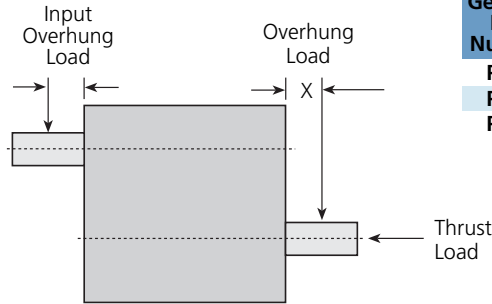


GEARBOXES

Overhung & Thrust Loads

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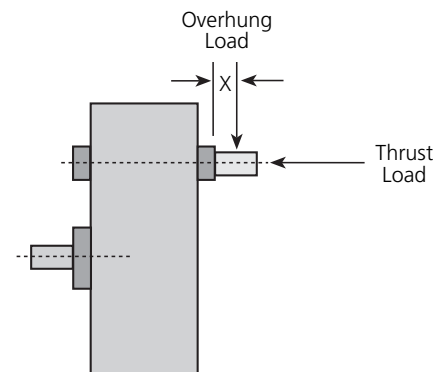
**PP
TYPE
DOUBLE
REDUCTION
GEARBOXES**



Gearbox Part Number	OUTPUT SHAFT			INPUT Overhung Load kg
	Distance 'X' mm	Overhung Load kg	Thrust Load kg	
PP35	12	12	10	6
PP50	20	30	20	10
PP60	25	45	35	15

Based on an input speed of 1000 Rpm taking a full load torque plus overhung load and thrust load

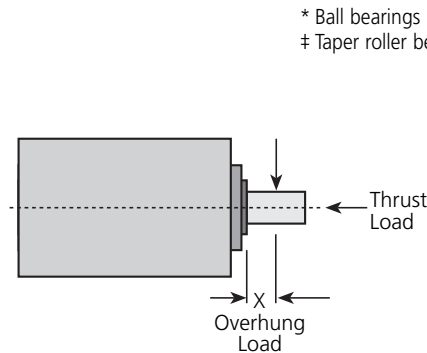
**FF
TYPE
SPUR GEAR
REDUCTION
GEARBOXES**



Gearbox Part Number	OUTPUT SHAFT			INPUT Overhung Load kg
	Distance 'X' mm	Overhung Load kg	Thrust Load kg	
FF10	8	10	10	6
FF15	10	20	20	12
FF20	15	40	30	16
FF30	20	60	40	20
FF40	30	80	50	30
FF50	40	100	60	40

Based on an input speed of 1000 Rpm taking a full load torque plus overhung load and thrust load

**EHD
TYPE
EPICYCLIC
GEARBOXES**

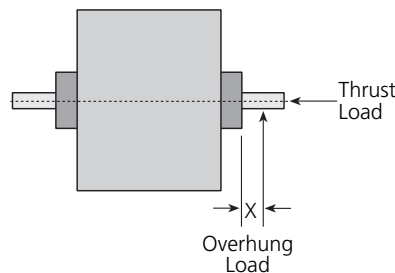


* Ball bearings
‡ Taper roller bearings

Gearbox Part Number	THRUST LOADS - KG		
	Distance 'X' mm	Overhung Load kg	Thrust Load kg
EHD04*	10	20	15
EHD06*	10	25	15
EHD08*	12	30	20
EHD12‡	20	60	60
EHD16‡	30	100	100

Based on an input speed of 1000 Rpm taking a full load torque plus overhung load and thrust load

**J/XJ
NT/
NH
TYPE
PLANETARY
GEARBOXES**



Gearbox Part Number	THRUST LOADS - KG		
	Distance 'X' mm	Overhung Load kg	Thrust Load kg
J & XJ 51-52-53	6	5	5
J & XJ 64-65-66	6	5	5
NT & NH 61-62-63	10	12	10
NT & NH 91-92	15	20	15
NT & NH 121-122	20	25	20

Based on an input speed of 1000 Rpm taking a full load torque plus overhung load and thrust load

Putting loading on bearings may reduce the bearing / gearbox life and alter the running quality of the unit.



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GEARBOXES

Gearbox Materials

Torque Figures: Torque figures are to be used for guidance only. Figures are based on a continuous daily duty cycle. You will need to assess duty, cycles and confirm gearbox suitability with your own calculations.

Keyways and Bores: All bores are toleranced to H7 ISO 286 as standard. Keyways allow use of parallel DIN 6885 keys with easy sliding fit. Tolerances may vary due to manufacturing processes.

Backlash: Figures given are at output of gearbox. Value given are approximate maximum and will vary due to manufacturing processes. Backlash in planetary gearboxes is dependant on ratio.

Thrust & Overhung Loads: Based on an input speed of 1000rpm taking full torque load and combined thrust and overhung load.

Specials: Available from Ondrives are not only an extensive range of standard design reduction units but modifications to this range are available. To find out more please contact the Ondrives Technical Department.

Loctite Products & (Current Food Approvals)

603* : Retainer for bearings (-40 to +150°C)

(National Sanitary Foundation (NSF) P1 Approval)

567 : Thread sealant (-40 to +200°C)

(WRC potable water Approval Number 9903504)

577 : Thread sealant (-50 to +150°C)

(WRC potable water Approval Number 0302507 & NSF P1)

5367 : Silicone sealant (-40 to +250°C)

641 : Bearing fit (-40 to +150°C)

222* : Thread Lock - used on capscrew/grubscrew to prevent loosening

(-40 to +150°C) (NSF P1)

*most frequently used by Ondrives - others dependent on design or by request

Note: FDA Approvals are being phased out and replaced by NSF approvals

Material Near Equivalents (to be used as a guide only)

EN24 817 M40: DIN 34CrNiMo6 equiv. - AISI/SAE/ASTM 4337/4340

EN36 655 M13: DIN 15NiCr13/14NiCr14 equiv. - AISI/SAE/ASTM 3310/3415/9314

EN8 080 M40: DIN C40E/Ck40 - AISI/SAE/ASTM 1040

316 S11: DIN X2CrNiMo 17-2-2 - AISI/SAE/ASTM 316L

303 S31/22: DIN X8CrNiS 18-9 equiv. - AISI/SAE/ASTM 303

Aluminium Housings (square design) 6082-T6 Grade (HE30)

Aluminium Housings (round design) 2014A Grade (HE15)

Delrin DE/E 9446 NC-010 (Dupont)



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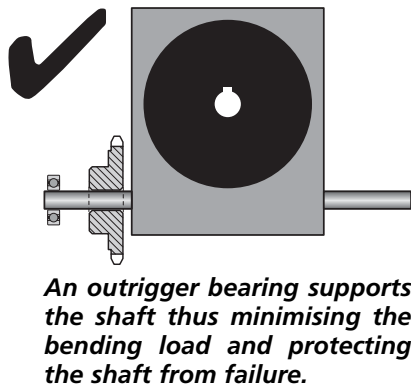
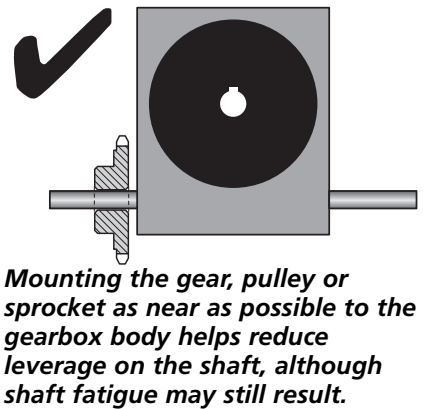
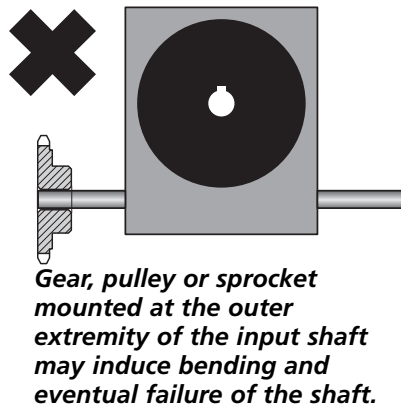
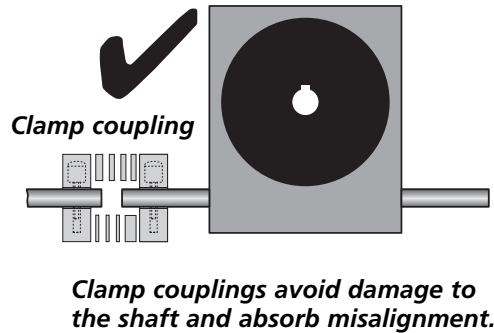
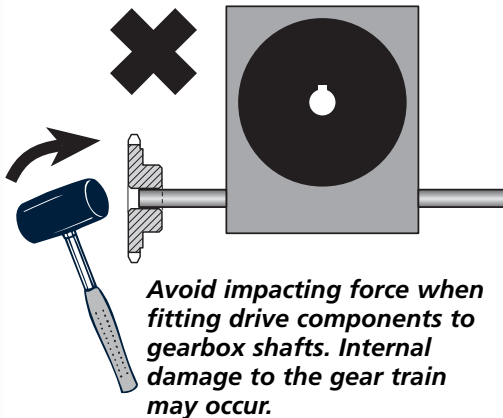
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GEARBOXES

Gearbox Application

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Customer modified gearboxes have an invalidated warranty.



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GEARBOXES

Gearbox Grease Filling

- Operating ambient temperature range = 0°C to 70°C
- The grease in most applications will run at 80°C but if speed and load are increased, the temperature of the gearbox will rise and may cause damage to the unit. Hand motion will not cause a problem because no thermal build up will arise until you motor power the unit.
- Gearboxes can be packed with wide-range temperature grease operating between -55°C to +155°C.
- Rubber seals (nitrile) oil seals: maximum operating temperature = +100°C
- Carbon steel bearings: maximum operating temperature = +150°C (if fitted with high temperature grease and ZZ Steel shields)
- Stainless steel bearings: maximum operating temperature = +288°C (if fitted with high temperature grease and ZZ Steel shields)
- Standard bearings: maximum operating temperature = +80°C (including hand motion)
- Gearboxes are greased for life. Refilling is only required when boxes are disassembled for refurbishment. Overfilling will cause excessive heat build up and potential failure.
- We are able to modify standard gearboxes to customer's specific requirements.
- Damage caused by customer modifications will invalidate the gearbox guarantee.
- We recommend that shafts are connected by flexible couplings.
- Our gearboxes are designed as speed reducing units, not as multipliers. If used in a speed increasing capacity, service life is not guaranteed.
- Customers will always need to test the units themselves in their particular application to ensure it is adequate for the job and has the desired results for them.



GEARBOXES

Grease Technical Data

Shell Nerita Grease HV

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Shell Nerita Grease HV - Synthetic High Speed Bearing Grease

A very high performance grease specially designed for the lubrication of heavily loaded, high-speed bearings. It consists of a blend of lithium soap, Shell XHVI synthetic base oil and carefully selected additives recommended for use where conventional greases are inadequate in anti-wear and extreme-pressure properties or in their oxidation resistance. Suitable over a wide temperature range from -30°C to a peak of +130°C, it gives extended bearing and grease life.

Performance Features

- Outstanding mechanical stability
- Long operational life
- Lead and nitrite free
- Wide operating temperature Range
- Excellent wear protection
- Heavy load capability
- Good oil separation

Typical Physical Characteristics

NLGI Consistency	2 to 3
Colour	Light Brown
Soap Type	Lithium
Base Oil (type)	Synthetic
Kinematic Viscosity (IP 71/ASTM-D445)	
40°C cSt	40
100°C cSt	7.2
Dropping Point (IP 132/ASTM-D566-76)	190°C
Cone Penetration Worked @ 25°C (IP 50/ASTM-D217)	
60 Strokes	250 - 280
100,000 Strokes change 0.1mm	+20 max.
Oil Separation on Storage of Grease (IP 121)	
7 days @ 40°C	4.8%
Emcor Steel Corrosion Test (IP 220)	
Distilled water 0 - 5 scale	0 - 0
Mechanical Stability (SKF V2F)	Pass
Bearing Life	
FAG FE9 Test @ 150°C L50 hours	> 250
SKF ROF Test @ 130°C L50 hours	> 1500
Extreme Pressure Properties (IP 239/ASTM-D2596)	
Shell Four Ball Test, Load at which welding occurs	315kg
Timken Wear & Lubricant Testing Machine, OK Load	50lbs
Minimum Operating Temperature	-30°C
Maximum Operating Temperature	+130°C (+140°C peak)

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

Health & Safety

Shell Nerita Grease HV is unlikely to present any significant health or safety hazard when properly used in the recommended application and good standards of industrial and personal hygiene are maintained. For further guidance on Product Health & Safety refer to the appropriate data sheet.



GEARBOXES

Grease Technical Data

Shell Alvania Grease HDX2

Shell Alvania Grease HDX2 - High Performance Grease Containing Solid Lubricant

A very high performance grease the lubrication of industrial bearings subjected to the most arduous conditions. It is based on a high viscosity index mineral oil and a lithium/calcium thickener and contains extreme-pressure, anti-oxidation, anti-wear, anti-corrosion and adhesion additives. It also contains molybdenum disulphide to enhance its EP properties. The essential qualities of Shell Alvania Grease HDX2 are its mechanical stability, water resistance, adhesion and exceptional performance in shock loaded conditions. It is recommended for the lubrication of shock loaded heavy duty bearings working in damp hostile conditions.

Performance Features

- Excellent mechanical stability
- For shock loaded conditions
- Extreme pressure performance
- Good water resistance
- Good adhesion properties

Typical Physical Characteristics

NLGI Consistency	2
Colour	Dark grey
Soap Type	Lithium/Calcium
Base Oil (type)	Mineral
Kinematic Viscosity (IP 71/ASTM-D445)	
40°C cST	160
100°C cST	15.5
Cone Penetration	
Worked @ 25°C 0.1mm (IP 50/ASTM-D217)	265 - 295
Dropping Point (IP 132/ASTM-D566-76)	184°C
Water Resistance	
Water Wash-out (ASTM-D1264)	3%
Water Spray-off (ASTM-D4049)	4.2%
Emcor Steel Corrosion Test (IP 220)	
Distilled water 0 - 5 scale	0 - 0
Mechanical Stability (SKF V2F)	
Condition 1 (50g max.)	Pass
Extreme Pressure Properties (IP 239/ASTM-D2596)	
Shell Four Ball Test, Load at which welding occurs	400kg
Minimum Operating Temperature	-25°C
Maximum Operating Temperature	+120°C (+140°C peak)

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

Health & Safety

Shell Alvania Grease HDX2 is unlikely to present any significant health or safety hazard when properly used in the recommended application and good standards of industrial and personal hygiene are maintained. For further guidance on Product Health & Safety refer to the appropriate data sheet.



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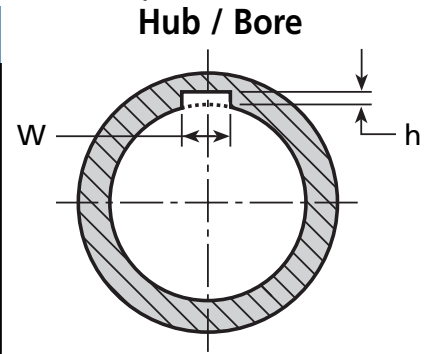
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GEARBOXES

Keyway Sizes & Tapping Drill Sizes

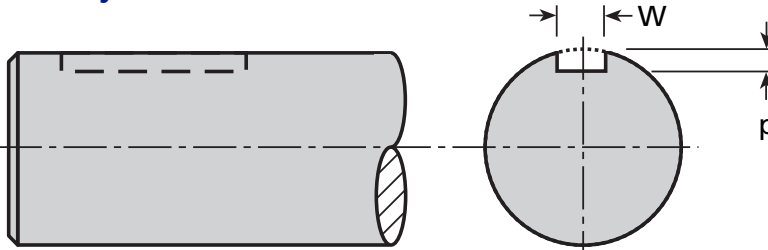
Keyway Sizes: DIN 6885 Ondrives standard on most products (Free Fit)

Ref	W		h		p	
	mm	Tol (JS9)	mm	Tol	mm	Tol
KK2	2	+0.0125	1.0	0.1	1.2	0.1
KK3	3	-0.0125	1.4		1.8	
KK4	4	+0.0150	1.8		2.5	
KK5	5	-0.0150	2.3		3.0	
KK6	6		2.8	0.2	3.5	0.2
KK8	8	+0.0180	3.3		4.0	
KK10	10	-0.0180	3.3		5.0	
KK12	12	+0.0215	3.3		5.0	
KK14	14	-0.0215	3.8		5.5	
KK16	16		4.3		6.0	



(width tolerance may come down when part is hardened or change depending on material and broaches used)

Shaft Key



Shaft

Ondrives keyways are Sliding Fit (N9/JS9) as Standard.

Tolerances may vary due to operating conditions and manufacturing processes

Other keyway standards may be available depending on product types. Please contact Technical for details.

Free Fit

H9	D10
----	-----

Sliding Fit

N9	Js9
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Tight Fit

P9

Bore or Shaft Ø over	up to & incl.	Keyway	Pin Hole Dia.	Grub Screw
4	6	-	1.50	M3
6	8	K2	2.00	M3
8	10	K3	3.00	M3
10	12	K4	4.00	M4
12	17	K5	5.00	M5
17	22	K6	6.00	M6
22	30	K8	8.00	M8
30	38	K10	10.00	M10
38	44	K12	10.00	M10
44	50	K14	10.00	M12
50	58	K16	10.00	M12



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TECHNICAL

GEARBOXES

Inertia and the Use of Inertia Figures to Aid Selection

Example Gearbox

3:1 ratio, 90% efficient, 0.52kg cm² (0.000052kg m²) reflected inertia at input

So, if acceleration = 10 Rads/sec²

Input torque needed = inertia (in kg m²) x acceleration (in radians per second)

Input torque needed = 0.000052 kg m² x 10 Rads/sec = 0.00052Nm

Also, if inertia of load 0.0062 kg m² (62 kg cm²) at output of unit
Reflected inertia at input will go upto 0.00817 kg m² (81.7kg cm²)
Torque now will need to be 0.0817Nm.

Using the calculations below :-

$$J_T = J_M + \frac{J_L}{R^2 n}$$

J_T (kg m²) x acceleration at input (radians per second) = acceleration torque needed Nm

J_T = total reflected inertia at input of gearbox unit (kg m²)

J_M = reflected inertia of gearbox (kg m²)

J_L = inertia of load at gearbox output (kg m²)

R = ratio :1

n = efficiency %

1 radian (rad) = 57.5928°

1 kg m² = 10,000 kg cm²

1 kg m² = 1,000,000,000 g mm²

1 m² = 1,000,000 mm²

1 m² = 10,000 cm²

1.0 x 10⁻² = 0.01

1.0 x 10⁻³ = 0.001

1.0 x 10⁻⁴ = 0.0001

1.0 x 10⁻⁵ = 0.00001

1.0 x 10⁻⁶ = 0.000001

1.0 x 10⁻⁷ = 0.0000001

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