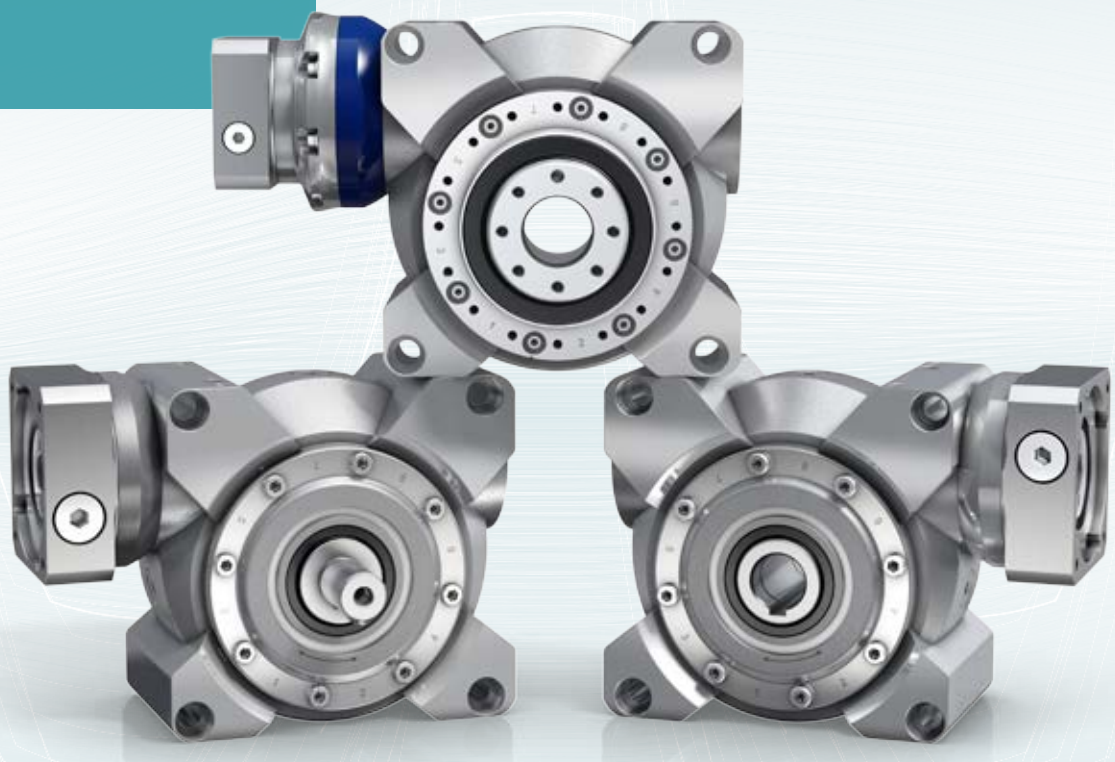
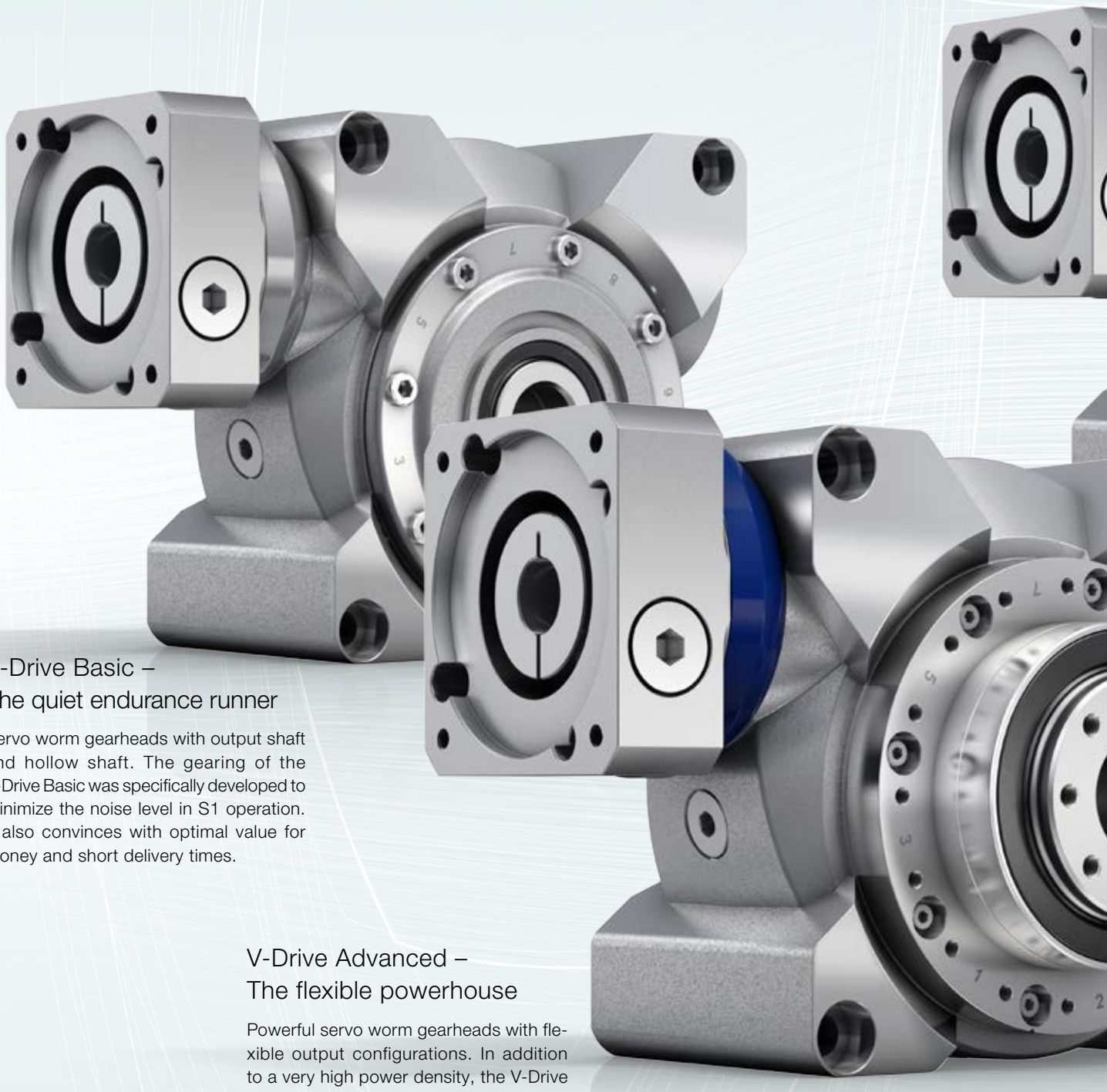
WITTENSTEIN | alpha

V-Drive
Sizing and Technical Data

Maximum power density
Constant torsional backlash
Supreme smooth running



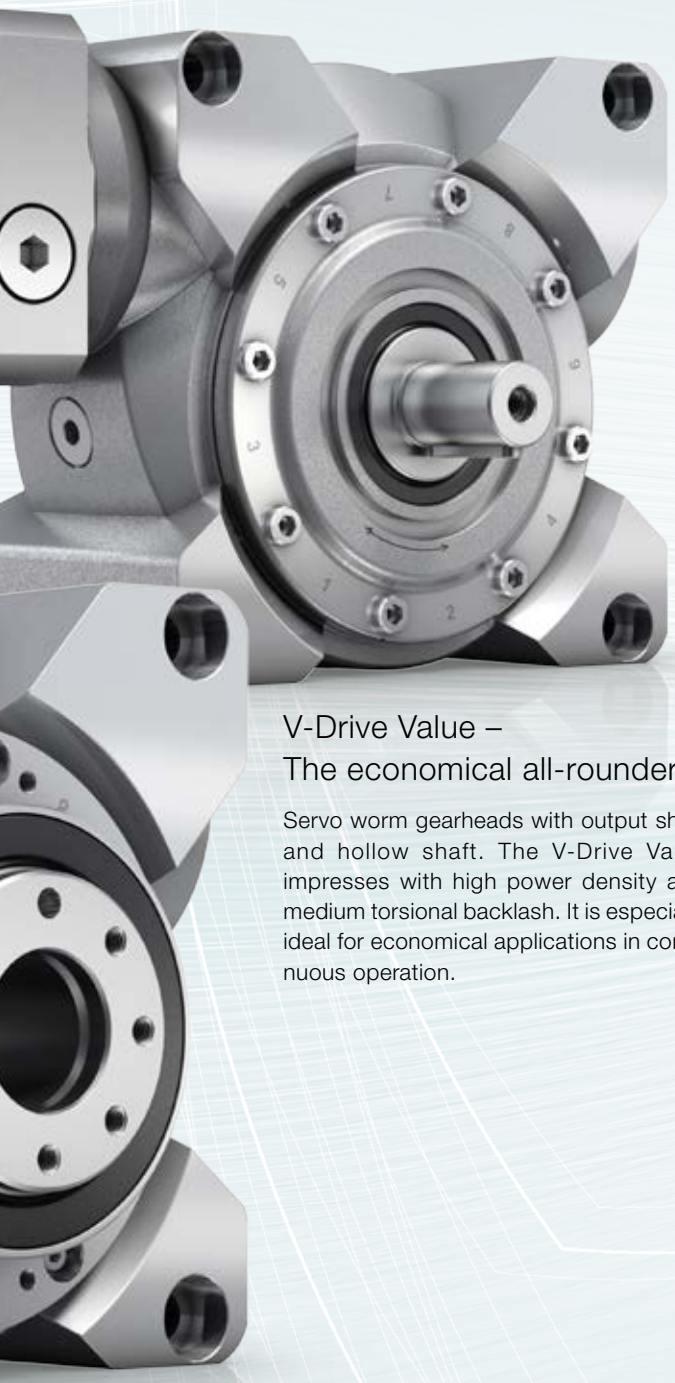


V-Drive Basic –
The quiet endurance runner

Servo worm gearheads with output shaft and hollow shaft. The gearing of the V-Drive Basic was specifically developed to minimize the noise level in S1 operation. It also convinces with optimal value for money and short delivery times.

V-Drive Advanced –
The flexible powerhouse

Powerful servo worm gearheads with flexible output configurations. In addition to a very high power density, the V-Drive Advanced achieves a constant, low torsional backlash throughout its lifespan. It is suitable for both cyclic and continuous duty applications.



V-Drive Value –
The economical all-rounder

Servo worm gearheads with output shaft and hollow shaft. The V-Drive Value impresses with high power density and medium torsional backlash. It is especially ideal for economical applications in continuous operation.

Contents

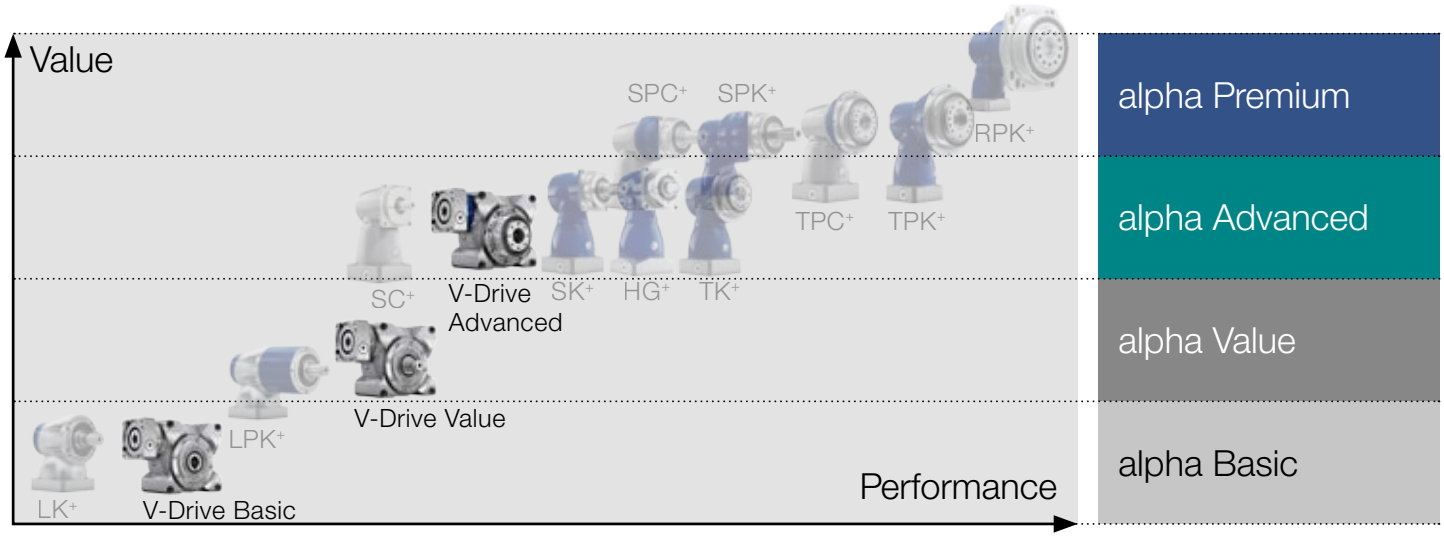
We drive the Performance

V-Drive servo worm gearheads

WITTENSTEIN alpha's worm gearhead family has been given a thorough facelift: apart from a new look, the gearheads also impress with maximum performance in a very small space – and are fully compatible with the existing series.

The newly developed V-Drive Basic complements the V-Drive Advanced and the V-Drive Value, rounding off our extensive and flexible portfolio for all performance ranges.

High-performance worm gearheads: the V-Drive series



Best-in-class precision

Tailored precision up to ≤ 2 arcminutes for a variety of applications.

Rapid availability

Short delivery times due to new standards - even with high volumes.

Optimal reliability

Perfected for continuous operation – premium quality made by WITTENSTEIN.

Extremely smooth running

Supreme smooth running and synchronization quality thanks to superior gearing technology.

Maximum economy

Maximum economy throughout a life-span of more than 20,000 hours.

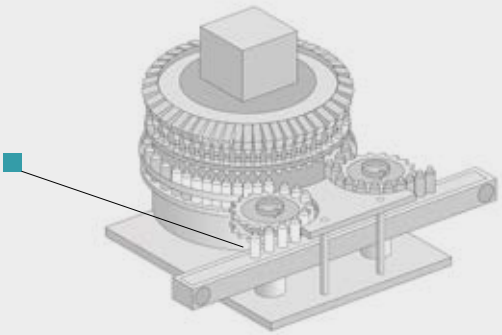
High efficiency

Ideal contact conditions and high quality lubricants guarantee more than 95% efficiency at full load.

Gearhead overview

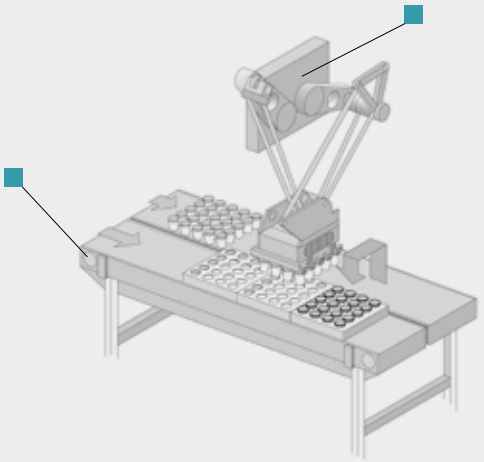
			alpha Basic		alpha Value		alpha Advanced		
									
Products			**CVH**	**CVS**	**NVH**	**NVS**	**VT⁺**	**VH⁺**	**VS⁺**
Power density			•		••		•••		
Positioning accuracy			•		••		•••		
Torsional rigidity			••		•••		•••		
Absorption of external forces			••		•••		•••		
Smooth-running			••		•••		•••		
Sizes		040	•	•	•	•		•	
		050	•	•	•	•	•	•	•
		063	•	•	•	•	•	•	•
		080					•	•	•
		100					•	•	•
Ratio	one stage		7 - 40		4 - 40		4 - 40		
	with pre-stage		-		12 - 400		12 - 400		
Max. torsional backlash [arcmin]	standard		≤ 15		≤ 6		≤ 3		
	reduced		-		-		≤ 2		
Max. torque	from	Nm	26	26	31	31	62	31	62
		in.lb	230	230	274	274	549	274	549
	to	Nm	301	301	365	365	1505	1505	1505
		in.lb	2664	2664	3231	3231	13320	13320	13320
Max. input speed [rpm]			6000		6000		6000		
Service life [h]			> 15000		> 20000		> 20000		
Output type									
Smooth output shaft				•		•			•
Keywayed output shaft				•		•			•
Output shaft with involute toothing						•			•
Smooth hollow shaft			•		•			•	
Keyed hollow shaft			•		•			•	
Flanged hollow shaft							•		
Shaft on both sides				•		•			•
Type									
Food-grade lubrication			•	•	•	•	•	•	•
Corrosion resistant					•	•	•	•	•

Typical applications



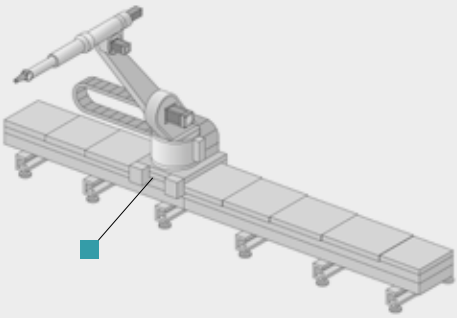
Food processing and packaging machinery

- Transport axes (belt and chain drives)
- Star drives
- Product feedings
- Swivel conveyors
- Carton feedings and erectings



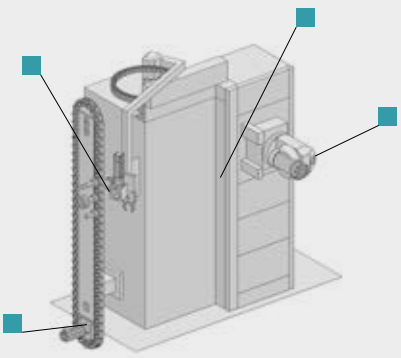
Materials handling

- Transport axes (belt and chain drives)
- Two-axis handling modules
- Loading systems in transfer axes



Robotics and automation

- Linear motions in the 7th axis
- Rotary and swivel axes
- Feed axes



Machine tools

- Tool changers
- Turntables
- Travel axes

Flexible output versions

Smooth hollow shaft

Keyed hollow shaft

Output shaft

Smooth hollow shaft

Keyed hollow shaft

Output shaft

Smooth hollow shaft

Keyed hollow shaft

Output shaft

Flanged hollow shaft

V-Drive Value optionally with integral planetary input stage

V-Drive Advanced optionally with integral planetary input stage

V-Drive Advanced and V-Drive Value optionally with integral planetary input stage

Ideal for space-saving applications involving high input speeds or reduction ratios i = 12 - 400.

Benefits for you

- Higher input speeds
- Higher ratios
- Compact design

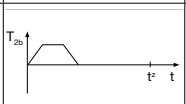
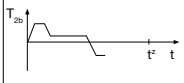
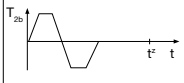
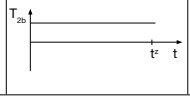
A: Simplified sizing for servo motors based on the maximum motor torque: $\mathbf{M_{max} * i \leq T_{2\alpha}}$

B: Sizing based on the application

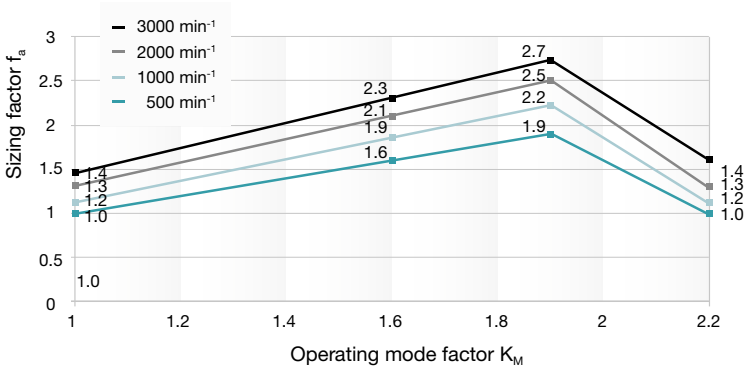
Step 1:
Determine the application data

$\mathbf{T_{2b}}$= _____ **[Nm]** $\mathbf{n_{1n}}$= _____ **[min^{-1}]**

Step 2:
Determine the operating mode factor $\mathbf{K_M}$= _____

Typical applications	Cycle	Torque characteristic	Operating mode factor K_M
Format changing, e.g. in packaging machines, drives for processing equipment, actuators etc.	**S5 operation:** Low duty cycle Small number of cycles Low dynamics		1,0
Tool changers with low dynamics, pick & place gantry axes, tire building machines etc.	**S5 operation:** Medium duty cycle Small number of cycles Medium dynamics		1,6
Linear axes in plasma, laser or water jet cutters, portals, tool changers with high dynamics	**S5 operation:** Medium duty cycle Medium number of cycles High dynamics		1,9
Roller drives in printing presses, star drives in rackers etc.	**S1 operation:** High duty cycle		2,2
cymex® 5 also allows sizing calculations for other applications / cycles!			

Step 3:
Determine the sizing factor f_a with the operating mode factor K_M $\mathbf{f_a}$= _____



Step 4:
Compare the equivalent application torque with the maximum gearhead $\mathbf{T_{2\alpha}}$ (see table, Step 5)

$\mathbf{T_{2\_eq} = f_a * T_{2b} \leq T_{2\alpha}}$

$\mathbf{T_{2\_eq}}$ = _____ * _____ ≤ $\mathbf{T_{2\alpha}}$

$\mathbf{T_{2\_eq}}$ = _____ **[Nm]** ≤ _____ **[Nm]**

We recommend using a vent screw for duty cycles ≥ 60%, longer than 20 min (S1 operation) and n1N ≥ 3000 rpm.

Step 5: Quick selection of the technical data

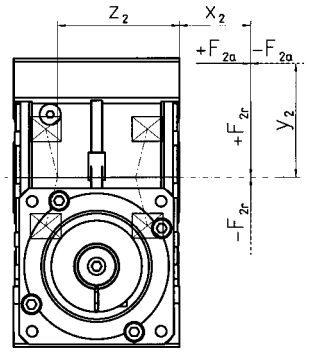
			alpha Basic			alpha Value			alpha Advanced				
			040	050	063	040	050	063	040	050	063	080	100
Ratio	i		7 - 40			4 - 400			4 - 400				
Maximum torque[a]	$T_{2\alpha}$	Nm	68-82	125-140	265-301	74-98	141-167	303-365	74-106	165-204	319-372	578-785	1184-1505
		in.lb	602-726	1106-1239	2345-2664	655-867	1248-1478	2682-3230	655-938	1460-1805	2823-3292	5115-6947	10478-13319
Max. input speed	n_{1max}	min^{-1}	6000	6000	4500	6000	6000	4500	6000	6000	4500	4000	3500
Max. radial force	F_{2RMax}	N	1000 / 2400[b]	1200 / 3800[b]	2000 / 6000[b]	2400	3800	6000	2400	3800	6000	9000	14000
		lb$_f$	225 / 540[b]	270 / 855[b]	450 / 1350[b]	540	855	1350	540	855	1350	2025	3150
Operating noise (with n_1 =3000 rpm no load)	L_{PA}	dB(A)	≤ 54	≤ 62	≤ 64	≤ 54	≤ 62	≤ 64	≤ 54	≤ 62	≤ 64	≤ 66	≤ 70
Max. torsional backlash	j_t	arcmin	≤ 15	≤ 15	≤ 15	≤ 6	≤ 6	≤ 6	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3
Service life (For calculation see "Information")	L_h	h	> 15000	> 15000	> 15000	> 20000	> 20000	> 20000	> 20000	> 20000	> 20000	> 20000	> 20000

[a] The maximum torques depend on the ratio.
[b] Referred to the shaft or flange center at the output
First value for MF version (standard), second value for MT version (stronger bearings).

Account must be taken of the radial and axial forces at the output:
Please also carry out steps 6 and 7 if forces are present at the output (e.g. if timing belt pulleys, pinions or levers are mounted there).

Step 6 (if external forces are present):

Determine the forces acting on the output and check the boundary conditions



Radial force F_{2r} = _____ [N]
Radial force distance x_2 = _____ [mm]
Axial force F_{2a} = _____ [N]
Axial force distance y_2 = _____ [mm]
(required if F_{2a} is present)

Conditions if axial force F_{2a} is present:

1. $F_{2a} \leq 0.25 * F_{2r} \Rightarrow$ (_____ ≤ 0.25 * _____) ☐ **Met** ☐ **Not met:** Sizing with cymex® 5

2. $y_2 \leq x_2 \Rightarrow$ (_____ ≤ _____) ☐ **Met** ☐ **Not met:** Sizing with cymex® 5

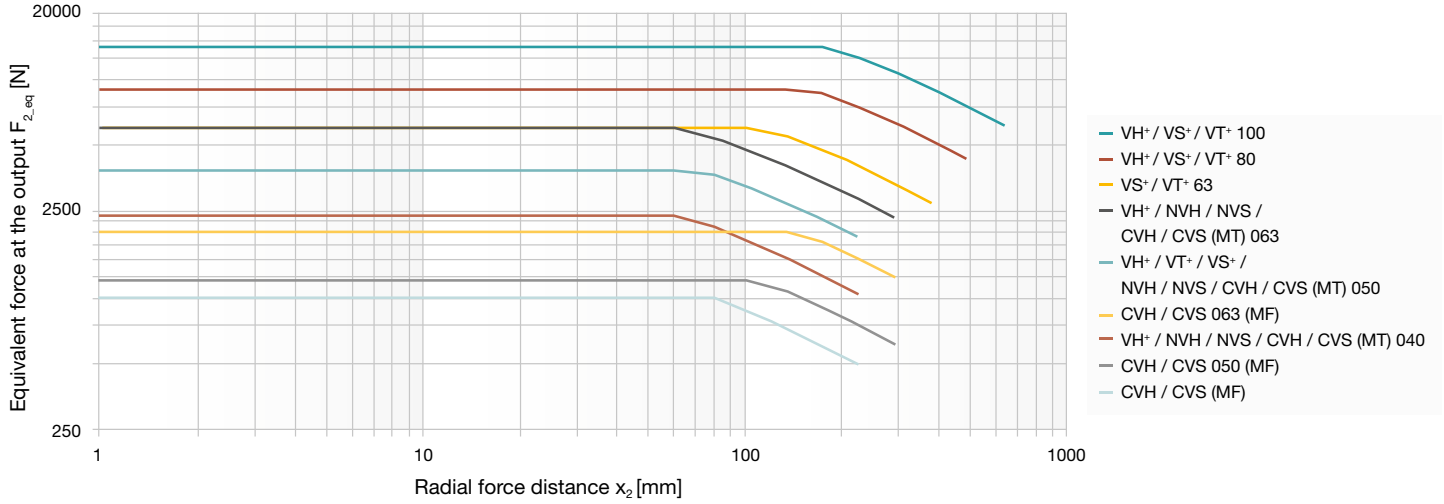
Step 7:

Determine the maximum equivalent force acting on the output F_{2_eq}

$F_{2\_eq} = F_{2r} + 0.25 * F_{2a} \leq F_{2RMax}$ (F_{2RMax} can be determined from the diagram below)

F_{2_eq} = _____ + 0.25 * _____ ≤ _____

F_{2_eq} = _____ [N] ≤ _____ [N] ☐ **Met** ☐ **Not met:** Sizing with cymex® 5



V-Drive Basic – The quiet endurance runner

CVH

Servo worm gearheads with output shaft and hollow shaft. The gearing of the V-Drive Basic was specifically developed to minimize the noise level in S1 operation. It also convinces with optimal value for money and short delivery times.

CVS

Product highlights

Optimized output bearings

adapted to a wide range of applications.

Specifically developed gearing

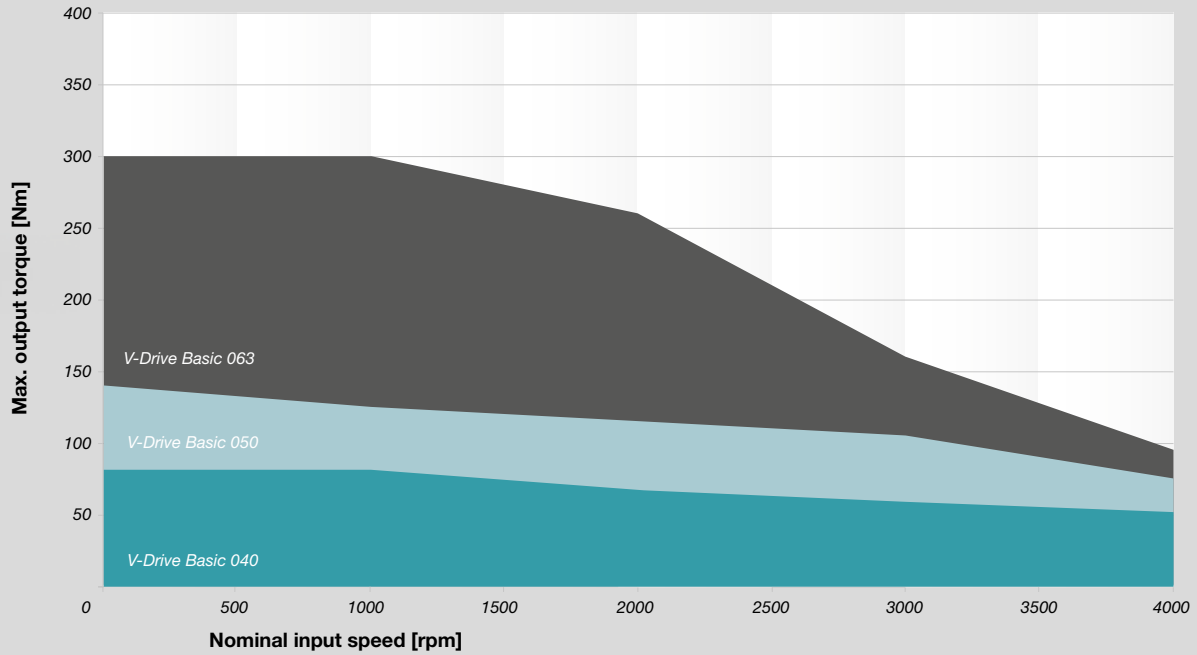
minimizes the noise level in S1 operation.

Optimal value for money

short delivery times and quality “made in Germany”.

Quick size selection

V-Drive Basic (example for i = 28)
For applications in cyclic operation (DC ≤ 60%) or continuous operation (DC > 60%)

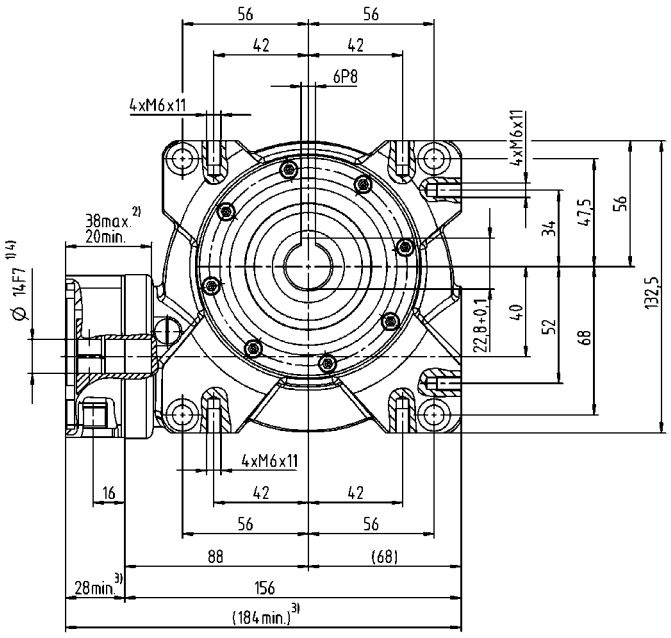


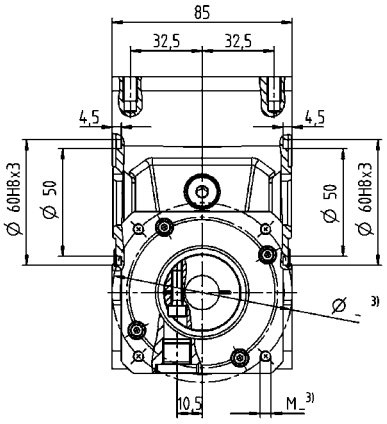
CVH 040

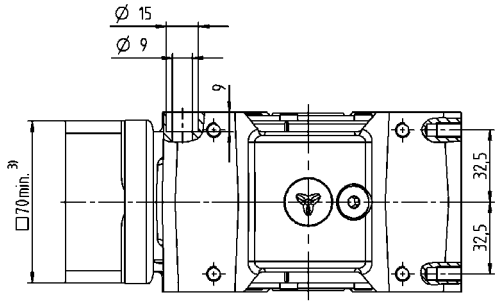
				1-stage				
Ratio			***i***	**7**	**10**	**16**	**28**	**40**
Max. torque			T_{2a} Nm	68	76	78	82	76
			in.lb	602	673	690	726	673
Efficiency at full load			η %	89	87	81	72	66
Emergency stop torque			T_{2Not} Nm	126	125	129	134	122
			in.lb	1115	1106	1142	1186	1080
Max. input speed			n_{1Max} rpm	6000				
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012} Nm	0.7	0.6	0.5	0.4	0.4
			in.lb	6.2	5.3	4.4	3.5	3.5
Max. torsional backlash			j_t arcmin	≤ 15				
Torsional rigidity			C_{t21} Nm/arcmin	3.5				
			in.lb/arcmin	31				
Max. axial force [b]			F_{2AMax} N	1200 / 3000[b]				
			lb_f	270 / 675[b]				
Max. radial force [b]			F_{2RMax} N	1000 / 2400[b]				
			lb_f	225 / 540[b]				
Max. tilting moment [b]			M_{2KMax} Nm	97 / 205[b]				
			in.lb	858 / 1814[b]				
Service life			L_h h	> 15000				
Weight incl. standard adapter plate			*m* kg	4.5				
			lb_m	10.0				
Operating noise (with n_1=3000 rpm no load)			L_{PA} dB(A)	≤ 54				
Max. permitted housing temperature			°C	+90				
			F	194				
Ambient temperature			°C	-15 to +40				
			F	5 to 104				
Lubrication				Synthetic transmission oil				
Paint				None				
Direction of rotation				See drawing				
Protection class				IP 65				
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C	14	J_1 kgcm²	0.38	0.38	0.34	0.32	0.31
			10^{-3} in.lb.s²	0.34	0.34	0.30	0.28	0.27
	E	19	J_1 kgcm²	0.40	0.37	0.35	0.34	0.33
			10^{-3} in.lb.s²	0.35	0.33	0.31	0.30	0.29

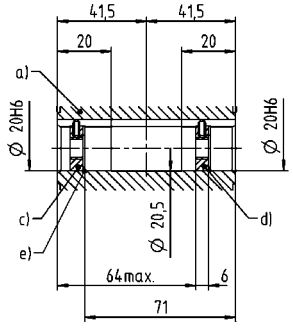
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).
Please use our cymex® 5 sizing tool to obtain a more detailed design – **www.wittenstein-cymex.com**

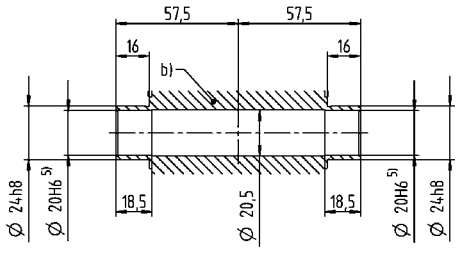
[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm
First value for MF-version (standard), second value for MT-version (reinforced bearings).











a) Hollow shaft, keywayed
b) Hollow shaft, smooth
c) End disc for screw M6
d) End disc as forcing washer for screw M8
e) Locking ring – DIN 472

Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length.
   Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm. Motor shaft diameters up to 19 mm available – please contact WITTENSTEIN alpha.
5) Tolerance h6 for mounted shaft.

CAD data is available under www.wittenstein-alpha.com

Motor mounting according to operating manual

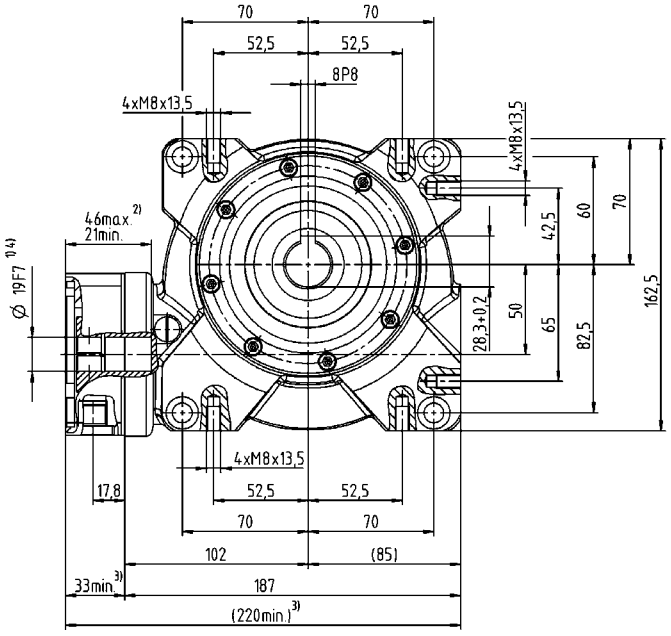
				1-stage				
Ratio			***i***	**7**	**10**	**16**	**28**	**40**
Max. torque			T_{2a} Nm	125	127	131	140	116
			T_{2a} in.lb	1106	1124	1159	1239	1027
Efficiency at full load			η %	89	85	80	70	63
Emergency stop torque			T_{2Not} Nm	242	242	250	262	236
			T_{2Not} in.lb	2142	2142	2213	2319	2089
Max. input speed			n_{1Max} rpm	6000				
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012} Nm	2.2	1.6	1.5	1.2	1.1
			T_{012} in.lb	19.5	14.2	13.3	10.6	9.7
Max. torsional backlash			j_t arcmin	≤ 15				
Torsional rigidity			C_{t21} Nm/arcmin	5.5				
			C_{t21} in.lb/arcmin	49				
Max. axial force [b]			F_{2AMax} N	1500 / 5000[b]				
			F_{2AMax} lb_f	337.5 / 1125[b]				
Max. radial force [b]			F_{2RMax} N	1200 / 3800[b]				
			F_{2RMax} lb_f	270 / 855[b]				
Max. tilting moment [b]			M_{2KMax} Nm	130 / 409[b]				
			M_{2KMax} in.lb	1150 / 3620[b]				
Service life			L_h h	> 15000				
Weight incl. standard adapter plate			*m* kg	8.0				
			m lb_m	18.0				
Operating noise (with n_1=3000 rpm no load)			L_{PA} dB(A)	≤ 62				
Max. permitted housing temperature			°C	+90				
			F	194				
Ambient temperature			°C	-15 to +40				
			F	5 to 104				
Lubrication				Synthetic transmission oil				
Paint				None				
Direction of rotation				See drawing				
Protection class				IP 65				
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	E	19	J_1 kgcm²	1.22	1.17	1.06	1.05	1.01
			J_1 10^{-3} in.lb.s²	1.08	1.04	0.94	0.93	0.89

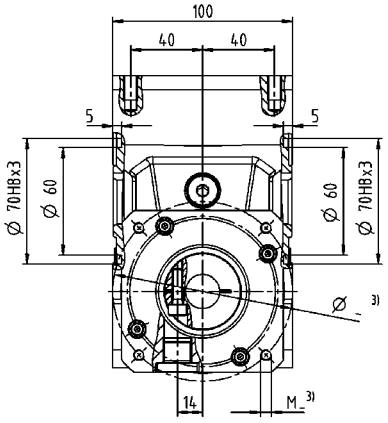
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

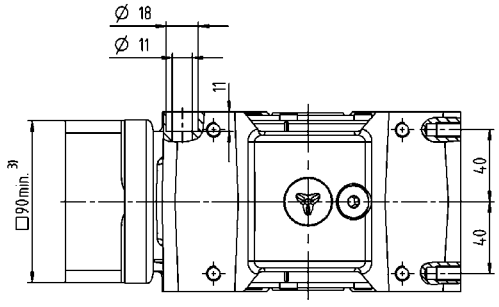
Please use our cymex® 5 sizing tool to obtain a more detailed design – **www.wittenstein-cymex.com**

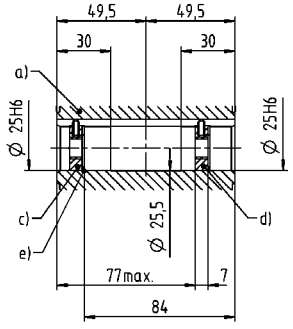
[a] Idling torques decrease during operation

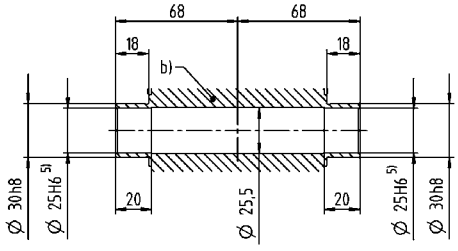
[b] Refers to center of output shaft or flange at n_2 = 300 rpm
First value for MF-version (standard),
second value for MT-version (reinforced bearings).











a) Hollow shaft, keywayed
b) Hollow shaft, smooth
c) End disc for screw M10 (on request)
d) End disc as forcing washer for screw M12 (on request)
e) Locking ring – DIN 472 (on request)

Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length.
Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

CAD data is available under www.wittenstein-alpha.com

Motor mounting according to operating manual

CVH 063

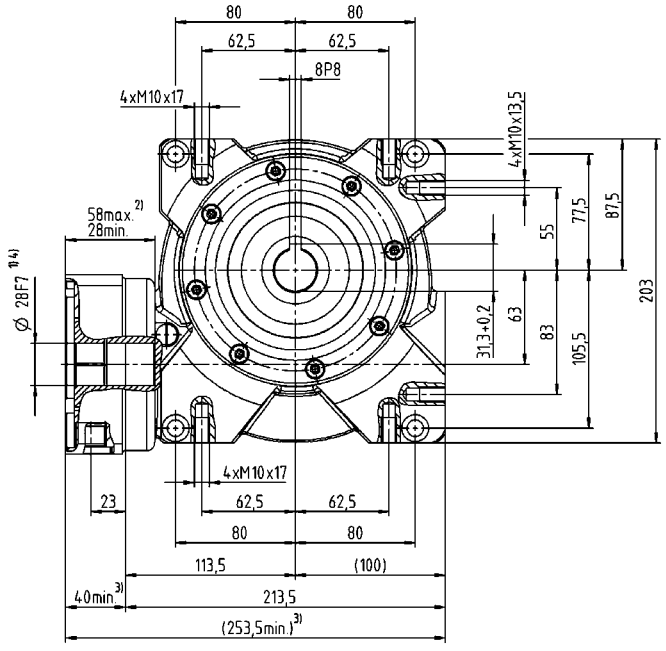
				1-stage				
Ratio			***i***	**7**	**10**	**16**	**28**	**40**
Max. torque			T_{2a} Nm	265	270	280	301	282
			in.lb	2345	2390	2478	2664	2496
Efficiency at full load			η %	90	87	82	73	67
Emergency stop torque			T_{2Not} Nm	484	491	494	518	447
			in.lb	4283	4345	4372	4584	3956
Max. input speed			n_{1Max} rpm	4500				
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012} Nm	3.1	3	2.4	2.3	2.2
			in.lb	27.4	26.6	21.2	20.4	19.5
Max. torsional backlash			j_t arcmin	≤ 15				
Torsional rigidity			C_{t21} Nm/arcmin	23				
			in.lb/arcmin	204				
Max. axial force [b]			F_{2AMax} N	2000 / 8250[b]				
			lb_f	450 / 1856[b]				
Max. radial force [b]			F_{2RMax} N	2000 / 6000[b]				
			lb_f	450 / 1350[b]				
Max. tilting moment [b]			M_{2KMax} Nm	281 / 843[b]				
			in.lb	2487 / 7461[b]				
Service life			L_h h	> 15000				
Weight incl. standard adapter plate			*m* kg	13.0				
			lb_m	29.0				
Operating noise (with n_1=3000 rpm no load)			L_{PA} dB(A)	≤ 64				
Max. permitted housing temperature			°C	+90				
			F	194				
Ambient temperature			°C	-15 to +40				
			F	5 to 104				
Lubrication				Synthetic transmission oil				
Paint				None				
Direction of rotation				See drawing				
Protection class				IP 65				
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	H	28	J_1 kgcm²	3.75	3.61	3.52	3.48	3.36
			10^{-3} in.lb.s²	3.32	3.19	3.12	3.08	2.97

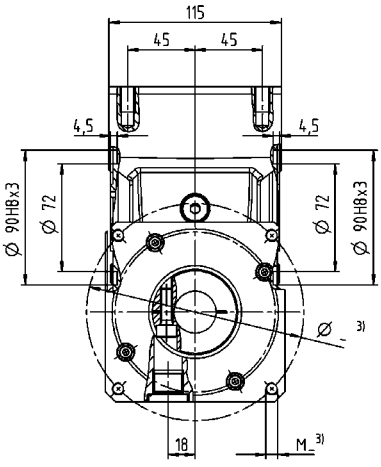
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

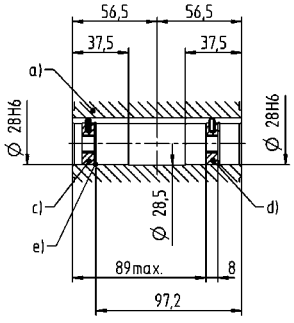
Please use our cymex® 5 sizing tool to obtain a more detailed design – **www.wittenstein-cymex.com**

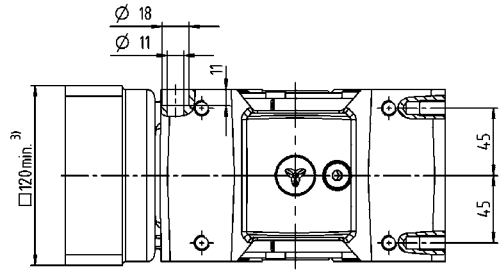
[a] Idling torques decrease during operation

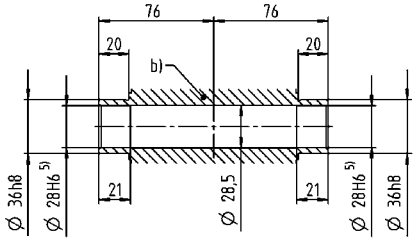
[b] Refers to center of output shaft or flange at n_2 = 300 rpm
First value for MF-version (standard),
second value for MT-version (reinforced bearings).











a) Hollow shaft, keywayed
b) Hollow shaft, smooth
c) End disc for screw M10 (on request)
d) End disc as forcing washer for screw M12 (on request)
e) Locking ring – DIN 472 (on request)

Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length.
   Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

CAD data is available under www.wittenstein-alpha.com

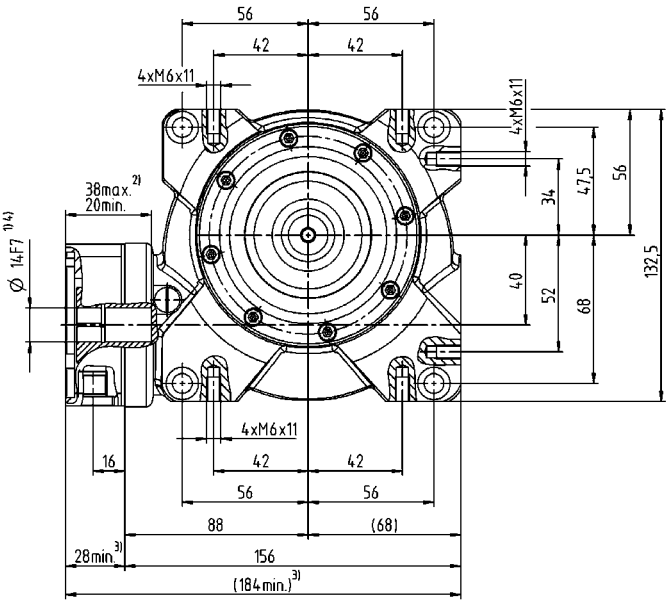
Motor mounting according to operating manual

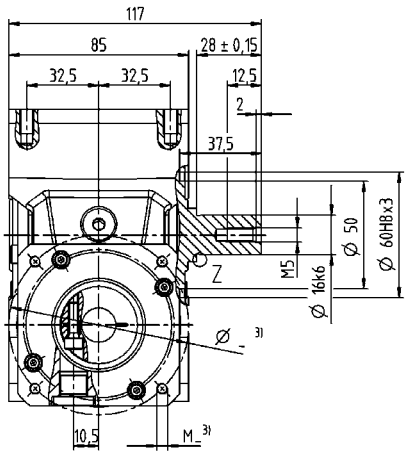
CVS 040

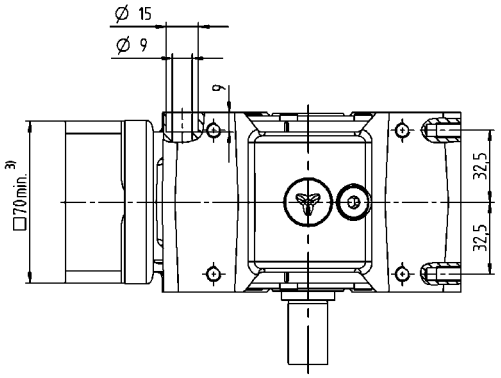
				1-stage				
Ratio			***i***	**7**	**10**	**16**	**28**	**40**
Max. torque			T_{2a} Nm	68	76	78	82	76
			in.lb	602	673	690	726	673
Efficiency at full load			η %	89	87	81	72	66
Emergency stop torque			T_{2Not} Nm	126	125	129	134	122
			in.lb	1115	1106	1142	1186	1080
Max. input speed			n_{1Max} rpm	6000				
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012} Nm	0.7	0.6	0.5	0.4	0.4
			in.lb	6.2	5.3	4.4	3.5	3.5
Max. torsional backlash			j_t arcmin	≤ 15				
Torsional rigidity			C_{t21} Nm/arcmin	3.5				
			in.lb/arcmin	31				
Max. axial force [b]			F_{2AMax} N	1200 / 3000[b]				
			lb_f	270 / 675[b]				
Max. radial force [b]			F_{2RMax} N	1000 / 2400[b]				
			lb_f	225 / 540[b]				
Max. tilting moment [b]			M_{2KMax} Nm	97 / 205[b]				
			in.lb	858 / 1814[b]				
Service life			L_h h	> 15000				
Weight incl. standard adapter plate			*m* kg	4.5				
			lb_m	10.0				
Operating noise (with n_1=3000 rpm no load)			L_{PA} dB(A)	≤ 54				
Max. permitted housing temperature			°C	+90				
			F	194				
Ambient temperature			°C	-15 to +40				
			F	5 to 104				
Lubrication				Synthetic transmission oil				
Paint				None				
Direction of rotation				See drawing				
Protection class				IP 65				
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C	14	J_1 kgcm²	0.38	0.38	0.34	0.32	0.31
			10^{-3} in.lb.s²	0.34	0.34	0.30	0.28	0.27
	E	19	J_1 kgcm²	0.40	0.37	0.35	0.34	0.33
			10^{-3} in.lb.s²	0.35	0.33	0.31	0.30	0.29

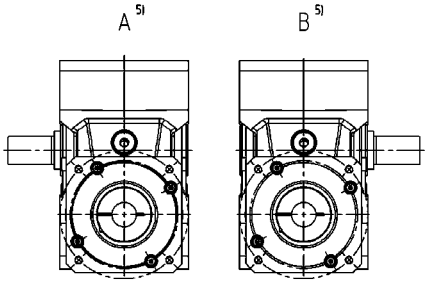
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).
Please use our cymex® 5 sizing tool to obtain a more detailed design – **www.wittenstein-cymex.com**

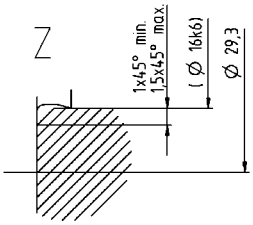
[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm
First value for MF-version (standard), second value for MT-version (reinforced bearings).

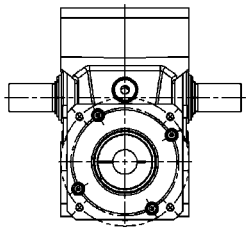










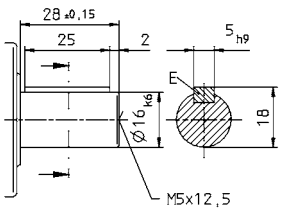


Optional dual-shaft output. Drawings available upon request.

Alternatives: Output shaft variants

Keywayed output shaft in mm

E = key as per DIN 6885, sheet 1, form A



Non-tolerated dimensions ± 1 mm

1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length.
   Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm. Motor shaft diameters up to 19 mm available – please contact WITTENSTEIN alpha.
5) Output side

CAD data is available under www.wittenstein-alpha.com

Motor mounting according to operating manual

CVS 050

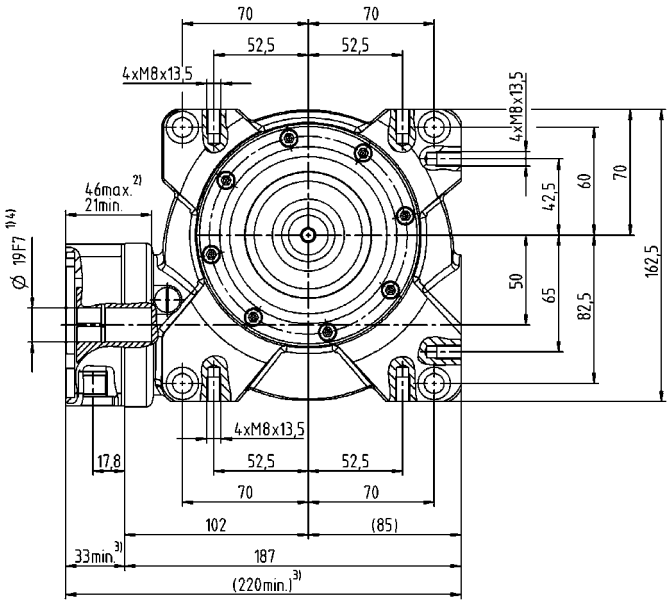
				1-stage				
Ratio			***i***	**7**	**10**	**16**	**28**	**40**
Max. torque			T_{2a} Nm	125	127	131	140	116
			in.lb	1106	1124	1159	1239	1027
Efficiency at full load			η %	89	85	80	70	63
Emergency stop torque			T_{2Not} Nm	242	242	250	262	236
			in.lb	2142	2142	2213	2319	2089
Max. input speed			n_{1Max} rpm	6000				
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012} Nm	2.2	1.6	1.5	1.2	1.1
			in.lb	19.5	14.2	13.3	10.6	9.7
Max. torsional backlash			j_t arcmin	≤ 15				
Torsional rigidity			C_{t21} Nm/arcmin	5.5				
			in.lb/arcmin	49				
Max. axial force [b]			F_{2AMax} N	1500 / 5000[b]				
			lb_f	337.5 / 1125[b]				
Max. radial force [b]			F_{2RMax} N	1200 / 3800[b]				
			lb_f	270 / 855[b]				
Max. tilting moment [b]			M_{2KMax} Nm	130 / 409[b]				
			in.lb	1150 / 3620[b]				
Service life			L_h h	> 15000				
Weight incl. standard adapter plate			*m* kg	8.0				
			lb_m	18.0				
Operating noise (with n_1=3000 rpm no load)			L_{PA} dB(A)	≤ 62				
Max. permitted housing temperature			°C	+90				
			F	194				
Ambient temperature			°C	-15 to +40				
			F	5 to 104				
Lubrication				Synthetic transmission oil				
Paint				None				
Direction of rotation				See drawing				
Protection class				IP 65				
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	E	19	J_1 kgcm²	1.22	1.17	1.06	1.05	1.01
			10^{-3} in.lb.s²	1.08	1.04	0.94	0.93	0.89

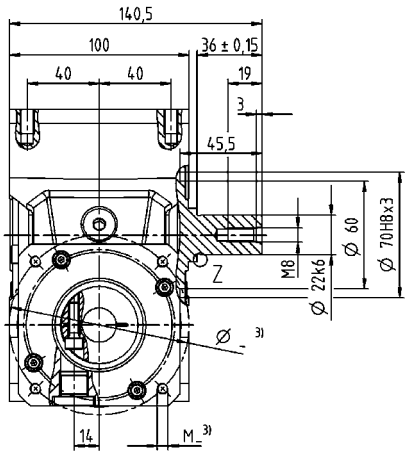
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

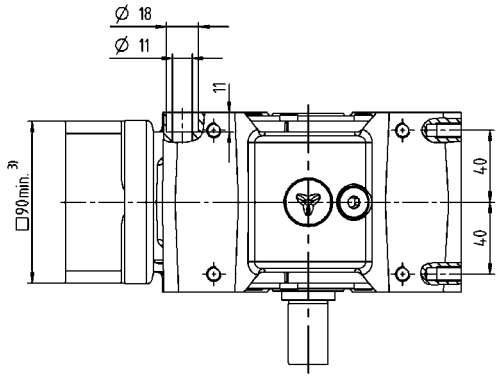
Please use our cymex® 5 sizing tool to obtain a more detailed design – **www.wittenstein-cymex.com**

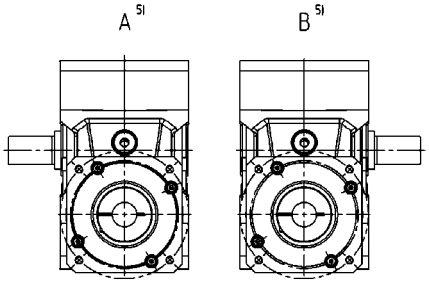
[a] Idling torques decrease during operation

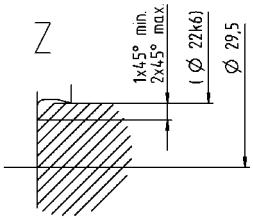
[b] Refers to center of output shaft or flange at n_2 = 300 rpm
First value for MF-version (standard),
second value for MT-version (reinforced bearings).

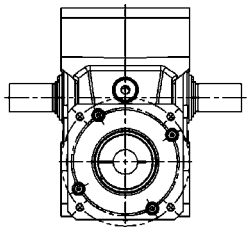










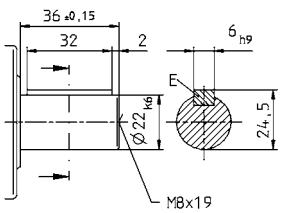


Optional dual-shaft output. Drawings available upon request.

Alternatives: Output shaft variants

Keywayed output shaft in mm

E = key as per DIN 6885, sheet 1, form A



Non-tolerated dimensions ± 1 mm

1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length.
   Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Output side

CAD data is available under www.wittenstein-alpha.com

Motor mounting according to operating manual

CVS 063

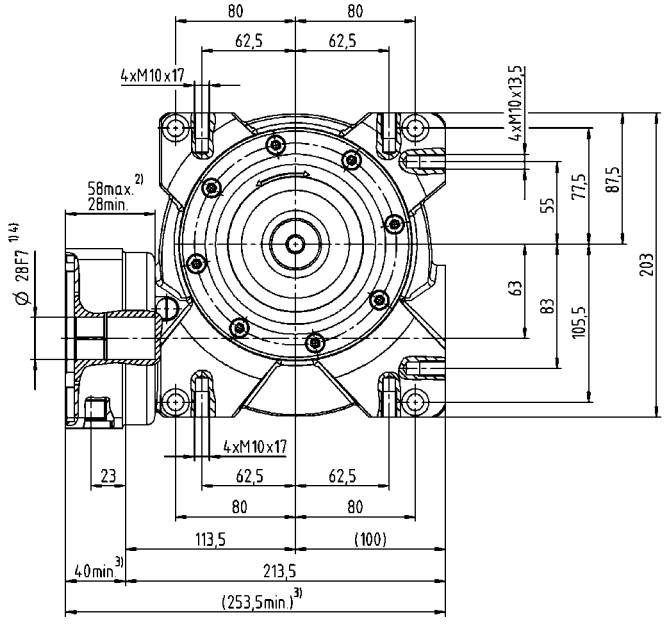
				1-stage				
Ratio			***i***	**7**	**10**	**16**	**28**	**40**
Max. torque			T_{2a} Nm	265	270	280	301	282
			in.lb	2345	2390	2478	2664	2496
Efficiency at full load			η %	90	87	82	73	67
Emergency stop torque			T_{2Not} Nm	484	491	494	518	447
			in.lb	4283	4345	4372	4584	3956
Max. input speed			n_{1Max} rpm	4500				
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012} Nm	3.1	3	2.4	2.3	2.2
			in.lb	27.4	26.6	21.2	20.4	19.5
Max. torsional backlash			j_t arcmin	≤ 15				
Torsional rigidity			C_{t21} Nm/arcmin	23				
			in.lb/arcmin	204				
Max. axial force [b]			F_{2AMax} N	2000 / 8250[b]				
			lb_f	450 / 1856[b]				
Max. radial force [b]			F_{2RMax} N	2000 / 6000[b]				
			lb_f	450 / 1350[b]				
Max. tilting moment [b]			M_{2KMax} Nm	281 / 843[b]				
			in.lb	2487 / 7461[b]				
Service life			L_h h	> 15000				
Weight incl. standard adapter plate			*m* kg	13.0				
			lb_m	29.0				
Operating noise (with n_1=3000 rpm no load)			L_{PA} dB(A)	≤ 64				
Max. permitted housing temperature			°C	+90				
			F	194				
Ambient temperature			°C	-15 to +40				
			F	5 to 104				
Lubrication				Synthetic transmission oil				
Paint				None				
Direction of rotation				See drawing				
Protection class				IP 65				
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	H	28	J_1 kgcm²	3.75	3.61	3.52	3.48	3.36
			10^{-3} in.lb.s²	3.32	3.19	3.12	3.08	2.97

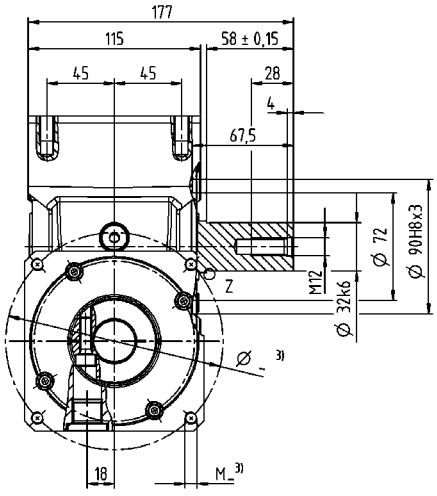
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

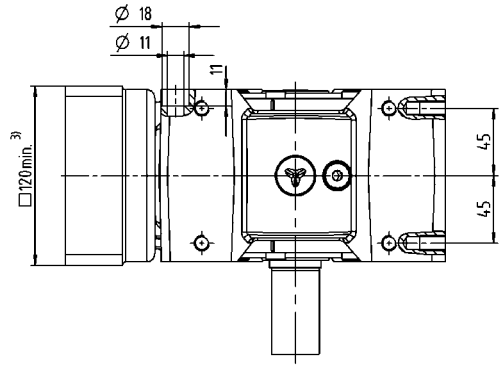
Please use our cymex® 5 sizing tool to obtain a more detailed design – **www.wittenstein-cymex.com**

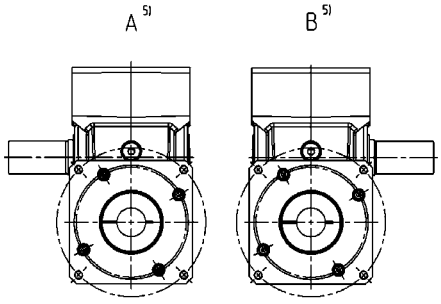
[a] Idling torques decrease during operation

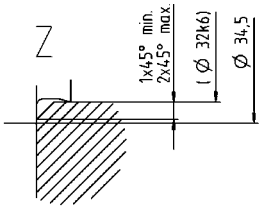
[b] Refers to center of output shaft or flange at n_2 = 300 rpm
First value for MF-version (standard),
second value for MT-version (reinforced bearings).

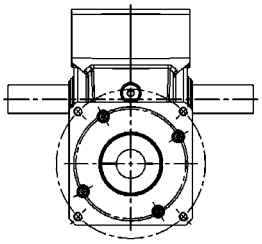










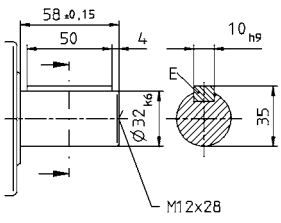


Optional dual-shaft output. Drawings available upon request.

Alternatives: Output shaft variants

Keywayed output shaft in mm

E = key as per DIN 6885, sheet 1, form A



Non-tolerated dimensions ± 1 mm

1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length.
   Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Output side

CAD data is available under www.wittenstein-alpha.com

Motor mounting according to operating manual

V-Drive Value – The economical all-rounder

NVH

Low backlash servo worm gearheads with output shaft and hollow shaft. The V-Drive Value impresses with its high power density and medium torsional backlash. It is especially suitable for economical applications in continuous operation.

NVS

Product highlights

Strong performance

for economical standard applications in cyclic or continuous operation.

High power density

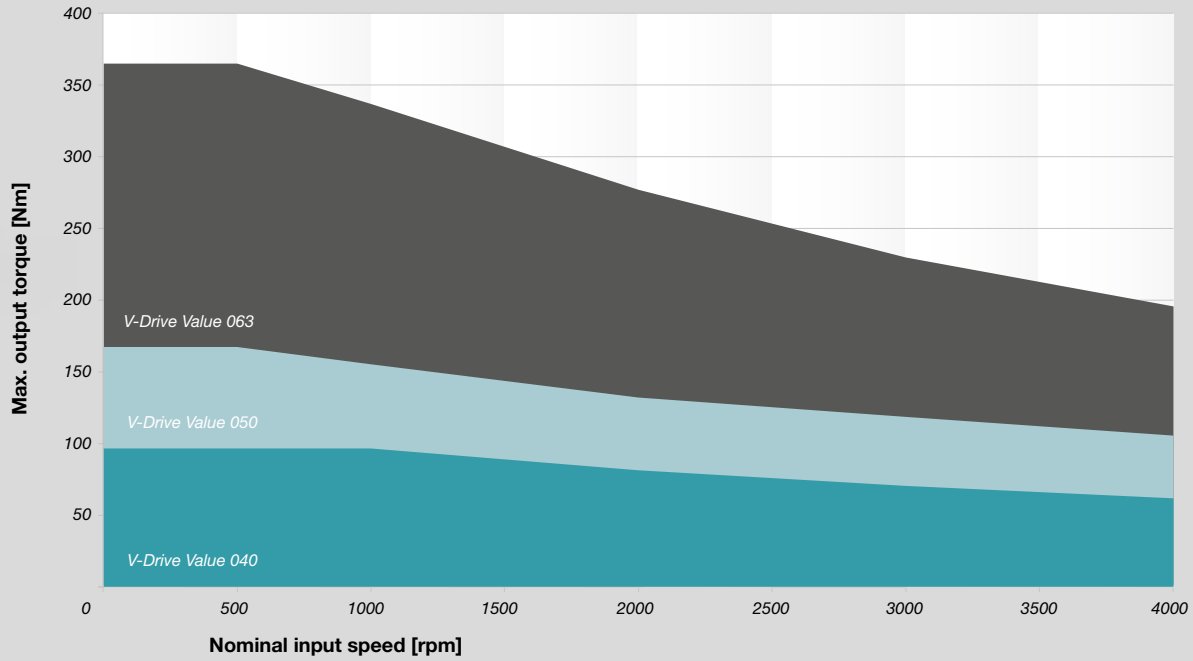
medium torsional backlash throughout its lifespan.

No stick-slip effect

owing to the optimized hollow-flank teeth.

Quick size selection

V-Drive Value (example for i = 28)
For applications in cyclic operation (DC ≤ 60%) or continuous operation (DC > 60%)



NVH 040

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	74	82	91	94	98	91	91	82	91	98	91	98	91
				in.lb	655	726	805	832	867	805	805	726	805	867	805	867	805
Efficiency at full load			η	%	93	90	88	82	73	67	86	88	86	71	65	71	65
Emergency stop torque			T_{2Not}	Nm	118	126	125	129	134	122	125	126	125	134	122	134	122
				in.lb	1044	1115	1106	1142	1186	1080	1106	1115	1106	1186	1080	1186	1080
Max. input speed			n_{1Max}	rpm	6000												
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	0.8	0.7	0.6	0.5	0.4	0.4	0.4	0.2	0.2	0.4	0.4	0.3	0.2
				in.lb	7.1	6.2	5.3	4.4	3.5	3.5	3.5	1.8	1.8	3.5	3.5	2.7	1.8
Max. torsional backlash			j_t	arcmin	≤ 6						Standard ≤ 7						
Torsional rigidity			C_{t21}	Nm/arcmin	4.5												
				in.lb/arcmin	40												
Max. axial force [b]			F_{2AMax}	N	3000												
				lb_f	675												
Max. radial force [b]			F_{2RMax}	N	2400												
				lb_f	540												
Max. tilting moment			M_{2KMax}	Nm	205												
				in.lb	1814												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	5.0						5.6						
				lb_m	11.1						12.0						
Operating noise (with n_1=3000 rpm no load)			L_{PA}	dB(A)	< 54						< 58						
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C	14	J_1	kgcm²	0.53	0.38	0.35	0.32	0.32	0.32	0.25	0.28	0.24	0.23	0.19	0.18	0.18
				10^{-3} in.lb.s²	0.47	0.34	0.31	0.28	0.28	0.34	0.22	0.25	0.21	0.20	0.17	0.16	0.16
	E	19	J_1	kgcm²	0.55	0.41	0.38	0.35	0.34	0.33	0.40	0.40	0.36	0.34	0.30	0.30	0.30
				10^{-3} in.lb.s²	0.49	0.36	0.34	0.31	0.30	0.29	0.35	0.35	0.32	0.30	0.27	0.27	0.27

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).
Please use our cymex® 5 sizing tool to obtain a more detailed design – **www.wittenstein-cymex.com**

[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	-	150	153	157	167	141	153	150	153	167	141	167	141
				in.lb	-	1328	1354	1389	1478	1248	1354	1328	1354	1478	1248	1478	1248
Efficiency at full load			η	%	-	89	86	82	72	64	84	87	84	70	62	70	62
Emergency stop torque			T_{2Not}	Nm	-	242	242	250	262	236	242	242	242	262	236	262	236
				in.lb	-	2142	2142	2213	2319	2089	2142	2142	2142	2319	2089	2319	2089
Max. input speed			n_{1Max}	rpm	6000												
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	-	2.2	1.6	1.5	1.2	1.1	0.7	0.5	0.4	0.6	0.6	0.4	0.4
				in.lb	-	19.5	14.2	13.3	10.6	9.7	6.2	4.4	3.5	5.3	5.3	3.5	3.5
Max. torsional backlash			j_t	arcmin	≤ 6						Standard ≤ 7						
Torsional rigidity			C_{t21}	Nm/arcmin	8												
				in.lb/arcmin	71												
Max. axial force [b]			F_{2AMax}	N	5000												
				lb_f	1125												
Max. radial force [b]			F_{2RMax}	N	3800												
				lb_f	855												
Max. tilting moment			M_{2KMax}	Nm	409												
				in.lb	3620												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	8.0						8.7						
				lb_m	17.7						19.0						
Operating noise (with n_1=3000 rpm no load)			L_{PA}	dB(A)	≤ 62												
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C	14	J_1	kgcm²	-	-	-	-	-	-	0.80	0.80	0.80	0.70	0.70	0.70	0.70
				10^{-3} in.lb.s²	-	-	-	-	-	-	0.71	0.71	0.71	0.62	0.62	0.62	0.62
	E	19	J_1	kgcm²	-	1.21	1.12	1.03	1.00	1.05	1.20	1.30	1.20	1.10	1.10	1.10	1.10
				10^{-3} in.lb.s²	-	1.07	0.99	0.91	0.89	0.93	1.06	1.15	1.06	0.97	0.97	0.97	0.97

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[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

NVH 063

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	-	303	319	331	365	321	319	303	319	365	321	365	321
				in.lb	-	2682	2823	2929	3230	2841	2823	2682	2823	3230	2841	3230	2841
Efficiency at full load			η	%	-	91	88	83	74	68	86	89	86	72	66	72	66
Emergency stop torque			T_{2Not}	Nm	-	484	491	494	518	447	491	484	494	518	447	518	447
				in.lb	-	4283	4345	4372	4584	3956	4345	4283	4372	4584	3956	4584	3956
Max. input speed			n_{1Max}	rpm	4500												
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	-	3.1	3	2.4	2.3	2.2	1.2	0.7	0.7	1.1	1.1	0.8	0.6
				in.lb	-	27.4	26.6	21.2	20.4	19.5	10.6	6.2	6.2	9.7	9.7	7.1	5.3
Max. torsional backlash			j_t	arcmin	≤ 6						Standard ≤ 7						
Torsional rigidity			C_{t21}	Nm/arcmin	28												
				in.lb/arcmin	248												
Max. axial force [b]			F_{2AMax}	N	8250												
				lb_f	1856												
Max. radial force [b]			F_{2RMax}	N	6000												
				lb_f	1350												
Max. tilting moment			M_{2KMax}	Nm	843												
				in.lb	7461												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	13.0						13.7						
				lb_m	28.7						30.0						
Operating noise (with n_1=3000 rpm no load)			L_{PA}	dB(A)	≤ 64												
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	G	19	J_1	kgcm²	-	-	-	-	-	-	2.60	2.80	2.50	2.40	2.40	2.40	2.30
				10^{-3} in.lb.s²	-	-	-	-	-	-	2.30	2.48	2.21	2.12	2.12	2.12	2.04
	H	28	J_1	kgcm²	-	3.89	3.65	3.56	3.52	3.47	-	-	-	-	-	-	-
				10^{-3} in.lb.s²	-	3.44	3.23	3.15	3.12	3.07	-	-	-	-	-	-	-
	K	24	J_1	kgcm²	-	-	-	-	-	-	4.10	4.30	4.10	4.00	4.00	3.90	3.90
				10^{-3} in.lb.s²	-	-	-	-	-	-	3.63	3.81	3.63	3.54	3.54	3.45	3.45

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[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	63	73	87	89	96	84	91	82	91	98	91	98	91
				in.lb	558	646	770	788	850	743	805	726	805	867	805	867	805
Efficiency at full load			η	%	93	90	88	82	73	67	86	88	86	71	65	71	65
Emergency stop torque			T_{2Not}	Nm	118	126	125	129	134	122	125	126	125	134	122	134	122
				in.lb	1044	1115	1106	1142	1186	1080	1106	1115	1106	1186	1080	1186	1080
Max. input speed			n_{1Max}	rpm	6000												
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	0.8	0.7	0.6	0.5	0.4	0.4	0.4	0.2	0.2	0.4	0.4	0.3	0.2
				in.lb	7.1	6.2	5.3	4.4	3.5	3.5	3.5	1.8	1.8	3.5	3.5	2.7	1.8
Max. torsional backlash			j_t	arcmin	≤ 6						Standard ≤ 7						
Torsional rigidity			C_{t21}	Nm/arcmin	4.5												
				in.lb/arcmin	40												
Max. axial force [b]			F_{2AMax}	N	3000												
				lb_f	675												
Max. radial force [b]			F_{2RMax}	N	2400												
				lb_f	540												
Max. tilting moment			M_{2KMax}	Nm	205												
				in.lb	1814												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	5.0						5.6						
				lb_m	11.1						12.0						
Operating noise (with n_1=3000 rpm no load)			L_{PA}	dB(A)	≤ 54						≤ 58						
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C	14	J_1	kgcm²	0.53	0.38	0.35	0.33	0.32	0.32	0.25	0.28	0.24	0.23	0.19	0.18	0.18
				10^{-3} in.lb.s²	0.47	0.34	0.31	0.29	0.28	0.28	0.22	0.25	0.21	0.20	0.17	0.16	0.16
	E	19	J_1	kgcm²	0.55	0.41	0.38	0.35	0.34	0.34	0.36	0.40	0.36	0.34	0.30	0.30	0.30
				10^{-3} in.lb.s²	0.49	0.36	0.34	0.31	0.30	0.30	0.32	0.35	0.32	0.30	0.27	0.27	0.27

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[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

NVS 050

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	-	150	153	157	167	141	153	150	153	167	141	167	141
				in.lb	-	1328	1354	1389	1478	1248	1354	1328	1354	1478	1248	1478	1248
Efficiency at full load			η	%	-	89	86	82	72	64	84	87	84	70	62	70	62
Emergency stop torque			T_{2Not}	Nm	-	242	242	250	262	236	242	242	242	262	236	262	236
				in.lb	-	2142	2142	2213	2319	2089	2142	2142	2142	2319	2089	2319	2089
Max. input speed			n_{1Max}	rpm	6000												
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	-	2.2	1.6	1.5	1.2	1.1	0.7	0.5	0.4	0.6	0.6	0.4	0.4
				in.lb	-	19.5	14.2	13.3	10.6	9.7	6.2	4.4	3.5	5.3	5.3	3.5	3.5
Max. torsional backlash			j_t	arcmin	≤ 6						Standard ≤ 7						
Torsional rigidity			C_{t21}	Nm/arcmin	8												
				in.lb/arcmin	71												
Max. axial force [b]			F_{2AMax}	N	5000												
				lb_f	1125												
Max. radial force [b]			F_{2RMax}	N	3800												
				lb_f	855												
Max. tilting moment			M_{2KMax}	Nm	409												
				in.lb	3620												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	8.0						8.7						
				lb_m	17.7						19.0						
Operating noise (with n_1=3000 rpm no load)			L_{PA}	dB(A)	≤ 62												
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C	14	J_1	kgcm²	-	-	-	-	-	-	0.80	0.80	0.80	0.70	0.70	0.70	0.70
				10^{-3} in.lb.s²	-	-	-	-	-	-	0.71	0.71	0.71	0.62	0.62	0.62	0.62
	E	19	J_1	kgcm²	-	1.21	1.12	1.03	1.00	1.05	1.20	1.30	1.20	1.10	1.10	1.10	1.10
				10^{-3} in.lb.s²	-	1.07	0.99	0.91	0.89	0.93	1.06	1.15	1.06	0.97	0.97	0.97	0.97

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[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

					1-stage						2-stage						
Ratio			*i*		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	-	303	319	331	365	321	319	303	319	365	321	365	321
				in.lb	-	2682	2823	2929	3230	2841	2823	2682	2823	3230	2841	3230	2841
Efficiency at full load			η	%	-	91	88	83	74	68	86	89	86	72	66	72	66
Emergency stop torque			T_{2Not}	Nm	-	484	491	494	518	447	491	484	494	518	447	518	447
				in.lb	-	4283	4345	4372	4584	3956	4345	4283	4372	4584	3956	4584	3956
Max. input speed			n_{1Max}	rpm	4500						4500						
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	-	3.1	3	2.4	2.3	2.2	1.2	0.7	0.7	1.1	1.1	0.8	0.6
				in.lb	-	27.4	26.6	21.2	20.4	19.5	10.6	6.2	6.2	9.7	9.7	7.1	5.3
Max. torsional backlash			j_t	arcmin	≤ 6						Standard ≤ 7						
Torsional rigidity			C_{t21}	Nm/arcmin	28												
				in.lb/arcmin	248												
Max. axial force [b]			F_{2AMax}	N	8250												
				lb_f	1856												
Max. radial force [b]			F_{2RMax}	N	6000												
				lb_f	1350												
Max. tilting moment			M_{2KMax}	Nm	843												
				in.lb	7461												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	13.0						13.7						
				lb_m	28.7						30.0						
Operating noise (with n_1=3000 rpm no load)			L_{PA}	dB(A)	≤ 64												
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	G	19	J_1	kgcm²	-	-	-	-	-	-	2.60	2.80	2.50	2.40	2.40	2.40	2.30
				10^{-3} in.lb.s²	-	-	-	-	-	-	2.30	2.48	2.21	2.12	2.12	2.12	2.04
	H	28	J_1	kgcm²	-	3.89	3.65	3.56	3.52	3.47	-	-	-	-	-	-	-
				10^{-3} in.lb.s²	-	3.44	3.23	3.15	3.12	3.07	-	-	-	-	-	-	-
	K	24	J_1	kgcm²	-	-	-	-	-	-	4.10	4.30	4.10	4.00	4.00	3.90	3.90
				10^{-3} in.lb.s²	-	-	-	-	-	-	3.63	3.81	3.63	3.54	3.54	3.45	3.45

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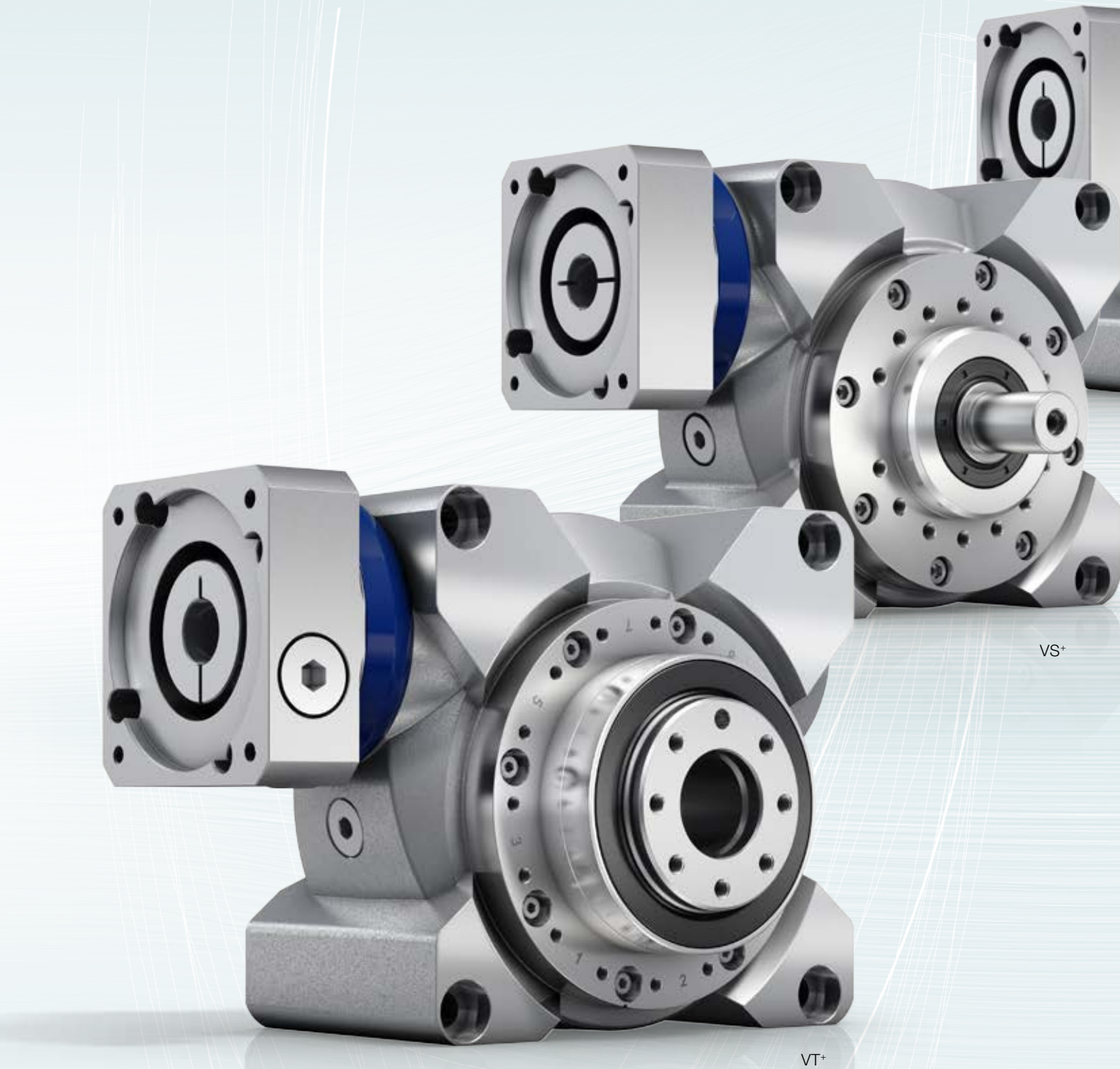
[a] Idling torques decrease during operation

[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

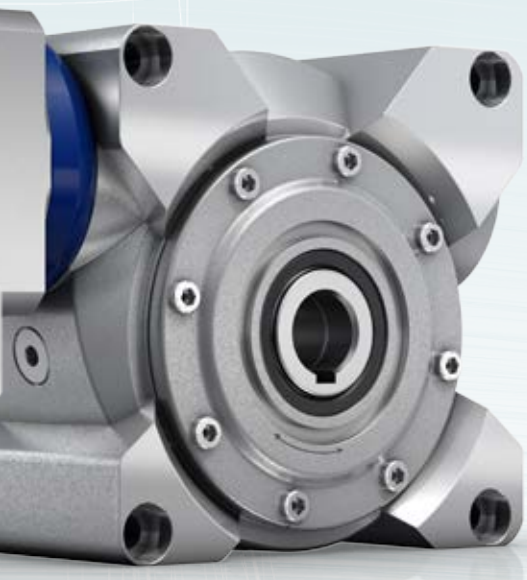
V-Drive Advanced – The flexible powerhouse



VS+

VT+

Servo worm gearheads with the solid shaft, hollow shaft and flanged hollow shaft types. The V-Drive Advanced impresses with its high power density and low torsional backlash. It is especially suitable for continuous duty applications.



VH⁺

Product highlights

Constant, low torsional backlash

consistently high quality and high positioning accuracy guaranteed throughout its lifespan.

Optimally sized output bearing

for absorbing high axial and radial forces in cyclic or continuous operation.

No stick-slip effect

owing to the enhanced hollow-flank teeth.

Top performance

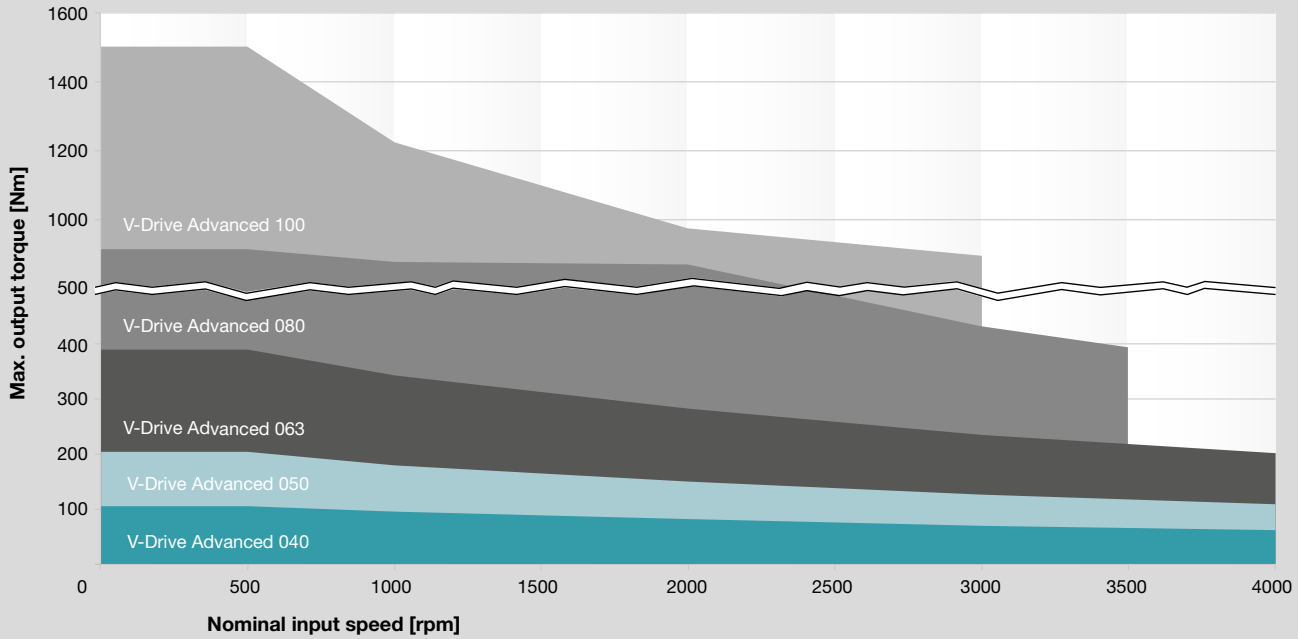
Optimized hollow-flank teeth guarantee high efficiency and minimal wear with very high power density.

Hollow-flank teeth with high overload capacity

owing to the low specific tooth pressure.

Quick size selection

V-Drive Advanced (example for i = 28)
For applications in cyclic operation (DC ≤ 60%) or continuous operation (DC > 60%)



VT+ 050

				1-stage						2-stage						
Ratio			***i***	**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a} Nm	165	180	182	193	204	183	182	180	182	204	183	204	183
			in.lb	1460	1593	1611	1708	1805	1620	1611	1593	1611	1805	1620	1805	1620
Constant torsional backlash throughout its lifespan			T_{2Servo} Nm	54	71	74	81	90	74	74	71	74	90	74	90	74
			in.lb	478	628	655	717	797	655	655	628	655	797	655	797	655
Efficiency at full load			η %	92	89	86	82	72	64	84	87	84	70	62	70	62
Emergency stop torque			T_{2Not} Nm	230	242	242	250	262	236	242	242	242	262	236	262	236
			in.lb	2036	2142	2142	2213	2319	2089	2142	2142	2142	2319	2089	2319	2089
Max. input speed			n_{1Max} rpm	6000												
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012} Nm	2.3	2.2	1.6	1.5	1.2	1.1	0.7	0.5	0.4	0.6	0.6	0.4	0.4
			in.lb	20.4	19.5	14.2	13.3	10.6	9.7	6.2	4.4	3.5	5.3	5.3	3.5	3.5
Max. torsional backlash			j_t arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity			C_{t21} Nm/arcmin	17						8						
			in.lb/arcmin	150						71						
Max. axial force [b]			F_{2AMax} N	5000												
			lb_f	1125												
Max. radial force [b]			F_{2RMax} N	3800												
			lb_f	855												
Max. tilting moment			M_{2KMax} Nm	409												
			in.lb	3620												
Tilting rigidity			C_{2K} Nm/arcmin	504												
			in.lb/arcmin	4460												
Service life			L_h h	> 20000												
Weight incl. standard adapter plate			*m* kg	9.0						9.5						
			lb_m	19.9						21.0						
Operating noise (with n_1=3000 rpm no load)			L_{PA} dB(A)	≤ 62												
Max. permitted housing temperature			°C	+90												
			F	194												
Ambient temperature			°C	-15 to +40												
			F	5 to 104												
Lubrication				Synthetic transmission oil												
Paint				None												
Direction of rotation				See drawing												
Protection class				IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C	14	J_1 kgcm²	-	-	-	-	-	-	0.80	0.80	0.80	0.70	0.70	0.70	0.70
			10^{-3} in.lb.s²	-	-	-	-	-	-	0.71	0.71	0.71	0.62	0.62	0.62	0.62
	E	19	J_1 kgcm²	1.50	1.21	1.12	1.03	1.00	1.05	1.20	1.30	1.20	1.10	1.10	1.10	1.10
			10^{-3} in.lb.s²	1.33	1.07	0.99	0.91	0.89	0.93	1.06	1.15	1.06	0.97	0.97	0.97	0.97

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Dimension sheets available from March 2017 on.

[a] Idling torques decrease during operation

[b] Refers to center of output shaft or flange at n_2 = 300 rpm

				1-stage						2-stage						
Ratio			***i***	**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a} Nm	319	353	364	372	392	363	364	353	364	392	363	392	363
			in.lb	2823	3124	3221	3292	3469	3213	3221	3124	3221	3469	3213	3469	3213
Constant torsional backlash throughout its lifespan			T_{2Servo} Nm	198	210	225	221	229	226	225	210	225	229	226	229	226
			in.lb	1752	1859	1991	1956	2027	2000	1991	1859	1991	2027	2000	2027	2000
Efficiency at full load			η %	93	91	88	83	74	68	86	89	86	72	66	72	66
Emergency stop torque			T_{2Not} Nm	460	484	491	494	518	447	491	484	494	518	447	518	447
			in.lb	4071	4283	4345	4372	4584	3956	4345	4283	4372	4584	3956	4584	3956
Max. input speed			n_{1Max} rpm	4500												
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012} Nm	4.2	3.1	3	2.4	2.3	2.2	1.2	0.7	0.7	1.1	1.1	0.8	0.6
			in.lb	37.2	27.4	26.6	21.2	20.4	19.5	10.6	6.2	6.2	9.7	9.7	7.1	5.3
Max. torsional backlash			j_t arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity			C_{t21} Nm/arcmin	50						28						
			in.lb/arcmin	443						248						
Max. axial force [b]			F_{2AMax} N	8250												
			lb_f	1856												
Max. radial force [b]			F_{2RMax} N	6000												
			lb_f	1350												
Max. tilting moment			M_{2KMax} Nm	843												
			in.lb	7461												
Tilting rigidity			C_{2K} Nm/arcmin	603												
			in.lb/arcmin	5337												
Service life			L_h h	> 20000												
Weight incl. standard adapter plate			*m* kg	15.0						15.2						
			lb_m	33						34.0						
Operating noise (with n_1=3000 rpm no load)			L_{PA} dB(A)	≤ 64												
Max. permitted housing temperature			°C	+90												
			F	194												
Ambient temperature			°C	-15 to +40												
			F	5 to 104												
Lubrication				Synthetic transmission oil												
Paint				None												
Direction of rotation				See drawing												
Protection class				IP 65												
Moment of inertia (relates to the drive)	G	19	J_1 kgcm²	-	-	-	-	-	-	2.60	2.80	2.50	2.40	2.40	2.40	2.30
			10^{-3} in.lb.s²	-	-	-	-	-	-	2.30	2.48	2.21	2.12	2.12	2.12	2.04
Clamping hub diameter [mm]	H	28	J_1 kgcm²	4.80	3.89	3.65	3.56	3.52	3.47	-	-	-	-	-	-	-
			10^{-3} in.lb.s²	4.25	3.44	3.23	3.15	3.12	3.07	-	-	-	-	-	-	-
	K	24	J_1 kgcm²	-	-	-	-	-	-	4.10	4.30	4.10	4.00	4.00	3.90	3.90
			10^{-3} in.lb.s²	-	-	-	-	-	-	3.63	3.81	3.63	3.54	3.54	3.45	3.45

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[a] Idling torques decrease during operation

[b] Refers to center of output shaft or flange at n_2 = 300 rpm

VT+ 080

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	578	646	672	702	785	676	672	646	672	785	676	785	676
				in.lb	5115	5717	5947	6213	6947	5983	5947	5717	5947	6947	5983	6947	5983
Constant torsional backlash throughout its lifespan			T_{2Servo}	Nm	469	601	613	677	764	631	613	601	613	764	631	764	631
				in.lb	4151	5319	5425	5991	6761	5584	5425	5319	5425	6761	5584	6761	5584
Efficiency at full load			η	%	94	92	89	86	77	70	87	90	87	75	68	75	68
Emergency stop torque			T_{2Not}	Nm	938	993	963	1005	1064	941	963	993	963	1064	941	1064	941
				in.lb	8301	8788	8523	8894	9416	8328	8523	8788	8523	9416	8328	9416	8328
Max. input speed			n_{1Max}	rpm	4000						4500						
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	7.2	7.1	6.5	5	4.8	4.5	2.8	1.6	1.5	2.4	2.4	1.8	1.3
				in.lb	63.7	62.8	57.5	44.3	42.5	39.8	24.8	14.2	13.3	21.2	21.2	15.9	11.5
Max. torsional backlash			j_t	arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity			C_{t21}	Nm/arcmin	113						78						
				in.lb/arcmin	1000						690						
Max. axial force [b]			F_{2AMax}	N	13900												
				lb_f	3128												
Max. radial force [b]			F_{2RMax}	N	9000												
				lb_f	2025												
Max. tilting moment			M_{2KMax}	Nm	1544												
				in.lb	13664												
Tilting rigidity			C_{2K}	Nm/arcmin	1178												
				in.lb/arcmin	10425												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	32.0						33.5						
				lb_m	70.7						74.0						
Operating noise (with n_1=3000 rpm no load)			L_{PA}	dB(A)	≤ 66						≤ 68						
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	G	24	J_1	kgcm²	-	-	-	-	-	-	10.40	10.10	10.10	8.80	9.50	9.40	9.30
				10^{-3} in.lb.s²	-	-	-	-	-	-	9.20	8.94	8.94	7.79	8.41	8.32	8.23
	K	38	J_1	kgcm²	20.30	16.56	16.69	15.33	15.24	15.90	17.30	17.00	17.10	15.80	16.40	16.30	16.20
				10^{-3} in.lb.s²	17.97	14.66	14.77	13.57	13.49	14.07	15.31	15.05	15.13	13.98	14.51	14.43	14.34

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[a] Idling torques decrease during operation

[b] Refers to center of output shaft or flange at n_2 = 300 rpm

				1-stage						2-stage						
Ratio			***i***	**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a} Nm	1184	1336	1377	1392	1505	1376	1377	1377	1377	1505	1376	1505	1376
			in.lb	10478	11824	12186	12319	13319	12178	12186	12186	12186	13319	12178	13319	12178
Constant torsional backlash throughout its lifespan			T_{2Servo} Nm	1155	1304	1343	1359	1469	1343	1343	1343	1343	1469	1343	1469	1343
			in.lb	10222	11540	11886	12027	13001	11886	11886	11886	11886	13001	11886	13001	11886
Efficiency at full load			η %	95	93	91	87	80	76	89	89	89	78	74	78	74
Emergency stop torque			T_{2Not} Nm	1819	1932	1940	1955	2073	1856	1940	1940	1940	2073	1856	2073	1856
			in.lb	16098	17098	17169	17302	18346	16426	17169	17169	17169	18346	16426	18346	16426
Max. input speed			n_{1Max} rpm	3500						4000						
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012} Nm	12.2	10.5	9.8	9.1	8.2	7.2	4.1	2.3	2.2	3.8	3.6	2.6	2
			in.lb	108.0	92.9	86.7	80.5	72.6	63.7	36.3	20.4	19.5	33.6	31.9	23.0	17.7
Max. torsional backlash			j_t arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity			C_{t21} Nm/arcmin	213						153						
			in.lb/arcmin	1885						1354						
Max. axial force [b]			F_{2AMax} N	19500												
			lb_f	4388												
Max. radial force [b]			F_{2RMax} N	14000												
			lb_f	3150												
Max. tilting moment			M_{2KMax} Nm	3059												
			in.lb	27072												
Tilting rigidity			C_{2K} Nm/arcmin	2309												
			in.lb/arcmin	20435												
Service life			L_h h	> 20000												
Weight incl. standard adapter plate			*m* kg	63.0						64.6						
			lb_m	139.0						143.0						
Operating noise (with n_1=3000 rpm no load)			L_{PA} dB(A)	≤ 70												
Max. permitted housing temperature			°C	+90												
			F	194												
Ambient temperature			°C	-15 to +40												
			F	5 to 104												
Lubrication				Synthetic transmission oil												
Paint				None												
Direction of rotation				See drawing												
Protection class				IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	K	38	J_1 kgcm²	-	-	-	-	-	-	31.70	33.00	31.10	30.10	30.40	30.00	29.80
			10^{-3} in.lb.s²	-	-	-	-	-	-	28.05	29.21	27.52	26.64	26.90	26.55	26.37
	M	48	J_1 kgcm²	50.02	40.63	38.73	39.60	37.14	37.47	46.40	47.70	45.80	44.80	45.10	44.70	44.50
			10^{-3} in.lb.s²	44.27	35.96	34.28	35.05	32.87	33.16	41.06	42.21	40.53	39.65	39.91	39.56	39.38

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[a] Idling torques decrease during operation

[b] Refers to center of output shaft or flange at n_2 = 300 rpm

VH+ 040

				1-stage						2-stage						
Ratio			***i***	**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a} Nm	74	82	98	101	106	98	98	82	98	106	98	106	98
			in.lb	655	726	867	894	938	867	867	726	867	938	867	938	867
Constant torsional backlash throughout its lifespan			T_{2Servo} Nm	17	24	25	26	29	25	25	24	25	29	25	29	25
			in.lb	150	212	221	230	257	221	221	212	221	257	221	257	221
Efficiency at full load			η %	93	90	88	82	73	67	86	88	86	71	65	71	65
Emergency stop torque			T_{2Not} Nm	118	126	125	129	134	122	125	126	125	134	122	134	122
			in.lb	1044	1115	1106	1142	1186	1080	1106	1115	1106	1186	1080	1186	1080
Max. input speed			n_{1Max} rpm	6000												
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012} Nm	0.8	0.7	0.6	0.5	0.4	0.4	0.4	0.2	0.2	0.4	0.4	0.3	0.2
			in.lb	7.1	6.2	5.3	4.4	3.5	3.5	3.5	1.8	1.8	3.5	3.5	2.7	1.8
Max. torsional backlash			j_t arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity			C_{t21} Nm/arcmin	4.5						5						
			in.lb/arcmin	40						40						
Max. axial force [b]			F_{2AMax} N	3000												
			lb_f	675												
Max. radial force [b]			F_{2RMax} N	2400												
			lb_f	540												
Max. tilting moment			M_{2KMax} Nm	205												
			in.lb	1814												
Service life			L_h h	> 20000												
Weight incl. standard adapter plate			*m* kg	5.0						5.6						
			lb_m	11.1						12.0						
Operating noise (with n_1 = 3000 rpm no load)			L_{PA} dB(A)	≤ 54						≤ 58						
Max. permitted housing temperature			°C	+90												
			F	194												
Ambient temperature			°C	-15 to +40												
			F	5 to 104												
Lubrication				Synthetic transmission oil												
Paint				None												
Direction of rotation				See drawing												
Protection class				IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C	14	J_1 kgcm²	0.52	0.38	0.34	0.32	0.32	0.31	0.25	0.28	0.24	0.23	0.19	0.18	0.18
			10^{-3} in.lb.s²	0.46	0.34	0.30	0.28	0.28	0.27	0.22	0.25	0.21	0.20	0.17	0.16	0.16
	E	19	J_1 kgcm²	0.54	0.40	0.37	0.35	0.34	0.33	0.36	0.40	0.36	0.34	0.30	0.30	0.30
			10^{-3} in.lb.s²	0.48	0.35	0.33	0.31	0.30	0.29	0.32	0.35	0.32	0.30	0.27	0.27	0.27

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[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	165	180	182	193	204	183	182	180	182	204	183	204	183
				in.lb	1460	1593	1611	1708	1805	1620	1611	1593	1611	1805	1620	1805	1620
Constant torsional backlash throughout its lifespan			T_{2Servo}	Nm	54	71	74	81	90	74	74	71	74	90	74	90	74
				in.lb	478	628	655	717	797	655	655	628	655	797	655	797	655
Efficiency at full load			η	%	92	89	86	82	72	64	84	87	84	70	62	70	62
Emergency stop torque			T_{2Not}	Nm	230	242	242	250	262	236	242	242	242	262	236	262	236
				in.lb	2036	2142	2142	2213	2319	2089	2142	2142	2142	2319	2089	2319	2089
Max. input speed			n_{1Max}	rpm	6000												
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	2.3	2.2	1.6	1.5	1.2	1.1	0.7	0.5	0.4	0.6	0.6	0.4	0.4
				in.lb	20.4	19.5	14.2	13.3	10.6	9.7	6.2	4.4	3.5	5.3	5.3	3.5	3.5
Max. torsional backlash			j_t	arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity			C_{t21}	Nm/arcmin	8												
				in.lb/arcmin	71												
Max. axial force [b]			F_{2AMax}	N	5000												
				lb_f	1125												
Max. radial force [b]			F_{2RMax}	N	3800												
				lb_f	855												
Max. tilting moment			M_{2KMax}	Nm	409												
				in.lb	3620												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	8.0						8.7						
				lb_m	17.7						19.0						
Operating noise (with n_1 = 3000 rpm no load)			L_{PA}	dB(A)	≤ 62												
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C	14	J_1	kgcm²	-	-	-	-	-	-	0.80	0.80	0.80	0.70	0.70	0.70	0.70
				10^{-3} in.lb.s²	-	-	-	-	-	-	0.71	0.71	0.71	0.62	0.62	0.62	0.62
	E	19	J_1	kgcm²	1.50	1.21	1.12	1.03	1.00	1.05	1.20	1.30	1.20	1.10	1.10	1.10	1.10
				10^{-3} in.lb.s²	1.33	1.07	0.99	0.91	0.89	0.93	1.06	1.15	1.06	0.97	0.97	0.97	0.97

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[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

VH+ 063

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	319	353	364	372	392	363	364	353	364	392	363	392	363
				in.lb	2823	3124	3221	3292	3469	3213	3221	3124	3221	3469	3213	3469	3213
Constant torsional backlash throughout its lifespan			T_{2Servo}	Nm	198	210	225	221	229	226	225	210	225	229	226	229	226
				in.lb	1752	1859	1991	1956	2027	2000	1991	1859	1991	2027	2000	2027	2000
Efficiency at full load			η	%	93	91	88	83	74	68	86	89	86	72	66	72	66
Emergency stop torque			T_{2Not}	Nm	460	484	491	494	518	447	491	484	494	518	447	518	447
				in.lb	4071	4283	4345	4372	4584	3956	4345	4283	4372	4584	3956	4584	3956
Max. input speed			n_{1Max}	rpm	4500												
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	4.2	3.1	3	2.4	2.3	2.2	1.2	0.7	0.7	1.1	1.1	0.8	0.6
				in.lb	37.2	27.4	26.6	21.2	20.4	19.5	10.6	6.2	6.2	9.7	9.7	7.1	5.3
Max. torsional backlash			j_t	arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity			C_{t21}	Nm/arcmin	28												
				in.lb/arcmin	248												
Max. axial force [b]			F_{2AMax}	N	8250												
				lb_f	1856												
Max. radial force [b]			F_{2RMax}	N	6000												
				lb_f	1350												
Max. tilting moment			M_{2KMax}	Nm	843												
				in.lb	7461												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	13.0						13.7						
				lb_m	28.7						30.0						
Operating noise (with n_1 = 3000 rpm no load)			L_{PA}	dB(A)	≤ 64												
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	G	19	J_1	kgcm²	-	-	-	-	-	-	2.60	2.80	2.50	2.40	2.40	2.40	2.30
				10^{-3} in.lb.s²	-	-	-	-	-	-	2.30	2.48	2.21	2.12	2.12	2.12	2.04
	H	28	J_1	kgcm²	4.80	3.89	3.65	3.56	3.52	3.47	-	-	-	-	-	-	-
				10^{-3} in.lb.s²	4.25	3.44	3.23	3.15	3.12	3.07	-	-	-	-	-	-	-
	K	24	J_1	kgcm²	-	-	-	-	-	-	4.10	4.30	4.10	4.00	4.00	3.90	3.90
				10^{-3} in.lb.s²	-	-	-	-	-	-	3.63	3.81	3.63	3.54	3.54	3.45	3.45

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Please use our cymex® 5 sizing tool to obtain a more detailed design – **www.wittenstein-cymex.com**

[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	578	646	672	702	785	676	672	646	672	785	676	785	676
				in.lb	5115	5717	5947	6213	6947	5983	5947	5717	5947	6947	5983	6947	5983
Constant torsional backlash throughout its lifespan			T_{2Servo}	Nm	469	601	613	677	764	631	613	601	613	764	631	764	631
				in.lb	4151	5319	5425	5991	6761	5584	5425	5319	5425	6761	5584	6761	5584
Efficiency at full load			η	%	94	92	89	86	77	70	87	90	87	75	68	75	68
Emergency stop torque			T_{2Not}	Nm	938	993	963	1005	1064	941	963	993	963	1064	941	1064	941
				in.lb	8301	8788	8523	8894	9416	8328	8523	8788	8523	9416	8328	9416	8328
Max. input speed			n_{1Max}	rpm	4000						-						
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	7.2	7.1	6.5	5	4.8	4.5	2.8	1.6	1.5	2.4	2.4	1.8	1.3
				in.lb	63.7	62.8	57.5	44.3	42.5	39.8	24.8	14.2	13.3	21.2	21.2	15.9	11.5
Max. torsional backlash			j_t	arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity			C_{t21}	Nm/arcmin	78												
				in.lb/arcmin	690												
Max. axial force [b]			F_{2AMax}	N	13900												
				lb_f	3128												
Max. radial force [b]			F_{2RMax}	N	9000												
				lb_f	2025												
Max. tilting moment			M_{2KMax}	Nm	1544												
				in.lb	13664												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	27.0						29.5						
				lb_m	59.7						68.0						
Operating noise (with n_1 = 3000 rpm no load)			L_{PA}	dB(A)	≤ 66						≤ 68						
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	G	24	J_1	kgcm²	-	-	-	-	-	-	10.40	10.10	10.10	8.80	9.50	9.40	9.30
				10^{-3} in.lb.s²	-	-	-	-	-	-	9.20	8.94	8.94	7.79	8.41	8.32	8.23
	K	38	J_1	kgcm²	20.30	16.75	16.79	15.37	15.26	15.90	17.30	17.00	17.10	15.80	16.40	16.30	16.20
				10^{-3} in.lb.s²	17.97	14.82	14.86	13.60	13.51	14.07	15.31	15.05	15.13	13.98	14.51	14.43	14.34

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[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	1184	1336	1377	1392	1505	1376	1377	1377	1377	1505	1376	1505	1376
				in.lb	10478	11824	12186	12319	13319	12178	12186	12186	12186	13319	12178	13319	12178
Constant torsional backlash throughout its lifespan			T_{2Servo}	Nm	1155	1304	1343	1359	1469	1343	1343	1343	1343	1469	1343	1469	1343
				in.lb	10222	11540	11886	12027	13001	11886	11886	11886	11886	13001	11886	13001	11886
Efficiency at full load			η	%	95	93	91	87	80	76	89	89	89	78	74	78	74
Emergency stop torque			T_{2Not}	Nm	1819	1932	1940	1955	2073	1856	1940	1940	1940	2073	1856	2073	1856
				in.lb	16098	17098	17169	17302	18346	16426	17169	17169	17169	18346	16426	18346	16426
Max. input speed			n_{1Max}	rpm	3500						4000						
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	12.2	10.5	9.8	9.1	8.2	7.2	4.1	2.3	2.2	3.8	3.6	2.6	2
				in.lb	108.0	92.9	86.7	80.5	72.6	63.7	36.3	20.4	19.5	33.6	31.9	23.0	17.7
Max. torsional backlash			j_t	arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity			C_{t21}	Nm/arcmin	153												
				in.lb/arcmin	1354												
Max. axial force [b]			F_{2AMax}	N	19500												
				lb_f	4388												
Max. radial force [b]			F_{2RMax}	N	14000												
				lb_f	3150												
Max. tilting moment			M_{2KMax}	Nm	3059												
				in.lb	27072												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	51.0						53.6						
				lb_m	112.7						118.0						
Operating noise (with n_1 = 3000 rpm no load)			L_{PA}	dB(A)	≤ 70												
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	K	38	J_1	kgcm²	-	-	-	-	-	-	31.70	33.00	31.10	30.10	30.40	30.00	29.80
				10^{-3} in.lb.s²	-	-	-	-	-	-	28.05	29.21	27.52	26.64	26.90	26.55	26.37
	M	48	J_1	kgcm²	50.25	40.70	38.77	39.62	37.15	37.47	46.40	47.70	45.80	44.80	45.10	44.70	44.50
				10^{-3} in.lb.s²	44.47	36.02	34.31	35.06	32.88	33.16	41.06	42.21	40.53	39.65	39.91	39.56	39.38

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[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

VS+ 050

				1-stage						2-stage						
Ratio	***i***			**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque	T_{2a}		Nm	165	180	182	193	204	183	182	180	182	204	183	204	183
			in.lb	1460	1593	1611	1708	1805	1620	1611	1593	1611	1805	1620	1805	1620
Constant torsional backlash throughout its lifespan	T_{2Servo}		Nm	54	71	74	81	90	74	74	71	74	90	74	90	74
			in.lb	478	628	655	717	797	655	655	628	655	797	655	797	655
Efficiency at full load	η		%	92	89	86	82	72	64	84	87	84	70	62	70	62
Emergency stop torque	T_{2Not}		Nm	230	242	242	250	262	236	242	242	242	262	236	262	236
			in.lb	2036	2142	2142	2213	2319	2089	2142	2142	2142	2319	2089	2319	2089
Max. input speed	n_{1Max}		rpm	6000												
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)	T_{012}		Nm	2.3	2.2	1.6	1.5	1.2	1.1	0.7	0.5	0.4	0.6	0.6	0.4	0.4
			in.lb	20.4	19.5	14.2	13.3	10.6	9.7	6.2	4.4	3.5	5.3	5.3	3.5	3.5
Max. torsional backlash	j_t		arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity	C_{t21}		Nm/arcmin	8												
			in.lb/arcmin	71												
Max. axial force [b]	F_{2AMax}		N	5000												
			lb_f	1125												
Max. radial force [b]	F_{2RMax}		N	3800												
			lb_f	855												
Max. tilting moment	M_{2KMax}		Nm	409												
			in.lb	3620												
Service life	L_h		h	> 20000												
Weight incl. standard adapter plate	*m*		kg	9.0						9.7						
			lb_m	19.9						21.0						
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}		dB(A)	≤ 62												
Max. permitted housing temperature			°C	+90												
			F	194												
Ambient temperature			°C	-15 to +40												
			F	5 to 104												
Lubrication				Synthetic transmission oil												
Paint				None												
Direction of rotation				See drawing												
Protection class				IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C	14	J_1	kgcm²	-	-	-	-	-	-	0.80	0.80	0.80	0.70	0.70	0.70	0.70
				10^{-3} in.lb.s²	-	-	-	-	-	-	0.71	0.71	0.71	0.62	0.62	0.62	0.62
	E	19	J_1	kgcm²	1.50	1.21	1.12	1.03	1.00	1.05	1.20	1.30	1.20	1.10	1.10	1.10	1.10
				10^{-3} in.lb.s²	1.33	1.07	0.99	0.91	0.89	0.93	1.06	1.15	1.06	0.97	0.97	0.97	0.97

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[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	319	353	364	372	392	363	364	353	364	392	363	392	363
				in.lb	2823	3124	3221	3292	3469	3213	3221	3124	3221	3469	3213	3469	3213
Constant torsional backlash throughout its lifespan			T_{2Servo}	Nm	198	210	225	221	229	226	225	210	225	229	226	229	226
				in.lb	1752	1859	1991	1956	2027	2000	1991	1859	1991	2027	2000	2027	2000
Efficiency at full load			η	%	93	91	88	83	74	68	86	89	86	72	66	72	66
Emergency stop torque			T_{2Not}	Nm	460	484	491	494	518	447	491	484	494	518	447	518	447
				in.lb	4071	4283	4345	4372	4584	3956	4345	4283	4372	4584	3956	4584	3956
Max. input speed			n_{1Max}	rpm	4500												
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	4.2	3.1	3	2.4	2.3	2.2	1.2	0.7	0.7	1.1	1.1	0.8	0.6
				in.lb	37.2	27.4	26.6	21.2	20.4	19.5	10.6	6.2	6.2	9.7	9.7	7.1	5.3
Max. torsional backlash			j_t	arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity			C_{t21}	Nm/arcmin	28												
				in.lb/arcmin	248												
Max. axial force [b]			F_{2AMax}	N	8250												
				lb_f	1856												
Max. radial force [b]			F_{2RMax}	N	6000												
				lb_f	1350												
Max. tilting moment			M_{2KMax}	Nm	843												
				in.lb	7461												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	16.0						16.7						
				lb_m	35.4						37.0						
Operating noise (with n_1 = 3000 rpm no load)			L_{PA}	dB(A)	≤ 64												
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	G	19	J_1	kgcm²	-	-	-	-	-	-	2.60	2.80	2.50	2.40	2.40	2.40	2.30
				10^{-3} in.lb.s²	-	-	-	-	-	-	2.30	2.48	2.21	2.12	2.12	2.12	2.04
	H	28	J_1	kgcm²	4.80	3.89	3.65	3.56	3.52	3.47	-	-	-	-	-	-	-
				10^{-3} in.lb.s²	4.25	3.44	3.23	3.15	3.12	3.07	-	-	-	-	-	-	-
	K	24	J_1	kgcm²	-	-	-	-	-	-	4.10	4.30	4.10	4.00	4.00	3.90	3.90
				10^{-3} in.lb.s²	-	-	-	-	-	-	3.63	3.81	3.63	3.54	3.54	3.45	3.45

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[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

VS+ 080

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	578	646	672	702	785	676	672	646	672	785	676	785	676
				in.lb	5115	5717	5947	6213	6947	5983	5947	5717	5947	6947	5983	6947	5983
Constant torsional backlash throughout its lifespan			T_{2Servo}	Nm	469	601	613	677	764	631	613	601	613	764	631	764	631
				in.lb	4151	5319	5425	5991	6761	5584	5425	5319	5425	6761	5584	6761	5584
Efficiency at full load			η	%	94	92	89	86	77	70	87	90	87	75	68	75	68
Emergency stop torque			T_{2Not}	Nm	938	993	963	1005	1064	941	963	993	963	1064	941	1064	941
				in.lb	8301	8788	8523	8894	9416	8328	8523	8788	8523	9416	8328	9416	8328
Max. input speed			n_{1Max}	rpm	4000						4500						
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	7.2	7.1	6.5	5	4.8	4.5	2.8	1.6	1.5	2.4	2.4	1.8	1.3
				in.lb	63.7	62.8	57.5	44.3	42.5	39.8	24.8	14.2	13.3	21.2	21.2	15.9	11.5
Max. torsional backlash			j_t	arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity			C_{t21}	Nm/arcmin	78												
				in.lb/arcmin	690												
Max. axial force [b]			F_{2AMax}	N	13900												
				lb_f	3128												
Max. radial force [b]			F_{2RMax}	N	9000												
				lb_f	2025												
Max. tilting moment			M_{2KMax}	Nm	1544												
				in.lb	13664												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	33.0						35.5						
				lb_m	72.9						78.0						
Operating noise (with n_1 = 3000 rpm no load)			L_{PA}	dB(A)	≤ 66						≤ 68						
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	G	24	J_1	kgcm²	-	-	-	-	-	-	10.40	10.10	10.10	8.80	9.50	9.40	9.30
				10^{-3} in.lb.s²	-	-	-	-	-	-	9.20	8.94	8.94	7.79	8.41	8.32	8.23
	K	38	J_1	kgcm²	20.30	16.56	16.69	15.33	15.24	15.90	17.30	17.00	17.10	15.80	16.40	16.30	16.20
				10^{-3} in.lb.s²	17.97	14.66	14.77	13.57	13.49	14.07	15.31	15.05	15.13	13.98	14.51	14.43	14.34

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[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

					1-stage						2-stage						
Ratio			***i***		**4**	**7**	**10**	**16**	**28**	**40**	**50**	**70**	**100**	**140**	**200**	**280**	**400**
Max. torque			T_{2a}	Nm	1184	1336	1377	1392	1505	1376	1377	1377	1377	1505	1376	1505	1376
				in.lb	10478	11824	12186	12319	13319	12178	12186	12186	12186	13319	12178	13319	12178
Constant torsional backlash throughout its lifespan			T_{2Servo}	Nm	1155	1304	1343	1359	1469	1343	1343	1343	1343	1469	1343	1469	1343
				in.lb	10222	11540	11886	12027	13001	11886	11886	11886	11886	13001	11886	13001	11886
Efficiency at full load			η	%	95	93	91	87	80	76	89	89	89	78	74	78	74
Emergency stop torque			T_{2Not}	Nm	1819	1932	1940	1955	2073	1856	1940	1940	1940	2073	1856	2073	1856
				in.lb	16098	17098	17169	17302	18346	16426	17169	17169	17169	18346	16426	18346	16426
Max. input speed			n_{1Max}	rpm	3500						4000						
Mean no load running torque [a] (With n_1=3000 min^{-1} and 20° C gear temperature)			T_{012}	Nm	12.2	10.5	9.8	9.1	8.2	7.2	4.1	2.3	2.2	3.8	3.6	2.6	2
				in.lb	108.0	92.9	86.7	80.5	72.6	63.7	36.3	20.4	19.5	33.6	31.9	23.0	17.7
Max. torsional backlash			j_t	arcmin	Standard ≤ 3 / Reduced ≤ 2						Standard ≤ 4 / Reduced ≤ 3						
Torsional rigidity			C_{t21}	Nm/arcmin	153												
				in.lb/arcmin	1354												
Max. axial force [b]			F_{2AMax}	N	19500												
				lb_f	4388												
Max. radial force [b]			F_{2RMax}	N	14000												
				lb_f	3150												
Max. tilting moment			M_{2KMax}	Nm	3059												
				in.lb	27072												
Service life			L_h	h	> 20000												
Weight incl. standard adapter plate			*m*	kg	62.0						64.6						
				lb_m	137.0						143.0						
Operating noise (with n_1 = 3000 rpm no load)			L_{PA}	dB(A)	≤ 70												
Max. permitted housing temperature				°C	+90												
				F	194												
Ambient temperature				°C	-15 to +40												
				F	5 to 104												
Lubrication					Synthetic transmission oil												
Paint					None												
Direction of rotation					See drawing												
Protection class					IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	K	38	J_1	kgcm²	-	-	-	-	-	-	31.70	33.00	31.10	30.10	30.40	30.00	29.80
				10^{-3} in.lb.s²	-	-	-	-	-	-	28.05	29.21	27.52	26.64	26.90	26.55	26.37
	M	48	J_1	kgcm²	50.02	40.63	38.73	39.60	37.14	37.47	46.40	47.70	45.80	44.80	45.10	44.70	44.50
				10^{-3} in.lb.s²	44.27	35.96	34.28	35.05	32.87	33.16	41.06	42.21	40.53	39.65	39.91	39.56	39.38

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[a] Idling torques decrease during operation
[b] Refers to center of output shaft or flange at n_2 = 300 rpm

Dimension sheets available from March 2017 on.

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- Individual support in all phases of interaction
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The Info & CAD Finder is available free of charge on our homepage:
www.wittenstein-alpha.com

Online sizing within seconds

SIZING ASSISTANT
The optimum gearhead within seconds

Our SIZING ASSISTANT suggests the most suitable gearhead from the WITTENSTEIN alpha portfolio based on your application data or the required motor.

Your benefits
- Efficient online sizing within seconds
- No need to log in
- Convenient and intuitive user interface
- Automatic comparison of the motor and gearhead geometry
- Dimension sheet and CAD data with a single click
- User friendly comparison function
- Direct request for nonbinding quotation after selection process

SIZING ASSISTANT
YOUR GEARHEAD WITHIN SECONDS

The SIZING ASSISTANT is available online and free of charge at:
www.sizing-assistant.com

WITTENSTEIN alpha

Sizing & consultation | Customized logistics solutions | After-sales services

cymex® 5
Sizing of the entire drive train

WITTENSTEIN alpha's engineers have fundamentally redesigned the cymex® sizing software. The result is a sizing tool that sets benchmarks in every respect.

Your benefits
- Enables precise simulations of motions and loads
- Defining any number of axes at once
- More than 14,000 motors from fifty leading manufacturers are stored in the sizing tool
- 90 percent less work compared to existing software solutions
- Uncompromisingly reliable
- A fundamentally new master-slave-function (available on request)
- Intuitive GUI
- 11 different languages
- Customers experiences served as valuable input
- Generating calculation documentation and data sheets

We handle the complete shipment for you

In time-critical situations, we ensure immediate and professional pick-up as well as the fastest possible delivery of drives in need of repair. Profit from our return service, which is also available for speedline® orders.

Your benefits
- Cost savings because downtime is minimized
- Professional logistics organization
- Reduced transport risks through customized, direct delivery

speedline®
Speedy deliveries

We offer you delivery of the V-Drive standard series within 72 hours ex works at attractive conditions.*

Your benefits
- Minimum re-stocking times and very fast response time in case of unplanned requirements
- Maximum reliability through transparent information flows and dependable processing

cymex®5
CALCULATE ON THE BEST

speedline®
by WITTENSTEIN alpha

The download of cymex® 5 is available free of charge at:
www.wittenstein-cymex.com

Our service team can be contacted on:
Tel.+49 7931 493-12900 (International)

Our speedline® team can be contacted on:
Phone +49 7931 493-10333 (International)
*Non-binding delivery time depending upon part availability

Glossary

Equivalent force at the output (F_{2_eq})

The equivalent force F_{2_eq} at the output describes the decisive forces for gearhead selection.

Equivalent application torque (T_{2_eq})

The equivalent application torque T_{2_eq} describes the decisive torque for gearhead selection.

Sizing factor (f_a)

The sizing factor f_a describes the influence of the daily operating time and the operating mode factor on the application torque.

Operating mode factor (K_M)

The operating mode factor K_M describes the influence of the duty cycle, the number of cycles and the dynamics on the application torque.

Max. output torque ($T_{2\alpha}$)

$T_{2\alpha}$ is the maximum torque which can be transmitted by the gearhead. This value may be lower, depending on the specific boundary conditions of the application.

Constant torsional backlash throughout its lifespan (T_{2Servo})

T_{2Servo} is a special value for precision applications in which a minimum backlash must be guaranteed over the life of the gearbox. The increase in backlash seen in other worm gears is less due to the optimized hollow flank teeth.

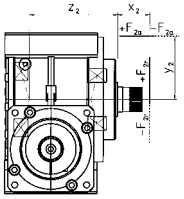
Max. radial force (F_{2RMax})

The radial force F_{2RMax} is the force component acting at right angles to the output shaft or parallel to the output flange. It acts perpendicular to the axial force and can assume an axial distance of x_2 in relation to the shaft shoulder or to the shaft flange, which acts as a lever arm.

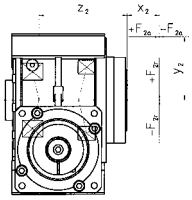
Axial force (F_{2AMax})

In the case of CVS, NVS and VS+ the axial force F_{2AMax} acting on a gearhead runs parallel to its output shaft. On a VT+, the force runs perpendicular to its output shaft. It may be applied with axial offset via a lever arm y_2 under certain circumstances, in which case it also generates a bending moment. If the axial force exceeds the permissible catalogue values, additional design features (e.g. axial bearings) must be implemented to absorb these forces.

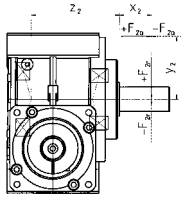
VS+ involute



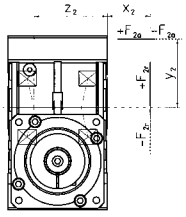
VT+



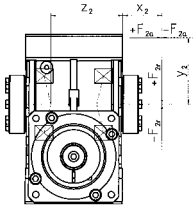
VS+ smooth, keywayed



VH+ / NVH / CVH keywayed



VH+ / NVH / CVH keywayed



Operating modes (continuous operation **S1** and cyclic operation **S5**)

When selecting a gearhead, it is important to consider whether the motion profile is characterized by frequent acceleration and deceleration phases in cyclic operation (S5) as well as pauses, or whether it is designed for continuous operation (S1), i.e. with long phases of constant motion.

Operating noise (L_{PA})

Low noise level L_{PA} is a factor of growing importance for environmental and health reasons. The gear ratio and speed both affect the noise level.
General rule:
A higher speed means a higher noise level, while a higher ratio means a lower noise level. The values specified in our catalog relate to an input speed of n=3000 rpm at no load.

Further information can be found in the glossary of our current product catalog.

Order codes

V-Drive

V	S	+	0	5	0	S	–	M	F	1	–	7	–	0	E	1	–	1K	–	A	C	1	/ Motor*

- V S + — Gearhead type
- 0 5 0 — Gearhead size
- S — Type code
- M — Gearhead variations
- F — Gearhead model
- 1 — Number of stages
- 7 — Ratios
- 0 — Output shaft shape / flange
- E — Clamping hub bore hole diameter
- 1 — Backlash
- 1K — Installation on motor side
- A C — Mounting position (see overview)
- 1 — number of shrink discs
- / Motor*

Gearhead type

Basic
CVH = hollow shaft
CVS = shaft

Value
NVH = hollow shaft
NVS = shaft

Advanced
VT⁺ = flange
VH⁺ = hollow shaft
VS⁺ = shaft

Gearhead size
040
050
063
080
100

Type code
S = Standard
F = Food-grade lubrication
W = Corrosion resistant

Gearhead variations
M = Motor attachment gearhead

Gearhead model
F = Standard
T = Reinforced bearings (V-Drive Basic)

Number of stages
1 = 1-stage
2 = 2-stage (V-Drive Value and V-Drive Advanced)

* Full motor designation only required for determining gearhead attached components!
X = Special model

Ratios
See table or data sheets

Output shaft shape / flange
0 = Hollow shaft interface, cover on rear side / Smooth shaft
1 = Hollow shaft, keyed on both sides / Shaft with key
2 = Splined shaft (DIN 5480)
4 = other
5 = Flanged hollow shaft
6 = Hollow shaft interfaces on both sides
D = Smooth shaft on both sides
H = Shaft with key on both sides

Clamping hub bore hole diameter
See table or data sheets

Backlash
1 = Standard
0 = Reduced

Installation on motor side
S = Push-on sleeve
K = Coupling

number of shrink discs
0 = no shrink disc
1 = one shrink disc
2 = two shrink discs

Worm gearheads

Mounting position (only relevant for oil volume)

Output side A:
View of motor interface,
Gear output left
Only valid for VS⁺, VT⁺,
NVS and CVS

AC 
AF 
AD 
AG 
AE 

Output side B:
View of motor interface,
Gear output right
Only valid for VS⁺, VT⁺,
NVS and CVS

BC 
BF 
BD 
BG 
BE 

For VS⁺, VH⁺, NVS, NVH, CVS and CVH with Dual-shaft output, A and B must be replaced with 0 (zero).

WITTENSTEIN | alpha

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WITTENSTEIN alpha – intelligent drive systems

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