VS

SPEED VARIATORS
planetary type

CONTENTS

Description 2-3
Operation principle 4
Mounting positions 5
Service factors, Weights, Oil 8

Selection tables
MVS, FVS 7

Dimensions
FVS-B5 8
Feet for B3 13

General information
Component parts 10
Gearbox coupling 11
Operation and Maintenance 12

VS - Variators

Description

The variators Series VS are manufactured with housing and covers of pressure die cast aluminium up to the size VS080 and cast iron for bigger units.

The torques as shown in selection tables, are output torques referred to the specific size and powers referred to 1440 rpm.

The variators are delivered already filled with lubricant up to size 80 and for bigger sizes, with lubricant in a separate kit, in the right oil quantity for the mounting positions as shown at page 6.

Selection table data are intended for service factor 1.0, i.e. 8-10 running hours per day, uniform load, less than 6 start/stops per hour and ambient temperature ranging from 15 to 35 °C.

Speed ratios

VS variators are manufactured without fixed reduction as standard but all the types of Varvel gearboxes can be directly plugged in.

Incorporation of 2 or 3 stage helical, parallel shaft, bevel/helical (in-line or right-angle) and worm gearboxes is easily done with input flange to match IEC motors giving a wide choice of speed ranges.

Actual values are depending on real reduction ratio, motor size and load, and mains conditions.

Variators - VS

Description

	GENERAL SPECIFICATIONS
Range	6 sizes VS 63, 71, 80, 90, 100, 112
Gearboxes RD	7 sizes 28 reduction ratios 2300Nm max. torque
Gearboxes RN	6 sizes 42 reduction ratios 3400Nm max. torque
Gearboxes RO/RV	6 sizes 33 reduction ratios 3400Nm max. torque
Gearboxes RS/RT	RS - 9 sizes RT - 7 sizes 55 reduction ratios 3020Nm max. torque
Housing Covers	Pressure die cast aluminium till VS080. Grey cast iron from VS090.
Toothed parts	Helical gears: case hardened, ground or shaved. Wormshafts: case hardened with ground ZI profile. Bronze gears on cast iron hub.
Shafts Keys	Steel C43 Shafts h7 - Bores E8 Keys according to DIN6885 B1
Bearings	Ball or roller bearings according to sizes and technical requirements
Oil seals	Type NB - nitril-butadiene with additional anti-dust lip according to DIN 3760
Lubricant	Automatic transmission fluid
Coating	Spray or epoxy-powder RAL9006

VS - Variators

Operation principle

Minimum speed

Maximum speed

Variator operation
The speed is adjusted by a manually operated hand wheel, fitted on the top of the casing.

The hand wheel can be fitted on either sides of the control shaft.

Usually, the hand wheel is fitted on the left side when looking from the motor fan.

The hand wheel position can be easily modified by using the second extension of the control shaft.

Working principle
The fixed inner race (10) fitted on motor shaft and the mobile race (11), pressed by Belleville washers (12), transmit rotation to planetary discs (7) that moving on the two outer races (6) and (9), accordingly rotate the planetary disc holder (2) (one-piece with the output shaft) to which the planetary discs are connected through the sliding bushes (3).

The hand wheel controls the rotation of the race (6) and its axial movement.

Such shifting is given by ball action (5) on the two opposite cams (4) and (6), and it acts on the cone sides by moving them radially inside the races (10) and (11), and beating this way the spring reaction (12).

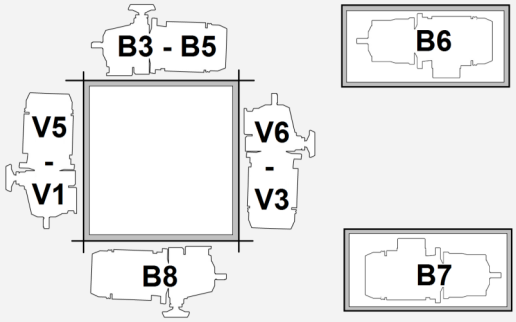
The variation of contact position on planetary disc sides originates the speed variation of disc holder and consequently, of the output shaft.

Items of internal parts used in working principle description are listed at page 10.

Attention !
Do not adjust the output speed when the variator is at standstill.

Variators - VS

Mounting positions



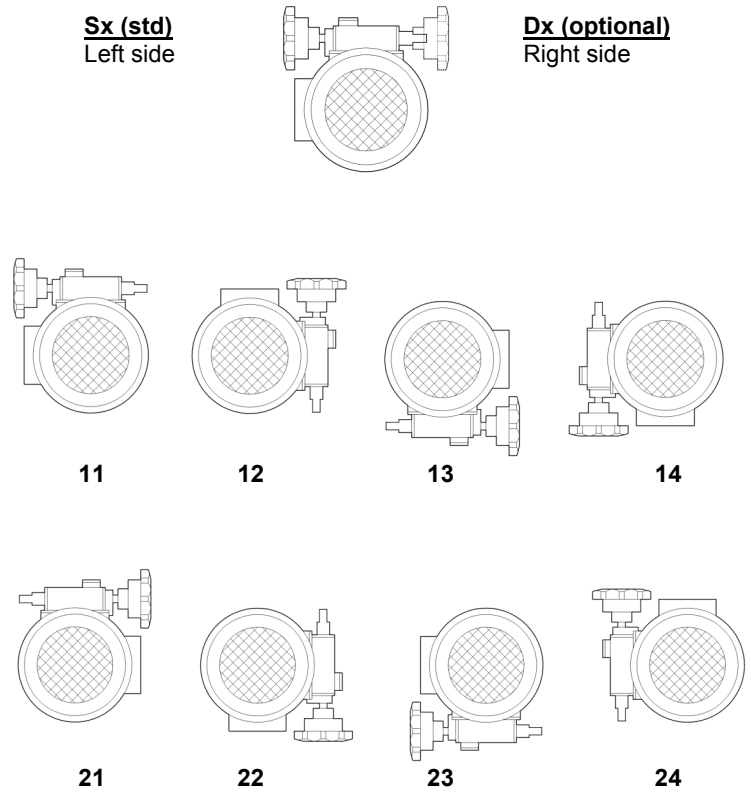
Forme costruttive

Per tutte le grandezze e per tutte le forme costruttive sono possibili due costruzioni:

- MVS
  motovariatore completo di motore elettrico
- FVS
  variatore predisposto all'accoppiamento di motore elettrico IEC-B5

Se non stabilito diversamente all'ordinazione, i variatori sono fabbricati per funzionamento orizzontale e con fissaggio a flangia B5 per accoppiamento ai riduttori ad ingranaggi o a vite senza fine.

Control hand wheel position



Note: Side-view from motor fan

VS - Variators

Service factors, Weights, Oil

Service factor FS1.0 is meant as typical of 8-10 hours/day operation, with uniform load and starts/ stops lower than 6 per hour and ambient temperature between 15 and 35 Celsius.

The ratio between the drive's maximum output torque M_2 and application torque $M_{(app)}$ defines the drive's Duty Factor that must be equal or bigger than the Service Factor SF.

For max. ambient temperature exceeding 40 °C or below 0 °C, please ask our Pre-sales Service.

For other operation conditions, the service factors of the two tables have to be multiplied accordingly.

Service Factor SF

Load type				Start-Stops per hour		
hours	uniform **SF_1**	variable **SF_1**	with shocks **SF_1**	number	**SF_2**	**$SF = SF_1 \times SF_2$**
< 8	0.8	1.0	1.5	6	1.0	
8 - 16	1.0	1.3	1.8	60	1.2	
24	1.4	1.6	2.0	120	1.4	

Weights (kg)
Oil (litres)

VS	kg	l (B5)	l (V1)	l (V3)
063	3.4	0.13	0.3	0.2
071	4.7	0.15	0.4	0.25
080	7.8	0.33	0.8	0.45
090	31	0.8	1.4	1.0
100	55	1.2	2.1	1.2
112	57	1.2	2.1	1.2

Recommended lubricants

AGIP	B P	CASTROL	CHEVRON	ESSO	FINA	I P	MOBIL	SHELL
ATF Dexron	Autran Dx	TQ Dexron II	ATF Dexron	ATF Dexron	ATF Dexron	Dexron Fluid II	ATF 200 Red	Donax TG

ATF - Automatic Transmission Fluid

Variators - VS

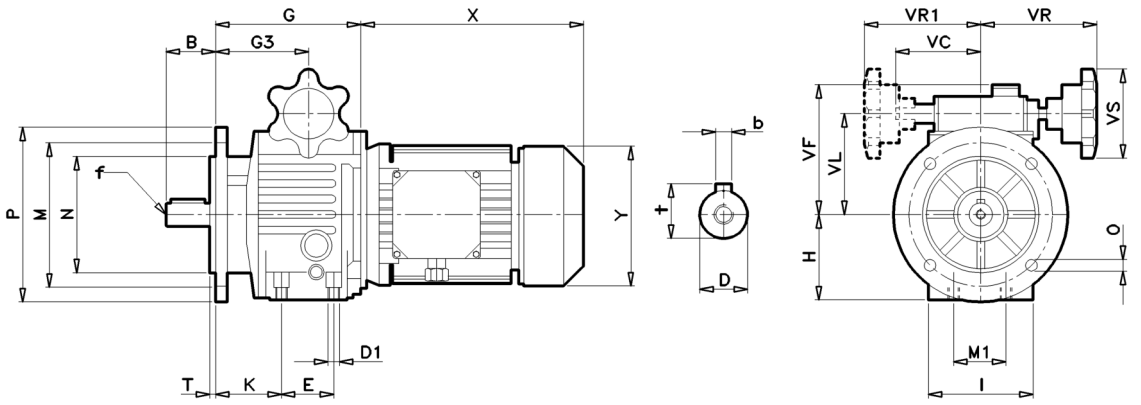
Selection table

Motor [kW]	Type	IEC input	Output speed [rpm] min ÷ max	Output torque [Nm] min ÷ max	Weight MVS [kg]	Weight FVS [kg]
0.18	**MVS063**	**63 B5**	170 ÷ 880	3 ÷ 1.5	7.7	3.4
0.25				3 ÷ 2	9.2	3.4
0.37	**MVS071**	71 B5	190 ÷ 1000	6 ÷ 3	10.9	4.7
0.55				6 ÷ 4.5	13.2	4.7
0.75	**MVS080**	**80 B5**	190 ÷ 1000	12 ÷ 6	17.6	7.8
1.1	**MVS090**	93 B5	190 ÷ 1000	18 ÷ 9	43	31
1.5				24 ÷ 12	44.5	31
2.2	**MVS100**	**100 B5**	190 ÷ 1000	36 ÷ 18	74	55
3.0				48 ÷ 24	76	55
4.0	**MVS112**	**100 B5**	190 ÷ 1000	64 ÷ 32	84	57

4-pole motor powers
Not binding dimensions and weights

VS - Variators

Overall dimensions

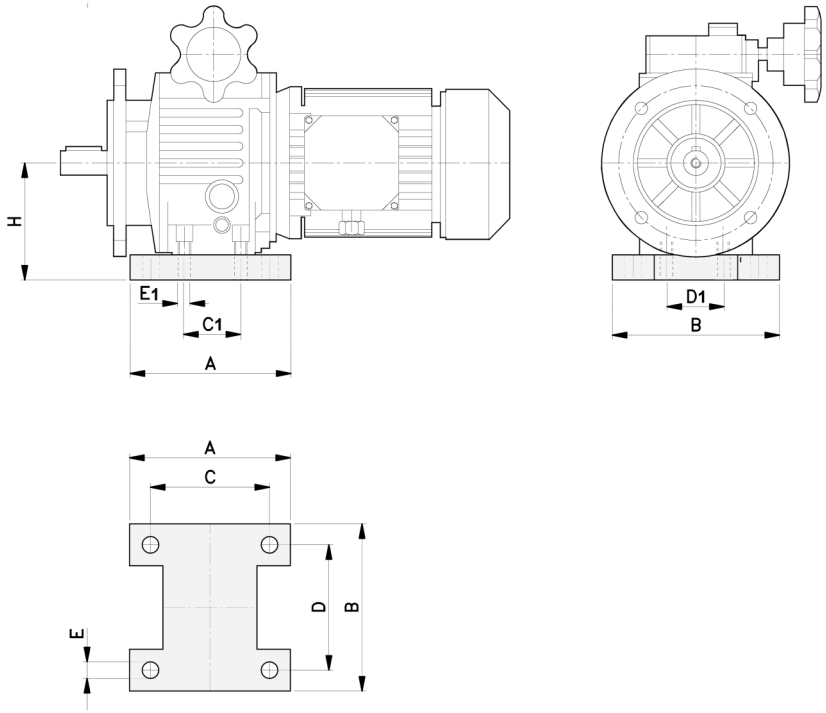


VS	063	071	080	090	100	112
B	23	30	40	50	60	60
$D_{(h7)}$	11	14	19	24	28	28
D_1	M6	M8	M8	---	---	---
E	50	40	58	----	---	---
G	111.5	108	143.5	174	222	222
G_3	64	71.5	87.5	106.5	131	131
H	70	80	100	111	136	136
I	72	90	98	230	265	265
K	46	51.5	62	---	---	---
M	115	130	165	165	215	215
M_1	60	77	84	---	---	---
N	95	110	130	130	180	180
O	9	9	11	11	15	15
P	140	160	200	200	250	250
T	3.5	3.5	3.5	3.5	4	4
VC	75	75	82.5	108.5	131	131
VF	113	125	142	148	181	181
VL	78	91	107	127	158	158
VR	113	113	120	140	150	150
VR_1	113	113	120	140	150	150
VS	70	70	85	85	120	120
b	4	5	6	8	8	8
f	M5	M6	M6	M8	M10	M10
t	12.5	16	21.5	27	33	33

X and Y dimensions according to motor make
Not binding dimensions and weights

Variators - VS

Overall dimensions

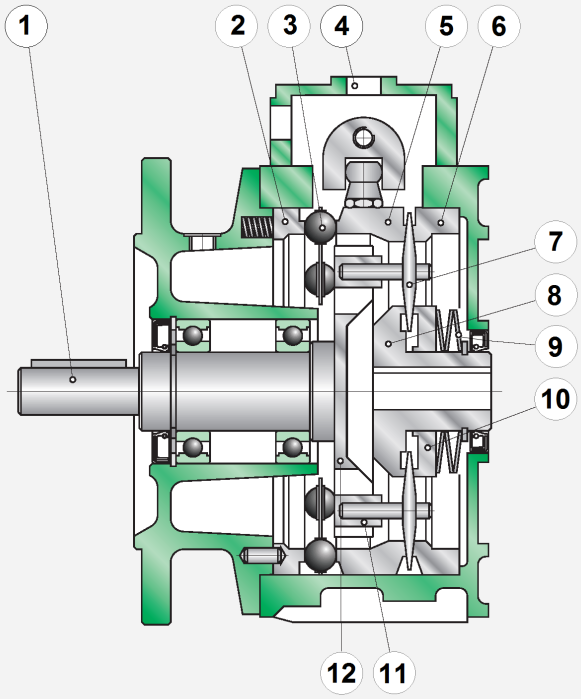


VS	063	071	080
A	120	125	150
B	145	149	190
C	105	104	125
C1	50	40	58
D	110	120	160
D1	60	77	84
E	9	9	11
E1 (4x)	M6	M8	M8
H	80	93	113

Not binding dimensions and weights

VS - Variators

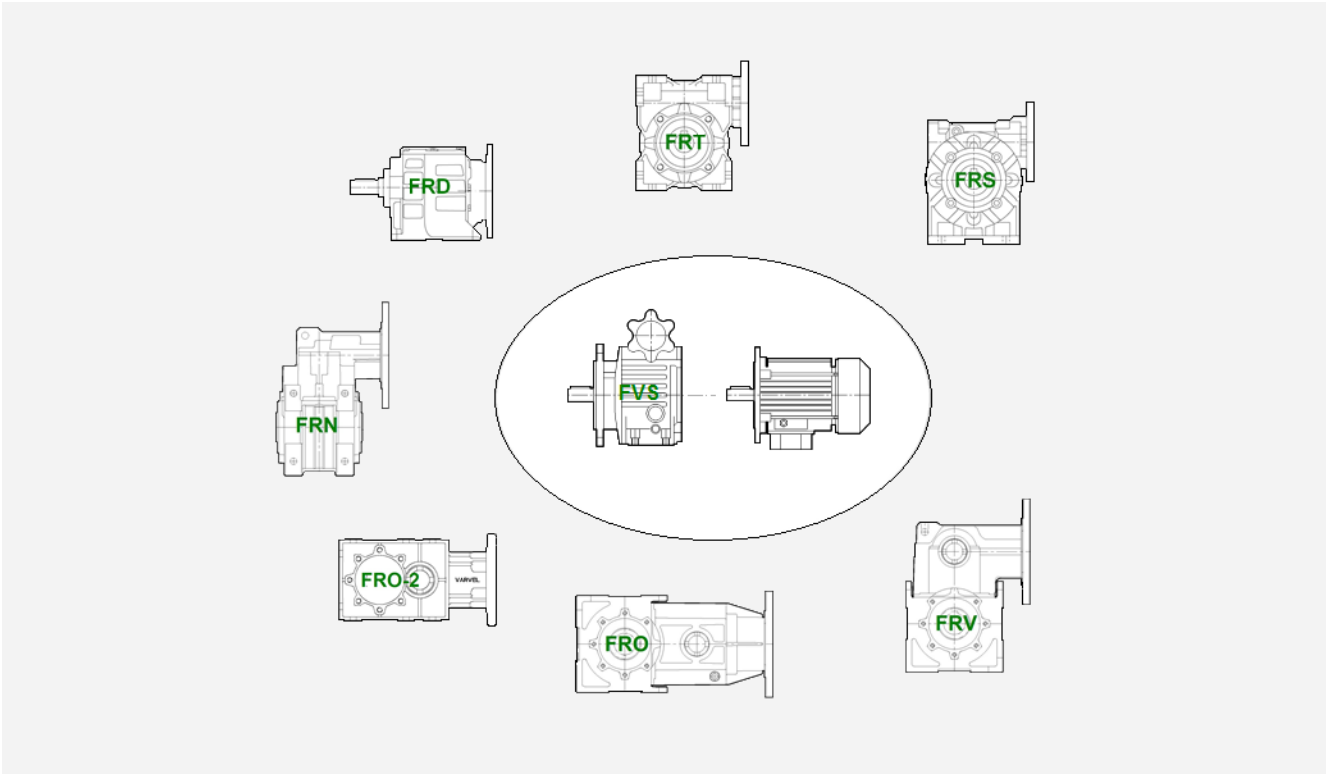
Component parts



01	Output shaft
02	Adjusting cam
03	Ball holder
04	Control shaft box
05	External mobile cam
06	External fixed cam
07	Planetary disc
08	Internal fixed cam
09	Bellville spring
10	Internal mobile cam
11	Sliding bush
12	Planetary disc holder

Variators - VS

Gearbox fitting



Please ask for the individual catalogues of the gearboxes
- RD helical,
- RN parallel,
- RO and RO2 in-line bevel/helical,
- RV right-angle bevel/helical,
- RS original worm,
- RT universal worm

to select the needed reduction ratios and torques of the following motor-variator-gearbox combinations:

- MVS / FRD
- MVS / FRS
- MVS / FRT
- MVS / FRN
- MVS / FRO
- MVS / FRO-2
- MVS / FRV

VS - Variators

Abstract of OPERATION AND MAINTENANCE INSTRUCTIONS
(complete manual on **www.varvel.com**)

Under the terms of the Machine Directive 2006/42/EC and relevant Guidelines, the speed gearboxes and variators are considered as “machines’ separate elements not having a specific application and meant for being incorporated onto the machine. The complete machine and equipped with such components must comply with the essential and relevant requisites for safety and health preservation” of the mentioned Directive.

Installation
Check if the unit to be installed. is properly se-lected to perform the required function and that its mounting position complies with the order.
The nameplate reports such information.
Check mounting stability to ensure the unit runs without vibrations or overloads.

Running
The unit may be connected for clockwise or counter-clockwise rotation.
The unit must be stopped as soon as defective running or unexpected noise occur. remove the faulty part or return the unit to the factory for checking.
If the faulty part is not replaced. other parts can also be affected. causing more severe damage and making the identification of initial cause more difficult.

Maintenance
Although the units are no-load run tested in the factory before despatch. it is recommended not to run them at maximum load for the first 20-30 running hours to allow the proper running in.

Handling
When hoisting. use relevant housing locations or eyebolts if provided. or foot or flange holes.
Never hoist on any moving part.

Painting
Carefully protect oil seals. coupling faces and shafts when units are re-painted.

Long-term storage
For storages longer than three months. apply anti-oxidants onto shafts and machined surfaces. and protective grease on oil seal lips.

Product’s Environmental Management
In conformity with Environmental Certification ISO 14001. we recommend the following to dispose of our products:
- scraped components of the units to be delivered to authorized centres for metal object collection;
- oils and lubricants drained from the units to be delivered to Exhausted Oil Unions;
- packages (pallets. carton boxes. paper. plastic. etc..) to lead into regeneration/recycling circuits as far as possible. by delivering separate waste classes to authorized companies.