

13. STEPLESS SPEED VARIATOR

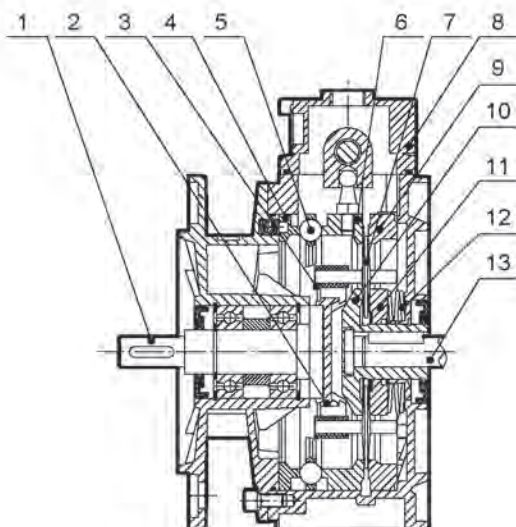
13.1 Brief introduction to stepless speed variator

The design of UDL series stepless speed variator comprises the advanced technology both at home and abroad. The products include the following main characteristics:

1. High speed-regulating precision: up to 0.5-1 rotation.
2. Large speed –changing range: The speed ratio ranges from 1:1.4 to 1:7 freely.
3. High in strength and long in service life.
4. Convenient to regulate the speed.
5. Continuous in running, front-to-back in running direction, smooth in driving, stable in performance and low in noise.
6. Full in sealing and suitable for any environment.
7. Compact in structure and small in volume.
8. Made of high-quality aluminium alloy diecast into forming, good-looking in appearance, light in weight and it never gets rusty.
9. Good in adaptation: UDL series stepless speed variators can be combined with all kinds of speed reducers, as to achieve low stepless speed-changing.

UDL series stepless speed variators are widely used for foodstuffs, ceramics, packing, chemicals, pharmacy, plastics, paper-making, machine-tools, communications, and all kinds of automatic lines, pipelines and assembly lines which need speed-regulation, It is a good companion for your production.

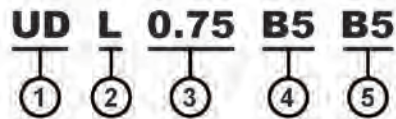
13.2 Structure



1. Output shaft
2. Planet carrier
3. Friction bearing - planet disk
4. Cam ring
5. Ball ring
6. Adjustable annulus ring
7. Planet disk
8. Control cover
9. Fixed annulus ring
10. Fixed sun race
11. Adjustable sun race
12. Belleville spring
13. Motor shaft

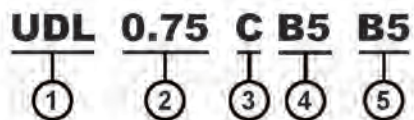
13.3 Model illuminate

13.3.1 stepless speed variator



No	Comments
1	Code of stepless speed variator
2	1). L: Aluminium alloy casing 2). No mark means cast iron casing
3	Motor power
4	1). B3: Foot-mounted model 2). B5: Flange-mounted model
5	Code of installation positon

13.3.2 Combination of stepless speed variator and gear speed reducer



No	Comments
1	Code of stepless speed variator with aluminium alloy casing
2	Motor power
3	Code of gear reducer
4	1). B3: Foot-mounted model 2). B5: Flange-mounted model
5	Code of installation positon

13.4 Product picture



UDL..B3



UDL..B5

13.5 Performance parameter

13.5.1 UDL Performance table for udl series speed variator

($n_1 = 1400$ r/min)

	Model	i	n_2 [r/min]	M_2 [Nm]
0.18KW	UDL0.18	1.6 ~ 8.2	880 ~ 170	1.5 ~ 3
0.37KW	UDL0.37	1.4 ~ 7	1000 ~ 200	3 ~ 6
0.55KW	UDL0.55	1.4 ~ 7	1000 ~ 200	4 ~ 8
0.75KW	UDL0.75	1.4 ~ 7	1000 ~ 200	6 ~ 12
1.1KW	UDL1.1(UD1.1)	1.4 ~ 7	1000 ~ 200	9 ~ 18
1.5KW	UD1.5	1.4 ~ 7	1000 ~ 200	12 ~ 24
2.2KW	UD2.2	1.4 ~ 7	1000 ~ 200	18 ~ 36
3.0KW	UD3.0	1.4 ~ 7	1000 ~ 200	24 ~ 48
4.0KW	UD4.0	1.4 ~ 7	1000 ~ 200	32 ~ 64
5.5KW	UD5.5	1.4 ~ 7	1000 ~ 200	45 ~ 90
7.5KW	UD7.5	1.4 ~ 7	1000 ~ 200	59 ~ 118

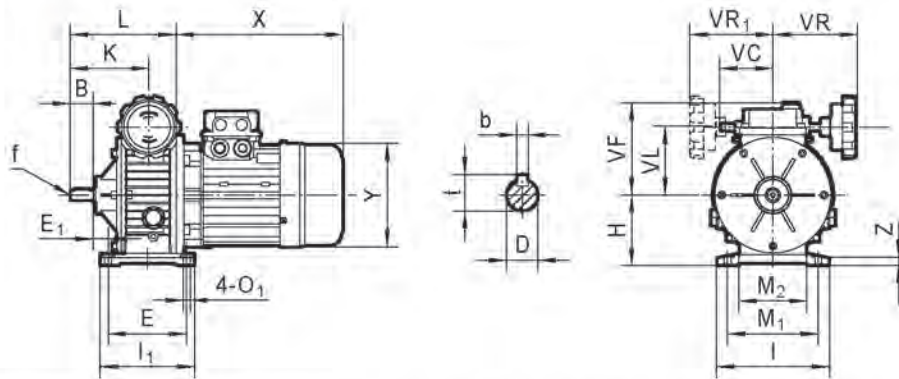
13.5.2 Performance table for stepless speed variator & gear speed reducer

($n_1 = 1400$ r/min)

Model	i	n_2 [r/min]	M_2 [Nm]
UDL0.18-CB3	5	176 ~ 34	7 ~ 15
UDL0.37-CB3	5	200 ~ 40	15 ~ 30
UDL0.75-CB3	5	200 ~ 40	30 ~ 60

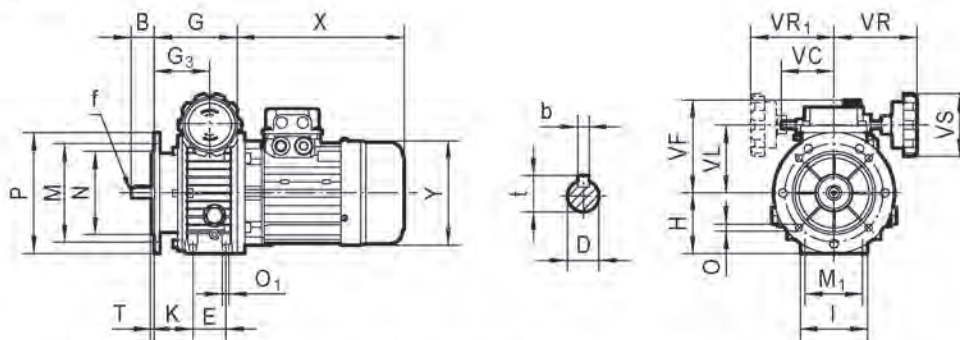
13.6 Outline dimension sheet

13.6.1 B3 Model



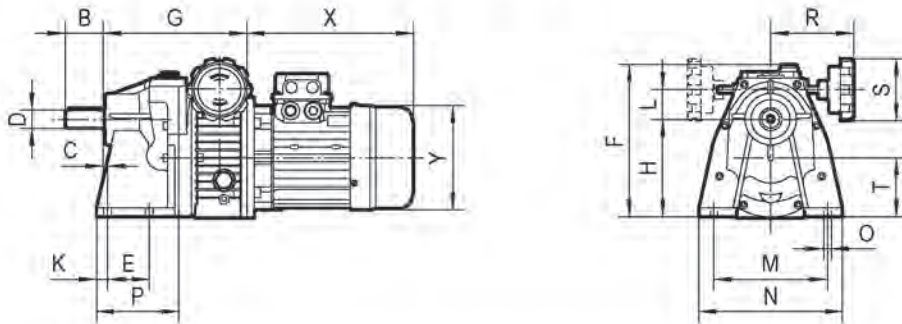
	B	D _{j6}	E	E ₁	H	I	I ₁	K	L	M ₁	M ₂	O ₁	VC	VF	VL	VR	VR ₁	VS	b	f	t	X	Y	Z
UDL0.18B3	23	11	105	18	80	145	120	88	136	110	71	9	71	111	78	110	110	85	4	-	12.5	200	120	10
UDL0.37B3	30	14	104	20	93	149	125	104	140	120	96	9	71	123	90	110	110	85	5	M6	16	227	141	10
UDL0.75B3	40	19	125	26	113	190	150	126	179	160	135	11	79	140	107	120	120	110	6	M6	21.5	268	160	15
UDL/UD1.1B3	40	24	105	35	100	207	130	136	187	160	115	13	-	124	102	150	-	110	8	M8	27	265	195	15
UD1.5B3	50	24	115	54	123	241	150	165	238	190	143	13	-	144	122	150	-	110	8	M8	27	290	195	18
UD2.2B3	60	28	230	25	150	300	270	191	268	245	190	14	-	188	150	150	-	110	8	M8	33	320	215	25
UD3.0B3	60	28	230	25	150	300	270	191	268	245	190	14	-	188	150	150	-	110	8	M8	33	320	215	25
UD4.0B3	60	28	230	25	150	300	270	191	268	245	190	14	-	188	150	150	-	110	8	M8	33	340	240	25
UD5.5B3	70	35	250	33	200	365	290	201	319	315	245	18	-	-	192	192	-	110	10	M10	38	395	275	30
UD7.5B3	70	35	250	33	200	365	290	201	319	315	245	18	-	-	192	192	-	110	10	M10	38	435	275	30

13.6.2 B5 Model



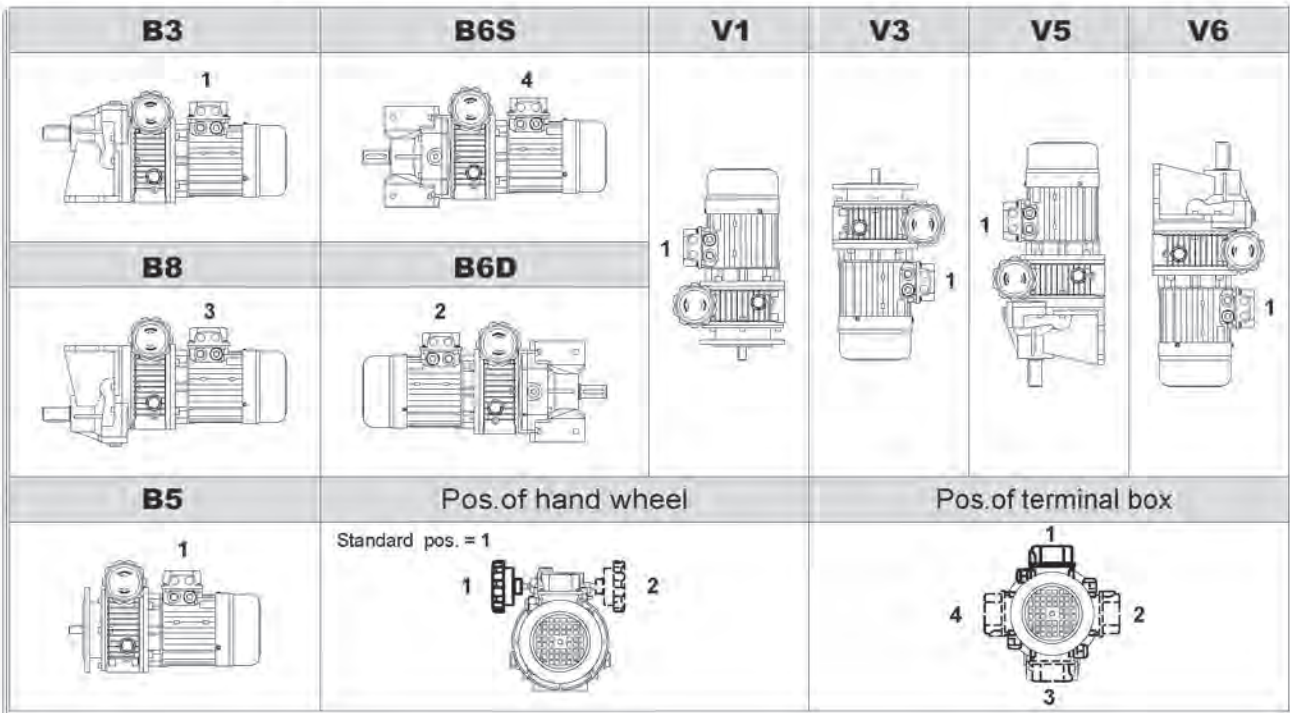
	B	D _{j6}	E	G	G ₃	H	I	M	M ₁	N	O	O ₁	P	T	K	VC	VF	VL	VR	VR ₁	VS	b	f	t	X	Y
UDL0.18B5	23	11	50	113	64.5	70	72	115	60	95	9	M6	140	3.5	46	71	111	78	110	110	85	4	-	13	200	120
UDL0.37B5	30	14	40	110	74	80	90	130	77	110	9	M8	160	3.5	53	71	123	90	100	110	85	5	M6	16	227	141
UDL0.75B5	40	19	58	139	85.5	100	98	165	84	130	11	M8	200	3.5	60	79	140	107	120	120	110	6	M6	22	268	160
UDL/UD1.1B5	40	24	-	147	95	98	207	165	-	130	11	-	200	3.5	-	-	124	102	150	-	110	8	M8	27	265	195
UD1.5B5	50	24	-	188	115	126	241	165	-	130	11	-	200	3.5	-	-	144	122	150	-	110	8	M8	27	290	195
UD2.2B5	60	28	-	208	131	150	270	165	-	230	15	-	250	4	-	-	188	150	160	-	100	8	M8	33	320	215
UD3.0B5	60	28	-	208	131	150	270	265	-	230	15	-	250	4	-	-	188	150	160	-	100	8	M8	33	320	215
UD4.0B5	60	28	-	208	131	150	270	265	-	230	15	-	250	4	-	-	188	150	160	-	110	8	M8	33	340	240
UD5.5B5	70	35	-	244	131	200	-	300	-	250	19	-	350	5	-	-	-	192	194	-	110	10	M10	38	395	275
UD7.5B5	70	35	-	244	131	200	-	300	-	250	19	-	350	5	-	-	-	192	194	-	100	10	M10	38	435	275

13.6.3 Combined outline & installation sizes for stepless speed variator & gear speed reducer with foot screws



Model	B	C	D	E	F	G	H	Y	L	M	N	O	P	R	S	T	X	K
UDL0.18-CB3	40	18	19	45	162	189	108	120	33	115	130	9	80	110	85	66	200	16
UDL0.37-CB3	50	6	24	70	187	190	130	141	39	150	190	10	110	100	85	79	227	15
UDL0.75-CB3	60	7	28	70	228	225	160	160	46	165	210	12	130	130	110	99	268	25

13.7 Installation positions diagram



- For special requirements, orders must specify the position of the terminal box with reference to the diagram. Unless otherwise specified the terminal box, the position of that will be mounted as shown in the diagram for the mounting position.
- Unless specified otherwise, the standard positions are B3 or B5.
- For positions not envisaged, it is necessary to call our Technical Service.

13.8 Operation & maintenance

1. The shapes of shaft extension are all cylindrical. It is subject to GB1569-1990 Cylindrical shaft extension. The key joint refers to GB1095-2003 Ordinary flat key.

2. The shaft lines should be kept concentric when the coupling is connected with a motor. The installation error should be no more than the tolerance value of the coupling.

3. When the output shaft is installed with the coupling or belt wheel, they should be pressed into the screw hole on shaft end. Or assembled by heating. No hammering on it!

4. The mechanical stepless speed variator is not used in such an occasion where overload or running-blockage happen to occur.

5. Speed-regulation should be effected in running. Do not turn the hand wheel of speed-regulation when the machine stops!

6. The limit screws of speed-regulation on two ends under the operating box are well adjusted, Please don't touch them!

7. This set is not suited to work in the environment over 40°C, especially no more than 45°C when the temperature rises. In regard to its temperature rise, please read the explanation as follows:

If a 4-pole motor is used for the speed variator, the temperature under running-in (empty running) is 40-50°C higher than that of normal working environment. After running-in up to 60-80 hours, the temperature rise will go down gradually. From that time on, it is 20°C higher than of environment, and the temperature will keep on rising stably. The high temperature rise in running will affect normal permissive working condition, but it won't bring any bad effects to the service life of parts.

8. The liquid lubricating oil is used for the speed variator. Its trade mark is Ub-3x. Please check up the oil level before use.

9. The machine is filled with lubricating oil before leaving factory. When it starts to work up to 2000 hours for the first time, its lubricating oil should be replaced, changing the lubricating oil every 5000 hours later.

10. The lubricating oil level inside the speed variator should be kept at the height of two-third in the oil scale. Users should usually check the height of oil level. It is strictly prohibited to operate it when short of lubricating oil. The air screw nut on the operating box is screwed up for preventing from oil leakage in moving before leaving factory. It should be loosed when it starts to run. It is strictly forbidden to use it before loosing!

14. LUBRICATION

In cases of ambient temperatures not envisaged in the table, call our Technical Service.

- In the case of temperatures under -30°C or over 60°C it is necessary to use oil seals with special material.
- For operating ranges with temperatures under 0°C it is necessary to consider the following:
 - The motors need to be suitable for operation at the envisaged ambient temperature.
 - The power of the electric motor needs to be adequate for exceeding the higher starting torques required.
 - In the case of reduction units with a cast-iron case, pay attention to impact loads since cast iron may have problems of fragility at temperatures under -15°C .
 - During the early stages of service, problems of lubrication may arise due to the high level of viscosity taken on by the oil and so it is wise to have a few minutes of rotation under no load.
- The oil needs to be changed after approximately 10,000 hours. This period depends on the type of service and the environment where the reduction unit works.
- The reduction units size TNRV 025-030-040-050-063-075-090-105, VF30-44-49 are supplied complete with lubricant, and can therefore be mounted in any position envisaged in the catalogue. V5/V6 for which you should call our Technical Service to assess the conditions of use.
- The reduction units size 110 and 130 are supplied complete with lubricant, mineral oil, (SHELL TEVELA OIL 320).
- The variator speed are supplied complete with lubricant, mineral oil (GUANGYAN Ub-3x).
- For sizes 110 and 130 it is necessary to specify the position, otherwise the reduction units are supplied with the quantity of oil relating to pos. B3.
- TNRV series worm gearbox should mount breather plug (optional parts) under special working condition.
- PC is supplied complete with life-long lubricant, synthetic oil (SHELL TEVELA OIL 320), and can therefore be mounted in all the positions.

14.1 Lubricants oil chosen table

	ISO	SHELL	AGIP	ESSO	MOBIL	CASTROL	BP	GUANGYAN			
TNRV025~105 PC063~090 VF30~49	-25	+50	VG320	Tivela OIL S320	Teliüm VSF320	S220	Glygoyle 30	Alphasyn PG320	Energol SG-XP320		Synthetic oil
TNRV110~130	-5	+40	VG460	Omala OIL460	Blasia 460	Spartan EP460	Mobilgear 634	Alpha MAX 460	Energol GR-XP460	CKE460	Mineral oil
	15	+25	VG220	Omala OIL220	Blasia 220	Spartan EP220	Mobilgear 630	Alpha MAX 220	Energol GR-XP220		
UDL	-25	+40	VG32	A.T.F.DXRON	A.T.F.DXRON	A.T.F.DXRON	A.T.F.220	TQ.DXRON II	Autran DX	Ub-3x	Mineral oil

14.2 Lubricant fill quantity

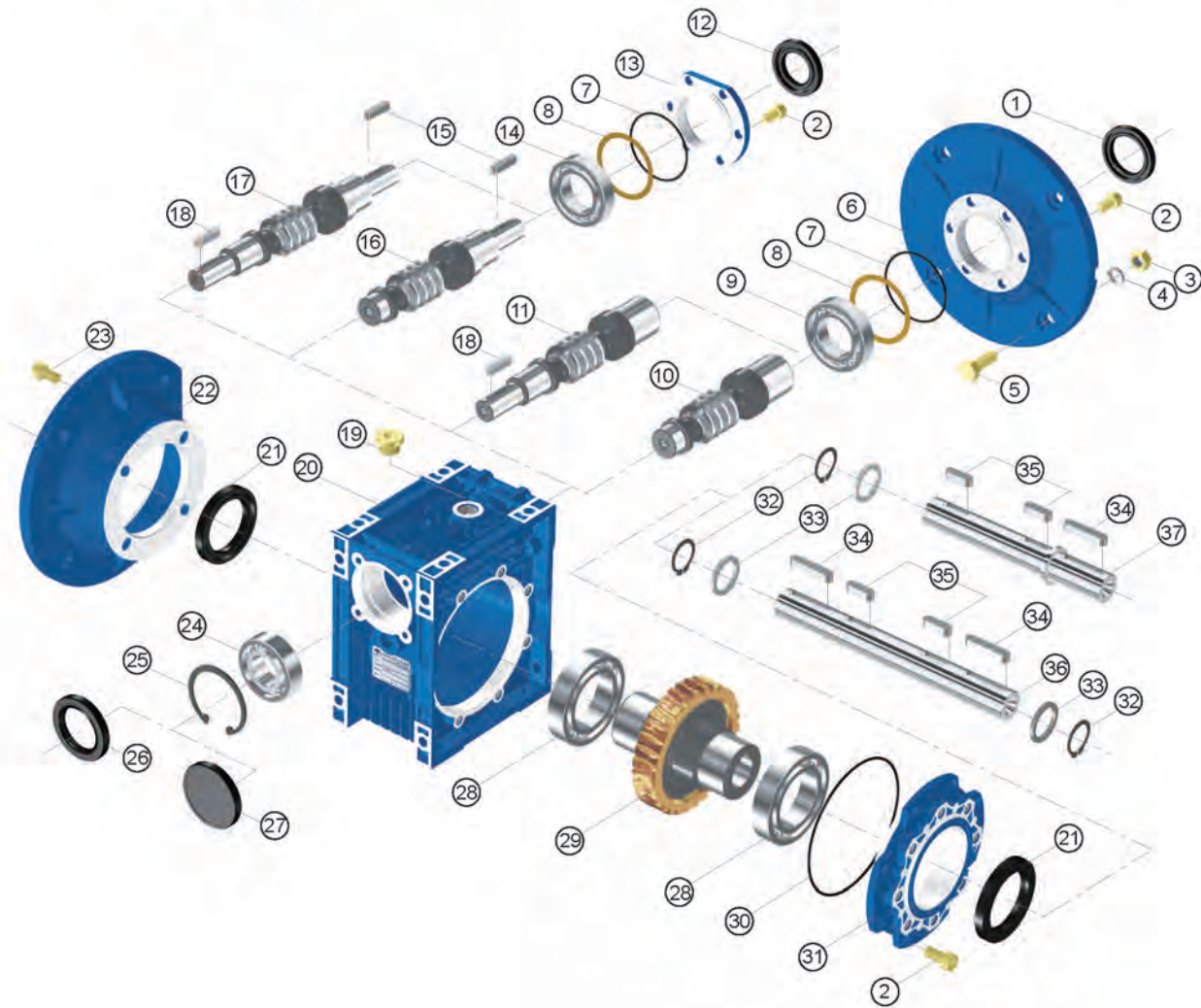
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	B3	B6	B7	B8	V1, V5	V3, V6
TNRV 025				0.023		
TNRV 030				0.05		
TNRV 040				0.1		
TNRV 050				0.15		
TNRV 063				0.3		
TNRV 075				0.5		
TNRV 090				1		
TNRV 105				1.6		
TNRV 110	3	2.5	2.5	2.2	3	2.2
TNRV 130	4.5	3.5	3.5	3.3	4.5	3.3
PC063				0.05		
PC071				0.07		
PC080				0.15		
PC090				0.16		
UDL0.18		0.13			0.2	
UDL0.37		0.15			0.25	
UDL0.55		0.33			0.45	
UDL0.75		0.33			0.45	
UD1.1		0.8			1	
UD1.5		0.8			1	
UD2.2		1.2			1.2	
UD3.0		1.2			1.2	
UD4.0		1.2			1.2	
	B3	B6	B7	B8	V5	V6
VF30	0.045	0.045	0.045	0.045	0.045	0.045
VF44	0.075	0.075	0.075	0.075	0.075	0.075
VF49	0.12	0.12	0.12	0.12	0.12	0.12

The fill quantity in the table is referenced, the exact value relating to the ratio and mounting positions.

15. NOTICE FOR ORDERING

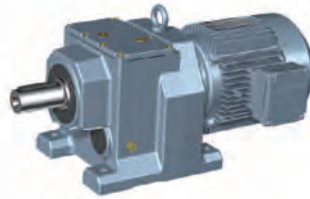
1. Please refer to the sheet of performance parameter, TNRV series dimensions, Mounting and operation positions diagram, make reasonable choice of model, and write down model mark to your required revolution scope, output torque and structural form on ordering (when ordering, you should show whether the reducers are equipped with motors, otherwise reducers aren't supplied with motors).
2. Please make the best choice of standard products in this catalogue, and give an additional explanation for your special requirement and motors.



- | | | | |
|---------------------|---------------------------------------|---------------------|-------------------------|
| 1. Oil seal | 11. Hole input and shaft output worm | 19. Oil plug | 29. Worm wheel |
| 2. Inner hex screw | 12. Oil seal | 20. Casing | 30. O-ring |
| 3. Nut | 13. Input cover | 21. Oil seal | 31. Output cover |
| 4. Spring washer | 14. Bearing | 22. Output flange | 32. Shaft-circlip |
| 5. Hex screw | 15. Key | 23. Inner hex screw | 33. Spacer |
| 6. Input flange | 16. Shaft input worm | 24. Bearing | 34. Key |
| 7. O-ring | 17. Shaft input and shaft output worm | 25. Hole-circlip | 35. Key |
| 8. Adjust spacer | 18. Key | 26. Oil seal | 36. Double output shaft |
| 9. Bearing | | 27. Cover | 37. Single output shaft |
| 10. Hole input worm | | 28. Bearing | |

SHOW THE SERIES PRODUCTS

TR Series helical geared motors



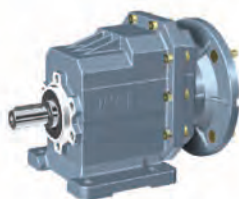
TS Series helical-worm geared motors

TK Series helical-bevel geared motors



TF Series parallel shaft helical geared motors

G3 Series mini helical geared motors



TRC Series mini helical gear units



TNRV Series worm gear units

UDL Series stepless speed variator

