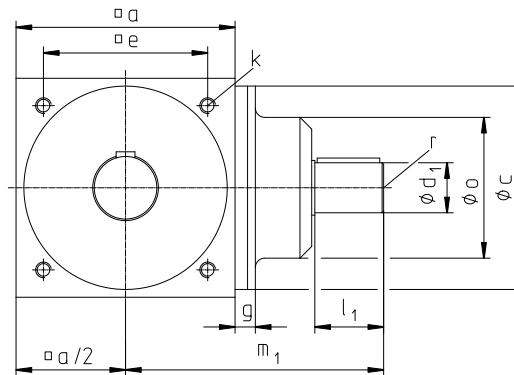
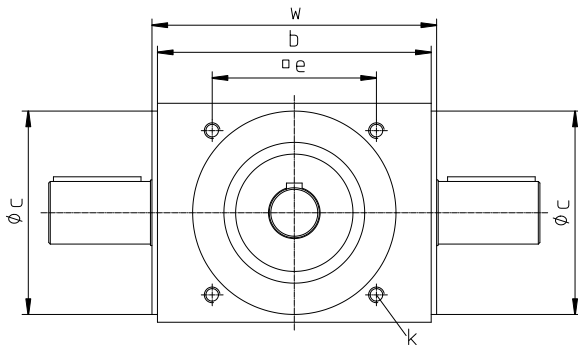
$$i = n_1:n_2 = 1:1 \text{ up to } 6:1$$

Depending on gearbox size

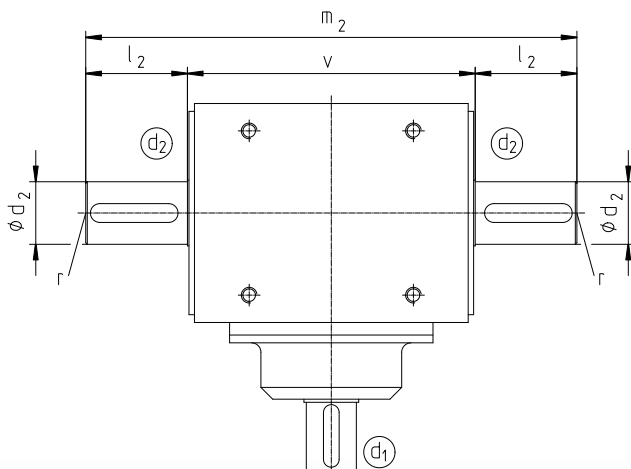
Please contact DieQua if alternative ratios are needed.



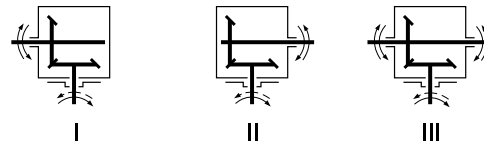
Fig. 14.1 Example of a Line Shaft Drive



The angle of the keys relative to one another shown is only symbolic. There is no defined reference position.



Internal Gear Arrangements



Gear arrangement III is shown, for more gear arrangements see page 22

Maximum Permitted Torque Through Shaft d₂

Gearbox Size	d _{2j6}	Changing Load Direction M ₂ [Nm]	Without Changing Load Direction M ₂ [Nm]
WV 00	20	150	270
WV 01	35	650	1150
WVA1	40	750	1550
WV B1	50	1400	2800
WV C1	60	2600	4500
WV D1	75	4300	6900
WV E1	85	6400	9700
WV F1	100	8100	16000

The torques shown in the table are only for the shaft d₂ (p.16, Fig. 14.1).

For the gears, the torques are from the tables on page 10-11.

Dimensions Not Dependent on Ratio

Output Shaft Dimensions d₂

Gearbox Size	a	b	ç ₇	e	k Depth = 1,5 • k	l ₂	m ₂	v	w	d _{2j6}	r	Key DIN 6885/1
WV 00	80	110	74	60	M 6	35	187	117	115	20	M 8	6x6
WV 01	110	145	102	82	M 8	55	262	152	150	35	M 10	10x8
WV A1	140	175	130	105	M 10	65	314	184	182	40	M 12	12x8
WV B1	170	215	160	130	M 12	80	384	224	222	50	M 16	14x9
WV C1	210	260	195	160	M 16	95	460	270	268	60	M 16	18x11
WV D1	260	330	245	200	M 16	115	570	340	338	75	M 20	20x12
WV E1	330	430	310	260	M 20	130	700	440	438	85	M 20	22x14
WV F1	400	530	380	320	M 24	160	860	540	538	100	M 24	28x16

Input Dimensions d₁

1:1 | 1.25:1 | 1.5:1 | 1.75:1 | 2:1 | 2.5:1

Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
WV 00	13	30	110	52	14	M 6	5x5
WV 01	14	35	135	70	22	M 8	6x6
WV A1	14	45	165	90	32	M 10	10x8
WV B1	18	60	210	110	42	M 12	12x8
WV C1	18	85	275	135	55	M 16	16x10
WV D1	23	100	340	150	65	M 16	18x11
WV E1	29	120	435	230	75	M 20	20x12
WV F1	40	150	550	270	90	M 24	25x14

Input Dimensions d₁

3:1

Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
WV 00	13	25	105	52	12	M 5	4x4
WV 01	14	35	135	70	22	M 8	6x6
WV A1	14	45	165	90	32	M 10	10x8
WV B1	18	55	205	100	36	M 10	10x8
WV C1	18	65	255	135	38	M 10	10x8
WV D1	32	85	325	135	55	M 16	16x10
WV E1	29	85	400	190	55	M 16	16x10
WV F1	40	120	520	270	75	M 20	20x12

Input Dimensions d₁

3.5:1

Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
WV 00	13	25	105	52	12	M 5	4x4
WV 01	14	30	130	70	16	M 6	5x5
WV A1	14	32	152	80	20	M 8	6x6
WV B1	23	45	200	80	26	M 8	8x7
WV C1	18	45	235	105	32	M 10	10x8
WV D1	28	70	310	110	42	M 12	12x8
WV E1	29	75	390	190	50	M 16	14x9
WV F1	40	95	495	200	60	M 16	18x11

Input Dimensions d₁

4:1

Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
WV 00	13	20	100	47	9	M 4	3x3
WV 01	14	30	130	70	16	M 6	5x5
WV A1	14	32	152	80	20	M 8	6x6
WV B1	23	45	200	80	26	M 8	8x7
WV C1	18	45	235	105	32	M 10	10x8
WV D1	28	70	310	110	42	M 12	12x8
WV E1	29	75	390	190	50	M 16	14x9
WV F1	40	95	495	200	60	M 16	18x11

Input Dimensions d₁

5:1

Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
WV 00	13	20	100	47	9	M 4	3x3
WV 01	14	22	122	55	12	M 5	4x4
WV A1	14	30	150	65	16	M 6	5x5
WV B1	24	40	195	70	22	M 8	6x6
WV C1	18	45	235	95	26	M 8	8x7
WV D1	23	58	298	105	32	M 10	10x8
WV E1	29	70	385	190	42	M 12	12x8
WV F1	40	85	485	200	55	M 16	16x10

Input Dimensions d₁

6:1

Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
WV 00	-	-	-	-	-	-	-
WV 01	14	22	122	50	10	M 4	3x3
WV A1	14	30	150	55	12	M 5	4x4
WV B1	24	30	185	70	16	M 6	5x5
WV C1	18	45	235	95	20	M 8	6x6
WV D1	23	45	285	105	26	M 8	8x7
WV E1	29	70	385	190	40	M 12	12x8
WV F1	40	85	485	200	55	M 16	16x10

Model HRZ

Spiral Bevel Gearboxes with Hollow Pinion

Spiral bevel gearboxes with hollow pinion, allow direct connection to drive shafts with splines to DIN 5482. No coupling is needed.

- Application Data can be found on page 41
- When ordering, please specify the mounting position, see page 40
- Quality characteristics, backlash and specifications can be found on pages 44-46
- For permissible torques, see pages 10-11

Other splines and bores with keyway available upon request



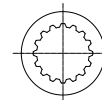
Ratios:

$i = n_1:n_2 = 1:1$ up to $2:1$

$i = n_1:n_2 = 1:1$ up to $1:2$

Depending on gearbox size

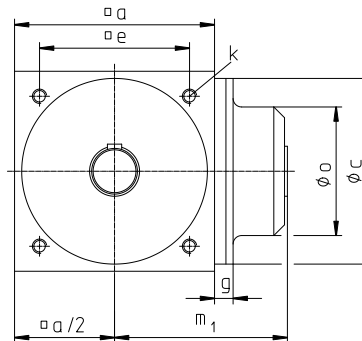
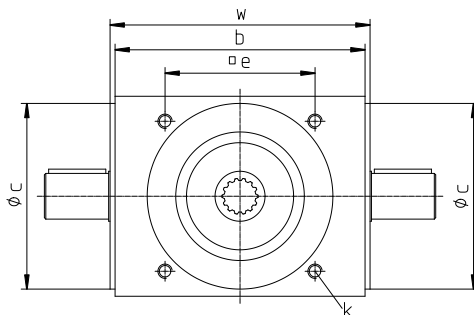
Please contact DieQua if alternative ratios are needed.



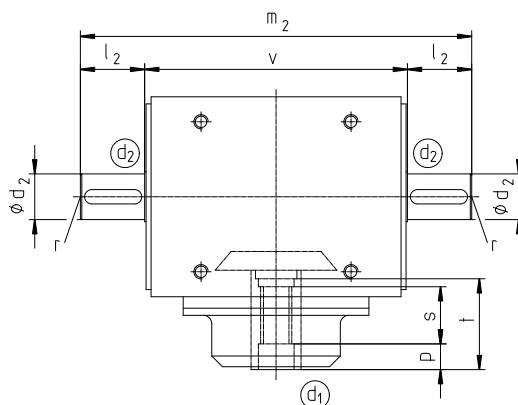
HRZ

Hollow Pinion d_1 with Internal
Involute Spline
(Hardened)

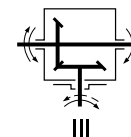
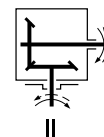
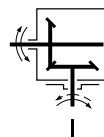
DIN 5482



The angle of the keys and tooth hub shown is only symbolic. There is no defined reference position.



Internal Gear Arrangements



Gear arrangement III is shown, for more gear arrangements see page 18

Dimensions Not Dependent on Ratio (except 1:1.75 und 1:2)													Output Shaft Dimensions d ₂		
Gearbox Size	a	b	c _{j7}	e	g	$\frac{k}{\text{Depth}} = 1.5 \cdot k$	l ₂	m ₁	m ₂	o	v	w	d _{2j6}	r	Key DIN 6885/1
HRZ 01	110	145	102	82	14	M 8	35	100	222	70	152	150	22	M 8	6x6
HRZ A1	140	175	130	105	14	M 10	45	120	274	90	184	182	32	M 8	10x8
HRZ B1	170	215	160	130	18	M 12	60	150	344	110	224	222	42	M 8	12x8
HRZ C1	210	260	195	160	18	M 16	85	190	440	135	270	268	55	M 10	16x10
HRZ D1	260	330	245	200	23	M 16	100	240	540	150	340	338	65	M 11	18x11
HRZ E1	330	430	310	260	29	M 20	120	315	680	230	440	438	75	M 17	20x12

Input Dimensions d ₁				
Gearbox Size	DIN 5482 an d ₁ DIN 5482 at d ₁	p	s	t
HRZ 01	A 20 x 17	20	30	60
HRZ A1	A 25 x 22	15	48	70
HRZ B1	A 30 x 27	15	48	95
HRZ C1	A 40 x 36	26	48	120
HRZ D1	A 45 x 41	30	48	150
HRZ E1	A 48 x 44	40	48	220

1:1.75 und /and 1:2													Output Dimensions d ₂		
Gearbox Size	a	b	c _{j7}	e	g	$\frac{k}{\text{Depth}} = 1.5 \cdot k$	l ₂	m ₁	m ₂	o	v		d _{2j6}	r	Key DIN 6885/1
HRZ 01	110	145	102	82	14	M 8	30	100	212	70	152		16	M 6	5x5
HRZ A1	140	175	130	105	14	M 10	42	120	268	90	184		24	M 8	8x7
HRZ B1	170	215	160	130	18	M 12	50	150	324	110	224		28	M 8	8x7
HRZ C1	210	260	195	160	18	M 16	60	190	390	135	270		38	M 10	10x8
HRZ D1	260	330	245	200	23	M 16	80	240	500	150	340		50	M 16	14x9
HRZ E1	330	430	310	260	29	M 20	90	315	620	230	440		50	M 16	14x9

Dimensions Not Dependent on Ratio (except 1:1.75 and 1:2)

Gearbox Size	a	b	c ₇	e	h	^k Depth = 1.5 · k	l ₂	m ₂	v	w	d _{2j6}	r	Key DIN 6885/1
F 00	80	110	74	60	52	M 6	30	177	117	115	14	M 6	5 x 5
F 01	110	145	102	82	73	M 8	35	222	152	150	22	M 8	6 x 6
F A1	140	175	130	105	80	M 10	45	274	184	182	32	M 10	10 x 8
F B1	170	215	160	130	92	M 12	60	344	224	222	42	M 12	12 x 8
F C1	210	260	195	160	92	M 16	85	440	270	268	55	M 16	16 x 10
F D1	260	330	245	200	115	M 16	100	540	340	338	65	M 16	18 x 11

1:1.75 und/and 1:2

Output Dimensions d₂

Gearbox Size	a	b	c ₇	e	^k Depth = 1.5 · k	l ₂	m ₂	v	d _{2j6}	r	Key DIN 6885/1
F 00	80	110	74	60	M 6	25	167	117	12	M 5	4 x 4
F 01	110	145	102	82	M 8	30	212	152	16	M 6	5 x 5
F A1	140	175	130	105	M 10	42	268	184	24	M 8	8 x 7
F B1	170	215	160	130	M 12	50	324	224	28	M 8	8 x 7
F C1	210	260	195	160	M 16	60	390	270	38	M 10	10 x 8
F D1	260	330	245	200	M 16	80	500	340	50	M 16	14 x 9

Dimensions Hollow Pinion d₁

Gearbox Size	l ₁	m ₁	t	u _{JS9}	d ₁	Key DIN 6885/1
F 00	30	92	16.3	5	14 ^{H7}	5 x 5
F 01	40	128	21.8	6	19 ^{H7}	6 x 6
F A1	60	150	31.3	8	28 ^{H7}	8 x 7
F B1	60	177	31.3	8	28 ^{H7}	8 x 7
F C1	80	197	41.3	10	38 ^{F7}	10 x 8
F D1	110	245	51.8	14	48 ^{F7}	14 x 9

Additional Hollow Pinion diameters on request.

For Alternative Dimensions for Special Hollow Pinion d₁
see Data Sheet S 1516

Gearbox Size	l ₁	t	u _{JS9}	d ₁	Key DIN
F 01	50	26	8	24 ^{H7}	8 x 5 6885/3
F A1	60	27.3	8	24 ^{H7}	8 x 7 6885/1
F B1	70	35.3	10	32 ^{H7}	10 x 8 6885/1
F C1	85 (110*)	45.3	12	42 ^{F7}	12 x 8 6885/1
F D1	110	59.3	16	55 ^{F7}	16 x 10 6885/1

*For 1:1 to 2.5:1

Flange (DIN EN 50347)

Flange Size	Gearbox Size				o	b ₁ ^{H7}	L _{kr}	s
105	00				105	70	85	7
120	00	01			120	80	100	7
140	00	01			140	95	115	9
160	00	01	A1	B1	160	110	130	9
200		01	A1	B1	200	130	165	11
250		01	A1	B1	250	180	215	13
300				C1	300	230	265	13
350				C1	350	250	300	18
400				D1	400	300	350	18



ServoFoxy® Spiral Bevel Gearboxes

For servo applications, we recommend our FS2- spiral bevel gearbox from the ServoFoxy® range. In contrast to the flanged gearboxes series F, the input is fitted with a 2 piece bellows coupling, they are lubricated for life and have a corrosion resistant finish.

Additionally, the FS2 series, like all gearboxes from the ServoFoxy® range, interchangeable flanges and couplings cater for almost all servo and standard motors, with and without keyed motor shafts.

For further information on the FS2 spiral bevel gearboxes see the ServoFoxy® catalogue and www.diequa.com.

Technical Data

Gear Arrangements

Schematic representations of the possible internal gear arrangements in spiral bevel gearboxes.

Standard / All Ratios

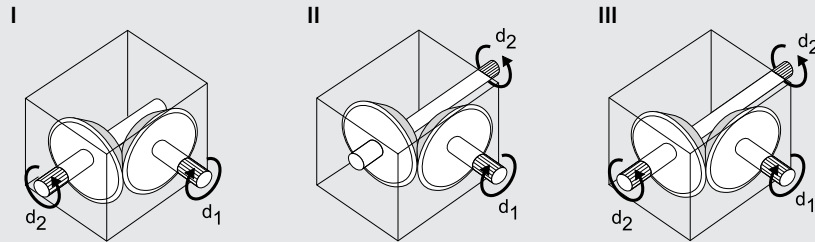


Figure 50.2

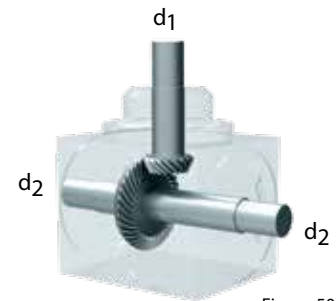


Figure 50.1

1 additional auxiliary shaft extension EA / all ratios

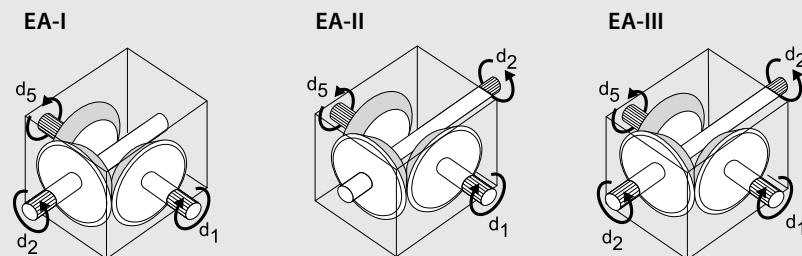


Figure 50.4

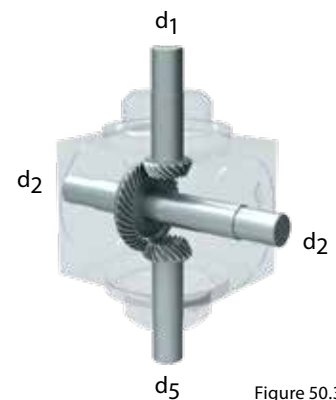
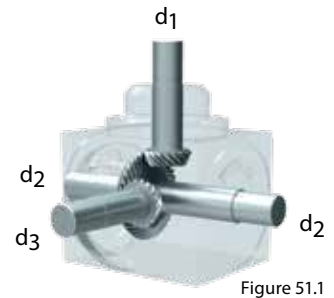
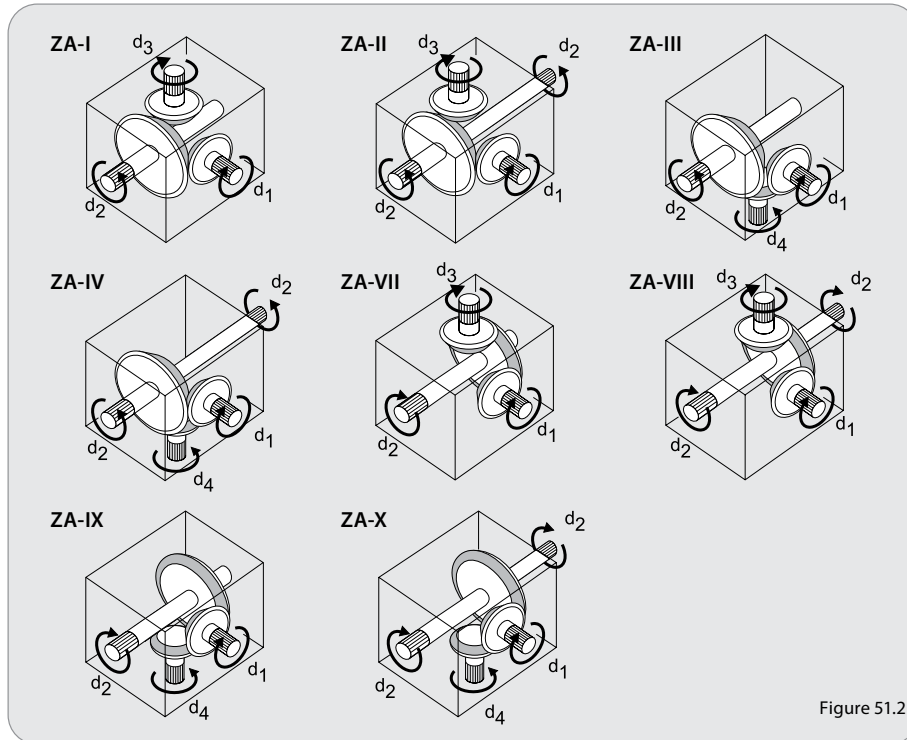


Figure 50.3

Fixed ratios: $n_1:n_5 = 1:1$

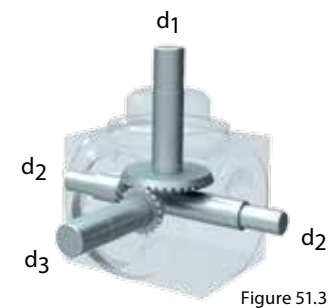
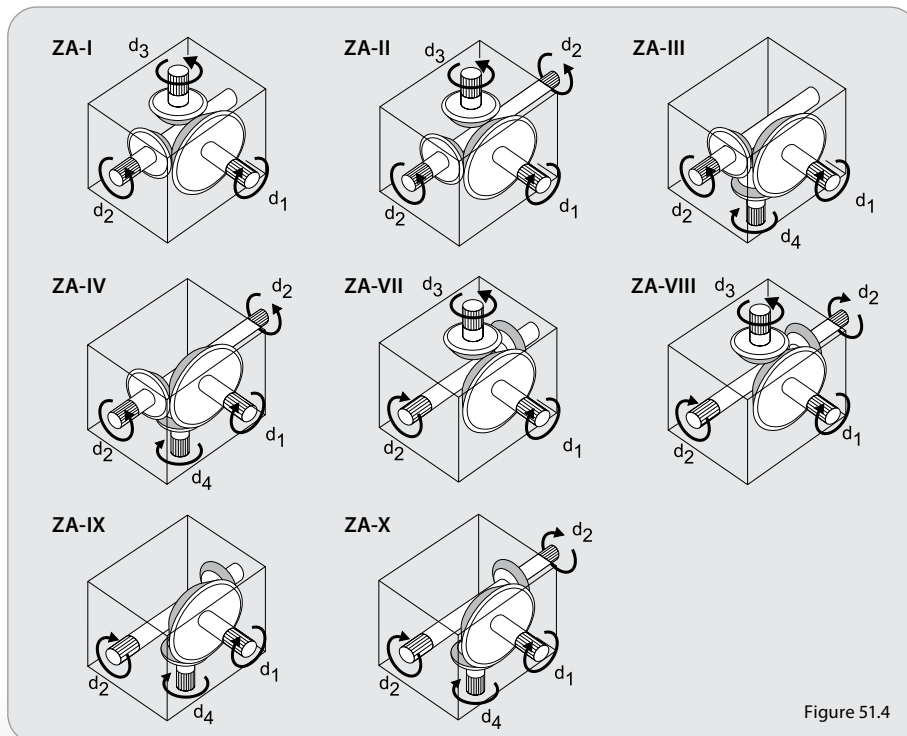
Technical Data

1 additional auxiliary shaft / gear ratio speed reducing $n_1:n_2$



Fixed ratios: $i=n_1:n_2=n_1:n_4=1:1$
Ratio $i=n_1:n_2=1:1$ is not possible

1 additional auxiliary shaft / gear ratio speed increasing $n_1:n_2$



Fixed ratios: $i=n_2:n_3=n_2:n_4=1:1$
Ratio $i=n_1:n_2=1:1$ is not possible

Models EA / ZA / DA

2 additional auxiliary shaft / gear ratio speed Reducing $n_1:n_2$

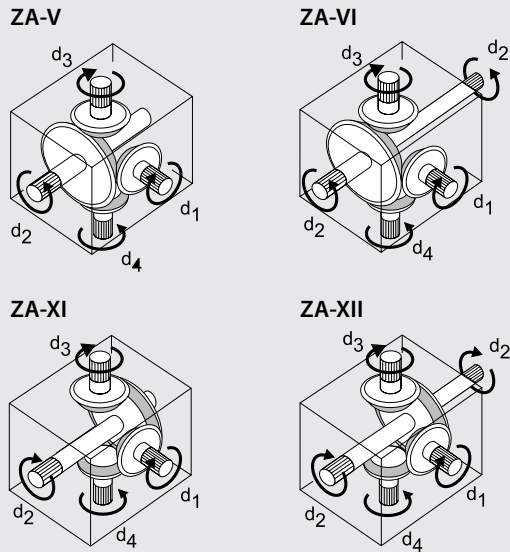


Figure 52.2

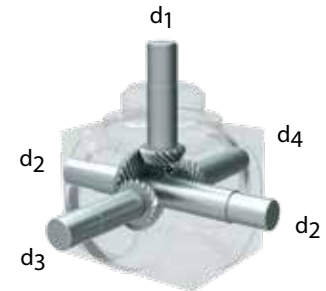


Figure 52.1

Fixed ratios: $i=n_1:n_3:n_4=1:1$

Ratio $i=n_1:n_2=1:1$ is not possible

2 additional auxiliary shaft / gear ratio speed Increasing $n_1:n_2$

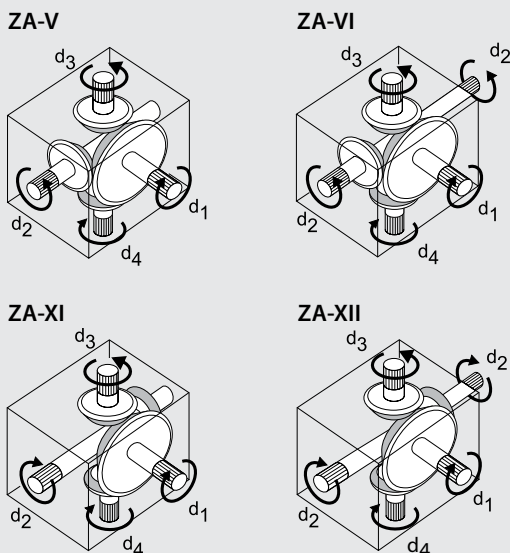


Figure 52.4

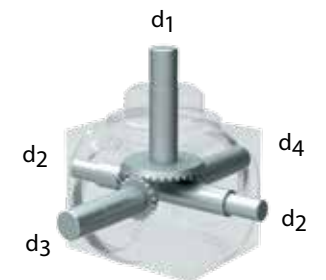


Figure 52.3

Fixed ratios: $i=n_1:n_3:n_4=1:1$

Ratio $i=n_1:n_2=1:1$ is not possible

Models EA / ZA / DA

3 additional auxiliary shaft / gear ratio speed Reducing $n_1:n_2$

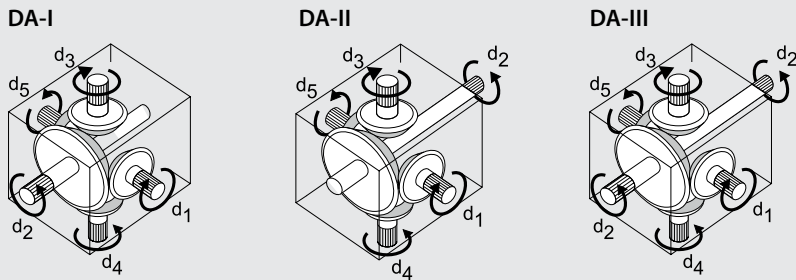


Figure 53.2

Lifetime lubricated, without oil-level gauge as standard all mounting positions possible

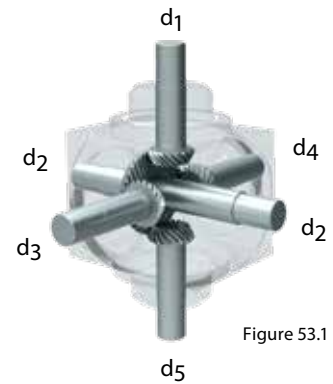


Figure 53.1

Fixed ratios: $i=n_1:n_3:n_4:n_5=1:1$

Ratio $i=n_1:n_2=1:1$ is not possible

3 additional auxiliary shaft / gear ratio speed Increasing $n_1:n_2$

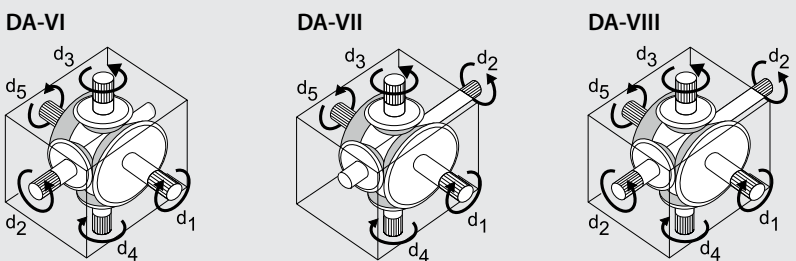


Figure 53.4

Lifetime lubricated, without oil-level gauge as standard all mounting positions possible

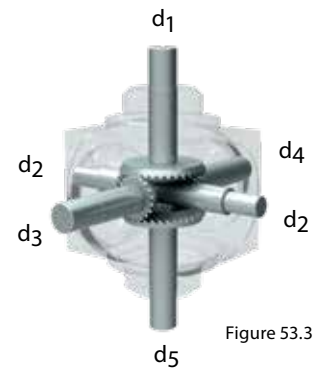


Figure 53.3

Fixed ratios: $i=n_1:n_5=1:1$

and

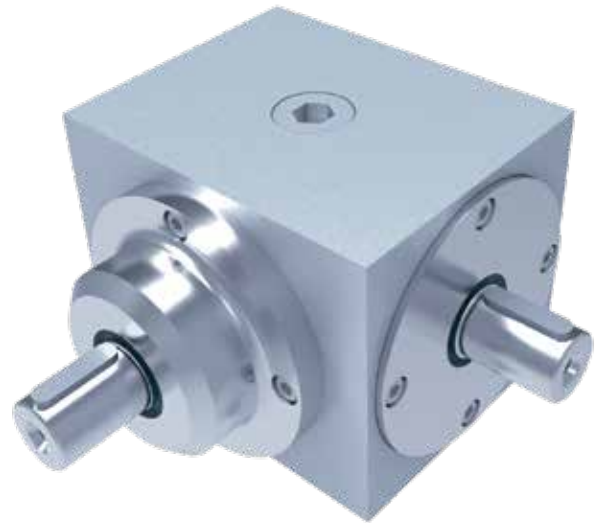
$i=n_2:n_3:n_4=1:1$

Ratio $i=n_1:n_2=1:1$ is not possible

Stainless Steel VA

Today there are many industries, particularly the food industry, which place great emphasis on corrosion resistance and hygiene. To meet these requirements we produce stainless steel gearboxes, dependent on size, ratio and configuration. These are factory filled with food grade oil or other lubricants if desired. All the dimensions of the stainless steel gearboxes are the same as the standard spiral bevel gearboxes and their variants.

As standard, our stainless steel gearboxes have only one screw plug per housing face, no oil sight glass and no mounting holes. Mounting holes are machined as per customer requirements in the specified face (for definition of faces see page 28, Fig 26.3). Please specify the face on your inquiry and/or order.



Model **Standard**

Standard Version

Features

- Anything you'd want to put here like the other pages?



Model **HW**

Hollow Shaft

Features

- Anything you'd want to put here like the other pages?



Model **HWS**

Hollow Shaft and Shrink Disk

Features

- Anything you'd want to put here like the other pages?



Model **WV**

Reinforced Shaft

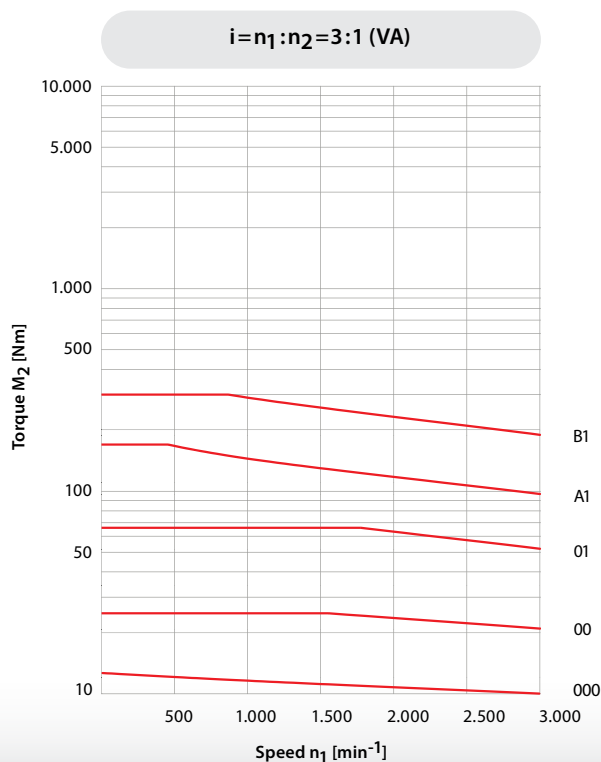
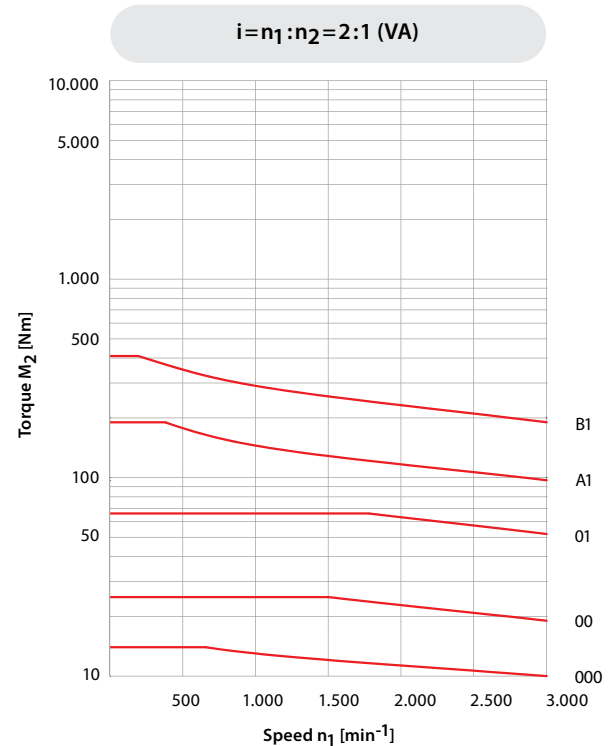
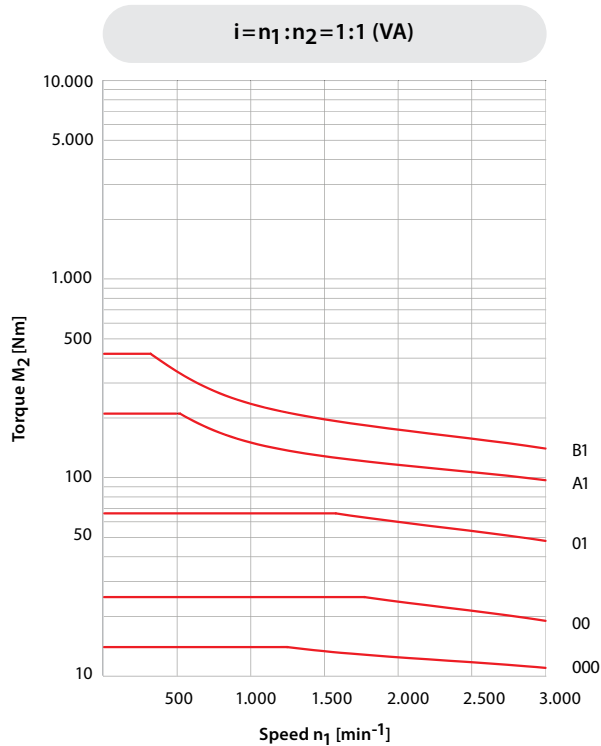
Features

- Anything you'd want to put here like the other pages?



VA

- Permissible Torques at Output Shaft d2



Model VA

Spiral Bevel Gearboxes in Stainless Steel VA

The stainless steel gearboxes are also available in other variants, like the standard spiral bevel gearboxes, such as with hollow shaft or reinforced shaft, see page 12.

Mounting holes are machined as per customer specification in the required mounting face or faces. See definition of mounting faces, Fig. 26.3 below.

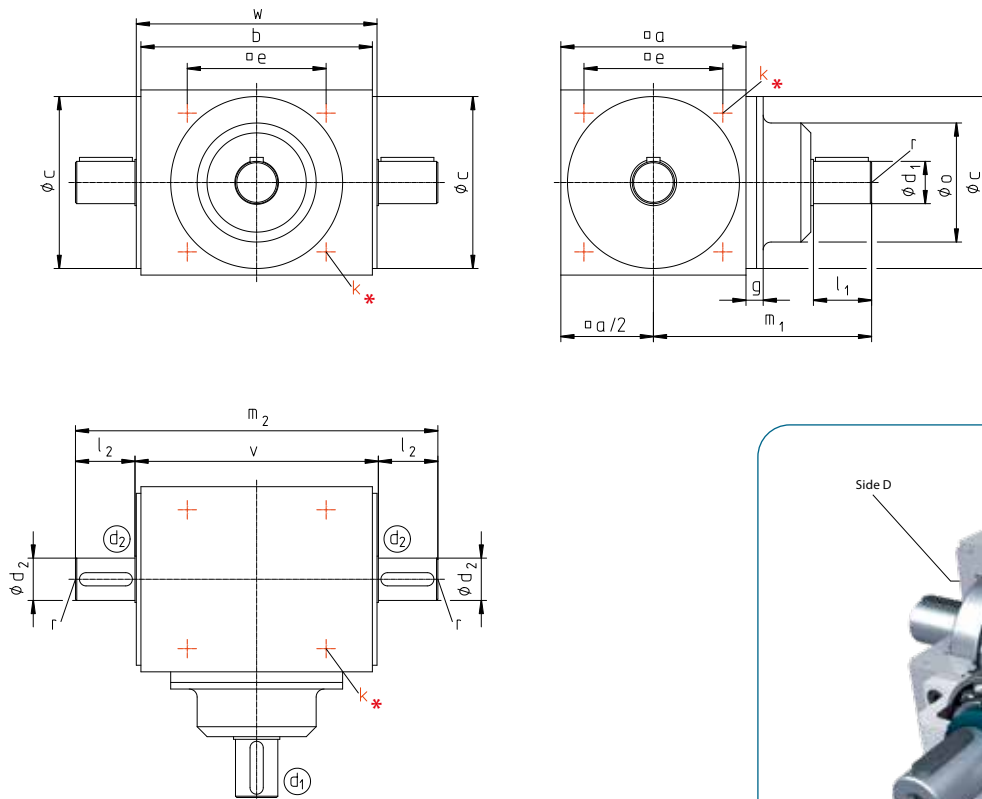
- Application Data can be found on page 41
- When ordering, please specify the mounting position, see page 40
- Quality characteristics, backlash and specifications can be found on pages 44-46



Ratios:

$$i = n_1:n_2 = 1:1, 2:1 \text{ to } 3:1$$

Please contact DieQua if alternative ratios are needed.



Mounting Holes K

Machined per customer specification in the required mounting face or faces. To determine the correct mounting face definition, see the next illustration below

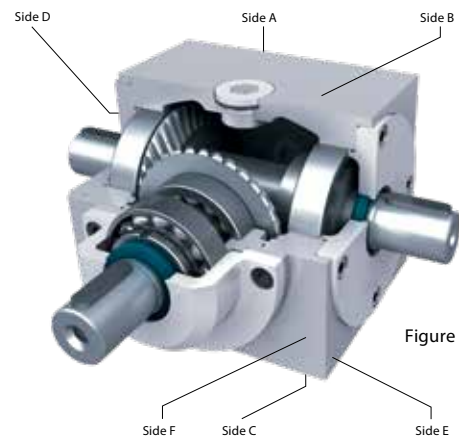


Figure 26.3

Designation of Gearbox Faces

According to DieQua standard TN 1 below

Dimensional Data

Dimensions Not Dependent on Ratio										Output Shaft Dimensions d ₂		
Gearbox Size	a	b	c ₇	e	k* Depth = 1.5 • k	l ₂	m ₂	v	w	d _{2j6}	r	Key DIN 6885/1
VA 000	60	73	59	46	M 5	23	132	86	84	12	M 5	4 x 4
VA 00	80	110	74	60	M 6	30	177	117	115	14	M 6	5 x 5
VA 01	110	145	102	82	M 8	35	222	152	150	22	M 8	6 x 6
VA A1	140	175	130	105	M 10	45	274	184	182	32	M 10	10 x 8
VA B1	170	215	160	130	M 12	60	344	224	222	42	M 12	12 x 8

* See page 28, mounting holes k

Input Dimensions d ₁ 1:1 2:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
VA 000	11	23	89	42	12	M 5	4 x 4
VA 00	13	30	110	52	14	M 6	5 x 5
VA 01	14	35	135	70	22	M 8	6 x 6
VA A1	14	45	165	90	32	M 10	10 x 8
VA B1	18	60	210	110	42	M 12	12 x 8

Input Dimensions d ₁ 3:1							
Gearbox Size	g	l ₁	m ₁	o	d _{1j6}	r	Key DIN 6885/1
VA 000	11	19	83	42	9	M 4	3 x 3
VA 00	13	25	105	52	12	M 5	4 x 4
VA 01	14	35	135	70	22	M 8	6 x 6
VA A1	14	45	165	90	32	M 10	10 x 8
VA B1	18	55	205	100	36	M 10	10 x 8

Models S / AS / W

Switching and Reversing Spiral Bevel Gearboxes

DieQua switching and reversing spiral bevel gearboxes provide a high accuracy, reliable means of disconnecting or reversing individual machine elements.

In other areas of application such as in auxiliary or emergency drives or in the agricultural industry the use of these gearboxes provides an economic solution. Component parts from the switching arrangement are individually adjusted by our fitters on assembly to ensure safe, reliable operation.

Special options such as electro-mechanical or pneumatic operation of the switch lever provide alternative methods of operation which enable the gearboxes to be installed in inaccessible locations. You have the choice of three variants of switching and reversing gearboxes. The AS version allows the d2 shaft to be disengaged.

The S version allows the d2 shaft to be disengaged and to have its direction of rotation reversed. Finally, the W version has a two piece through shaft which can be disengaged or reversed in direction.

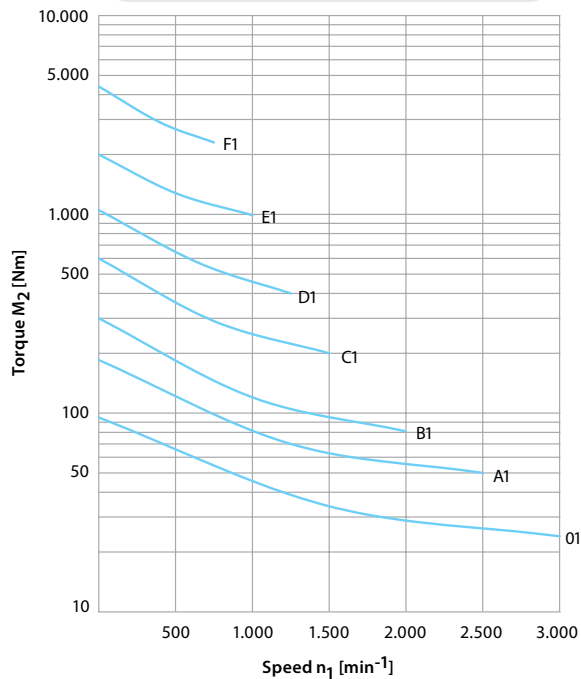


Performance Data

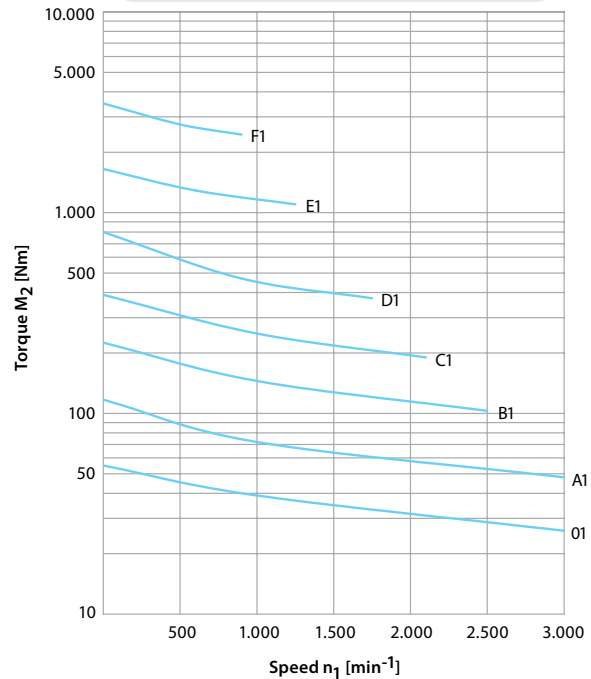
S
AS
W

- Permissible Torques at Output Shaft d2
- Torques for other ratios upon request

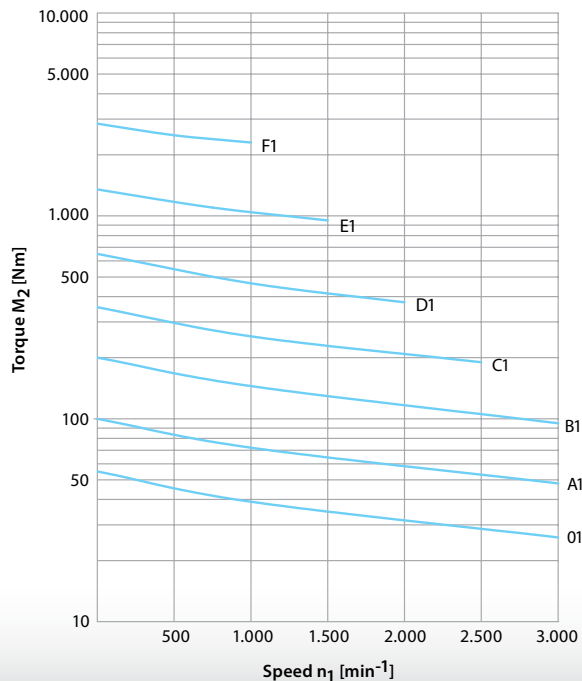
$i = n_1 : n_2 = 1:1$



$i = n_1 : n_2 = 2:1$



$i = n_1 : n_2 = 3:1$



Model S / AS

Switching Spiral Bevel Gearboxes

Spiral bevel gearboxes where the output shaft can be disengaged from the input shaft (series AS). The S series adds the capability to reverse the direction of the output shaft relative to the input shaft.

- Application Data can be found on page 41
- When ordering, please specify the mounting position, see page 40
- Quality characteristics, backlash and specifications can be found on pages 44-46
- Gear arrangements I and III are possible

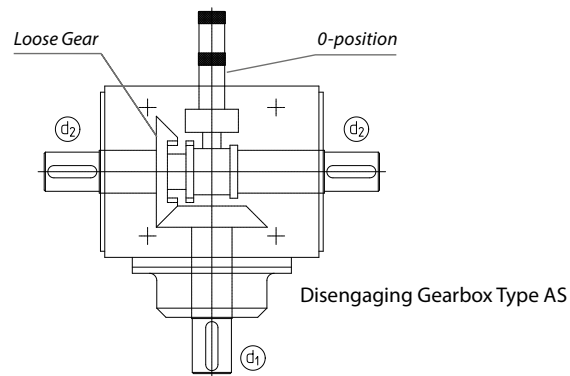
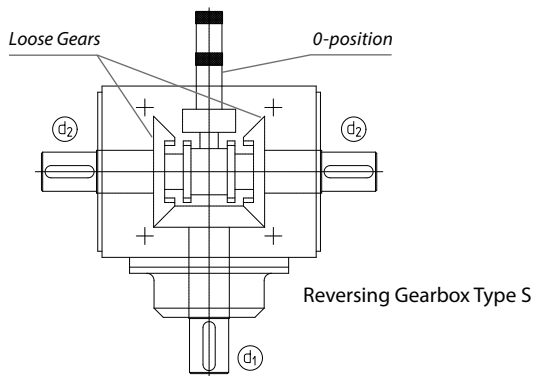


Ratios:

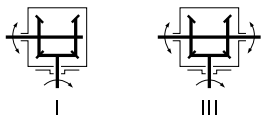
$$i = n_1:n_2 = 1:1 \text{ up to } 3:1$$

Depending on gearbox size

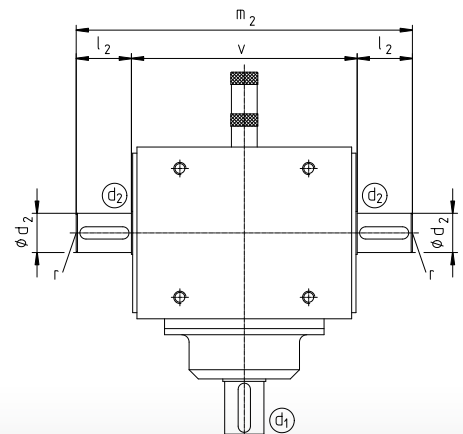
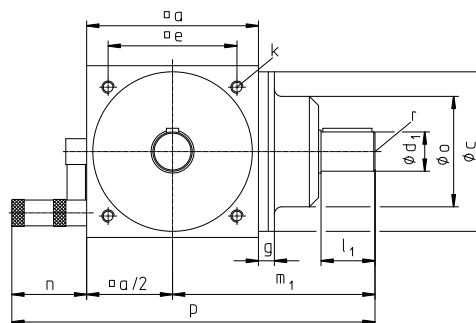
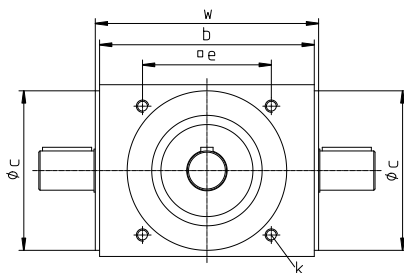
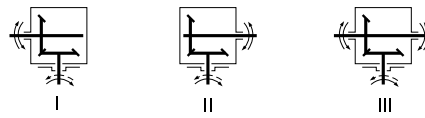
Please contact DieQua if alternative ratios are needed.



Internal Gear Arrangements



Internal Gear Arrangements



The angle of the keys relative to one another shown is only symbolic.

There is no defined reference position.

Gear arrangement III is shown, for more gear arrangements see page 22

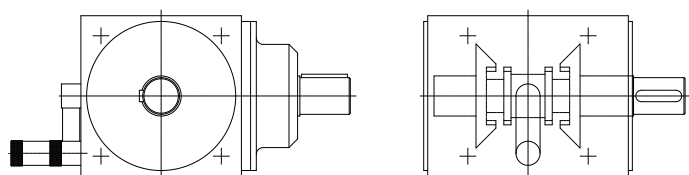
Dimensional Data

Dimensions Not Dependent on Ratio										Output Shaft Dimensions d_2		
Gearbox Size	a	b	c_7	e	k Depth $= 1.5 \cdot k$	l_2	m_2	v	w	d_{2j6}	r	Key DIN 6885/1
S/AS 01	110	145	102	82	M 8	35	222	152	150	22	M 8	6 x 6
S/ASA1	140	175	130	105	M 10	45	274	184	182	32	M 10	10 x 8
S/ASB1	170	215	160	130	M 12	60	344	224	222	42	M 12	12 x 8
S/ASC1	210	260	195	160	M 16	85	440	270	268	55	M 16	16 x 10
S/ASD1	260	330	245	200	M 16	100	540	340	338	65	M 16	18 x 11
S/ASE1	330	430	310	260	M 20	120	680	440	438	75	M 20	20 x 12
S/ASF1	400	530	380	320	M 24	150	840	540	538	90	M 24	25 x 14

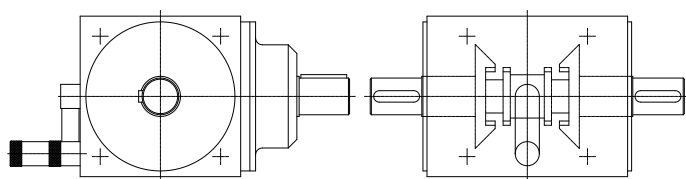
Input Dimensions d_1 1:1 1.25:1 1.5:1 1.75:1 2:1									
Gearbox Size	g	l_1	m_1	n	o	p	d_{1j6}	r	Key DIN 6885/1
S/AS 01	14	35	135	65	70	255	22	M 8	6 x 6
S/ASA1	14	45	165	65	90	300	32	M 10	10 x 8
S/ASB1	18	60	210	80	110	375	42	M 12	12 x 8
S/ASC1	18	85	275	80	135	460	55	M 16	16 x 10
S/ASD1	23	100	340	80	150	550	65	M 16	18 x 11
S/ASE1	29	120	435	80	230	680	75	M 20	20 x 12
S/ASF1	40	150	550	80	270	830	90	M 24	25 x 14

Input Dimensions d_1 3:1									
Gearbox Size	g	l_1	m_1	n	o	p	d_{1j6}	r	Key DIN 6885/1
S/AS 01	14	35	135	65	70	255	22	M 8	6 x 6
S/ASA1	14	45	165	65	90	300	32	M 10	10 x 8
S/ASB1	18	55	205	80	100	370	36	M 10	10 x 8
S/ASC1	18	65	255	80	135	440	38	M 10	10 x 8
S/ASD1	32	85	325	80	135	535	55	M 16	16 x 10
S/ASE1	29	85	400	80	190	645	55	M 16	16 x 10
S/ASF1	40	120	520	80	270	800	75	M 20	20 x 12

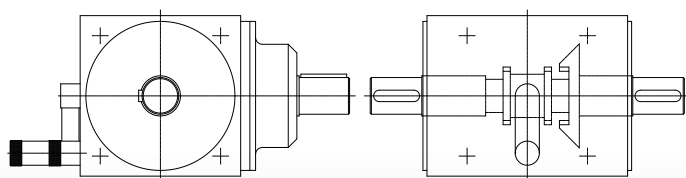
Standard Switch Lever



Reversing gearbox S / gear arrangement I / standard switch lever position



Reversing gearbox S / gear arrangement III / standard switch lever position



Disengaging gearbox AS / gear arrangement III / standard switch lever position

- Switch angle 70° to 80° from 0-position
- Gearbox must be stationary, with no load, before switching
- For more ratios, see pages 36 and 37

Model W

Reversing Spiral Bevel Gearboxes W

With a constant direction of input shaft d_1 , the direction of rotation of the through shaft (d_2 loose gear) can be switched to rotate in the same or opposite directions. The gearbox can be supplied either with or without shaft d_1 .

- Application Data can be found on page 41
- When ordering, please specify the mounting position, see page 40
- Quality characteristics, backlash and specifications can be found on pages 44-46

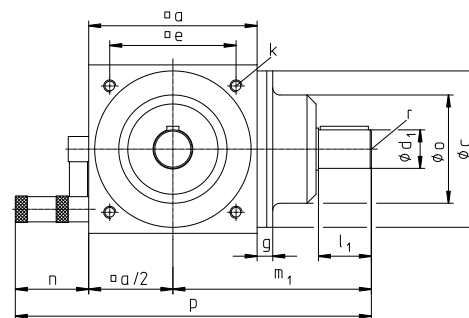
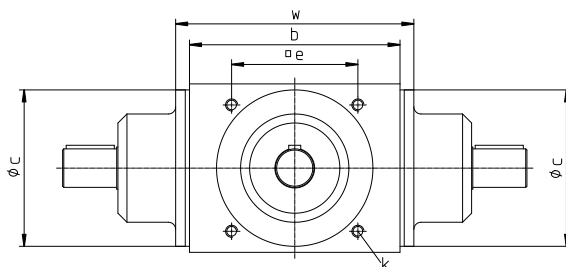
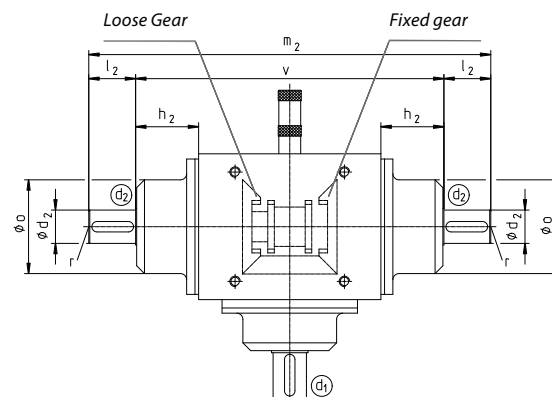
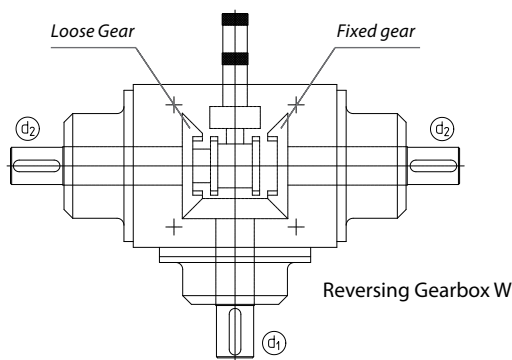


Ratios:

$$i = n_1:n_2 = 1:1 \text{ up to } 2:1$$

Depending on gearbox size

Please contact DieQua if alternative ratios are needed.



The angle of the keys relative to one another shown is only symbolic.

There is no defined reference position.

Switching Options

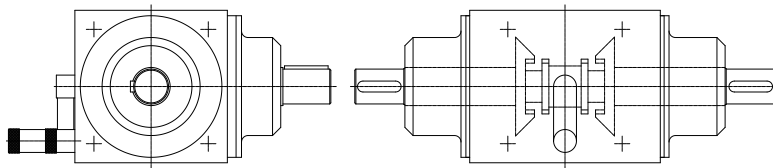
In addition to the conventional manual operation of the switch lever, we can offer pneumatic, hydraulic, electric and electro-mechanical switching options.

Gear arrangement III is shown, for more gear arrangements see page 22

Dimensional Data

Dimensions Not Dependent on Ratio																		
Gearbox Size	a	b	c _{j7}	e	g	h ₂	k Depth = 1.5 • k	l ₁ l ₂	m ₁	m ₂	n	o	p	v	w	d _{1j6} d _{2j6}	r	Key DIN 6885/1
W01	110	145	102	82	14	47,5	M 8	35	135	310	65	70	255	240	161	22	M 8	
WA1	140	175	130	105	14	60,5	M 10	45	165	386	65	90	300	296	185	32	M 10	
WB1	170	215	160	130	18	69,5	M 12	60	210	474	80	110	375	354	228	42	M 12	
WC1	210	260	195	160	18	73,0	M 16	85	275	576	80	135	460	406	272	50	M 16	
WD1	260	330	245	200	23	94,0	M 16	95	335	708	80	150	545	518	344	60	M 16	

Standard Switch Lever



Reversing spiral bevel gearboxes W/gear arrangement III/ standard switch lever position

- Switch angle 70° to 80° from 0-position
- Gearbox must be stationary, with no load, before switching
- For more ratios, see pages 36 and 37

Model S & W

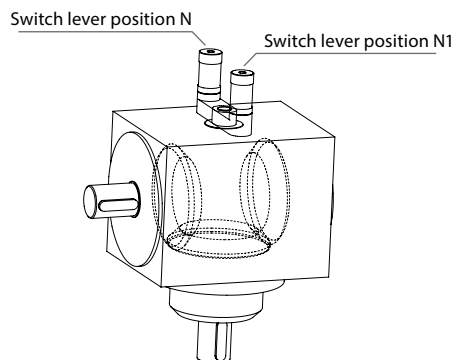
Position of Switch Lever for Disengaging and Reversing Gearboxes According to Dimension Sheet S 507

In general, the switch lever of a standard gearbox is assembled at the lower position, on the face opposite the pinion shaft d1.

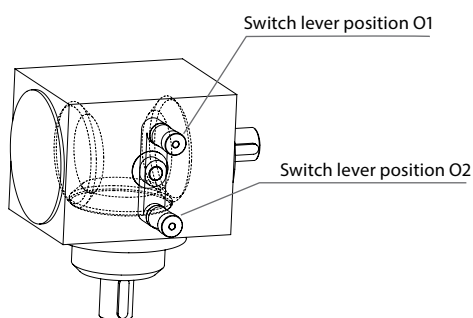
For special assembly conditions the switch lever may also be assembled as shown. In the order, please define the position as follows: S507 U2.

S With Gear Arrangement I

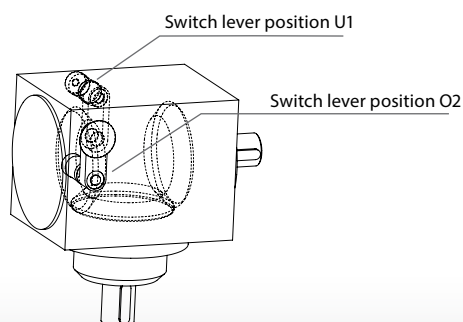
S 507
N or N1



S 507
O1 or O2

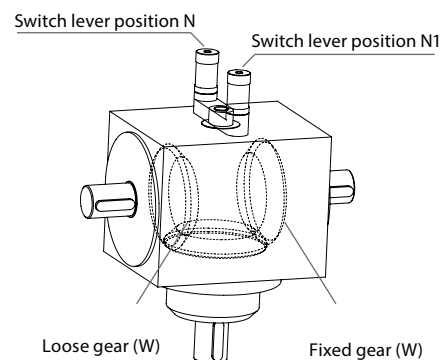


S 507
U1 or U2

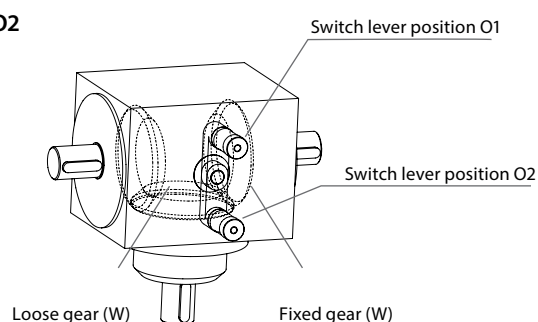


S / W With Gear Arrangement III

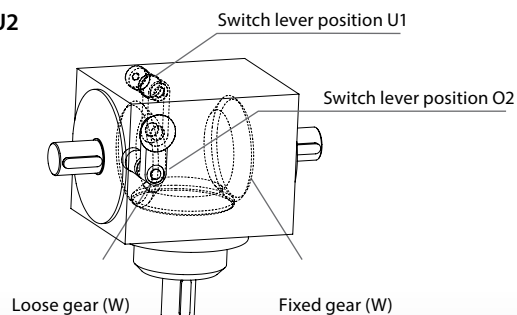
S 507
N or N1



S 507
O1 or O2



S 507
U1 or U2

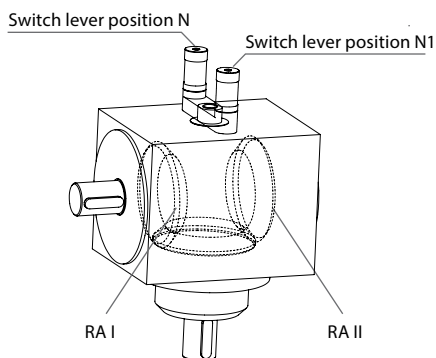


Position of Switch Lever for Disengaging Gearboxes According to Dimension Sheet S 507

AS

With Gear Wheel Arrangement I or II

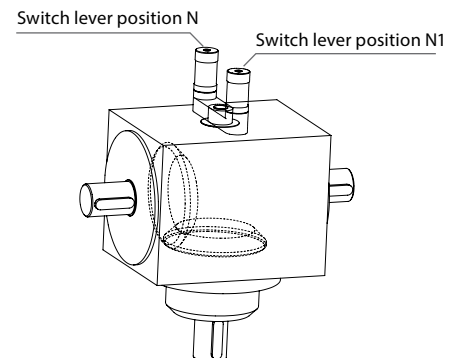
S 507
N or N1



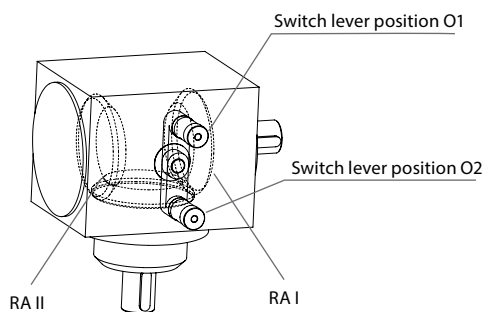
AS

With Gear Wheel Arrangement III

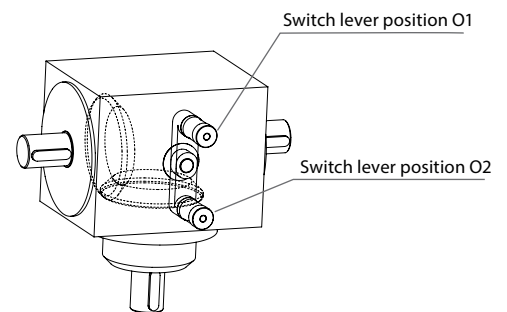
S 507
N or N1



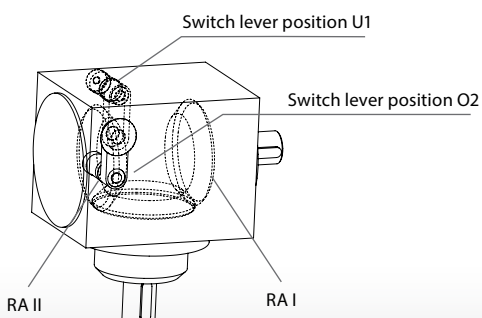
S 507
O1 or O2



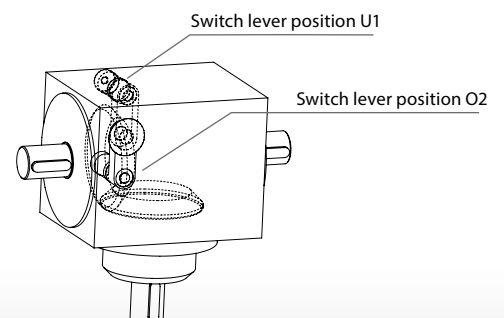
S 507
O1 or O2



S 507
U1 or U2



S 507
U1 or U2



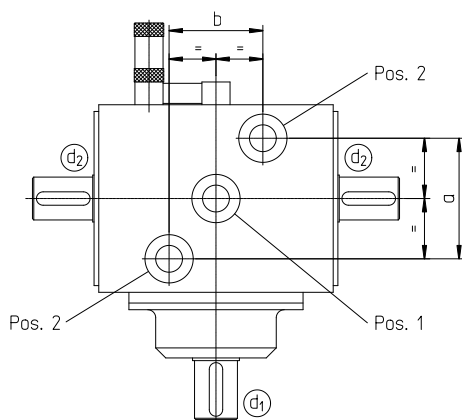
Characteristics & Specifications

Models S / AS / W

Backlash at Shaft d_2

Gearbox Size	01 - B1	C1 - F1
Standard design [arc min.]	9'	10'
Reduced backlash SF [arc min.]	6'	8'

Position of Oil Filter and Drain Plugs



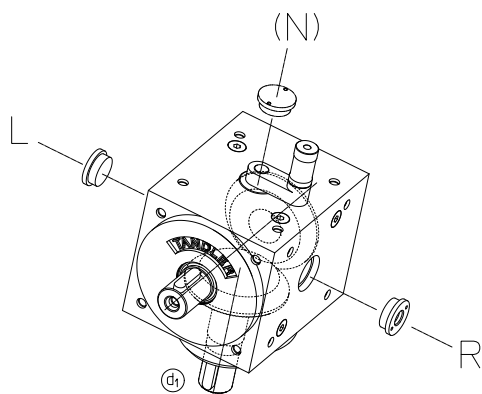
Screw Plug Dimensions						
Gearbox Size	Quantity	Thread / Position 1	Quantity	Thread / Position 2	a	b
01	2	M 30 x 1.5	6	M 12 x 1.5	58	67
A1	2	M 30 x 1.5	6	M 12 x 1.5	90	70
B1	2	M 30 x 1.5	6	M 30 x 1.5	100	68
C1	2	M 30 x 1.5	6	M 30 x 1.5	110	98
D1	2	M 30 x 1.5	6	M 30 x 1.5	146	134
E1	2	M 42 x 1.5	6	M 42 x 1.5	180	168
F1	2	M 48 x 1.5	6	M 48 x 1.5	120	230

Arrangement of the Oil-Level Gauges

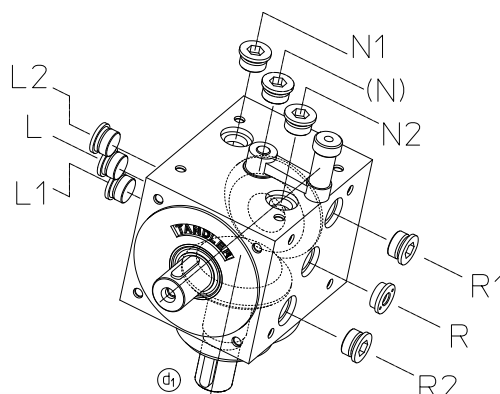
With disengaging and reversing gearboxes, the oil sight glass is mounted in the middle of the casing side at 90° to shaft d_1 . Irrespective of the gear ratio, the oil is filled to the middle of the sight glass.

All gearbox faces are machined and provided with tapped holes for the oil plugs and sight glass to allow for alternative oil sight positions.

Where an alternative position is required, please use the diagram below to establish the designation and indicate it to us on your order.



Gearbox size 01; A1



Gearbox size B1 - F1

Characteristics & Specifications

Models S / AS / W

Lubricants and Lubricant Quantities

The selection of lubricants and their viscosity is made taking into account the type, scope, speed, backlash and operating temperature of the gearbox. The run-tested spiral bevel gearboxes are supplied filled with the correct quantity of mineral oil CLP to DIN 51517-3 ISO VG 68.

The position of the oil sight glass can be changed to suit the application. The oil sight glass and screw plugs are sealed with O-rings. The oil change intervals are dependent on the operating conditions. To extend the oil change intervals, gearboxes can be supplied filled with fully synthetic oil. For low speeds applications we recommend fluid grease GP 00 according to DIN 51826, which can be filled by the customer. All gearboxes can be supplied with food grade oils and greases.

Splash Lubrication

Suitable for peripheral speed of spiral bevel gears up to 15 m/sec. Above 15 m/sec forced lubrication is recommended. The peripheral speed can be calculated using the gear pitch circle diameter d_0 given on page 54.

Standard initial fill: Mineral oil CLP to DIN 51517-3 ISO VG 68

Optional initial fill: Synthetic, food grade or other special oils

Lubricant Quantities		
Gearbox Size	Oil [Ltr.] S/AS	Oil [Ltr.] W
01	0.23	0.25
A1	0.58	0.60
B1	1.10	1.15
C1	2.20	2.35
D1	4.50	4.40
E1	11.00	-
F1	23.00	-

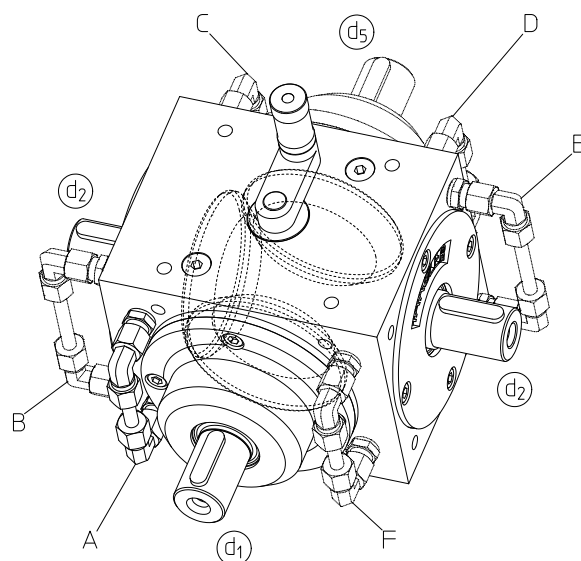
Quantities listed are approximate values.

Oil Gauge for Gearboxes with Additional Shaft Extensions (S 545)

When gearboxes are specified with additional shaft extensions, and all shafts are in the horizontal plane, it is not possible to use the standard oil sight glass. A special angular oil level indicator (as shown opposite) is recommended.

To ensure that the oil level indicator is visible after installation of the gearbox, the correct position, eg S545-A (as shown in the data sheet S545 and diagram opposite) must be specified.

Further positions upon request.



Technical Data /Mass Moments of Inertia / External Loads

On request, we can provide further data such as inertia or more information regarding radial and axial loads, which are dependent on operating conditions such as speed and torque transmitted.

Technical questions will be answered in a timely manner.

Gearbox Specifications

On the following pages you will find general information and data about our spiral bevel gearboxes. Should you have any questions, please contact us.

For information on torque capacity, radial load, weights, lubricants, position of filler and drain plugs, arrangement of the oil sight glasses or angular oil level indicators see "quality characteristics | specifications", in the particular gearbox range.

Ordering Information

An ordering example is shown below.

The following important additional information is also required to complete your order:

1. Speed
2. Mounting position (shafts horizontal or vertical)
3. Exceptional environmental conditions

Should you have any questions, please give us a call and we will be happy to be of assistance!

Example 1	E1	–	EA III	–	6:1	
Example 2	HW	–	A1	–	III	– 2:1 – S...
Example 3	HL HWS	–	01	–	II	– 1:1 – S...
	Series		Gearbox Size		Gear Arrangement	Overall Ratio $i=n_1:n_2$
						Special Number

In this section

Designation of gearbox faces, identification	48
determination of application data.....	49
determination of gearbox ratio.....	49
Service factors for the selection of gearboxes	49
Gear arrangements	50
Vertical installation.....	54
Definition of quality classes	54
Measurement of gearbox accuracy	55

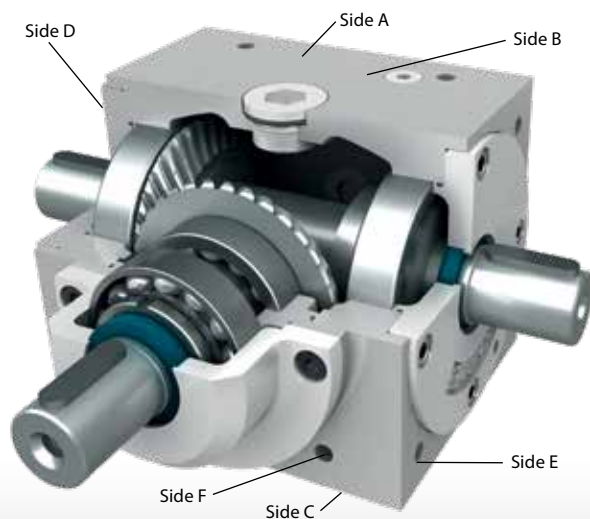
Special Design Number

On ordering, each new design is issued with a unique special design number, which is advised to you in the order confirmation.

A corresponding special design data sheet is sent to you for approval. For subsequent orders, please specify the special design number.

Designation of Gearbox Faces

According to DieQua Standard TN 1



Identification Details

As standard, the spiral bevel gearbox identification details are marked on gearbox side A. Here you will find the gearbox type, specification and serial number.

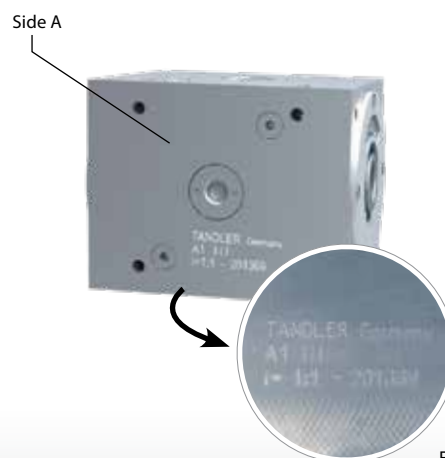


Figure 48.1

Gearbox Specifications

Determination of Application Data

Power	P [kW]	1 kW = 1,36 PS
Torque	M [Nm]	1 Nm = 0,102 kpm
Speed	n [min ⁻¹]	1 min ⁻¹ = 0,1047 rad/s
Radial load	FR [N]	
Weight	m [kg]	

Input torque	M ₁ (an/to d1) [Nm]
Output torque	M ₂ (an/to d2) [Nm]
Nominal torque of motor	M _n [Nm]
Calculated or measured output torque	M _{eff} [Nm]

$$M = \frac{30\,000}{\pi} \times \frac{P}{n} \approx 9550 \times \frac{P}{n}$$

$$M_2 = M_1 \times i$$

Determination of the Ratio

Generally applicable: $i = \frac{n_1}{n_2} = \frac{\text{speed of shaft } d_1}{\text{speed of shaft } d_2}$

Note: the term ratio always applies regardless whether the speed is increasing or reducing.

Example: speed n₁ of shaft d₁ = 1500 min⁻¹
speed n₂ of shaft d₂ = 750 min⁻¹

$$i = \frac{n_1}{n_2} = \frac{1500}{750} = \frac{2}{1} = 2:1$$

Relate to n₁, speed reduction

When placing an order, the ratio specified by Tandler must be observed. On order to avoid errors DieQua will assume that n₁ applies to shaft d₁ (flange side) and n₂ applies to shaft d₂.

Service Factors Used in the Selection of Gearboxes

Where the gearbox is selected on basis of the nominal torque of the motor, the driving as well as the driven machines have to be taken into consideration (factor c). Thus, the following formula applies:

$$M_2 > M_n \times i \times c$$

Where the actual application torque is used for gearbox selection, this factor does not have to be taken into consideration. It is evident that the maximum calculated torque must be lower than the gearbox torque capacity.

$$M_2 > M_{\text{eff}} \times i$$

Operation	Application Factor (c)	Machine (examples)
I Almost Shockfree	1	Electric motor (smooth operation), power generators, screw conveyors, lightly loaded elevators, feed drives for machine tools, fans, lathes
II Moderate Shocks	1.5	Electric motor (irregular operation), main drive for machine tools, conveyors for unit loads, piston or centrifugal pumps, winches, trolleys
III Heavy Shocks	2	Single-cylinder piston engine, woodworking machine, light ball mill, blooming mill, hoist, screw press
IIII Strong Shocks	2.5	Excavators, heavy ball mill, crusher (stone, ore), mechanical hammers

When the load on the output shaft is oscillating due to a high number of torque reversals, please use a plain output shaft without key and a shrink disk connection.

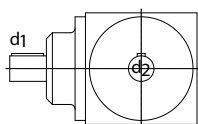
Gearbox Specifications

Vertical Installation (S 515)

Please advise us of the mounting position. When a shaft is vertical, the lubrication of the upper bearings must be maintained.

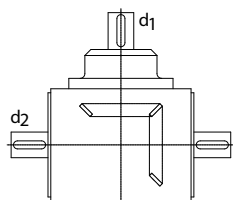
Standard

Mounting Position standard
(all shafts horizontal)



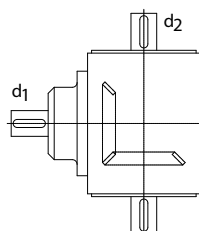
S 515 d1

Mounting Position S515 d1
(d1 vertical up)



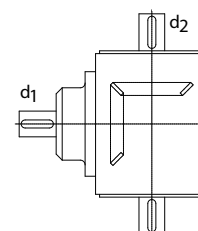
S 515 d2L

Mounting Position S515 d2L
(d2 vertical, ring gear at the bottom)



S515 d2R

Mounting Position S515 d2R
(d2 vertical, ring gear at the top)



Definition of Quality Class

Standard – Standard gearbox, available with reduced backlash on request. Supplied without test report.

Quality Class 2 (G2) – Precision gearbox with selected gear sets. Available with reduced backlash on request. Supplied with test report.

Quality Class 1 (G1) – High precision gearbox with high accuracy gear sets. Available with reduced backlash on request. Supplied with test report.

Classification With Regard to Transmission Error

Gearbox Size	Pitch circle diameter of large spiral bevel gear	Transmission error in arc minutes F'_i / Quality Class			1 arc minute at the pitch circle diameter
	$\varnothing d_0$ [mm]	Standard	Quality Class 1 (G1)	Quality Class 2 (G2)	
000	61	> 5.0	-	-	0.0058 mm
00	55	> 4.5	< 2.5	2.5 - 4.5	0.0073 mm
01	80	> 4.0	< 2.3	2.3 - 4.0	0.0116 mm
A1	100	> 4.0	< 2.3	2.3 - 4.0	0.0145 mm
B1	125	> 4.0	< 2.1	2.1 - 4.0	0.0182 mm
C1	150	> 3.8	< 2.1	2.1 - 3.8	0.0218 mm
D1	190	> 3.5	< 2.0	2.0 - 3.5	0.0276 mm
E1	225	> 3.5	< 2.0	2.0 - 3.5	0.0327 mm
F1	300	> 3.5	< 2.0	2.0 - 3.5	0.0436 mm
Quality according to DIN 3965		≈ 7	≈ 4	≈ 5-6	-

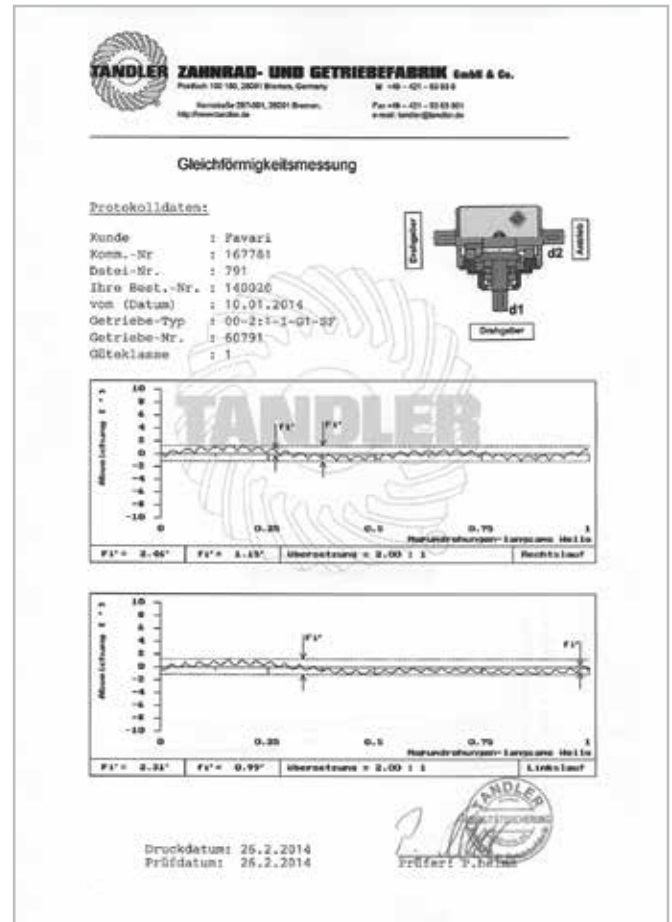
The values for class 1 shall apply to all ratios.

For standard gearboxes and class 2 gearboxes, where the ratio $i \neq 1:1$, the value of F'_i as specified in the table may differ by up to 2 arc minutes. At higher ratios, it may not be possible to achieve the values indicated due to limitations of machining.

Gearbox Specifications

Measurement of Gearbox Accuracy

In our climate controlled inspection department, equipped with the most up to date inspection equipment, we can precisely measure our gears and gearboxes. In this way we can, for example, provide single flank test reports on assembled gearboxes and accurate information regarding backlash.



Our gear boxes are individually assembled with the gears set to the correct contact pattern to achieve the optimum torque transmission.

Technical Data

Standard / HW / HWS / HWK / HWZ / WV / HRZ / F

Backlash at Shaft d_2

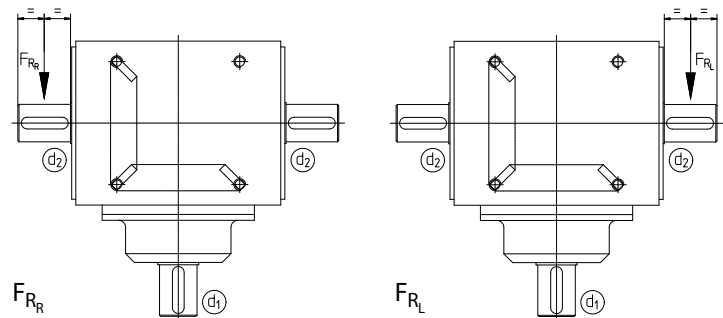
Gearbox Size	000 - B1	C1 - F1
Standard Design [arc min.]	6'	7'
Reduced Backlash SF [arc min.]	4'	4'

Depending on the application 1 arc min may also be possible

Permissible Radial Load

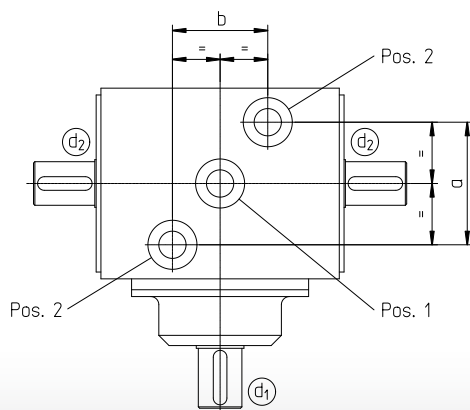
Permissible Radial Load at Shafts d_2^*					
Gearbox Size	Ratio $i=n_1:n_2$	Standard		Reinforced Bearing (S 523)	
		F_{R_R} [N]	F_{R_L} [N]	F_{R_R} [N]	F_{R_L} [N]
000	1:1	550	700	-	-
000	2:1, 3:1	800	850	-	-
00	1:1	700	900	2900	3000
00	2:1 to 5:1	1050	1150	3400	3500
01	1:1	1150	1550	5500	5700
01	2:1 to 6:1	1700	1900	6200	6400
A1	1:1	2800	3300	7500	8000
A1	2:1 to 6:1	3900	4300	8500	9000
B1	1:1	4300	4900	11000	12000
B1	2:1 to 6:1	5600	6100	12000	13000
C1	1:1	5600	7000	15000	16000
C1	2:1 to 6:1	7500	8000	17000	17000
D1	1:1	10000	12500	25000	28000
D1	2:1 to 6:1	13500	14500	28000	30000
E1	1:1	12000	17000	34000	39000
E1	2:1 to 6:1	16000	19000	39000	42000
F1	1:1	22000	25000	-	-
F1	2:1 to 6:1	28000	33000	-	-

Radial loads for different conditions, and on d_1 shaft on request



* Values apply for 50% of the allowable torque at 50% of maximum speed (see diagram on page 8-9).

Position of Oil Filter and Drain Plugs



Screw Plug Dimensions					
Gearbox size	Quantity	Thread / Position 1	Quantity	Thread / Position 2	a b
000	3	M 20 x 1.5	-	-	- -
00	2	R 3/4"	6	M 12 x 1.5	39.6 39.6
01	2	M 30 x 1.5	6	M 12 x 1.5	58 67
A1	2	M 30 x 1.5	6	M 12 x 1.5	90 70
B1	2	M 30 x 1.5	6	M 30 x 1.5	100 68
C1	2	M 30 x 1.5	6	M 30 x 1.5	110 98
D1	2	M 30 x 1.5	6	M 30 x 1.5	146 134
E1	2	M 42 x 1.5	6	M 42 x 1.5	180 168
F1	2	M 48 x 1.5	6	M 48 x 1.5	120 230

Size 000: each face is fitted with a screw plug, no oil sight

Size 00: diagonal pattern of plugs is opposite to figure 21.1

Standard / HW / HWS / HWK / HWZ / WV / HRZ / F

Arrangement of the Oil-Level Gauges

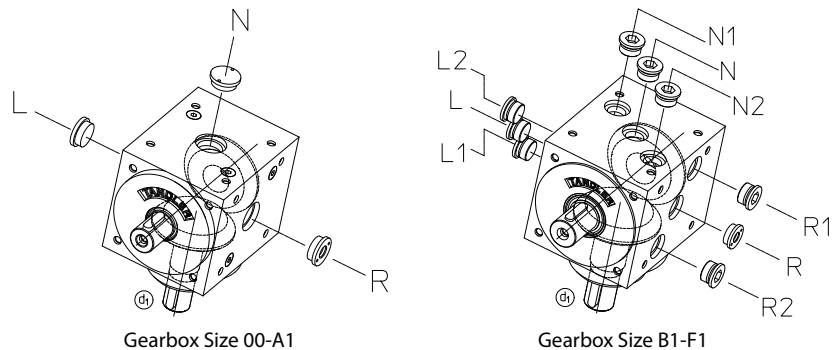
For standard gearboxes, sizes 00, 01 and A1, irrespective of ratio, the sight glass is always in the middle of the casing, with the oil level to the middle of the sight glass.

For gearbox sizes B1; C1; D1; E1; F1, with 1:1 ratio, the oil sight glasses are always fitted at the lowest position, with the oil level at the center of the sight glass.

For gearbox ratios other than 1:1, the oil sight is fitted in the middle of the casing. All gearbox faces are machined and provided with tapped holes for the oil plugs and sight glass to allow for alternative oil sight positions.

Where an alternative position is required, please use the diagram below to establish the designation and indicate it to us on your order.

Possible positions of the oil sight glass (S 506)



Lubricants and Lubricant Quantities

The selection of lubricants and their viscosity is made taking into account the type, scope, speed, backlash and operating temperature of the gearbox. The run-tested spiral bevel gearboxes are supplied filled with the correct quantity of mineral oil CLP to DIN 51517-3 ISO VG 68.

The position of the oil sight glass can be changed to suit the application. The oil sight glass and screw plugs are sealed with O-rings. The oil change intervals are dependent on the operating conditions. To extend the oil change intervals, gearboxes can be supplied filled with fully synthetic oil. For low speeds applications we recommend fluid grease GP 00 according to DIN 51826. All gearboxes can be supplied with food grade oils and greases.

Splash Lubrication

Suitable for peripheral speed of spiral bevel gears up to 15 m/sec. Above 15 m/sec forced lubrication is recommended. The peripheral speed can be calculated using the gear pitch circle diameter d_0 given on page 54.

Standard initial fill: Mineral oil CLP to DIN 51517-3 ISO VG 68

Optional initial fill: Synthetic, food grade or other special oils

Lubricant Quantities

Gearbox Size	Oil [Ltr.] $i = 1:1$	Oil [Ltr.] $i \neq 1:1$	Grease [kg]
000	0.03	0.05	0.05
00	0.10	0.10	0.15
01	0.25	0.25	0.45
A1	0.60	0.60	1.00
B1	0.80	1.15	1.60
C1	1.50	2.25	3.00
D1	3.00	4.40	6.00
E1	8.00	11.00	15.00
F1	13.00	23.00	19.00

Quantities listed are approximate values.

Grease Lubrication

For peripheral speed of spiral bevel gears up to 3m/ sec, grease lubrication is recommended. The peripheral speed can be calculated using the gear pitch circle diameter d_0 given on page 54.

Standard initial fill: Aral Aralub FDP 00

Optional initial fill: Synthetic, food grade or other special greases

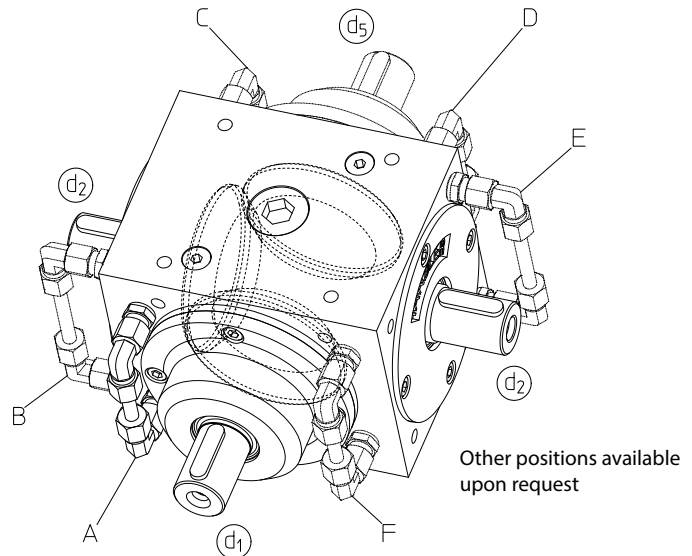
Technical Data

Standard / HW / HWS / HWK / HWZ / WV / HRZ / F

Oil gauge for gearboxes with additional shaft extensions (S 545)

When gearboxes are specified with additional shaft extensions, and all shafts are in the horizontal plane, it is not possible to use the standard oil sight glass. A special angular oil level indicator (as shown opposite) is recommended.

To ensure that the oil level indicator is visible after installation of the gearbox, the correct position, eg S545-A (as shown in the data sheet S545 and diagram opposite) must be specified.



Weights

Gearbox Size	Basic Model		Series HW HWK HWZ		Series HWS		Series WV		Series HRZ		Series F	
	Standard Version	Aluminium Version										
000	2.5	1.5	HW 000	2.5	HWS 000	2.5	-	-	-	-	-	-
00	5	3	HW 00	5	HWS 00	5	WV 00	5.2	-	-	160 F00	6.5
01	11	7	HW 01	11	HWS 01	11.5	WV 01	12.5	HRZ 01	10.5	160 F01	14
A1	21	12	HW A1	20	HWS A1	21	WV A1	22.5	HRZ A1	20.5	200 FA1	26
B1	36	23	HW B1	34	HWS B1	35	WV B1	38.5	HRZ B1	35	200 FB1	42
C1	64	44	HW C1	59	HWS C1	61	WV C1	67	HRZ C1	61	300 FC1	74
D1	124	-	HW D1	116	HWS D1	120	WV D1	131	HRZ D1	119	350 FD1	140
E1	250	-	HW E1	241	HWS E1	247	WV E1	266	HRZ E1	242	-	-
F1	455	-	HW F1	422	HWS F1	429	WV F1	460	-	-	-	-

Small deviations of the weights are possible.

Technical Data / Mass Moments of Inertia / External Loads

On request, we can provide further data such as inertia or more information regarding radial and axial loads, which are dependent on operating conditions such as speed and torque transmitted.

Technical questions will be answered in a timely manner.

Characteristics & Specifications

Model VA

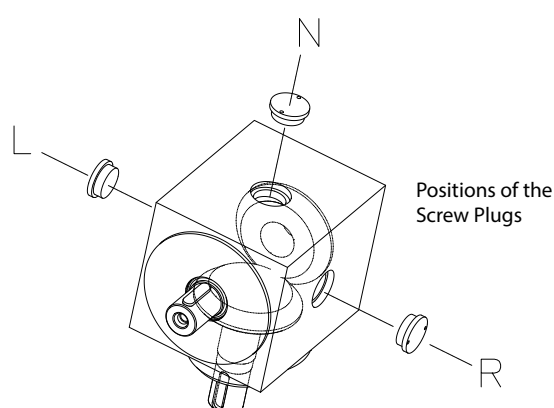
Backlash at Shaft d_2

See Spiral Bevel Gearbox in Standard Version on page 20

Permissible Radial Load

See Spiral Bevel Gearbox in Standard Version on page 20

Position of Oil Filter and Drain Plugs



Tread for Screw Plugs	
Gearbox size	Thread
VA 000	M 20 x 1.5
VA 00	R 3/4"
VA 01	M 30 x 1.5
VA A1	M 30 x 1.5
VA B1	M 30 x 1.5

Lubricants and Lubricant Quantities

The selection of lubricants and their viscosity is made taking into account design, circumferential speed of the gears, backlash and the operating temperature of the gearbox. The run-tested VA stainless steel gearboxes are supplied with the required filling of food grade NSF-H1 synthetic oil. Under normal operating conditions, (gearbox temperature up to 80° C), DieQua stainless steel gearboxes VA are lubricated for life.

Lubricant Quantities		
Gearbox Size	Oil [Ltr.]	Grease [kg]
VA 000	0.04	0.05
VA 00	0.10	0.15
VA 01	0.20	0.45
VA A1	0.40	1.00
VA B1	0.80	1.60

Quantities listed are approximate values.

Splash Lubrication

Suitable for peripheral speed of spiral bevel gears up to 15 m/sec. Above 15 m/sec forced lubrication is recommended. The peripheral speed can be calculated using the gear pitch circle diameter d_0 given on page 54.

Standard initial fill: Lubrication with synthetic oil to NSF-H1 specification

Grease Lubrication

For peripheral speed of spiral bevel gears up to 3m/ sec, grease lubrication is recommended. The peripheral speed can be calculated using the gear pitch circle diameter d_0 given on page 54.

Standard initial fill: Lubrication with synthetic grease to NSF-H-1 specification

Characteristics & Specifications

Weights

Gearbox Size	Basic Model	Series HW HWK HWZ		Series HWS	
VA 000	2.2	VA HW 000	2.2	VA HWS 000	2.2
VA 00	5.5	VA HW 00	5	VA HWS 00	5
VA 01	12.5	VA HW 01	11	VA HWS 01	11.5
VA A1	24	VA HW A1	20.5	VA HWS A1	21.5
VA B1	43	VA HW B1	34	VA HWS B1	35

Small deviations of the weights are possible.

Technical Data / Mass Moments of Inertia / External Loads

On request, we can provide further data such as inertia or more information regarding radial and axial loads, which are dependent on operating conditions such as speed and torque transmitted.

Technical questions will be answered in a timely manner.

PowerMaster Gearboxes

Compared to our well-known spiral bevel gearboxes the PowerMaster gearboxes of the same size can transmit up to double the torque.

Transmits the highest torques in the smallest space.

Advantages of PowerMaster Gearboxes

- Extremely high torque capacity
- High permitted overloads for rough service conditions
- Bigger hollow shaft diameters, also with keyway
- Small space envelope



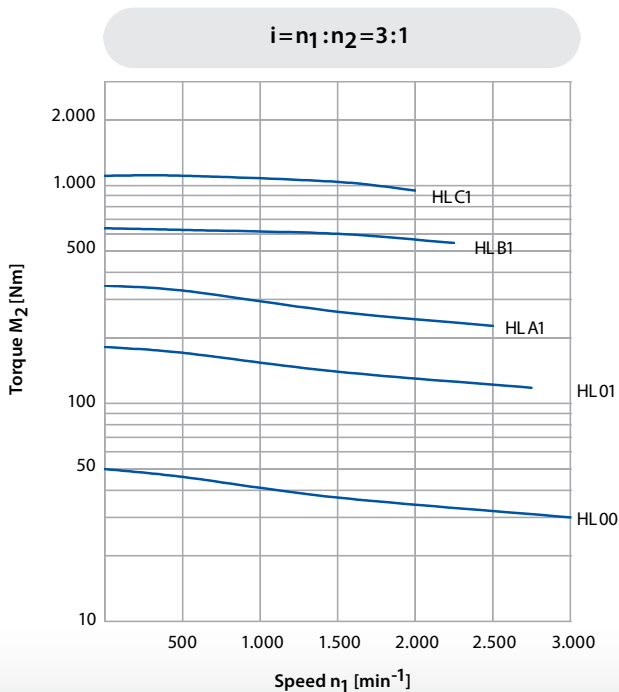
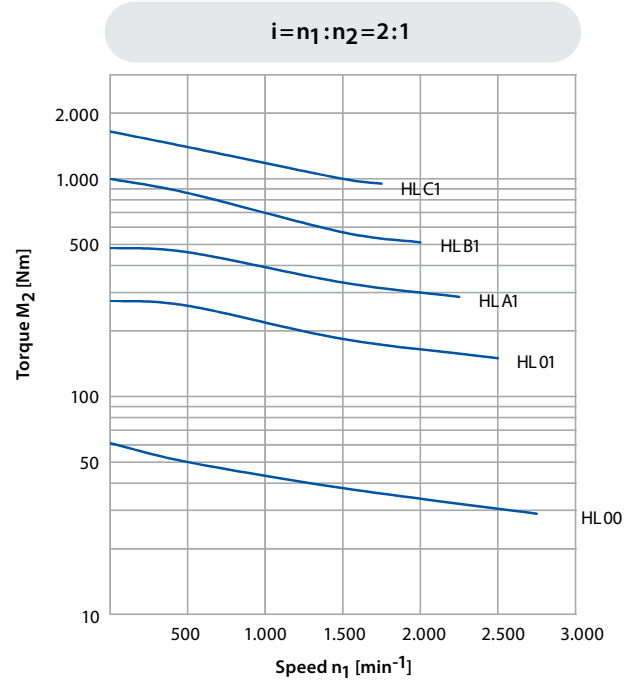
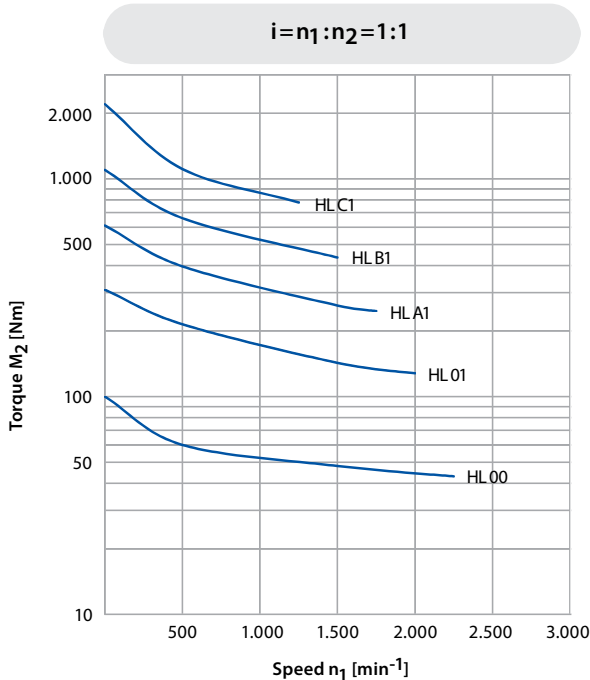
Models HL HW / HL HWS

Performance Data

HL HW
HL HWS

- Torques for other ratios upon request

Permissible Torques at Output Shaft d2



Standard PowerMaster Gearboxes

The standard version of the PowerMaster gearbox has large diameter input and output shafts. These gearboxes are used where the requirement is for high torque transmission within a small space envelope.

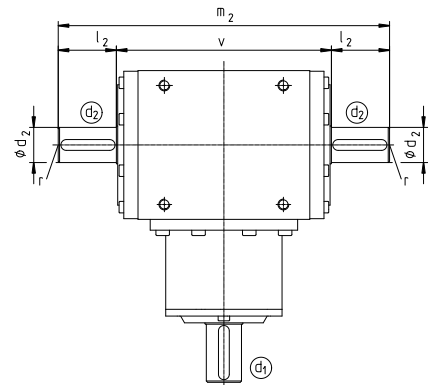
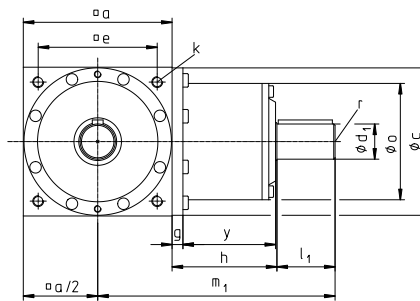
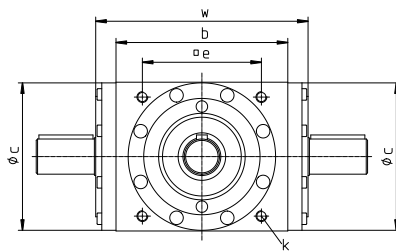
- Application Data can be found on page 44
- When ordering, please specify the mounting position, see page 44
- Quality characteristics, backlash and specifications can be found on pages 46-48
- Permissible torques, see page 51



Ratios:

$i = n_1:n_2 = 1:1$ up to 3:1

Please contact DieQua if alternative ratios are needed.



The angle of the keys relative to one another shown is only symbolic.

There is no defined reference position.

Gear arrangement III is shown, for more gear arrangements see page 22

For ratios i=n ₁ :n ₂ =1:1 2:1 3:1															d ₁			d ₂			
Gearbox Size	a	b	c _{j7}	e	g	h	k Depth = 1.5 • k	l ₁	l ₂	m ₁	m ₂	o	v	w	y	d _{1j6}	r	Key DIN 6885/1	d _{2j6}	r	Key DIN 6885/1
HL 00	80	92	79	64	5	49	M 6	30	30	119	177	60	117	115	43	16	M 6		16	M 6	
HL 01	110	127	108	86	8	77.5	M 8	43	43	175.5	245	86	159	157	68.5	26	M 8		26	M 8	
HL A1	140	155	138	110	8	87	M 10	60	60	217	308	108	188	186	78	36	M 10		36	M 10	
HL B1	170	192	168	134	9	105	M 12	73	73	263	372	128	226	224	95	46	M 12		46	M 12	
HL C1	210	236	208	166	13.5	125	M 16	95	95	325	468	154	278	276	110.5	60	M 16	18 x 11	60	M 16	18 x 11

Models HL HW / HL HWS

PowerMaster Gearboxes with Hollow Shaft

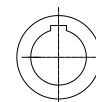
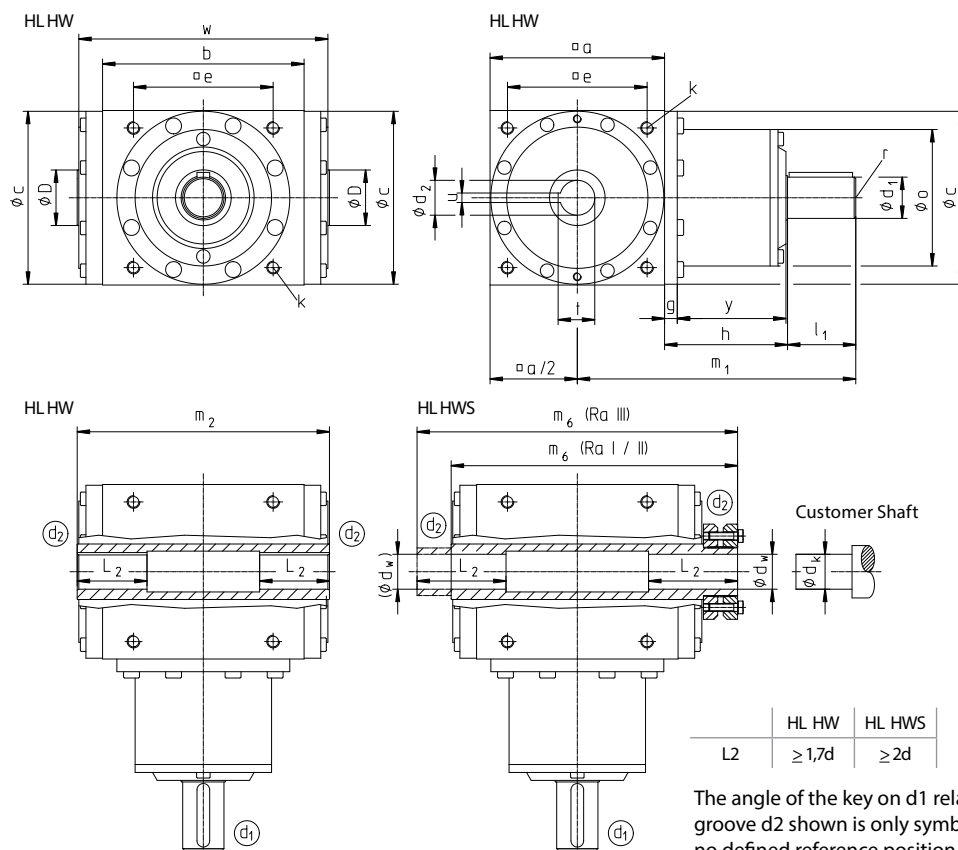
High performance gearboxes with hollow output shaft suitable for direct connection of machine elements, ensuring transmission of torque with small installation space. Versions with keyway and shrink disk connection are available.

- Application Data can be found on page 44
- When ordering, please specify the mounting position, see page 44
- Quality characteristics, backlash and specifications can be found on pages 46-48
- Permissible torques, see page 52

Ratios:

$i = n1:n2 = 1:1$ up to 3:1

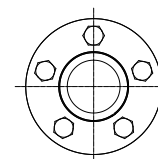
Please contact DieQua if alternative ratios are needed.



HL HW

Hollow Shaft with Keyway
(Hardened, bore ground)

DIN 6885/3



HL HWS

Hollow Shaft with Shrink Disk
(ground)

The shrink disc is always mounted to the extended hollow shaft d2. The standard version includes the delivery of one shrink disk. With gear wheel arrangements I and II (RA I and RA II) the diameter of the hollow shaft opposite the shrink disk = $d_w + 0.5$ mm.

	HL HW	HL HWS
L2	$\geq 1,7d$	$\geq 2d$

The angle of the key on d1 relative to key groove d2 shown is only symbolic. There is no defined reference position.

Disengaging gearbox AS / gear arrangement III / standard switch lever position

	HL HW					HL HWS			Customer Shaft
Gearbox Size	d_2^{H7}	D	m_2	t	u_{JS9}	m_6 RA I, II	m_6 RA III	d_w^{H6}	d_k
HL 00	14	22	117	15.2	5	133.5	150	14	14 h6
HL 01	22	35	159	23.6	6	180.5	202	22	22 h6
HL A1	32	45	188	34.4	10	213.5	239	32	32 h6
HL B1	42	60	226	44.2	12	253.5	281	42	42 h6
HL C1	52	72	278	54.4	16	310	342	52	52 h6

Characteristics & Specifications

PowerMaster Gearboxes

Backlash at Shaft d_2

Gearbox Size	HL 00 - HL C1
Standard Design [arc min.]	6'
Reduced Backlash SF [arc min.]	4'

Depending on the application 1 arc minute may also be possible.

Permitted Radial Load

Permissible Radial Load at Shafts d_2 *			
Gearbox Size	Ratio $i=n_1:n_2$	F_{R_R} [N]	F_{R_L} [N]
HL00	1:1	1300	1700
HL00	2:1	1800	1900
HL00	3:1	2100	2200
HL01	1:1	2300	4000
HL01	2:1	3000	4300
HL01	3:1	3800	4800
HLA1	1:1	3300	6100
HLA1	2:1	4300	6500
HLA1	3:1	5500	7200
HLB1	1:1	5000	9700
HLB1	2:1	6100	10300
HLB1	3:1	7800	11500
HLC1	1:1	8500	13300
HLC1	2:1	10100	14000
HLC1	3:1	12400	15300

* Values apply for 50% of the allowable torque at 50% of maximum speed (see diagram on page 8-9 and 43).

Radial loads for different conditions and on shaft d_1 on request.

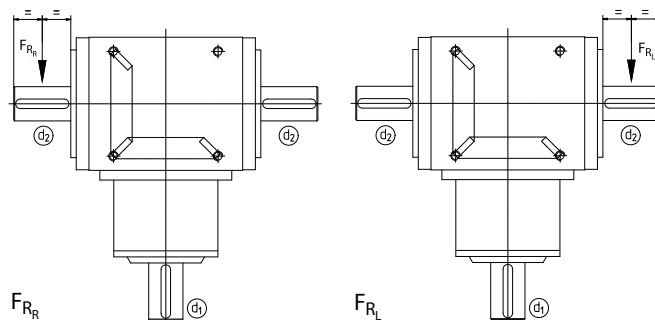


Figure 46.1

Characteristics & Specifications

PowerMaster Gearboxes

Lubricants and Lubricant Quantities

The selection of lubricants and their viscosity is made taking into account the type, scope, speed, backlash and operating temperature of the gearbox. The run-tested PowerMaster gearboxes are supplied filled with the correct quantity of synthetic oil CLP to DIN 51517-3 ISO VG 68.

A check of the oil level is not required. PowerMaster gearboxes, used under normal conditions, (max 90°C gearbox temperature) are lubricated for life. At low speeds, we recommend fluid grease GP 00 according to DIN 51826. The gearboxes are universal and can be mounted immediately.

Lubricant Quantities	
Gearbox Size	Oil [Ltr.]
HL 00	0.06
HL 01	0.25
HL A1	0.55
HL B1	1.10
HL C1	2.0

Quantities listed are approximate values.

Oil Lubrication

Standard initial fill: PAO CLP 68

Optional initial fill: Synthetic, food grade or other special oils

Grease Lubrication

Standard initial fill: GP 00

Optional initial fill: Synthetic, food grade or other special greases

Weights

Gearbox Size	Series HL		Series HL HW		Series HL HWS	
HL 00	HL 00	5	HL HW 00	5	HL HWS 00	5
HL 01	HL 01	13	HL HW 01	12	HL HWS 01	13
HL A1	HL A1	25	HL HW A1	22	HL HWS A1	23
HL B1	HL B1	43	HL HW B1	39	HL HWS B1	39
HL C1	HL C1	83	HL HW C1	71	HL HWS C1	73

Technical Data /Mass Moments of Inertia / External Loads

On request, we can provide further data such as inertia or more information regarding radial and axial loads, which are dependent on operating conditions such as speed and torque transmitted.

Technical questions will be answered in a timely manner.

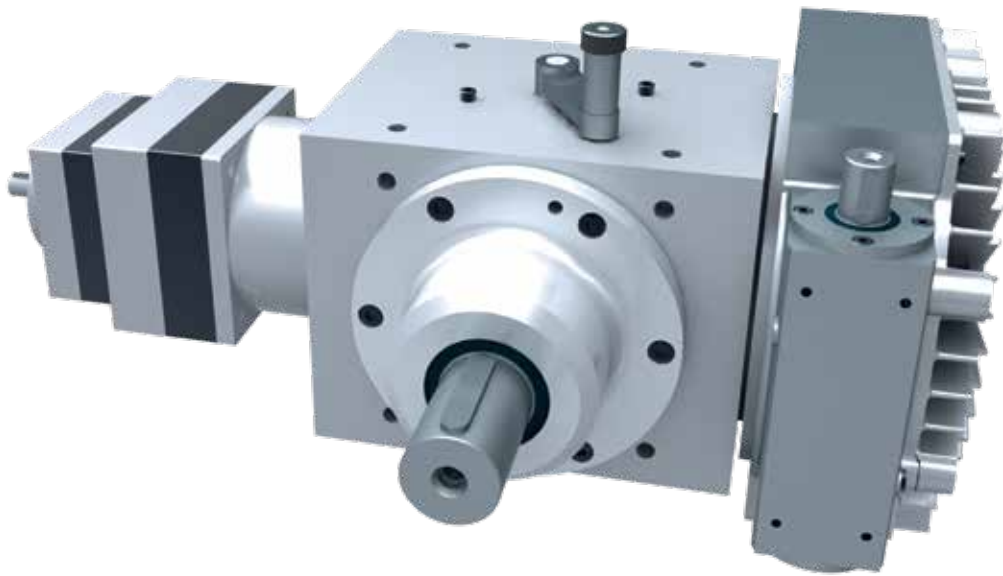
Custom Gearboxes

Whether your requirement is for reinforced bearings, high ambient temperatures, for use in the food industry or corrosion protection.

With our special options, gearbox combinations or special gearboxes, we can match your needs.

In this section

Corrosion Protection	57
Options	58
ATEX Gearboxes.....	59
Gearbox Combinations and Special Gearboxes	60
Ordering Example	40



Special Designed Numbers

Most Commonly Used Special Designed Numbers

S522 Reinforced bearings d1 shaft
S523 Reinforced bearings d2 shaft
S507 Switch handle position
S543 Switch handle w/ sightglass
S515d2L mounting position vertical d2 shaft and ring gear at the bottom sealed bearing side d2
S515d2R mounting position vertical d2 shaft ring gear at the top sealed gear side d2
S515d1 mounting position vertical d1 shaft sealed pinion
S544 Corrosion protection nickel plating of gearbox housing
S1544 Corrosion protect of Tenifer 30 NO
S579 Pinion shaft d1 hard chrome plated
S583 d2 shaft stainless steel
S502 HIGH temp applications lubrication and seals of viton/o-rings
S3705 HIGH temp application rated to 150C
S521 gearboxes where increased axial load on d2 shaft is needed
S539 where cover plates are used to protect shaft seals from dust/debris and high pressure washdown/S537
S599 ATEX special design with certification explosion proof
S535 Oil injection ports for oil cooling
S1545 Breather vent for thermal expansion
S3769 IP69K rated VA gearbox
S545 external sightglass

S2978 consisting of:

S579 All shafts chrome plated
S1544 all outside parts tenifer QPQ
S522 Taper roller bearings on d1
Special bearing and driven cap with special sealing on d1 and d2 for outside pressure 0.6 bar.
Grease lubrication (full filled)

S3109 consisting of:

S583- Shafts from stainless steel
Housing parts from anodized aluminum (HC-CU 40)
Stainless steel bolts
Food grade oil

S3213 consisting of:

reinforced bearings at d2 (S523)
Pinion shaft d1 hard-chrome plated (S579)
drive shaft d2 of stainless-steel (S583)
Gearbox painted with dupont-silicon paint
gearbox filled with Food grade oil 68

Corrosion Protection



Stainless Steel Gearboxes (VA) **IP69K rated available upon request**

Today there are many industries, particularly the food industry, which place great emphasis on corrosion resistance and hygiene. To meet these requirements we produce stainless steel gearboxes, dependent on size, ratio and configuration. These are factory filled with food grade oil or other lubricants if desired. See page 24.

Aluminium Gearboxes

Do you need the lightest possible gearbox? We recommend that the aluminium version of our gearbox is used. Depending on the size a weight reduction of up to 40% can be achieved. Together with lacquered or anodized surfaces protection against corrosion is also guaranteed.



Gearbox with Tenifer 30 NO Treatment (S1544)

The Tenifer 30 NO process offers a modern, cost effective and corrosion-resistant alternative to conventional methods such as painting or plating. The surface treatment is carried out in our in-house heat treatment plant. After the process, the parts have a black finish. In addition nickel-plated screws are used.

Nickel Plated Gearboxes (S544)

Another very visually attractive method of corrosion protection is the nickel plating of the gearbox housing, together with stainless steel or hard chrome plated shafts (available for all spiral bevel gearboxes).

Painted Gearboxes

Naturally you can order all gearboxes from our range finish painted to your requirements. Let us know the colour you need and we will take care of the rest. In addition we can also provide you with custom paint finishes for example for use in the food industry.

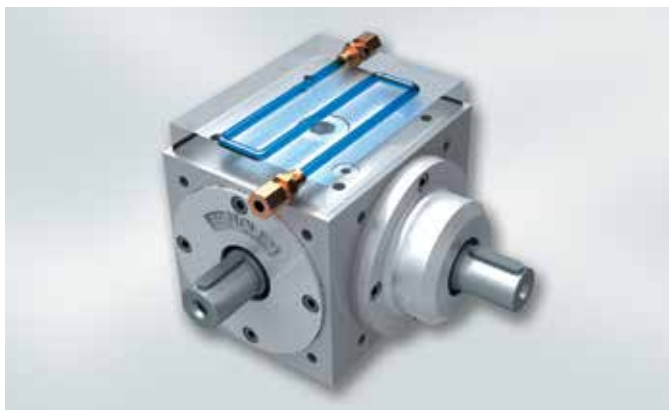
Modified Gearboxes

Options



Gearboxes with Cooling Ribs

To reduce the operating temperature, cooling fins (see fig. 58.1) can be fitted to the gearbox casing. This method is particularly effective when the gearbox is installed in a stream of air or can be blown by a fan.



Gearboxes with Plates for Water Cooling (S1519)

As an alternative to cooling fins, cross drilled aluminium plates can be mounted to the gearbox casing for connection to a water cooling circuit. This results in even better heat dissipation.

Gearboxes for High Temperatures (S502)

For high speeds, or operation at high ambient temperatures, we use special lubricants and seals. In some cases, the fitting of a breather (S1545) is recommended. In addition, there are various methods of external cooling which can be employed.



Circulating Oil Lubrication (S535/S537)

Under extreme operating conditions, we recommend a forced lubrication system (see fig. 58.3). In the simple version (S535), we replace the lubrication plugs with fittings so that they can be connected directly to a recirculating oil cooling system. Even more effective is the custom version (S537), in which, depending on the installation position, oil inlets in the optimum position can be incorporated in the gearbox casing, so that oil is injected where it is needed, directly into the gear mesh and the bearings.

On request, we can provide external piping and the complete cooling unit including filter, pump and radiator.

Gearboxes with Reinforced Bearings (S 522/S523)

In certain operating conditions, when there are high shock loads or external loads, it may be useful to use heavy duty bearings on shaft d1 (S522) and / or shaft d2 (S523).

Gearboxes for increased axial loads on shaft d2 (S521)



To cater for high axial loads on shaft d2 which, for example, occur in spindle drives (as shown in fig. 59.1), we can provide our gearboxes with a special bearing assembly, so that no additional external support bearing is necessary. In combination with hollow shafts, we can offer a variant of a machine tool spindle. Another possible variation is a hollow shaft with flange to allow a lead screw nut to be screwed directly to the gearbox.

Gearboxes without keyways in the shafts (S500/S529)

All spiral bevel gearboxes can be supplied without keyways in the shafts. Either with the keys fitted and ground flush with the shaft (S529), or specially-made components produced without keyways (S500).

Cover plates for radial shaft seals (S539)

When used in a severely contaminated environment, cover plates are used to protect the radial shaft seals from contamination or damage from foreign bodies.

We also offer many other options such as special housing tolerances, defined key positions, high torque or high accuracy gear sets to enhance our gearbox range.

Test certificate, inspection report, material certificate

On request, a wide range of certification and reports are available and can be provided to meet your needs.

Many more options are available. Discuss your application with us and we will develop a solution.

ATEX Gearboxes

For use in hazardous areas we can provide our spiral bevel gearboxes, depending on specification, with ATEX certification.

ATEX gearboxes from TANDLER conform to the Provisions of the Council Directive 94/9/EC Explosion Protection for Non-Electrical Equipment, for the conditions II 2 GD ck T 135°C (T4).



Custom Gearboxes

Gearbox Combinations and Special Gearboxes

The DieQua modular system provides almost unlimited possibilities of gearbox combinations. Gearboxes from the various ranges of spiral bevel, speed modulation and ServoFoxx® gearboxes can be combined together to provide the optimum solution. Additionally, we offer a variety of special options and special solutions, tailored specifically for individual applications.

Working together with you we will develop complete special gearboxes such as spur, helical, worm or planetary solutions to meet your needs. So that you always get the optimum product and secure a competitive advantage.

Gearbox Combinations



PSK2 W BD2-1.16-III S 3058/ I, gearbox to open a flood-gate, customer can choose if he wants to use the normal drive (big main motor), if the main motor fails there is an auxiliary drive with a small electric motor on the planetary input, if there is no electric power anymore there is the possibility to open/ close the gate with a handwheel on d3.

Spiral Bevel / Spur Gearbox



SKS 01-105.1 S 3143-24(28), custom made spiral bevel spur gearbox for an industrial buzz saw, the saw blade is directly mounted on our output flange, the bevel gear angle is not 90°

Miniature Gearbox



GK 000-1.1 S 3136 F, very small gearbox for horse dentist equipment

Spur Gearbox



TA 1939, TA 1958, TA 2246, typical spur gear box, we offered different versions with counter rotating output shafts and output shafts rotating in the same direction. For example for packing machines, test stand for motorcycle clutches, beton drilling machine, etc.

About Special Gearboxes



Spiral bevel gearboxes for high speed application air cooled.



STG A1-1.1 S 3047, spur gearbox with adjustable shaft distance for plastic industry.



B1-185.1-III S 3513, custom made gearbox for foil/paper unwinders (coil ends).



SP2 00-1.1-III-L S 2680, SP2 WV 00-1.1-III-L S 2753 (for DIEQUA), special speed modulation gearbox to save space in a printing machine.



S3143 speed and torque first will be angled by 105 degree via bevel gear and direction of rotation inverted, 1:1 ratio. After that spur gears invert the direction of rotation again ratio 1.05



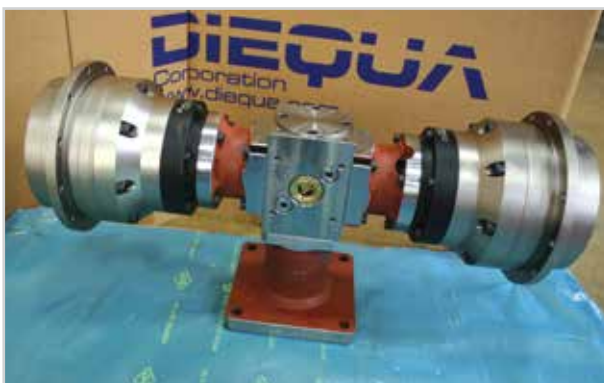
VA HW 000-2.1-III S 3380, for oil industry (bore heads).



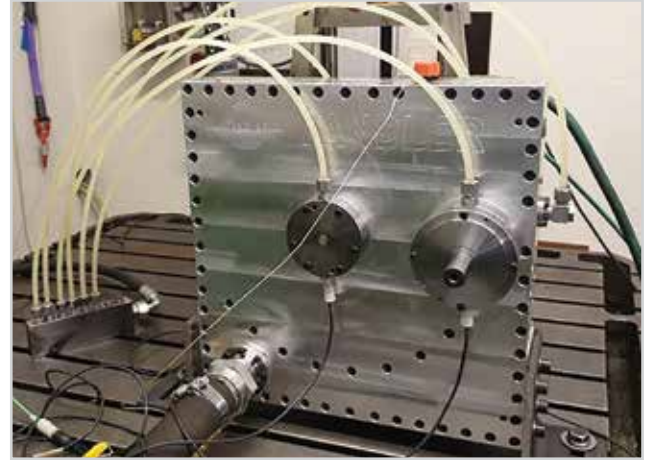
Special indexing gearbox for example for carton unfolders.

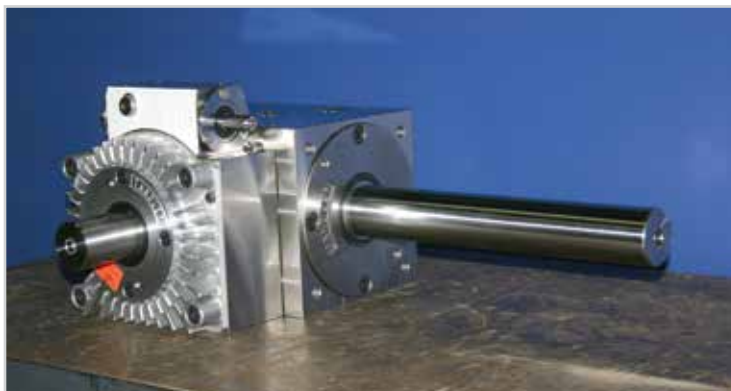
Custom





Custom





Custom





ABOUT DIEQUA

Founded in 1980 by Dietmar Quaas, and now owned by his sons, DieQua Corporation has expanded from a single product line to become a leading manufacturer and supplier of an extensive line of high-quality power transmission and precision motion control products, including gearboxes, servo gearheads, screw jack systems, speed reducers, cycloidal reducers, and connecting components. The company also offers custom product modifications and complete design solutions for virtually any application. DieQua Corporation serves a wide range

of industries, including medical and health care, marine engineering, renewable energy, mining, transportation, steel, forestry and lumber, water and wastewater, automotive, and factory automation, to name a few.

An experienced and knowledgeable technical sales, customer service, and engineering support staff, as well as local distributors, ensure that DieQua customers in North America, Mexico and South America select the optimum components, systems, and best design solutions for their specific requirements.

The DieQua family of products



Spiral Bevel
Gearboxes



Servo
Gearheads



Cycloidal Reducers
& Positioners



Screw Jack
Systems



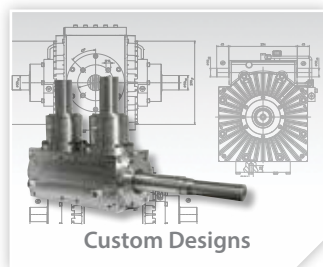
Helical
Speed Reducers



Speed Modulating
Gearboxes



Zero Backlash Couplings
and Line Shafts



Custom Designs

The DieQua Advantage

Engineering Support

DieQua Corporation has several decades of combined experience specifying power transmission and motion control components. This assures proper selection of components and systems to suit your unique requirements.

Warehousing

We pride ourselves for our extensive in-stock inventory. For fast product turnaround, DieQua Corporation stocks many components of various ratios and sizes, ready to ship fast.

Manufacturing and Assembly

DieQua Corporation now manufactures or assembles most of the products, for on-time delivery of standard orders as well as prototypes. We are ISO 9001 certified and are constantly improving our quality systems to ensure our customers receive the best products.



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