

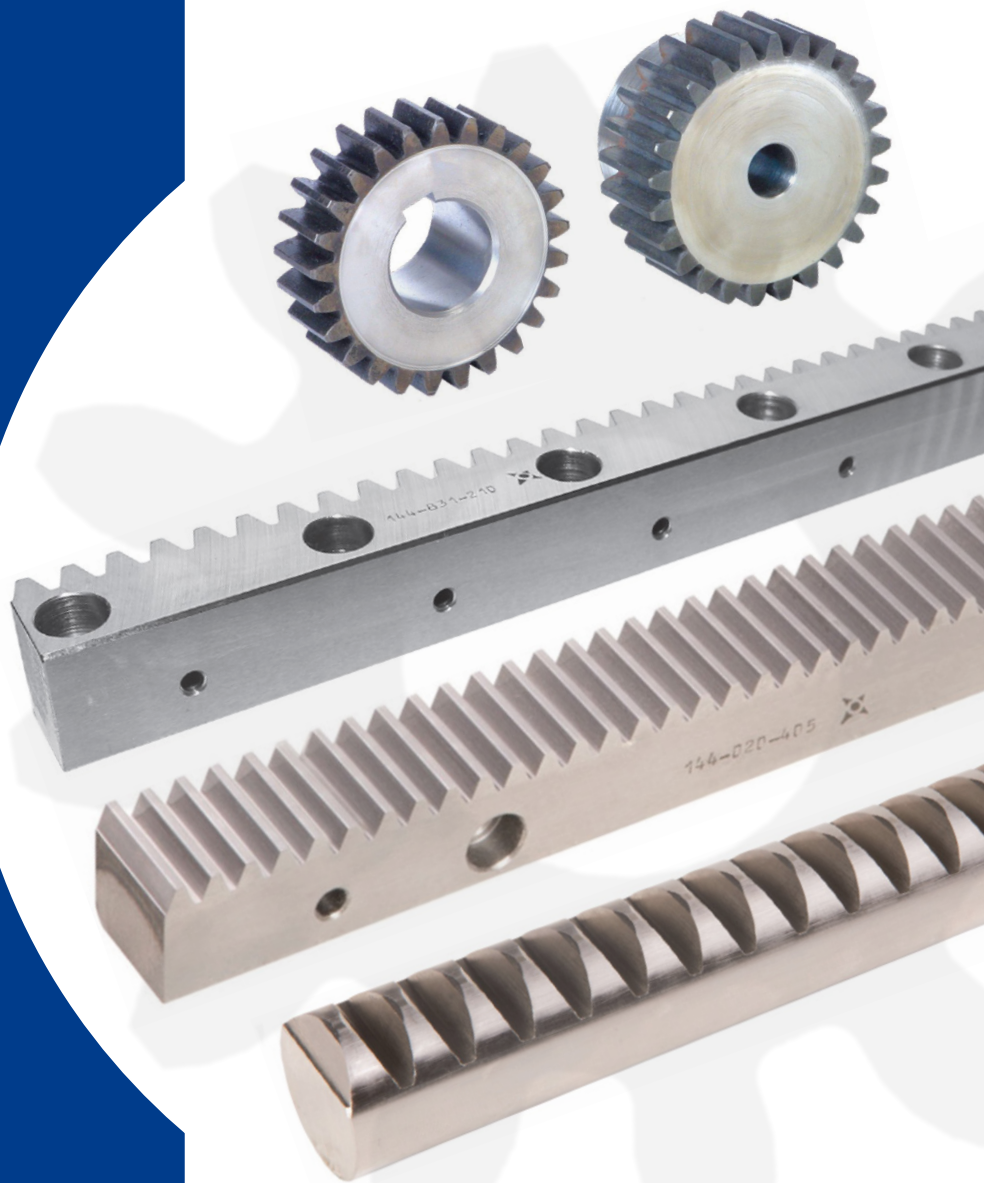
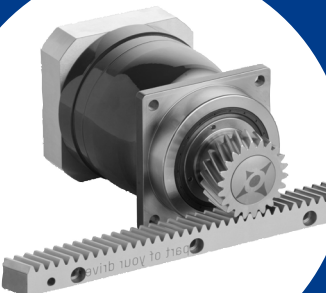


"Part of your drive"

RACK & PINION

STOCK CATALOGUE

EDITION 02



**www.apex-trans.co.uk
sales@apex-trans.co.uk**

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FAX: 01827 253 390**



HELICAL RACKS



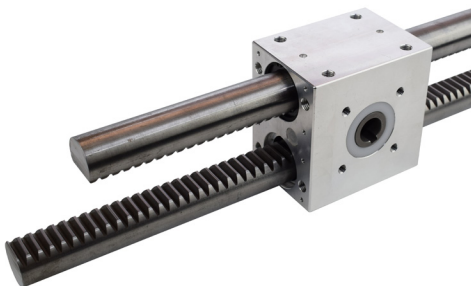
HELICAL PINIONS



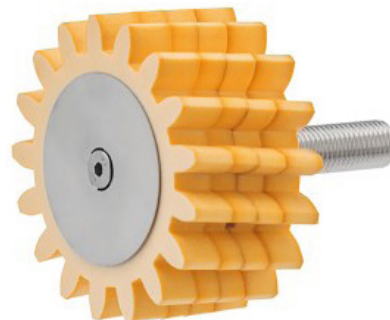
STRAIGHT RACKS



STRAIGHT PINIONS



ROUND RACK JACKS



LUBRICATION PINIONS

Helical Racks	05 – 14	
Helical Pinions	15 – 22	
Straight Racks	23 – 40	
Straight Pinions	41 – 70	
Round Rack Jacks	71 – 78	
Lubrication Pinions	79 – 83	

Here at **APEX**, we are dedicated to quality customer service, high quality products and fast delivery. We pride ourselves on next day delivery on stock items and delivery of non stock or special items in just a few weeks.

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We hold extensive stock at our headquarters in Tamworth, Staffordshire situated on junction 10 of the M42 just north of the N.E.C, Birmingham providing excellent access to the motorway network and our customers.

Here at **APEX**, we offer unrivalled customer service and product quality. We focus on several specialist linear motion services including:

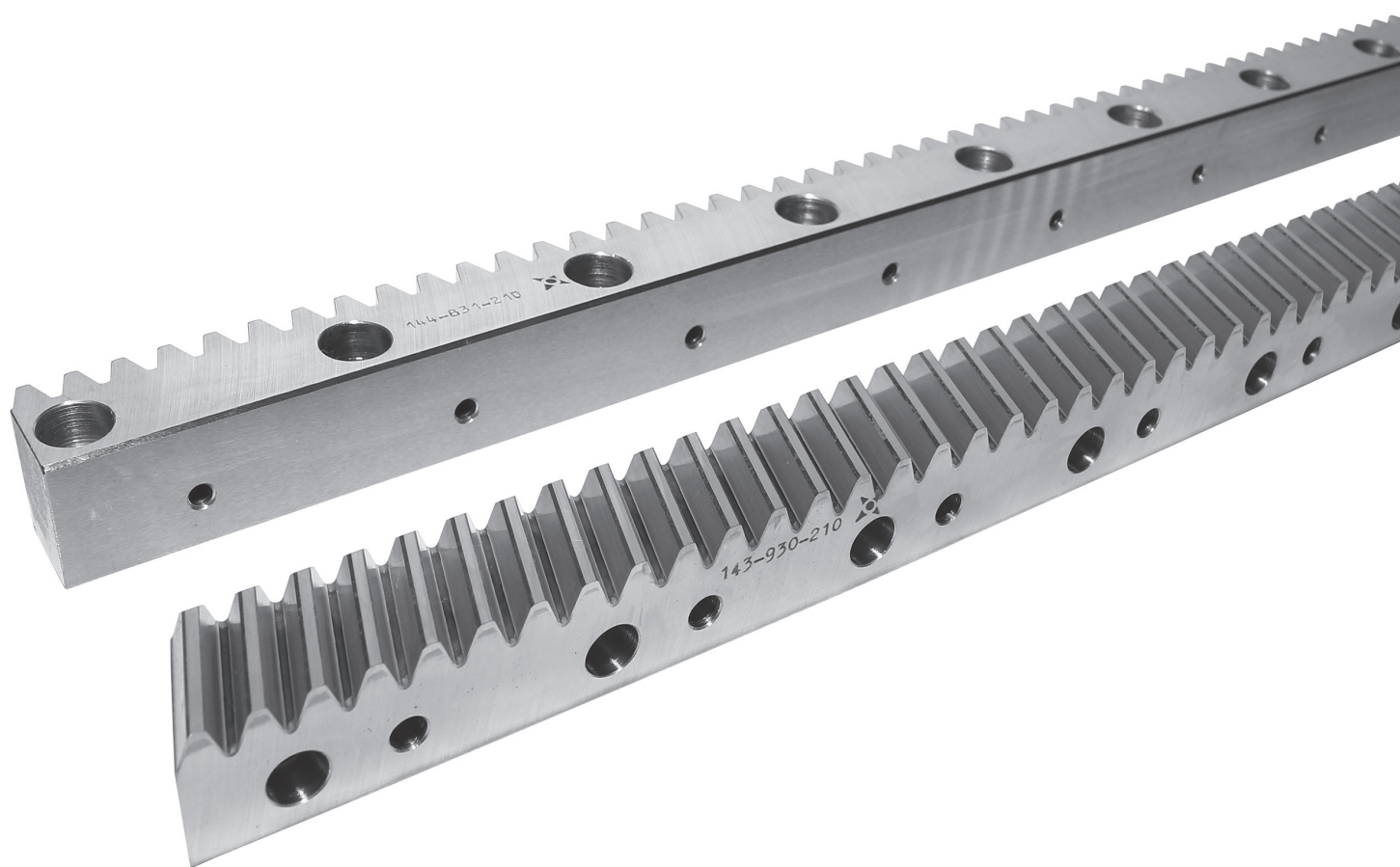
- Precision planetary reduction gearboxes -
- Low backlash spiral bevel gearboxes -
- Distribution of Bosch Rexroth Linear Guides -
- Machining & assembly of Bosch Rexroth Ballscrews -
- Bespoke rack & pinion milling & grinding -
- Integrated & stand alone lubrication systems -
- Bosch Rexroth aluminium profile systems -

Our in-house, fully equipped CNC machine shop and years of industry experience gives us the capability to tailor any products to specific customer requirements – contact our sales team with your requirements.

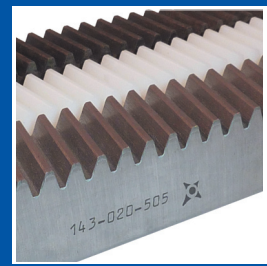




Helical Racks



AS WELL AS OUR RANGE OF STANDARD PRODUCTS WE CAN ALSO MANUFACTURE SPECIAL COMPONENTS IN HOUSE – PLEASE CONTACT OUR SALES TEAM WITH YOUR REQUIREMENTS



Tooth Pitch Deviation

DIN 3962 Standard

Quality 6						
MOD	fp/300	Fp/300	fp/500	Fp/500	fp/1000	Fp/1000
1	7	25	8	28	8	32
2	7	25	8	28	8	32
3	7	28	8	32	8	36
4	9	28	9	36	10	40
5	9	28	9	36	10	40
6	9	28	9	36	10	40
8	10	32	11	36	11	40
10	10	32	11	36	11	40

Quality 7						
MOD	fp/300	Fp/300	fp/500	Fp/500	fp/1000	Fp/1000
1	10	32	11	40	12	45
2	10	32	11	40	12	45
3	10	36	11	45	12	50
4	12	40	12	45	14	56
5	12	40	12	45	14	56
6	12	40	12	45	14	56
8	14	45	14	56	16	63
10	14	45	14	56	16	63

Quality 8						
MOD	fp/300	Fp/300	fp/500	Fp/500	fp/1000	Fp/1000
1	14	50	16	56	16	63
2	14	50	16	56	16	63
3	14	50	16	63	16	71
4	16	56	18	71	20	80
5	16	56	18	71	20	80
6	16	56	18	71	20	80
8	20	63	20	71	22	80
10	20	63	20	71	22	80

Quality 9						
MOD	fp/300	Fp/300	fp/500	Fp/500	fp/1000	Fp/1000
1	20	63	22	80	22	90
2	20	63	22	80	22	90
3	20	71	22	90	22	100
4	25	80	25	90	28	110
5	25	80	25	90	28	110
6	25	80	25	90	28	110
8	28	90	28	100	32	110
10	28	90	28	100	32	110

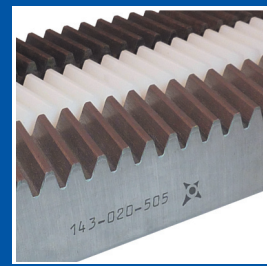
Quality 10						
MOD	fp/300	Fp/300	fp/500	Fp/500	fp/1000	Fp/1000
1	32	110	36	125	36	140
2	32	110	36	125	36	140
3	32	125	36	140	36	160
4	40	125	40	140	45	180
5	40	125	40	140	45	180
6	40	125	40	140	45	180
8	45	140	45	160	50	180
10	45	140	45	160	50	180

Quality 12						
MOD	fp/300	Fp/300	fp/500	Fp/500	fp/1000	Fp/1000
1	80	280	90	320	90	360
2	80	280	90	320	90	360
3	80	320	90	360	100	400
4	100	320	100	360	110	450
5	100	320	100	360	110	450
6	100	320	100	360	110	450
8	110	360	125	400	125	450
10	110	360	125	400	125	405

fp = Maximum pitch error for one single tooth (µm)

Fp = Maximum Cumulative pitch error over length (µm)

QUALITY GRADES ONLY SHOWN FOR RACKS KEPT IN STOCK – FOR ERRORS OF OTHER QUALITIES, PLEASE REFER TO DIN 3962 STANDARD OR CONTACT OUR SALES TEAM FOR MORE INFORMATION



Application Guide

DIN Quality	1	2	3	4	5	6	7	8	9	10	11	12
Manufacturing Method							Punched, Pressed, Injection Moulded					
						Planed, Milled, Shaped						
					Shaved							
		Ground										
Circumferential Speed										< 3 m/s		
								3 – 6 m/s				
					6 – 20 m/s							
		> 20 m/s										
Typical Applications								Agricultural Machines				
							Lifting Devices, Conveyors, Office Machinery					
						Construction Machinery						
							Apparatus Construction					
					Machine Tool Manufacturing							
					Internal Combustion Engines							
				Turbines, Measuring Equipment								
		Testing Equipment										

Example of Tooth Quality Effect:

Tooth quality is an important factor when calculating gear drives. Apart from the benefits of improved accuracy, better tooth quality also increases the torque / power capacity of the system for the same given design parameters (i.e. same rack section dimensions, material and surface heat treatment).

The following example system shows the direct coloration between tooth quality and system power capacity:

Tooth Form : Straight Spur
Module Size : 4.0
Pinion Teeth : 25
Pinion Speed : 50 rpm
Material : C45 Steel
Tooth Finish : Ind. Hard
Lubrication : Grease

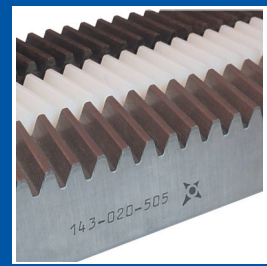
Tooth Quality	Max Power	Life (hours)
Q9	1.5 kW	20,000
Q8	2.0 kW	20,000
Q7	2.4 kW	20,000
Q6	3.0 kW	20,000

Alternatively, better tooth quality also increases the service life of the system for the same given design parameters (i.e. same rack section dimensions, material and surface heat treatment) and loadings.

The following example system shows the direct coloration between tooth quality and system service life:

Tooth Form : Straight Spur
Module Size : 4.0
Pinion Teeth : 25
Pinion Speed : 50 rpm
Material : C45 Steel
Tooth Finish : Ind. Hard
Lubrication : Grease

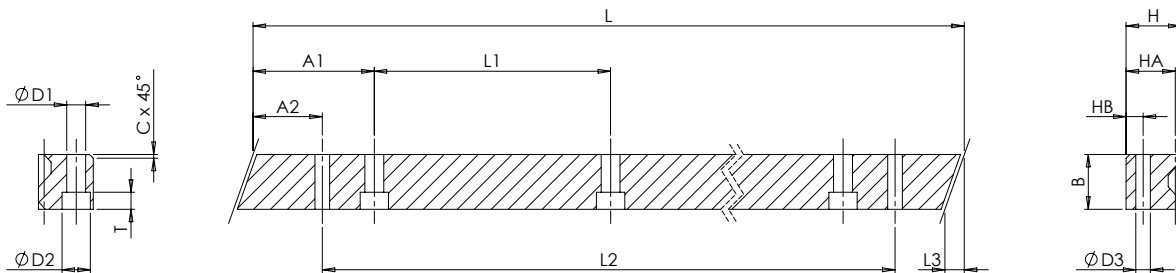
Tooth Quality	Max Power	Life (hours)
Q9	2.0 kW	15,000
Q8	2.0 kW	20,000
Q7	2.0 kW	24,000
Q6	2.0 kW	30,000



Precision Helical Racks

Ground Rear & Contact Surfaces – Ground Teeth

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
R/H 19° 31' 42"	20°	Q6 h23 **	Ind. Hard + Ground	C45 (1.0503)	50~55 HRC *

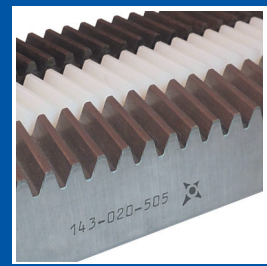


MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	L2	L3	A1	A2	D1	D2	D3	C +0.5	T	Mass (kg)	Order Code
2	500	75	24	24	22	8	125	436.6	8.5	62.5	31.7	7	11	5.7	2	7	2.1	143-020-405
	1000	150						936.6									4.3	143-020-410
3	500	50	29	29	26	9	125	430.0	10.3	62.5	35.0	10	15	7.7	2	9	3.0	143-030-405
	1000	100						930.0									6.1	143-030-410
4	506.66	38	39	39	35	12	125	433.0	13.8	62.5	33.3	10	15	7.7	3	9	5.5	143-040-405
	1000	75						933.4									10.9	143-040-410
	2000	150						1933.4									21.8	143-040-420
5	500	30	49	39	34	12	125	425.0	17.4	62.5	37.5	14	20	11.7	3	13	6.5	143-050-405
	1000	60						925.0									13.0	143-050-410
	2000	120						1925.0									26.0	143-050-420
6	500	25	59	49	43	16	125	425.0	20.9	62.5	37.5	18	26	15.7	3	17	9.9	143-060-405
	1000	50						925.0									19.8	143-060-410
	2000	100						1925.0									36.2	143-060-420
8	480	18	79	79	71	25	120	240.0	28.0	60.0	120.0	22	33	19.7	3	21	21.0	143-080-405
	960	36						720.0									42.5	143-080-410
	1920	72						1680.0									85.0	143-080-420
10	1000	30	99	99	89	32	125	750.0	35.1	62.5	125.0	33	48	19.7	3	32	68.7	143-100-410

* Module 1~3 teeth flanks & roots hardened. Module 4~10 only flanks hardened
 ** Racks with nominal length of 2000mm are finished to Q6 h24 tolerance

Un-Bored Order Code 143-XXX-3XX

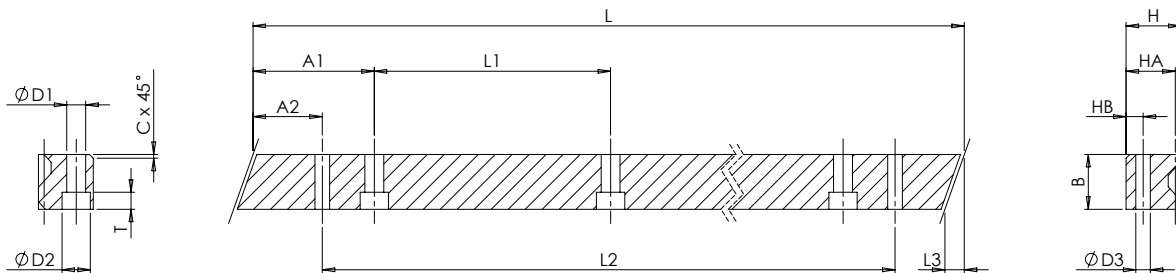
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
 WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Precision Helical Racks

Ground Rear & Contact Surfaces – Milled Teeth

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
R/H 19° 31' 42"	20°	Q10 h27	Ind. Hard + Milled	C45 (1.0503)	50~55 HRC *

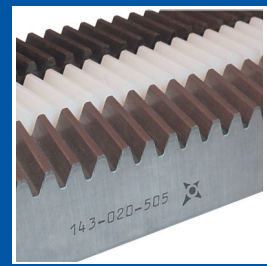


MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	L2	L3	A1	A2	D1	D2	D3	C +0.5	T	Mass (kg)	Order Code
2	500	75	24	24	22	8	125	436.6	8.5	62.5	31.7	7	11	5.7	2	7	2.1	143-020-805
	1000	150						936.6									4.3	143-020-810
	2000	300						1936.6									8.6	143-020-820
3	500	50	29	29	26	9	125	430.0	10.3	62.5	35.0	10	15	7.7	2	9	3.0	143-030-805
	1000	100						930.0									6.1	143-030-810
	2000	200						1930									12.2	143-030-820
4	506.66	38	39	39	35	12	125	433.0	13.8	62.5	33.3	10	15	7.7	3	9	5.5	143-040-805
	1000	75						933.4									10.9	143-040-810
	2000	150						1933.4									21.8	143-040-820
5	500	30	49	39	34	12	125	425.0	17.4	62.5	37.5	14	20	11.7	3	13	6.5	143-050-805
	1000	60						925.0									13.0	143-050-810
6	500	25	59	49	43	16	125	425.0	20.9	62.5	37.5	18	26	15.7	3	17	9.9	143-060-805
	1000	50						925.0									19.8	143-060-810

* Module 1~3 teeth flanks & roots hardened. Module 4~10 only flanks hardened

Un-Bored Order Code 143-XXX-9XX

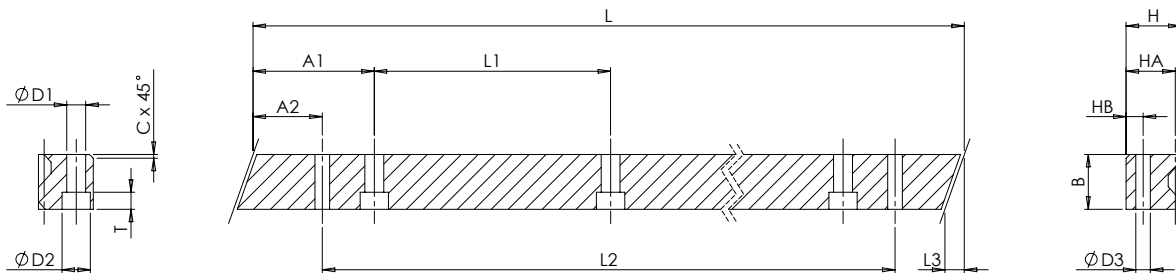
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Economy Helical Racks

Milled Rear & Contact Surfaces – Milled Teeth

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
R/H 19° 31' 42"	20°	Q9 h27	Milled	C45 (1.0503)	Soft



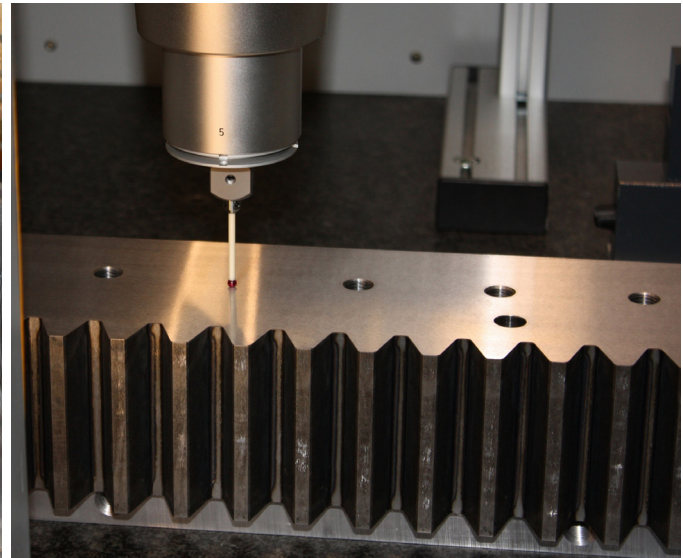
MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	L2	L3	A1	A2	D1	D2	D3	C +0.5	T	Mass (kg)	Order Code
1.5	1000	200	17	16.8	15.3	6	125	936.6	6.0	62.5	31.7	6	10	5.7	-	6	2.0	145-015-210
	1500	300						1436.6									3.0	145-015-215
	2000	400						1936.6									4.0	145-015-220
2	500	75	25	24.75	22.75	8	125	436.6	8.9	62.5	31.7	7	11	5.7	-	7	2.2	145-020-205
	1000	150						936.6									4.4	145-020-210
	1500	225						1436.6									6.6	145-020-215
	2000	300						1936.6									8.8	145-020-220
3	500	50	30	29.75	26.75	9	125	430.0	10.6	62.5	35.0	10	15	7.7	-	9	3.1	145-030-205
	1000	100						930.0									6.2	145-030-210
	2000	200						1930.0									12.5	145-030-220
4	506.66	38	40	39.7	35.7	12	125	433.0	14.2	62.5	33.3	10	15	7.7	-	9	5.6	145-040-205
	1000	75						933.4									11.1	145-040-210
	2000	150						1933.4									22.2	145-040-220
5	1000	60	50	39.7	34.7	12	125	925.0	17.7	62.5	37.5	14	20	11.7	-	13	13.3	145-050-210
	2000	120						1925.0									26.5	145-050-220
6	1000	50	60	49.7	43.7	16	125	925.0	21.3	62.5	37.5	18	26	15.7	-	17	20.1	145-060-210
	2000	100						1925.0									40.2	145-060-220
8	960	36	80	79.6	71.6	25	120	720.0	28.4	60.0	120.0	22	33	19.7	-	21	44.8	145-080-210
	1920	72						1680.0									89.7	145-080-220
10	1000	30	100	99.0	89.0	32	125	750.0	35.5	62.5	125.0	33	48	19.7	-	32	69.8	145-100-210

Un-Bored Order Code 145-XXX-1XX

BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Special Manufacture Racks



SUPPLIER OF HIGH QUALITY RACKS & PINIONS WITH A COMPREHENSIVE RANGE CATERING TO ALL NEEDS FROM HARDENED & GROUND QUALITY 5 DOWN TO ECONOMY MILLED QUALITY 12

AT OUR FACILITY IN TAMWORTH, STAFFORDSHIRE WE HAVE THE MACHINERY AND INDUSTRY EXPERTISE TO MODIFY ANY OF OUR STANDARD RACK & PINIONS IN-HOUSE

WE ALSO HAVE THE CAPABILITY TO PRODUCE ALMOST ANY RACK IMAGINABLE BE IT CORRECTED TOOTH GEOMETRY, EXOTIC MATERIALS AND EVEN CURVED SEGMENTS

STANDARD RACKS ARE RIGHT HANDED AND ALL STANDARD PINIONS ARE LEFT HANDED BUT WE CAN PRODUCE LEFT HANDED RACKS AND RIGHT HANDED PINIONS ON REQUEST

CONTACT OUR SALES TEAM WITH YOUR REQUIREMENTS AND WE WILL BE HAPPY TO HELP

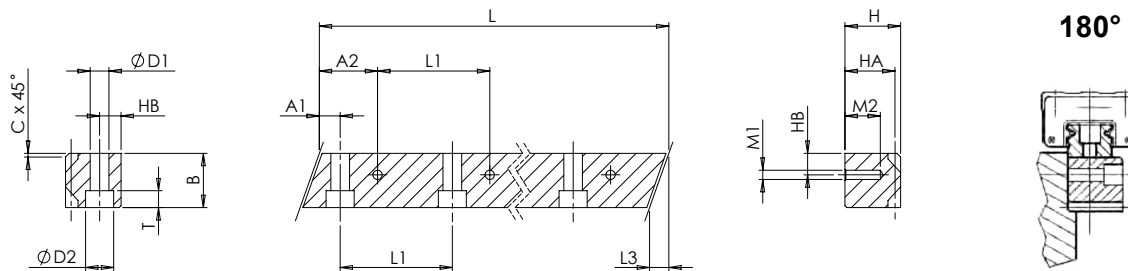




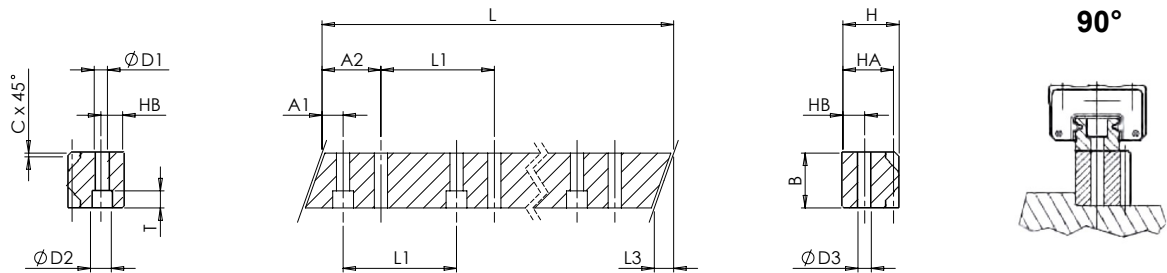
Precision Helical Racks

Ground Contact Surfaces – For Linear Guides

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
R/H 19° 31' 42"	20°	Q6 h23	Ind. Hard + Ground	C45 (1.0503)	50~55 HRC



MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	L3	A1	A2	D1	D2	M1	M2	C +0.5	T	Mass (kg)	Order Code
2	960	144	19	19.5	17.5	7.5	60	6.7	10	30	5.8	10	M4	8	1	6	2.7	143-820-110
2	960	144	24	24.5	22.5	10	60	8.5	10	30	7	11	M5	11	1	7	4.2	143-820-210
3	960	96	29	29.75	26.75	11.5	60	10.3	10	30	10	15	M6	13.5	2	9	5.6	143-830-210
4	960	72	39	39.75	35.75	14	80	13.8	20	40	12	18	M8	16	2	12	10.5	143-840-310
4	960	72	39	48.75	44.75	17	80	13.8	20	40	12	18	M8	16	2	12	13.0	143-840-410
4	840	63	49	58.0	54.0	22.5	105	17.4	30	60	14	20	M12	25	2	13	17.3	143-840-510



MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	L3	A1	A2	D1	D2	D3	C +0.5	T	Mass (kg)	Order Code
2	960	144	19	19.5	17.5	7.5	60	6.7	10	30	4.5	7.5	4.5	1	5.3	2.7	143-920-110
2	480	72														1.3	143-920-105
2	960	144	24	24.5	22.5	10	60	8.5	10	30	6	9.5	6	1	8.5	4.2	143-920-210
2	480	72														2.1	143-920-205
3	960	96	29	29.75	26.75	11.5	60	10.3	10	30	7	11	7	2	9	5.6	143-930-210
3	480	48														2.8	143-930-205
4	960	72	39	39.75	35.75	14	80	13.8	20	40	10	15	10	2	9	10.5	143-940-310
4	480	36														5.2	143-940-305
4	960	72	39	48.75	44.75	17	80	13.8	20	40	10	15	10	2	9	13.0	143-940-410
4	408	36														6.5	143-940-405
4	840	63	49	58.0	54.0	22.5	105	17.4	30	60	14	20	14	2	13	17.3	143-940-510

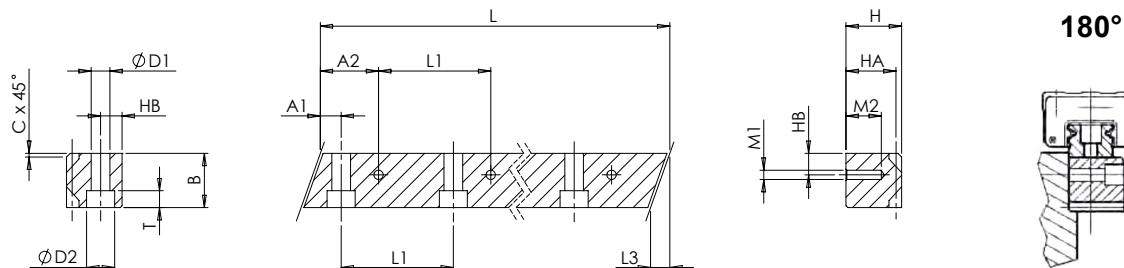
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



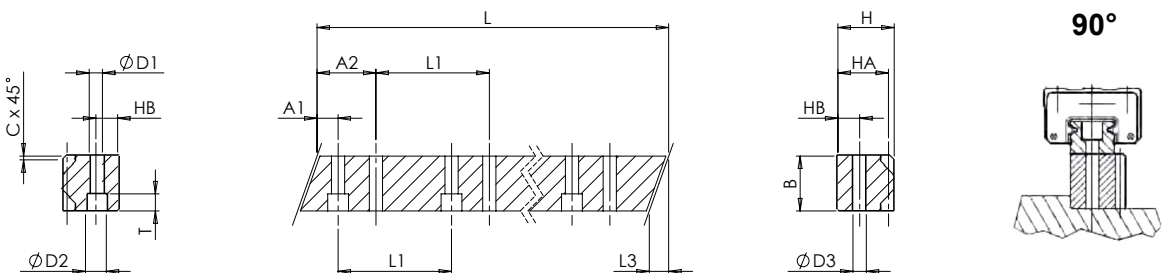
Economy Helical Racks

Milled Contact Surfaces – For Linear Guides

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
R/H 19° 31' 42"	20°	Q9 h27	Milled	C45 (1.0503)	Soft

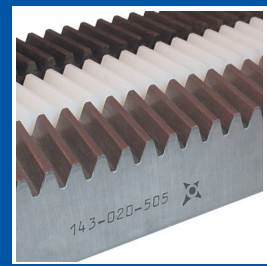


MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	L3	A1	A2	D1	D2	M1	M2	C +0.5	T	Mass (kg)	Order Code
2	1920	288	20	19.5	17.5	7.5	60	7.1	10	30	5.8	10	M4	8	-	6	5.4	145-820-120
2	1920	288	25	24.5	22.5	10	60	8.9	10	30	7	11	M5	11	-	7	8.4	145-820-220
3	1920	192	30	29.75	26.75	11.5	60	10.6	10	30	10	15	M6	13.5	-	9	11.2	145-830-220
4	1920	144	40	39.75	35.75	14	80	14.2	20	40	12	18	M8	16	-	12	21.5	145-840-320



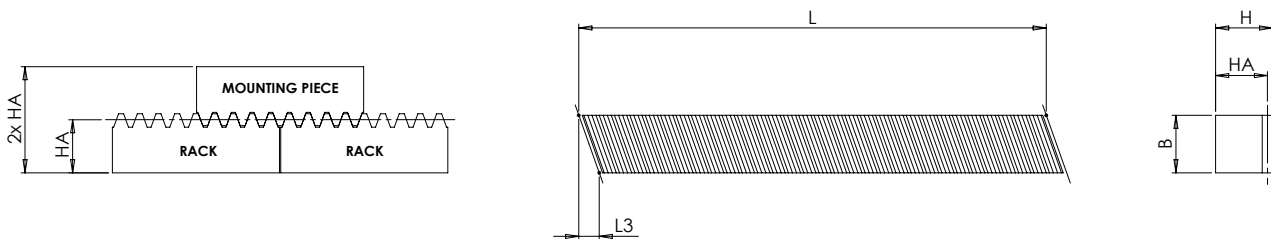
MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	L3	A1	A2	D1	D2	D3	C +0.5	T	Mass (kg)	Order Code
2	1920	288	20	19.5	17.5	7.5	60	7.1	10	30	4.5	7.5	4.5	-	5.3	5.4	145-920-120
2	1920	288	25	24.5	22.5	10	60	8.9	10	30	6	9.5	6	-	8.5	8.4	145-920-220
3	1920	192	30	29.75	26.75	11.5	60	10.6	10	30	7	11	7	-	9	11.2	145-930-220
4	1920	144	40	39.75	35.75	14	80	14.2	20	40	10	15	10	-	9	21.5	145-940-320

BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Helical Mounting Pieces

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
L/H 19° 31' 42"	20°	Q5 / Q8	Milled / Ground	C45 (1.0503)	Soft



MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	L3	Mass (kg)	Order Code	
								Q5 Ground	Q8 Milled
2	200	30	24	24	22	8.5	0.9	143-020-002	-
			25	24.75	22.75	8.9	0.9	-	143-020-001
3	200	20	29	29	26	10.3	1.2	143-030-002	-
			30	29.75	26.75	10.6	1.3	-	143-030-001
4	200	15	39	39	35	13.8	2.2	143-040-002	-
			40	39.7	35.7	14.2	2.2	-	143-040-001
5	200	12	49	39	34	17.4	2.6	143-050-002	-
			50	39.7	34.7	17.7	2.7	-	143-050-001
6	200	10	59	49	43	20.9	3.6	143-060-002	-
			60	49.7	43.7	21.3	4.0	-	143-060-001
8	215	8	79	79	71	28.0	8.5	143-080-002	-
			80	79.6	71.6	28.4	9.0	-	143-080-001
10	235	7	99	99	89	35.1	13.7	143-100-002	-
			100	99.0	89.0	35.5	13.4	-	143-100-001

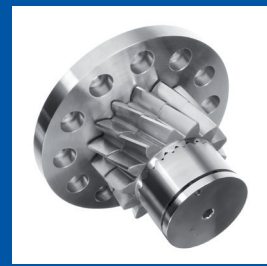
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Helical Pinions

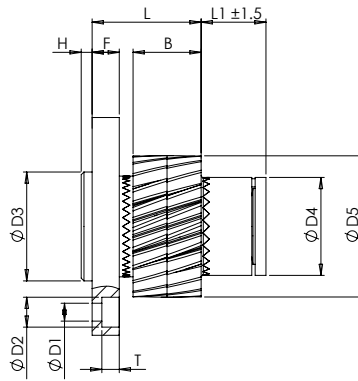
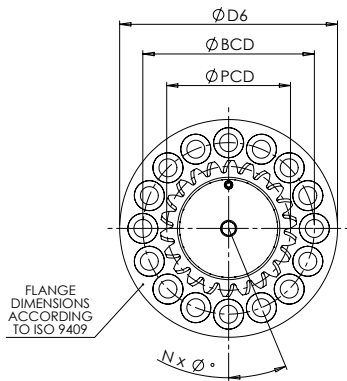


AS WELL AS OUR RANGE OF STANDARD PRODUCTS WE CAN ALSO MANUFACTURE SPECIAL COMPONENTS IN HOUSE – PLEASE CONTACT OUR SALES TEAM WITH YOUR REQUIREMENTS



Helical Double Pinions

For Anti-Backlash Applications



Design Parameter	Value
Helix Angle	L/H 19° 31' 42"
Pressure Angle	20°
Tooth Quality	Q6 e25
Tooth Finish	Case Hard + Ground
Material	16MnCr5 (1.7131)
Hardness	58~62 HRC

Only one half of the double pinion transmits power at any given time hence all calculations should be based on half of the face width (B)

MOD	Tooth Number	X *	B	BCD	PCD	D1	D2	D3	D4	D5	D6	F	H	L	L1**	T	N x Ø °	Order Code
2	22	0.330	25	63	48	6.6	11	40	36	52	80	10	4	40	23	6.4	16 x 22.5	123-020-122
3	14	0.239	30	63	46	6.6	11	40	36	52	80	10	4	45	23	6.4	16 x 22.5	123-030-114
4	13	0.353	40	80	58	9	15	50	45	66	100	13	6	58	38	8.6	12 x 30	123-040-113
5	14	0.573	50	125	80	11	18	80	65	90	160	20	6	75	38	10.6	12 x 30	123-050-114

* X = Addendum modification factor

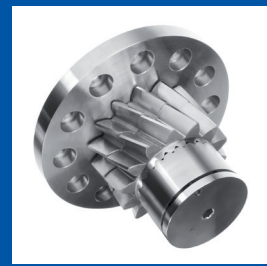
** Dimension L1 can vary due to the nature of the preload adjustment mechanism

MOD	Tooth Number	X *	B	Max Torque (Nm) ***		Resultant Speed (rpm) Based on 2.5 m/s Travel	Order Code
				Without Preload	With Max. Preload		
2	22	0.330	25	132	66	1071	123-020-122
3	14	0.239	30	147	74	1071	123-030-114
4	13	0.353	40	305	153	865	123-040-113
5	14	0.573	50	594	297	643	123-050-114

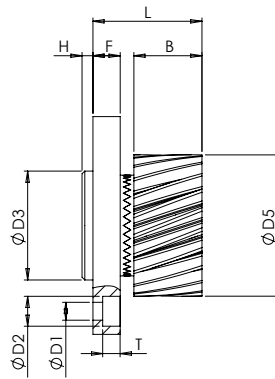
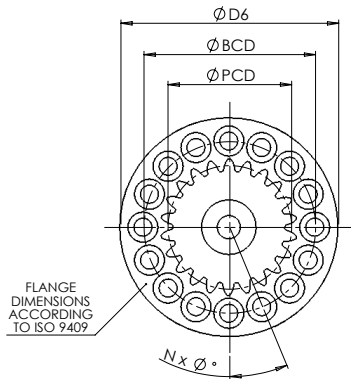
* X = Addendum modification factor

*** Stated values based on 20,000 hours service life with continuous grease lubrication

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST



Helical Flange Pinions



Design Parameter	Value
Helix Angle	L/H 19° 31' 42"
Pressure Angle	20°
Tooth Quality	Q6 e25
Tooth Finish	Case Hard + Ground
Material	16MnCr5 (1.7131)
Hardness	58~62 HRC

MOD	Tooth Number	X *	B	BCD	PCD	D1	D2	D3	D5	D6	F	H	L	T	N x ϕ°	Order Code
2	22	0.330	25	63	48	6.6	11	40	52	80	10	4	40	6.4	16 x 22.5	122-120-022
3	14	0.239	30		46											122-130-014
3	18	0.450	30	80	60	9	15	50	66	100	13	6	58	8.6	12 x 30	122-230-018
4	13	0.353	40		58											122-240-013
4	19	0.170	40	125	82	11	18	80	90	160	20	6	65	10.6	12 x 30	122-340-019
5	14	0.573	50		80											122-350-014

* X = Addendum modification factor

WE CAN PRODUCE CUSTOM FLANGE PINIONS AS WELL AS OUR STANDARD RANGE

MODULE & NUMBER OF TEETH CAN BE ADJUSTED TO CUSTOMER SPECIFICATION

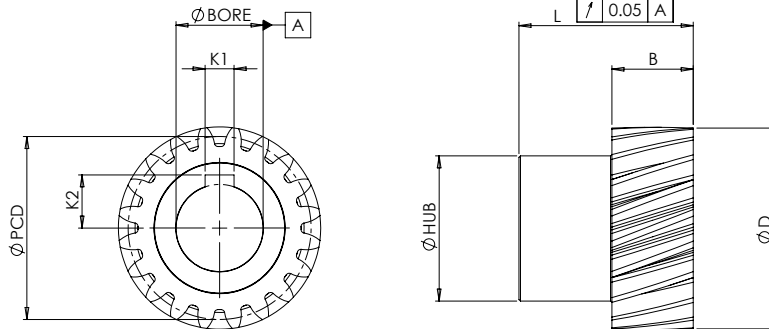
PLEASE CONTACT OUR SALES TEAM WITH YOUR REQUIREMENTS

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR
ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST



Precision Helical Pinions

Case Hardened – With Hub



Design Parameter	Value
Helix Angle	L/H 19° 31' 42"
Pressure Angle	20°
Tooth Quality	Q7 e25
Tooth Finish	Case Hard + Ground
Material	16MnCr5 (1.7131)
Hardness	58~62 HRC

Case hardened gears are supplied with bore and key size specified below and cannot be modified

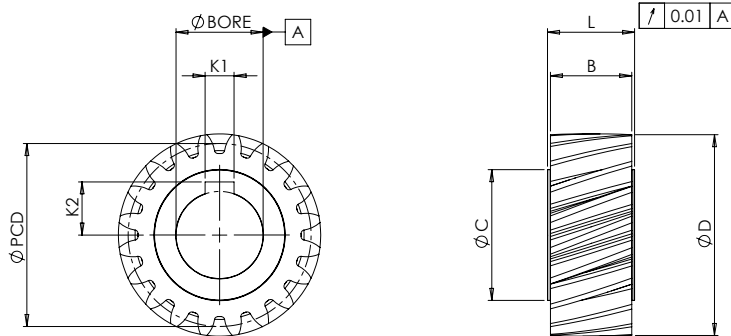
Keyway aligned with tooth root within +/- 0.5mm

MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H6	HUB Ø h8	Length (L)	K1	K2	Order Code
2	28	20	42.441	46.441	19	30	56	6	12.3	125-120-920
					22	36	56	6	13.8	125-220-220
		21	44.563	48.563	22	36	56	6	13.8	125-220-221
		22	46.686	50.686	19	30	56	6	12.3	125-120-922
					22	36	56	6	13.8	125-220-222
		25	53.052	57.052	19	30	56	6	12.3	125-120-925
		28	59.418	63.418	22	36	56	6	13.8	125-220-225
					19	30	56	6	12.3	125-120-928
		30	63.662	67.662	22	36	56	6	13.8	125-220-228
					30	50	60	8	18.3	125-320-030
					32	55	65	10	19.3	125-320-230
3	28	20	63.662	69.662	22	36	56	6	13.8	125-220-232
					32	55	65	10	19.3	125-220-239
					22	36	56	6	13.8	125-230-220
					25	44	60	8	15.8	125-230-520
		22	70.028	76.028	30	50	60	8	18.3	125-330-020
					32	55	65	10	19.3	125-330-220
					40	62	65	12	23.3	125-430-022
					22	36	56	6	13.8	125-230-225
		25	79.578	85.578	25	44	60	8	15.8	125-230-525
					30	50	60	8	18.3	125-330-025
					32	55	65	10	19.3	125-330-225
					35	55	65	10	20.8	125-330-525
		28	89.127	95.127	40	62	65	12	23.3	125-430-025
					32	55	65	10	19.3	125-330-228
					40	62	65	12	23.3	125-430-028
					32	55	65	10	19.3	125-330-232
4	40	18	76.394	84.394	40	62	65	12	23.3	125-430-032
					32	55	75	10	19.3	125-340-218
					32	55	75	10	19.3	125-340-221
					35	55	75	10	20.8	125-340-521
		21	89.127	97.127	40	62	75	12	23.3	125-440-021
					45	68	75	14	26.3	125-440-521
					32	55	75	10	19.3	125-340-224
					35	55	75	10	20.8	125-340-524
		24	101.859	109.859	40	62	75	12	23.3	125-440-024
					45	68	75	14	26.3	125-440-524
					55	80	80	16	31.8	125-540-524
					55	80	80	16	31.8	125-540-525



Precision Helical Pinions

Case Hardened – Without Hub



Design Parameter	Value
Helix Angle	L/H 19° 31' 42"
Pressure Angle	20°
Tooth Quality	Q7 e25
Tooth Finish	Case Hard + Ground
Material	16MnCr5 (1.7131)
Hardness	58~62 HRC

Case hardened gears are supplied with bore and key size specified below and cannot be modified

Keyway aligned with tooth root within +/- 0.5mm

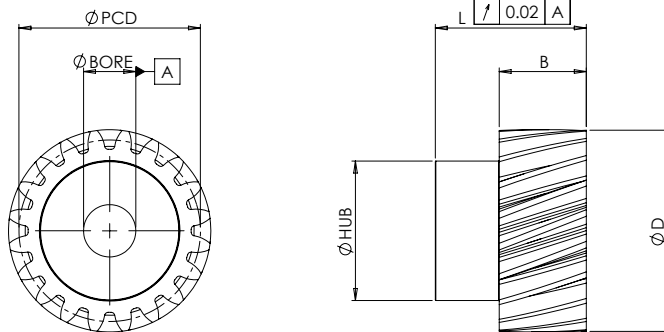
MOD	Face Width (B)	Length (L)	Tooth Number	PCD	Ø D	BORE Ø H6	Ø C	K1	K2	Order Code
2	28	30	20	42.441	46.441	20	30	6	12.8	123-220-020
			25	53.052	57.052	20	30	6	12.8	123-220-025
						25	36	8	15.8	123-220-525
			28	59.418	63.418	35	48	10	20.8	123-320-528
			30	63.662	67.662	25	36	8	15.8	123-220-530
						30	45	8	20.8	123-320-030
			32	67.906	71.906	20	30	6	12.8	123-220-032
						25	36	8	15.8	123-220-532
						35	48	10	20.8	123-320-532
			36	76.394	80.394	35	48	10	20.8	123-320-536
40	84.883	88.883	35	48	10	20.8	123-320-540			
3	28	30	20	63.662	69.662	30	45	8	18.3	123-330-020
						35	48	10	20.8	123-330-520
			22	70.028	76.028	25	36	8	15.8	123-230-522
						30	45	8	18.3	123-330-022
						35	48	10	20.8	123-330-522
			25	79.578	85.578	25	36	8	15.8	123-230-525
						30	45	8	18.3	123-330-025
						35	48	10	20.8	123-330-525
			4	40	50	19	80.639	88.639	35	48
20	84.883	92.883				35	48	10	20.8	123-340-520
						45	58	14	26.3	123-440-520
22	93.371	101.371				35	52	10	20.8	123-340-522
						45	65	14	26.3	123-440-522
25	106.103	114.103				35	48	10	20.8	123-340-525
						45	58	14	26.3	123-440-525

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST



Precision Helical Pinions

Induction Hardened & Ground Teeth Only



Design Parameter	Value
Helix Angle	L/H 19° 31' 42"
Pressure Angle	20°
Tooth Quality	Q6 e25
Tooth Finish	Ind. Hard + Ground
Material	16MnCr5 (1.7131)
Hardness	60 HRC

Induction hardened gears have soft cores and so can be reworked in-house on request

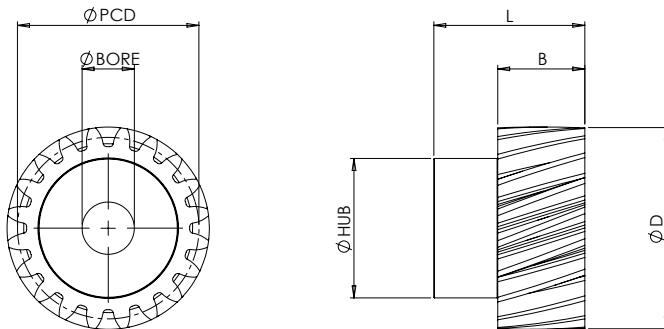
MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code
2	25	18	38.197	42.197	18	30	47	127-020-018
		20	42.441	46.441	18	30	47	127-020-020
		22	46.686	50.686	18	36	47	127-020-022
		25	53.052	57.052	18	44	53	127-020-025
		28	59.418	63.418	18	50	53	127-020-028
		30	63.662	67.662	24	54	53	127-020-030
		32	67.906	71.906	24	55	53	127-020-032
		36	76.394	80.394	24	65	53	127-020-036
3	30	40	84.883	88.883	24	68	53	127-020-040
		18	57.296	63.296	24	45	52	127-030-018
		20	63.662	69.662	24	48	52	127-030-020
		22	70.028	76.028	24	55	52	127-030-022
		25	79.578	85.578	24	62	58	127-030-025
		28	89.127	95.127	24	68	58	127-030-028
		30	95.493	101.493	24	68	58	127-030-030
		32	101.859	107.859	24	68	58	127-030-032
4	40	36	114.592	120.592	24	68	58	127-030-036
		18	76.394	84.394	24	62	73	127-040-018
		20	84.883	92.883	24	62	73	127-040-020
		22	93.371	101.371	24	68	73	127-040-022
		25	106.103	114.103	24	80	74	127-040-025
		28	118.836	126.836	24	80	74	127-040-028
		30	127.324	135.324	30	80	74	127-040-030
		32	135.812	143.812	30	110	74	127-040-032
5	50	36	152.789	160.789	30	110	74	127-040-036
		22	116.714	126.714	24	90	91	127-050-022
		25	132.629	142.629	24	110	101	127-050-025
		28	148.545	158.545	24	110	101	127-050-028
		30	159.155	169.155	30	110	101	127-050-030
		32	169.766	179.766	30	110	101	127-050-032
6	60	36	190.986	200.986	30	110	101	127-050-036
		20	127.324	139.324	30	100	140	127-060-020
		25	159.155	171.155	30	130	140	127-060-025
		28	178.254	190.254	30	130	140	127-060-028
		30	190.986	202.986	30	140	140	127-060-030

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Economy Helical Pinions

Soft Core & Teeth



Design Parameter	Value
Helix Angle	L/H 19° 31' 42"
Pressure Angle	20°
Tooth Quality	Q9 e27
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft

Economy milled gears are un-hardened and so can be fully reworked in-house on request

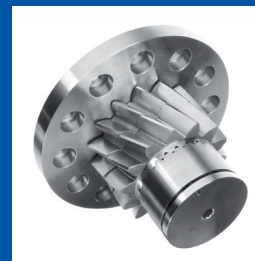
MOD	Face Width (B)	Length (L)	Tooth Number	PCD	Ø D	BORE Ø	HUB Ø	Order Code
2	28	35	20	42.441	46.441	9	30	126-020-020
			25	53.052	57.052	12	35	126-020-025
			30	63.662	67.662	12	40	126-020-030
3	30	50	20	63.662	69.662	14	45	126-030-020
			25	79.578	85.578	14	60	126-030-025
4	40	60	15	63.662	71.662	16	50	126-040-015
			20	84.883	92.883	16	60	126-040-020
			25	106.103	114.103	16	75	126-040-025
5	50	70	20	106.103	116.103	20	70	126-050-020
			25	132.629	142.629	20	80	126-050-025
6	60	80	20	127.324	139.324	20	90	126-060-020
			25	159.155	171.155	20	110	126-060-025
8	80	120	20	169.766	185.766	40	120	126-080-020

WE CAN PRODUCE SPECIAL MANUFACTURED HELICAL GEARS ON REQUEST

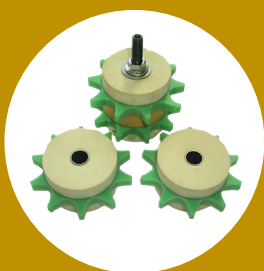
MODULE & NUMBER OF TEETH CAN BE ADJUSTED TO CUSTOMER SPECIFICATION

PLEASE CONTACT OUR SALES TEAM WITH YOUR REQUIREMENTS

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST



Lubrication Systems



www.apex-trans.co.uk
sales@apex-trans.co.uk



LUBRICATION SYSTEMS
STOCK CATALOGUE
EDITION 01

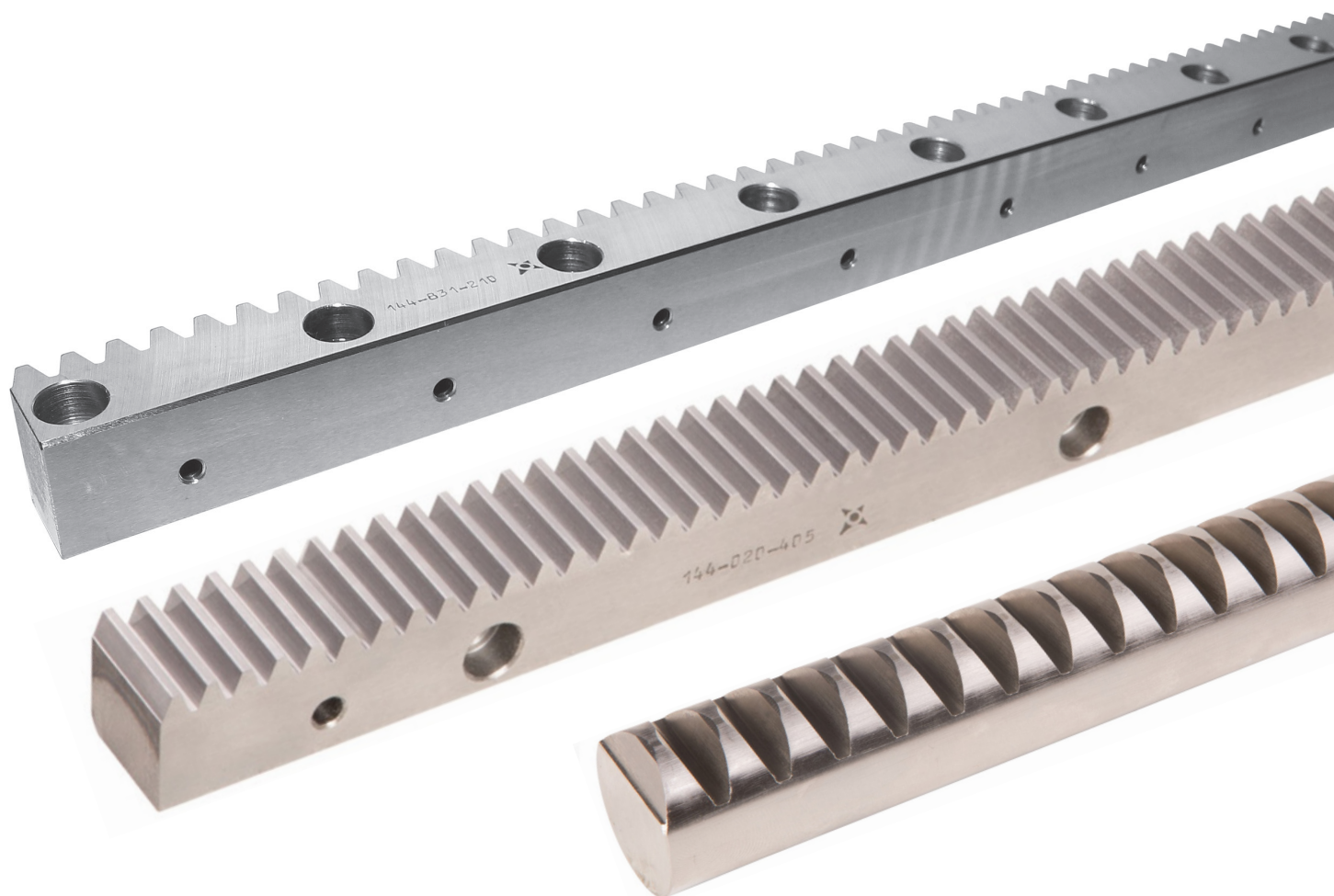


TEL: 01827 253 340
FAX: 01827 253 390

PLEASE SEE OUR LUBRICATION SYSTEMS CATALOGUE FOR MORE INFORMATION ON
OUR PROGRAMMABLE AUTOMATIC LUBRICATION PUMPS AND SUITABLE LUBRICANTS



Straight Racks



AS WELL AS OUR RANGE OF STANDARD PRODUCTS WE CAN ALSO MANUFACTURE SPECIAL COMPONENTS IN HOUSE – PLEASE CONTACT OUR SALES TEAM WITH YOUR REQUIREMENTS



Tooth Pitch Deviation

DIN 3962 Standard

Quality 6						
MOD	fp/300	Fp/300	fp/500	Fp/500	fp/1000	Fp/1000
1	7	25	8	28	8	32
2	7	25	8	28	8	32
3	7	28	8	32	8	36
4	9	28	9	36	10	40
5	9	28	9	36	10	40
6	9	28	9	36	10	40
8	10	32	11	36	11	40
10	10	32	11	36	11	40

Quality 7						
MOD	fp/300	Fp/300	fp/500	Fp/500	fp/1000	Fp/1000
1	10	32	11	40	12	45
2	10	32	11	40	12	45
3	10	36	11	45	12	50
4	12	40	12	45	14	56
5	12	40	12	45	14	56
6	12	40	12	45	14	56
8	14	45	14	56	16	63
10	14	45	14	56	16	63

Quality 8						
MOD	fp/300	Fp/300	fp/500	Fp/500	fp/1000	Fp/1000
1	14	50	16	56	16	63
2	14	50	16	56	16	63
3	14	50	16	63	16	71
4	16	56	18	71	20	80
5	16	56	18	71	20	80
6	16	56	18	71	20	80
8	20	63	20	71	22	80
10	20	63	20	71	22	80

Quality 9						
MOD	fp/300	Fp/300	fp/500	Fp/500	fp/1000	Fp/1000
1	20	63	22	80	22	90
2	20	63	22	80	22	90
3	20	71	22	90	22	100
4	25	80	25	90	28	110
5	25	80	25	90	28	110
6	25	80	25	90	28	110
8	28	90	28	100	32	110
10	28	90	28	100	32	110

Quality 10						
MOD	fp/300	Fp/300	fp/500	Fp/500	fp/1000	Fp/1000
1	32	110	36	125	36	140
2	32	110	36	125	36	140
3	32	125	36	140	36	160
4	40	125	40	140	45	180
5	40	125	40	140	45	180
6	40	125	40	140	45	180
8	45	140	45	160	50	180
10	45	140	45	160	50	180

Quality 12						
MOD	fp/300	Fp/300	fp/500	Fp/500	fp/1000	Fp/1000
1	80	280	90	320	90	360
2	80	280	90	320	90	360
3	80	320	90	360	100	400
4	100	320	100	360	110	450
5	100	320	100	360	110	450
6	100	320	100	360	110	450
8	110	360	125	400	125	450
10	110	360	125	400	125	405

fp = Maximum pitch error for one single tooth (µm)

Fp = Maximum Cumulative pitch error over length (µm)

QUALITY GRADES ONLY SHOWN FOR RACKS KEPT IN STOCK – FOR ERRORS OF OTHER QUALITIES, PLEASE REFER TO DIN 3962 STANDARD OR CONTACT OUR SALES TEAM FOR MORE INFORMATION



Application Guide

DIN Quality	1	2	3	4	5	6	7	8	9	10	11	12
Manufacturing Method							Punched, Pressed, Injection Moulded					
						Planed, Milled, Shaped						
					Shaved							
		Ground										
Circumferential Speed										< 3 m/s		
								3 – 6 m/s				
					6 – 20 m/s							
		> 20 m/s										
Typical Applications								Agricultural Machines				
							Lifting Devices, Conveyors, Office Machinery					
						Construction Machinery						
							Apparatus Construction					
					Machine Tool Manufacturing							
					Internal Combustion Engines							
				Turbines, Measuring Equipment								
		Testing Equipment										

Example of Tooth Quality Effect:

Tooth quality is an important factor when calculating gear drives. Apart from the benefits of improved accuracy, better tooth quality also increases the torque / power capacity of the system for the same given design parameters (i.e. same rack section dimensions, material and surface heat treatment).

The following example system shows the direct coloration between tooth quality and system power capacity:

Tooth Form : Straight Spur
Module Size : 4.0
Pinion Teeth : 25
Pinion Speed : 50 rpm
Material : C45 Steel
Tooth Finish : Ind. Hard
Lubrication : Grease

Tooth Quality	Max Power	Life (hours)
Q9	1.5 kW	20,000
Q8	2.0 kW	20,000
Q7	2.4 kW	20,000
Q6	3.0 kW	20,000

Alternatively, better tooth quality also increases the service life of the system for the same given design parameters (i.e. same rack section dimensions, material and surface heat treatment) and loadings.

The following example system shows the direct coloration between tooth quality and system service life:

Tooth Form : Straight Spur
Module Size : 4.0
Pinion Teeth : 25
Pinion Speed : 50 rpm
Material : C45 Steel
Tooth Finish : Ind. Hard
Lubrication : Grease

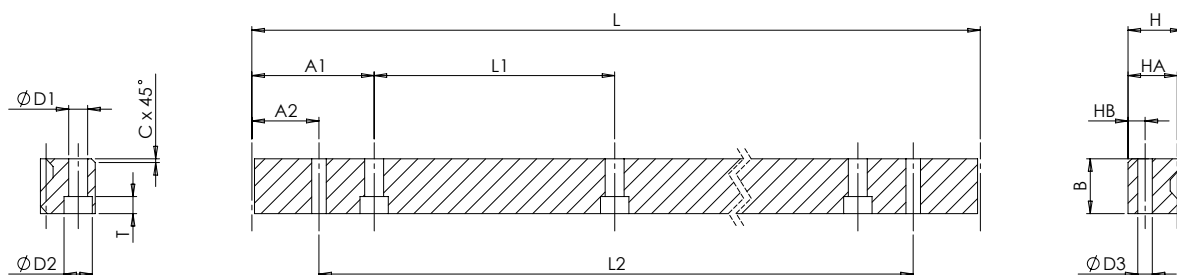
Tooth Quality	Max Power	Life (hours)
Q9	2.0 kW	15,000
Q8	2.0 kW	20,000
Q7	2.0 kW	24,000
Q6	2.0 kW	30,000



Precision Straight Racks

Ground Rear & Contact Surfaces – Ground Teeth

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q6 h23 **	Ind. Hard + Ground	C45 (1.0503)	50~55 HRC *



MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	L2	A1	A2	D1	D2	D3	C +0.5	T	Mass (kg)	Order Code
2	502.65	80	24	24	22	8	125.66	440.1	62.8	31.3	7	11	5.7	2	7	2.1	144-020-405
	1005.30	160						942.7								4.2	144-020-410
3	508.93	54	29	29	26	9	127.23	440.1	63.6	34.4	10	15	7.7	2	9	3.0	144-030-405
	1017.87	108						949.1								6.0	144-030-410
4	502.65	40	39	39	35	12	125.66	427.7	62.8	37.5	10	15	7.7	3	9	5.3	144-040-405
	1005.30	80						930.3								10.5	144-040-410
	2010.61	160						1935.6								21.0	144-040-420
5	502.65	32	49	39	34	12	125.66	442.4	62.8	30.1	14	20	11.7	3	13	6.7	144-050-405
	1005.30	64						945.0								13.4	144-050-410
	2010.61	128						1950.4								26.8	144-050-420
6	508.93	27	59	49	43	16	127.23	446.1	63.6	31.4	18	26	15.7	3	17	10.4	144-060-405
	1017.87	54						955.0								20.2	144-060-410
	2035.75	108						1973.0								40.4	144-060-420
8	502.65	20	79	79	71	25	125.66	449.5	62.8	26.6	22	33	19.7	3	21	22.4	144-080-405
	1005.30	40						952.0								44.8	144-080-410
	2010.61	80						1957.3								89.5	144-080-420
10	1005.30	32	99	99	89	32	125.66	754.0	62.8	125.7	33	48	19.7	3	32	68.7	144-100-410

* Module 1~3 teeth flanks & roots hardened. Module 4~10 only flanks hardened
 ** Racks with nominal length of 2000mm are finished to Q6 h24 tolerance

Un-Bored Order Code 144-XXX-3XX

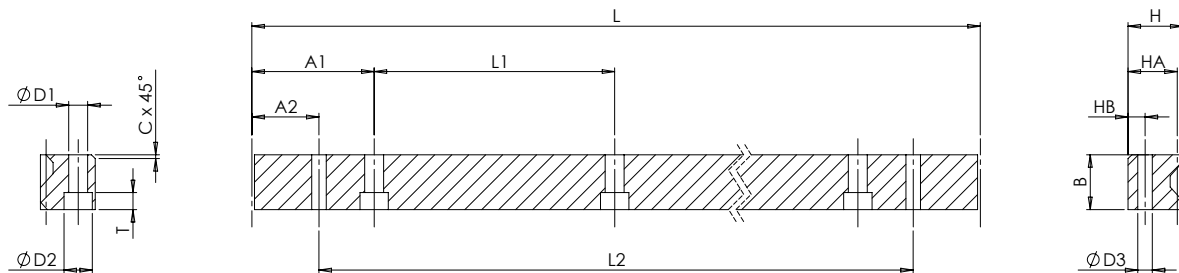
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
 WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Precision Straight Racks

Ground Rear & Contact Surfaces – Milled Teeth

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q10 h27	Ind. Hard + Milled	C45 (1.0503)	50~55 HRC *



MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	L2	A1	A2	D1	D2	D3	C +0.5	T	Mass (kg)	Order Code
2	502.65	80	24	24	22	8	125.66	440.1	62.8	31.3	7	11	5.7	2	7	2.1	144-020-805
	1005.30	160						942.7								4.2	144-020-810
	2010.61	320						1948.0								8.4	144-020-820
3	508.93	54	29	29	26	9	127.23	440.1	63.6	34.4	10	15	7.7	2	9	3.0	144-030-805
	1017.87	108						949.1								6.0	144-030-810
	2035.75	216						1967.0								12.0	144-030-820
4	502.65	40	39	39	35	12	125.66	427.7	62.8	37.5	10	15	7.7	3	9	5.3	144-040-805
	1005.30	80						930.3								10.5	144-040-810
	2010.61	160						1935.6								21.0	144-040-820
5	502.65	32	49	39	34	12	125.66	442.4	62.8	30.1	14	20	11.7	3	13	6.7	144-050-805
	1005.30	64						945.0								13.4	144-050-810
	2010.61	128						1950.4								26.8	144-050-820
6	508.93	27	59	49	43	16	127.23	446.1	63.6	31.4	18	26	15.7	3	17	10.4	144-060-805
	1017.87	54						955.0								20.2	144-060-810
	2035.75	108						1973.0								40.4	144-060-820

* Module 1~3 teeth flanks & roots hardened. Module 4~10 only flanks hardened

Un-Bored Order Code 144-XXX-9XX

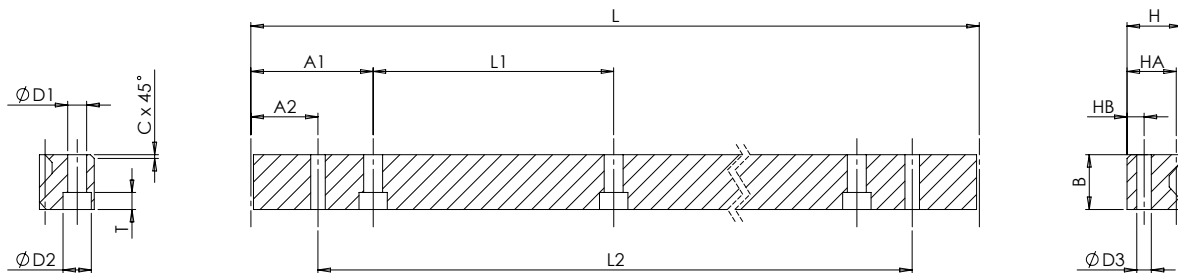
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Economy Straight Racks

Milled Rear & Contact Surfaces – Milled Teeth

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q9 h27	Milled	C45 (1.0503)	Soft



MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	L2	A1	A2	D1	D2	D3	C +0.5	T	Mass (kg)	Order Code *
1	499.51	159	10	9.80	8.80	-	-	-	-	-	-	-	-	-	-	0.4	146-010-905
	999.03	318						-								0.7	146-010-910
1.5	499.51	106	15	14.80	13.30	-	-	-	-	-	-	-	-	-	-	0.8	146-015-905
	999.03	212						-								1.6	146-015-910
	1998.05	424						-								3.1	146-015-920
	3015.93	636						-								4.6	146-015-930
2	502.65	80	20	19.75	17.75	8	125.66	440.1	62.8	31.3	7	11	5.7	-	7	1.4	146-020-805
	1005.31	160						942.7								2.8	146-020-810
	2010.62	320						1948.0								5.6	146-020-820
	3015.93	480						-								8.5	146-020-930
2.5	502.65	64	25	24.75	22.25	-	-	-	-	-	-	-	-	-	-	2.1	146-025-905
	1005.31	128						-								4.2	146-025-910
	2010.62	256						-								8.4	146-025-920
	3015.93	384						-								12.6	146-025-930
3	508.94	54	30	29.75	26.75	9	127.23	440.1	63.6	34.4	10	15	7.7	-	9	3.1	146-030-805
	1017.88	108						949.1								6.2	146-030-810
	2035.75	216						1967.0								12.4	146-030-820
	3053.63	324						-								19.3	146-030-930
4	502.65	40	40	39.70	35.70	12	125.66	427.7	62.8	37.5	10	15	7.7	-	9	5.5	146-040-805
	1005.31	80						930.3								11.0	146-040-810
	2010.62	160						1935.6								22.0	146-040-820
	3015.93	240						-								33.9	146-040-930
5	502.65	32	50	49.70	44.70	12	125.66	442.4	62.8	30.2	14	20	11.7	-	13	8.6	146-050-805
	1005.31	64						945.0								17.2	146-050-810
	2010.62	128						1950.4								34.4	146-050-820
	3015.93	192						-								51.6	146-050-930
6	508.94	27	60	59.65	53.65	16	127.23	446.1	63.6	31.4	18	26	15.7	-	17	12.3	146-060-805
	1017.88	54						955.0								24.5	146-060-810
	2035.75	108						1973.0								49.0	146-060-820
8	502.65	20	80	79.60	71.60	25	125.66	449.5	62.8	26.6	22	33	19.7	-	21	21.4	146-080-805
	1005.31	40						952.0								42.7	146-080-810
	2010.62	80						1957.3								85.4	146-080-820
10	1005.31	32	100	99.60	89.60	32	125.66	754.0	62.8	125.7	33	48	19.7	-	32	70.6	146-100-810

* Modules 1, 1.5 & 2.5 and all 3000mm racks not available pre-bored as standard

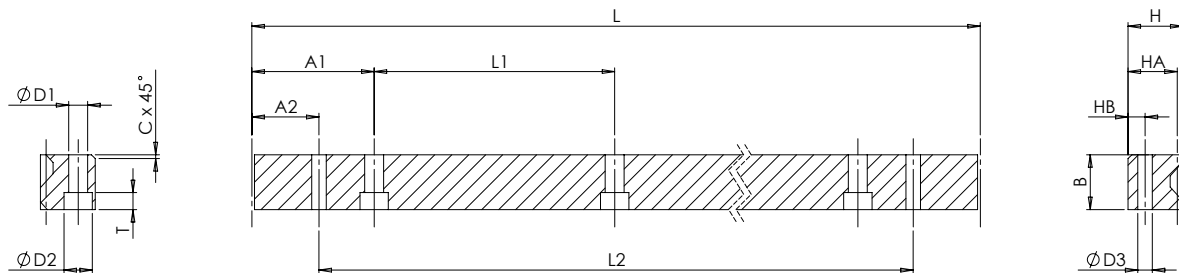
Un-Bored Order Code 146-XXX-9XX



Economy Straight Racks

Milled Rear & Contact Surfaces – Milled Teeth

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q10 h27	Ind. Hard + Milled	C45 (1.0503)	50~55 HRC **



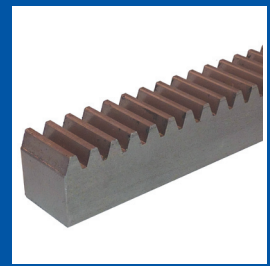
MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	L2	A1	A2	D1	D2	D3	C +0.5	T	Mass (kg)	Order Code *
1	499.51	159	10	9.80	8.80	-	-	-	-	-	-	-	-	-	-	0.4	146-010-305
	999.03	318						-								0.7	146-010-310
1.5	499.51	106	15	14.80	13.30	-	-	-	-	-	-	-	-	-	-	0.8	146-015-305
	999.03	212						-								1.6	146-015-310
	1998.05	424						-								3.1	146-015-320
2	502.65	80	20	19.75	17.75	8	125.66	440.1	62.8	31.3	7	11	5.7	-	7	1.4	146-020-705
	1005.31	160						942.7								2.8	146-020-710
	2010.62	320						1948.0								5.6	146-020-720
2.5	502.65	64	25	24.75	22.25	-	-	-	-	-	-	-	-	-	-	2.1	146-025-305
	1005.31	128						-								4.2	146-025-310
	2010.62	256						-								8.4	146-025-320
3	508.94	54	30	29.75	26.75	9	127.23	440.1	63.6	34.4	10	15	7.7	-	9	3.1	146-030-705
	1017.88	108						949.1								6.2	146-030-710
	2035.75	216						1967.0								12.4	146-030-720
4	502.65	40	40	39.70	35.70	12	125.66	427.7	62.8	37.5	10	15	7.7	-	9	5.5	146-040-705
	1005.31	80						930.3								11.0	146-040-710
	2010.62	160						1935.6								22.0	146-040-720
5	502.65	32	50	49.70	44.70	12	125.66	442.4	62.8	30.2	14	20	11.7	-	13	8.6	146-050-705
	1005.31	64						945.0								17.2	146-050-710
	2010.62	128						1950.4								34.4	146-050-720
6	508.94	27	60	59.65	53.65	16	127.23	446.1	63.6	31.4	18	26	15.7	-	17	12.3	146-060-705
	1017.88	54						955.0								24.5	146-060-710
	2035.75	108						1973.0								49.0	146-060-720
8	502.65	20	80	79.60	71.60	25	125.66	449.5	62.8	26.6	22	33	19.7	-	21	21.4	146-080-705
	1005.31	40						952.0								42.7	146-080-710
	2010.62	80						1957.3								85.4	146-080-720
10	1005.31	32	100	99.60	89.60	32	125.66	754.0	62.8	125.7	33	48	19.7	-	32	70.6	146-100-710

* Modules 1, 1.5 & 2.5 racks not available pre-bored as standard

** Module 1~3 teeth flanks & roots hardened. Module 4~10 only flanks hardened

Un-Bored Order Code 146-XXX-3XX

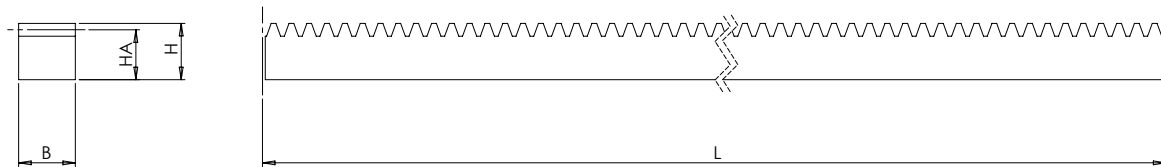
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Circular Pitch Straight Racks

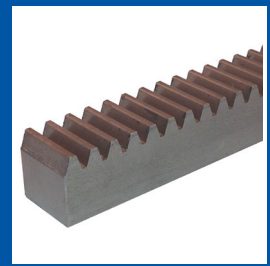
Milled Rear & Contact Surfaces

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q9 / Q10 h27	Milled	C45 (1.0503)	Soft / 50~55 HRC*



MOD	Pitch	Length (mm)	Tooth Number	B	H	HA (PCD)	Mass (kg)	Order Code	
								Q9 Soft	Q10 Hard
1.5916	5	500	100	15	14.8	13.21	0.8	146-016-905	146-016-305
		1000	200				1.6	146-016-910	146-016-310
		2000	400				3.1	146-016-920	146-016-320
3.1831	10	500	50	30	29.7	26.52	3.1	146-031-905	146-031-305
		1000	100				6.2	146-031-910	146-031-310
		2000	200				12.4	146-031-920	146-031-320

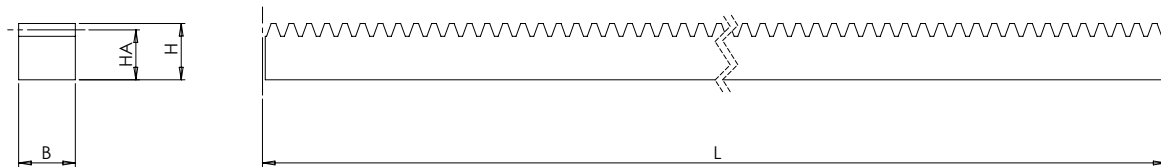
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Stainless Steel Straight Racks

Milled Rear & Contact Surfaces

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q8 h27	Milled	X8 CrNiS 18-9 (1.4305)	Soft



MOD	Pitch	Length (mm)	Tooth Number	B	H	HA (PCD)	Mass (kg)	Order Code
1	3.1416	499.51	159	10	9.80	8.80	0.3	146-010-605
		999.02	318				0.7	146-010-610
1.5	4.7124	499.51	106	15	14.80	13.30	0.8	146-015-605
		999.02	212				1.6	146-015-610
1.5916	5	250	50	15	14.80	13.21	0.4	146-016-602
		500	100				0.8	146-016-605
		1000	200				1.6	146-016-610
2	6.2832	502.65	80	20	19.75	17.75	1.4	146-020-605
		999.02	159				2.8	146-020-610
		1998.05	318				5.6	146-020-620
3	9.4248	499.51	53	30	29.75	16.75	3.1	146-030-605
		999.02	106				6.2	146-030-610
		1998.05	212				12.4	146-030-620
3.1831	10	250	25	30	29.70	26.52	1.6	146-031-602
		500	50				3.1	146-031-605
		1000	100				6.2	146-031-610
		2000	200				12.4	146-031-620
4	12.5664	1005.30	80	40	39.70	35.70	11.0	146-040-610
		1998.05	59				22.0	146-040-620

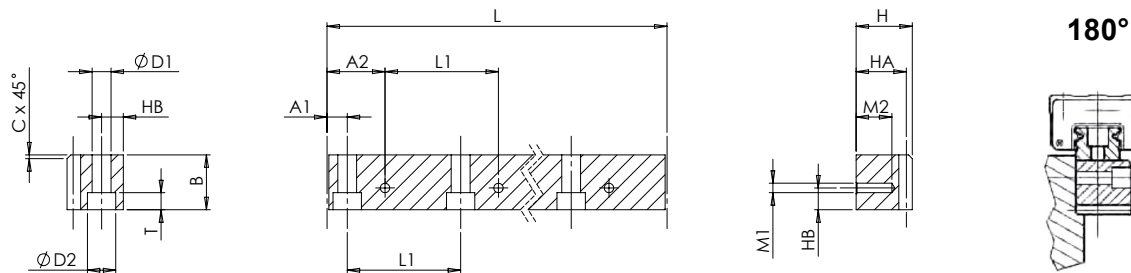
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



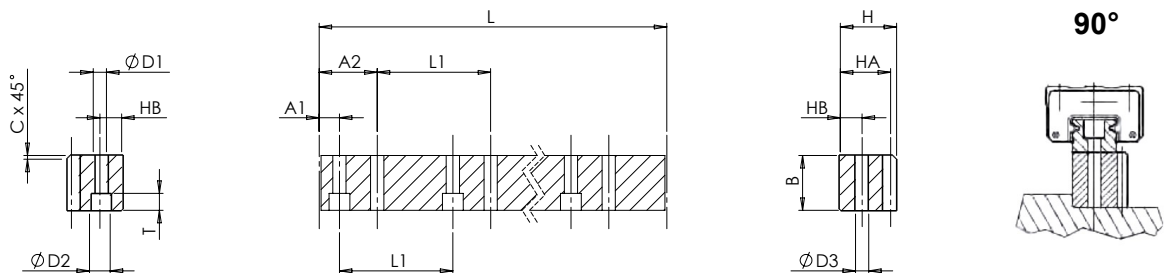
Precision Straight Racks

Ground Contact Surfaces – For Linear Guides

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q6 h23	Ind. Hard + Ground	C45 (1.0503)	50~55 HRC



MOD	Pitch (mm)	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	A1	A2	D1	D2	M1	M2	C +0.5	T	Mass (kg)	Order Code
1.591	5	960	192	19	19.5	17.91	7.5	60	10	30	5.8	10	M4	8	1	6	2.7	144-816-110
1.591	5	960	192	24	24.5	22.91	10	60	10	30	7	11	M5	11	1	7	4.2	144-816-210
3.183	10	960	96	29	29.75	26.57	11.5	60	10	30	10	15	M6	13.5	2	9	5.6	144-831-210



MOD	Pitch (mm)	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	A1	A2	D1	D2	D3	C +0.5	T	Mass (kg)	Order Code
1.591	5	960	192	19	19.5	17.91	7.5	60	10	30	4.5	7.5	4.5	1	5.3	2.7	144-916-110
1.591	5	960	192	24	24.5	22.91	10	60	10	30	6.0	9.5	6.0	1	8.5	4.2	144-916-210
3.183	10	960	96	29	29.75	26.57	11.5	60	10	30	7.0	11	7.0	2	9.0	5.6	144-931-210

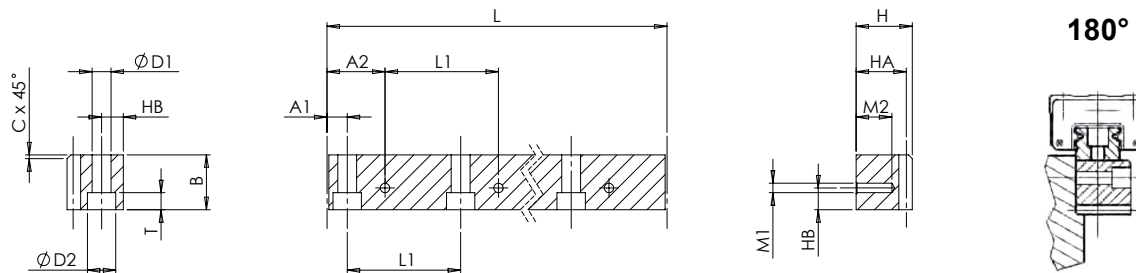
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



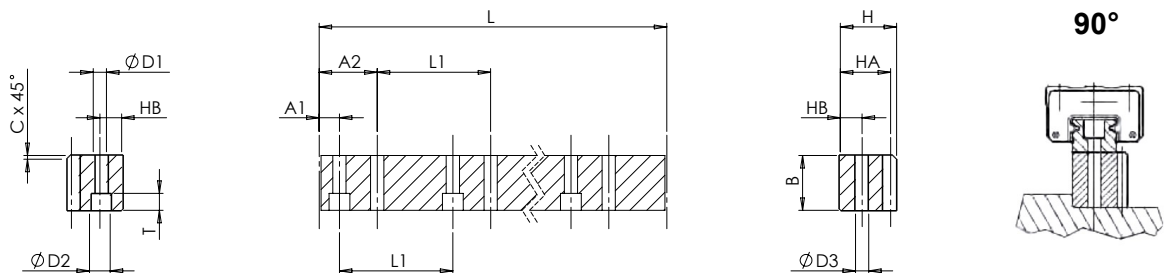
Economy Straight Racks

Milled Contact Surfaces – For Linear Guides

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q9 h27	Milled	C45 (1.0503)	Soft



MOD	Pitch (mm)	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	A1	A2	D1	D2	M1	M2	C +0.5	T	Mass (kg)	Order Code
1.591	5	1920	384	20	19.5	17.91	7.5	60	10	30	5.8	10	M4	8	-	6	5.4	146-816-120
1.591	5	1920	384	25	24.5	22.91	10	60	10	30	7	11	M5	11	-	7	8.4	146-816-220
3.183	10	1920	192	30	29.75	26.57	11.5	60	10	30	10	15	M6	13.5	-	9	11.2	146-831-220



MOD	Pitch (mm)	Length (mm)	Tooth Number	B	H	HA (PCD)	HB	L1	A1	A2	D1	D2	D3	C +0.5	T	Mass (kg)	Order Code
1.591	5	1920	384	20	19.5	17.91	7.5	60	10	30	4.5	7.5	4.5	-	5.3	5.4	146-916-120
1.591	5	1920	384	25	24.5	22.91	10	60	10	30	6.0	9.5	6.0	-	8.5	8.4	146-916-220
3.183	10	1920	192	30	29.75	26.57	11.5	60	10	30	7.0	11	7.0	-	9.0	11.2	146-931-220

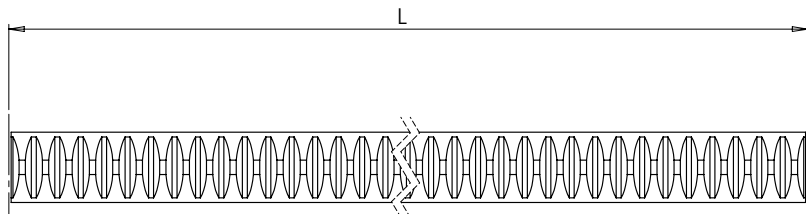
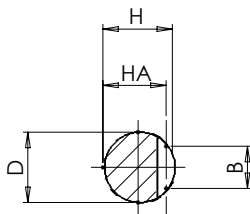
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Straight Round Racks

Standard C45 Steel

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q8 h27	Milled	C45 (1.0503)	Soft



MOD	Pitch (mm)	Length (mm)	Tooth Number	Ø D h11	H	HA (PCD)	B	Mass (kg)	Order Code
1	3.1416	499.51	159	15	15	14	7.5	0.7	141-610-050
		999.02	318					1.4	141-610-100
1.5	4.7124	499.51	106	17	17	15.5	9.6	0.9	141-615-050
		999.02	212					1.8	141-615-100
1.5916	5	500	100	15	14.8	13.2	9.7	0.9	141-616-050
		1000	200					1.8	141-616-100
2	6.2832	502.65	80	20	20	18	12	1.1	141-620-050
		999.02	159					2.2	141-620-100
2.5	7.8540	502.65	64	25	25	22.5	15	1.8	141-625-050
		997.45	127					3.6	141-625-100
3	9.4248	499.51	53	30	30	27	18	2.5	141-630-050
		999.02	106					5.1	141-630-100
3.1831	10	500	50	30	29.7	26.5	19.3	2.5	141-631-050
		1000	100					5.1	141-631-100
4	12.5664	502.65	40	40	40	36	24	4.5	141-640-050
		1005.30	80					9.1	141-640-100
5	15.7080	502.65	32	50	50	45	30	7.1	141-650-050
		1005.30	64					14.3	141-650-100
		2010.60	128					28.6	141-650-200

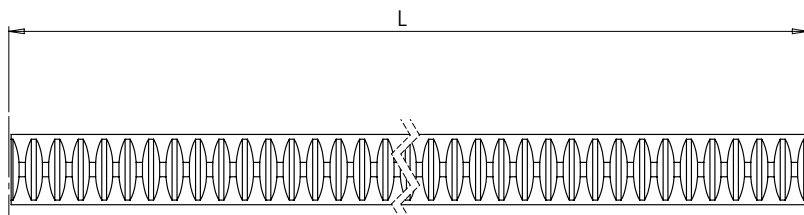
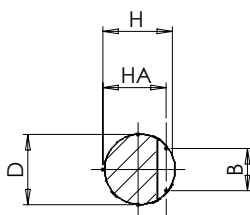
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Straight Round Racks

Stainless Steel & ETG®100 Alloy Steel

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q8 h27	Milled	Stainless / ETG®100	Soft



MOD	Length (mm)	Tooth Number	Ø D * h9 / h6*	H	HA (PCD)	B	Mass (kg)	Order Code	
								X8 CrNiS 18-9	ETG®100 **
1	499.51	159	10	10	9	6	0.7	141-510-050	141-410-050
	999.02	318					1.4	141-510-100	141-410-100
1.5	499.51	106	15	15	13.5	9	0.9	141-515-050	141-415-050
	999.02	212					1.8	141-515-100	141-415-100
2	502.65	80	20	20	18	12	1.1	141-520-050	141-420-050
	999.02	159					2.2	141-520-100	141-420-100
3	499.51	53	30	30	27	18	2.5	141-530-050	141-430-050
	999.02	106					5.1	141-530-100	141-430-100
	1998.05	212					10.2	-	141-430-200
4	502.65	40	40	40	36	24	4.5	-	141-440-050
	1005.30	80					9.1	-	141-440-100
	2010.62	160					18.2	-	141-440-200

* Stainless Steel (1.4305) = h9, ETG®100 = h6 ground bar diameter

** ETG®100 high quality alloy steel has 960-1100 N/mm² tensile strength

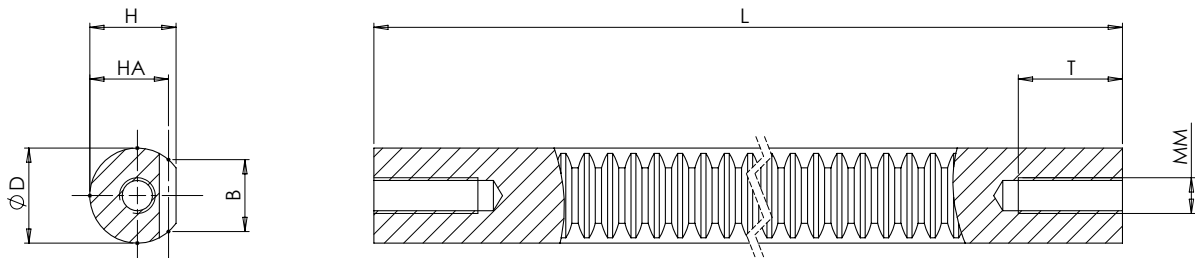
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Rack Jack Round Racks

With Straight Teeth

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q8 h27	Milled	ETG®100 *	Soft



MOD	Suits Rack Jack Size	Pitch (mm)	Length (mm)**	Tooth Number	Ø D h6	H	HA (PCD)	B	M	T	Mass (kg)	Order Code
1.0	R1	3.1416	2900	923	25	22.5	21.5	15.0	M10	30	10.2	141-210-529
2.5	R2	7.8540	2900	369	32	29.0	26.5	18.6	M12	35	16.0	141-325-229
2.5	R3	7.8540	2900	369	60	52.0	49.5	40.8	M20	50	55.4	141-625-029

* ETG®100 high quality alloy steel has 960-1100 N/mm² tensile strength

** Maximum available rack length / number of teeth
(Shorter lengths available upon request)

Our rack jacks feature specially made round type racks. They have increased section diameter and tooth width over standard round racks as well as squared-off tooth profiles to prevent rotation within the jack body. The racks are also made from high tensile ETG®100 alloy steel to increase the capacity of the jacks.

Rack jacks require protection against side and transverse loads as they can only transfer tensile and compressive forces.

This support is usually achieved via the use of linear guides or ball bushes running parallel with the rack travel.

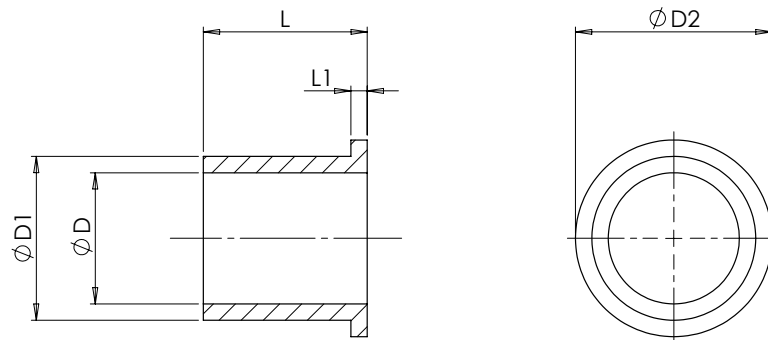
Please contact our sales team for information on the options available from stock.

BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Round Rack Bushes

Oil Impregnated Bronze With Added MoS2

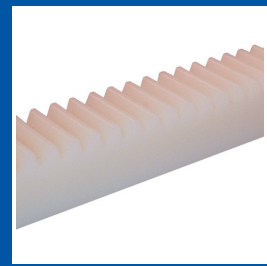


Suits Round Rack MOD *	ØD E7**	ØD1 r7	ØD2	L	L1	Mass (kg)	Order Code
1.0	10	16	22	16	3	0.02	141-010-000
1.0 / 1.5 / 1.5916	15	21	26	16	3	0.03	141-015-000
2.0	20	26	32	25	3	0.04	141-020-000
3.0 / 3.1416	30	38	46	30	4	0.12	141-030-000
4.0	40	50	60	50	5	0.27	141-040-000
5.0	50	60	70	63	5	0.60	141-050-000

* Bushes are not intended for use with rack jack specific round racks
Please note bar diameter on 1.0 & 1.5 module C45 round racks

** Internal bore tolerance on Ø50mm bush is E8

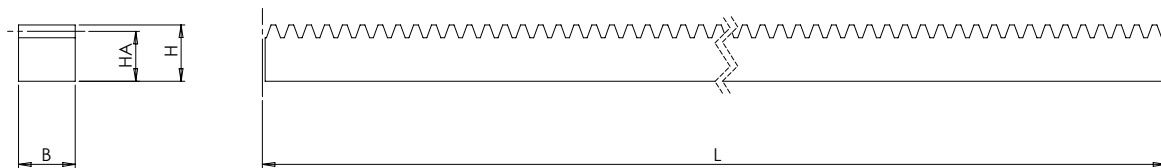
OIL IMPREGNATED BRONZE BUSHES WITH ADDED MOS2
THEREFORE PRACTICALLY MAINTENANCE FREE OPERATION



Synthetic Racks

With Straight Teeth

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q10 h27	Milled	Nylon P6	Soft

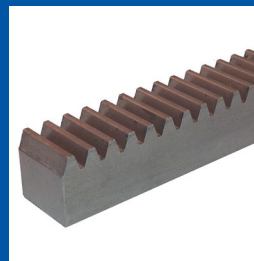


MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	Mass (kg)	Order Code
1	251.32	80	10	10	9	0.03	148-010-602
	499.51	159				0.05	148-010-605
	999.02	318	15	15	14	0.30	148-010-610
1.5	249.75	53	15	15	13.5	0.06	148-015-602
	499.51	106				0.11	148-015-605
	999.02	212	17	17	15.5	0.36	148-015-610
2	251.32	40	20	20	18	0.13	148-020-602
	502.65	80				0.20	148-020-605
	997.45	159				0.40	148-020-610
2.5	254.46	32	25	25	22.5	0.15	148-025-602
	502.65	64				0.31	148-025-605
	997.45	127				0.61	148-025-610
3	254.46	27	30	30	27	0.20	148-030-602
	499.51	53				0.40	148-030-605
	999.02	106				0.80	148-030-610

WE CAN ALSO OFFER A LARGE RANGE OF INJECTION MOULDED SYNTHETIC RACKS INCLUDING MODULES 0.5, 0.7 & 1.25 ON REQUEST

WE CAN PRODUCE ALMOST ANY RACK TO ANY SPECIFICATION ON REQUEST
PLEASE CONTACT OUR SALES TEAM WITH YOUR REQUIREMENTS

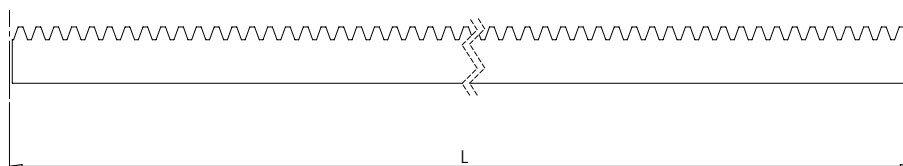
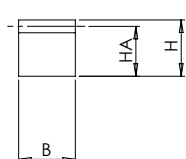
BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW CONTINUOUS MOUNTING.



Commercial Straight Racks

For Low Speed Applications

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q12 +	Milled	C45 (1.0503)	Soft



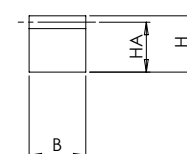
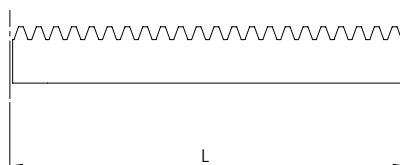
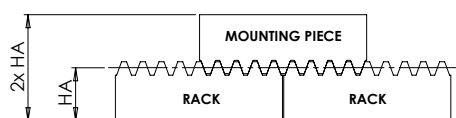
MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	Mass (kg)	Order Code
1	499.51	159	15	15	14	0.8	147-010-005
	1002.17	319				1.6	147-010-010
	2001.19	637				3.3	147-010-020
1.5	504.23	107	17	17	15.5	1.0	147-015-005
	1003.74	213				2.0	147-015-010
	2002.77	425				4.1	147-015-020
2	502.65	80	20	20	18	1.4	147-020-005
	1005.31	160				2.8	147-020-010
	2004.34	319				5.6	147-020-020
2.5	502.65	64	25	25	22.5	2.2	147-025-005
	1005.31	128				4.4	147-025-010
	2002.77	255				8.8	147-025-020
3	508.94	54	30	30	27	3.2	147-030-005
	1008.45	107				6.3	147-030-010
	2007.48	213				12.6	147-030-020
4	502.65	40	40	40	36	5.6	147-040-005
	1005.31	80				11.2	147-040-010
	2010.62	160				22.4	147-040-020
5	502.65	32	50	50	45	8.8	147-050-005
	1005.31	64				17.5	147-050-010
	2010.62	128				35.0	147-050-020
6	1017.88	54	60	60	54	25.2	147-060-010
	2016.90	107				50.4	147-060-020
8	1005.31	40	80	80	72	44.0	147-080-010
	2010.62	80				89.0	147-080-020

BOTH ENDS OF EACH RACK ARE MACHINED TO ALLOW FOR CONTINUOUS MOUNTING
CALCULATIONS N/A FOR COMMERCIAL RACKS – NOT RECOMMENDED FOR DYNAMIC APPLICATIONS



Straight Mounting Pieces

Helix Angle	Pressure Angle	Tooth Quality	Tooth Finish	Material	Hardness
STRAIGHT 0°	20°	Q5 / Q8	Milled / Ground	C45 (1.0503)	Soft



MOD	Length (mm)	Tooth Number	B	H	HA (PCD)	Mass (kg)	Order Code	
							Q5 Ground	Q8 Milled
1	200	63	10	9.8	8.8	0.2	-	144-010-001
1.5	200	42	15	14.8	13.3	0.4	-	144-015-001
1.5916	200	40	15	14.8	13.21	0.4	-	144-016-001
2	200	31	24	24	22	0.9	144-020-002	-
			25	24.75	22.75	0.9	-	144-020-001
2.5	200	25	-	-	-	-	-	-
			25	24.75	22.25	0.9	-	144-025-001
3	200	21	29	29	26	1.2	144-030-002	-
			30	29.75	26.75	1.3	-	144-030-001
3.1831	200	20	-	-	-	-	-	-
			30	29.7	26.52	1.3	-	144-031-001
4	200	16	39	39	35	2.2	144-040-002	-
			40	39.7	35.7	2.2	-	144-040-001
5	200	12	49	39	34	2.6	144-050-002	-
			50	39.7	34.7	2.7	-	144-050-001
6	200	10	59	49	43	3.6	144-060-002	-
			60	49.7	43.7	4.0	-	144-060-001
8	200	8	79	79	71	8.5	144-080-002	-
			80	79.6	71.6	9.0	-	144-080-001
10	220	7	99	99	89	13.7	144-100-002	-
			100	99.0	89.0	13.4	-	144-100-001

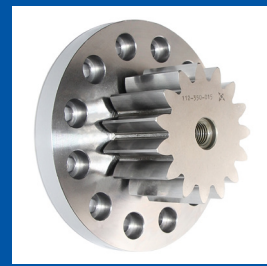
WE RECOMMEND THE USE OF A MOUNTING PIECE AND GREASE OR OIL LUBRICATION



Straight Pinions

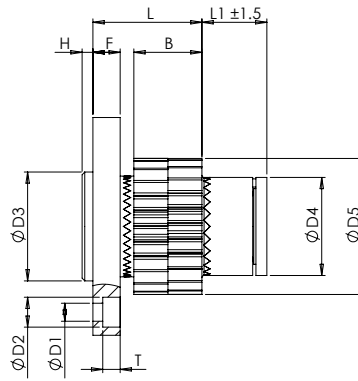
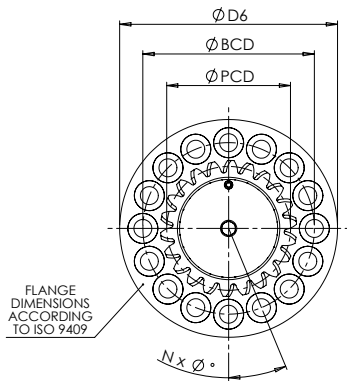


AS WELL AS OUR RANGE OF STANDARD PRODUCTS WE CAN ALSO MANUFACTURE SPECIAL COMPONENTS IN HOUSE – PLEASE CONTACT OUR SALES TEAM WITH YOUR REQUIREMENTS



Straight Double Pinions

For Anti-Backlash Applications



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q6 e25
Tooth Finish	Case Hard + Ground
Material	16MnCr5 (1.7131)
Hardness	58~62 HRC

Only one half of the double pinion transmits power at any given time hence all calculations should be based on half of the face width (B)

MOD	Tooth Number	X *	B	BCD	PCD	D1	D2	D3	D4	D5	D6	F	H	L	L1**	T	N x Ø °	Order Code
2	22	0.500	25	63	46	6.6	11	40	36	50	80	10	4	40	23	6.4	16 x 22.5	113-020-122
3	15	0.167	30	63	46	6.6	11	40	36	52	80	10	4	45	23	6.4	16 x 22.5	113-030-115
4	14	0.250	40	80	58	9	15	50	45	66	100	13	6	58	38	8.6	12 x 30	113-040-114
5	15	0.500	50	125	80	11	18	80	65	90	160	20	6	75	38	10.6	12 x 30	113-050-115

* X = Addendum modification factor

** Dimension L1 can vary due to the nature of the preload adjustment mechanism

MOD	Tooth Number	X *	B	Max Torque (Nm) ***		Resultant Speed (rpm) Based on 2.5 m/s Travel	Order Code
				Without Preload	With Max. Preload		
2	22	0.500	25	92	46	1061	113-020-122
3	15	0.167	30	109	55	1061	113-030-115
4	14	0.250	40	237	119	853	113-040-114
5	15	0.500	50	623	312	637	113-050-115

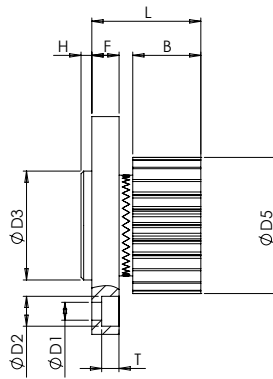
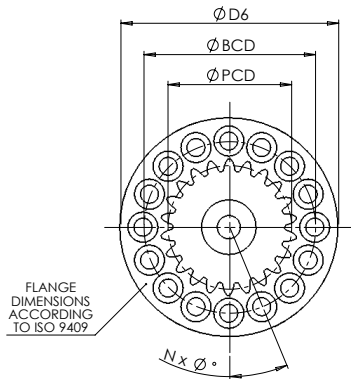
* X = Addendum modification factor

*** Stated values based on 20,000 hours service life with continuous grease lubrication

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST



Straight Flange Pinions



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q6 e25
Tooth Finish	Case Hard + Ground
Material	16MnCr5 (1.7131)
Hardness	58~62 HRC

MOD	Tooth Number	X *	B	BCD	PCD	D1	D2	D3	D5	D6	F	H	L	T	N x Ø °	Order Code
2	22	0.500	25	63	46	6.6	11	40	50	80	10	4	40	6.4	16 x 22.5	112-120-022
3	15	0.167	30		46				52				45			112-130-015
3	19	0.500	30	80	60	9	15	50	66	100	13	6	58	8.6	12 x 30	112-230-019
4	14	0.250	40		58								58			112-240-014
4	20	0.250	40	125	82	11	18	80	90	160	20	6	65	10.6	12 x 30	112-340-020
5	15	0.500	50		80								75			112-350-015

* X = Addendum modification factor

WE CAN PRODUCE CUSTOM FLANGE PINIONS AS WELL AS OUR STANDARD RANGE

MODULE & NUMBER OF TEETH CAN BE ADJUSTED TO CUSTOMER SPECIFICATION

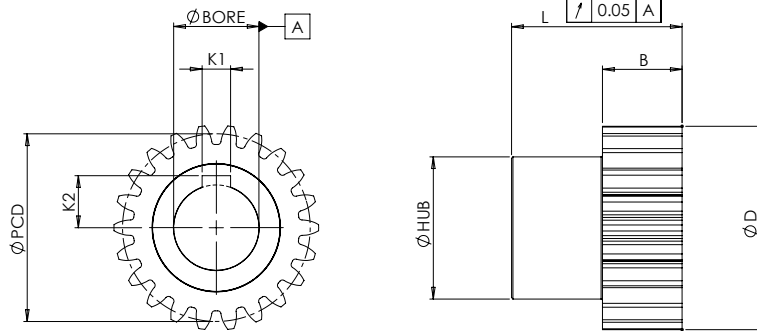
PLEASE CONTACT OUR SALES TEAM WITH YOUR REQUIREMENTS

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR
ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST



Precision Straight Pinions

Case Hardened – With Hub



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q7 e25
Tooth Finish	Case Hard + Ground
Material	16MnCr5 (1.7131)
Hardness	58~62 HRC

Case hardened gears are supplied with bore and key size specified below and cannot be modified

Keyway aligned with tooth root within +/- 0.5mm

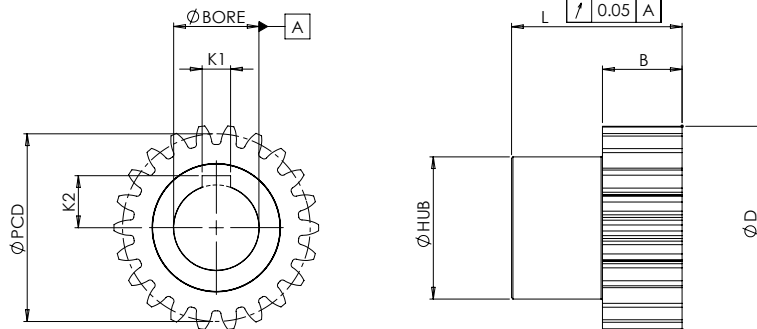
MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H6	HUB Ø h8	Length (L)	K1	K2	Order Code
2	28	20	40	44	19	30	56	6	12.3	115-120-920
					22	36	56	6	13.8	115-220-220
		22	44	48	19	30	56	6	12.3	115-120-922
					22	36	56	6	13.8	115-220-222
		25	50	54	16	30	54	5	10.3	115-120-625
					19	30	56	6	12.3	115-120-925
					22	36	56	6	13.8	115-220-225
		28	56	60	19	30	56	6	12.3	115-120-928
					30	50	60	8	18.3	115-320-028
					16	30	54	5	10.3	115-120-632
		32	64	68	22	36	56	6	13.8	115-220-232
					30	50	60	8	18.3	115-320-032
					32	55	65	10	19.3	115-320-232
		36	72	76	40	62	65	12	23.3	115-420-036
					32	55	65	10	19.3	115-320-240
		40	80	84	40	62	65	12	23.3	115-420-040
					45	68	65	14	26.3	114-420-540
					45	68	65	14	26.3	115-420-550
3	28	22	66	72	22	36	56	6	13.8	115-230-222
					25	44	60	8	15.8	115-230-522
					30	50	60	8	18.3	115-330-022
					32	55	65	10	19.3	115-330-232
					35	55	65	10	20.8	115-330-522
					40	62	65	12	23.3	115-430-022
		25	75	81	32	55	65	10	19.3	115-330-225
					40	62	65	12	23.3	115-430-025

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST



Precision Straight Pinions

Case Hardened – With Hub



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q7 e25
Tooth Finish	Case Hard + Ground
Material	16MnCr5 (1.7131)
Hardness	58~62 HRC

Case hardened gears are supplied with bore and key size specified below and cannot be modified

Keyway aligned with tooth root within +/- 0.5mm

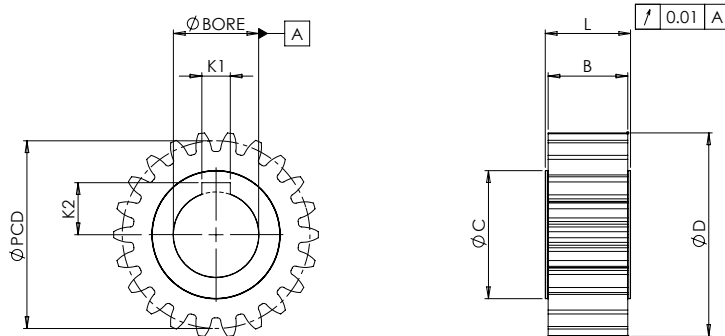
MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H6	HUB Ø h8	Length (L)	K1	K2	Order Code
3	28	28	84	90	22	36	56	6	13.8	115-230-228
					25	44	60	8	15.8	115-230-528
					30	50	60	8	18.3	115-330-028
					32	55	65	10	19.3	115-330-228
					35	55	65	10	20.8	115-330-528
					40	62	65	12	23.3	115-430-028
					45	68	65	14	26.3	115-430-528
		32	96	102	32	55	65	10	19.3	115-330-232
					40	62	65	12	23.3	115-430-032
		36	108	114	45	68	65	14	26.3	115-430-536
4	40	20	80	88	32	55	75	10	19.3	115-340-220
					35	55	75	10	20.8	115-340-520
					40	62	75	12	23.3	115-440-020
		22	88	96	45	68	75	14	26.3	115-440-522
					32	55	75	10	19.3	115-340-225
					35	55	75	10	20.8	115-340-525
					40	62	75	12	23.3	115-440-025
		25	100	108	55	80	80	16	31.8	115-540-525
					45	68	75	14	26.3	115-440-528
					55	80	80	16	31.8	115-540-532
		28	112	120	45	68	75	14	26.3	115-440-528
		32	128	136	75	110	100	20	42.9	115-740-532
					75	110	100	20	42.9	115-740-540
		40	160	168	75	110	100	20	42.9	115-740-540

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST



Precision Straight Pinions

Case Hardened – Without Hub



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q7 e25
Tooth Finish	Case Hard + Ground
Material	16MnCr5 (1.7131)
Hardness	58~62 HRC

Case hardened gears are supplied with bore and key size specified below and cannot be modified

Keyway aligned with tooth root within +/- 0.5mm

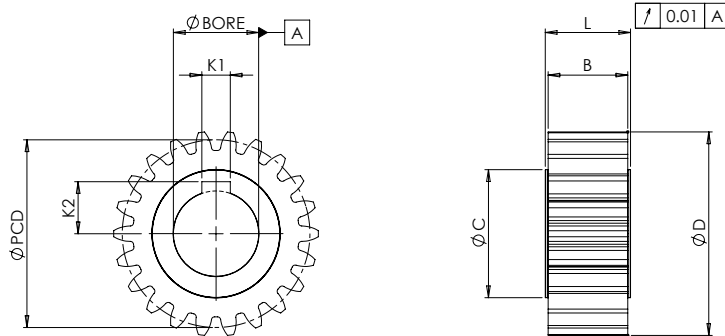
MOD	Face Width (B)	Length (L)	Tooth Number	PCD	Ø D	BORE Ø H6	Ø C	K1	K2	Order Code
2	28	30	16	32	36	15	25	5	9.8	113-120-516
			18	36	40	20	25	6	12.8	113-220-018
			20	40	44	20	30	6	12.8	113-220-020
			22	44	48	15	25	5	9.8	113-120-522
						20	30	6	12.8	113-220-022
						25	36	8	15.8	113-220-522
			25	50	54	20	30	6	12.8	113-220-025
						25	36	8	15.8	113-220-525
						30	45	8	18.3	113-320-025
			28	56	60	20	30	6	12.8	113-220-028
						25	36	8	15.8	113-220-528
						30	45	8	18.3	113-320-028
						35	48	10	20.8	113-320-528
			32	64	68	20	30	6	12.8	113-220-032
						25	36	8	15.8	113-220-532
						30	45	8	18.3	113-320-032
						35	48	10	20.8	113-320-532
			36	72	76	25	36	8	15.8	113-220-536
						30	45	8	18.3	113-320-036
						35	48	10	20.8	113-320-536
						45	58	14	26.3	113-420-536
			40	80	84	25	36	8	15.8	113-220-540
						30	45	8	18.3	113-320-040
						35	48	10	20.8	113-320-540
						45	58	14	26.3	113-420-540
			45	90	94	35	48	10	20.8	113-320-545
						45	58	14	26.3	113-420-545
			50	100	104	35	48	10	20.8	113-320-550
						45	58	14	26.3	113-420-550

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST



Precision Straight Pinions

Case Hardened – Without Hub



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q7 e25
Tooth Finish	Case Hard + Ground
Material	16MnCr5 (1.7131)
Hardness	58~62 HRC

Case hardened gears are supplied with bore and key size specified below and cannot be modified

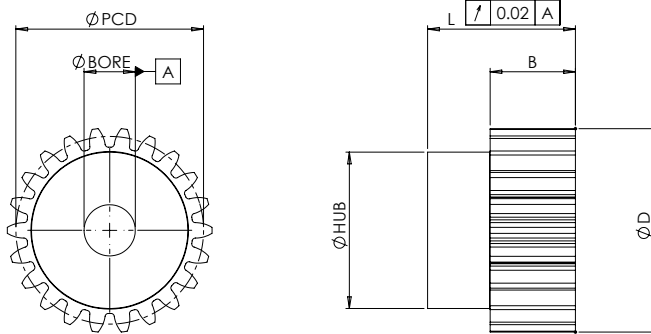
Keyway aligned with tooth root within +/- 0.5mm

MOD	Face Width (B)	Length (L)	Tooth Number	PCD	Ø D	BORE Ø H6	Ø C	K1	K2	Order Code
3	28	30	18	54	60	25	36	8	15.8	113-230-518
			20	60	66	25	36	8	15.8	113-230-520
						30	45	8	18.3	113-330-020
						35	48	10	20.8	113-330-520
			22	66	72	25	36	8	15.8	113-230-522
						30	45	8	18.3	113-330-022
						35	48	10	20.8	113-330-522
			25	75	81	25	36	8	15.8	113-230-525
						30	45	8	18.3	113-330-025
						35	48	10	20.8	113-330-525
						45	58	14	26.3	113-430-525
			28	84	90	25	36	8	15.8	113-230-528
						30	45	8	18.3	113-330-028
						35	48	10	20.8	113-330-528
						45	58	14	26.3	113-430-528
			32	96	102	25	36	8	15.8	113-230-532
						30	45	8	18.3	113-330-032
						35	48	10	20.8	113-330-532
						45	58	14	26.3	113-430-532
			36	108	114	35	48	10	20.8	113-330-536
						45	58	14	26.3	113-430-536
			40	120	126	35	48	10	20.8	113-330-540
						45	58	14	26.3	113-430-540
4	40	50	20	80	88	35	52	10	20.8	113-340-520
						45	65	14	26.3	113-440-520
			22	88	96	35	52	10	20.8	113-340-522
						45	65	14	26.3	113-440-522
			25	100	108	35	52	10	20.8	113-340-525
						45	65	14	26.3	113-440-525
			28	112	120	35	52	10	20.8	113-340-528
						45	65	14	26.3	113-440-528
			32	128	136	35	52	10	20.8	113-340-532
						45	65	14	26.3	113-440-532
			40	160	168	45	65	14	26.3	113-440-540
						60	80	18	34.3	113-640-040



Precision Straight Pinions

Induction Hardened & Ground Teeth Only



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q6 e25
Tooth Finish	Ind. Hard + Ground
Material	16MnCr5 (1.7131)
Hardness	60 HRC

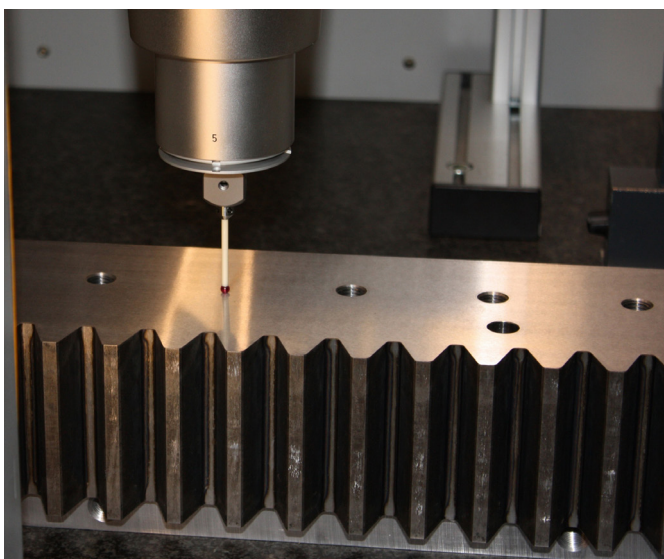
Induction hardened gears have soft cores and so can be reworked in-house on request

MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code
2	25	18	36	40	18	30	47	117-020-018
		20	40	44	18	30	47	117-020-020
		22	44	48	18	36	47	117-020-022
		25	50	54	18	44	53	117-020-025
		28	56	60	18	50	53	117-020-028
		30	60	64	24	54	53	117-020-030
		32	64	68	24	55	53	117-020-032
		36	72	76	24	65	53	117-020-036
3	30	40	80	84	24	68	53	117-020-040
		18	54	60	24	45	52	117-030-018
		20	60	66	24	48	52	117-030-020
		22	66	72	24	55	52	117-030-022
		25	75	81	24	62	58	117-030-025
		28	84	90	24	68	58	117-030-028
		30	90	96	24	68	58	117-030-030
		32	96	102	24	68	58	117-030-032
4	40	36	108	114	24	68	58	117-030-036
		18	72	80	24	62	73	117-040-018
		20	80	88	24	62	73	117-040-020
		22	88	96	24	68	73	117-040-022
		25	100	108	24	80	74	117-040-025
		28	112	120	24	80	74	117-040-028
		30	120	128	30	80	74	117-040-030
		32	128	136	30	110	74	117-040-032
5	50	36	144	152	30	110	74	117-040-036
		22	110	120	24	90	91	117-050-022
		25	125	135	24	110	101	117-050-025
		28	140	150	24	110	101	117-050-028
		30	150	160	30	110	101	117-050-030
		32	160	170	30	110	101	117-050-032
6	60	36	180	190	30	110	101	117-050-036
		20	120	132	30	100	140	117-060-020
		25	150	162	30	130	140	117-060-025
		28	168	180	30	130	140	117-060-028
		30	180	192	30	140	140	117-060-030

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Special Manufacture Pinions



SUPPLIER OF HIGH QUALITY RACKS & PINIONS WITH A COMPREHENSIVE RANGE CATERING TO ALL NEEDS WITH 3D MILLING EQUIPMENT THAT CAN PRODUCE PINIONS UP TO 3M IN DIAMETER

AT OUR FACILITY IN TAMWORTH, STAFFORDSHIRE WE HAVE THE MACHINERY AND INDUSTRY EXPERTISE TO MODIFY ANY OF OUR STANDARD RACK & PINIONS IN-HOUSE

WE ALSO HAVE THE CAPABILITY TO PRODUCE ALMOST ANY PINION IMAGINABLE BE IT CORRECTED TOOTH GEOMETRY, EXOTIC MATERIALS AND EVEN HERRINGBONE TEETH

STANDARD RACKS ARE RIGHT HANDED AND ALL STANDARD PINIONS ARE LEFT HANDED BUT WE CAN PRODUCE LEFT HANDED RACKS AND RIGHT HANDED PINIONS ON REQUEST

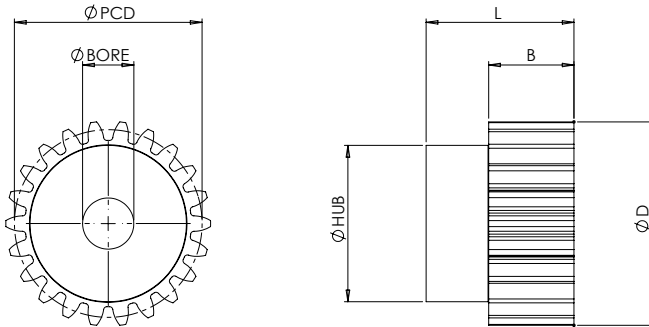
CONTACT OUR SALES TEAM WITH YOUR REQUIREMENTS AND WE WILL BE HAPPY TO HELP





Economy Straight Pinions

Standard Pinions – For General Purpose



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q9 / Q10 e27
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft / 60 HRC

Induction hardened gears have soft cores and so can be reworked in-house on request

MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code	
								Q9 Soft	Q10 Ind. Hard
1	8	12	12	14	4	9	18	111-010-012	-
		13	13	15	4	10	18	111-010-013	-
		14	14	16	4	12	18	111-010-014	-
		15	15	17	5	12	18	111-010-015	111-010-415
		16	16	18	5	12	18	111-010-016	-
		17	17	19	6	14	18	111-010-017	-
		18	18	20	6	15	18	111-010-018	-
		19	19	21	6	15	18	111-010-019	-
		20	20	22	6	15	18	111-010-020	111-010-420
		21	21	23	6	18	18	111-010-021	-
		22	22	24	6	18	18	111-010-022	-
		23	23	25	6	18	18	111-010-023	-
		24	24	26	6	18	18	111-010-024	-
		25	25	27	6	18	18	111-010-025	111-010-425
		28	28	30	8	20	18	111-010-028	-
		30	30	32	8	20	18	111-010-030	111-010-430
		36	36	38	8	25	18	111-010-036	-
		38	38	40	8	25	18	111-010-038	-
		40	40	42	8	25	18	111-010-040	111-010-440
		45	45	47	8	30	18	111-010-045	-
		48	48	50	8	30	18	111-010-048	-
		50	50	52	8	35	18	111-010-050	-
		52	52	54	10	35	18	111-010-052	-
		56	56	58	10	35	18	111-010-056	-
		60	60	62	10	40	18	111-010-060	111-010-460
		76	76	78	10	-	-	110-010-076	-
		80	80	82	10	-	-	110-010-080	-
		95	95	97	10	-	-	110-010-095	-
		120	120	122	10	-	-	110-010-120	-

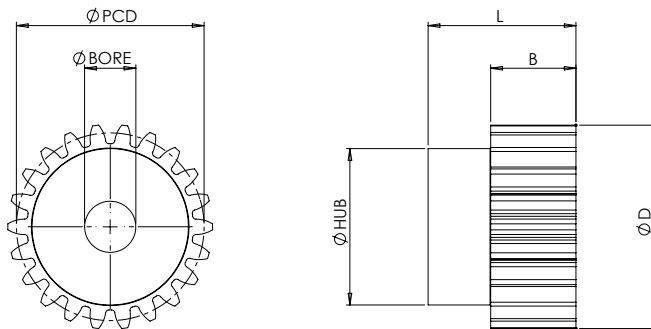
WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Economy Straight Pinions

Standard Pinions – For General Purpose



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q9 / Q10 e27
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft / 60 HRC

Induction hardened gears have soft cores and so can be reworked in-house on request

MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code	
								Q9 Soft	Q10 Ind. Hard
1.5	12	12	18	21	6	14	25	111-015-012	-
		13	19.5	22.5	6	15	25	111-015-013	-
		14	21	24	6	16.5	25	111-015-014	-
		15	22.5	25.5	6	18	25	111-015-015	111-015-415
		16	24	27	6	18	25	111-015-016	-
		17	25.5	28.5	6	20	25	111-015-017	-
		18	27	30	8	20	25	111-015-018	-
		19	28.5	31.5	8	20	25	111-015-019	-
		20	30	33	8	20	25	111-015-020	111-015-420
		21	31.5	34.5	8	25	25	111-015-021	-
		22	33	36	8	25	25	111-015-022	-
		23	34.5	37.5	8	25	25	111-015-023	-
		24	36	39	8	25	25	111-015-024	-
		25	37.5	40.5	8	25	25	111-015-025	111-015-425
		28	42	45	10	30	25	111-015-028	-
		30	45	48	10	30	25	111-015-030	111-015-430
		36	54	57	10	40	25	111-015-036	-
		38	57	60	10	40	25	111-015-038	-
		40	60	63	10	40	25	111-015-040	111-015-440
		45	67.5	70.5	10	45	25	111-015-045	-
		48	72	75	10	45	25	111-015-048	-
		50	75	78	12	50	25	111-015-050	-
		52	78	81	12	50	25	111-015-052	-
		56	84	87	12	50	25	111-015-056	-
		60	90	93	12	60	25	111-015-060	111-015-460
		76	114	117	16	-	-	110-015-076	-
		80	120	123	16	-	-	110-015-080	-
		95	142.5	145.5	16	-	-	110-015-095	-
		120	180	183	16	-	-	110-015-120	-

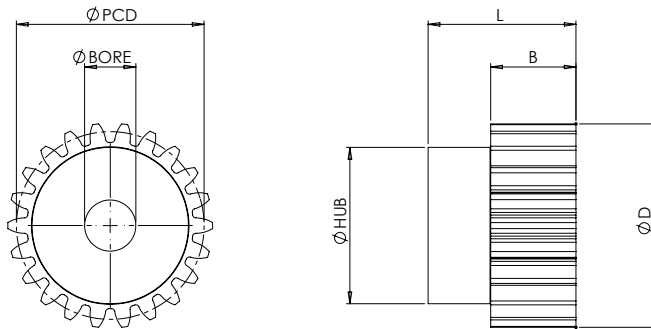
WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Economy Straight Pinions

Standard Pinions – For General Purpose



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q9 / Q10 e27
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft / 60 HRC

Induction hardened gears have soft cores and so can be reworked in-house on request

MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code	
								Q9 Soft	Q10 Ind. Hard
1.5916	12	12	19.0986	22.2817	6	14	25	111-016-012	-
		15	23.8732	27.0563	6	18	25	111-016-015	111-016-415
		18	28.6479	31.8310	8	20	25	111-016-018	-
		20	31.8310	35.0141	8	20	25	111-016-020	111-016-420
		24	38.1972	41.3803	8	25	25	111-016-024	-
		25	39.7887	42.9718	8	25	25	111-016-025	111-016-425
		30	47.7465	50.9296	10	30	25	111-016-030	111-016-430
		36	57.2958	60.4789	10	40	25	111-016-036	-
		40	63.6620	66.8451	10	40	25	111-016-040	111-016-440
		45	71.6197	74.8028	10	45	25	111-016-045	-
		50	79.5775	82.7606	12	50	25	111-016-050	-
		60	95.4930	98.6761	12	60	25	111-016-060	111-016-460

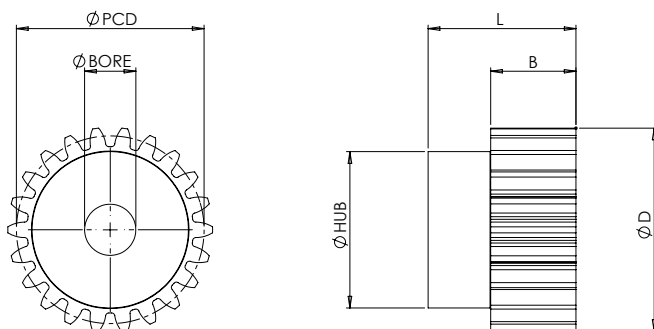
WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Economy Straight Pinions

Standard Pinions – For General Purpose



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q9 / Q10 e27
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft / 60 HRC

Induction hardened gears have soft cores and so can be reworked in-house on request

MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code	
								Q9 Soft	Q10 Ind. Hard
2	16	12	24	28	8	18	30	111-020-012	-
		13	26	30	8	20.5	30	111-020-013	-
		14	28	32	8	22.5	30	111-020-014	-
		15	30	34	8	24	30	111-020-015	111-020-415
		16	32	36	8	25	30	111-020-016	-
		17	34	38	8	27.5	30	111-020-017	-
		18	36	40	10	28	30	111-020-018	-
		19	38	42	10	28	30	111-020-019	-
		20	40	44	10	28	30	111-020-020	111-020-420
		21	42	46	10	30	30	111-020-021	-
		22	44	48	10	30	30	111-020-022	-
		23	46	50	10	30	30	111-020-023	-
		24	48	52	10	30	30	111-020-024	-
		25	50	54	10	30	30	111-020-025	111-020-425
		28	56	60	10	40	30	111-020-028	-
		30	60	64	12	40	30	111-020-030	111-020-430
		36	72	76	12	50	30	111-020-036	-
		38	76	80	12	50	30	111-020-038	-
		40	80	84	12	50	30	111-020-040	111-020-440
		45	90	94	12	60	30	111-020-045	-
		48	96	100	12	60	30	111-020-048	-
		50	100	104	15	70	30	111-020-050	-
		52	104	108	15	70	30	111-020-052	-
		56	112	116	15	70	30	111-020-056	-
		60	120	124	15	80	30	111-020-060	111-020-460
		76	152	156	16	-	-	110-020-076	-
		80	160	164	16	-	-	110-020-080	-
		95	190	194	16	-	-	110-020-095	-
		120	240	244	20	-	-	110-020-120	-

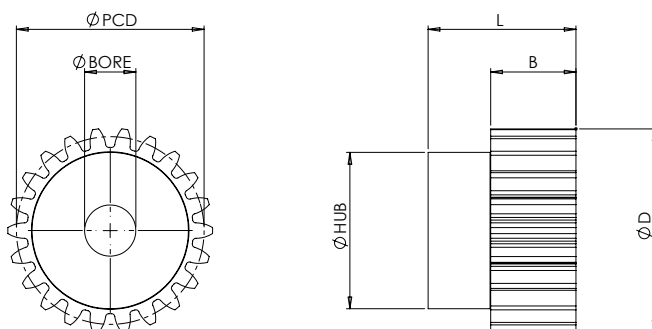
WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Economy Straight Pinions

Standard Pinions – For General Purpose



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q9 / Q10 e27
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft / 60 HRC

Induction hardened gears have soft cores and so can be reworked in-house on request

MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code	
								Q9 Soft	Q10 Ind. Hard
2.5	20	12	30	35	10	23	35	111-025-012	-
		13	32.5	37.5	10	25	35	111-025-013	-
		14	35	40	10	25	35	111-025-014	-
		15	37.5	42.5	10	25	35	111-025-015	111-025-415
		16	40	45	10	25	35	111-025-016	-
		17	42.5	47.5	10	30	35	111-025-017	-
		18	45	50	12	30	35	111-025-018	-
		19	47.5	52.5	12	30	35	111-025-019	-
		20	50	55	12	30	35	111-025-020	111-025-420
		21	52.5	57.5	12	40	35	111-025-021	-
		22	55	60	12	40	35	111-025-022	-
		23	57.5	62.5	12	40	35	111-025-023	-
		24	60	65	12	40	35	111-025-024	-
		25	62.5	67.5	12	40	35	111-025-025	111-025-425
		28	70	75	12	45	35	111-025-028	-
		30	75	80	15	50	35	111-025-030	111-025-430
		36	90	95	15	60	35	111-025-036	-
		38	95	100	15	60	35	111-025-038	-
		40	100	105	15	60	35	111-025-040	111-025-440
		45	112.5	117.5	15	70	35	111-025-045	-
		48	120	125	15	70	35	111-025-048	-
		50	125	130	20	80	35	111-025-050	-
		52	130	135	20	80	35	111-025-052	-
		56	140	145	20	80	35	111-025-056	-
		60	150	155	20	90	35	111-025-060	111-025-460
		76	190	195	16	-	-	110-025-076	-
		80	200	205	16	-	-	110-025-080	-
		95	237.5	242.5	16	-	-	110-025-095	-

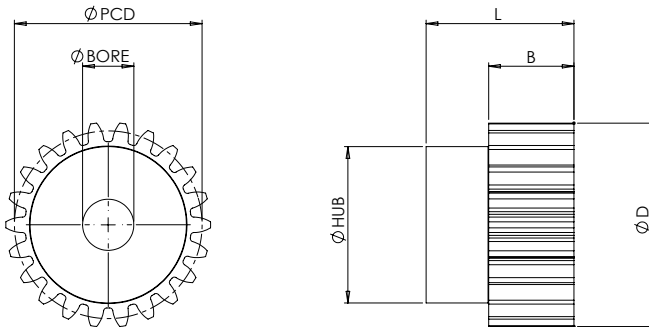
WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Economy Straight Pinions

Standard Pinions – For General Purpose



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q9 / Q10 e27
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft / 60 HRC

Induction hardened gears have soft cores and so can be reworked in-house on request

MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code	
								Q9 Soft	Q10 Ind. Hard
3	25	12	36	42	10	25	40	111-030-012	-
		13	39	45	10	30	40	111-030-013	-
		14	42	48	10	30	40	111-030-014	-
		15	45	51	12	30	40	111-030-015	111-030-415
		16	48	54	12	30	40	111-030-016	-
		17	51	57	12	40	40	111-030-017	-
		18	54	60	15	40	40	111-030-018	-
		19	57	63	15	40	40	111-030-019	-
		20	60	66	15	40	40	111-030-020	111-030-420
		21	63	69	15	45	40	111-030-021	-
		22	66	72	15	50	40	111-030-022	-
		23	69	75	15	50	40	111-030-023	-
		24	72	78	15	50	40	111-030-024	-
		25	75	81	15	50	40	111-030-025	111-030-425
		28	84	90	15	60	40	111-030-028	-
		30	90	96	20	60	40	111-030-030	111-030-430
		36	108	114	20	70	40	111-030-036	-
		38	114	120	20	70	40	111-030-038	-
		40	120	126	20	80	40	111-030-040	111-030-440
		45	135	141	20	-	-	110-030-045	-
		48	144	150	20	-	-	110-030-048	-
		50	150	156	20	-	-	110-030-050	-
		52	156	162	25	-	-	110-030-052	-
		56	168	174	25	-	-	110-030-056	-
		60	180	186	25	-	-	110-030-060	110-030-460
		76	228	234	25	-	-	110-030-076	-
		80	240	246	25	-	-	110-030-080	-
		95	285	291	25	-	-	110-030-095	-

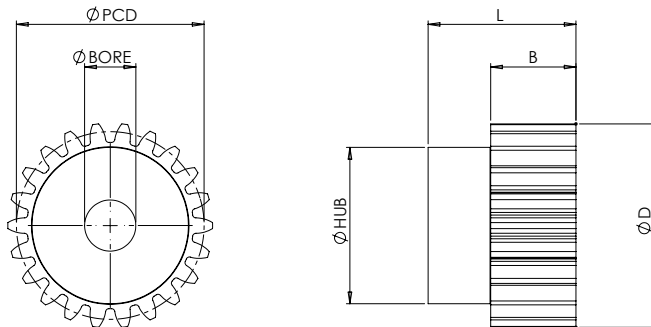
WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Economy Straight Pinions

Standard Pinions – For General Purpose



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q9 / Q10 e27
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft / 60 HRC

Induction hardened gears have soft cores and so can be reworked in-house on request

MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code	
								Q9 Soft	Q10 Ind. Hard
3.1831	25	12	38.1972	44.5634	10	25	40	111-031-012	-
		15	47.7465	54.1127	12	30	40	111-031-015	111-031-415
		18	57.2958	63.6620	15	40	40	111-031-018	-
		20	63.6620	70.0282	15	40	40	111-031-020	111-031-420
		24	76.3944	82.7606	15	50	40	111-031-024	-
		25	79.5775	85.9437	15	50	40	111-031-025	111-031-425
		30	95.4930	101.8592	20	60	40	111-031-030	111-031-430
		36	114.5916	120.9578	20	70	40	111-031-036	-
		40	127.3240	133.6902	20	80	40	111-031-040	111-031-440
		45	143.2394	149.6056	20	-	-	110-031-045	-
		50	159.1549	165.5211	20	-	-	110-031-050	-
		60	190.9859	197.3521	25	-	-	110-031-060	110-031-460

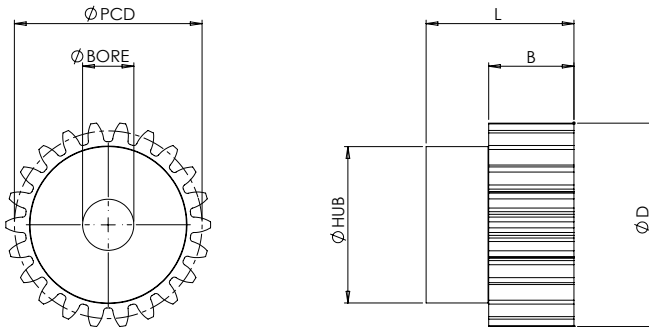
WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Economy Straight Pinions

Standard Pinions – For General Purpose



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q9 / Q10 e27
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft / 60 HRC

Induction hardened gears have soft cores and so can be reworked in-house on request

MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code	
								Q9 Soft	Q10 Ind. Hard
4	32	12	48	56	12	36	50	111-040-012	-
		13	52	60	12	40	50	111-040-013	-
		14	56	64	12	44	50	111-040-014	-
		15	60	68	15	45	50	111-040-015	111-040-415
		16	64	72	15	45	50	111-040-016	-
		17	68	76	15	50	50	111-040-017	-
		18	72	80	20	50	50	111-040-018	-
		19	76	84	20	50	50	111-040-019	-
		20	80	88	20	50	50	111-040-020	111-040-420
		21	84	92	20	60	50	111-040-021	-
		22	88	96	20	60	50	111-040-022	-
		23	92	100	20	60	50	111-040-023	-
		24	96	104	20	60	50	111-040-024	-
		25	100	108	20	60	50	111-040-025	111-040-425
		28	112	120	20	70	50	111-040-028	-
		30	120	128	25	80	50	111-040-030	111-040-430
		36	144	152	25	-	-	110-040-036	-
		38	152	160	25	-	-	110-040-038	-
		40	160	168	25	-	-	110-040-040	110-040-440
		45	180	188	25	-	-	110-040-045	-
		48	192	200	25	-	-	110-040-048	-
		50	200	208	25	-	-	110-040-050	-
		52	208	216	30	-	-	110-040-052	-
		56	224	232	30	-	-	110-040-056	-
		60	240	248	30	-	-	110-040-060	110-040-460
		76	304	312	30	-	-	110-040-076	-
		80	320	328	30	-	-	110-040-080	-
		95	380	388	30	-	-	110-040-095	-

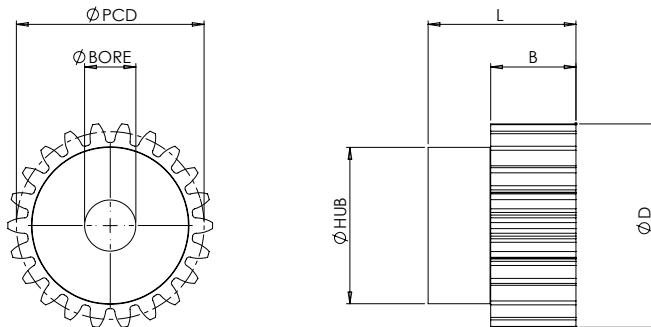
WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Economy Straight Pinions

Standard Pinions – For General Purpose



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q9 / Q10 e27
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft / 60 HRC

Induction hardened gears have soft cores and so can be reworked in-house on request

MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code	
								Q9 Soft	Q10 Ind. Hard
5	40	12	60	70	15	45	60	111-050-012	-
		13	65	75	15	50	60	111-050-013	-
		14	70	80	15	50	60	111-050-014	-
		15	75	85	20	50	60	111-050-015	111-050-415
		16	80	90	20	50	60	111-050-016	-
		17	85	95	20	64	60	111-050-017	-
		18	90	100	25	65	60	111-050-018	-
		19	95	105	25	68	60	111-050-019	-
		20	100	110	25	70	60	111-050-020	111-050-420
		21	105	115	25	75	60	111-050-021	-
		22	110	120	25	75	60	111-050-022	-
		23	115	125	25	80	60	111-050-023	-
		24	120	130	25	80	60	111-050-024	-
		25	125	135	25	80	60	111-050-025	111-050-425
		28	140	150	25	-	-	110-050-028	-
		30	150	160	30	-	-	110-050-030	110-050-430
		36	180	190	30	-	-	110-050-036	-
		38	190	200	30	-	-	110-050-038	-
		40	200	210	30	-	-	110-050-040	110-050-440
		45	225	235	30	-	-	110-050-045	-
		48	240	250	30	-	-	110-050-048	-
		50	250	260	30	-	-	110-050-050	-
		52	260	270	40	-	-	110-050-052	-
		56	280	290	40	-	-	110-050-056	-
		60	300	310	40	-	-	110-050-060	110-050-460
		76	380	390	40	-	-	110-050-076	-
		80	400	410	40	-	-	110-050-080	-
		95	475	485	40	-	-	110-050-095	-

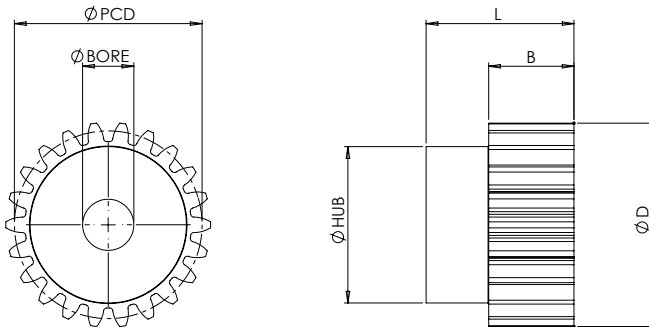
WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Economy Straight Pinions

Standard Pinions – For General Purpose



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q9 / Q10 e27
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft / 60 HRC

Induction hardened gears have soft cores and so can be reworked in-house on request

MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code	
								Q9 Soft	Q10 Ind. Hard
6	48	12	72	84	20	54	70	111-060-012	-
		13	78	90	20	60	70	111-060-013	-
		15	90	102	25	60	70	111-060-015	111-060-415
		16	96	108	25	60	70	111-060-016	-
		18	108	120	25	70	70	111-060-018	-
		20	120	132	25	70	70	111-060-020	111-060-420
		24	144	156	30	80	70	111-060-024	-
		25	150	162	30	80	70	111-060-025	111-060-425
		28	168	180	30	-	-	110-060-028	-
		30	180	192	30	-	-	110-060-030	110-060-430
		36	216	228	30	-	-	110-060-036	-
		38	228	240	30	-	-	110-060-038	-
		40	240	252	30	-	-	110-060-040	110-060-440
		45	270	282	40	-	-	110-060-045	-
		48	288	300	40	-	-	110-060-048	-
		50	300	312	40	-	-	110-060-050	-
		52	312	324	40	-	-	110-060-052	-
		56	336	348	40	-	-	110-060-056	-
		60	360	372	40	-	-	110-060-060	110-060-460
		76	456	468	40	-	-	110-060-076	-
		80	480	492	50	-	-	110-060-080	-
		95	570	582	50	-	-	110-060-095	-
8	64	15	120	136	25	80	95	111-080-015	111-080-415
		20	160	176	30	100	95	111-080-020	111-080-420
		25	200	216	30	125	95	111-080-025	111-080-425
		30	240	256	30	-	-	110-080-030	110-080-430
		40	320	336	40	-	-	110-080-040	110-080-440
		60	480	496	50	-	-	110-080-060	110-080-460

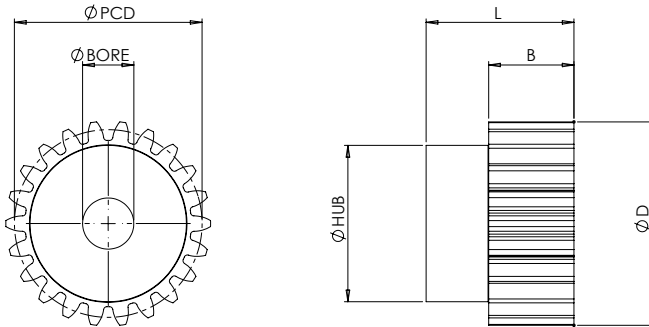
WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Stainless Steel Pinions

With Straight Teeth



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q9 e27
Tooth Finish	Milled
Material	X8CrNiS 18-9 (1.4305)
Hardness	Soft

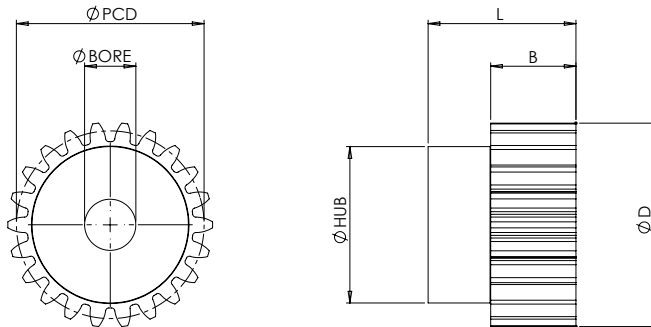
MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Length (L)	Order Code
1	8	15	15	17	5	12	18	111-010-615
		20	20	22	6	15	18	111-010-620
		25	25	27	6	18	18	111-010-625
		30	30	32	8	20	18	111-010-630
		40	40	42	8	25	18	111-010-640
		60	60	62	10	40	18	111-010-660
1.5	12	15	22.5	25.5	6	18	25	111-015-615
		20	30	33	8	20	25	111-015-620
		25	37.5	40.5	8	25	25	111-015-625
		30	45	48	10	30	25	111-015-630
		40	60	63	10	40	25	111-015-640
		60	90	93	12	60	25	111-015-660
2	16	15	30	34	8	24	30	111-020-615
		20	40	44	10	28	30	111-020-620
		25	50	54	10	30	30	111-020-625
		30	60	64	12	40	30	111-020-630
		40	80	84	12	50	30	111-020-640
		60	120	124	15	80	30	111-020-660
3	25	15	45	51	12	30	40	111-030-615
		20	60	66	15	40	40	111-030-620
		25	75	81	15	50	40	111-030-625
		30	90	96	20	60	40	111-030-630
		40	120	126	20	80	40	111-030-640
		60	180	186	25	-	-	110-030-660
4	32	15	60	68	15	45	50	111-040-615
		20	80	88	20	50	50	111-040-620
		25	100	108	20	60	50	111-040-625
		30	120	128	25	80	50	111-040-630
		40	160	168	25	-	-	110-040-640
		60	240	248	30	-	-	110-040-660

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION FOR
ALL RACK & PINION SYSTEMS – LIFE TIME CALCULATIONS AVAILABLE ON REQUEST
WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Synthetic Pinions

With Straight Teeth



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q10 e27
Tooth Finish	Milled
Material	Nylon P6
Hardness	Soft

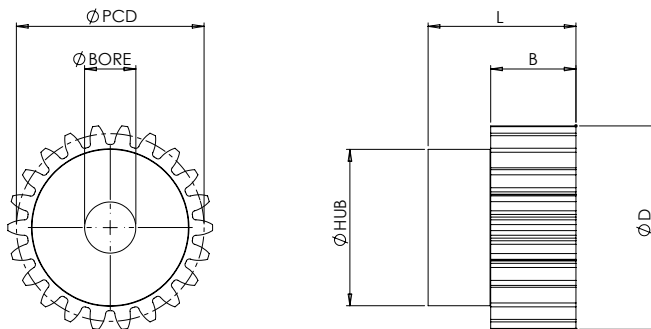
MOD	Face Width (B)	Length (L)	Tooth Number	PCD	Ø D	BORE Ø H7	HUB Ø	Order Code
1	8	18	15	15	17	5	12	118-010-015
			16	16	18	5	12	118-010-016
			18	18	20	6	15	118-010-018
			20	20	22	6	15	118-010-020
			24	24	26	6	18	118-010-024
			25	25	27	6	18	118-010-025
1.5	12	25	15	22.5	25.5	6	18	118-015-015
			16	24	27	6	18	118-015-016
			18	27	30	8	20	118-015-018
			20	30	33	8	20	118-015-020
			24	36	39	8	25	118-015-024
			25	37.5	40.5	8	25	118-015-025
2	16	30	15	30	34	8	25	118-020-015
			16	32	36	8	25	118-020-016
			18	36	40	10	28	118-020-018
			20	40	44	10	28	118-020-020
			24	48	52	10	30	118-020-024
			25	50	54	10	30	118-020-025
2.5	25	35	15	37.5	42.5	10	25	118-025-015
			16	40	45	10	25	118-025-016
			18	45	50	12	30	118-025-018
			20	50	55	12	30	118-025-020
			24	60	65	12	40	118-025-024
			25	62.5	67.5	12	40	118-025-025

WE OFFER IN-HOUSE MACHINING SERVICES FOR ALL SOFT CORE GEARS – CONTACT US TODAY



Commercial Straight Pinions

For Low Speed Applications



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q12 +
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft

We offer in-house machining services for all soft gears including bore and keying

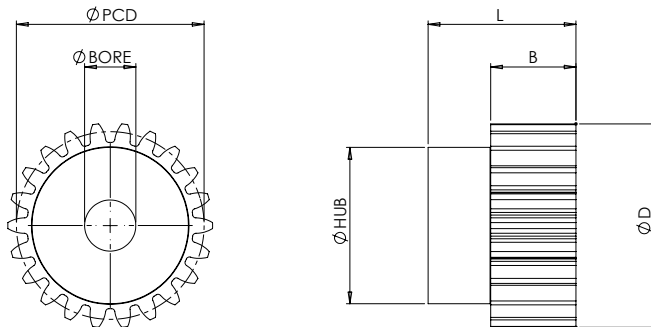
MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø (Pilot)	HUB Ø	Length (L)	Order Code
1	15	12	12	14	- *	9	25	116-010-012
		13	13	15	- *	10	25	116-010-013
		14	14	16	- *	11	25	116-010-014
		15	15	17	- *	12	25	116-010-015
		16	16	18	- *	13	25	116-010-016
		17	17	19	- *	14	25	116-010-017
		18	18	20	8	15	25	116-010-018
		19	19	21	8	15	25	116-010-019
		20	20	22	8	16	25	116-010-020
		21	21	23	8	16	25	116-010-021
		22	22	24	8	18	25	116-010-022
		23	23	25	8	18	25	116-010-023
		24	24	26	10	20	25	116-010-024
		25	25	27	10	20	25	116-010-025
		26	26	28	10	20	25	116-010-026
		28	28	30	10	20	25	116-010-028
		30	30	32	10	20	25	116-010-030
		32	32	34	10	25	25	116-010-032
		35	35	37	10	25	25	116-010-035
		36	36	38	10	25	25	116-010-036
		38	38	40	10	25	25	116-010-038
		40	40	42	10	25	25	116-010-040
		42	42	44	10	30	25	116-010-042
		45	45	47	10	30	25	116-010-045
		48	48	50	10	30	25	116-010-048
		50	50	52	12	30	25	116-010-050
		52	52	54	12	40	25	116-010-052
		54	54	56	12	40	25	116-010-054
		56	56	58	12	40	25	116-010-056
		58	58	60	12	40	25	116-010-058
		60	60	62	12	40	25	116-010-060
		70	70	72	12	50	25	116-010-070
		76	76	78	12	-	-	114-010-076
		80	80	82	12	-	-	114-010-080
		95	95	97	12	-	-	114-010-095
		110	110	112	12	-	-	114-010-110
		114	114	116	12	-	-	114-010-114

* Gears previously stocked with Ø6mm pilot bores are now discontinued



Commercial Straight Pinions

For Low Speed Applications



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q12 +
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft

We offer in-house machining services for all soft gears including bore and keying

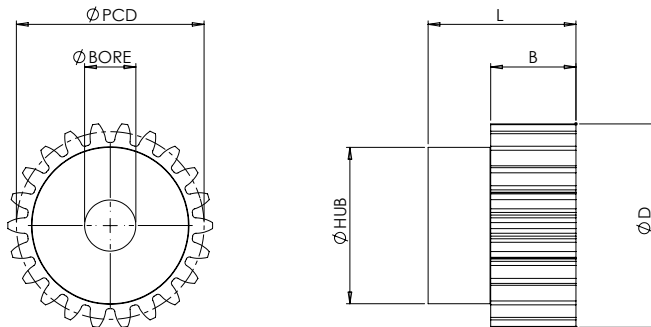
MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø (Pilot)	HUB Ø	Length (L)	Order Code
1.5	17	12	18	21	8	14	30	116-015-012
		13	19.5	22.5	8	15	30	116-015-013
		14	21	24	8	17	30	116-015-014
		15	22.5	25.5	8	18	30	116-015-015
		16	24	27	8	19	30	116-015-016
		17	25.5	28.5	8	20	30	116-015-017
		18	27	30	8	20	30	116-015-018
		19	28.5	31.5	8	20	30	116-015-019
		20	30	33	8	25	30	116-015-020
		21	31.5	34.5	10	25	30	116-015-021
		22	33	36	10	25	30	116-015-022
		23	34.5	37.5	10	25	30	116-015-023
		24	36	39	10	25	30	116-015-024
		25	37.5	40.5	10	25	30	116-015-025
		26	39	42	12	30	30	116-015-026
		28	42	45	12	30	30	116-015-028
		30	45	48	12	30	30	116-015-030
		32	48	51	12	35	30	116-015-032
		35	52.5	55.5	12	35	30	116-015-035
		36	54	57	12	35	30	116-015-036
		38	57	60	12	40	30	116-015-038
		40	60	63	12	40	30	116-015-040
		42	63	66	12	50	30	116-015-042
		45	67.5	70.5	12	50	30	116-015-045
		48	72	75	14	50	30	116-015-048
		50	75	78	14	50	30	116-015-050
		52	78	81	14	60	30	116-015-052
		54	81	84	14	60	30	116-015-054
		56	84	87	16	60	30	116-015-056
		58	87	90	16	60	30	116-015-058
		60	90	93	16	60	30	116-015-060
		70	105	108	16	70	30	116-015-070
		76	114	117	16	-	-	114-015-076
		80	120	123	16	-	-	114-015-080
		95	142.5	145.5	16	-	-	114-015-095
		110	165	168	16	-	-	114-015-110
		114	171	174	16	-	-	114-015-114

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION



Commercial Straight Pinions

For Low Speed Applications



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q12 +
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft

We offer in-house machining services for all soft gears including bore and keying

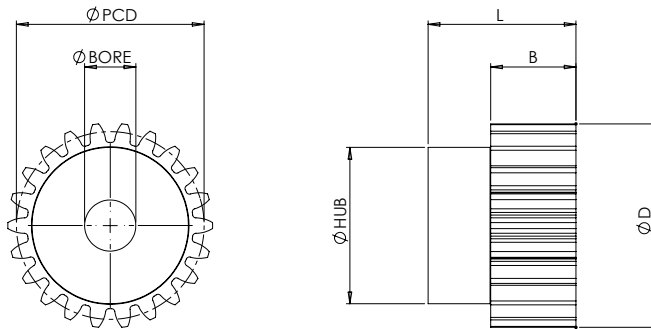
MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø (Pilot)	HUB Ø	Length (L)	Order Code
2	20	12	24	28	10	18	35	116-020-012
		13	26	30	10	20	35	116-020-013
		14	28	32	10	20	35	116-020-014
		15	30	34	10	24	35	116-020-015
		16	32	36	10	25	35	116-020-016
		17	34	38	10	25	35	116-020-017
		18	36	40	10	25	35	116-020-018
		19	38	42	10	25	35	116-020-019
		20	40	44	10	30	35	116-020-020
		21	42	46	12	30	35	116-020-021
		22	44	48	12	30	35	116-020-022
		23	46	50	12	30	35	116-020-023
		24	48	52	12	35	35	116-020-024
		25	50	54	12	35	35	116-020-025
		26	52	56	12	40	35	116-020-026
		28	56	60	12	40	35	116-020-028
		30	60	64	14	40	35	116-020-030
		32	64	68	14	45	35	116-020-032
		35	70	74	14	45	35	116-020-035
		36	72	76	14	45	35	116-020-036
		38	76	80	14	50	35	116-020-038
		40	80	84	14	50	35	116-020-040
		42	84	88	16	55	35	116-020-042
		45	90	94	16	60	35	116-020-045
		48	96	100	16	70	35	116-020-048
		50	100	104	16	70	35	116-020-050
		52	104	108	16	70	35	116-020-052
		54	108	112	16	70	35	116-020-054
		56	112	116	16	70	35	116-020-056
		58	116	120	16	70	35	116-020-058
		60	120	124	16	80	35	116-020-060
		70	140	144	16	80	35	116-020-070
		76	152	156	20	-	-	114-020-076
		80	160	164	20	-	-	114-020-080
		95	190	194	20	-	-	114-020-095
		110	220	224	20	-	-	114-020-110
		114	228	232	20	-	-	114-020-114

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION



Commercial Straight Pinions

For Low Speed Applications



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q12 +
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft

We offer in-house machining services for all soft gears including bore and keying

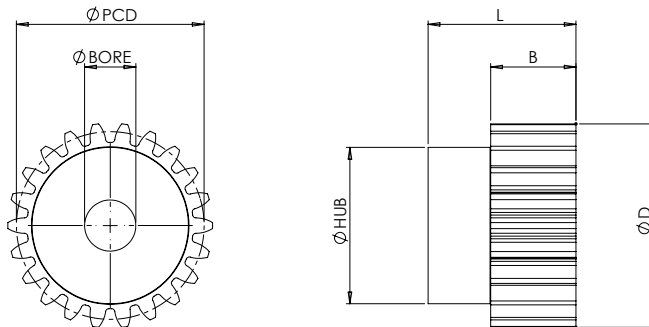
MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø (Pilot)	HUB Ø	Length (L)	Order Code
2.5	25	12	30	35	10	22	45	116-025-012
		13	32.5	37.5	10	25	45	116-025-013
		14	35	40	10	28	45	116-025-014
		15	37.5	42.5	10	30	45	116-025-015
		16	40	45	12	32	45	116-025-016
		17	42.5	47.5	12	35	45	116-025-017
		18	45	50	12	35	45	116-025-018
		19	47.5	52.5	12	35	45	116-025-019
		20	50	55	12	40	45	116-025-020
		21	52.5	57.5	14	40	45	116-025-021
		22	55	60	14	45	45	116-025-022
		23	57.5	62.5	14	45	45	116-025-023
		24	60	65	14	45	45	116-025-024
		25	62.5	67.5	14	50	45	116-025-025
		26	65	70	14	50	45	116-025-026
		28	70	75	14	50	45	116-025-028
		30	75	80	14	55	45	116-025-030
		32	80	85	16	55	45	116-025-032
		35	87.5	92.5	16	60	45	116-025-035
		36	90	95	16	60	45	116-025-036
		38	95	100	16	60	45	116-025-038
		40	100	105	16	70	45	116-025-040
		42	105	110	16	70	45	116-025-042
		45	112.5	117.5	16	70	45	116-025-045
		48	120	125	20	80	45	116-025-048
		50	125	130	20	80	45	116-025-050
		52	130	135	20	90	45	116-025-052
		54	135	140	20	90	45	116-025-054
		56	140	145	20	100	45	116-025-056
		58	145	150	20	100	45	116-025-058
		60	150	155	20	100	45	116-025-060
		70	175	180	20	-	-	114-025-070
		76	190	195	20	-	-	114-025-076
		80	200	205	20	-	-	114-025-080
		95	237.5	242.5	20	-	-	114-025-095
		110	275	280	20	-	-	114-025-110
		114	285	290	20	-	-	114-025-114

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION



Commercial Straight Pinions

For Low Speed Applications



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q12 +
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft

We offer in-house machining services for all soft gears including bore and keying

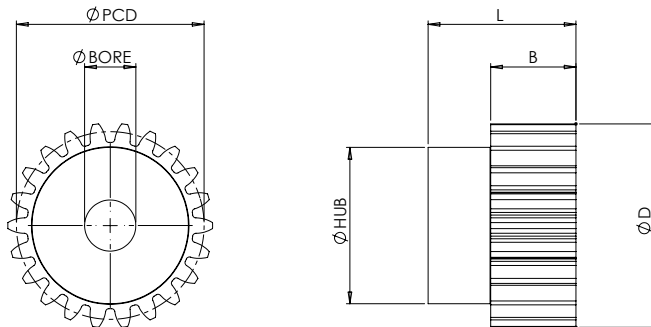
MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø (Pilot)	HUB Ø	Length (L)	Order Code
3	30	12	36	42	12	27	50	116-030-012
		13	39	45	12	30	50	116-030-013
		14	42	48	12	33	50	116-030-014
		15	45	51	12	35	50	116-030-015
		16	48	54	14	38	50	116-030-016
		17	51	57	14	42	50	116-030-017
		18	54	60	14	45	50	116-030-018
		19	57	63	14	45	50	116-030-019
		20	60	66	14	45	50	116-030-020
		21	63	69	16	45	50	116-030-021
		22	66	72	16	50	50	116-030-022
		23	69	75	16	50	50	116-030-023
		24	72	78	16	50	50	116-030-024
		25	75	81	16	60	50	116-030-025
		26	78	84	16	60	50	116-030-026
		28	84	90	16	60	50	116-030-028
		30	90	96	16	60	50	116-030-030
		32	96	102	16	70	50	116-030-032
		35	105	111	16	70	50	116-030-035
		36	108	114	20	70	50	116-030-036
		38	114	120	20	80	50	116-030-038
		40	120	126	20	80	50	116-030-040
		42	126	132	20	80	50	116-030-042
		45	135	141	20	90	50	116-030-045
		48	144	150	20	100	50	116-030-048
		50	150	156	20	-	-	114-030-050
		52	156	162	20	-	-	114-030-052
		60	180	186	20	-	-	114-030-060
		76	228	234	25	-	-	114-030-076
		80	240	246	25	-	-	114-030-080
		95	285	291	25	-	-	114-030-095
		100	300	306	25	-	-	114-030-100
		114	342	348	30	-	-	114-030-114

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION



Commercial Straight Pinions

For Low Speed Applications



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q12 +
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft

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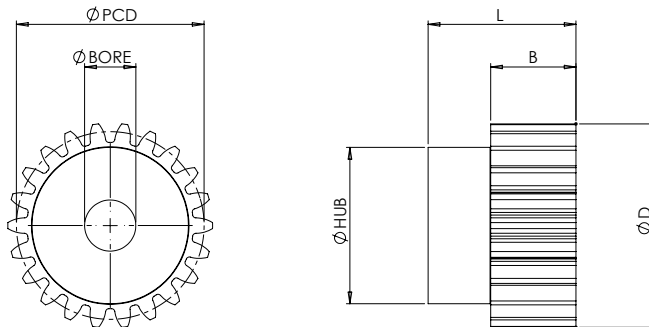
MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø (Pilot)	HUB Ø	Length (L)	Order Code
4	40	12	48	56	14	35	60	116-040-012
		13	52	60	14	40	60	116-040-013
		14	56	64	14	45	60	116-040-014
		15	60	68	14	45	60	116-040-015
		16	64	72	16	50	60	116-040-016
		17	68	76	16	50	60	116-040-017
		18	72	80	16	50	60	116-040-018
		19	76	84	16	60	60	116-040-019
		20	80	88	16	60	60	116-040-020
		21	84	92	16	70	60	116-040-021
		22	88	96	16	70	60	116-040-022
		23	92	100	20	75	60	116-040-023
		24	96	104	20	75	60	116-040-024
		25	100	108	20	75	60	116-040-025
		26	104	112	20	75	60	116-040-026
		28	112	120	20	75	60	116-040-028
		30	120	128	20	75	60	116-040-030
		32	128	136	20	80	60	116-040-032
		35	140	148	20	80	60	116-040-035
		36	144	152	25	80	60	116-040-036
		38	152	160	25	-	-	114-040-038
		40	160	168	25	-	-	114-040-040
		45	180	188	25	-	-	114-040-045
		48	192	200	25	-	-	114-040-048
		50	200	208	25	-	-	114-040-050
		52	208	216	25	-	-	114-040-052
		60	240	248	25	-	-	114-040-060
		76	304	312	30	-	-	114-040-076
		80	320	328	30	-	-	114-040-080
		95	380	388	30	-	-	114-040-095
		100	400	408	30	-	-	114-040-100
		114	456	464	30	-	-	114-040-114

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION



Commercial Straight Pinions

For Low Speed Applications



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q12 +
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft

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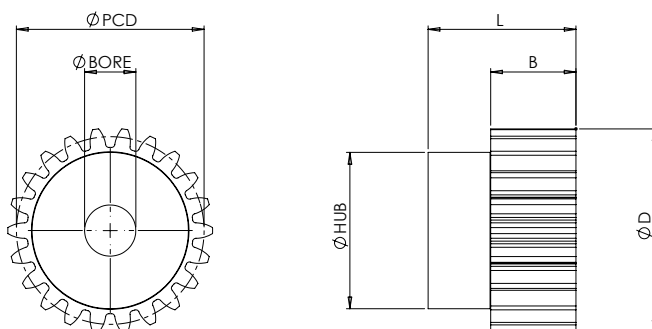
MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø (Pilot)	HUB Ø	Length (L)	Order Code
5	50	12	60	70	20	45	75	116-050-012
		13	65	75	20	50	75	116-050-013
		14	70	80	20	55	75	116-050-014
		15	75	85	20	60	75	116-050-015
		16	80	90	20	65	75	116-050-016
		17	85	95	20	70	75	116-050-017
		18	90	100	20	70	75	116-050-018
		19	95	105	20	70	75	116-050-019
		20	100	110	20	80	75	116-050-020
		21	105	115	20	80	75	116-050-021
		22	110	120	20	80	75	116-050-022
		23	115	125	20	90	75	116-050-023
		24	120	130	20	90	75	116-050-024
		25	125	135	20	90	75	116-050-025
		26	130	140	20	100	75	116-050-026
		28	140	150	25	100	75	116-050-028
		30	150	160	25	110	75	116-050-030
		32	160	170	25	-	-	114-050-032
		35	175	185	25	-	-	114-050-035
		38	190	200	25	-	-	114-050-038
		40	200	210	25	-	-	114-050-040
		45	225	235	25	-	-	114-050-045
		48	240	250	25	-	-	114-050-048
		50	250	260	30	-	-	114-050-050
		52	260	270	30	-	-	114-050-052
		60	300	310	30	-	-	114-050-060
		76	380	390	30	-	-	114-050-076
		80	400	410	30	-	-	114-050-080
		95	475	485	30	-	-	114-050-095
		100	500	510	30	-	-	114-050-100
		114	570	580	30	-	-	114-050-114

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION



Commercial Straight Pinions

For Low Speed Applications



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Quality	Q12 +
Tooth Finish	Milled
Material	C45 (1.0503)
Hardness	Soft

We offer in-house machining services for all soft gears including bore and keying

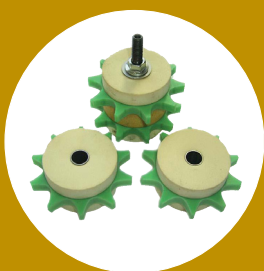
MOD	Face Width (B)	Tooth Number	PCD	Ø D	BORE Ø (Pilot)	HUB Ø	Length (L)	Order Code
6	60	12	72	84	20	54	80	116-060-012
		13	78	90	20	60	80	116-060-013
		15	90	102	20	70	80	116-060-015
		16	96	108	20	75	80	116-060-016
		18	108	120	20	80	80	116-060-018
		20	120	132	20	90	80	116-060-020
		24	144	156	25	110	80	116-060-024
		25	150	162	25	110	80	116-060-025
		28	168	180	25	-	-	114-060-028
		30	180	192	25	-	-	114-060-030
		32	192	204	25	-	-	114-060-032
		35	210	222	25	-	-	114-060-035
8	80	38	228	240	25	-	-	114-060-038
		40	240	252	25	-	-	114-060-040
		15	120	136	25 *	90	110 *	116-080-015
		18	144	160	25 *	100	110 *	116-080-018
		20	160	176	30 *	120	110 *	116-080-020
		24	192	208	30 *	150	110 *	116-080-024
		25	200	216	30 *	150	110 *	116-080-025
		30	240	256	30 *	190	110 *	116-080-030

* Gears previously stocked with Ø40mm pilot bores and 120mm overall length are now discontinued

WE RECOMMEND THE USE OF CONTINUOUS GREASE OR OIL LUBRICATION



Lubrication Systems



www.apex-trans.co.uk
sales@apex-trans.co.uk

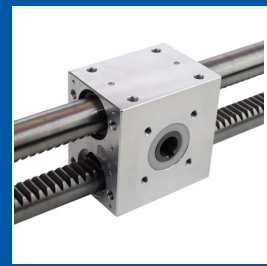


LUBRICATION SYSTEMS
STOCK CATALOGUE
EDITION 01



TEL: 01827 253 340
FAX: 01827 253 390

PLEASE SEE OUR LUBRICATION SYSTEMS CATALOGUE FOR MORE INFORMATION ON
OUR PROGRAMMABLE AUTOMATIC LUBRICATION PUMPS AND SUITABLE LUBRICANTS

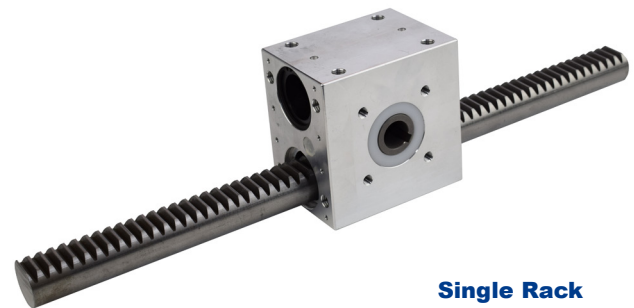


Rack Jacks – Round Racks

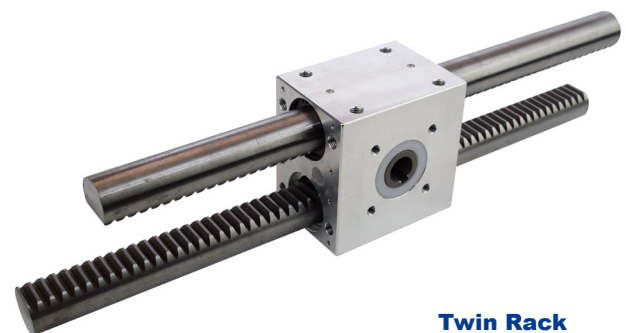
The unique range of rack type jacks transforms rotational motion into linear motion and vice versa providing rapid, synchronous positioning in any direction.

A simple mechanical principle and robust compact housings ensures a durable, repeatable and reliable operation:

- Simple and economical lifting devices
- Robust design for long service life and continuous use
- High bending stiffness due to the large diameter and wide toothing of the rack
- Robust sliding guide for the rack
- Simple structure, high repeatability
- Lifting speeds up to 600 mm/s with precise positioning in the lifting direction
- Complete range consisting of 3 sizes with up to 800 kg lifting capacity
- All sizes with same design principle and functionality
- Numerous mounting options including flange connections
- 4 pinion shaft interfaces for each size



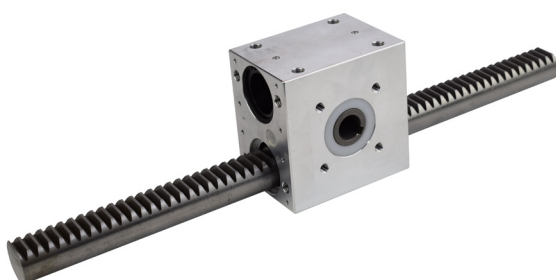
Single Rack



Twin Rack

AS WELL AS OUR RANGE OF STANDARD PRODUCTS WE CAN ALSO MANUFACTURE SPECIAL COMPONENTS IN HOUSE – PLEASE CONTACT OUR SALES TEAM WITH YOUR REQUIREMENTS

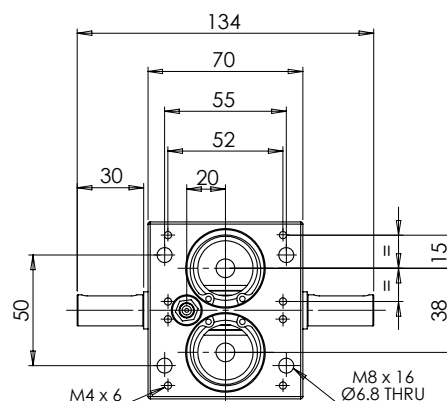
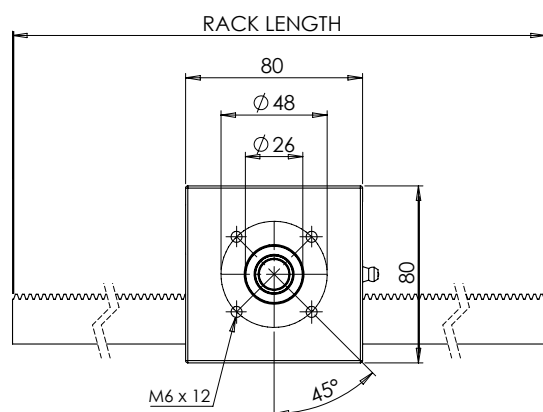
Single Travelling Rack

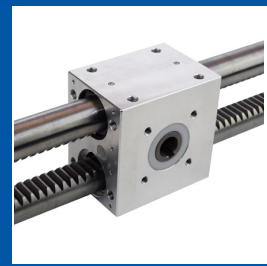


Model	541-131-923
Travel per Input rev (mm)	62.8318
Max. Travel Speed (mm/s)	600
Max. Acceleration (m/s ²)	30
Max. Input Speed (rpm)	573
Max. Input Torque (Nm)	8
Max. Capacity (kg)	80
Material of Body	Aluminium
Material of Rack*	ETG100
Rack Weight (kg/m)	3.5
Module	1
Tooth Quality	8 h27
Pinion No of Teeth	20
Standard Rack No of Teeth**	923
Theor. Rack Length (mm)**	2900

Technical drawing of a 100mm x 100mm x 10mm bearing housing. The drawing shows a top view with dimensions: 100mm x 100mm overall size, 50mm x 50mm internal bore, 10mm thickness, and 6mm keyway depth. It also shows a side view with dimensions: 100mm x 100mm x 10mm, 50mm x 50mm internal bore, 10mm thickness, and 6mm keyway depth. The drawing includes a detail of the keyway and a detail of the mounting hole. The mounting hole is M10 x 10 (for grease nipple). The keyway is 5x5. The drawing is labeled '100mm x 100mm x 10mm' and '6mm'.

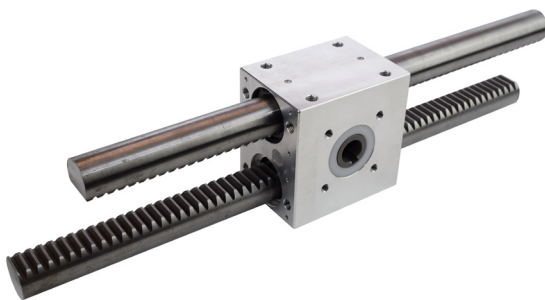
Shaft Option	Description
1	DIN ISO 14 Spline bore input 6 x 11 x 14
2	Input shaft one side only
3	Input shaft both sides
4	Hollow bore & key input Ø10mm h7 3x3 P9 keyway





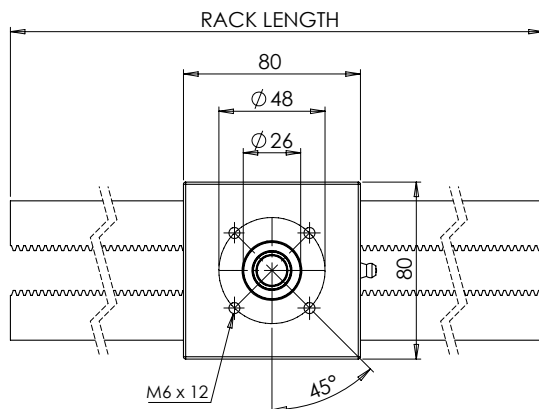
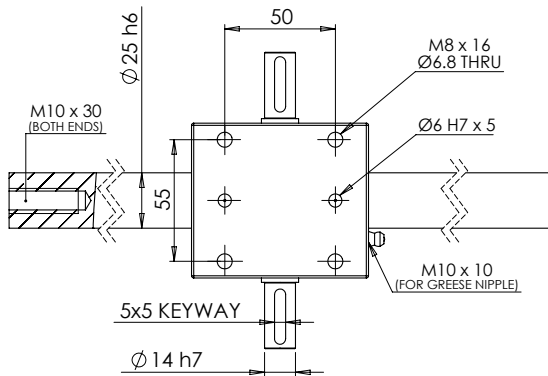
R1 – 80 kg Capacity

Twin Travelling Rack



NOTE: Racks move in opposite directions when the input gear is rotated

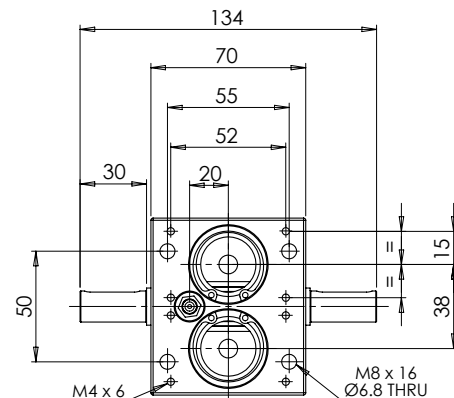
NOTE: Example jack shown below with 2 racks and shaft option 3

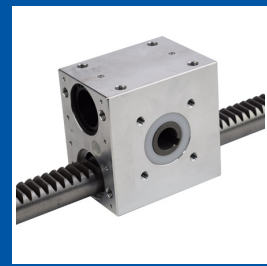


Model	541-132-923
Travel per Input rev (mm)	62.8318
Max. Travel Speed (mm/s)	600
Max. Acceleration (m/s ²)	30
Max. Input Speed (rpm)	573
Max. Input Torque (Nm)	8
Max. Capacity (kg)	80
Material of Body	Aluminium
Material of Rack*	ETG100
Rack Weight (kg/m)	3.5
Module	1
Tooth Quality	8 h27
Pinion No of Teeth	20
Standard Rack No of Teeth**	923
Theor. Rack Length (mm)**	2900

- * ETG100 alloy steel has 960-1100 N/mm² tensile strength
- ** Maximum available rack length / number of teeth (Shorter lengths available upon request)

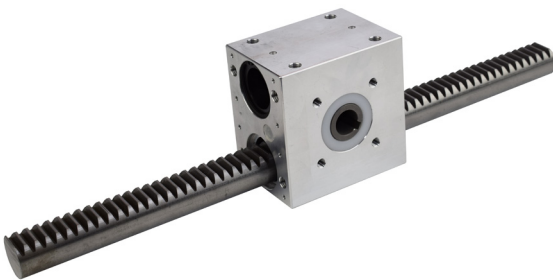
Shaft Option	Description
1	DIN ISO 14 Spline bore input 6 x 11 x 14
2	Input shaft one side only
3	Input shaft both sides
4	Hollow bore & key input Ø10mm h7 3x3 P9 keyway



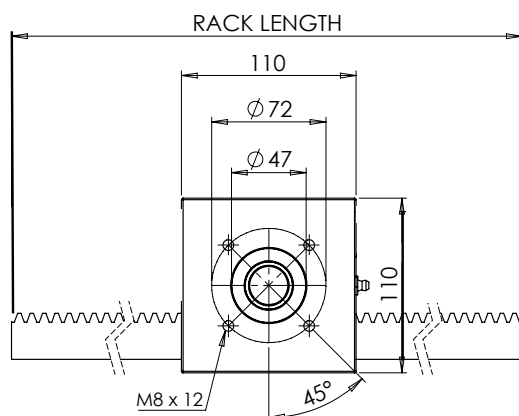
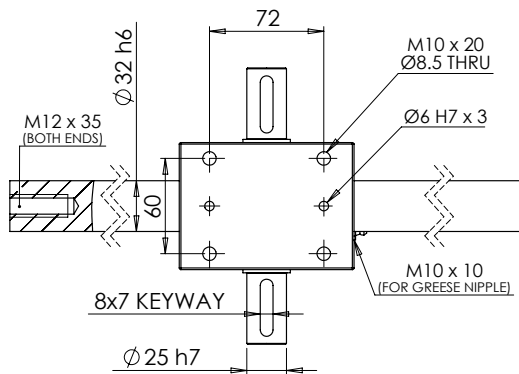


R2 – 200 kg Capacity

Single Travelling Rack



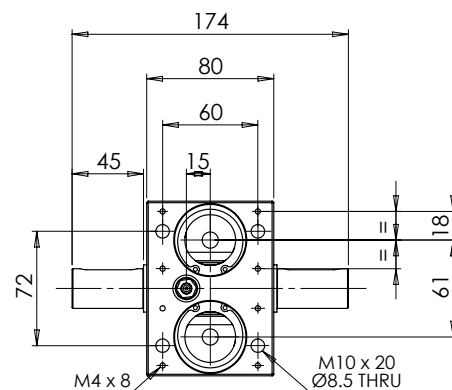
NOTE: Example jack shown below with 1 rack and shaft option 3

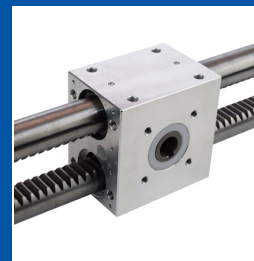


Model	541-231-369
Travel per Input rev (mm)	125.6637
Max. Travel Speed (mm/s)	600
Max. Acceleration (m/s ²)	30
Max. Input Speed (rpm)	286
Max. Input Torque (Nm)	40
Max. Capacity (kg)	200
Material of Body	Aluminium
Material of Rack*	ETG100
Rack Weight (kg/m)	5.5
Module	2.5
Tooth Quality	8 h27
Pinion No of Teeth	16
Standard Rack No of Teeth**	369
Theor. Rack Length (mm)**	2900

- * ETG100 alloy steel has 960-1100 N/mm² tensile strength
- ** Maximum available rack length / number of teeth (Shorter lengths available upon request)

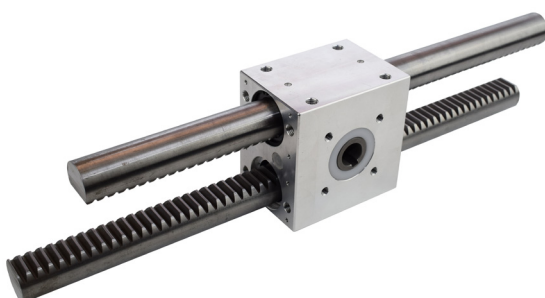
Shaft Option	Description
1	DIN ISO 14 Spline bore input 6 x 16 x 20
2	Input shaft one side only
3	Input shaft both sides
4	Hollow bore & key input $\phi 20$ mm h7 6x6 P9 keyway





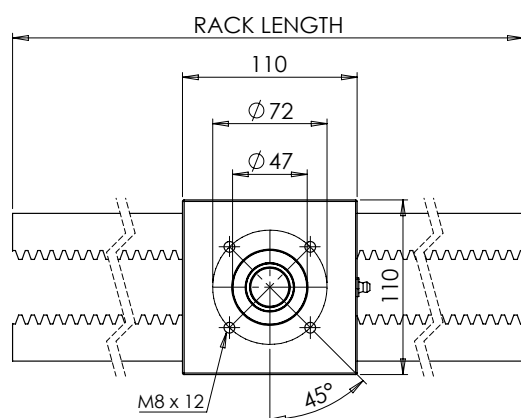
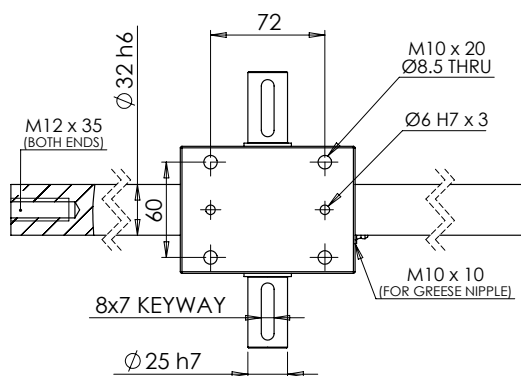
R2 – 200 kg Capacity

Twin Travelling Rack



NOTE: Racks move in opposite directions when the input gear is rotated

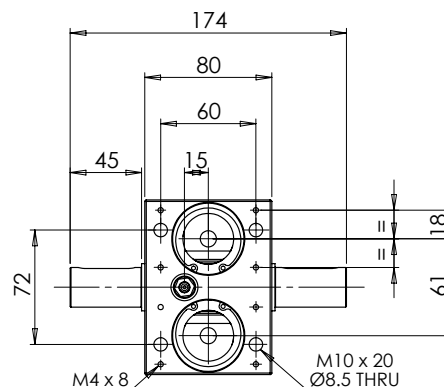
NOTE: Example jack shown below with 2 racks and shaft option 3

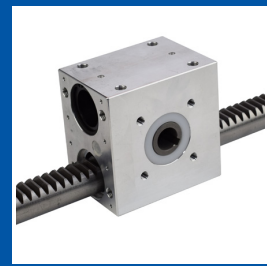


Model	541-232-369
Travel per Input rev (mm)	125.6637
Max. Travel Speed (mm/s)	600
Max. Acceleration (m/s ²)	30
Max. Input Speed (rpm)	286
Max. Input Torque (Nm)	40
Max. Capacity (kg)	200
Material of Body	Aluminium
Material of Rack*	ETG100
Rack Weight (kg/m)	5.5
Module	2.5
Tooth Quality	8 h27
Pinion No of Teeth	16
Standard Rack No of Teeth**	369
Theor. Rack Length (mm)**	2900

- * ETG100 alloy steel has 960-1100 N/mm² tensile strength
- ** Maximum available rack length / number of teeth (Shorter lengths available upon request)

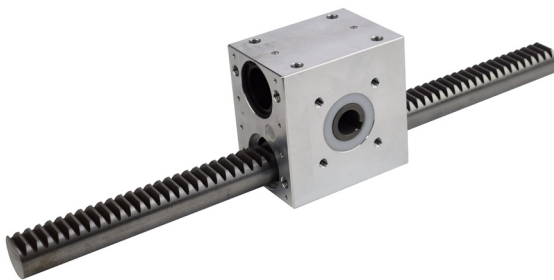
Shaft Option	Description
1	DIN ISO 14 Spline bore input 6 x 16 x 20
2	Input shaft one side only
3	Input shaft both sides
4	Hollow bore & key input $\phi 20$ mm h7 6x6 P9 keyway



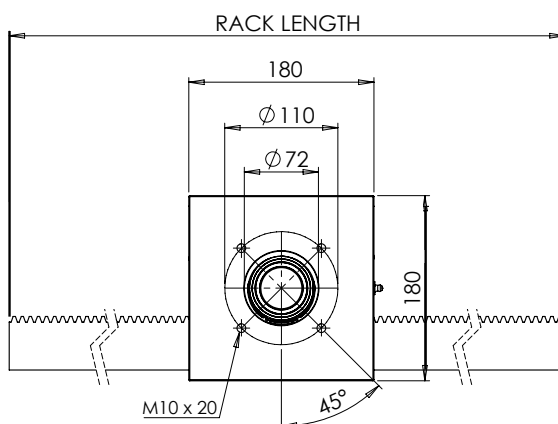
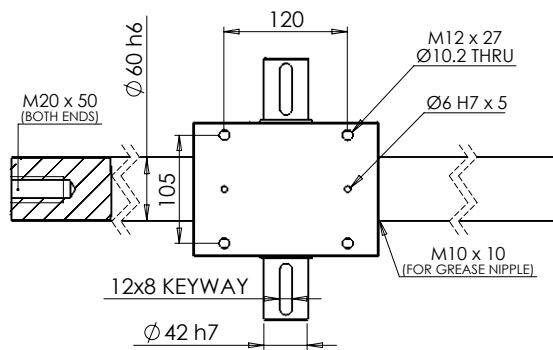


R3 – 800 kg Capacity

Single Travelling Rack



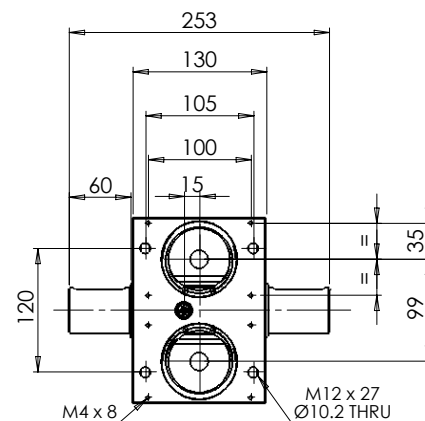
NOTE: Example jack shown below with 1 rack and shaft option 3

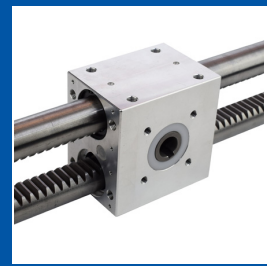


Model	541-331-369
Travel per Input rev (mm)	188.4955
Max. Travel Speed (mm/s)	600
Max. Acceleration (m/s ²)	30
Max. Input Speed (rpm)	191
Max. Input Torque (Nm)	240
Max. Capacity (kg)	800
Material of Body	Aluminium
Material of Rack*	ETG100
Rack Weight (kg/m)	19.1
Module	2.5
Tooth Quality	8 h27
Pinion No of Teeth	24
Standard Rack No of Teeth**	369
Theor. Rack Length (mm)**	2900

- * ETG100 alloy steel has 960-1100 N/mm² tensile strength
- ** Maximum available rack length / number of teeth (Shorter lengths available upon request)

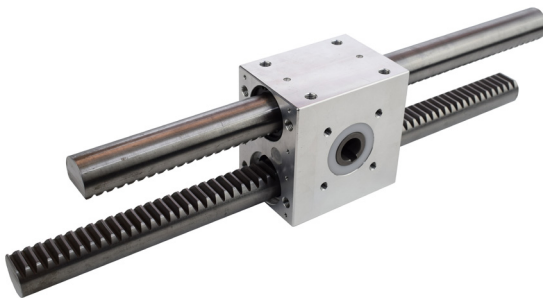
Shaft Option	Description
1	DIN ISO 14 Spline bore input 8 x 32 x 38
2	Input shaft one side only
3	Input shaft both sides
4	Hollow bore & key input Ø35mm h7 10x8 P9 keyway





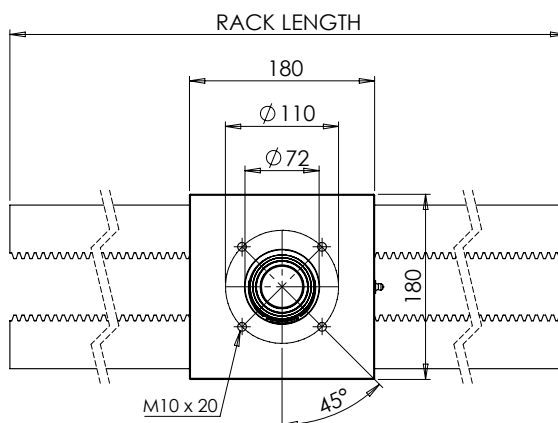
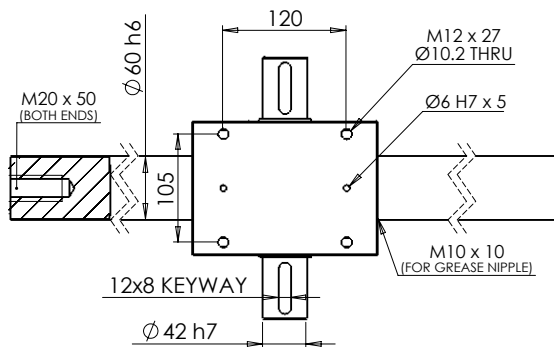
R3 – 800 kg Capacity

Twin Travelling Rack



NOTE: Racks move in opposite directions when the input gear is rotated

NOTE: Example jack shown below with 2 racks and shaft option 3

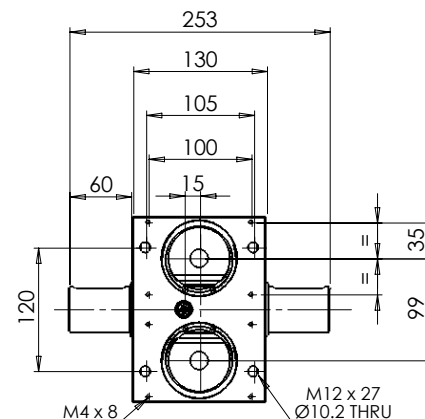


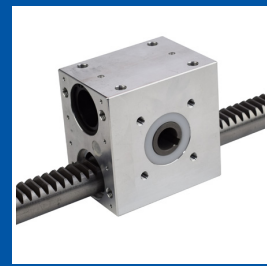
Model	541-332-369
Travel per Input rev (mm)	188.4955
Max. Travel Speed (mm/s)	600
Max. Acceleration (m/s ²)	30
Max. Input Speed (rpm)	191
Max. Input Torque (Nm)	240
Max. Capacity (kg)	800
Material of Body	Aluminium
Material of Rack*	ETG100
Rack Weight (kg/m)	19.1
Module	2.5
Tooth Quality	8 h27
Pinion No of Teeth	24
Standard Rack No of Teeth**	369
Theor. Rack Length (mm)**	2900

* ETG100 alloy steel has 960-1100 N/mm² tensile strength

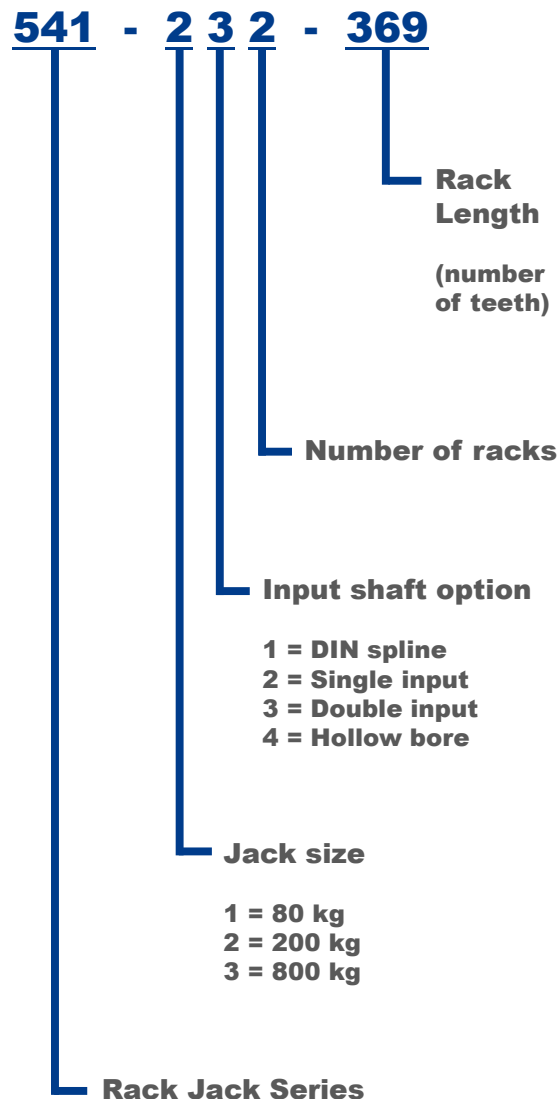
** Maximum available rack length / number of teeth (Shorter lengths available upon request)

Shaft Option	Description
1	DIN ISO 14 Spline bore input 8 x 32 x 38
2	Input shaft one side only
3	Input shaft both sides
4	Hollow bore & key input Ø35mm h7 10x8 P9 keyway





Rack Jack Order Codes



Rack jacks can be supplied singular, with additional accessories, part of a larger assembly or modified specially to customer request.

These order codes are for standard jacks only, if you require additional accessories or modifications such as special input shafts, motor flanges or specific rack end machining then please contact our sales team for a competitive quotation.

PLEASE SEE PAGE 36 FOR ORDER CODES FOR RACK JACK SPECIFIC ROUND RACKS



Lubrication Pinions

- For the lubrication of racks
- For the lubrication of pinions
- For the lubrication of slewing rings
- For grease or oil up to NLGI class 2
- Temperature range -30 to +150°C
- Integrated sleeve bearings
- Low weight
- Axial or radial supply
- Customised designs available

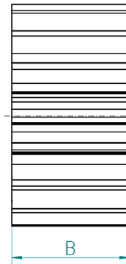
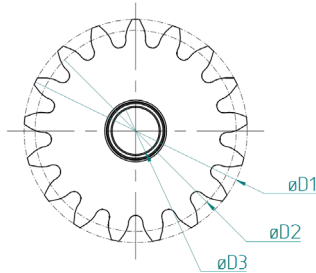


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Straight Lubrication Pinions

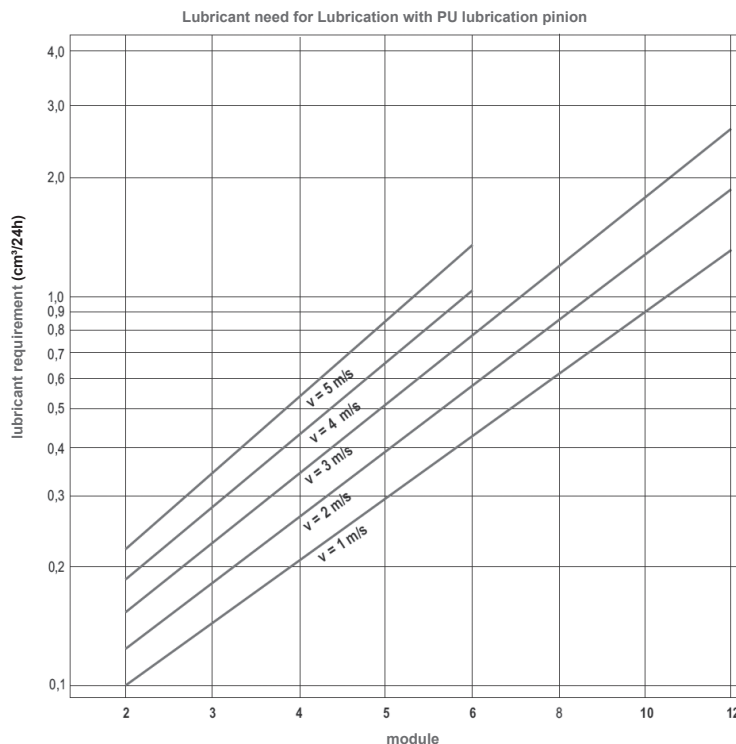
For Lubricating Straight Racks & Pinions



Design Parameter	Value
Helix Angle	STRAIGHT 0°
Pressure Angle	20°
Tooth Form	DIN 867
Material	PU Foam

Lubrication pinions are supplied complete with suitable bushing and sleeve bearing. Must be pre-lubricated prior to installation!

MOD	Tooth Number	Face Width (B)	Ø D3 (BORE)	Ø D2 (PCD)	Ø D1	Part Number
1.5	24	15	12	36	39	130-015-024
2	17	20	12	34	38	130-020-017
3	17	30	12	51	57	130-030-017
4	17	40	12	68	76	130-040-017
5	17	50	20	85	95	130-050-017
6	17	60	20	102	114	130-060-017
8	17	80	20	136	152	130-080-017
10	17	100	20	170	190	130-100-017



For very small rack & pinion drives ≤ 1 module and systems operating at less than 1 m/s travel speed, manual application of lubrication directly onto the teeth faces of the rack or pinion is acceptable.

For rack & pinion drives larger than 1 module and / or any system operating at over 1 m/s travel speed, accurate lubrication becomes much more critical to the operation and service life of the system.

We offer complete, fully automatic solutions to delivering the optimum quantity of lubrication to all rack & pinion systems in the form of automatic, programmable lubrication lumps and pinions.

The system includes lubrication pinions that are designed to mesh with the teeth of the rack or pinion.

The lubrication pinion does not transmit any torque, it simply follows the rotational movement of the teeth to transfer lubricant directly onto the contact faces.

The material stores the lubricant and releases it gradually which avoids wear from inconsistent lubrication and also prevents over lubrication resulting in a more cost effective lubrication system.

Lubrication pinions are made of open cellular polyurethane foam with an operating temperature range from -30°C up to +150°C.

Using lubrication pinions of an open cell design ensures an optimal supply of lubricant to the tooth faces over long periods of use.

When lubricating rack & pinion systems, it is preferable to mesh the lubrication pinion with the drive pinion rather than along the rack travel.

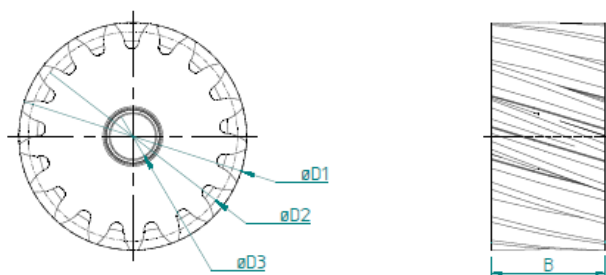
This is due to the fact that each tooth on the drive pinion sees more contact - and thus a greater potential for wear - than each tooth along the rack.

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Helical Lubrication Pinions

For Lubricating Standard Helical L/H Pinions

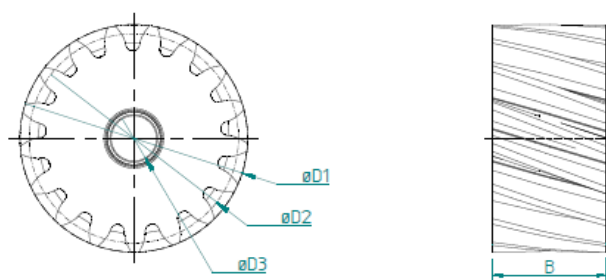


Design Parameter	Value
Helix Angle	R/H 19° 31' 42"
Pressure Angle	20°
Tooth Form	DIN 867
Material	PU Foam

Lubrication pinions are supplied complete with suitable bushing and sleeve bearing
Must be pre-lubricated prior to installation !

MOD	Tooth Number	Face Width (B)	Ø D3 (BORE)	Ø D2 (PCD)	Ø D1	Part Number
1.5	24	15	12	38.197	41.197	131-015-024
2	17	20	12	36.075	40.075	131-020-017
3	17	30	12	54.113	60.113	131-030-017
4	17	40	12	72.150	80.150	131-040-017
5	17	50	20	90.188	100.188	131-050-017
6	17	60	20	108.226	120.226	131-060-017
8	17	80	20	144.301	160.301	131-080-017
10	17	100	20	180.376	200.376	131-100-017

For Lubricating Standard Helical R/H Racks



Design Parameter	Value
Helix Angle	L/H 19° 31' 42"
Pressure Angle	20°
Tooth Form	DIN 867
Material	PU Foam

Lubrication pinions are supplied complete with suitable bushing and sleeve bearing
Must be pre-lubricated prior to installation !

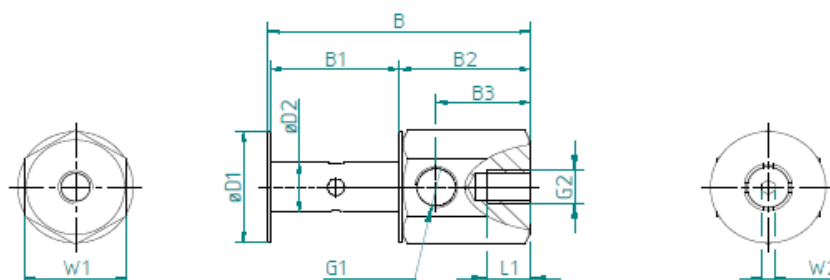
MOD	Tooth Number	Face Width (B)	Ø D3 (BORE)	Ø D2 (PCD)	Ø D1	Part Number
1.5	24	15	12	38.197	41.197	132-015-024
2	17	20	12	36.075	40.075	132-020-017
3	17	30	12	54.113	60.113	132-030-017
4	17	40	12	72.150	80.150	132-040-017
5	17	50	20	90.188	100.188	132-050-017
6	17	60	20	108.226	120.226	132-060-017
8	17	80	20	144.301	160.301	132-080-017
10	17	100	20	180.376	200.376	132-100-017

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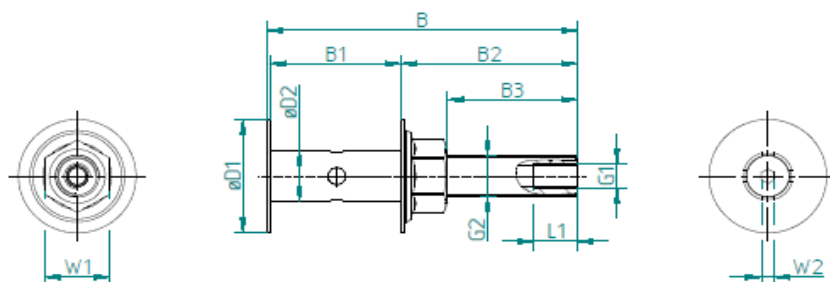
Mounting Axis

For Lubrication Pinions – Radial Supply



MOD	B1	D1	D2	L1	W2	B	B2	B3	G1	G2	W1	Part Number
1.5	15.2	27	12	10	3	46.4	30.6	22	G1/8	M8	24	133-015-001
2	20.2	27	12	10	3	54.4	30.6	22	G1/8	M8	24	133-020-001
3	30.2	27	12	10	3	61.4	30.6	22	G1/8	M8	24	133-030-001
4	40.2	27	12	10	3	71.4	30.6	22	G1/8	M8	24	133-040-001
5	50.2	60	20	10	4	81.4	30.6	22	G1/8	M8	24	133-050-001
6	60.2	60	20	10	4	91.4	30.6	22	G1/8	M8	24	133-060-001
8	80.2	60	20	10	4	111.4	30.6	22	G1/8	M8	24	133-080-001
10	100.2	100	20	10	4	131.4	30.6	22	G1/8	M8	24	133-100-001

For Lubrication Pinions – Axial Supply

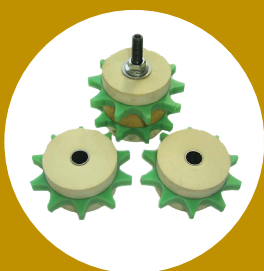


MOD	B1	D1	D2	L1	W2	B	B2	B3	G1	G2	W1	Part Number
1.5	15.2	27	12	10	3	60.2	44.6	34.2	M6	M10	15	133-015-002
2	20.2	27	12	10	3	61.2	41.2	30.6	M6	M10	15	133-020-002
3	30.2	27	12	10	3	71.2	40.4	30	M6	M10	15	133-030-002
4	40.2	27	12	10	3	81.2	40.4	30	M6	M10	15	133-040-002
5	50.2	60	20	10	4	116.4	65.6	49.1	G1/8	M16	24	133-050-002
6	60.2	60	20	10	4	126.4	65.6	49.1	G1/8	M16	24	133-060-002
8	80.2	60	20	10	4	146.4	65.6	49.1	G1/8	M16	24	133-080-002
10	100.2	100	20	10	4	166.4	65.6	49.1	G1/8	M16	24	133-100-002

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