



Descriptions

A **Square Bevel Gearbox** is a specific type of gearbox that utilizes spiral bevel gears within a square-shaped housing. This design offers a range of advantages for right-angle power transmission applications. The following standard transmission ratios are available: **1:1, 1.5:1, 2:1, 3:1, 4:1 and 5:1**. Bevel gearboxes can be configured in 2-way, 3-way, and 4-way arrangements to transmit and distribute rotational motion between intersecting shafts. Rated power is from **0.1kW to 156kW**. Rated torque is from **7Nm to 1200Nm**. It is available in solid shaft and hollow output shaft configurations with the optional motor mounting flange, for easy direct coupling of a standard electric motor.

Key Characteristics:

- **Spiral Bevel Gears:** These gears have curved, oblique teeth that gradually and smoothly engage with each other. This design results in quieter and smoother operation compared to straight bevel gears. They offer improved load-carrying capacity and efficiency.
- **Square Housing:** The square shape of the gearbox housing allows for universal mounting possibilities, making it versatile for integration into various machine designs.
- **Right-Angle Power Transmission:** Square spiral bevel gearboxes are designed to transmit power between shafts that intersect at a right angle.

Advantages:

- **Compact Design:** The square housing and efficient spiral bevel gears contribute to a compact and space-saving design, making them suitable for applications with limited installation space.
- **Smooth and Quiet Operation:** The gradual meshing of the spiral bevel gear teeth results in smoother operation and reduced noise and vibration compared to other bevel gear types.
- **High Load Capacity and Torque Transmission:** Spiral bevel gears can handle higher loads and torque due to their increased tooth contact area.
- **Precision Motion Control:** The smooth engagement of the teeth allows for more precise control in applications that require accurate positioning and synchronization.
- **Versatility:** The square shape and various options for shaft arrangements (e.g., solid shaft, hollow bore) allow for adaptability to diverse application needs.
- **Low Backlash:** With proper calibration, square spiral bevel gearboxes can achieve very low backlash, which is the amount of play in the gears when reversing direction.

Applications:

Square spiral bevel gearboxes are utilized across various industries for applications requiring right-angle power transmission. Examples include differential assemblies in the automotive industry, helicopter transmissions and aircraft engines in aerospace and defense, and machinery in mining, construction, and manufacturing. They are also used in marine propulsion.

Materials

We use the best materials to guarantee the performance and lifetime of the bevel gearboxes that you purchased.

Housing

- HT250 Cast Iron, High-strength Casting housing (KMV090 - KMV280). Aluminum alloy housing (KMV065 - KMV140). Cube-shaped, all-round machined symmetrical housing. Custom Stainless Steel 304 or 316 (Corrosion-resistant Stainless Steel Gearbox).

Spiral Bevel Gears

- High purity rugged alloy steel 20CrMnTi, Carburizing and Quenching, Case Hardened and Lapped in Pairs.

Input Shaft and Output Shaft

- Hardened and tempered alloy steel 40Cr as standard. Custom Stainless Steel 304 or 316 (Corrosion-resistant Stainless Steel Gearbox).

Bearing

- Equipped with Tapered Roller Bearings with heavy load capacity. Custom reinforced bearings for higher radial and axial load. Custom corrosion resistant stainless steel bearings.

Oil Seals

- Double-lip Oil Seal, High Dust-proof and Oil leak proof.

Lubricants

- Applications with high speeds and/or high daily duty cycle, Gear oil #320 lubrication is recommended. But applications with low input speed and low daily duty cycle, #0 or #00 lithium grease is recommended. All aluminum alloy gearboxes models (KMV065 - KMV140) with #00 lithium grease for lubrication.

- **Note:** For input speeds 1500 rpm a change in oil level may be required in combination with a breather(vent)

Materials





Selection Guide

Calculation Formulas

- (01) Gear Ratio = Input Speed (rpm) / Output Speed (rpm)
- (02) Required Output Torque (N.m)
 - Calculate the Corrected Output Torque (N.m) = Required Output Torque (N.m) x f_l
 - Calculate the Corrected Output Power (kW) = Required Output Torque (N.m) x Output Speed (rpm) / 9550.
 - Calculate the Input Power (kW) = Output Power (kW) / Efficiency (Gearbox efficiency is 95% after initial running in).

The ratings for bevel gearboxes in this catalogue are based on a service factor of 1.00. For other operating conditions, the application power or torque must be multiplied by the appropriate service factor, to determine the equivalent gear drive power rating. A bevel gearbox should be selected with a rated capacity equal to or greater than the equivalent rating. Below table designates recommended Service Factors for various conditions of load, power source, and duration of service.

● **Service Factors f_l**

Driven Machine Load Characteristic	Operating Time per Day		
	≤ 2 hours	2-10 hours	10-24 hours
Uniform (Light Shocks)	1.00 (1.00)	1.00 (1.25)	1.25 (1.50)
Medium Shocks	1.00 (1.25)	1.25 (1.50)	1.50 (1.75)
Heavy Shocks	1.25 (1.50)	1.50 (1.75)	1.75 (2.00)

- **Note:** please use these data inside the brackets when “frequent starts and stops” refers to more than 10 starts per hour.
- **Note:** time specified for intermittent and occasional service refers to total operating time per day.
- * **Uniform (Light Shocks) driven machine:** generators, conveyor belts, apron conveyor, ventilators, agitators and mixers for uniform densities, filling and packing stations, gear wheel pumps, feed servos of machine tools, filling machines, elevators, light screw conveyors, light conveyor belts, blowers, small agitators, control machines, assembly lines, auxiliary drives for machine tools, centrifuges, packaging machinery.
- * **Medium Shocks driven machine:** lifts, swing gear on cranes, pit ventilators, agitators and mixers for unequal densities, piston pumps, timber processing machines, paper processing machines, winches, auxiliary drives in ships, textile machines, reel winders, plate conveyors, calenders, balancing machines, heavy-duty conveyor belts, sheet metal bending machines, road-building machinery, planing machines, shears, extruders, main drives for machine tools, kneading machines, weaving looms, light table rollers.
- * **Heavy Shocks driven machine:** punches, shears, rolling and smelting machines, heavy-duty centrifuges, heavy-duty supply pumps, edge runners, vibrating machines, cutting machines, brick works machines, heavy-duty lifts, excavators, heavy-duty mixers, presses, muller mixers, rolling mills, heavy-duty table rollers, cold reduction mills, stone crushers, eccentric presses, cutter heads, folding machines, rubber belt conveyors (batch loads), bark peeling drums, run ning gears, punching presses, piston pumps, rotary furnaces, mills, plate filters.



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- (03) Duty Cycle per Hour (% Running time) = working time (minutes) ÷ 60 minutes
- (04) **Thermal Power Limit (P_T)**

After the gearbox size has been determined, it is necessary to verify the thermal operating conditions, which means to verify if the selected gearbox can operate in the required conditions without risk of over-heating of the oil lubricant and of the components.

Each gearbox has a **Thermal Power Limit P_T**, which is determined based on an ambient temperature of 20°C and duty cycle of 100% per hour value stated in the table at the bottom of this page, which must not be exceeded without a controlled and forced cooling. In case of risk of exceeding the thermal power limit, the bevel gearboxes should be always lubricated exclusively with oil instead of grease. Or a larger gearbox must be selected and a check run on the other parameters.

In order to consider the real environment conditions, if different from 20°C, and the duty cycle, if different from the reference one, two factors are introduced which modify the thermal power limit, allowing the calculation of the **Corrected Thermal Power Limit P_{Tc}**

$$P_{Tc} = P_T \times f_T \times f_i$$

P_{Tc} > P_A (Natural Cooling)

P_{Tc} < P_A (Fan Cooling or Oil Cooling)

P_{Tc} = Corrected Thermal Power Limit (kW)

P_T = Thermal Power Limit (kW)

P_A = Actually Required Operating Power (kW)

f_T = Ambient Temperature Factor

f_i = Duty Cycle Factor referred to continuous operating over 3 hours (period of time considered to determine the thermal power limit)

● **Ambient Temperature Factor f_T**

Ambient Temperature °C	0	10	20	30	40	50	60
f _T	1.3	1.2	1	0.87	0.75	0.62	0.5

● **Duty Cycle Factor f_i**

Duty cycle per hour is the percentage of the time per hour during which the gearbox will be on-load

Duty Cycle per Hour (%)	100	80	60	40	20	10
f _i	1	1.2	1.4	1.6	1.8	2

● **Thermal Power Limit (P_T)**

* The selected bevel gearbox must not exceed the value of the **Corrected Thermal Power Limit P_{Tc}**, referred to the same gearbox, otherwise the oil lubricant should be cooled.

* The capacity of some gearboxes is limited by the maximum permissible temperature of the oil bath. The charts below show the **Thermal Power Limit P_T**, which can be transferred without cooling at an ambient temperature of 20°C and duty cycle of 100% per hour.

Model	KMV90	KMV110	KMV140	KMV170	KMV210	KMV240	KMV280
P _T (kW)	4.5	6.8	11	15.5	24	31	44

■ **WARNING:** The case temperature must not exceed 80°C.



Selection Guide

Sample Part Number (Example):

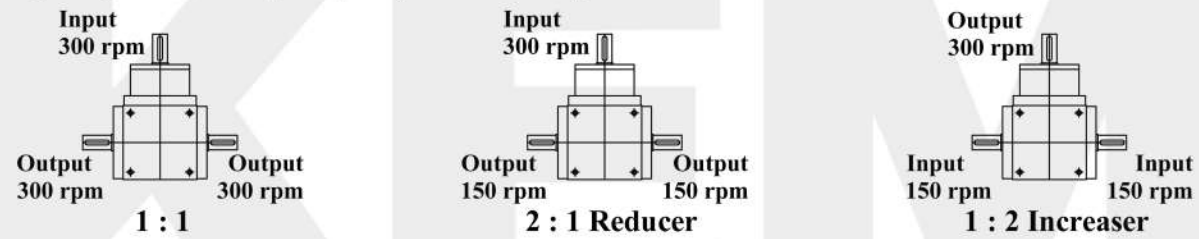
KMV140R1ILRHM

- **KMV Series:** Solid shaft input, Solid shaft output.
- **KMVH Series:** Solid shaft input, Hollow shaft output with keyway.
- **KMVF Series:** Input Motor Flange(IEC), Solid shaft output.
- **KMVQ Series:** Input Motor Flange(IEC), Hollow shaft output with keyway.

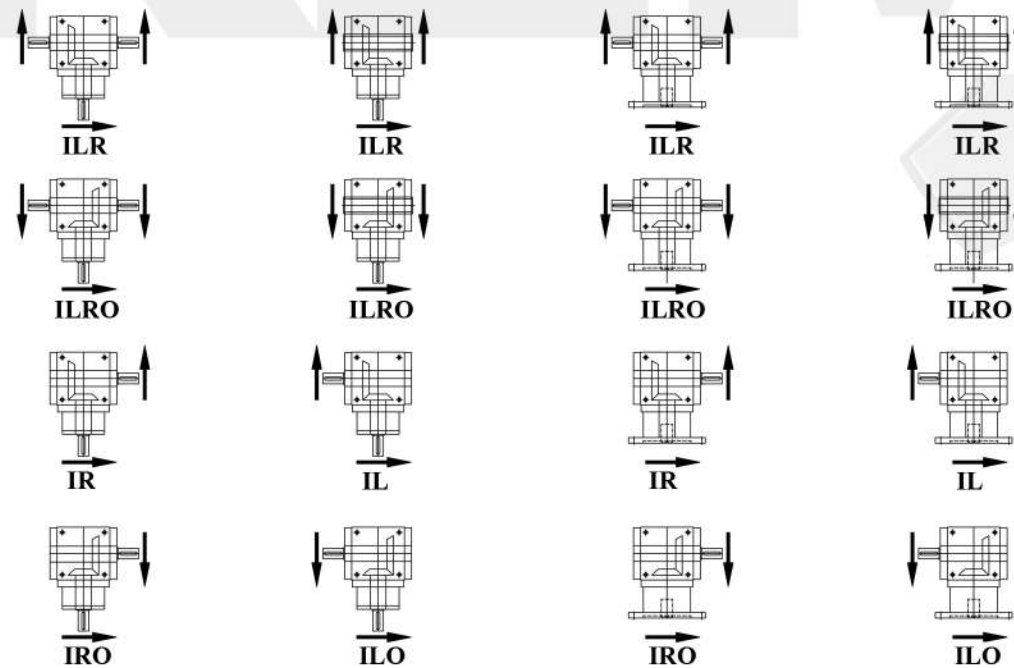
■ (1) Models and Gear Ratios

Model	KMV065	KMV090	KMV110	KMV140	KMV170	KMV210	KMV240	KMV280
Input & Output Shafts Dia.(mm)	13	18	22	32	40	45	55	60
Gear Ratios	1:1, 2:1	1:1, 1.5:1, 2:1, 3:1, 4:1, 5:1	1:1, 1.5:1, 2:1, 3:1, 4:1, 5:1	1:1, 1.5:1, 2:1, 3:1, 4:1, 5:1	1:1, 1.5:1, 2:1, 3:1, 4:1, 5:1	1:1, 1.5:1, 2:1, 3:1, 4:1, 5:1	1:1, 1.5:1, 2:1, 3:1, 4:1, 5:1	1:1, 1.5:1, 2:1, 3:1, 4:1, 5:1
Max. Torque (Nm) Under 1500RPM	9.1	40	70	150	250	430	570	990
Max. Power (kW)	1.1	6.0	11.0	23.9	39.2	67.5	90.5	156

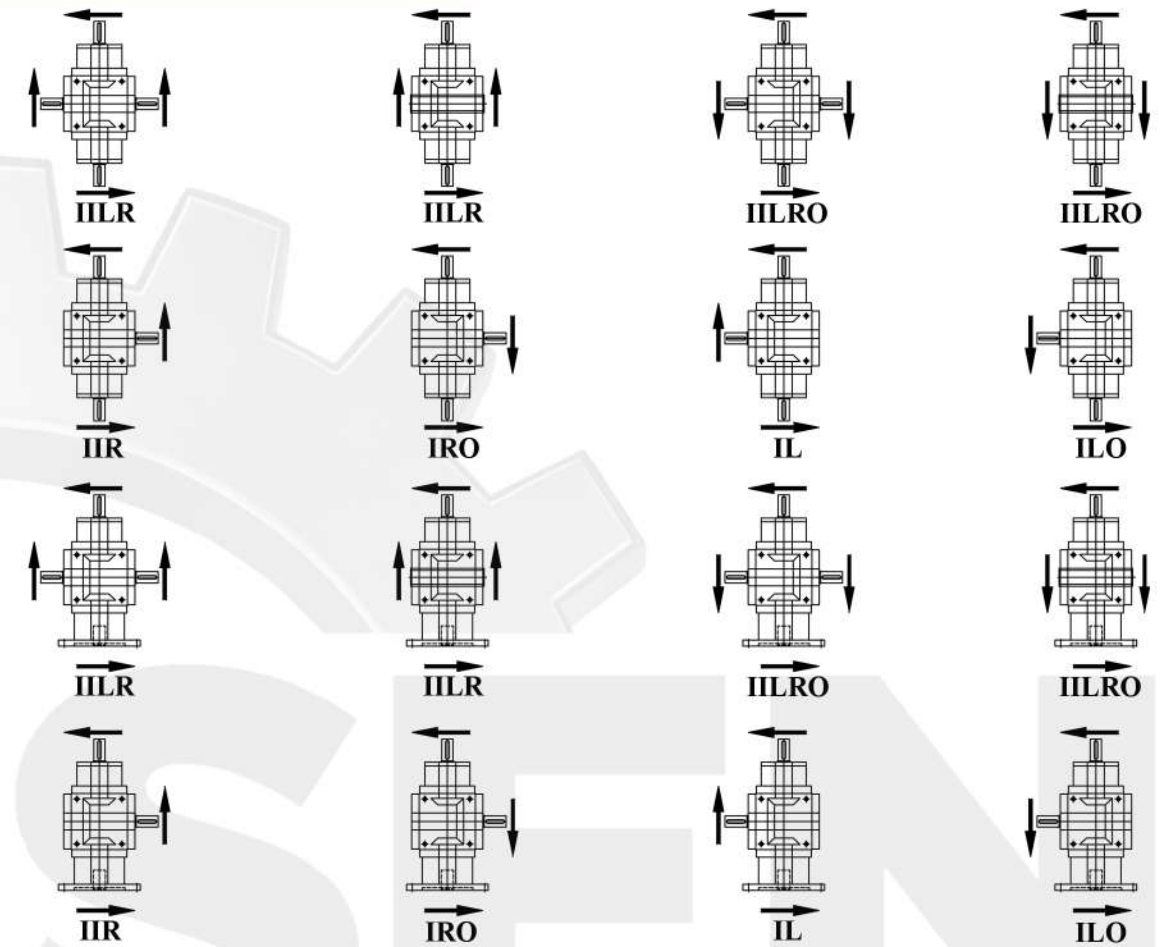
■ (2) Input Speed and Output Speed, Below is Sample



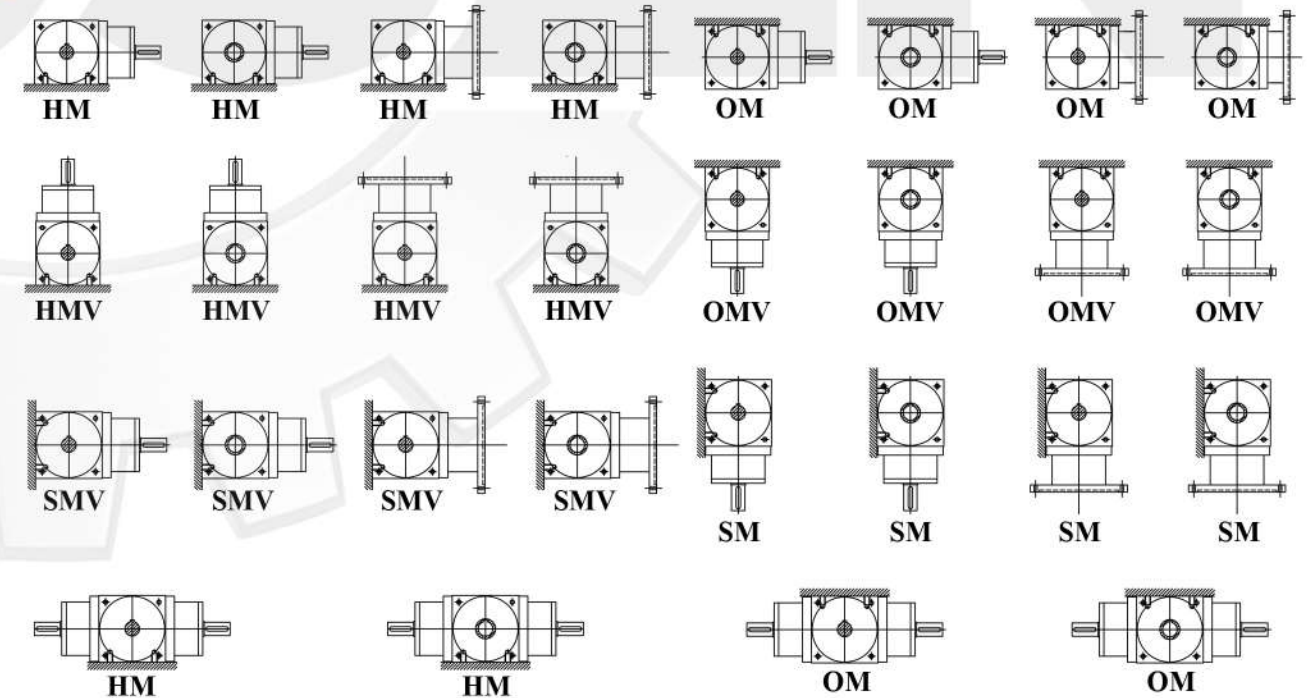
■ (3) Shaft Arrangements And Rotation Directions



Selection Guide

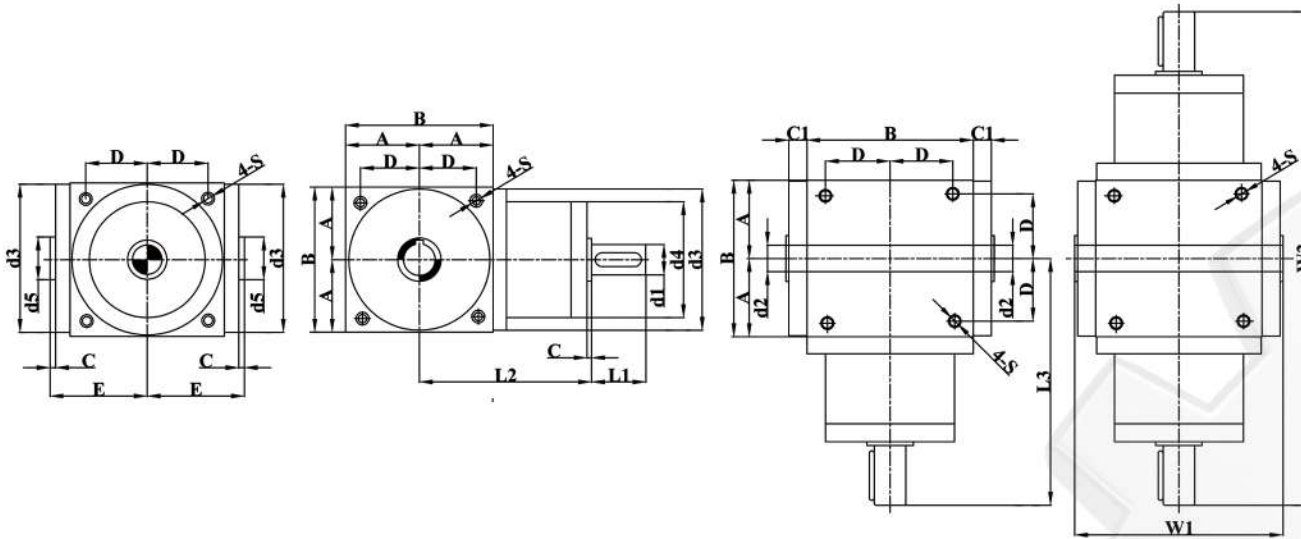


■ (4) Mounting Positions



Overall Dimensions

KMVH (1:1~5:1), Solid Input Shaft and Hollow Output Shaft



Gear Ratio	1 : 1~5 : 1		1 : 1 2 : 1		3 : 1		4 : 1		5 : 1		1 : 1 2 : 1 3 : 1		
	Model	B	d2(H7)	d5	d1(h7)	L1	d1(h7)	L1	d1(h7)	L1	d1(h7)	L1	d4
KMVH065	65	13	20	13	19.5								63
KMVH090	90	16	25	18	35	16	30	11	23	11	23		62
KMVH110	110	22	35	22	40	20	35	16	30	14	25		81
KMVH140	140	28	45	32	50	26	45	20	35	16	30		98
KMVH170	170	38	55	40	60	32	50	26	45	22	40		118
KMVH210	210	45	65	45	70	38	55	32	50	30	50		128
KMVH240	240	55	75	55	85	45	70	35	55	35	55		138
KMVH280	280	60	85	60	110	50	80	45	70	42	70		150

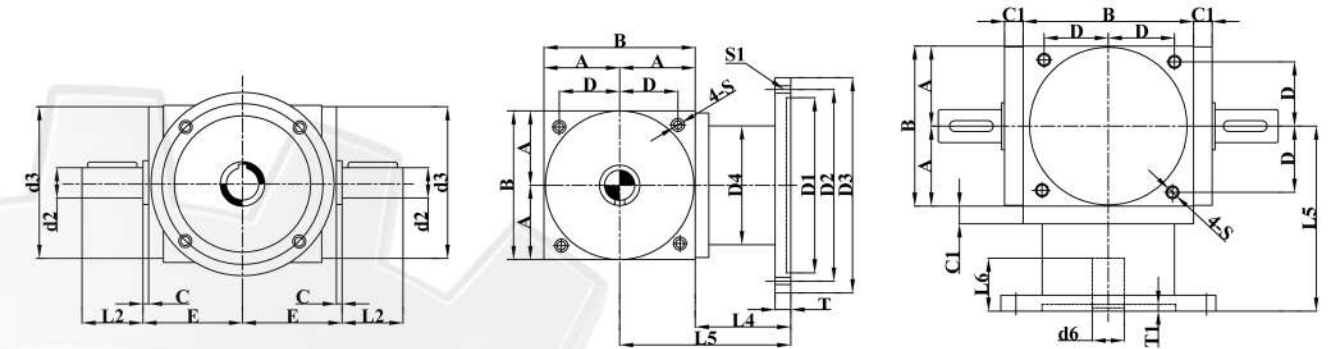
• Note: The Metric Key and Keyway Sizes are following the international standard.

Gear Ratio	4 : 1 5 : 1								1 : 1 2 : 1		1 : 1~5 : 1		1 : 1 2 : 1	
	Model	d4	d3(h7)	C	C1	D	E	A	L2	L3	S	W1	W2	
KMVH065		63	2	13	27	47.5	32.5	76	95.5	M4	95	191		
KMVH090		62	88	2	12	36	59	45	97	132	M6	118	264	
KMVH110		72	108	2	12	44	69	55	112	152	M8	138	304	
KMVH140		81	135	2	15	55	87	70	132	184	M10	174	364	
KMVH170		98	165	3	15	67	103	85	158	218	M12	206	436	
KMVH210		110	205	2	18	85	125	105	195	265	M16	250	530	
KMVH240		120	235	2	18	95	140	120	220	305	M16	280	610	
KMVH280		135	275	2	18	110	160	140	255	365	M16	320	730	

*. Dimensions are subject to change without notice

Overall Dimensions

KMVF (1:1~5:1), Motor Flange Input and Solid Output Shaft

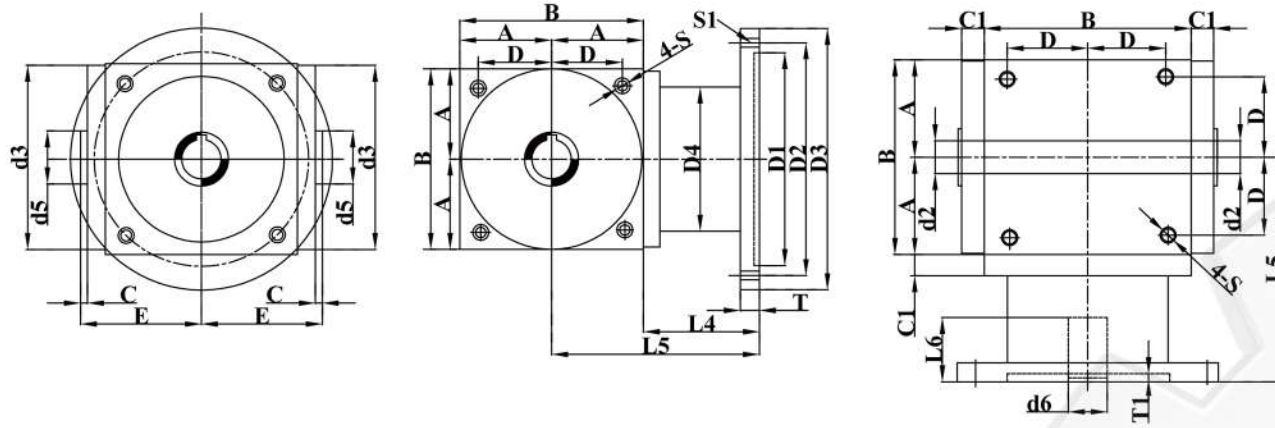


Model	B	d2(h7)	d3(h7)	A	C	C1	D	E	L2	L4	L5
KMVF090	90	18	88	45	2	12	36	59	35	65	110
KMVF110	110	22	108	55	2	12	44	69	40	75	130
KMVF140	140	32	135	70	2	15	55	87	50	102	170
KMVF170	170	40	165	85	3	15	67	103	60	130	215
KMVF210	210	45	205	105	2	18	85	125	70	140	245
KMVF240	240	55	235	120	2	18	95	140	85	145	265
KMVF280	280	60	275	140	2	18	110	160	110	175	315

• Note: The Metric Key and Keyway Sizes are following the international standard.

Gear Ratio	1 : 1 / 2 : 1				1 : 1 / 2 : 1				
	Model	D1 x D2 x D3	T1	T	D4	d6 x L6	S	S1	IEC Flange Code
KMVF090	Φ80 x Φ100 x Φ120	3.5	11	76		9x23	M6	4xM6	56B5
	Φ95 x Φ115 x Φ140	3.5	11			11x26	M6	4xM8	63B5
	Φ110 x Φ130 x Φ160	4.0	11			14x33	M6	4xM8	71B5
KMVF110	Φ95 x Φ115 x Φ140	3.5	11	82		11x26	M8	4xM8	63B5
	Φ110 x Φ130 x Φ160	4.0	11			14x33	M8	4xM8	71B5
	Φ130 x Φ165 x Φ200	4.0	14			19x43	M8	4xM10	80B5
KMVF140	Φ130 x Φ165 x Φ200	4.0	14	104		19x43	M8	4xM10	80B5
	Φ130 x Φ165 x Φ200	4.0	14			24x53	M10	4xM10	90B5
	Φ180 x Φ215 x Φ250	4.5	16			28x63	M10	4xM12	100/112B5
KMVF170	Φ130 x Φ165 x Φ200	4.0	14	128		24x53	M12	4xM10	90B5
	Φ180 x Φ215 x Φ250	4.5	16			28x63	M12	4xM12	100/112B5
	Φ230 x Φ265 x Φ300	4.5	16			38x83	M12	4xM12	132B5
KMVF210	Φ180 x Φ215 x Φ250	4.5	16	160		28x63	M16	4xM12	100/112B5
	Φ230 x Φ265 x Φ300	4.5	16			38x83	M16	4xM12	132B5
	Φ250 x Φ300 x Φ350	6	20			42x115	M16	4xM16	160B5
KMVF240	Φ230 x Φ265 x Φ300	4.5	16	170		38x83	M16	4xM12	132B5
	Φ250 x Φ300 x Φ350	6	20			42x115	M16	4xM16	160B5
	Φ250 x Φ300 x Φ350	6	20			48x115	M16	4xM16	180B5
KMVF280	Φ250 x Φ300 x Φ350	6	20	190		42x115	M16	4xM16	160B5
	Φ250 x Φ300 x Φ350	6	20			48x115	M16	4xM16	180B5
	Φ300 x Φ350 x Φ400	6	20			55x115	M16	4xM16	200B5

*. Dimensions are subject to change without notice

Overall Dimensions
KMVQ (1:1~5:1), Motor Flange Input and Hollow Output Shaft


Model	B	d2(H7)	d3(h7)	d5	A	C	C1	D	E	L4	L5
KMVQ090	90	16	88	25	45	2	12	36	59	65	110
KMVQ110	110	22	108	35	55	2	12	44	69	75	130
KMVQ140	140	28	135	45	70	2	15	55	87	102	170
KMVQ170	170	38	165	55	85	3	15	67	103	130	215
KMVQ210	210	45	205	65	105	2	18	85	125	140	245
KMVQ240	240	55	235	75	120	2	18	95	140	145	265
KMVQ280	280	60	275	85	140	2	18	110	160	175	315

• Note: The Metric Keyway Sizes are following the international standard.

Gear Ratio	1 : 1 / 2 : 1				1 : 1 / 2 : 1				
	Model	D1 x D2 x D3	T1	T	D4	d6 x L6	S	S1	IEC Flange Code
KMVQ090		Φ80 x Φ100 x Φ120	3.5	11		9x23	M6	4xM6	56B5
		Φ95 x Φ115 x Φ140	3.5	11	76	11x26	M6	4xM8	63B5
		Φ110 x Φ130 x Φ160	4.0	11		14x33	M6	4xM8	71B5
KMVQ110		Φ95 x Φ115 x Φ140	3.5	11		11x26	M8	4xM8	63B5
		Φ110 x Φ130 x Φ160	4.0	11	82	14x33	M8	4xM8	71B5
		Φ130 x Φ165 x Φ200	4.0	14		19x43	M8	4xM10	80B5
KMVQ140		Φ130 x Φ165 x Φ200	4.0	14		19x43	M8	4xM10	80B5
		Φ130 x Φ165 x Φ200	4.0	14	104	24x53	M10	4xM10	90B5
		Φ180 x Φ215 x Φ250	4.5	16		28x63	M10	4xM12	100/112B5
KMVQ170		Φ130 x Φ165 x Φ200	4.0	14		24x53	M12	4xM10	90B5
		Φ180 x Φ215 x Φ250	4.5	16	128	28x63	M12	4xM12	100/112B5
		Φ230 x Φ265 x Φ300	4.5	16		38x83	M12	4xM12	132B5
KMVQ210		Φ180 x Φ215 x Φ250	4.5	16		28x63	M16	4xM12	100/112B5
		Φ230 x Φ265 x Φ300	4.5	16	160	38x83	M16	4xM12	132B5
		Φ250 x Φ300 x Φ350	6	20		42x115	M16	4xM16	160B5
KMVQ240		Φ230 x Φ265 x Φ300	4.5	16		38x83	M16	4xM12	132B5
		Φ250 x Φ300 x Φ350	6	20	170	42x115	M16	4xM16	160B5
		Φ250 x Φ300 x Φ350	6	20		48x115	M16	4xM16	180B5
KMVQ280		Φ250 x Φ300 x Φ350	6	20		42x115	M16	4xM16	160B5
		Φ250 x Φ300 x Φ350	6	20	190	48x115	M16	4xM16	180B5
		Φ300 x Φ350 x Φ400	6	20		55x115	M16	4xM16	200B5

*. Dimensions are subject to change without notice