

Worm Gear Units ZM/I

General data: Universal heavy-duty gearboxes.
4 sizes, centre distance 40, 50, 63 and 80 mm.
Centre distance 100 - 315 mm available on request.

Housing: High-quality grey cast iron, all sides machined and with mounting holes on 5 sides.

Gearing: 13 ratios from 5 to 83 : 1; worm shaft hardened and ground. Worm gear made from special centrifugally cast bronze.

Efficiency factor: The efficiency factors stated in the selection tables are guideline values for properly run-in and lubricated gearboxes at operating temperature with nominal load and driving worm shaft. Proper running in is a crucial factor influencing the lifetime of the gearbox. The starting efficiency factor (η_A) is, as the operating efficiency factor (h), depending on the lead angle.

Self-locking: Self-locking only occurs in worm gear units, when the unit cannot be driven from the output side. Worms with 4 and 6 threads sometimes permit transmission ratios for gearing up ($i = 5 : 1$ to $13.3 : 1$). If a gearbox must be implicitly self-locking, or must implicitly not be self-locking, we urge you to contact us.

The ratios 40:1 and 72:1 optimized for manual operation are static and dynamic self-locking.

Bearing system: All gearbox shafts with generously dimensioned roller bearings.

Lubrication: The gearboxes are lubricated for life using synthetic oil. Under normal operating conditions, no maintenance is required. The housing should be checked for leakages at an interval of approx. 2 years.

Ventilation: Size (centre distance) 40 is supplied without ventilation. With the other gearboxes, the sealing plug has to be exchanged with the separately packed venting filter.

Version A



Version HL



Venting Filter (VF)

Size	A mm	B mm	C mm	D mm	E mm	F mm
40*	-	-	-	-	-	-
50	50	20	33	22	58	25
63	62,5	27,5	37	22	67	25
80	77,5	32,5	57	22	82	25

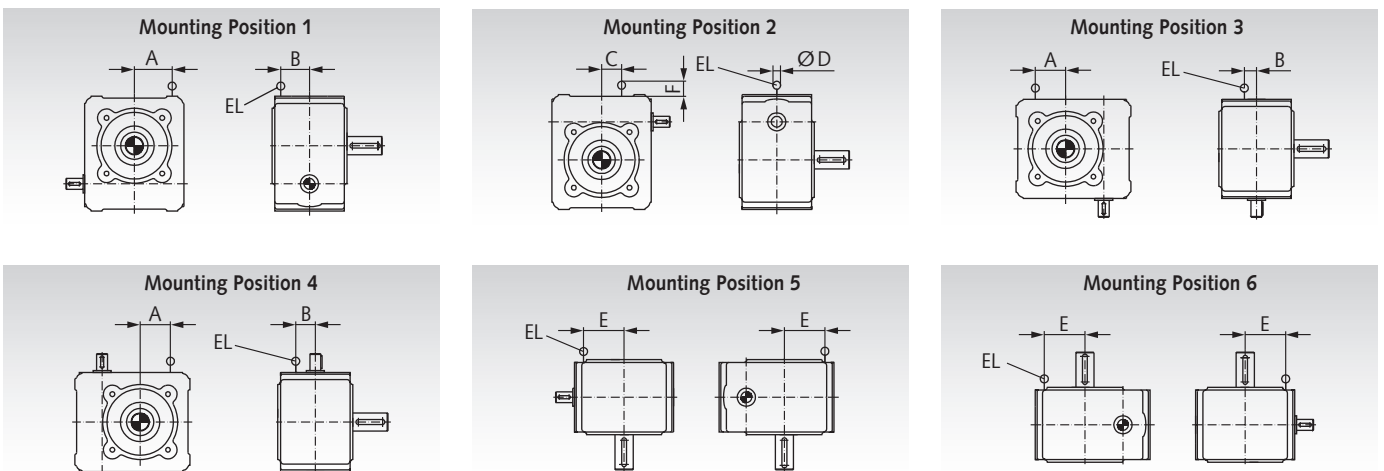
* Size 40 without Ventilation.

Lubrication Volume in Litre (dm³)

Size	Mounting Position			
	1	2	3 + 4	5 + 6
40	0,20	0,25	0,20	0,20
50	0,30	0,60	0,45	0,45
63	0,50	1,10	0,70	0,80
80	0,90	2,10	1,40	1,60

The standard lubrication volume is calculated for mounting position 2. For other mounting positions and high permanent speeds it might have to be reduced, to avoid oil leakages.

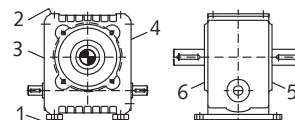
Position of the Oil Fittings Size 50 - 80



Mounting Sides

The worm gear units can be mounted in any position and the shaft ends can be positioned to your requirements.

Sizes 40 - 80



Worm Gear Units ZM/I, Technical Data, Size 63

The input power $P_{1\text{ perm}}$ and output torques $T_{2\text{ perm}}$ listed in the selection tables are based on shock-free continuous operation, an operating time of 8 hours/day, 3 starts per hour, operating time (OT) = 100% and 20°C ambient temperature. The maximum output torques $T_{2\text{ max}}$ may frequently be reached in short-term load peaks but they must not be exceeded. With an operating time under 90%, the permissible gearbox output can usually be increased.

i_n, i_{ist} = nominal ratio, real ratio.

n_1, n_2 [min⁻¹] = input speed, output speed.

$P_{1\text{ perm}}$ [kW] = permissible input power.

$T_{2\text{ perm}}$ [Nm] = permissible output torque (permanent).

$T_{2\text{ max}}$ [Nm] = maximum output torque (peak).

η = operating efficiency.

Dimensions Table Page 736.

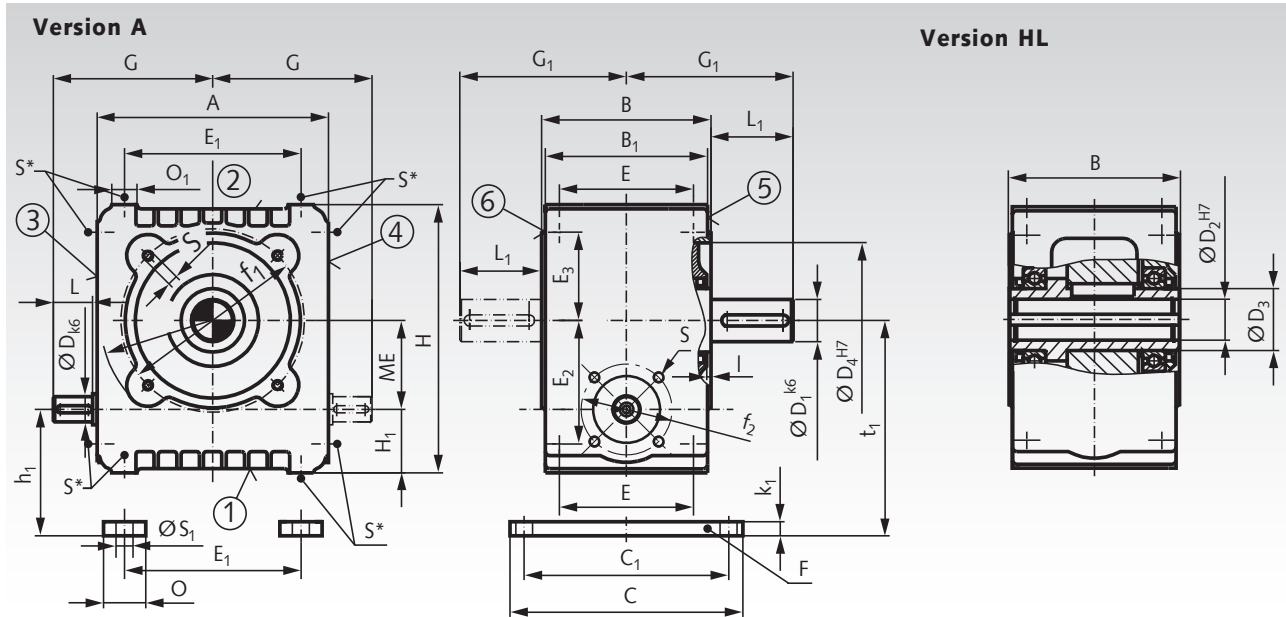
Version with foot mounting brackets or shafts on both sides on request.

Version A Output Side 5 Product No.	Version A Output Side 6 Product No.	Version HL Hollow Shaft Product No.	Ratio i	n_1 min ⁻¹	$n_2 \approx$ min ⁻¹	$P_{1\text{ perm}}$ KW	$T_{2\text{ perm}}$ Nm	$T_{2\text{ max}}$ Nm	η
421 021 00	421 021 01	421 023 00	4,83 : 1 *29/6	1500	300	5,87	174	288	0,96
				1000	200	4,25	188	288	0,95
				500	100	2,57	223	288	0,94
				10	2	0,07	288	288	0,86
421 021 02	421 021 03	421 023 01	7,25 : 1 *29/4	1500	200	4,44	194	328	0,95
				1000	133	3,17	206	328	0,94
				500	67	1,93	244	328	0,91
				10	1,3	0,06	328	328	0,83
421 021 04	421 021 05	421 023 02	9,75 : 1 *39/4	1500	150	3,35	195	301	0,94
				1000	100	2,35	203	301	0,93
				500	50	1,29	216	301	0,90
				10	1	0,04	289	301	0,83
421 021 06	421 021 07	421 023 03	12,75 : 1 *51/4	1500	113	1,81	135	243	0,92
				1000	75	1,28	142	243	0,91
				500	38	0,71	152	243	0,88
				10	0,75	0,02	239	243	0,82
421 021 08	421 021 09	421 023 04	14,5 : 1 *29/2	1500	100	2,24	186	387	0,89
				1000	67	1,78	217	387	0,88
				500	33	1,14	268	387	0,84
				10	0,67	0,04	387	387	0,74
421 021 10	421 021 11	421 023 05	19,5 : 1 *39/2	1500	75	2	220	355	0,88
				1000	50	1,46	235	355	0,87
				500	25	0,82	252	355	0,83
				10	0,5	0,02	339	355	0,74
421 021 12	421 021 13	421 023 06	25,5 : 1 *51/2	1500	57	1,25	174	314	0,86
				1000	38	0,89	182	314	0,84
				500	19	0,5	197	314	0,80
				10	0,38	0,02	281	314	0,73
421 021 14	421 021 15	421 023 07	29,0 : 1 *29/1	1500	50	1,22	183	429	0,81
				1000	33	0,99	215	429	0,79
				500	17	0,67	274	429	0,73
				10	0,33	0,03	429	429	0,60
421 021 16	421 021 17	421 023 08	39,0 : 1 *39/1	1500	38	1,11	217	393	0,79
				1000	25	0,89	255	393	0,76
				500	13	0,58	305	393	0,71
				10	0,25	0,02	393	393	0,60
-	-	421 023 14 ¹⁾	40,0 : 1 *40/1 optimized for manual operation ¹⁾	1500	38	0,77	136	256	0,70
				50	1,25	0,08	256	256	0,44
421 021 18	421 021 19	421 023 09	51,0 : 1 *51/1	1500	28	0,78	191	346	0,75
				1000	19	0,57	201	346	0,73
				500	9,4	0,33	218	346	0,68
				10	0,19	0,01	298	346	0,58
421 021 20	421 021 21	421 023 10	61,0 : 1 *61/1	1500	24	0,78	211	281	0,70
				1000	16	0,58	226	281	0,67
				500	8,1	0,32	226	281	0,60
				10	0,16	0,01	226	281	0,47
421 021 24	421 021 25	421 023 12	72,0 : 1 *72/1	1500	21	0,6	176	235	0,64
				1000	14	0,43	176	235	0,60
				500	6,9	0,24	176	235	0,53
				10	0,14	0,01	176	235	0,39
421 021 26 ¹⁾	421 021 27 ¹⁾	421 023 13 ¹⁾	72,0 : 1 *72/1 optimized for manual operation ¹⁾	100	1,38	0,06	176	235	0,41
				50	0,69	0,03	176	235	0,41
421 021 22	421 021 23	421 023 11	82,0 : 1 *82/1	1500	18	0,45	152	247	0,64
				1000	12	0,32	152	247	0,61
				500	6	0,17	152	247	0,56
				10	0,12	0,004	152	247	0,46

* Example: Worm gear number of teeth 29 / worm shaft 6 threads.

¹⁾ This implicitly self-locking version is optimized for hand operation.

Dimensions Table Worm Gear Units ZM/I



The sides 1 to 6 are machined and can be used as mounting surfaces. The foot mounting brackets F can be connected to the sides 1 and 2. The sides 1, 2, 3, 5 and 6 are ex-works always supplied with threaded bores. If side 4 is to be used as mounting surface, the respective surface is supplied with threaded bores. The worm shaft end can be fitted on side 3 or 4 as desired. Shaft end with thread alignment according to DIN 332 sheet 2 see page 863, feather keys and grooves according to DIN 6885/1. Position of the venting filter according to the table on page 731. The gearbox can function in any mounting position.

Version with foot mounting bracket or double-sided output shaft on request.

Gearbox Dimensions

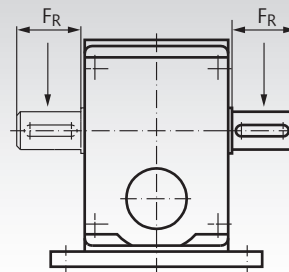
Size	ME	A	B	B ₁	c	c ₁	D ₄	D x L	D ₁ x L ₁	D ₂	D ₃	E	E ₁	E ₂ *	E ₃ *	F ₁
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
40	40	104	90	85	125	110	70	14 x 24	22 x 36	22	35	70	70	55	35	53
50	50	140	105	100	150	130	90	16 x 28	25 x 42	25	40	80	100	70	50	65
63	63	164	120	115	165	145	110	18 x 28	30 x 58	30	45	95	125	87,5	62,5	80
80	80	204	140	135	190	165	140	24 x 36	38 x 58	38	55	115	155	107,5	77,5	100

Size	f ₁	f ₂	G	G ₁	H ₁	h ₁	H	I	k ₁	O	O ₁	S*	S ₁	t ₁	Weight
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
40	85	50	79	81	32	40	124	3	8	25	14	M6 x 12	10	80	7
50	110	64	100	94,5	40	50	160	3	10	30	18	M8 x 14	12	100	12
63	130	70	113	118	45	55	190	3	10	30	18	M8 x 14	12	118	18
80	165	81	141	128	55	67	237	3	12	35	22	M10 x 17	15	147	28

* Threaded bores on side 4 at extra charge. Dimensions may be subject to alteration.

Permissible Radial Loads F_R [N] for Normal Output Shaft and Bearing System

The perm. radial loads indicated in the table are calculated for the centre of the output shaft end, also calculating in the output speed and the nominal output torque. The values were calculated for the adverse rotational direction. The perm. radial loads only apply to unilateral load. If in your application high radial loads occur in combination with axial loads, we ask you to contact us.



Size	Output Torques Nm	Permiss. Radial Load [N] at Output Speeds n ₂ [min ⁻¹]																	
		6	8	10	12	16	20	25	32	40	50	63	80	100	125	160	200	250	320
40	0 - 80	2500	2375	2250	2125	2000	1875	1775	1675	1575	1400	1325	1250	1175	1125	1050	925	875	800
	125 - 160	3500	3325	3150	2970	2800	2620	2480	2340	2200	1960	1850	1750	1640	1570	1470	1290	1220	1120
63	0 - 200	5000	4750	4500	4250	4000	3750	3550	3350	3150	2800	2650	2500	2350	2250	2100	1850	1750	1600
	200 - 250	4600	4360	4140	3910	3680	3450	3260	3080	2900	2570	2440	2300	2160	2070	1930	1700	1610	1470
	250 - 320	3500	3325	3150	2975	2800	2625	2485	2345	2205	1960	1855	1750	1645	1575	1470	1295	1225	1120
80	0 - 500	7500	7120	6740	6370	6000	5620	5320	5000	4700	4200	4000	3750	3500	3370	3140	2770	2620	2400