

PINION CAPABILITIES



Standard Range:

The index on the next page provides an overview of our Standard range of straight (spur) and helical tooth pinions. Pinions in the standard range are usually in stock allowing for short delivery times. The standard pinions are available in 5 styles, master gear, plain bore

(soft bore allows customer to rework to required diameter), bored and keyed, flange mount to ISO 9409-1 and pinion shafts in modules 1 – 10 (diametral pitch (d.p.) = 25.4 – 2.54) with quality from AGMA 8 to AGMA 12.

The standard range is completed by the innovative PDP split pinion for eliminating backlash between rack & pinion.

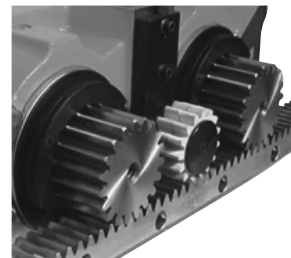


Custom Pinions:

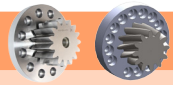
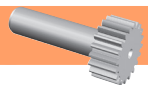
In addition to the standard range, Andantex can provide Straight or Helical pinions with internal or external teeth to customer designs:

- Precision milled teeth in modules 0.5-24 and diameters up to 5000 mm (200 in.)

- Shaped or hobbled teeth in modules 0.5 - 10 (d.p. = 50.8 – 2.54) with pitch diameters up to 800 mm (31.5 in.) and widths up to 180 mm (7 in.)
- Ground teeth in modules 1 – 10 (d.p. = 25.4 – 2.54) with pitch diameter up to 2000 mm (79 in.)
- Material hardened or plated
- Stainless Steel
- Plastic



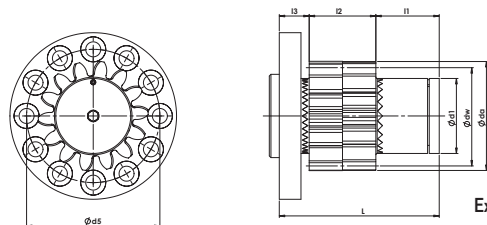
RANGE OF PINIONS

Part Numbers	Style	Module	Heat	Quality Treatment	Page Level
 Pinions - PDP (Preloaded Double Pinion)					
113-____-____	Straight (spur)	2, 3, 4, 5	Hardened & Ground	6 e 25 (~AGMA 11)	40
123-____-____	Helical	2, 3, 4, 5	Hardened & Ground	6 e 25 (~AGMA 11)	40
 Pinions - Flange mounted per ISO 9409-1					
112-____-____	Straight Spur	2, 3, 4, 5	Hardened & Ground	6 e 25 (~AGMA 12)	42
122-____-____	Helical	2, 3, 4, 5	Hardened & Ground	6 e 25 (~AGMA 12)	42
 Pinions - Master Gear					
117-____-____	Straight (spur)	2, 3, 4, 5, 6	Hardened & Ground	6 e 25 (~AGMA 12)	45
127-____-____	Helical	2, 3, 4, 5, 6	Hardened & Ground	6 e 25 (~AGMA 12)	47
 Pinions - Plain Bore					
254 0__	Straight (spur)	1.5, 2, 2.5, 3, 4, 5, 6, 8, 10	Hardened & Ground	6 f 24 (~AGMA 12)	49
254 5__	Helical	1.5, 2, 2.5, 3, 4, 5, 6, 8, 10	Hardened & Ground	6 f 24 (~AGMA 12)	49
154 ____	Straight (spur)	2, 5, 7.5, 10, 12.5, 16, 20, 25 Circular Pitch	Hardened & Ground	6 f 24 (~AGMA 12)	49
 Pinions - Bored & Keyed					
113-____-____	Straight (spur)	2, 3, 4	Hardened & Ground	7 e 25 (~AGMA 11)	50
123-____-____	Helical	2, 3, 4	Hardened & Ground	7 e 25 (~AGMA 11)	52
154 ____	Straight (spur)	2, 5, 7.5, 10, 12.5, 16, 20, 25 Circular Pitch	Hardened & Ground	6 f 24 (~AGMA 11)	54
14 _ ____	Straight (spur)	1.5, 2, 2.5, 3, 4, 5, 6	Hardened & Ground	6 f 24 (~AGMA 11)	55
14 _ ____	Helical	1.5, 2, 2.5, 3, 4, 5, 6, 8	Hardened & Ground	6 f 24 (~AGMA 11)	56
 Pinions - Shaft					
201 ____	Straight (spur)	1, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10	Hardened & Ground	6 f 24 (~AGMA 12)	57
4 _ ____	Straight (spur)	2, 3.33, 5, 7.5, 10, 12.5, 16, 20 Circular Pitch	Hardened & Ground	6 f 24 (~AGMA 12)	57
211____	Helical	1.5, 2, 2.5, 3, 4, 5, 6, 8	Hardened & Ground	6 f 24 (~AGMA 12)	58

* Note all AGMA quality grades in this catalog are based on AGMA standard 2000-A88. The new AGMA quality numbers defined in AGMA 2015-1-A01 are similar to the DIN numbers shown.

NEW! PRELOADED DOUBLE PINION WITH STRAIGHT & HELICAL TEETH - VERSION 2013

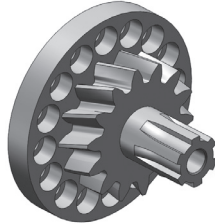
Our new Preloaded Double Pinion enables a back-lash-free drive in connection with a rack. A flange acc. to ISO 9409-1 connects the Preloaded Double Pinion with a gearbox. The Preloaded Double Pinion is available as either helical or straight teeth type. Unique hirth couplings are used to preload the pinion and connect it to the flange. In addition to our standard range shown below, we offer customized Preloaded Double Pinions as well. Parameters such as module or number of teeth can be chosen to suit customers' requirements.



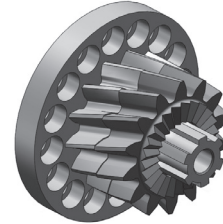
Assembly Instructions

NEW! Preloaded Double Pinion (PDP)

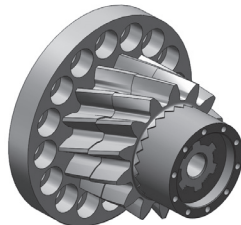
1. Assembly flange to the gearbox



2. Install the PDP on the shaft

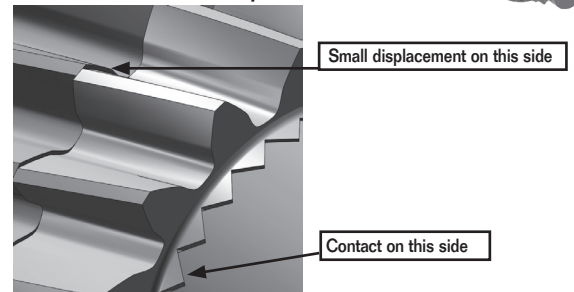


3. Install the pressure plate of the Hirth-Coupling

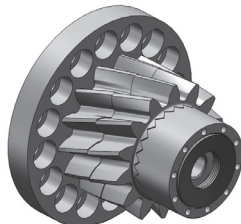


CAUTION: THE DISPLACEMENT AND CONTACT MUST BE AS SHOWN BEFORE PRELOADING TO AVOID DAMAGING PDP

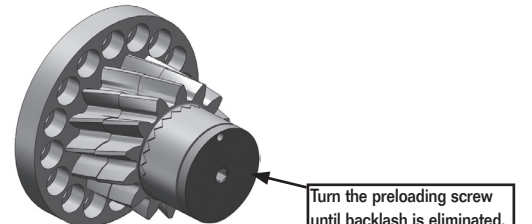
4. Choose the correct position



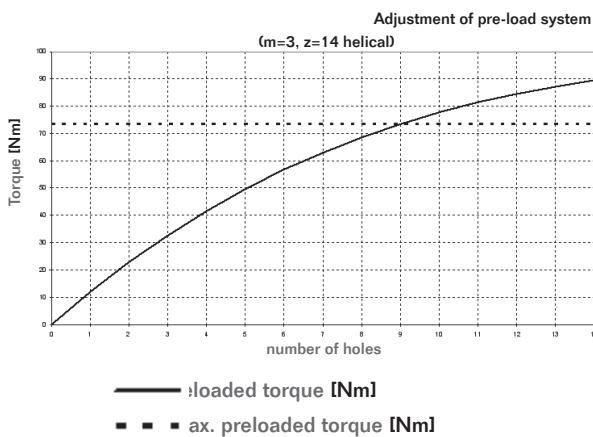
5. Install the disc springs



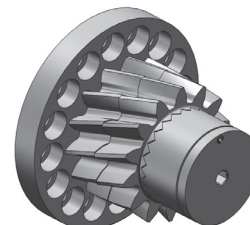
6. Insert the preloading screw and preload until backlash is eliminated



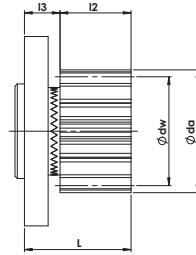
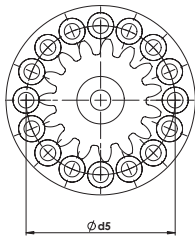
7. Use the diagram and turn the number of holes required for preload



8. Insert the locking set screw



NEW! FLANGE PINION



MODULES 2 - 5

Straight (Spur) teeth or Helical,
Pressure angle $\phi=20^\circ$
L.H. Helix angle $\beta=19^\circ 31' 42''$
Material STEEL AISI 5115 DIN 1.7131 (16MnCr5)
Case Hardened & Ground Teeth 58-62 HRC
Gear Quality 6e24 (~AGMA 11)

Straight Teeth

Module	No. Teeth	β	x	d_w	d_a	d_5	L	l_2	l_3	Flange Type	Part No.
2	22	0°	0.500	46	50	63	40	25	15	1	112-120-022
3	15	0°	0.167	46	52	63	45	30	15	1	112-130-015
3	19	0°	0.500	60	66	80	58	30	18	2	112-230-019
4	14	0°	0.250	58	66	80	58	40	18	2	112-240-014
4	20	0°	0.250	82	90	125	65	40	25	3	112-340-020
5	15	0°	0.500	80	90	125	75	50	25	3	112-350-015

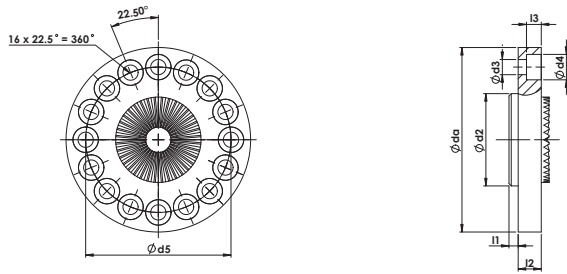
Helical Teeth

Module	No. teeth	β	x	d_w	d_a	d_5	L	l_2	l_3	Flange Type	Part No.
2	22	$19^\circ 31' 42''$	0.330	48	52	63	40	25	15	1	122-120-022
3	14	$19^\circ 31' 42''$	0.239	46	52	63	45	30	15	1	122-130-014
3	18	$19^\circ 31' 42''$	0.450	60	66	80	58	30	18	2	122-230-018
4	13	$19^\circ 31' 42''$	0.353	58	66	80	58	40	18	2	122-240-013
4	19	$19^\circ 31' 42''$	0.170	82	90	125	65	40	25	3	122-340-019
5	14	$19^\circ 31' 42''$	0.573	80	90	125	75	50	25	3	122-350-014

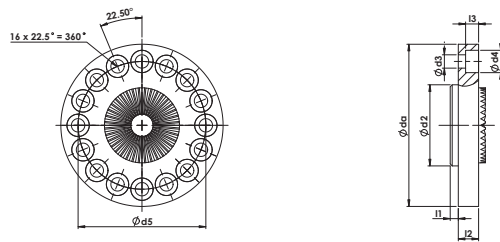
x - addendum modification.

In addition to our standard range shown above, we offer customized Flange Pinions as well. Parameters such as module or number of teeth can be chosen to suit customers' requirements.

FLANGE DIMENSIONS Use for Preloaded Double Pinion & Flange Pinion



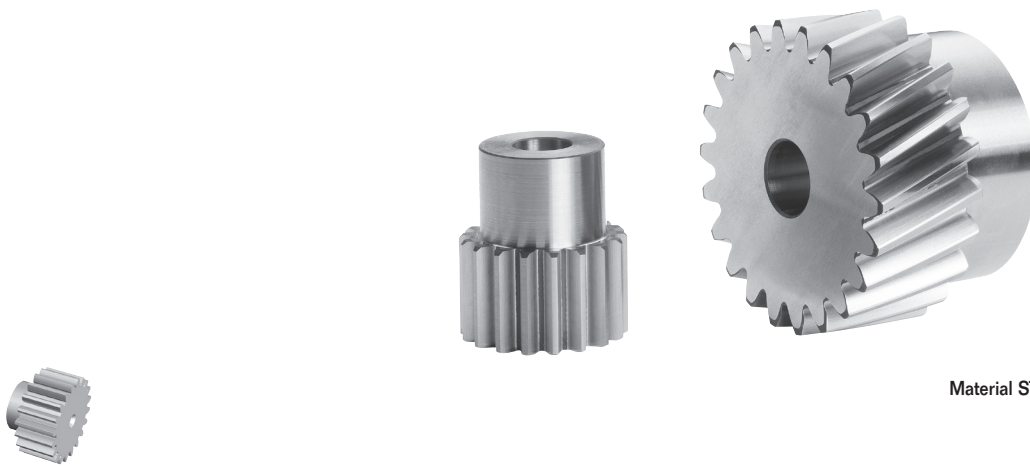
Flange Type	d_a	d_2	d_3	d_4	d_5	l_1	l_2	l_3
1	80	40	6.6	11	63	4	10	6.4



Flange Type	d_a	d_2	d_3	d_4	d_5	l_1	l_2	l_3
2	100	50	9	15	80	6	13	8.6
3	160	80	11	18	125	6	20	10.6



Master-Gears



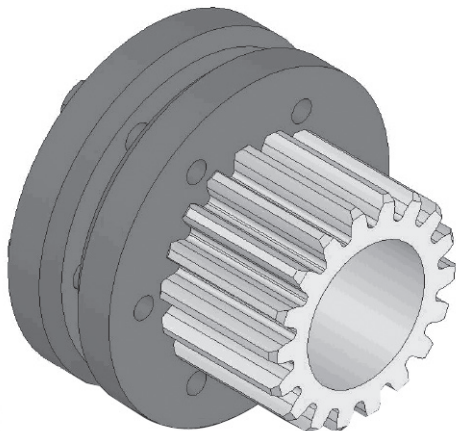
Straight (Spur) Teeth or Helical
Pressure angle $\alpha=20^\circ$
L.H. Helix angle $\beta=19^\circ 31'42''$
Material STEEL AISI 5115 DIN 1.7131 (16MnCr5)
Teeth Induction hardened & ground
Gear Quality 6e25 (~AGMA 11)

Module 2-6 product range

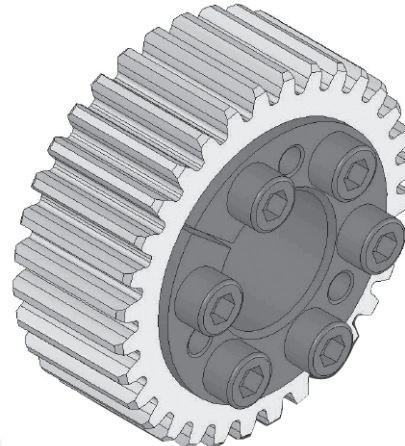
The teeth of the master-gears are case-hardened and ground. The hub and the bore will be machined according to the operating range. Thereby the delivery time is shorter and the spectrum of applications will be enlarged.

Examples

with shrink discs

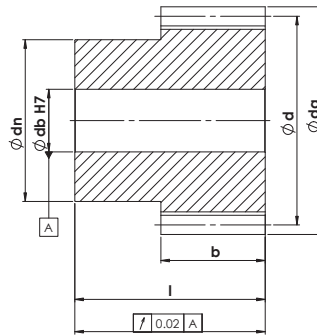


with locking assemblies



MODULAR RACK & PINION SYSTEM

Straight (Spur) Teeth
Pressure angle $\phi=20^\circ$
Material AISI 5115 (16MnCr5)
Carburized and teeth induction hardened
Quality 6e25 (–AGMA 11)



MASTER-GEARS

Ground, Straight (Spur) Teeth



Module 2.0

No. teeth	d	d _a	d _b H7	b	d _n	l	Part No.
18	36.0	40.0	18	25	30	47	117-020-018
20	40.0	44.0	18	25	30	47	117-020-020
22	44.0	48.0	18	25	36	47	117-020-022
25	50.0	54.0	18	25	44	53	117-020-025
28	56.0	60.0	18	25	50	53	117-020-028
30	60.0	64.0	24	25	54	53	117-020-030
32	64.0	68.0	24	25	55	53	117-020-032
36	72.0	76.0	24	25	65	53	117-020-036
40	80.0	84.0	24	25	68	53	117-020-040

Module 3.0

No. teeth	d	d _a	d _b H7	b	d _n	l	Part No.
18	54.0	60.0	24	30	45	45	117-030-018
20	60.0	66.0	24	30	48	48	117-030-020
22	66.0	72.0	24	30	55	55	117-030-022
25	75.0	81.0	24	30	62	62	117-030-025
28	84.0	90.0	24	30	68	68	117-030-028
30	90.0	96.0	24	30	68	68	117-030-030
32	96.0	102.0	24	30	68	68	117-030-032
36	108.0	114.0	24	30	68	68	117-030-036

Dimensions are in mm and subject to change – consult factory.

MASTER-GEARS

Ground, Straight (Spur) Teeth

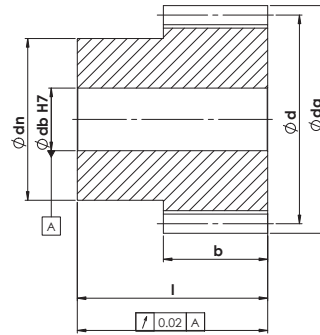
Straight (Spur) Teeth

Pressure angle $\phi=20^\circ$

Material AISI 5115 (16MnCr5)

Carburized and teeth induction hardened

Quality 6e25 (~AGMA 11)



Module 4.0

No. teeth	d	d _a	d _b H7	b	d _n	l	Part No.
18	72.0	80.0	24	40	62	73	117-040-018
20	80.0	88.0	24	40	62	73	117-040-020
22	88.0	96.0	24	40	68	73	117-040-022
25	100.0	108.0	24	40	80	74	117-040-025
28	112.0	120.0	24	40	80	74	117-040-028
30	120.0	128.0	30	40	80	74	117-040-030
32	128.0	136.0	30	40	110	74	117-040-032
36	144.0	152.0	30	40	110	74	117-040-036

Module 5.0

No. teeth	d	d _a	d _b H7	b	d _n	l	Part No.
22	110.0	120.0	24	50	90	91	117-050-022
25	125.0	135.0	24	50	110	101	117-050-025
28	140.0	150.0	24	50	110	101	117-050-028
30	150.0	160.0	30	50	110	101	117-050-030
32	160.0	170.0	30	50	110	101	117-050-032
36	180.0	190.0	30	50	110	101	117-050-036

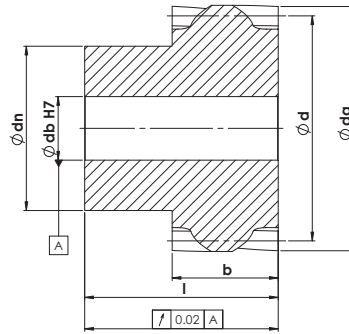
Module 6.0

No. teeth	d	d _a	d _b H7	b	d _n	l	Part No.
20	120.0	132.0	30	60	100	140	117-060-020
25	150.0	162.0	30	60	130	140	117-060-025
28	168.0	180.0	30	60	130	140	117-060-028
30	180.0	192.0	30	60	140	140	117-060-030

Dimensions are in mm and subject to change – consult factory.

MODULAR RACK & PINION SYSTEM

Helical, left hand
Helix angle $19^{\circ} 31' 42''$
Pressure angle $\phi=20^{\circ}$
Material AISI 5115 (16MnCr5)
Carburized and teeth induction hardened
Quality 6e25 (~AGMA 11)



MASTER-GEARS

Ground, Helical Teeth



Module 2.0

No. teeth	d	d _a	d _b H7	b	d _n	l	Part No.
18	38.2	42.20	18	25	30	47	127-020-018
20	42.44	46.44	18	25	30	47	127-020-020
22	46.69	50.69	18	25	36	47	127-020-022
25	53.05	57.05	18	25	44	53	127-020-025
28	59.42	63.42	18	25	50	53	127-020-028
30	63.66	67.66	24	25	54	53	127-020-030
32	67.91	71.91	24	25	55	53	127-020-032
36	76.39	80.39	24	25	65	53	127-020-036
40	84.88	88.88	24	25	68	53	127-020-040

Module 3.0

No. teeth	d	d _a	d _b H7	b	d _n	l	Part No.
18	57.30	63.30	24	30	45	52	127-030-018
20	63.66	69.66	24	30	48	52	127-030-020
22	70.03	76.03	24	30	62	52	127-030-022
25	79.58	85.58	24	30	62	58	127-030-025
28	89.13	95.13	24	30	68	58	127-030-028
30	95.49	101.49	24	30	68	58	127-030-030
32	101.86	107.86	24	30	68	58	127-030-032
36	114.59	120.59	24	30	68	58	127-030-036

Dimensions are in mm and subject to change – consult factory.

MASTER-GEARS

Ground, Helical Teeth

Helical, left hand

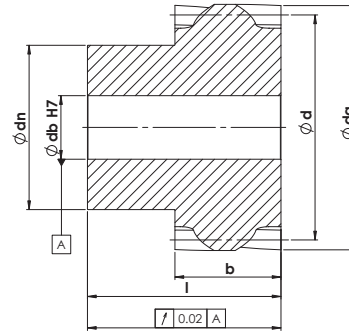
Helix angle $19^{\circ} 31' 42''$

Pressure angle $\phi=20^{\circ}$

Material AISI 5115 (16MnCr5)

Carburized and teeth induction hardened

Quality 6e25 (~AGMA 11)



Module 4.0

No. teeth	d	d _a	d _b H7	b	d _n	l	Part No.
18	76.39	84.39	24	40	62	73	127-040-018
20	84.88	92.88	24	40	62	73	127-040-020
22	93.37	101.37	24	40	68	73	127-040-022
25	106.10	114.10	24	40	80	74	127-040-025
28	118.84	126.84	24	40	80	74	127-040-028
30	127.32	135.32	30	40	80	74	127-040-030
32	135.81	143.81	30	40	110	74	127-040-032
36	152.79	160.79	30	40	110	74	127-040-036

Module 5.0

No. teeth	d	d _a	d _b H7	b	d _n	l	Part No.
22	116.71	126.71	24	50	90	91	127-050-022
25	132.63	142.63	24	50	110	101	127-050-025
28	148.54	158.54	24	50	110	101	127-050-028
30	159.16	169.16	30	50	110	101	127-050-030
32	169.77	179.77	30	50	110	101	127-050-032
36	190.99	200.99	30	50	110	101	127-050-036

Module 6.0

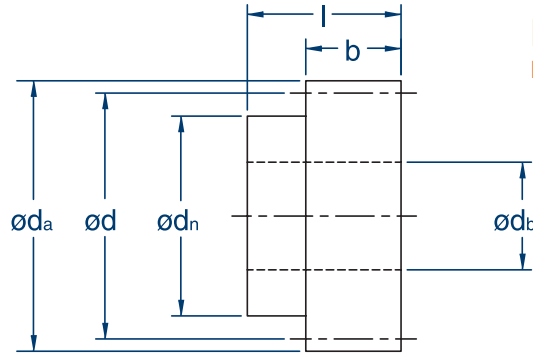
No. teeth	d	d _a	d _b H7	b	d _n	l	Part No.
20	127.3	139.0	30	60	100	140	117-060-020
25	159.2	171.2	30	60	130	140	117-060-025
28	178.3	190.0	30	60	130	140	117-060-028
30	191.0	203.0	30	60	140	140	117-060-030

Dimensions are in mm and subject to change – consult factory.

MODULAR RACK & PINION SYSTEM

MODULE 1.5 - 10.0

Straight (Spur) Teeth
Pressure angle $\phi=20^\circ$
Material AISI 5115 (16MnCr5)
Case hardened, 60HRC, ground & crowned teeth
Quality 6f24 (~AGMA 11)



PINIONS

PLAIN BORE (CAN BE REWORKED)



No. teeth	Module	d	da	db H7	dn	b	l	Part No.
20	1.5	30.0	33	10.0	25.0	20	28	254 012
20	2.0	40.0	44	15.0	34.5	20	30	254 022
20	2.5	50.0	55	15.0	40.0	25	37	254 032
20	3.0	60.0	66	15.0	40.0	30	44	254 042
20	4.0	80.0	88	30.0	65.0	40	59	254 052
20	5.0	100.0	110	40.0	85.0	50	70	254 062
20	6.0	120.0	132	50.0	104.0	60	100	254 072
20	8.0	160.0	176	50.0	120.0	80	130	254 082
20	10.0	200.0	220	50.0	150.0	100	150	254 092

MODULE 1.5 - 10.0

Helical teeth, left hand
Pressure angle $\phi=20^\circ$
Helix angle $\beta=19^\circ 31'42''$
Material AISI 5115 (16MnCr5)
Case hardened, 60HRC, ground & crowned teeth
Quality 6f24 (~AGMA 11)



No. teeth	Module	d	da	db H7	dn	b	l	Part No.
20	1.5	31.83	34.83	10.0	25.0	20	28	254 512
20	2.0	42.44	46.44	15.0	35.0	20	30	254 522
20	2.5	53.05	58.05	15.0	40.0	25	37	254 532
20	3.0	63.66	69.66	15.0	40.0	30	44	254 542
20	4.0	84.88	92.88	30.0	65.0	40	59	254 552
20	5.0	106.10	116.10	40.0	85.0	50	70	254 562
20	6.0	127.22	139.30	50.0	105.0	60	100	254 572
20	8.0	169.76	185.70	50.0	120.0	80	130	254 582
20	10.0	212.21	232.20	50.0	150.0	100	150	254 592

CIRCULAR PITCH 2.0-25.0

Straight (Spur) Teeth
Pressure angle $\phi=20^\circ$
Material AISI 5115 (16MnCr5)
Case hardened, 60 HRC, ground & crowned teeth
Quality 6f24 (~AGMA 11)



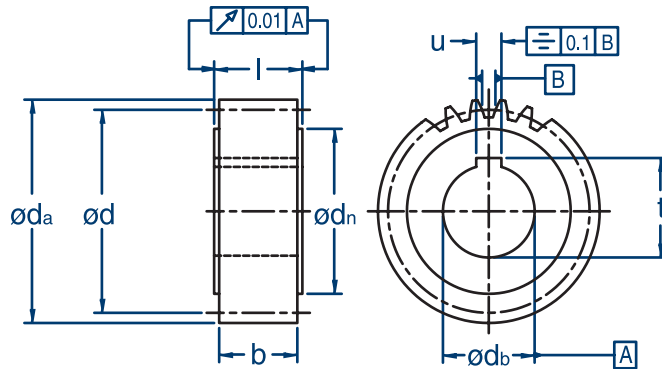
No. teeth	Pitch	d	da	db H7	dn	b	l	Part No.
25	2.0	15.92	17.2	5.0	10.0	9.5	15	154 020*
20	5.0	31.83	35.0	10.0	25.0	14.5	23	154 050
20	7.5	47.75	52.5	15.0	40.0	19.5	30	154 075
20	10.0	63.66	70.0	15.0	50.0	29.5	43	154 100
20	12.5	79.58	87.5	30.0	65.0	40.0	60	154 125
20	16.0	101.86	112.1	40.0	85.0	50.0	90	154 160
20	20.0	127.32	140.1	50.0	105.0	60.0	105	154 201
20	25.0	159.15	175.1	50.0	135.0	80.0	105	154 251

* Material: Nitralloy 135 (EGT 100) nitrided.
Dimensions are in mm and are subject to change - consult factory.

ANDANTEX

49

PINIONS BORED & KEYED



MODULE 2.0

Straight (Spur) Teeth
Pressure angle $\phi=20^\circ$
Material AISI 5115 (16MnCr5)
Case Hardened & Ground Teeth
Quality 7e25 (~AGMA 10)

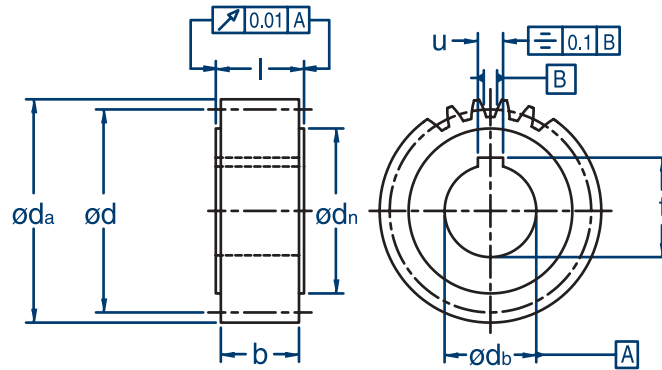
No. teeth	d	da	db H6	dn	b	l	u	t	Part No.
16	32.0	36.0	15	25	28	30	5	17.3	113-120-516
18	36.0	40.0	20	25	28	30	6	22.8	113-220-018
20	40.0	44.0	20	30	28	30	6	22.8	113-220-020
22	44.0	48.0	15	25	28	30	5	17.3	113-120-522
22	44.0	48.0	20	30	28	30	6	22.8	113-220-022
22	44.0	48.0	25	36	28	30	8	28.3	113-220-522
25	50.0	54.0	20	30	28	30	6	22.8	113-220-025
25	50.0	54.0	25	36	28	30	8	28.3	113-220-525
25	50.0	54.0	30	45	28	30	8	33.3	113-320-025
28	56.0	60.0	20	30	28	30	6	22.8	113-220-028
28	56.0	60.0	25	36	28	30	8	28.3	113-220-528
28	56.0	60.0	30	45	28	30	8	33.3	113-320-028
28	56.0	60.0	35	48	28	30	10	38.3	113-320-528
32	64.0	68.0	20	30	28	30	6	22.8	113-220-032
32	64.0	68.0	25	36	28	30	8	28.3	113-220-532
32	64.0	68.0	30	45	28	30	8	33.3	113-320-032
32	64.0	68.0	35	48	28	30	10	38.3	113-320-532
36	72.0	76.0	25	36	28	30	8	28.3	113-220-536
36	72.0	76.0	30	45	28	30	8	33.3	113-320-036
36	72.0	76.0	35	48	28	30	10	38.3	113-320-536
36	72.0	76.0	45	58	28	30	14	48.8	113-420-536
40	80.0	84.0	25	36	28	30	8	28.3	113-220-540
40	80.0	84.0	30	45	28	30	8	33.3	113-320-040
40	80.0	84.0	35	48	28	30	10	38.3	113-320-540
40	80.0	84.0	45	58	28	30	14	48.8	113-420-540
45	90.0	94.0	35	48	28	30	10	38.3	113-320-545
45	90.0	94.0	45	58	28	30	14	48.8	113-420-545
50	100.0	104.0	35	48	28	30	10	38.3	113-320-550
50	100.0	104.0	45	58	28	30	14	48.8	113-420-550

Dimensions are in mm and are subject to change - consult factory.

MODULAR RACK & PINION SYSTEM

MODULE 3.0

Straight (Spur) Teeth
Pressure angle $\phi=20^\circ$
Material AISI 5115 (16MnCr5)
Case Hardened & Ground Teeth
Quality 7e25 (~AGMA 10)



PINIONS BORED & KEYED

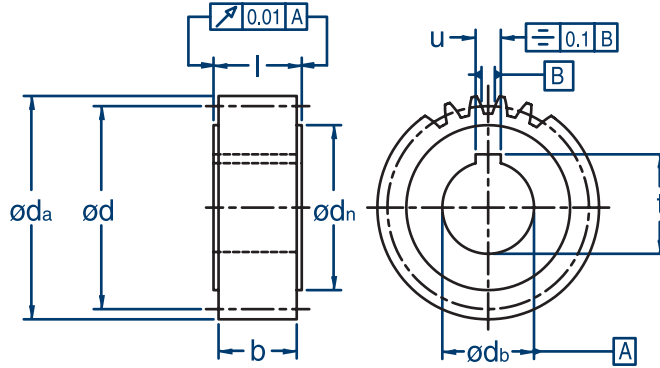
No. teeth	d	da	db H6	dn	b	l	u	t	Part No.
18	54.0	60.0	25	36	28	30	8	28.3	113-230-518
20	60.0	66.0	25	36	28	30	8	28.3	113-230-520
20	60.0	66.0	30	45	28	30	8	33.3	113-330-020
20	60.0	66.0	35	48	28	30	10	38.3	113-330-520
22	66.0	72.0	25	36	28	30	8	28.3	113-230-522
22	66.0	72.0	30	45	28	30	8	33.3	113-330-022
22	66.0	72.0	35	48	28	30	10	38.3	113-330-522
25	75.0	81.0	25	36	28	30	8	28.3	113-230-525
25	75.0	81.0	30	45	28	30	8	33.3	113-330-025
25	75.0	81.0	35	48	28	30	10	38.3	113-330-525
25	75.0	81.0	45	58	28	30	14	48.8	113-430-525
28	84.0	90.0	25	36	28	30	8	28.3	113-230-528
28	84.0	90.0	30	45	28	30	8	33.3	113-330-028
28	84.0	90.0	35	48	28	30	10	38.3	113-330-528
28	84.0	90.0	45	58	28	30	14	48.8	113-430-528
32	96.0	102.0	25	36	28	30	8	28.3	113-230-532
32	96.0	102.0	30	45	28	30	8	33.3	113-330-032
32	96.0	102.0	35	48	28	30	10	38.3	113-330-532
32	96.0	102.0	45	58	28	30	14	48.8	113-430-532
36	108.0	114.0	35	48	28	30	10	38.3	113-330-536
36	108.0	114.0	45	58	28	30	14	48.8	113-430-536
40	120.0	126.0	35	48	28	30	10	38.3	113-330-540
40	120.0	126.0	45	58	28	30	14	48.8	113-430-540

Dimensions are in mm and are subject to change - consult factory.



MODULAR RACK & PINION SYSTEM

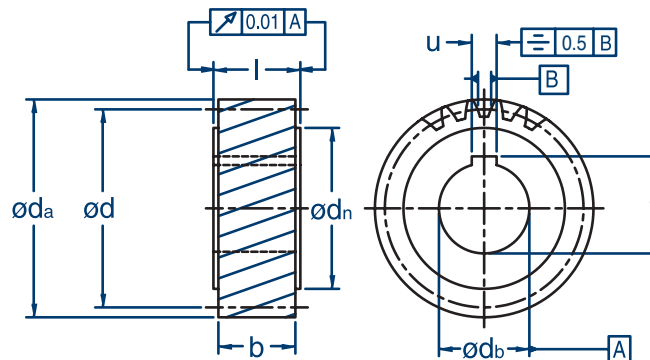
PINIONS BORED & KEYPED



MODULE 4.0

Straight (Spur) teeth
Pressure angle $\phi=20^\circ$
Material AISI 5115 (16MnCr5)
Case Hardened & Ground Teeth
Quality 7e25 (~AGMA 10)

No. teeth	d	da	db H6	dn	b	l	u	t	Part No.
20	80.0	88.0	35	52	40	50	10	38.3	113-340-520
20	80.0	88.0	45	65	40	50	14	48.8	113-440-520
22	88.0	96.0	35	52	40	50	10	38.3	113-340-522
22	88.0	96.0	45	65	40	50	14	48.8	113-440-522
25	100.0	108.0	35	52	40	50	10	38.3	113-340-525
25	100.0	108.0	45	65	40	50	14	48.8	113-440-525
28	112.0	120.0	35	52	40	50	10	38.3	113-340-528
28	112.0	120.0	45	65	40	50	14	48.8	113-440-528
32	128.0	136.0	35	52	40	50	10	38.3	113-340-532
32	128.0	136.0	45	65	40	50	14	48.8	113-440-532
40	160.0	168.0	45	65	40	50	14	48.8	113-440-540
40	160.0	168.0	60	80	40	50	18	64.3	113-640-040



MODULE 2.0

Helical Teeth, Left Hand
Teeth pressure angle $\phi=20^\circ$
Helix angle $\beta=19^\circ 31'42''$
Material AISI 5115 (16MnCr5)
Case hardened, ground teeth
Quality 7e25 (~AGMA 10)

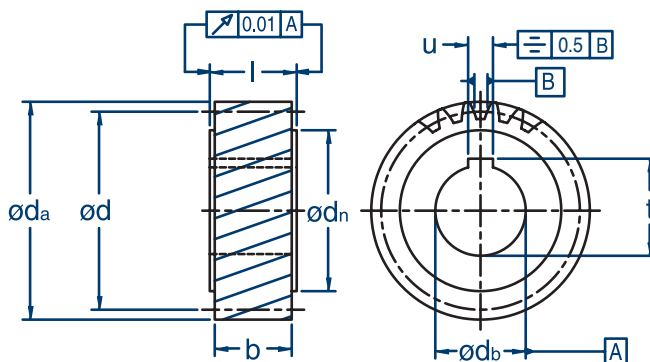
No. teeth	d	da	db H6	dn	b	l	u	t	Part No.
20	42.44	46.4	20	30	28	30	6	22.8	123-220-020
25	53.05	57.1	20	30	28	30	6	22.8	123-220-025
25	53.05	57.1	25	36	28	30	8	28.3	123-220-525
28	59.42	63.4	35	48	28	30	10	38.3	123-320-528
30	63.66	67.7	25	36	28	30	8	28.3	123-220-530
30	63.66	67.7	30	45	28	30	8	33.3	123-320-030
32	67.91	71.9	20	30	28	30	6	22.8	123-220-032
32	67.91	71.9	25	36	28	30	8	28.3	123-220-532
32	67.91	71.9	35	48	28	30	10	38.3	123-320-532
36	76.39	80.4	35	48	28	30	10	38.3	123-320-536
40	84.88	88.9	35	48	28	30	10	38.3	123-320-540

Dimensions are in mm and are subject to change - consult factory.

MODULAR RACK & PINION SYSTEM

MODULE 3.0

Helical teeth, Left Hand
pressure angle $\phi=20^\circ$
Helix angle $\beta=19^\circ 31'42''$
Material AISI 5115 (16MnCr5)
Case Hardened & Ground Teeth
Quality 7e25 (~AGMA 10)

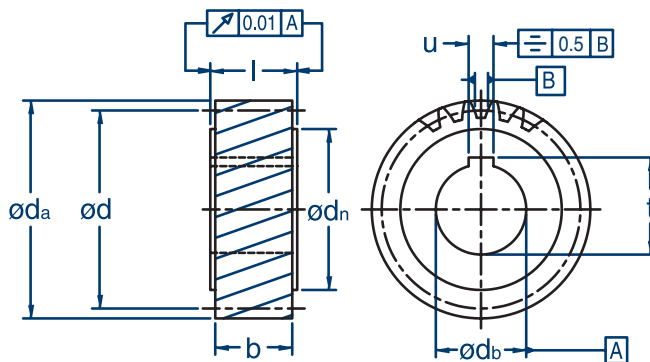


PINIONS BORED & KEYPED

No. teeth	d	da	db H6	dn	b	l	u	t	Part No.
20	63.66	69.7	30	45	28	30	8	33.3	123-330-020
20	63.66	69.7	35	48	28	30	10	38.3	123-330-520
22	70.03	76.0	25	36	28	30	8	28.3	123-230-522
22	70.03	76.0	30	45	28	30	8	33.3	123-330-022
22	70.03	76.0	35	48	28	30	10	38.3	123-330-522
25	79.58	85.6	25	36	28	30	8	28.3	123-230-525
25	79.58	85.6	30	45	28	30	8	33.3	123-330-025
25	79.58	85.6	35	48	28	30	10	38.3	123-330-525

MODULE 4.0

Helical teeth, Left Hand
pressure angle $\phi=20^\circ$
Helix angle $\beta=19^\circ 31'42''$
Material AISI 5115 (16MnCr5)
Case Hardened & Ground Teeth
Quality 7e25 (~AGMA 10)

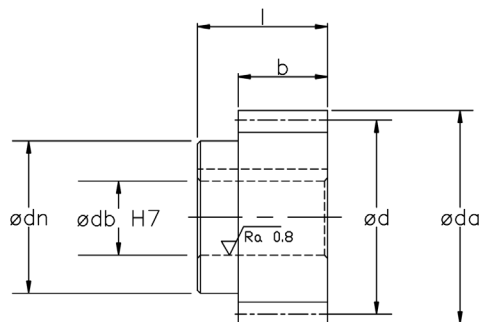


No. teeth	d	da	db H6	dn	b	l	u	t	Part No.
15	63.66	71.7	35	48	40	50	10	38.3	123-340-515
20	84.88	92.9	35	48	40	50	10	38.3	123-340-520
20	84.88	92.9	45	58	40	50	14	48.8	123-440-520
22	93.37	101.4	35	52	40	50	10	38.3	123-340-522
22	93.37	101.4	45	65	40	50	14	48.8	123-440-522
25	106.10	114.1	35	48	40	50	10	38.3	123-340-525
25	106.10	114.1	45	58	40	50	14	48.8	123-440-525

Dimensions are in mm and are subject to change - consult factory.

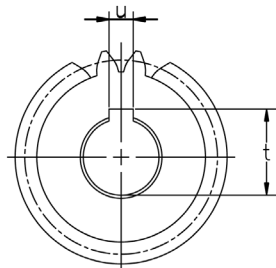
MODULAR RACK & PINION SYSTEM

PINIONS BORED & KEYED



CIRCULAR PITCH P=2, 5, 7.5, 10, 12.5, 16, 20, & 25

Straight (Spur) teeth
Pressure angle $\phi=20^\circ$
Material AISI 5115 (16MnCr5)
Case hardened, 60 HRc,
Ground & Crowned teeth
Quality 6f24 (-AGMA 11)



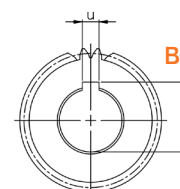
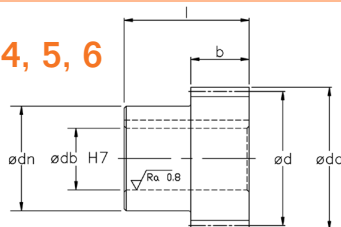
No. teeth	pitch	Module	d	da	db H7	dn	b	l	u	t	Part No.
25	2.0	0.637	15.915	17.19	6	10	9.5	15	2	7.0	154021
25	2.0	0.637	15.915	17.19	7	10	9.5	15	2	8.0	154022
20	5.0	1.592	31.831	35.01	11	25	14.5	23	4	12.8	154051
20	5.0	1.592	31.831	35.01	14	25	14.5	23	5	16.3	154052
20	5.0	1.592	31.831	35.01	16	25	14.5	23	5	18.3	154053
20	7.5	2.387	47.746	52.52	22	40	19.5	30	6	24.8	154076
20	7.5	2.387	47.746	52.52	25	40	19.5	30	8	28.3	154077
20	7.5	2.387	47.746	52.52	30	40	19.5	30	8	33.3	154078
20	10.0	3.183	63.662	70.03	22	50	29.5	43	6	24.8	154101
20	10.0	3.183	63.662	70.03	25	50	29.5	43	8	28.3	154102
20	10.0	3.183	63.662	70.03	32	50	29.5	43	10	35.3	154103
20	12.5	3.979	79.557	87.54	32	65	40.0	60	10	35.3	154127
20	12.5	3.979	79.557	87.54	35	65	40.0	60	10	38.3	154128
20	12.5	3.979	79.557	87.54	40	65	40.0	60	12	43.3	154129
20	16.0	5.093	101.859	112.05	40	85	50.0	90	12	43.3	154161
20	16.0	5.093	101.859	112.05	45	85	50.0	90	14	48.8	154162
20	16.0	5.093	101.859	112.05	55	85	50.0	90	16	59.3	154163
20	20.0	6.366	127.324	140.06	55	105	60.0	105	16	59.3	154202
20	20.0	6.366	127.324	140.06	75	105	60.0	105	20	79.9	154203
20	20.0	6.366	127.324	140.06	85	105	60.0	105	22	90.4	154204
20	25.0	7.958	159.155	175.07	55	135	80.0	105	16	59.3	154252
20	25.0	7.958	159.155	175.07	75	135	80.0	105	20	79.9	154253
20	25.0	7.958	159.155	175.07	85	135	80.0	105	22	90.4	154254

Dimensions are in mm and are subject to change - consult factory.

MODULAR RACK & PINION SYSTEM

MODULES 1.5, 2, 2.5, 3, 4, 5, 6

Straight (Spur) teeth
Pressure angle $\phi=20^\circ$
Material AISI 5115 (16MnCr5)
Case Hardened, 60HRC, Ground & Crowned Teeth
Quality 6f24 (~AGMA 11)



PINIONS BORED & KEYED

No. teeth	Module	d	da	db H7	dn	b	l	u	t	Part No.
25	1.5	37.5	40.5	16	30	20	46	5	18.3	141501
32	1.5	48.0	51.0	22	36	20	48	6	24.8	141502
40	1.5	60.0	63.0	22	36	20	48	6	24.8	141503
25	2.0	50.0	54.0	16	30	28	54	5	18.3	142001
25	2.0	50.0	54.0	22	36	28	56	6	24.8	142002
28	2.0	56.0	60.0	30	50	28	60	8	33.3	142003
32	2.0	64.0	68.0	16	30	28	54	5	18.3	142004
32	2.0	64.0	68.0	22	36	28	56	6	24.8	142005
32	2.0	64.0	68.0	30	50	28	60	8	33.3	142006
32	2.0	64.0	68.0	32	55	28	65	10	35.3	142007
36	2.0	72.0	76.0	40	62	28	65	12	43.3	142008
40	2.0	80.0	84.0	32	55	28	65	10	35.3	142009
40	2.0	80.0	84.0	40	62	28	65	12	43.3	142010
40	2.0	80.0	84.0	45	68	28	65	14	48.8	142011
50	2.0	100.0	104.0	45	68	28	65	14	48.8	142012
22	2.5	55.0	60.0	22	36	28	56	6	24.8	142501
28	2.5	70.0	75.0	32	55	28	65	10	35.3	142502
36	2.5	90.0	95.0	40	62	28	65	12	43.3	142503
22	3.0	66.0	72.0	22	36	28	56	6	24.8	143001
22	3.0	66.0	72.0	25	44	28	60	8	28.3	143002
22	3.0	66.0	72.0	30	50	28	60	8	33.3	143003
22	3.0	66.0	72.0	32	55	28	65	10	35.3	143004
22	3.0	66.0	72.0	35	55	28	65	10	38.3	143005
25	3.0	75.0	81.0	40	62	28	65	12	43.3	143006
28	3.0	84.0	90.0	22	36	28	56	6	24.8	143007
28	3.0	84.0	90.0	25	44	28	60	8	28.3	143008
28	3.0	84.0	90.0	30	50	28	60	8	33.3	143009
28	3.0	84.0	90.0	32	55	28	65	10	35.3	143010
28	3.0	84.0	90.0	35	55	28	65	10	38.3	143011
28	3.0	84.0	90.0	45	68	28	65	14	48.8	143012
32	3.0	96.0	102.0	40	62	28	65	12	43.3	143013
36	3.0	108.0	114.0	45	68	28	65	14	48.8	143014
20	4.0	80.0	88.0	32	55	40	75	10	35.3	144001
20	4.0	80.0	88.0	35	55	40	75	10	38.3	144002
20	4.0	80.0	88.0	40	62	40	75	12	43.3	144003
22	4.0	88.0	96.0	45	68	40	75	14	48.8	144004
25	4.0	100.0	108.0	32	55	40	75	10	35.3	144005
25	4.0	100.0	108.0	35	55	40	75	10	38.3	144006
25	4.0	100.0	108.0	40	62	40	75	12	43.3	144007
25	4.0	100.0	108.0	55	80	40	80	16	59.3	144008
28	4.0	112.0	120.0	45	68	40	75	14	48.8	144009
32	4.0	128.0	136.0	88	80	40	80	16	59.3	144010
32	4.0	128.0	136.0	75	110	40	100	20	79.9	144011
40	4.0	160.0	168.0	75	110	40	100	20	79.9	144012
21	5.0	105.0	115.0	45	68	50	85	14	48.8	145001
21	5.0	105.0	115.0	55	80	50	90	16	59.3	145002
25	5.0	125.0	135.0	45	68	50	85	14	48.8	145003
25	5.0	125.0	135.0	55	80	50	90	16	59.3	145004
25	5.0	125.0	135.0	75	110	50	110	20	79.9	145005
21	6.0	126.0	138.0	55	80	60	100	16	59.3	146001
21	6.0	126.0	138.0	75	110	60	120	20	79.9	146002
25	6.0	150.0	162.0	55	80	60	100	16	59.3	146003
25	6.0	150.0	162.0	75	110	60	120	20	79.9	146004

Dimensions are in mm and are subject to change - consult factory.

ANDANTEX

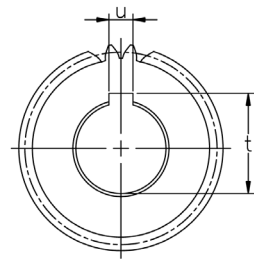
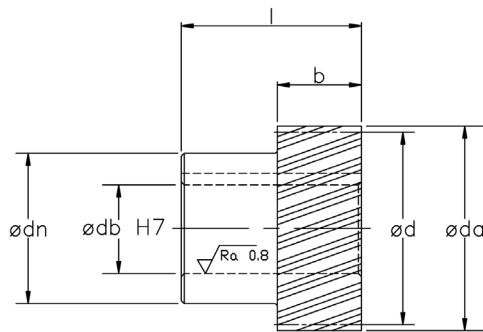
55

MODULAR RACK & PINION SYSTEM

PINIONS

BORED & KEYED

MODULES 1.5, 2, 2.5, 3, 4, 5, 6, 8



Helical Teeth, Left Hand
Pressure angle = 20°
Helix Angle = 19 31'42"
Material AISI 5115 (16MnCr5)
Case hardened, 60 HRC,
Ground & Crowned teeth
Quality 6f24 (~AGMA 11)

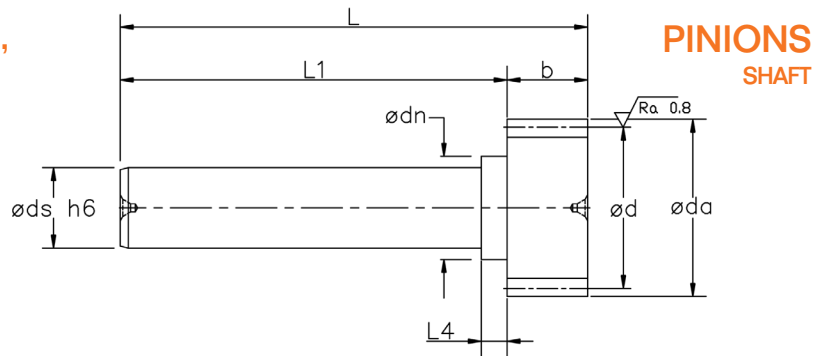
No. teeth	Module	d	da	db H7	dn	b	l	u	t	Part No.
21	1.5	33.423	36.42	16	30	20	46	5	18.3	141551
30	1.5	47.747	50.75	22	36	20	48	6	24.8	141552
39	1.5	62.071	65.07	22	36	20	48	6	24.8	141553
21	2.0	44.563	48.56	22	36	28	56	6	24.8	142051
30	2.0	63.662	67.66	22	36	28	56	6	24.8	142052
30	2.0	63.662	67.66	30	50	28	60	8	33.3	142053
30	2.0	63.662	67.66	32	55	28	65	10	35.3	142054
39	2.0	82.761	86.76	32	55	28	65	10	35.3	142055
20	2.5	53.052	58.05	22	36	28	56	6	24.8	142551
25	2.5	66.315	71.31	22	36	28	56	6	24.8	142552
25	2.5	66.315	71.31	32	55	28	65	10	35.3	142553
20	3.0	63.662	69.66	22	36	28	56	6	24.8	143051
20	3.0	63.662	69.66	25	44	28	60	8	28.3	143052
20	3.0	63.662	69.66	30	50	28	60	8	33.3	143053
20	3.0	63.662	69.66	32	55	28	65	10	35.3	143054
25	3.0	79.578	85.58	22	36	28	56	6	24.8	143055
25	3.0	79.578	85.58	25	44	28	60	8	28.3	143056
25	3.0	79.578	85.58	30	50	28	60	8	33.3	143057
25	3.0	79.578	85.58	32	55	28	65	10	35.3	143058
25	3.0	79.578	85.58	35	55	28	65	10	38.3	143059
18	4.0	76.394	84.39	32	55	40	75	10	35.3	144051
21	4.0	89.127	97.13	32	55	40	75	10	35.3	144052
21	4.0	89.127	97.13	35	55	40	75	10	38.3	144053
21	4.0	89.127	97.13	40	62	40	75	12	43.3	144054
21	4.0	89.127	97.13	45	68	40	75	14	48.8	144055
24	4.0	101.859	109.86	32	55	40	75	10	35.3	144056
24	4.0	101.859	109.86	35	55	40	75	10	38.3	144057
24	4.0	101.859	109.86	40	62	40	75	12	43.3	144058
24	4.0	101.859	109.86	45	68	40	75	14	48.8	144059
24	4.0	101.859	109.86	55	80	40	80	16	59.3	144060
18	5.0	95.493	105.49	45	68	50	85	14	48.8	145051
24	5.0	127.324	137.32	45	68	50	85	14	48.8	145052
24	5.0	127.324	137.32	55	80	50	90	16	59.3	145053
24	5.0	127.324	137.32	75	110	50	110	20	79.9	145054
20	6.0	127.324	139.32	55	80	60	100	16	59.3	146051
20	6.0	127.324	139.32	75	110	60	120	20	79.9	146052
25	6.0	159.155	171.16	55	80	60	100	16	59.3	146053
25	6.0	159.155	171.16	75	110	60	120	20	79.9	146054
18	8.0	152.789	168.79	75	110	80	140	20	79.9	148051

Dimensions are in mm and are subject to change - consult factory.

MODULAR RACK & PINION SYSTEM

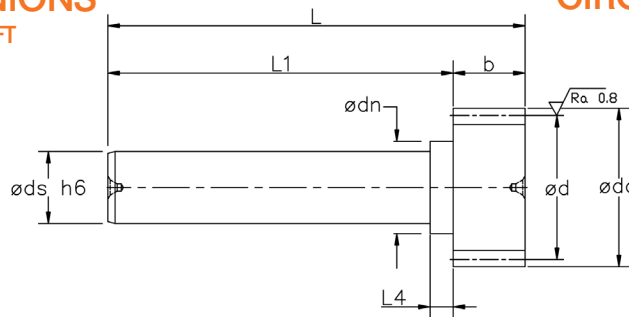
MODULES 1.0, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10

Straight (Spur) teeth
Pressure angle $\phi=20^\circ$
Material AISI 5115 (16MnCr5)
Case hardened, 60 HRC, Ground & Crowned teeth
Quality 6f24 (~AGMA 11)



No. teeth	Module	d	da	ds	dn	L	L ₁	b	L ₄	Fits Servo	Part No.
20	1.0	20.0	22.0	12	16	70	55	15	2.5	HPG 030	201020
25	1.0	25.0	27.0	12	16	70	60.5	9.5	2.5	HPG 030	201025
16	1.5	24.9	27.9	12	16	90	70	20	4.5	HPG 030	201116
20	1.5	30.0	33.0	20	26	110	90	20	4.5	HPG 045	201120
16	2.0	33.2	37.2	20	26	110	90	20	8.0	HPG 045	201216
20	2.0	40.0	44.0	25	32	140	120	20	8.0	HPG 060	201220
20	2.5	50.0	55.0	25	32	145	120	25	8.0	HPG 060	201320
16	3.0	49.8	55.8	25	32	150	120	30	8.0	HPG 060	201416
20	3.0	60.0	66.0	40	50	190	160	30	12.5	HPG 090	201420
20	4.0	80.0	88.0	40	50	200	160	40	18.0	HPG 090	201520
20	5.0	100.0	110.0	60	85	310	260	50	35.0	HPG 120	201620
20	6.0	120.0	132.0	60	85	320	260	60	35.0	HPG 120	201720
20	8.0	160.0	176.0	60	85	345	260	80	35.0	HPG 120	201820
20	8.0	160.0	176.0	90	105	385	305	80	35.0	HPG 180	201821
16	10.0	166.0	186.0	90	105	410	310	100	40.0	HPG 180	201916

PINIONS SHAFT



CIRCULAR PITCH 2.0, 3.33, 5.0, 7.5, 10.0, 12.5, 16.0, 20.0

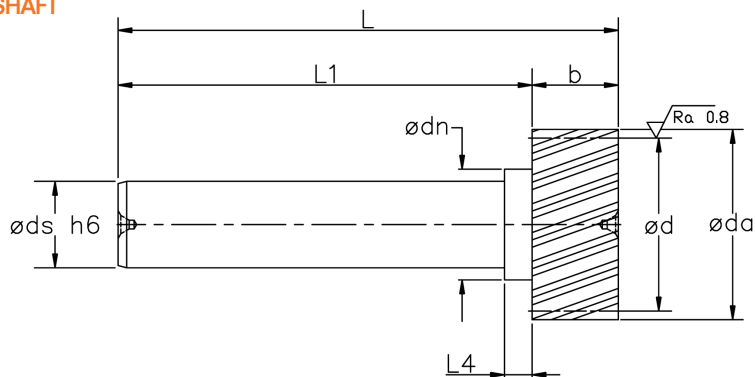
Straight (Spur) teeth
Pressure angle $\phi=20^\circ$
Material AISI 5115 (16MnCr5)
Case hardened, 60 HRC, Ground & Crowned teeth
Quality 6f24 (~AGMA 11)

No. teeth	Pitch	d	da	ds	dn	L	L ₁	b	L ₄	Fits Servo	Part No.
30	2.0	19.10	20.4	12	17	70	60.5	9.5	2.5	HPG 030	403040
20	3.3	21.221	23.3	12	16	70	60.5	9.5	2.5	HPG 030	403042
20	5.0	31.83	35.0	12	20	90	78.5	11.5	4.5	HPG 030	403041
20	5.0	31.83	35.0	20	26	90	78.5	11.5	4.5	HPG 045	404540
20	5.0	31.83	35.0	20	26	90	75.5	14.5	11.5	HPG 045	404541
20	7.5	47.75	52.5	20	25	108	88.5	19.5	8.0	HPG 045	404542
20	7.5	47.75	52.5	25	32	108	88.5	19.5	8.0	HPG 060	406040
20	10.0	63.66	70.0	25	32	162	132.5	29.5	12.5	HPG 060	406041
14	10.0	46.47	52.5	25	32	162	132.5	29.5	12.5	HPG 060	406042
20	10.0	63.66	70.0	40	50	162	132.5	29.5	12.5	HPG 090	409040
20	12.5	79.58	87.5	40	50	239	199.0	40.0	20.0	HPG 090	409041
14	12.5	58.09	66.0	40	45	196	156.0	40.0	18.0	HPG 090	903547
26	12.5	103.45	111.4	60	85	277	237.0	40.0	18.0	HPG 120	412041
20	16.0	101.86	112.1	60	85	302	252.0	50.0	40.0	HPG 120	412044
20	20.0	127.32	140.1	60	85	302	242.0	60.0	55.0	HPG 120	412043
20	20.0	127.32	140.1	90	105	350	290.0	60.0	20.0	HPG 180	418040

Dimensions are in mm and are subject to change - consult factory.

MODULAR RACK & PINION SYSTEM

PINIONS SHAFT



MODULES 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 8.0, 10.0

Helical Teeth, Left hand
Helix Angle = $19^{\circ} 31' 42''$
Pressure angle $\phi = 20^{\circ}$
Material AISI 5115 (16MnCr5)
Case Hardened, 60HRC, Ground & Crowned Teeth
Quality 6f24 (~AGMA 11)

No. teeth	Module	d	da	ds	dn	L	L ₁	b	L ₄	Fits Servo	Part No.
16	1.5	26.36	29.36	12	16.0	90.0	70.0	20	4.5	HPG 030	211116
20	1.5	31.83	34.83	20	26.0	110.0	90.0	20	4.5	HPG 045	211120
16	2.0	35.15	39.15	20	26.0	110.0	90.0	20	8.0	HPG 045	211216
20	2.0	42.44	46.44	25	32.0	140.0	120.0	20	8.0	HPG 060	211220
20	2.5	53.05	58.05	25	32.0	145.0	120.0	25	8.0	HPG 060	211320
16	3.0	52.73	58.73	25	32.0	150.0	120.0	30	8.0	HPG 060	211416
20	3.0	63.66	69.66	40	50.0	190.0	160.0	30	12.5	HPG 090	211420
20	4.0	84.88	92.88	40	50.0	200.0	160.0	40	18.0	HPG 090	211520
20	4.0	84.88	92.9	60	74.0	310	270.0	40	14.5	HPG 120	211521
20	5.0	106.10	116.10	60	85.0	310.0	260.0	50	35.0	HPG 120	211620
20	6.0	127.32	139.30	90	105.0	350.0	290.0	60	20.0	HPG 180	211720
20	8.0	169.76	185.70	90	105.0	350.0	270.0	80	35.0	HPG 180	211820
15	10.0	165.16	185.20	90	105.0	410.0	310.0	100	40.0	HPG 180	211915

Dimensions are in mm and are subject to change - consult factory.

MODULAR RACK & PINION SYSTEM

RACK & PINION TORQUE RATINGS

The values shown in the tables below are given for a linear speed of 1.5 m/s, shock free operation, good lubrication (automatic electric lubricator, or manual lubrication once/day), and rigid cantilevered pinion support. Calculations are based on root stress bending fatigue and hertzian stress pit-

ting fatigue and provide a life of 20,000 hours. In all cases pinions are hardened & ground AISI 5115 (16MnCr5) with minimum quality of 7e25.

Module 1.5 (19 mm Face Width)

# of Teeth z	Torque Capacity for Straight Nm(lb.ft.):					Torque Capacity for Helical Nm(lb.ft.):				
	d (mm)	Soft Rack A30	Quenched & Tempered Rack A20	Induction Hardened Rack A40	Hardened & Ground Rack A10	d (mm)	Soft Rack A31	Quenched & Tempered Rack A21	Induction Hardened Rack A41	Hardened & Ground Rack A11
15	22.5	2 (1)	3.2 (2)	7.9 (6)	-	-	-	-	-	-
16	24	6.4 (5)	-	-	35 (26)	25.46	-	-	-	41 (30)
20	30	10 (7)	-	32 (24)	55 (41)	31.83	-	-	-	67 (49)
25	37.5	20 (15)	30 (22)	60 (44)	70 (52)	-	-	-	-	-
30	-	-	-	-	-	47.75	-	-	-	-
32	48	38 (28)	53 (39)	75 (55)	82 (60)	-	-	-	-	-

Module 2.0 (24 mm Face Width)

# of Teeth z	Torque Capacity for Straight Nm(lb.ft.):					Torque Capacity for Helical Nm(lb.ft.):				
	d (mm)	Soft Rack A30	Quenched & Tempered Rack A20	Induction Hardened Rack A40	Hardened & Ground Rack A10	d (mm)	Soft Rack A31	Quenched & Tempered Rack A21	Induction Hardened Rack A41	Hardened & Ground Rack A11
15	30	13.8 (10)	22 (16)	29 (21)	-	-	-	-	-	-
16	32	14 (10)	-	41 (30)	77 (57)	33.95	-	-	-	92 (68)
18	36	23 (17)	33 (24)	50 (37)	86 (63)	-	-	-	-	-
20	40	28 (21)	43 (32)	75 (55)	119 (88)	42.44	35 (26)	46 (34)	130 (96)	139 (103)
22	44	33 (24)	52 (38)	90 (66)	131 (97)	46.68	-	59 (44)	155 (114)	-
25	50	48 (35)	68 (50)	128 (94)	171 (126)	53.05	60 (44)	73 (54)	180 (133)	196 (145)
28	56	64 (47)	82 (60)	140 (103)	192 (142)	59.41	80 (59)	88 (65)	197 (145)	220 (162)
30	60	74 (55)	100 (74)	152 (112)	195 (144)	63.66	92 (68)	105 (77)	213 (157)	238 (176)
32	64	83 (61)	116 (86)	163 (120)	205 (151)	67.91	105 (77)	120 (89)	228 (168)	250 (184)
36	72	119 (88)	140 (103)	173 (128)	224 (165)	76.39	130 (96)	150 (111)	250 (184)	275 (203)
45	90	-	-	-	260 (192)	95.49	-	-	-	334 (246)

Module 2.5 (24 mm Face Width)

# of Teeth z	Torque Capacity for Straight Nm(lb.ft.):					Torque Capacity for Helical Nm(lb.ft.):				
	d (mm)	Soft Rack A30	Quenched & Tempered Rack A20	Induction Hardened Rack A40	Hardened & Ground Rack A10	d (mm)	Soft Rack A31	Quenched & Tempered Rack A21	Induction Hardened Rack A41	Hardened & Ground Rack A11
15	37.5	15.6 (12)	-	60 (44)	-	-	-	-	-	-
20	50.0	45 (33)	-	150 (111)	225 (166)	53.05	-	-	-	275 (203)
22	55.0	60 (44)	-	180 (133)	251 (185)	-	-	-	-	-
25	62.5	95 (70)	-	256 (189)	-	66.31	-	-	-	343 (253)
28	70.0	115 (85)	-	280 (207)	311 (229)	-	-	-	-	-
36	90.0	215 (159)	-	350 (258)	389 (287)	-	-	-	-	-
40	100.0	245 (181)	-	400 (295)	-	-	-	-	-	-

Module 3.0 (29 mm Face Width)

# of Teeth z	Torque Capacity for Straight Nm(lb.ft.):					Torque Capacity for Helical Nm(lb.ft.):				
	d (mm)	Soft Rack A30	Quenched & Tempered Rack A20	Induction Hardened Rack A40	Hardened & Ground Rack A10	d (mm)	Soft Rack A31	Quenched & Tempered Rack A21	Induction Hardened Rack A41	Hardened & Ground Rack A11
15	45	40.8 (30)	63 (46)	87 (64)	218 (161)	-	-	-	-	294 (217)
16	49.8	-	-	-	302 (223)	50.93	-	-	200 (148)	346 (255)
18	54	81 (60)	121 (89)	197 (145)	324 (239)	57.30	-	-	-	434 (320)
19	57	-	-	-	390 (288)	-	-	-	-	-
20	60	92 (68)	138 (102)	215 (159)	411 (303)	63.66	102 (75)	145 (107)	410 (302)	467 (344)
22	66	115 (85)	170 (125)	305 (225)	434 (320)	70.03	128 (94)	182 (134)	430 (317)	511 (374)
25	75	168 (124)	235 (173)	440 (325)	500 (369)	79.57	188 (139)	245 (181)	490 (361)	605 (446)
28	84	205 (151)	285 (210)	485 (358)	564 (416)	-	-	295 (218)	555 (409)	-
32	96	290 (214)	-	510 (376)	641 (473)	-	-	415 (306)	563 (415)	-
35	105	-	-	-	670 (494)	111.41	-	-	-	750 (553)
36	108	386 (271)	512 (378)	642 (474)	692 (510)	-	-	525 (387)	700 (516)	-
40	120	450 (332)	620 (457)	780 (575)	850 (627)	127.32	-	640 (472)	820 (605)	940 (693)
52	156	-	-	-	1133 (836)	165.52	-	-	-	1255 (926)