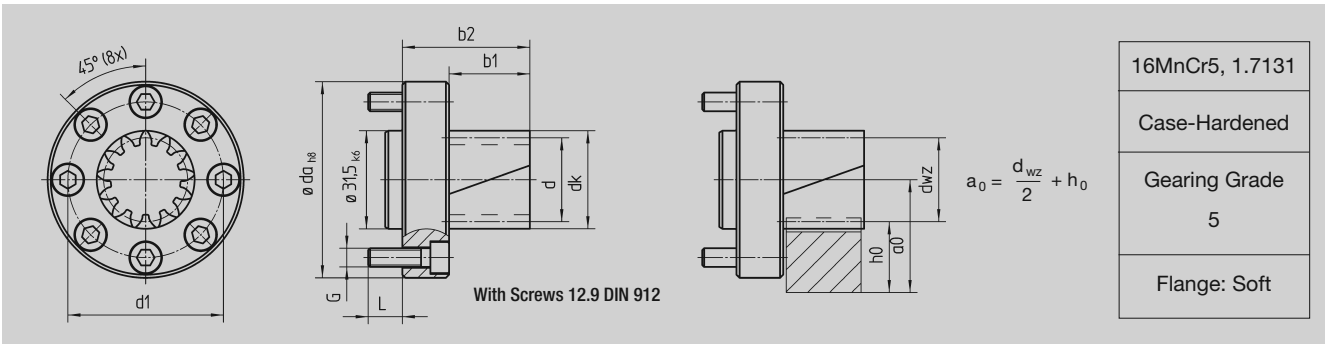
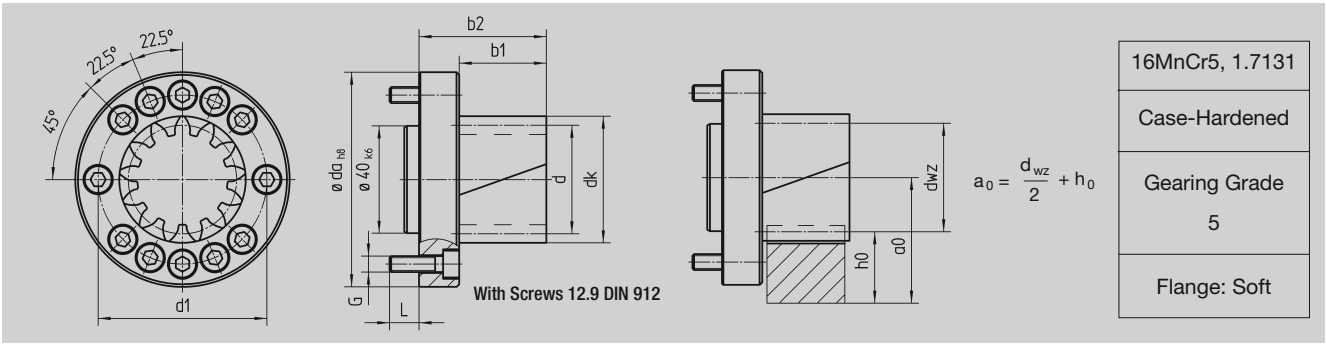
Bolt Circle-ø 50, helical tooth system, 19° 31‘ 42“ left-hand



Order Code	No. of Teeth	Profile Modification Factor							Interface					
	z	x	d_{wz}	d_k	b_1	b_2	L	a_0	ISO	d_1	G	d_{ah8}	L	kg
Module 2														
78 21 912	12	0.5	27.46	31.50	26.0	41	80.00	35.73	9409-1-A-50	50	M6	63	11	0.5
78 21 916	16	0	33.95	37.95	26.0	41	106.67	38.98	9409-1-A-50	50	M6	63	11	0.6

Further number of teeth on request, min. number of teeth 12, max. number of teeth 16

Bolt Circle-ø 63, helical tooth system, 19° 31‘ 42“ left-hand



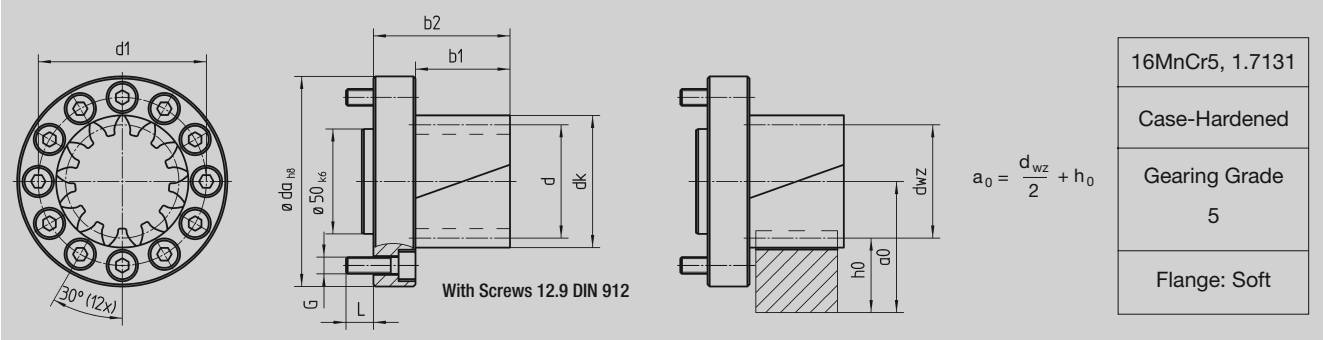
Order Code	No. of Teeth	Profile Modification Factor							Interface					
	z	x	d_{wz}	[mm] d_k	[mm] b_1	[mm] b_2	[mm] L	[mm] a_0	ISO	d_1	G	d_{ah8}	L	kg
Module 2														
78 22 912	12	0.5	27.46	31.5	26.0	41	80.00	35.73	9409-1-A-63	63	M6	80	11	0.8
78 22 919	19	0	40.32	44.3	26.0	41	126.67	42.16	9409-1-A-63	63	M6	80	11	0.9
78 22 923	23	0	48.81	52.8	26.0	41	153.33	46.40	9409-1-A-63	63	M6	80	11	1.0

Further number of teeth on request, min. number of teeth 12, max. number of teeth 23

Module 3														
78 32 912	12	0.5	41.20	47.2	32.5	47.5	120.00	46.60	9409-1-A-63	63	M6	80	11	1.0
78 32 914	14	0.3	46.36	52.4	32.5	47.5	140.00	49.18	9409-1-A-63	63	M6	80	11	1.0

Further number of teeth on request, min. number of teeth 12, max. number of teeth 14

Bolt Circle-ø 80, helical tooth system, 19° 31‘ 42“ left-hand



Order Code	No. of Teeth	Profile Modification Factor							Interface					
	z	x	d_{wz}	d_k	b_1	b_2	L	a_0	ISO	d_1	G	d_{ah8}	L	kg
Module 2														
78 23 912	12	0.5	27.46	31.5	26.0	46	80.00	37.73	9409-1-A-80	80	M8	100	13	1.4
78 23 923 (1)	23	0	48.81	52.8	26.0	46	153.33	46.40	9409-1-A-80	80	M8	100	13	1.6
78 23 929 (1)	29	0	61.54	65.5	26.0	46	193.33	52.77	9409-1-A-80	80	M8	100	13	1.9

Further number of teeth on request, min. number of teeth 12, max. number of teeth 29

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 3														
78 33 912	12	0.5	41.20	47.2	32.5	52.5	120.00	46.60	9409-1-A-80	80	M8	100	13	1.6
78 33 916	16	0	50.93	56.9	32.5	52.5	160.00	51.46	9409-1-A-80	80	M8	100	13	1.8
78 33 917 (1)	17	0	54.11	60.1	32.5	52.5	170.00	53.06	9409-1-A-80	80	M8	100	13	1.9
78 33 919	19	0	60.48	66.5	32.5	52.5	190.00	56.24	9409-1-A-80	80	M8	100	13	2.0

Further number of teeth on request, min. number of teeth 12, max. number of teeth 19

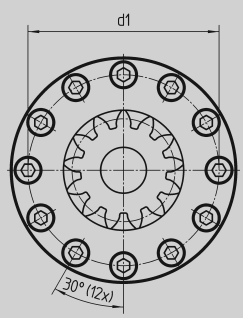
Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

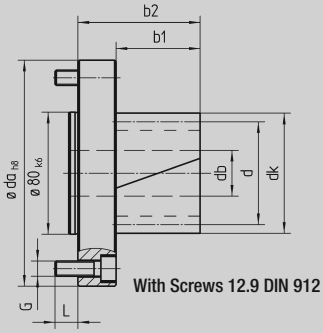
Module 4														
78 43 912	12	0.5	54.93	62.9	45.0	65	160.00	62.46	9409-1-A-80	80	M8	100	13	2.1

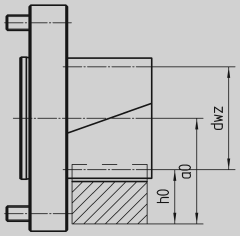
Further number of teeth on request, min. number of teeth 12, max. number of teeth 13

(1) Also available as pinion for counter bearing.

Bolt Circle-ø 125, helical tooth system, 19° 31‘ 42“ left-hand







$a_0 = \frac{d_{wz}}{2} + h_0$

16MnCr5, 1.7131
Case-Hardened
Gearing Grade 5
Flange: Soft

Order Code	No. of Teeth	Profile Modification Factor	Interface												
	z	x	d_{wz}	d_k	b_1	b_2	L	a_0	ISO	d_1	G	d_{ah8}	L	d_b	kg
Module 3															
78 34 912	12	0.5	41.20	47.20	32.5	57.5	120	46.60	9409-1-A-125	125	M10	148	15	–	3.8
78 34 312	12	0.5	41.20	47.20	32.5	57.5	120	46.60	–	125	M12	148	17	–	3.8
78 34 919	19	0	60.48	66.50	32.5	57.5	190	56.24	9409-1-A-125	125	M10	148	15	–	4.2
78 34 319	19	0	60.48	66.50	32.5	57.5	190	56.24	–	125	M12	148	17	–	4.2
78 34 925	25	0	79.58	85.60	32.5	57.5	250	65.79	9409-1-A-125	125	M10	148	15	–	4.8
78 34 926 (1)	26	0	82.76	88.80	32.5	57.5	260	67.38	9409-1-A-125	125	M10	148	15	–	4.9
78 34 326	26	0	82.76	88.80	32.5	57.5	260	67.38	–	125	M12	148	17	–	4.9
78 34 932 (1)	32	0	101.86	107.90	32.5	57.5	320	76.93	9409-1-A-125	125	M10	148	15	–	5.6
78 34 332	32	0	101.86	107.90	32.5	57.5	320	79.63	–	125	M12	148	17	–	5.6

Further number of teeth on request, min. number of teeth 12, max. number of teeth 32

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 4															
78 44 912	12	0.5	54.93	62.90	45.0	70.0	160.00	62.46	9409-1-A-125	125	M10	148	15	–	4.4
78 44 312	12	0.5	54.93	62.90	45.0	70.0	160.00	62.46	–	125	M12	148	17	–	4.3
78 44 915	15	0	63.66	71.70	45.0	70.0	200.00	66.83	9409-1-A-125	125	M10	148	15	–	4.7
78 44 916	16	0	67.91	75.90	45.0	70.0	213.33	68.95	9409-1-A-125	125	M10	148	15	–	4.8
78 44 917	17	0	72.15	80.15	32.5	57.5	170.00	53.06	9409-1-A-125	125	M10	148	15	–	5.0
78 44 317	17	0	72.15	80.15	32.5	57.5	170.00	53.06	–	125	M12	148	17	–	5.0
78 44 919	19	0.11	81.52	89.50	45.0	70.0	256.10	75.76	9409-1-A-125	125	M10	148	15	–	5.4
78 44 319	19	0.11	81.52	89.50	45.0	70.0	256.10	75.76	–	125	M12	148	17	–	5.3
78 44 920 (1)	20	0	84.88	92.90	45.0	70.0	266.67	77.44	9409-1-A-125	125	M10	148	15	–	5.5
78 44 320	20	0	84.88	92.90	45.0	70.0	266.67	77.44	–	125	M12	148	17	–	5.5
78 44 923	23	0	97.62	105.60	45.0	70.0	306.67	83.81	–	125	M10	148	15	–	6.1

urther number of teeth on request, min. number of teeth 12, max. number of teeth 23

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 5															
78 54 912	12	0.5	68.66	78.70	55	80	200.00	68.33 (2)	9409-1-A-125	125	M10	148	15	–	5.1
78 54 312	12	0.5	68.66	78.70	55	80	200.00	68.33 (2)	–	125	M12	148	17	–	5.1
78 54 916 (1)	16	0	84.88	94.90	55	80	266.67	76.44 (2)	9409-1-A-125	125	M10	148	15	–	6.0
78 54 316	16	0	84.88	94.90	55	80	266.67	76.44 (2)	–	125	M12	148	17	–	6.3
78 54 918	18	0	95.49	105.50	55	80	300.00	81.75 (2)	9409-1-A-125	125	M10	148	15	–	6.6
78 54 318	18	0	95.49	105.50	55	80	300.00	81.75 (2)	–	125	M12	148	17	–	6.6

Further number of teeth on request, min. number of teeth 12, max. number of teeth 18

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

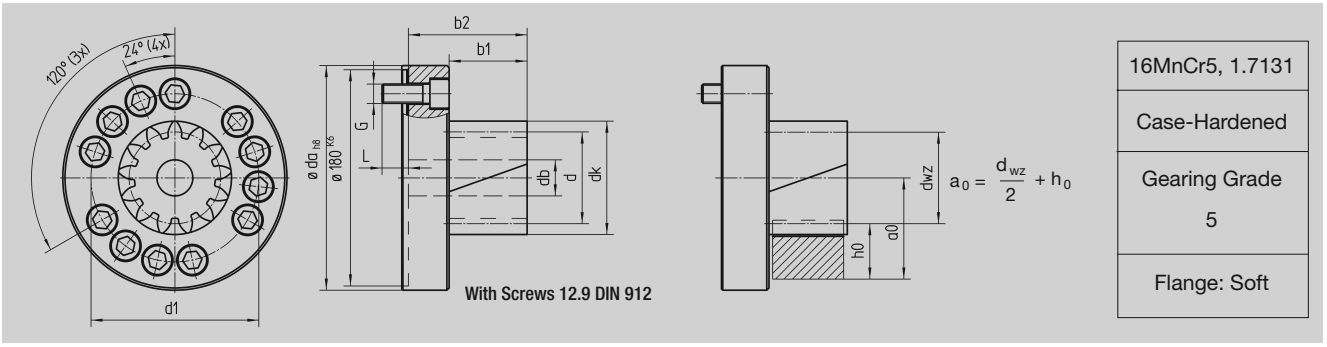
Module 6															
78 64 912	12	0.5	82.39	94.40	65	90	240.00	84.20	9409-1-A-125	125	M10	148	15	25	5.8
78 64 312	12	0.5	82.39	94.40	65	90	240.00	84.20	–	125	M12	148	17	25	5.9
78 64 913	13	0.5	88.76	100.80	65	90	260.00	87.38	9409-1-A-125	125	M10	148	15	25	6.3
78 64 915	15	0	95.49	107.50	65	90	300.00	90.75	9409-1-A-125	125	M10	148	15	25	6.8

Further number of teeth on request, min. number of teeth 12, max. number of teeth 15

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

(1) Also available as pinion for counter bearing.
(2) For 29 55 ... $a'_0 = a_0 + 10$.

Bolt Circle-ø 140, helical tooth system, 19° 31‘ 42“ left-hand



Order Code	No. of Teeth	Profile Modification Factor							Interface						
	z	x	d_{wz}	d_k	b_1	b_2	L	a_0	ISO	d_1	G	d_{ah8}	L	d_b	kg
Module 4															
78 46 912	12	0.5	54.93	62.90	45	79	160.00	62.46	–	140	M16	187	22	–	8.1
78 46 919	19	0.11	81.52	89.50	45	79	256.10	75.76	–	140	M16	187	22	–	9.1
78 46 920	20	0	84.88	92.90	45	79	266.67	77.40	–	140	M16	187	22	–	9.2
78 46 320	20	0	84.88	92.90	45	79	266.67	77.40	–	145	M20	187	16	–	9.6

Further number of teeth on request, min. number of teeth 12, max. number of teeth 25

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 5															
78 56 914	14	0.3	77.27	87.30	55	89	233.33	72.64 (2)	–	140	M16	187	22	–	9.2
78 56 918	18	0	95.49	105.50	55	89	300.00	81.74 (2)		140	M16	187	22	–	10.3
78 56 919	19	0	100.80	110.80	55	89	316.67	84.40 (2)	–	140	M16	187	22	–	10.6

Further number of teeth on request, min. number of teeth 12, max. number of teeth 20

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

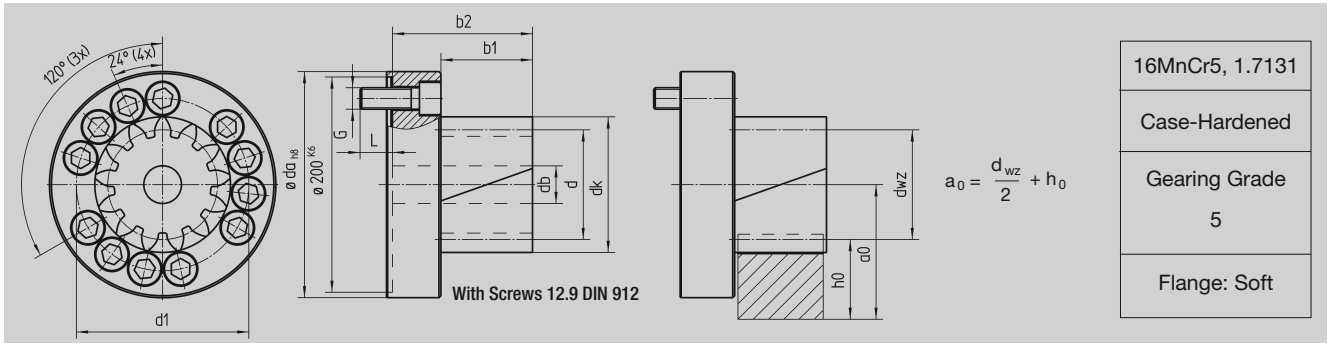
Module 6															
78 66 912	12	0.5	82.39	94.40	65	99	240.00	84.20	–	140	M16	187	22	25	9.5
78 66 915	15	0	95.49	107.50	65	99	300.00	90.75	–	140	M16	187	22	25	10.5
78 66 916 (1)	16	0	101.86	113.90	65	99	320.00	93.93	–	140	M16	187	22	25	11.3

Further number of teeth on request, min. number of teeth 12, max. number of teeth 16

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

(1) Also available as pinion for counter bearing.
(2) For 29 55 ... $a'_0 = a_0 + 10$.

Bolt Circle-ø 160, helical tooth system, 19° 31‘ 42“ left-hand



Order Code	No. of Teeth	Profile Modification Factor							Interface						
	z	x	d_{wz}	d_k	b_1	b_2	L	a_0	ISO	d_1	G	d_{ah8}	L	d_b	kg
Module 5															
78 57 912	12	0.5	68.66	78.7	55	100	200.00	68.33 (1)	–	160	M20	210	30	–	13.8
78 57 919	19	0	100.80	110.8	55	100	316.67	84.40 (1)	–	160	M20	210	30	–	15.6

Further number of teeth on request, min. number of teeth 12, max. number of teeth 22

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 6															
78 67 912	12	0.5	82.39	94.4	65	110	240.00	84.20	–	160	M20	210	30	25	14.5
78 67 916	16	0	101.86	113.9	65	110	320.00	93.93	–	160	M20	210	30	25	15.9

Further number of teeth on request, min. number of teeth 12, max. number of teeth 18

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 8															
78 87 912	12	0.5	109.86	125.9	85	130	320.00	125.93	–	160	M20	210	30	30	17.8

(2) For 29 55 ... $a'_0 = a_0 + 10$.

Helical Tooth System, 19° 31' 42" left-hand

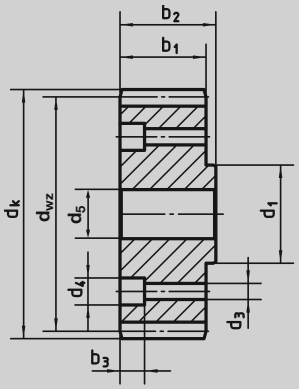


Bild 1 / Fig. 1

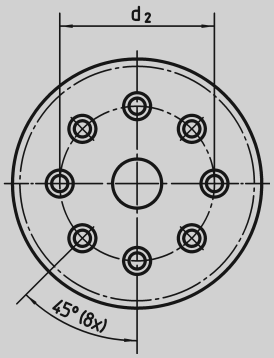
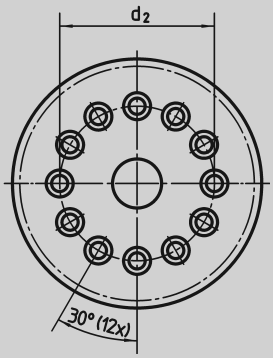


Bild 2 / Fig. 1

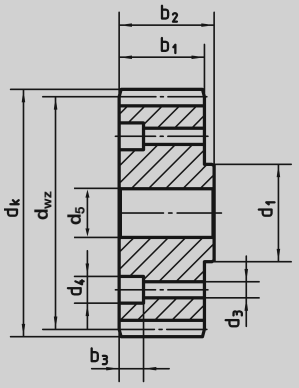


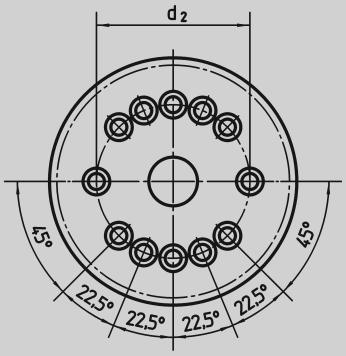
16MnCr5, 1.7131
Case-Hardened
Gearing Grade **5 e 24**

With Screws 12.9 DIN 912

Order Code	Fig.	Module	N° of Teeth z	x (1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5^{H6}	b_1	b_2	b_3	L=PI*d L	kg	Interface ISO
78 20 526	1	2	26	0.4065	56.80	60.60	20.0	31.5	5.5	10	15	26	29.0	12	173.33	0.4	9409-1-A-31.5
78 20 527	1	2	27	0	57.30	61.29	20.0	31.5	5.5	10	15	30	33.5	11	180.00	0.5	9409-1-A-31.5
78 20 529	1	2	29	0.4150	63.20	67.00	20.0	31.5	5.5	10	15	26	29.0	12	193.33	0.5	9409-1-A-31.5
78 20 535	1	2	35	0.3819	75.80	79.60	20.0	31.5	5.5	10	15	26	29.0	12	233.33	0.8	9409-1-A-31.5
78 25 529	1	2	29	0.4150	63.20	67.00	25.0	40.0	6.6	11	20	26	30.0	14	193.33	0.5	9409-1-A-40
78 21 533	1	2	33	0.3928	71.60	75.30	31.5	50.0	6.6	11	20	26	30.0	14	220.00	0.7	9409-1-A-50
78 20 536	1	2	36	0	76.40	80.39	31.5	50.0	6.6	11	20	30	34.0	8	240.00	1.2	9409-1-A-50
78 21 537	1	2	37	0.4209	80.20	84.00	31.5	50.0	6.6	11	20	26	30.0	14	246.67	0.9	9409-1-A-50
78 31 531	1	3	31	0.3540	100.80	106.60	31.5	50.0	6.6	11	20	31	35.5	9	310.00	1.8	9409-1-A-50
78 29 501	2	2	37	0.4209	80.20	84.00	31.5	50.0	6.6	11	20	26	30.0	14	246.67	0.9	9409-1-A-50

(1) Profile modification factor





16MnCr5, 1.7131
Case-Hardened
Gearing Grade **5 e 24**

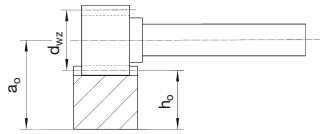
With Screws 12.9 DIN 912

Order Code	Module	N° of Teeth z	x (1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5^{H6}	b_1	b_2	b_3	L=PI*d L	kg	Interface ISO
78 22 540	2	40	0.3792	86.40	90.20	40.0	63.0	6.6	11	31.5	26	30	14	266.69	1.0	9409-1-A-63
78 22 545	2	45	0.3267	96.80	100.60	40.0	63.0	6.6	11	31.5	26	30	14	300.00	1.4	9409-1-A-63
78 30 530	3	30	0	95.49	101.49	40.0	63.0	6.6	11	20.0	35	39	10	300.00	2.2	9409-1-A-63

(1) Profile modification factor

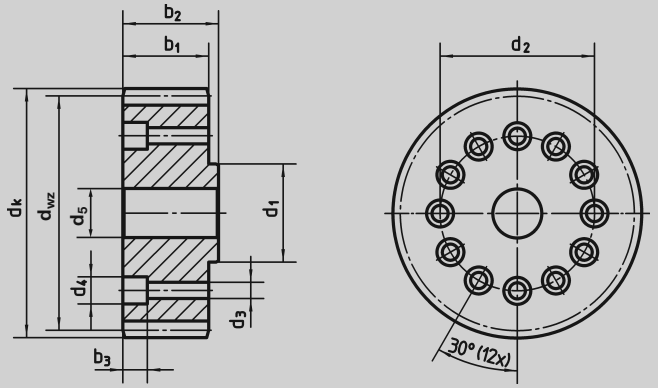
The max. torque is limited by the threaded connection.

Calculation of center distance a between gearwheel and rack.



$$a_o = \frac{d_{wz}}{2} + h_o$$

Helical Tooth System, 19° 31’ 42" left-hand



16MnCr5, 1.7131

Case-Hardened

Gearing Grade

5 e 24

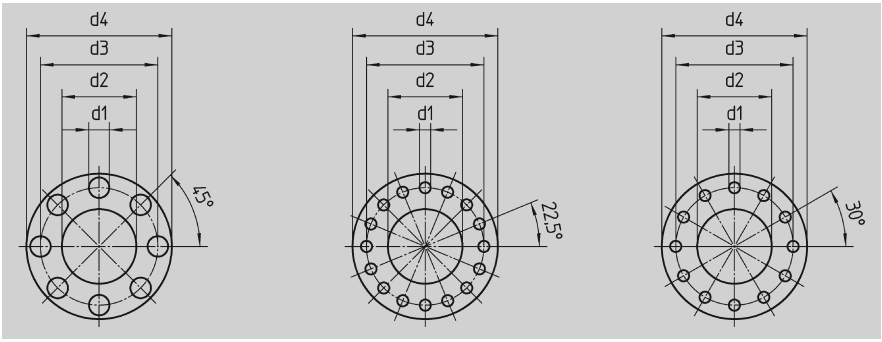
With Screws 12.9 DIN 912

Order Code	Module	N° of Teeth z	x (1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5^{H6}	b_1	b_2	b_3	L=Pl*d L	kg	Interface ISO
78 33 535	3	35	0.3652	113.60	119.40	50	80	9	15	40	31	35.0	11	350.00	1.8	9409-1-A-80
78 33 540	3	40	0.3792	129.60	135.40	50	80	9	15	40	31	35.0	11	400.00	2.5	9409-1-A-80
78 40 530	4	30	0	127.32	135.32	50	80	9	15	40	45	49.0	11	400.00	3.5	9409-1-A-80
78 50 521	5	21	0	111.40	121.40	50	80	9	–	40	59	64.5	–	350.00	3.5	9409-1-A-80
78 50 536	5	36	0	190.99	200.98	80	125	11	18	60	55	61.0	13	600.00	8.0	9409-1-A-125

(1) Profile modification factor

The max. torque is limited by the threaded connection.

Foil Coated with Diamonds to increase the Friction Coefficient



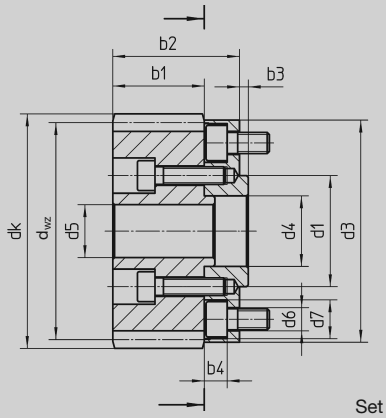
Order Code	Fig. No.	ISO Connection	d_1	d_2	d_3	d_4
78 01 001	Fig. 1	A – 31.5	5.5	20.0	31.5	39
78 01 002	Fig. 1	A – 50	6.6	31.5	50.0	62
78 01 003	Fig. 2	A – 63	6.6	40.0	63.0	80
78 01 004	Fig. 3	A – 80	9.0	50.0	80.0	100
78 01 005	Fig. 3	A – 125	11.0	80.0	125.0	148

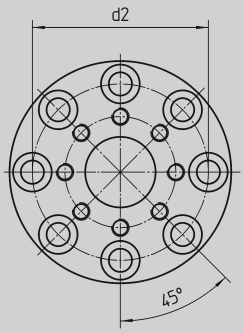
A transmission of the torque in connections based on friction is limited by the friction coefficient of the materials which are used.
The change of the size of a construction is sometimes not possible, so the only possibility to transmit a higher torque is to increase the coefficient of friction. The foil which is coated with diamonds is able to increase this friction coefficient.

Material	Rz [µm]	p [Mpa]	Coefficient of Friction			
			Static		Dynamic	
			Average from 5 test results	Standard deviation	Average from 5 test results	Standard deviation
C45	1-3	50	0.38	0.16	–	-
(HV = 262)		100	0.45	0.07	0.41	0.05
16MnCr5	1-3	50	0.46	0.14	–	-
(HV = 735)		100	0.34	0.05	0.38	0.11

If you need more information please contact us.

Helical Tooth System, 19° 31’ 42" left-hand





Interface A50

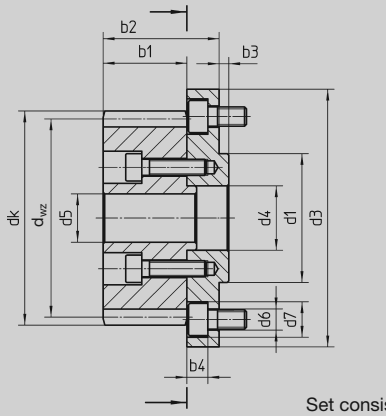
16MnCr5, 1.7131
Case-Hardened
Gearing Grade **5 e 24**
Flange: Soft

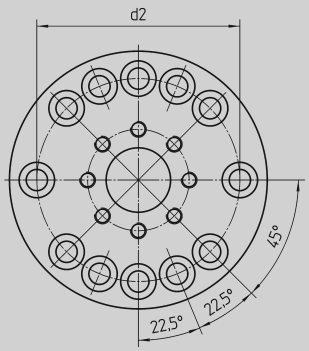
With Screws 12.9 DIN 912

Set consists of Order Code Gear and Order Code Flange

Order Code Pinion	Order Code Flange	Module	N° of Teeth z	x(1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5	d6	d7	b_1	b_2	b_3	b4	L=PI*d L	kg	Interface ISO
78 20 526	**26578001**	2	26	0.4065	56.80	60.60	31.5	50	63	20	1.5	6.6	11	26	36	2.5	6.5	173.33	0.6	9409-1-A-31.5/50
78 20 527	**26578001**	2	27	0	57.30	61.29	31.5	50	63	20	1.5	6.6	11	30	40	2.5	6.5	180.00	0.7	9409-1-A-31.5/50
78 20 529	**26578001**	2	29	0.4150	63.20	67.00	31.5	50	63	20	1.5	6.6	11	26	36	2.5	6.5	193.33	0.7	9409-1-A-31.5/50
78 20 535	**26578001**	2	35	0.3819	75.80	79.60	31.5	50	63	20	1.5	6.6	11	26	36	2.5	6.5	233.33	1.0	9409-1-A-31.5/50

(1) Profile modification factor





Interface A63

16MnCr5, 1.7131
Case-Hardened
Gearing Grade **5 e 24**
Flange: Soft

With Screws 12.9 DIN 912

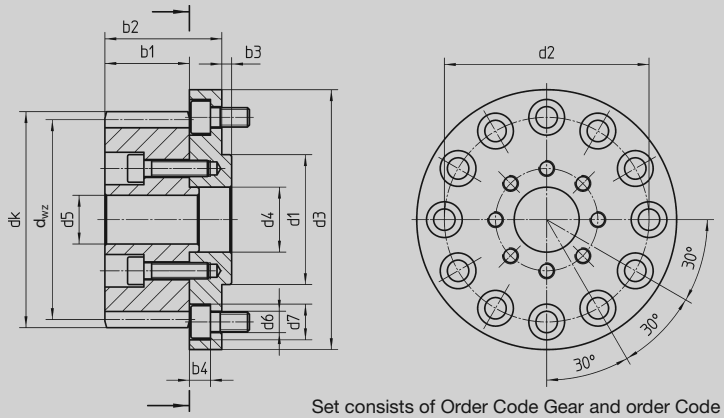
Set consists of Order Code Gear and Order Code Flange

Order Code Pinion	Order Code Flange	Module	N° of Teeth z	x(1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5	d6	d7	b_1	b_2	b_3	b4	L=PI*d L	kg	Interface ISO
78 20 526	**26578002**	2	26	0.4065	56.80	60.60	40	63	80	20	1.5	6.6	11	26	36	3	6.5	173.33	0.7	9409-1-A-31.5/63
78 20 527	**26578002**	2	27	0	57.30	61.29	40	63	80	20	1.5	6.6	11	30	40	3	6.5	180.00	0.8	9409-1-A-31.5/63
78 20 529	**26578002**	2	29	0.4150	63.20	67.0	40	63	80	20	1.5	6.6	11	26	36	3	6.5	193.33	0.8	9409-1-A-31.5/63
78 20 535	**26578002**	2	35	0.3819	75.80	79.60	40	63	80	20	1.5	6.6	11	26	36	3	6.5	233.33	1.1	9409-1-A-31.5/63

(1) Profile modification factor

The max. torque is limited by the threaded connection.

Helical Tooth System, 19° 31' 42" left-hand



Interface A80

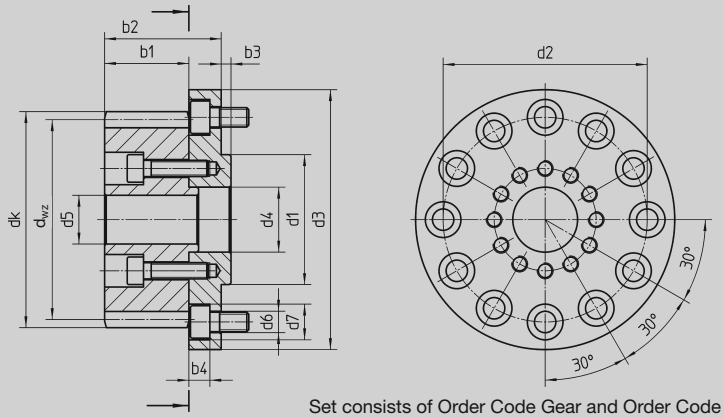
16MnCr5, 1.7131
Case-Hardened
Gearing Grade **5 e 24**
Flange: Soft

With Screws 12.9 DIN 912

Set consists of Order Code Gear and order Code Flange

Order Code Pinion	Order Code Flange	Module	N° of Teeth z	x(1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5	d6	d7	b_1	b_2	b_3	b4	L=PI*d L	kg	Interface ISO
78 20 526	**26578001**(2)	2	26	0.4065	56.80	60.60	50	80	100	31.5	15	9	15	26	49	4	9	173.33	1.2	9409-1-A-31.5/50/80
	26578003(2)																			
78 20 527	**26578001**(2)	2	27	0	57.30	61.29	50	80	100	31.5	15	9	15	30	53	4	9	180.00	1.3	9409-1-A-31.5/50/80
	26578003(2)																			
78 20 529	**26578001**(2)	2	29	0.4150	63.20	67.00	50	80	100	31.5	15	9	15	26	49	4	9	193.33	1.3	9409-1-A-31.5/50/80
	26578003(2)																			
78 20 535	**26578001**(2)	2	35	0.3819	75.80	79.60	50	80	100	31.5	15	9	15	26	49	4	9	233.33	1.6	9409-1-A-31.5/50/80
	26578003(2)																			
78 21 533	**26578003**	2	33	0.3928	71.60	75.30	50	80	100	31.5	20	9	15	26	39	4	9	220.00	1.3	9409-1-A-50/80
78 20 536	**26578003**	2	36	0	76.40	80.40	50	80	100	31.5	20	9	15	30	43	4	9	240.00	1.4	9409-1-A-50/80
78 21 537	**26578003**	2	37	0.4209	80.20	84.00	50	80	100	31.5	20	9	15	26	39	4	9	246.67	1.5	9409-1-A-50/80
78 31 531	**26578003**	3	31	0.3540	100.80	106.60	50	80	100	31.5	20	9	15	31	44	4	9	310.00	2.4	9409-1-A-50/80

(1) Profile modification factor (2) 2 flange



Interface A125

16MnCr5, 1.7131
Case-Hardened
Gearing Grade **5 e 24**
Flange: Soft

With Screws 12.9 DIN 912

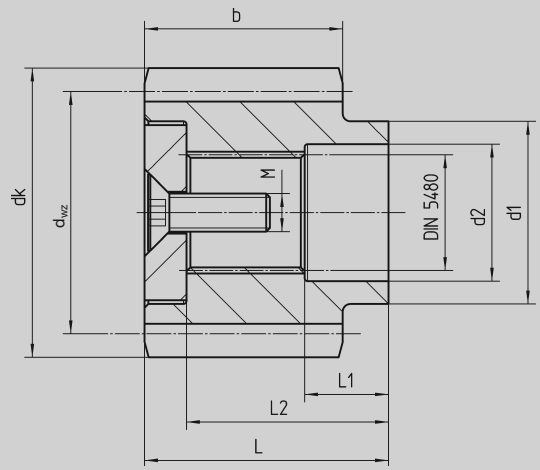
Set consists of Order Code Gear and Order Code Flange

Order Code Pinion	Order Code Flange	Module	N° of Teeth z	x(1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5	d6	d7	b_1	b_2	b_3	b4	L=PI*d L	kg	Interface ISO
78 31 531	**26578003**(2)	3	31	0.3540	100.80	106.60	80	125	148	50	20	11	18	31	63	6	14	310.00	3.4	9409-1-A-50/80/125
	26578004(2)																			
78 33 535	**26578004**	3	35	0.3652	113.60	119.40	80	125	148	50	40	11	18	31	50	6	14	350.00	3.8	9409-1-A80/125
78 33 540	**26578004**	3	40	0.3792	129.60	135.40	80	125	148	50	40	11	18	31	50	6	14	400.00	4.5	9409-1-A80/125
78 40 530	**26578004**	4	30	0	127.32	135.32	80	125	148	50	40	11	18	45	64	6	14	400.00	5.5	9409-1-A80/125
78 50 521	**26578004**	5	21	0	111.40	121.40	80	125	148	50	40	11	18	59	78	6	14	350.00	5.5	9409-1-A80/125

(1) Profile modification factor (2) 2 flange

The max. torque is limited by the threaded connection.

Helical Tooth System, 19° 31' 42" left-hand

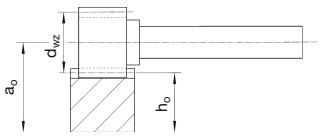


With Washer and Screws 8.8 DIN 7991

16MnCr5, 1.7131
Case-Hardened
Gearing Grade **5 e 24**

Order Code	N° of Teeth	Module	Profile Modification Factor	d_{wz}	d_k	d_1	L	d_2	L_1	L_2	b	M	DIN 5480	kg
79 11 538	38	1.5	–	60.48	63.48	30	33	24	12	27.5	20	M8x25	N22x1.25x30x16x7H	0.1
79 20 515	15	2	0.5922	34.20	38.0	24	32	18	11	26.5	26	M5x16	N16x0.8x30x18x7H	0.2
79 20 516	16	2	0.6117	36.40	40.1	24	32	18	11	26.5	26	M5x16	N16x0.8x30x18x7H	0.2
79 20 518	18	2	0.5000	40.20	44.0	24	32	18	11	26.5	26	M5x16	N16x0.8x30x18x7H	0.3
79 21 518	18	2	0.5000	40.20	44.0	30	33	24	12	27.5	26	M8x25	N22x1.25x30x16x7H	0.3
79 21 520	20	2	0.4900	44.40	48.2	30	33	24	12	27.5	26	M8x25	N22x1.25x30x16x7H	0.3
79 21 522	22	2	0.4786	48.60	52.5	30	33	24	12	27.5	26	M8x25	N22x1.25x30x16x7H	0.4
79 21 525	25	2	–	53.05	57.05	30	33	24	12	27.5	26	M8x25	N22x1.25x30x16x7H	0.4
79 22 523	23	2	0.4981	50.80	54.6	40	34	35	13	27.0	26	M12x35	N32x1.25x30x24x7H	0.4
79 22 525	25	2	0.4871	55.00	59.0	40	34	35	13	27.0	26	M12x35	N32x1.25x30x24x7H	0.4
79 22 527	27	2	0.3760	58.80	62.6	40	34	35	13	27.0	26	M12x35	N32x1.25x30x24x7H	0.5
79 33 520	20	3	0.4563	66.40	72.2	50	51	41	20	41.0	31	M16x45	N40x2x30x18x7H	0.7
79 33 522	22	3	0.4620	72.80	78.6	50	51	41	20	41.0	31	M16x45	N40x2x30x18x7H	0.8
79 33 524	24	3	0.4676	79.20	85.0	50	51	41	20	41.0	31	M16x45	N40x2x30x18x7H	1.0
79 44 520	20	4	0.4000	88.08	96.1	75	54	56	20	44.0	41	M20x50	N55x2x30x26x7H	1.5
79 45 525	25	4	0.3400	108.82	116.8	90	65	72	24	55.0	41	M20x50	N70x2x30x34x7H	3.0

Calculation of center distance a between gearwheel and rack.



$$a_o = \frac{d_{wz}}{2} + h_o$$

Helical Tooth System, Ground Teeth, 19° 31' 42" left-hand, with Bore ØH6 and Keyway acc. to DIN 6885

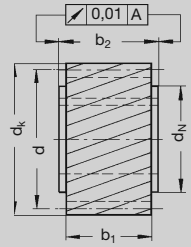


Fig. 1

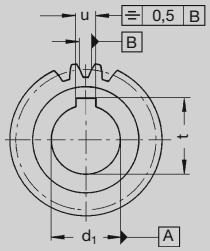


Fig. 1 + 3 Keyway Middle of Tooth Gap

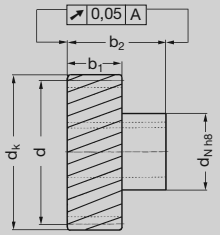


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Gearing Grade **6 e 25**

Order Code	Fig.	N° of Teeth z	d	d*PI	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Shrink-Disk on Page GH-1
Module 1.5													
24 11 520 [1]	1	20	31.83	100.00	34.83	11	25	20	22	4	12.8	0.13	
24 14 520 [1]	1	20	31.83	100.00	34.83	14	25	20	22	5	16.3	0.13	
24 16 520 [1]	1	20	31.83	100.00	34.83	16	25	20	22	5	18.3	0.13	
24 16 321 [1]	3	21	33.42	105.00	36.42	16	30	20	46	5	18.3	0.15	80 83 030
Module 2													
24 26 518	1	18	38.197	120.00	42.2	16	25	28	30	5	18.3	0.2	
24 29 520	1	20	42.44	133.33	46.4	19*	30	28	30	6	21.8	0.3	
24 29 320	3	20	42.44	133.33	46.4	19*	30	28	56	6	21.8	0.3	80 83 030
24 22 520	1	20	42.44	133.33	46.4	20	30	28	30	6	22.8	0.3	
24 20 320	3	20	42.44	133.33	46.4	22*	36	28	56	6	24.8	0.3	80 84 036
24 23 520	1	20	42.44	133.33	46.4	22	30	28	30	6	24.8	0.3	
24 26 521	1	21	44.56	140.00	48.6	16	25	28	30	5	18.3	0.3	
24 20 321	3	21	44.56	140.00	48.6	22	36	28	56	6	24.8	0.2	80 84 036
24 29 522	1	22	46.69	146.67	50.7	19*	30	28	30	6	21.8	0.2	
24 29 322	3	22	46.69	146.67	50.7	19*	30	28	56	6	21.8		80 83 030
24 20 522	1	22	46.69	146.67	50.7	22*	30	28	30	6	24.8	0.3	
24 20 322	3	22	46.69	146.67	50.7	22*	36	28	56	6	24.8		80 84 036
24 29 525	1	25	53.05	166.67	57.1	19*	30	28	30	6	21.8		
24 29 325	3	25	53.05	166.67	57.1	19*	30	28	56	6	21.8		80 83 030
24 22 525	1	25	53.05	166.67	57.1	20	30	28	30	6	22.8	0.4	
24 20 525	1	25	53.05	166.67	57.1	22*	30	28	30	6	24.8	0.3	
24 20 325	3	25	53.05	166.67	57.1	22*	36	28	56	6	24.8		80 84 036
24 23 525	1	25	53.05	166.67	57.1	25	36	28	30	8	28.3	0.4	
24 29 528	1	28	59.42	186.67	63.4	19*	30	28	30	6	21.8	0.4	
24 29 328	3	28	59.42	186.67	63.4	19*	30	28	56	6	21.8		80 83 030
24 20 528	1	28	59.42	186.67	63.4	22*	30	28	30	6	24.8	0.4	
24 20 328	3	28	59.42	186.67	63.4	22*	36	28	56	6	24.8		80 84 036
24 25 528	1	28	59.42	186.67	63.4	35	48	28	30	10	38.3	0.4	
24 26 530	1	30	63.66	200.00	67.7	16	25	28	30	5	18.3	0.7	
24 22 530	1	30	63.66	200.00	67.7	20	30	28	30	6	22.8	0.6	
24 20 330	3	30	63.66	200.00	67.7	22	36	28	56	6	24.8	0.6	80 84 036
24 23 530	1	30	63.66	200.00	67.7	25	36	28	30	8	28.3	0.8	
24 24 530	1	30	63.66	200.00	67.7	30*	45	28	30	8	33.3		
24 22 330	3	30	63.66	200.00	67.7	30	50	28	60	8	33.3	0.8	80 85 050
24 23 330	3	30	63.66	200.00	67.7	32	55	28	65	10	35.3	0.8	80 80 055
24 22 532	1	32	67.91	213.33	71.9	20	30	28	30	6	22.8	0.8	
24 20 532	1	32	67.91	213.33	71.9	22*	30	28	30	6	24.8	0.7	
24 20 332	3	32	67.91	213.33	71.9	22*	36	28	56	6	27.8		80 84 036
24 23 532	1	32	67.91	213.33	71.9	25	36	28	30	8	28.3	0.7	
24 25 532	1	32	67.91	213.33	71.9	35	48	28	30	10	38.3	0.6	
24 25 536	1	36	76.39	240.00	80.4	35	48	28	30	10	38.3	0.8	
24 23 339	3	39	82.76	260.00	86.8	32	55	28	65	10	35.3	1.3	80 80 055
24 25 540	1	40	84.88	266.67	88.9	35	48	28	30	10	38.3	1.1	

* H7 tolerance

[1] Gearing grade 6 f 24

Helical Tooth System, Ground Teeth, 19° 31' 42" left-hand, with Bore ØH6 and Keyway acc. to DIN 6885

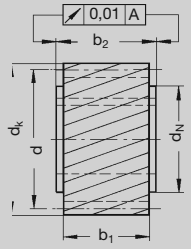


Fig. 1

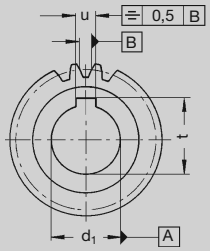


Fig. 1 + 3 Keyway Middle of Tooth Gap

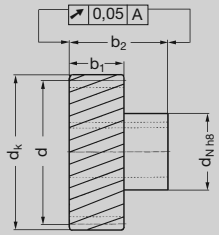


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Gearing Grade **6 e 25**

Order Code	Fig.	N° of Teeth z	d	d*PI	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Shrink-Disk on Page GH-1
Module 3													
24 30 320	3	20	63.66	200.00	69.7	22	36	28	56	6	24.8	0.6	80 84 036
24 31 320	3	20	63.66	200.00	69.7	25	44	28	60	8	28.3	0.7	80 80 044
24 34 520	1	20	63.66	200.00	69.7	30	45	28	30	8	33.3	0.8	
24 32 320	3	20	63.66	200.00	69.7	30	50	28	60	8	33.3	0.8	80 85 050
24 33 320	3	20	63.66	200.00	69.7	32	55	28	65	10	35.3	0.8	80 80 055
24 35 520	1	20	63.66	200.00	69.7	35	48	28	30	10	38.3	0.7	
24 33 522	1	22	70.03	220.00	76.0	25	36	28	30	8	28.3	0.8	
24 34 522	1	22	70.03	220.00	76.0	30	45	28	30	8	33.3	0.7	
24 33 322	3	22	70.03	220.00	76.0	32*	55	28	65	10	35.3	1.0	80 80 055
24 35 522	1	22	70.03	220.00	76.0	35	48	28	30	10	38.3	0.7	
24 35 322	3	22	70.03	220.00	76.0	40*	62	28	65	12	43.3	1.0	80 86 062
24 30 325	3	25	79.58	250.00	85.6	22	36	28	56	6	24.8	1.0	80 84 036
24 33 525	1	25	79.58	250.00	85.6	25	36	28	30	8	28.3	1.0	
24 31 325	3	25	79.58	250.00	85.6	25	44	28	60	8	28.3	1.1	80 80 044
24 34 525	1	25	79.58	250.00	85.6	30	45	28	30	8	33.3	1.0	
24 32 325	3	25	79.58	250.00	85.6	30	50	28	60	8	33.3	1.2	80 85 050
24 33 325	3	25	79.58	250.00	85.6	32	55	28	65	10	35.3	1.2	80 80 055
24 35 525	1	25	79.58	250.00	85.6	35	48	28	30	10	38.3	0.9	
24 34 325	3	25	79.58	250.00	85.6	35	55	28	65	10	38.3	1.1	80 80 055
24 36 525	1	25	79.58	250.00	85.6	40	70	28	50	12	43.3	1.1	
24 35 325	3	25	79.58	250.00	85.6	40*	62	28	65	12	43.3	1.1	80 86 062
24 33 328	3	28	89.13	280.00	95.1	32*	55	28	65	10	35.3	1.1	80 80 055
24 35 328	3	28	89.13	280.00	95.1	40*	62	28	65	12	43.3	1.1	80 86 062
24 33 332	3	32	101.86	320.00	107.85	32*	55	28	65	10	35.3	2.1	80 80 055
24 35 332	3	32	101.86	320.00	107.85	40*	62	28	65	12	43.3	2.1	80 86 062

* H7 tolerance

Helical Tooth System, Ground Teeth, 19° 31' 42" left-hand, with Bore ØH6 and Keyway acc. to DIN 6885

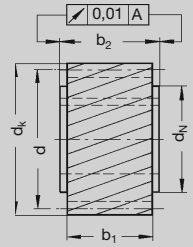


Fig. 1

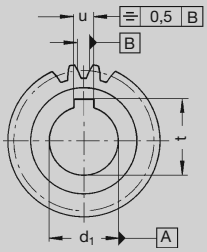


Fig. 1 + 3 Keyway Middle of Tooth Gap

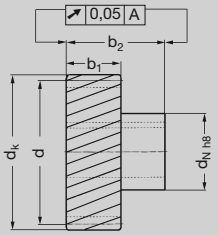


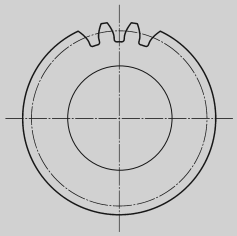
Fig. 3

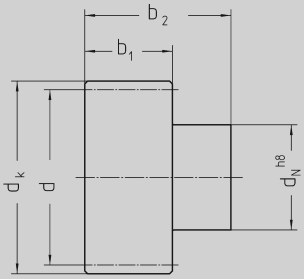
16MnCr5, 1.7131
Case-Hardened
Gearing Grade **6 e 25**

Order Code	Fig.	N° of Teeth z	d	d*PI	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Shrink-Disk on Page GH-1
Module 4													
24 45 515	1	15	63.66	200.00	71.7	35	52	40	50	10	38.3	1.4	
24 43 318	3	18	76.39	240.00	84.4	32	55	40	75	10	35.3	1.5	80 80 055
24 45 520	1	20	84.88	266.67	92.9	35	52	40	50	10	38.3	1.9	
24 47 520	1	20	84.88	266.67	92.9	45	65	40	50	14	48.8	1.6	
24 43 321	3	21	89.13	280.00	97.1	32	55	40	75	10	35.3	2.0	80 80 055
24 44 321	3	21	89.13	280.00	97.1	35	55	40	75	10	38.3	1.9	80 80 055
24 45 321	3	21	89.13	280.00	97.1	40	62	40	75	12	43.3	1.9	80 86 062
24 46 321	3	21	89.13	280.00	97.1	45	68	40	75	14	48.8	1.7	80 80 068
24 45 522	1	22	93.37	293.33	101.4	35	52	40	50	10	38.3	2.3	
24 47 522	1	22	93.37	293.33	101.4	45	65	40	50	14	48.8	2.0	
24 43 324	3	24	101.86	320.00	109.9	32	55	40	75	10	35.3	2.6	80 80 055
24 44 324	3	24	101.86	320.00	109.9	35	55	40	75	10	38.3	2.5	80 80 055
24 45 324	3	24	101.86	320.00	109.9	40	62	40	75	12	43.3	2.5	80 86 062
24 46 324	3	24	101.86	320.00	109.9	45	68	40	75	14	48.8	2.3	80 80 068
24 47 324	3	24	101.86	320.00	109.9	55	80	40	80	16	59.3	2.4	80 87 080
24 45 525	1	25	106.10	333.33	114.1	35	52	40	50	10	38.3	3.1	
24 47 525	1	25	106.10	333.33	114.1	45	65	40	50	14	48.8	2.8	
24 47 325	3	25	106.10	333.33	114.1	55	80	40	80	16	59.3		80 87 080
Module 5													
24 56 318	3	18	95.49	300.00	105.5	45	68	50	85	14	48.8	2.7	80 80 068
24 56 324	3	24	127.32	400.00	137.3	45	68	50	85	14	48.8	4.9	80 80 068
24 57 324	3	24	127.32	400.00	137.3	55	80	50	90	16	59.3	4.9	80 87 080
24 58 324	3	24	127.32	400.00	137.3	75	110	50	110	20	79.9	5.6	80 80 110
Module 6													
24 67 320	3	20	127.32	400.00	139.3	55	80	60	100	16	59.3	5.7	80 87 080
24 68 320	3	20	127.32	400.00	139.3	75	110	60	120	20	79.9	6.3	80 80 110
24 67 325	3	25	159.16	500.00	171.2	55	80	60	100	16	59.3	9.0	80 87 080
24 68 325	3	25	159.16	500.00	171.2	75	110	60	120	20	79.9	9.6	80 80 110
Module 8													
24 88 318	3	18	152.79	480.00	168.8	75	110	80	140	20	79.9	10.8	80 80 110
24 89 320*	3	20	169.80	533.44	185.8	85	125	80	145	22	90.4	13.6	80 80 125
Module 10													
24 09 720*		20	212.21	666.68	232.2	85	125	100	165	22	90.4	26.2	80 80 125

* Gearing grade 5 f 23

Helical Tooth System, left-hand, 19° 31’ 42", without Bore





16MnCr5, 1.7131
Carburized, Teeth Induction Hardened
Gearing Grade **6 e 25**

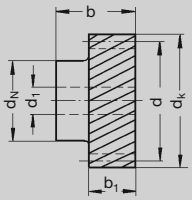
Order Code	Module	N° of Teeth	d	d*PI	d_k	d_N	b_1	b_2	kg	Shrink-Disk on Page GH-1
24 99 218	2	18	38.20	120.00	42.2	30	28	56	0.3	80 83 030
24 99 220	2	20	42.44	133.33	46.4	30	28	56	0.4	80 83 030
24 99 222	2	22	46.69	146.67	50.7	36	28	56	0.5	80 84 036
24 99 225	2	25	53.05	166.67	57.1	44	28	60	0.8	80 80 044
24 99 228	2	28	59.42	186.67	63.4	50	28	60	1.0	80 85 050
24 99 230	2	30	63.66	200.00	67.7	50	28	60	1.1	80 85 050
24 99 232	2	32	67.91	213.33	71.9	55	28	65	1.4	80 80 055
24 99 318	3	18	57.30	180.00	63.3	44	28	60	0.8	80 80 044
24 99 320	3	20	63.66	200.00	69.7	50	28	60	1.0	80 85 050
24 99 322	3	22	70.03	220.00	76.0	55	28	65	1.4	80 80 055
24 99 325	3	25	79.58	250.00	85.6	62	28	65	1.8	80 86 062
24 99 328	3	28	89.13	280.00	95.1	68	28	65	2.3	80 80 068
24 99 418	4	18	76.39	240.00	84.4	62	40	77	2.0	80 86 062
24 99 420	4	20	84.88	266.67	92.9	62	40	77	2.4	80 86 062
24 99 421	4	21	89.13	280.00	97.1	68	40	77	2.8	80 80 068
24 99 422	4	22	93.37	293.33	101.4	68	40	77	2.9	80 80 068
24 99 424	4	24	101.86	320.00	109.9	80	40	80	3.9	80 87 080
24 99 425	4	25	106.10	333.33	114.1	80	40	80	4.0	80 87 080
24 99 522	5	22	116.71	366.67	126.7	80	50	90	5.5	80 87 080
24 99 524	5	24	127.32	400.00	137.3	110	50	110	9.6	80 80 110
24 99 525	5	25	132.63	416.67	142.6	110	50	110	9.1	80 80 110
24 99 620	6	20	127.32	400.00	139.3	110	60	120	9.7	80 80 110
24 99 820 [1]	8	20	169.77	533.33	185.8	125	80	145	19.4	80 80 125

[1] With bore Ø40^{H7}

The pinion could be fixed at d_k or d_n to be reworked (see page ZF-10).

Maximum bore diameter of the pinion on request.

Helical Tooth System, left-hand, 19° 31’ 42", prebored

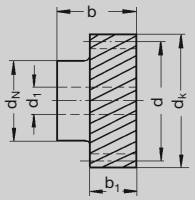


Soft
Ck45 1.0503
Gearing Grade **8 e 25**

Order Code	N° of Teeth	b_1	b	d	d_k	d_1 (J8)	d_N	kg
Module 1.5								
21 15 520	20	17	30	31.83	34.8	9	25	0.14
21 15 525	25	17	30	39.79	42.8	9	30	0.22
Module 2								
21 20 520	20	28	35	42.44	46.4	9	30	0.35
21 20 525	25	28	35	53.05	57.1	12	35	0.54
21 20 530	30	28	35	63.66	67.7	12	40	0.76
Module 3								
21 30 520	20	30	50	63.66	69.7	14	45	0.99
21 30 525	25	30	50	79.58	85.6	14	60	1.60
Module 4								
21 40 515	15	40	60	63.66	71.7	16	50	1.10
21 40 520	20	40	60	84.88	92.9	16	60	2.21
21 40 525	25	40	60	106.10	114.1	16	75	3.45

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

Helical Tooth System, left-hand, 19° 31’ 42", prebored



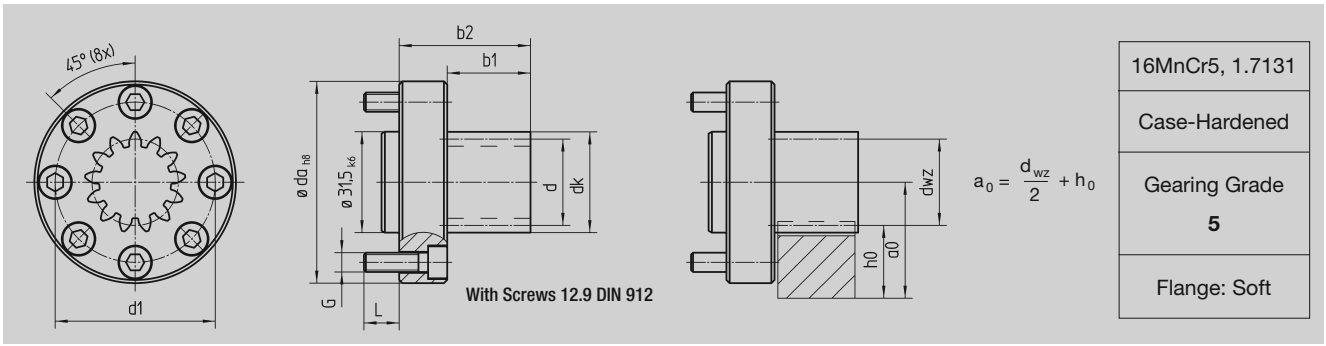
Soft
Ck45 1.0503
Gearing Grade **8 e 25**

Order Code	N° of Teeth	b_1	b	d	d_k	d_1 (J8)	d_N	kg
Module 5								
21 50 520	20	50	70	106.10	116.1	20	70	4.0
21 50 525	25	50	70	132.60	142.6	20	80	6.2
Module 6								
21 60 520	20	60	80	127.30	139.3	20	90	7.0
21 60 525	25	60	80	159.20	171.2	20	110	10.8
Module 8								
21 80 520	20	80	120	166.08	182.0	40	120	15.8
Module 10*								
21 10 518	18	100	150	190.99	211.0	40	150	32.7
Module 12*								
21 12 518	18	130	180	229.18	253.18	40	170	47.2

* With threads for handling

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

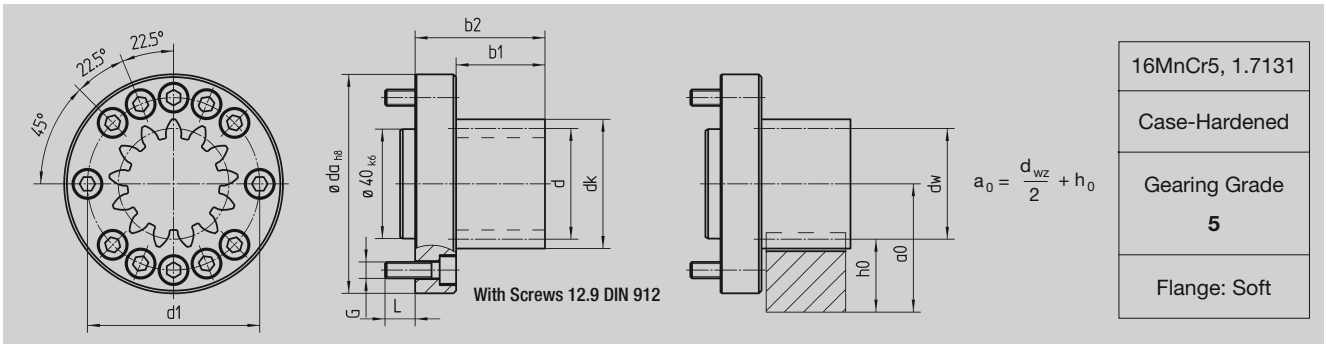
Bolt Circle-ø 50, straight tooth system



Order Code	No. of Teeth	Profile Modification Factor						Interface					
	z	x	d_{wz}	d_k	b_1	b_2	L	a_0	ISO	d_1	G	d_{ah8}	L	kg
Module 2														
78 21 813	13	0.366	27.47	31.5	26	41	81.68	35.73	9409-1-A-50	50	M6	63	11	0.5
78 21 817	17	-0.012	33.95	38.0	26	41	106.81	38.98	9409-1-A-50	50	M6	63	11	0.6

Further number of teeth on request, min. number of teeth 13, max. number of teeth 17

Bolt Circle-ø 63, straight tooth system



Order Code	No. of Teeth	Profile Modification Factor						Interface					
	z	x	d_{wz}	d_k	b_1	b_2	L	a_0	ISO	d_1	G	d_{ah8}	L	kg
Module 2														
78 22 813	13	0.366	27.47	31.5	26	41	81.68	35.73	9409-1-A-63	63	M6	80	11	0.8
78 22 817	17	-0.012	33.95	38.0	26	41	106.81	38.98	9409-1-A-63	63	M6	80	11	0.8
78 22 824	24	0.202	48.81	52.8	26	41	150.80	46.40	9409-1-A-63	63	M6	80	11	1.0

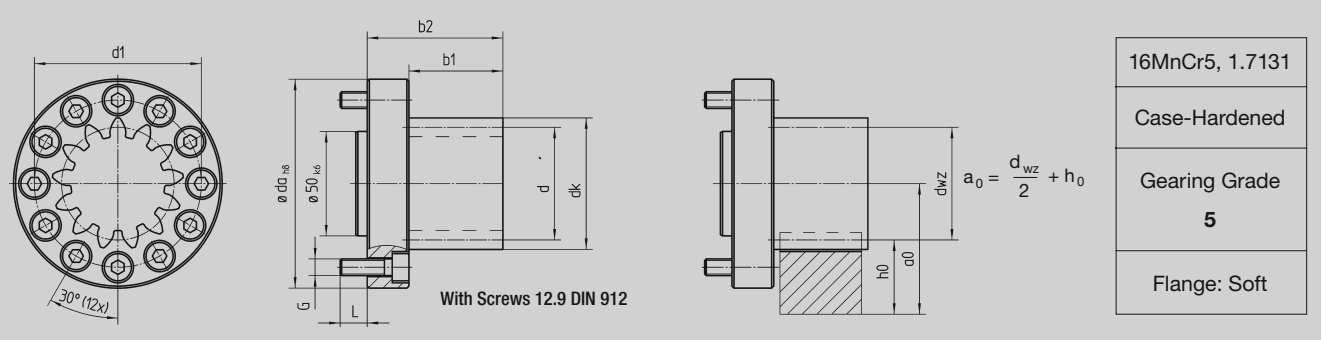
Further number of teeth on request, min. number of teeth 13, max. number of teeth 24

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 3														
78 32 813	13	0.366	41.20	47.2	32.5	47.5	122.52	46.60	9409-1-A-63	63	M6	80	11	1.0

Further number of teeth on request, min. number of teeth 13, max. number of teeth 15

Bolt Circle-ø 80, straight tooth system



16MnCr5, 1.7131
Case-Hardened
Gearing Grade **5**
Flange: Soft

Order Code	No. of Teeth	Profile Modification Factor							Interface					
	z	x	d_{wz}	d_k	b_1	b_2	L	a_0	ISO	d_1	G	d_{ah8}	L	kg
Module 2														
78 23 813	13	0.366	27.47	31.5	26	46	81.68	35.73	9409-1-A-80	80	M8	100	13	1.4
78 23 824 (1)	24	0.202	48.81	52.8	26	46	150.80	46.40	9409-1-A-80	80	M8	100	13	1.6

Further number of teeth on request, min. number of teeth 13, max. number of teeth 31

Module 3														
78 33 813	13	0.366	41.20	47.2	32.5	52.5	122.52	46.60	9409-1-A-80	80	M8	100	13	1.6
78 33 820	20	0.080	60.48	66.5	32.5	52.5	188.50	56.24	9409-1-A-80	80	M8	100	13	2.0

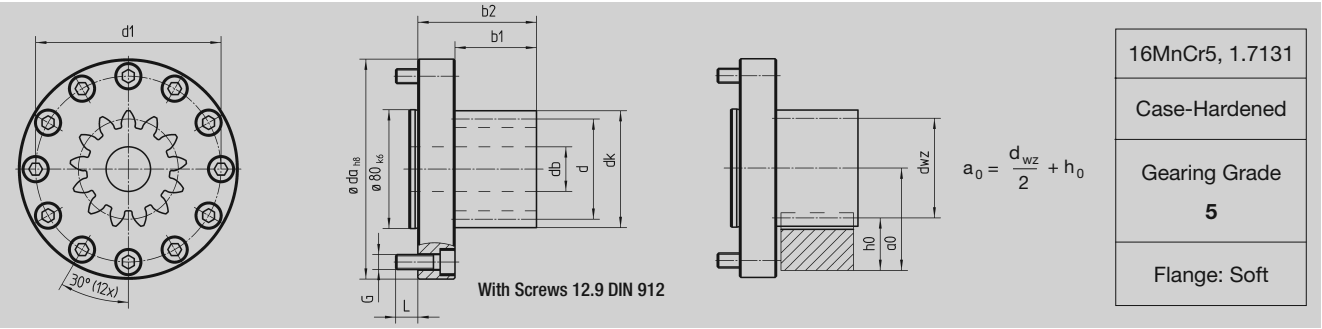
Further number of teeth on request, min. number of teeth 13, max. number of teeth 20

Module 4														
78 43 813	13	0.366	54.93	62.9	45	65	163.36	62.47	9409-1-A-80	80	M8	100	13	2.1
78 43 814	14	0.397	59.17	67.2	45	65	175.93	64.59	9409-1-A-80	80	M8	100	13	2.2

(1) Also available as pinion for counter bearing.

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Bolt Circle-ø 125, straight tooth system



Order Code	No. of Teeth	Profile Modification Factor							Interface						
	z	x	d_{wz}	d_k	b_1	b_2	L	a_0	ISO	d_1	G	d_{ah8}	L	d_b	kg
Module 3															
78 34 813	13	0.366	41.20	47.2	32.5	57.5	122.52	46.60	9409-1-A-125	125	M10	148	15	–	3.8
78 34 413	13	0.366	41.20	47.2	32.5	57.5	122.52	46.60	–	125	M12	148	17	–	3.8
78 34 820	20	0.080	60.48	66.5	32.5	57.5	188.50	56.24	9409-1-A-125	125	M10	148	15	–	4.2
78 34 420	20	0.080	60.48	66.5	32.5	57.5	188.50	56.24	–	125	M12	148	17	–	4.2
78 34 427	27	0.294	82.76	88.8	32.5	57.5	254.47	67.38	–	125	M12	148	17	–	4.9
78 34 433	33	0.477	101.86	107.9	32.5	57.5	311.02	76.93	–	125	M12	148	17	–	5.6

Further number of teeth on request, min. number of teeth 13, max. number of teeth 34

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 4															
78 44 813	13	0.366	54.93	62.9	45	70	163.36	62.47	9409-1-A-125	125	M10	148	15	–	4.4
78 44 413	13	0.366	54.93	62.9	45	70	163.36	62.47	–	125	M12	148	17	–	4.4
78 44 820	20	0.190	81.52	89.5	45	70	256.10	75.76	9409-1-A-125	125	M10	148	15	–	5.4
78 44 420	20	0.190	81.52	89.5	45	70	256.10	75.76	–	125	M12	148	17	–	5.4
78 44 821 (1)	21	0.110	84.88	92.9	45	70	263.89	77.44	9409-1-A-125	125	M10	148	15	–	5.5
78 44 421	21	0.110	84.88	92.9	45	70	263.89	77.44	–	125	M12	148	17	–	5.5
78 44 824	24	0.202	97.61	105.6	45	70	301.59	83.81	9409-1-A-125	125	M10	148	15	–	6.1
78 44 424	24	0.202	97.61	105.6	45	70	301.59	83.81	–	125	M12	148	17	–	6.1

Further number of teeth on request, min. number of teeth 13, max. number of teeth 24

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 5															
78 54 813	13	0.366	68.66	78.7	55	80	204.20	68.33 (2)	9409-1-A-125	125	M10	148	15	–	5.1
78 54 413	13	0.366	68.66	78.7	55	80	204.20	68.33 (2)	–	125	M12	148	17	–	5.1
78 54 417	17	-0.012	84.88	94.9	55	80	267.04	79.44 (2)	–	125	M12	148	17	–	6.0
78 54 819	19	0.049	95.49	105.5	55	80	298.45	81.75 (2)	9409-1-A-125	125	M10	148	15	–	6.6
78 54 419	19	0.049	95.49	105.5	55	80	298.45	81.75 (2)	–	125	M12	148	17	–	6.6

Further number of teeth on request, min. number of teeth 13, max. number of teeth 19

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

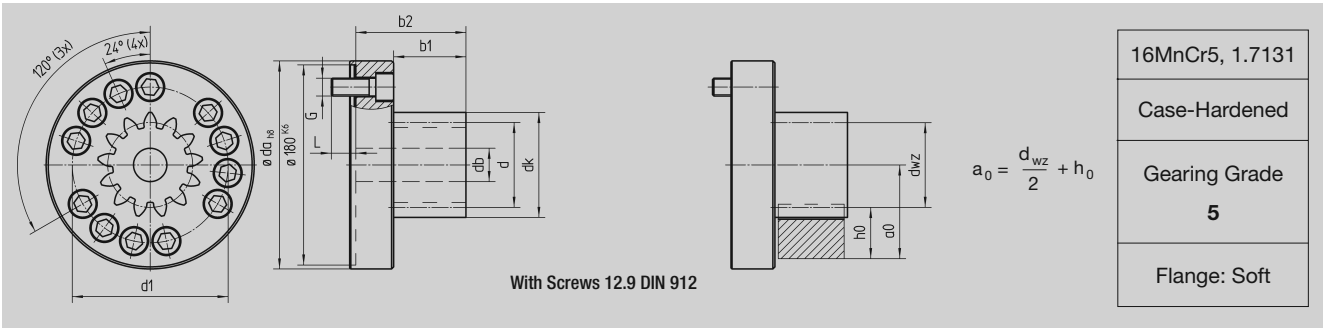
Module 6															
78 64 813	13	0.366	82.40	94.4	65	90	245.04	84.20	9409-1-A-125	125	M10	148	15	25	5.8
78 64 413	13	0.366	82.40	94.4	65	90	245.04	84.20	–	125	M12	148	17	25	5.9
78 64 814	14	0.397	88.76	100.8	65	90	263.89	87.38	9409-1-A-125	125	M10	148	15	25	6.3
78 64 816	16	-0.042	95.49	107.5	65	90	301.59	90.75	9409-1-A-125	125	M10	148	15	25	6.8

Further number of teeth on request, min. number of teeth 13, max. number of teeth 16

(1) Also available as pinion for counter bearing.
(2) For 29 55 ... $a'_0 = a_0 + 10$.

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Bolt Circle-ø 140, straight tooth system



$$a_0 = \frac{d_{wz}}{2} + h_0$$

16MnCr5, 1.7131
Case-Hardened
Gearing Grade **5**
Flange: Soft

Order Code	No. of Teeth	Profile Modification Factor							Interface						
	z	x	d_{wz}	d_k	b_1	b_2	L	a_0	ISO	d_1	G	d_{ah8}	L	d_b	kg
Module 4															
78 46 813	13	0.366	54.93	62.9	45	79	163.36	62.47	–	140	M16	187	22	–	8.1
78 46 820	20	0.190	81.52	89.5	45	79	256.10	75.76	–	140	M16	187	22	–	9.1
78 46 821	21	0.110	84.88	92.9	45	79	263.89	77.44	–	140	M16	187	22	–	9.2

Further number of teeth on request, min. number of teeth 13, max. number of teeth 26

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 5															
78 56 815	15	0.227	77.27	87.3	55	89	235.62	72.64 (2)	–	140	M16	187	22	–	9.2
78 56 820	20	0.080	100.80	110.8	55	89	314.16	84.40 (2)	–	140	M16	187	22	–	10.6

Further number of teeth on request, min. number of teeth 13, max. number of teeth 21

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

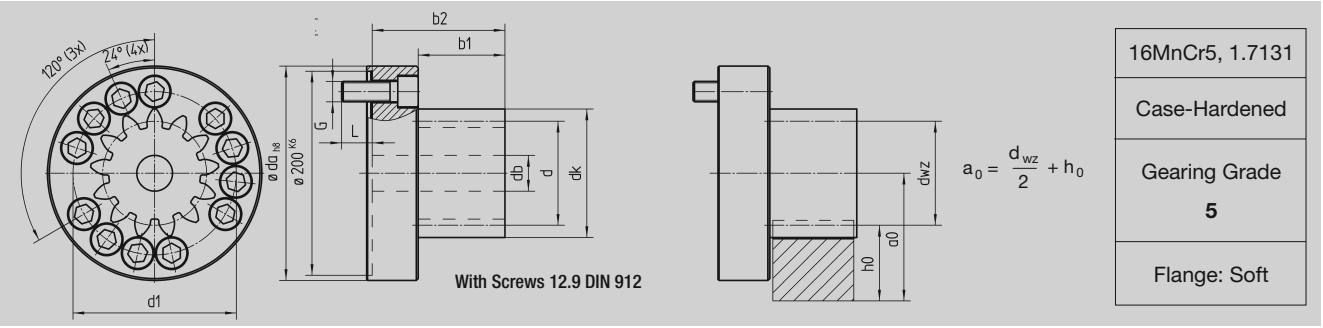
Module 6															
78 66 813	13	0.366	82.40	94.4	65	99	245.04	84.20	–	140	M16	187	22	25	9.5
78 66 817 (1)	17	-0.012	101.86	113.9	65	99	320.44	93.93	–	140	M16	187	22	25	10.9

Further number of teeth on request, min. number of teeth 13, max. number of teeth 17

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

(1) Also available as pinion for counter bearing.
(2) For 29 55 ... $a'_0 = a_0 + 10$.

Bolt Circle-ø 160, straight tooth system



16MnCr5, 1.7131
Case-Hardened
Gearing Grade **5**
Flange: Soft

Order Code	No. of Teeth	Profile Modification Factor							Interface						
	z	x	d_{wz}	d_k	b_1	b_2	L	a_0	ISO	d_1	G	d_{ah8}	L	d_b	kg
Module 5															
78 57 813	13	0.366	68.66	78.7	55	100	204.20	68.33 (2)	–	160	M20	210	30	–	13.8
78 57 820	20	0.080	100.80	110.8	55	100	314.16	84.40 (2)	–	160	M20	210	30	–	15.6

Further number of teeth on request, min. number of teeth 13, max. number of teeth 23

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 6															
78 67 813	13	0.366	82.39	94.4	65	110	245.04	84.20	–	160	M20	210	30	25	14.5
78 67 817	17	-0.012	101.86	113.9	65	110	320.44	93.93	–	160	M20	210	30	25	15.9
78 67 819	19	0.049	114.59	126.6	65	110	358.14	100.30	–	160	M20	210	30	25	17.0

Further number of teeth on request, min. number of teeth 13, max. number of teeth 19

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 8															
78 87 813	13	0.366	109.86	125.9	85	130	326.73	125.93	–	160	M20	210	30	30	17.8

(2) For 29 55 ... $a'_0 = a_0 + 10$.

Straight Tooth System, with Bore ØH6 and Keyway acc. to DIN 6885

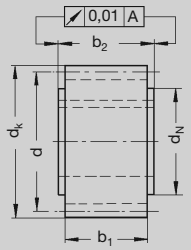


Fig. 1

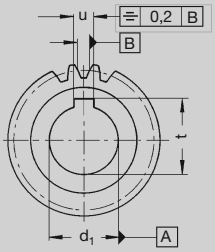


Fig. 1 + 3 Keyway Middle of Tooth Gap

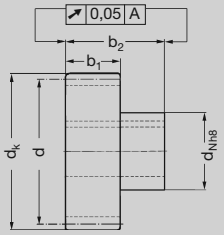


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Gearing Grade **6 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1 H6	d_N	b_1	b_2	u	t	kg	Shrink-Disk on Page GH-1
Module 2												
24 21 216	1	16	32	36	15	25	28	30.0	5	17.3	0.1	
24 21 218	1	18	36	40	15	28	28	30.0	5	17.3	0.2	
24 22 218	1	18	36	40	20	28	28	30.0	6	22.8	0.2	
24 21 220	1	20	40	44	15	25	28	30.0	5	17.3	0.2	
24 29 420	3	20	40	44	19*	30	28	56.0	6	21.8	0.2	80 83 030
24 29 220	1	20	40	44	19*	30	28	30.0	6	21.8	0.2	
24 22 220	1	20	40	44	20*	30	28	30.0	6	22.8	0.2	
24 20 120	3	20	40	44	22*	36	28	56.0	6	24.8	0.3	80 84 036
24 20 220	1	20	40	44	22*	30	28	30.0	6	24.8	0.2	
24 21 222	1	22	44	48	15	25	28	30.0	5	17.3	0.3	
24 29 222	1	22	44	48	19*	30	28	30.0	6	21.8	0.3	
24 29 422	3	22	44	48	19*	30	28	56.0	6	21.8	0.3	80 83 030
24 22 222	1	22	44	48	20	30	28	30.0	6	22.8	0.3	
24 20 222	1	22	44	48	22*	30	28	30.0	6	24.8	0.2	
24 20 122	3	22	44	48	22	36	28	56.0	6	27.8	0.2	80 84 036
24 23 222	1	22	44	48	25	36	28	30.0	8	28.3	0.2	
24 21 225	1	25	50	54	15	25	28	30.0	5	17.3	0.4	
24 26 225	3	25	50	54	16	30	28	54.0	5	18.3	0.3	80 83 030
24 29 225	1	25	50	54	19*	30	28	30.0	6	21.8	0.3	
24 29 425	3	25	50	54	19*	30	28	56.0	6	21.8	0.3	80 83 030
24 22 225	1	25	50	54	20	30	28	30.0	6	22.8	0.4	
24 20 225	1	25	50	54	22	30	28	30.0	6	24.8	0.3	
24 20 425	3	25	50	54	22*	36	28	56.0	6	24.8	0.4	80 84 036
24 23 225	1	25	50	54	25	36	28	30.0	8	28.3	0.3	
24 24 225	1	25	50	54	30	45	28	30.0	8	33.3	0.3	
24 21 228	1	28	56	60	15	25	28	30.0	5	17.3	0.5	
24 29 228	1	28	56	60	19*	30	28	30.0	6	21.8	0.5	
24 29 428	3	28	56	60	19*	30	28	56.0	6	21.8	0.5	80 83 030
24 22 228	1	28	56	60	20	30	28	30.0	6	22.8	0.5	
24 20 128	3	28	56	60	22*	36	28	56.0	6	24.8	0.3	80 84 036
24 20 228	1	28	56	60	22*	30	28	30.0	6	24.8	0.3	
24 23 228	1	28	56	60	25	36	28	30.0	8	28.3	0.4	
24 22 428	3	28	56	60	30	50	28	60.0	8	33.3	0.4	80 85 050
24 24 228	1	28	56	60	30	45	28	30.0	8	33.3	0.4	
24 25 228	1	28	56	60	35	48	28	30.0	10	38.3	0.3	
24 21 232	1	32	64	68	15	36	28	30.0	5	17.3	0.6	
24 26 232	3	32	64	68	16	30	28	54.0	5	18.3	0.6	80 83 030
24 22 232	1	32	64	68	20	30	28	30.0	6	22.8	0.6	
24 20 232	1	32	64	68	22*	30	28	30.0	6	24.8	0.4	
24 20 432	3	32	64	68	22	36	28	56.0	6	24.8	0.6	80 84 036
24 23 232	1	32	64	68	25	36	28	30.0	8	28.3	0.6	
24 22 432	3	32	64	68	30	50	28	60.0	8	33.3	0.6	80 85 050
24 24 232	1	32	64	68	30	45	28	30.0	8	33.3	0.6	
24 23 432	3	32	64	68	32	55	28	65.0	10	35.3	0.5	80 80 055
24 25 232	1	32	64	68	35	48	28	30.0	10	38.3	0.5	
24 22 236	1	36	72	76	20	30	28	30.0	6	22.8	0.8	
24 23 236	1	36	72	76	25	36	28	30.0	8	28.3	0.8	
24 24 236	1	36	72	76	30	45	28	30.0	8	33.3	0.7	
24 25 236	1	36	72	76	35	48	28	30.0	10	38.3	0.7	
24 25 436	3	36	72	76	40	62	28	65.0	12	43.3	0.5	80 86 062
24 27 236	1	36	72	76	45	58	28	30.0	14	48.8	0.6	

* H7 tolerance

Straight Tooth System, with Bore ØH6 and Keyway acc. to DIN 6885

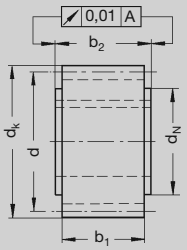


Fig. 1

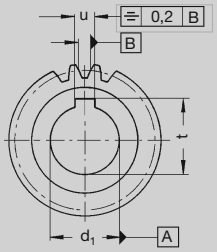


Fig. 1 + 3 Keyway Middle of Tooth Gap

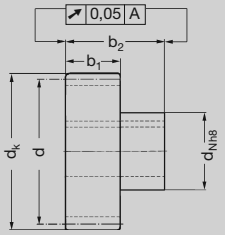


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Gearing Grade **6 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Shrink-Disk on Page GH-1
Modul / Module **2**												
24 21 240	1	40	80	84	15	36	28	30.0	5	17.3	1.0	
24 22 240	1	40	80	84	20	30	28	30.0	6	22.8	1.0	
24 23 240	1	40	80	84	25	36	28	30.0	8	28.3	1.0	
24 24 240	1	40	80	84	30	45	28	30.0	8	33.3	1.0	
24 23 440	3	40	80	84	32	55	28	65.0	10	35.3	0.9	80 80 055
24 25 240	1	40	80	84	35	48	28	30.0	10	38.3	0.9	
24 25 440	3	40	80	84	40	62	28	65.0	12	43.3	0.7	80 86 062
24 26 440	3	40	80	84	45	68	28	65.0	14	48.8	1.3	80 80 068
24 27 240	1	40	80	84	45	58	28	30.0	14	48.8	0.8	
24 22 245	1	45	90	94	20	30	28	30.0	6	22.8	1.3	
24 23 245	1	45	90	94	25	36	28	30.0	8	28.3	1.2	
24 25 245	1	45	90	94	35	48	28	30.0	10	38.3	1.2	
24 27 245	1	45	90	94	45	58	28	30.0	14	48.8	1.1	
24 22 250	1	50	100	104	20	30	28	30.0	6	22.8	1.6	
24 23 250	1	50	100	104	25	36	28	30.0	8	28.3	1.5	
24 25 250	1	50	100	104	35	48	28	30.0	10	38.3	1.5	
24 27 250	1	50	100	104	45	58	28	30.0	14	48.8	1.4	
24 26 450	3	50	100	104	45	68	28	65.0	14	48.8	2.0	80 80 068
24 23 256	1	56	112	116	25	36	28	30.0	8	28.3	1.9	
24 25 256	1	56	112	116	35	48	28	30.0	10	38.3	1.8	
24 23 263	1	63	126	130	25	36	28	30.0	8	28.3	2.5	
24 25 271	1	71	142	146	35	48	28	30.0	10	38.3	3.15	
24 25 280	1	80	160	164	35	48	28	30.0	10	38.3	4.2	
24 27 290	1	90	180	184	45	58	28	30.0	14	48.8	5.7	

Straight Tooth System, with Bore ØH6 and Keyway acc. to DIN 6885

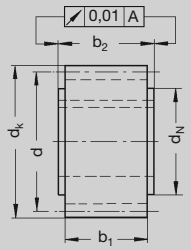


Fig. 1

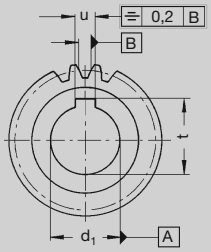


Fig. 1 + 3 Keyway Middle of Tooth Gap

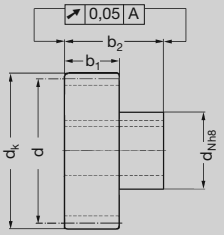


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Gearing Grade **6 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1 H6	d_N	b_1	b_2	u	t	kg	Shrink-Disk on Page GH-1
Module 3												
24 33 218	1	18	54	60	25	36	28	30.0	8	28.3	0.4	
24 33 220	1	20	60	66	25	36	28	30.0	8	28.3	0.5	
24 34 220	1	20	60	66	30	45	28	30.0	8	33.3	0.5	
24 35 220	1	20	60	66	35	48	28	30.0	10	38.3	0.4	
24 30 422	3	22	66	72	22	36	28	56.0	6	24.8	0.8	80 84 036
24 31 422	3	22	66	72	25	44	28	60.0	8	28.3	0.9	80 80 044
24 33 222	1	22	66	72	25	36	28	30.0	8	28.3	0.6	
24 32 422	3	22	66	72	30	50	28	60.0	8	33.3	0.9	80 85 050
24 34 222	1	22	66	72	30	45	28	30.0	8	33.3	0.6	
24 33 422	3	22	66	72	32	55	28	65.0	10	35.3	1.0	80 80 055
24 34 422	3	22	66	72	35	55	28	65.0	10	38.3	0.9	80 80 055
24 35 222	1	22	66	72	35	48	28	30.0	10	38.3	0.6	
24 35 422	3	22	66	72	40*	62	28	65	12	43.3	1.0	80 86 062
24 33 225	1	25	75	81	25	36	28	30.0	8	28.3	0.9	
24 34 225	1	25	75	81	30	45	28	30.0	8	33.3	0.8	
24 33 425	3	25	75	81	32*	55	28	65	10	35.3	1.2	80 80 055
24 35 225	1	25	75	81	35	48	28	30.0	10	38.3	0.8	
24 35 425	3	25	75	81	40	62	28	65.0	12	43.3	1.2	80 86 062
24 37 225	1	25	75	81	45	58	28	30.0	14	48.8	0.6	
24 30 428	3	28	84	90	22	36	28	56.0	6	24.8	1.3	80 84 036
24 31 428	3	28	84	90	25	44	28	60.0	8	28.3	1.4	80 80 044
24 33 228	1	28	84	90	25	36	28	30.0	8	28.3	1.1	
24 32 428	3	28	84	90	30	50	28	60.0	8	33.3	1.4	80 85 050
24 34 228	1	28	84	90	30	45	28	30.0	8	33.3	1.1	
24 33 428	3	28	84	90	32	55	28	65.0	10	35.3	1.5	80 80 055
24 34 428	3	28	84	90	35	55	28	65.0	10	38.3	1.4	80 80 055
24 35 228	1	28	84	90	35	48	28	30.0	10	38.3	1.0	
24 35 428	3	28	84	90	40*	62	28	65	12	43.3	1.4	80 86 062
24 36 428	3	28	84	90	45	68	28	65.0	14	48.8	1.5	80 80 068
24 37 228	1	28	84	90	45	58	28	30.0	14	48.8	0.9	
24 33 232	1	32	96	102	25	36	28	30.0	8	28.3	1.5	
24 34 232	1	32	96	102	30	45	28	30.0	8	33.3	1.4	
24 33 432	3	32	96	102	32*	55	28	65	10	35.3	1.8	80 80 055
24 35 232	1	32	96	102	35	48	28	30.0	10	38.3	1.4	
24 35 432	3	32	96	102	40	62	28	65.0	12	43.3	1.8	80 86 062
24 37 232	1	32	96	102	45	58	28	30.0	14	48.8	1.3	
24 39 232	1	32	96	102	60	80	28	30.0	18	64.4	1.1	
24 33 236	1	36	108	114	25	36	28	30.0	8	28.3	1.9	
24 35 236	1	36	108	114	35	48	28	30.0	10	38.3	1.8	
24 36 436	3	36	108	114	45	68	28	65.0	14	48.8	2.2	80 80 068
24 37 236	1	36	108	114	45	58	28	30.0	14	48.8	1.7	
24 39 236	1	36	108	114	60	80	28	30.0	18	64.4	1.4	
24 33 240	1	40	120	126	25	36	28	30	8	28.3	2.3	
24 35 240	1	40	120	126	35	48	28	30.0	10	38.3	2.3	
24 37 240	1	40	120	126	45	58	28	30.0	14	48.8	2.1	
24 39 240	1	40	120	126	60	80	28	30.0	18	64.4	1.9	
24 33 245	1	45	135	141	25	36	28	30.0	8	28.3	3.0	
24 35 245	1	45	135	141	35	48	28	30.0	10	38.3	2.7	
24 37 245	1	45	135	141	45	58	28	30.0	14	48.8	2.4	

* H7 tolerance

Straight Tooth System, with Bore ØH6 and Keyway acc. to DIN 6885

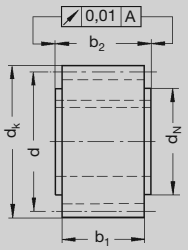


Fig. 1

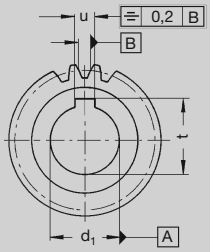


Fig. 1 + 3 Keyway Middle of Tooth Gap

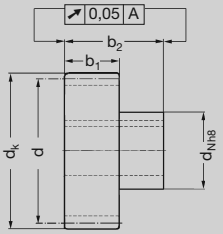


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Gearing Grade **6 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Shrink-Disk on Page GH-1
Module 3												
24 39 245	1	45	135	141	60	80	28	30.0	18	64.4	2.4	
24 35 250	1	50	150	156	35	48	28	30.0	10	38.3	3.6	
24 37 250	1	50	150	156	45	58	28	30	14	48.8	3.5	
24 37 256	1	56	168	174	45	58	28	30.0	14	48.8	4.4	
24 37 263	1	63	189	195	45	58	28	30.0	14	48.8	5.4	
24 39 263	1	63	189	195	60	80	28	30.0	18	64.4	5.4	

Straight Tooth System, with Bore ØH6 and Keyway acc. to DIN 6885

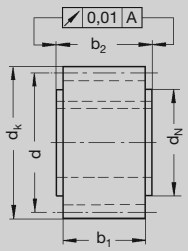


Fig. 1

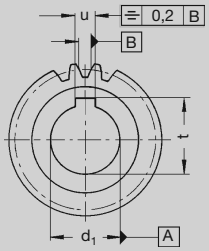


Fig. 1 + 3 Keyway Middle of Tooth Gap

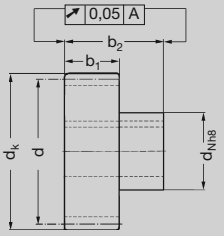
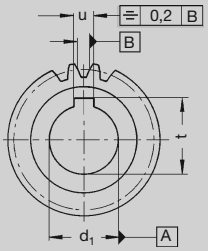


Fig. 3

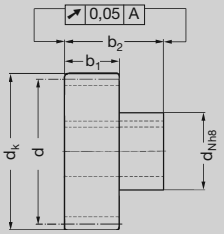
16MnCr5, 1.7131
Case-Hardened
Gearing Grade **6 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Shrink-Disk on Page GH-1
Module 4												
24 43 420	3	20	80	88	32	55	40	75.0	10	35.3	1.7	80 80 055
24 45 220	1	20	80	88	35	52	40	50.0	10	38.3	1.3	
24 44 420	3	20	80	88	35	55	40	75.0	10	38.3	1.7	80 80 055
24 45 420	3	20	80	88	40	62	40	75.0	12	43.3	1.7	80 86 062
24 47 220	1	20	80	88	45	65	40	50.0	14	48.8	1.2	
24 45 222	1	22	88	96	35	52	40	50.0	10	38.3	1.7	
24 47 222	1	22	88	96	45	65	40	50.0	14	48.8	1.5	
24 46 422	3	22	88	96	45	68	40	75.0	14	48.8	2.0	80 80 068
24 43 425	3	25	100	108	32	55	40	75.0	10	35.3	2.6	80 80 055
24 45 225	1	25	100	108	35	52	40	50.0	10	38.3	2.2	
24 44 425	3	25	100	108	35	55	40	75.0	10	38.3	2.5	80 80 055
24 45 425	3	25	100	108	40	62	40	75.0	12	43.3	2.5	80 86 062
24 47 225	1	25	100	108	45	65	40	50.0	14	48.8	2.0	
24 47 425	3	25	100	108	55	80	40	80.0	16	59.3	2.5	80 87 080
24 45 228	1	28	112	120	35	52	40	50.0	10	38.3	2.9	
24 47 228	1	28	112	120	45	65	40	50.0	14	48.8	2.7	
24 46 428	3	28	112	120	45	68	40	75.0	14	48.8	3.1	80 80 068
24 45 232	1	32	128	136	35	52	40	50.0	10	38.3	3.8	
24 47 232	1	32	128	136	45	65	40	50.0	14	48.8	3.7	
24 47 432	3	32	128	136	55	80	40	80.0	16	59.3	4.1	80 87 080
24 48 432	3	32	128	136	75	110	40	100.0	20	79.9	5.0	80 80 110
24 47 240	1	40	160	168	45	65	40	50.0	14	48.8	5.9	
24 49 240	1	40	160	168	60	80	40	50.0	18	64.4	5.6	
24 48 440	3	40	160	168	75	110	40	100.0	20	79.9	7.3	80 80 110

Straight Tooth System, with Bore ØH6 and Keyway acc. to DIN 6885



Keyway Middle of Tooth Gap

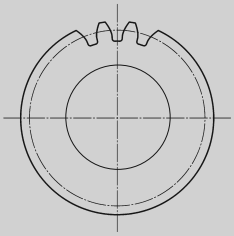


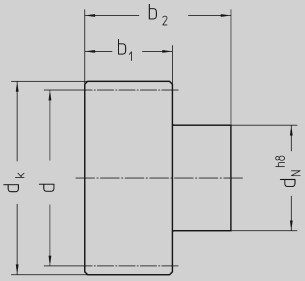
16MnCr5, 1.7131
Case-Hardened
Gearing Grade **6 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Shrink-Disk on Page GH-1
Module 5												
24 56 421		21	105	115	45	68	50	85.0	14	48.8	3.7	80 80 068
24 57 421		21	105	115	55	80	50	90.0	16	59.3	3.7	80 87 080
24 56 425		25	125	135	45	68	50	85.0	14	48.8	5.2	80 80 068
24 57 425		25	125	135	55	80	50	90.0	16	59.3	5.1	80 87 080
24 58 425		25	125	135	75	110	50	110.0	20	80.4	4.7	80 80 110
Module 6												
24 67 421		21	126	138	55	80	60	100.0	16	59.3	5.6	80 87 080
24 68 421		21	126	138	75	110	60	120.0	20	79.9	4.7	80 80 110
24 67 425		25	150	162	55	80	60	100.0	16	59.3	8.0	80 87 080
24 68 425		25	150	162	75	110	60	120.0	20	79.9	7.1	80 80 110
Module 8												
24 88 420*		20	160	176	75	110	80	140	20	79.9	12.0	80 80 110
24 89 420*		20	160	176	85	125	80	145	22	90.4	12.1	80 80 125
Module 10												
24 09 620*		20	200	220	85	125	100	165	22	90.4	23	80 80 125

* Gearing quality 5 f 23

Straight Tooth System, 20° Pressure Angle, without Bore





16MnCr5, 1.7131
Induction-Hardened
Gearing Grade **6 e 25**

Order Code	Module	N° of Teeth	d	d_k	d_N	b_1	b_2	kg	Shrink-Disk on Page GH-1
24 98 218	2	18	36	40	30	28	56	0.3	80 83 030
24 98 220	2	20	40	44	30	28	56	0.4	80 83 030
24 98 222	2	22	44	48	36	28	56	0.5	80 84 036
24 98 225	2	25	50	54	44	28	60	0.7	80 80 044
24 98 228	2	28	56	60	50	28	60	0.9	80 85 050
24 98 230	2	30	60	64	50	28	60	1.0	80 85 050
24 98 232	2	32	64	68	55	28	65	1.3	80 80 055
24 98 236	2	36	72	76	62	28	65	1.6	80 86 062
24 98 240	2	40	80	84	68	28	65	2.0	80 80 068
24 98 318	3	18	54	60	44	28	60	0.8	80 80 044
24 98 320	3	20	60	66	50	28	60	1.0	80 85 050
24 98 322	3	22	66	72	55	28	65	1.3	80 80 055
24 98 325	3	25	75	81	62	28	65	1.7	80 86 062
24 98 328	3	28	84	90	68	28	65	2.1	80 80 068
24 98 330	3	30	90	96	68	28	65	2.2	80 80 068
24 98 332	3	32	96	102	68	28	65	2.4	80 80 068
24 98 336	3	36	108	114	68	28	65	2.8	80 80 068
24 98 340	3	40	120	126	68	28	65	3.3	80 80 068
24 98 418	4	18	72	80	55	40	77	1.7	80 80 055
24 98 420	4	20	80	88	62	40	77	2.2	80 86 062
24 98 422	4	22	88	96	68	40	77	2.7	80 80 068
24 98 425	4	25	100	108	80	40	80	3.7	80 87 080
24 98 428	4	28	112	120	80	40	80	4.4	80 87 080
24 98 430	4	30	120	128	80	40	80	4.6	80 87 080
24 98 432	4	32	128	136	110	40	100	7.9	80 80 110
24 98 436	4	36	144	152	110	40	100	8.9	80 80 110
24 98 440	4	40	160	168	110	40	100	9.9	80 80 110
24 98 521	5	21	105	115	80	50	90	4.9	80 87 080
24 98 522	5	22	110	120	80	50	90	5.0	80 87 080
24 98 525	5	25	125	135	110	50	110	9.0	80 80 110
24 98 528	5	28	140	150	110	50	110	10.2	80 80 110
24 98 530	5	30	150	160	110	50	110	10.9	80 80 110
24 98 621	6	21	126	138	110	60	120	5.9	80 80 110
24 98 625	6	25	150	162	110	60	120	8.9	80 80 110

The pinion could be fixed at d_k or d_n to be reworked (see page ZF-10).

Maximum bore diameter of the pinion on request.

Straight Tooth System, prebored

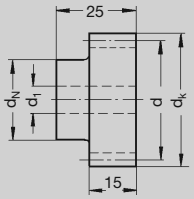


Fig. 1

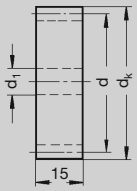


Fig. 2

Soft
C45, 1.0503
Gearing Grade **8 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 10 012	1	12	12.0	14.0	6	9	–	–	0.01
21 10 013	1	13	13.0	15.0	6	9	–	–	0.01
21 10 014	1	14	14.0	16.0	6	11	–	–	0.02
21 10 015	1	15	15.0	17.0	6	12	–	–	0.02
21 10 016	1	16	16.0	18.0	6	12	–	–	0.03
21 10 017	1	17	17.0	19.0	6	14	–	–	0.03
21 10 018	1	18	18.0	20.0	6	15	–	–	0.04
21 10 019	1	19	19.0	21.0	6	15	–	–	0.04
21 10 020	1	20	20.0	22.0	6	16	–	–	0.05
21 10 021	1	21	21.0	23.0	6	16	–	–	0.05
21 10 022	1	22	22.0	24.0	6	18	–	–	0.06
21 10 023	1	23	23.0	25.0	6	18	–	–	0.06
21 10 024	1	24	24.0	26.0	9	20	–	–	0.07
21 10 025	1	25	25.0	27.0	9	20	–	–	0.07
21 10 030	1	30	30.0	32.0	9	20	–	–	0.10
21 10 035	1	35	35.0	37.0	9	25	–	–	0.14
21 10 038	1	38	38.0	40.0	9	25	–	–	0.17
21 10 040	1	40	40.0	42.0	9	25	–	–	0.18
21 10 045	1	45	45.0	47.0	9	30	–	–	0.25
21 10 048	1	48	48.0	50.0	9	30	–	–	0.26
21 10 050	1	50	50.0	52.0	9	30	–	–	0.28
21 10 057	1	57	57.0	59.0	9	40	–	–	0.37
21 10 060	1	60	60.0	62.0	9	40	–	–	0.40
23 10 076	2	76	76.0	78.0	10	–	–	–	0.55
23 10 080	2	80	80.0	82.0	10	–	–	–	0.60
23 10 095	2	95	95.0	97.0	10	–	–	–	0.85
23 10 100	2	100	100.0	102.0	10	–	–	–	0.95
23 10 114	2	114	114.0	116.0	10	–	–	–	1.20

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Straight Tooth System, prebored

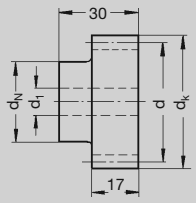


Fig. 1

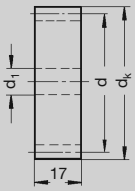


Fig. 2

Soft
C45, 1.0503
Gearing Grade **8 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 15 012	1	12	18.0	21.0	6	14	–	–	0.03
21 15 013	1	13	19.5	22.5	6	14	–	–	0.03
21 15 014	1	14	21.0	24.0	6	16	–	–	0.04
21 15 015	1	15	22.5	25.5	6	18	–	–	0.05
21 15 016	1	16	24.0	27.0	6	18	–	–	0.07
21 15 017	1	17	25.5	28.5	9	20	–	–	0.08
21 15 018	1	18	27.0	30.0	9	20	–	–	0.09
21 15 019	1	19	28.5	31.5	9	20	–	–	0.10
21 15 020	1	20	30.0	33.0	9	25	–	–	0.13
21 15 021	1	21	31.5	34.5	9	25	–	–	0.14
21 15 022	1	22	33.0	36.0	9	25	–	–	0.15
21 15 023	1	23	34.5	37.5	9	25	–	–	0.16
21 15 024	1	24	36.0	39.0	9	25	–	–	0.17
21 15 025	1	25	37.5	40.5	9	25	–	–	0.18
21 15 030	1	30	45.0	48.0	9	30	–	–	0.23
21 15 035	1	35	52.5	55.5	9	40	–	–	0.40
21 15 038	1	38	57.0	60.0	9	40	–	–	0.40
21 15 040	1	40	60.0	63.0	9	40	–	–	0.46
21 15 045	1	45	67.5	70.5	12	50	–	–	0.61
21 15 048	1	48	72.0	75.0	12	50	–	–	0.70
21 15 050	1	50	75.0	78.0	12	50	–	–	0.75
21 15 057	1	57	85.5	88.5	12	60	–	–	1.00
21 15 060	1	60	90.0	93.0	12	60	–	–	1.16
23 15 076	2	76	114.0	117.0	16	–	–	–	1.40
23 15 080	2	80	120.0	123.0	16	–	–	–	1.50
23 15 595	2	95	142.5	145.5	20	–	–	–	2.10

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Straight Tooth System, prebored

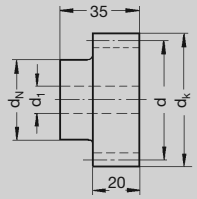


Fig. 1

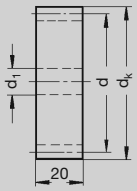


Fig. 2

Soft
C45, 1.0503
Gearing Grade **8 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 20 012	1	12	24.0	28.0	9	18.0	–	–	0.07
21 20 013	1	13	26.0	30.0	9	19.0	–	–	0.12
21 20 014	1	14	28.0	32.0	9	19.0	–	–	0.14
21 20 015	1	15	30.0	34.0	9	24.5	–	–	0.15
21 20 016	1	16	32.0	36.0	9	25.0	–	–	0.17
21 20 017	1	17	34.0	38.0	9	25.0	–	–	0.18
21 20 018	1	18	36.0	40.0	9	25.0	–	–	0.19
21 20 019	1	19	38.0	42.0	9	25.0	–	–	0.20
21 20 020	1	20	40.0	44.0	9	30.0	–	–	0.22
21 20 021	1	21	42.0	46.0	9	30.0	–	–	0.26
21 20 022	1	22	44.0	48.0	9	30.0	–	–	0.27
21 20 023	1	23	46.0	50.0	9	30.0	–	–	0.28
21 20 024	1	24	48.0	52.0	12	35.0	–	–	0.36
21 20 025	1	25	50.0	54.0	12	35.0	–	–	0.39
21 20 028	1	28	56.0	60.0	12	40.0	–	–	0.45
21 20 030	1	30	60.0	64.0	12	40.0	–	–	0.50
21 20 032	1	32	64.0	68.0	12	40.0	–	–	0.60
21 20 035	1	35	70.0	74.0	12	50.0	–	–	0.67
21 20 036	1	36	72.0	76.0	12	50.0	–	–	0.85
21 20 038	1	38	76.0	80.0	12	50.0	–	–	0.90
21 20 040	1	40	80.0	84.0	12	50.0	–	–	0.95
21 20 045	1	45	90.0	94.0	12	60.0	–	–	1.25
21 20 048	1	48	96.0	100.0	15	70.0	–	–	1.50
21 20 050	1	50	100.0	104.0	15	70.0	–	–	1.60
21 20 056	1	56	112.0	116.0	15	70.0	–	–	1.90
21 20 057	1	57	114.0	118.0	15	70.0	–	–	2.00
21 20 060	1	60	120.0	124.0	15	70.0	–	–	2.40
23 20 576	2	76	152.0	156.0	20	–	–	–	2.80
23 20 580	2	80	160.0	164.0	20	–	–	–	3.10
23 20 595	2	95	190.0	194.0	20	–	–	–	4.40

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Straight Tooth System, prebored

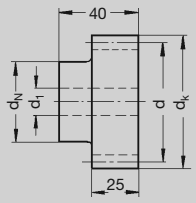


Fig. 1

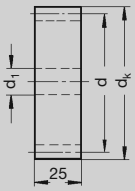


Fig. 2

Soft
C45, 1.0503
Gearing Grade **8 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 25 012	1	12	30.0	35.0	9	20.0	–	–	0.16
21 25 013	1	13	32.5	37.5	9	20.0	–	–	0.18
21 25 014	1	14	35.0	40.0	9	25.0	–	–	0.22
21 25 015	1	15	37.5	42.5	9	25.0	–	–	0.25
21 25 016	1	16	40.0	45.0	9	30.0	–	–	0.31
21 25 017	1	17	42.5	47.5	9	30.0	–	–	0.35
21 25 018	1	18	45.0	50.0	9	35.0	–	–	0.41
21 25 019	1	19	47.5	52.5	12	35.0	–	–	0.43
21 25 020	1	20	50.0	55.0	12	35.0	–	–	0.47
21 25 021	1	21	52.5	57.5	12	35.0	–	–	0.50
21 25 022	1	22	55.0	60.0	12	40.0	–	–	0.53
21 25 023	1	23	57.5	62.5	12	40.0	–	–	0.62
21 25 024	1	24	60.0	65.0	12	40.0	–	–	0.66
21 25 025	1	25	62.5	67.5	12	45.0	–	–	0.75
21 25 030	1	30	75.0	80.0	12	50.0	–	–	0.97
21 25 035	1	35	87.5	92.5	12	60.0	–	–	1.49
21 25 038	1	38	95.0	100.0	12	60.0	–	–	1.72
21 25 040	1	40	100.0	105.0	12	70.0	–	–	1.84
21 25 045	1	45	112.5	117.5	15	70.0	–	–	2.36
21 25 048	1	48	120.0	125.0	15	80.0	–	–	2.75
21 25 050	1	50	125.0	130.0	15	80.0	–	–	2.94
21 25 057	1	57	142.5	147.5	15	90.0	–	–	3.67
21 25 060	1	60	150.0	155.0	15	90.0	–	–	4.00
23 25 580	2	80	200.0	205.0	25	–	–	–	6.10

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Straight Tooth System, prebored

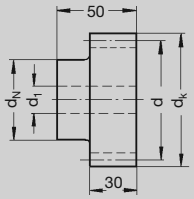


Fig. 1

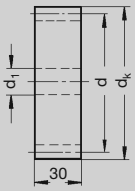


Fig. 2

Soft
C45, 1.0503
Gearing Grade **8 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 30 012	1	12	36	42	14	25	–	–	0.25
21 30 013	1	13	39	45	14	25	–	–	0.30
21 30 014	1	14	42	48	14	25	–	–	0.34
21 30 015	1	15	45	51	14	35	–	–	0.41
21 30 016	1	16	48	54	14	35	–	–	0.51
21 30 017	1	17	51	57	14	42	–	–	0.67
21 30 018	1	18	54	60	14	45	–	–	0.70
21 30 019	1	19	57	63	14	45	–	–	0.75
21 30 020	1	20	60	66	14	45	–	–	0.82
21 30 021	1	21	63	69	14	45	–	–	0.89
21 30 022	1	22	66	72	14	50	–	–	1.05
21 30 023	1	23	69	75	14	50	–	–	1.10
21 30 024	1	24	72	78	14	50	–	–	1.20
21 30 025	1	25	75	81	14	60	–	–	1.35
21 30 027	1	27	81	87	14	60	–	–	1.60
21 30 028	1	28	84	90	14	60	–	–	1.70
21 30 030	1	30	90	96	14	60	–	–	1.80
21 30 032	1	32	96	102	14	60	–	–	2.00
21 30 035	1	35	105	111	14	80	–	–	2.70
21 30 036	1	36	108	114	14	80	–	–	2.80
21 30 038	1	38	114	120	14	80	–	–	3.00
21 30 040	1	40	120	126	14	80	–	–	3.30
23 30 545	2	45	135	141	20	–	–	–	3.30
23 30 548	2	48	144	150	20	–	–	–	3.80
23 30 550	2	50	150	156	25	–	–	–	4.10
23 30 552	2	52	156	162	25	–	–	–	4.50
23 30 556	2	56	168	174	25	–	–	–	5.20
23 30 560	2	60	180	186	25	–	–	–	6.00
23 30 576	2	76	228	234	25	–	–	–	9.60
23 30 595	2	95	285	291	25	–	–	–	15.00

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Straight Tooth System, prebored

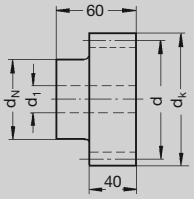


Fig. 1

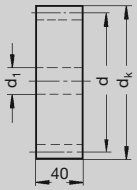


Fig. 2

Soft
C45, 1.0503
Gearing Grade **8 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 40 012	1	12	48	56	16	35	–	–	0.58
21 40 013	1	13	52	60	16	35	–	–	0.72
21 40 014	1	14	56	64	16	45	–	–	0.90
21 40 015	1	15	60	68	16	45	–	–	1.00
21 40 016	1	16	64	72	16	45	–	–	1.10
21 40 017	1	17	68	76	16	50	–	–	1.30
21 40 018	1	18	72	80	16	50	–	–	1.40
21 40 019	1	19	76	84	16	60	–	–	1.70
21 40 020	1	20	80	88	16	60	–	–	1.80
21 40 021	1	21	84	92	16	70	–	–	2.20
21 40 022	1	22	88	96	16	70	–	–	2.50
21 40 023	1	23	92	100	16	75	–	–	2.60
21 40 024	1	24	96	104	16	75	–	–	2.75
21 40 025	1	25	100	108	16	75	–	–	2.90
21 40 030	1	30	120	128	16	75	–	–	4.00
23 40 538	2	38	152	160	25	–	–	–	5.70
23 40 540	2	40	160	168	25	–	–	–	6.30
23 40 545	2	45	180	188	25	–	–	–	8.00
23 40 550	2	50	200	208	25	–	–	–	9.80
23 40 556	2	56	224	232	25	–	–	–	12.30
23 40 560	2	60	240	248	25	–	–	–	14.20
23 40 580	2	80	320	328	25	–	–	–	25.20
23 40 595	2	95	380	388	25	–	–	–	35.60

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Straight Tooth System, prebored

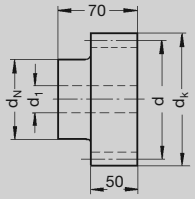


Fig. 1

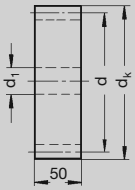


Fig. 2

Soft
C45, 1.0503
Gearing Grade **8 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 50 012	1	12	60	70	20	45	–	–	1.20
21 50 013	1	13	65	75	20	45	–	–	1.38
21 50 014	1	14	70	80	20	55	–	–	1.78
21 50 015	1	15	75	85	20	60	–	–	2.00
21 50 016	1	16	80	90	20	60	–	–	2.10
21 50 017	1	17	85	95	20	70	–	–	2.20
21 50 018	1	18	90	100	20	70	–	–	2.58
21 50 019	1	19	95	105	20	70	–	–	2.80
21 50 020	1	20	100	110	20	70	–	–	3.10
21 50 021	1	21	105	115	20	70	–	–	3.80
21 50 022	1	22	110	120	20	80	–	–	4.30
21 50 023	1	23	115	125	20	80	–	–	4.70
21 50 024	1	24	120	130	20	80	–	–	5.00
21 50 025	1	25	125	135	20	80	–	–	5.40
21 50 030	1	30	150	160	20	90	–	–	7.70
23 50 536	2	36	180	190	30	–	–	–	9.90
23 50 540	2	40	200	210	30	–	–	–	12.30
23 50 550	2	50	250	260	30	–	–	–	19.20
23 50 595	2	95	475	485	30	–	–	–	69.50

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 6, Straight Tooth System, prebored

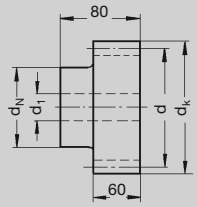


Fig. 1

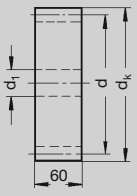


Fig. 2

Soft
C45, 1.0503
Gearing Grade **8 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 60 015	1	15	90	102	20	60	–	–	3.20
21 60 019	1	19	114	126	20	80	–	–	5.40
21 60 020	1	20	120	132	20	90	–	–	6.00
21 60 021	1	21	126	138	20	90	–	–	6.70
21 60 022	1	22	132	144	20	100	–	–	7.40
21 60 025	1	25	150	162	20	110	–	–	9.60
23 60 530	2	30	180	192	30	–	–	–	11.90
23 60 536	2	36	216	228	30	–	–	–	17.20

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

Module 8, 10 and 12, Straight Tooth System, prebored

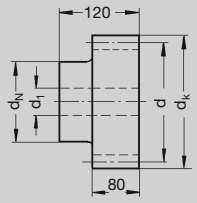


Fig. 1

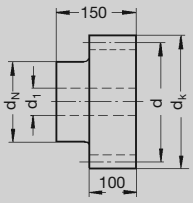


Fig. 2

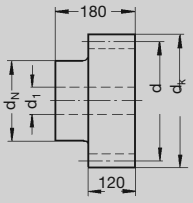


Fig. 3

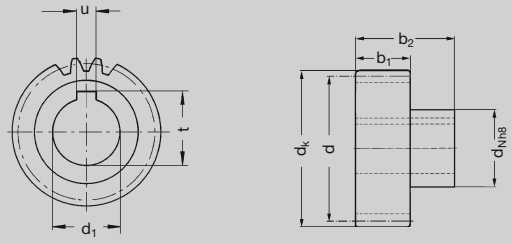
Soft
C45, 1.0503
Gearing Grade **8 e 25**

Order Code	Fig.	N° of Teeth z	d	d_k	d_1	d_N	d_3	s	kg
Module 8									
21 80 015	1	15	120	136	40	90	–	–	7.70
21 80 018	1	18	144	160	40	100	–	–	9.90
21 80 020	1	20	160	176	40	120	–	–	14.80
21 80 024	1	24	192	208	40	150	–	–	22.00
21 80 025	1	25	200	216	40	150	–	–	23.80
21 80 030	1	30	240	256	40	190	–	–	32.00
Module 10*									
21 11 020	2	20	200	220	40	150	–	–	35.00
Module 12*									
21 12 020	3	20	240	264	40	170	–	–	51.33

* with threads for handling

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

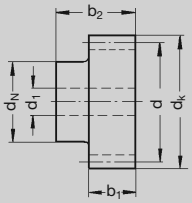
Straight Tooth System, Ground Teeth



16MnCr5, 1.7131
Case-Hardened
Gearing Grade **6 e 25**

Order Code	Module	N° of Teeth z	d	d_k	d_1 H6	d_N	b_1	b_2	u	t	kg	Shrink-Disk on page GH-1
Pitch 5 mm												
24 06 425	1.591	25	39.79	42.9	16	30	25	51	5	18.3	0.31	80 83 030
24 00 430	1.591	30	47.75	50.9	22	36	25	54	6	24.8	0.43	80 84 036
24 03 440	1.591	40	63.66	66.8	25	44	25	56	8	28.3	0.78	80 80 044
Pitch 10 mm												
24 70 420	3.183	20	63.66	70.0	22	36	31	60	6	24.8	0.83	80 84 036
24 71 425	3.183	25	79.58	85.9	25	44	31	62	8	28.3	1.40	80 80 044
24 73 425	3.183	25	79.58	85.9	32	55	31	68	10	35.3	1.50	80 80 055
Pitch 13.33 mm												
24 93 420	4.244	20	84.89	93.3	32	55	40	77	10	35.3	2.00	80 80 055
24 95 425	4.244	25	106.10	114.6	40	62	40	77	12	43.3	2.90	80 86 062

Straight Tooth System, milled teeth



Soft
Ck45 1.0503
Gearing Grade **8 e 25**

Order Code	Module m	N° of Teeth z	d	d_k	d_1	d_N	b_1	b_2	kg
Pitch 5 mm									
07 06 012	1.591	12	19.1	22.3	6	14	12	25	0.03
07 06 015	1.591	15	23.9	27.0	6	18	12	25	0.06
07 06 018	1.591	18	28.6	31.8	8	20	12	25	0.07
07 06 020	1.591	20	31.8	35.0	8	20	12	25	0.10
07 06 025	1.591	25	39.8	43.0	8	25	12	25	0.14
07 06 030	1.591	30	47.7	50.9	10	30	12	25	0.20
07 06 040	1.591	40	63.6	66.8	10	40	12	25	0.36
07 06 050	1.591	50	79.6	82.7	12	50	12	25	0.56
07 06 060	1.591	60	95.5	98.6	12	60	12	25	0.82
Pitch 10 mm									
07 08 012	3.183	12	38.2	44.6	10	25	25	40	0.22
07 08 015	3.183	15	47.7	54.1	12	30	25	40	0.38
07 08 018	3.183	18	57.3	63.7	15	40	25	40	0.50
07 08 020	3.183	20	63.7	70.0	15	40	25	40	0.60
07 08 025	3.183	25	79.6	85.9	15	50	25	40	0.96
07 08 030	3.183	30	95.5	101.9	20	60	25	40	1.46
07 08 040	3.183	40	127.3	133.7	20	80	25	40	2.68

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.