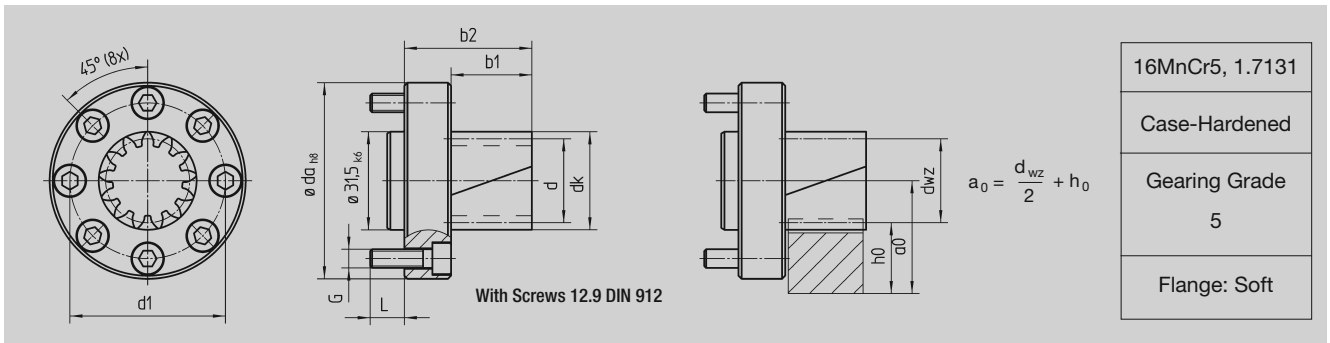




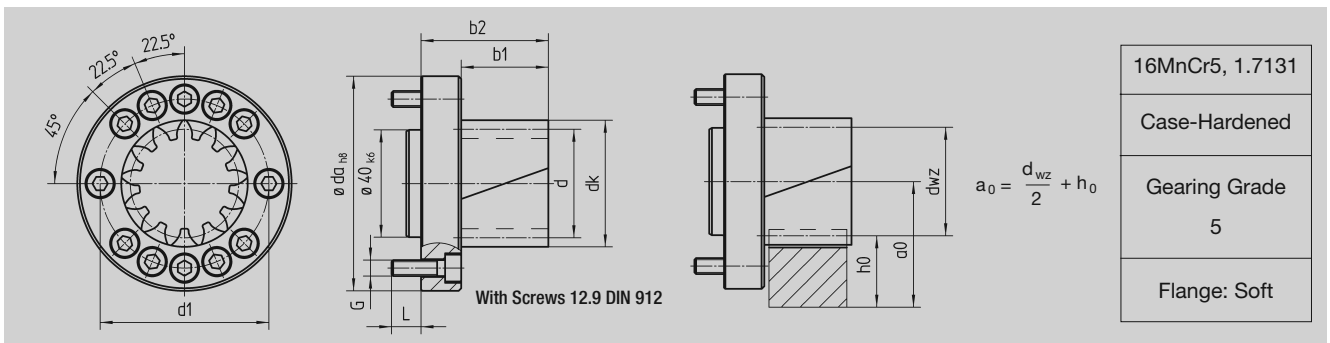
Bolt Circle-ø 50, helical tooth system, 19° 31' 42" left-hand



Order Code	No. of Teeth	Profile Modification Factor	Interface											
			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											
			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

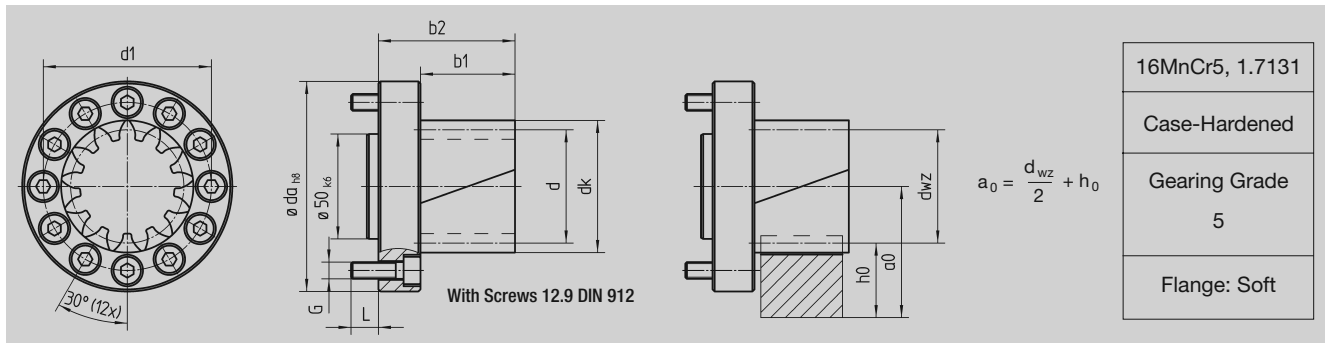
Further number of teeth on request, min. number of teeth 12, max. number of teeth 23

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- $\varnothing 80$, helical tooth system, $19^\circ 31' 42''$ left-hand



Order Code	No. of Teeth	Profile Modification Factor	Interface							ISO	d ₁	G	d _{ah8}	L	kg
			x	d _{wz}	d _k	b ₁	b ₂	L	a ₀						
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	

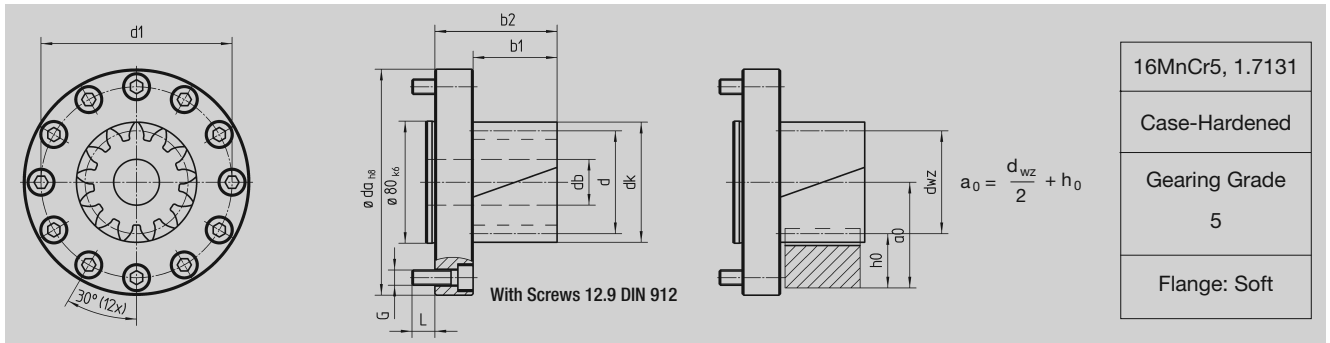
Further number of teeth on request, min. number of teeth 12, max. number of teeth 13

(1) Also available as pinion for counter bearing.





Bolt Circle-ø 125, helical tooth system, 19° 31' 42" left-hand



Order Code	No. of Teeth	Profile Modification Factor	Interface											kg	
			z	x	d _{wz}	d _k	b ₁	b ₂	L	a ₀	ISO	d ₁	G		d _{ah8}
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

Further 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

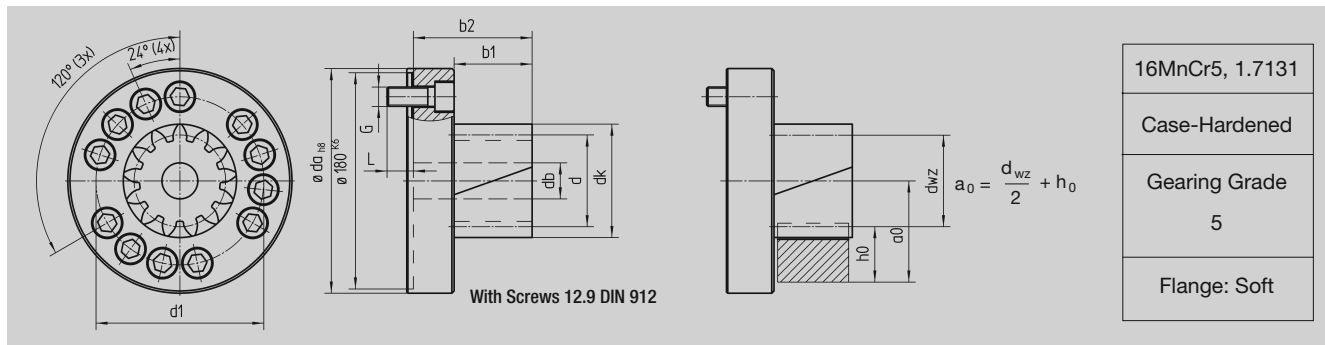
Highlighted items will become obsolete in the future. Please check with the factory for delivery information.

(1) Also available as pinion for counter bearing.

(2) For 29 55 ... a₀ = a₀ + 10.



Bolt Circle- $\varnothing 140$, helical tooth system, $19^\circ 31' 42''$ left-hand



Order Code	No. of Teeth	Profile Modification Factor	Interface												
			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.

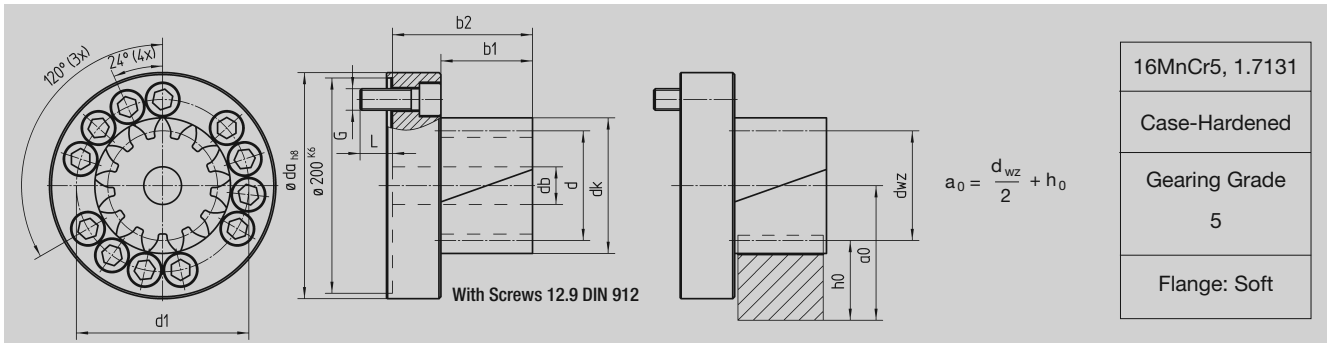
(1) Also available as pinion for counter bearing.

(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												
			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.

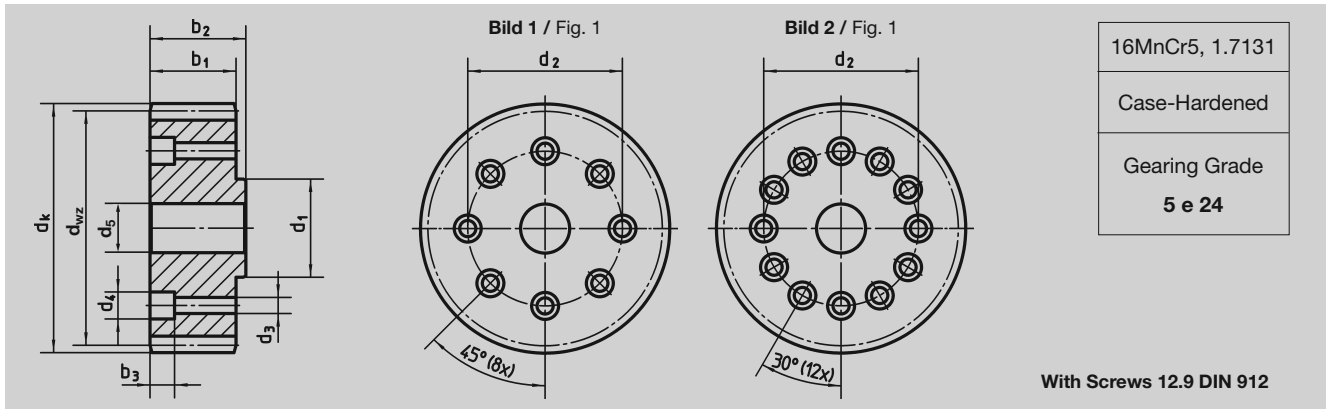
Module 8															
78 87 912	12	0.5	109.86	125.9	85	130	320.00	125.93	-	160	M20	210	30	30	17.8

⁽²⁾ For 29 55 ... $a'_0 = a_0 + 10$.



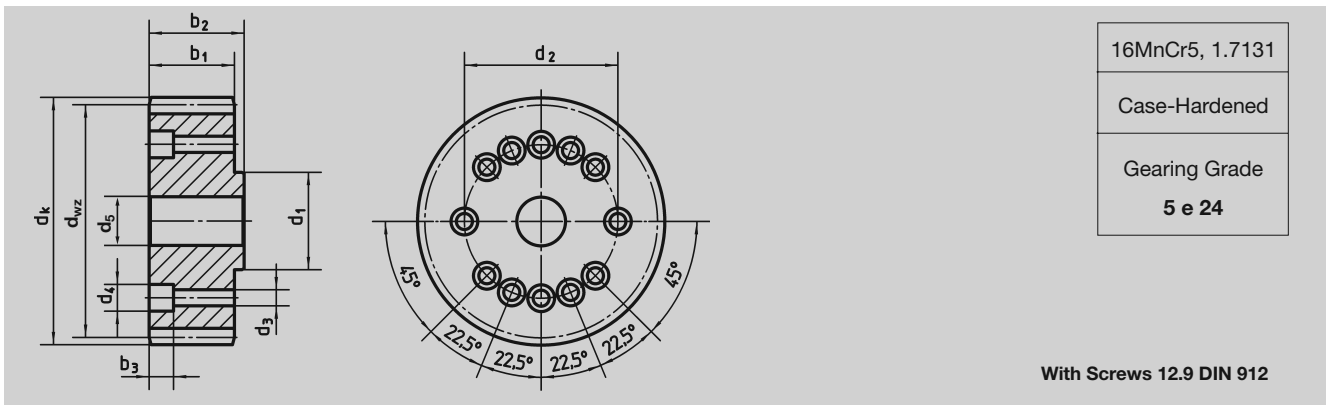


Helical Tooth System, 19° 31' 42" left-hand



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

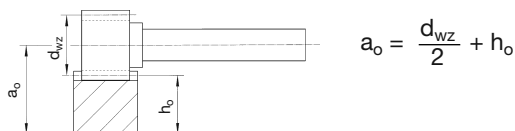


Order Code	Module	N° of Teeth z	x ⁽¹⁾	d _{wz}	d _k	d _{1h6}	d ₂	d ₃	d ₄	d ₅ ^{H6}	b ₁	b ₂	b ₃	L=PI*d L	kg	Interface ISO
78 22 540	2	40	0.3792	86.40	90.20	40.0	63.0	6.6	11	31.5	26	30	14	266.69	1.0	9409-1-A-63
78 22 545	2	45	0.3267	96.80	100.60	40.0	63.0	6.6	11	31.5	26	30	14	300.00	1.4	9409-1-A-63
78 30 530	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

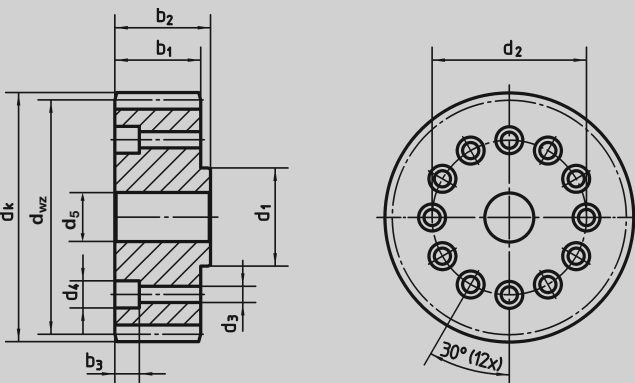
The max. torque is limited by the threaded connection.

Calculation of center distance a between gearwheel and rack.





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



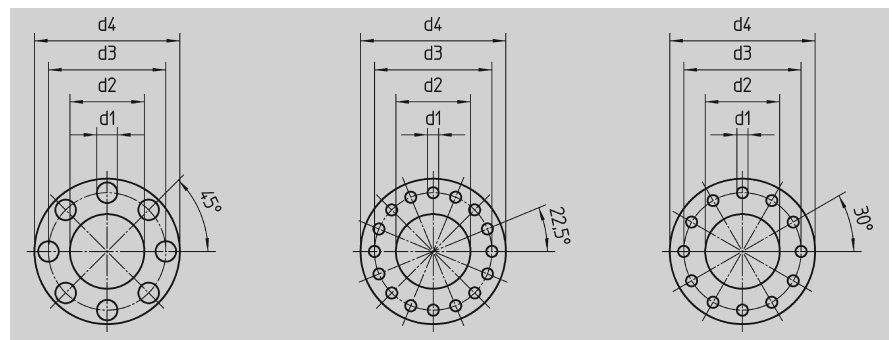
16MnCr5, 1.7131
Case-Hardened
Gearing Grade 5 e 24

With Screws 12.9 DIN 912

Order Code	Module	N° of Teeth z	χ ⁽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		Interface ISO
														L	kg	
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

Set consists of Order Code Gear and Order Code Flange

With Screws 12.9 DIN 912

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	d ₆	d ₇	b ₁	b ₂	b ₃	b ₄	L=PI*d L	kg	Interface ISO
78 20 526	265 78001	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	265 78001	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	265 78001	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	265 78001	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

Set consists of Order Code Gear and Order Code Flange

With Screws 12.9 DIN 912

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	d ₆	d ₇	b ₁	b ₂	b ₃	b ₄	L=PI*d L	kg	Interface ISO
78 20 526	265 78002	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	265 78002	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	265 78002	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	265 78002	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	d ₆	d ₇	b ₁	b ₂	b ₃	b ₄	L=PI*d L	kg	Interface ISO
78 20 526	265 78001⁽²⁾ 265 78003⁽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
78 20 527	265 78001⁽²⁾ 265 78003⁽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
78 20 529	265 78001⁽²⁾ 265 78003⁽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
78 20 535	265 78001⁽²⁾ 265 78003⁽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
78 21 533	265 78003	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	265 78003	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	265 78003	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	265 78003	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

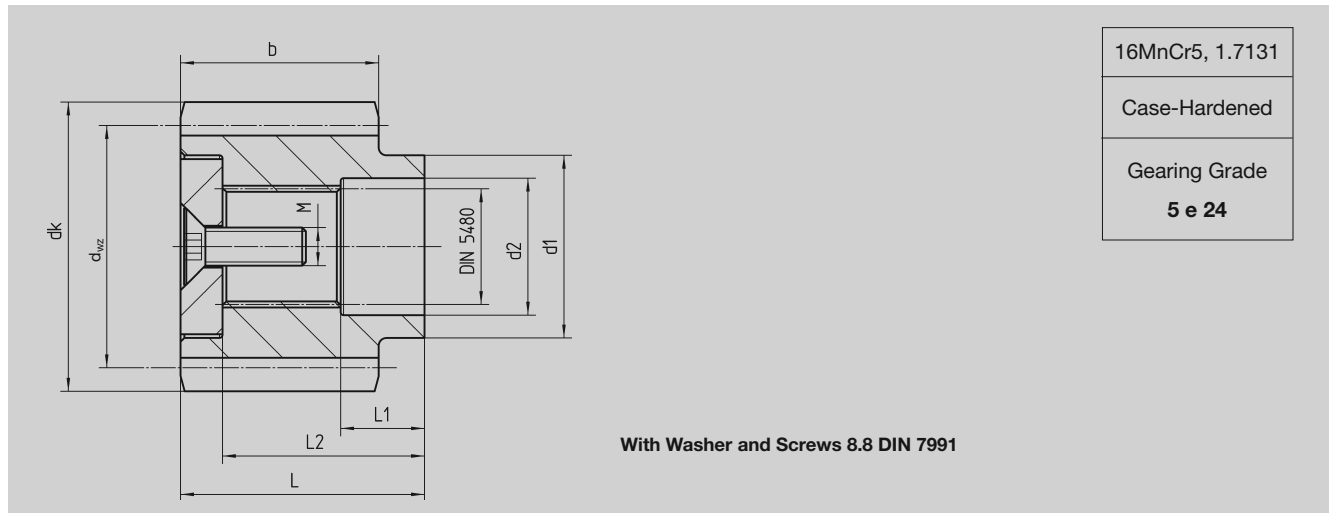
Order Code Pinion	Order Code Flange	Module	N° of Teeth z	x ⁽¹⁾	d _{wz}	d _k	d _{1h6}	d ₂	d ₃	d ₄	d ₅	d ₆	d ₇	b ₁	b ₂	b ₃	b ₄	L=PI*d L	kg	Interface ISO
78 31 531	265 78003⁽²⁾ 265 78004⁽²⁾	3	31	0.3540	100.80	106.60	80	125	148	50	20	11	18	31	63	6	14	310.00	3.4	9409-1-A-50/80/125
78 33 535	265 78004	3	35	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	265 78004	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	265 78004	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	265 78004	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



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

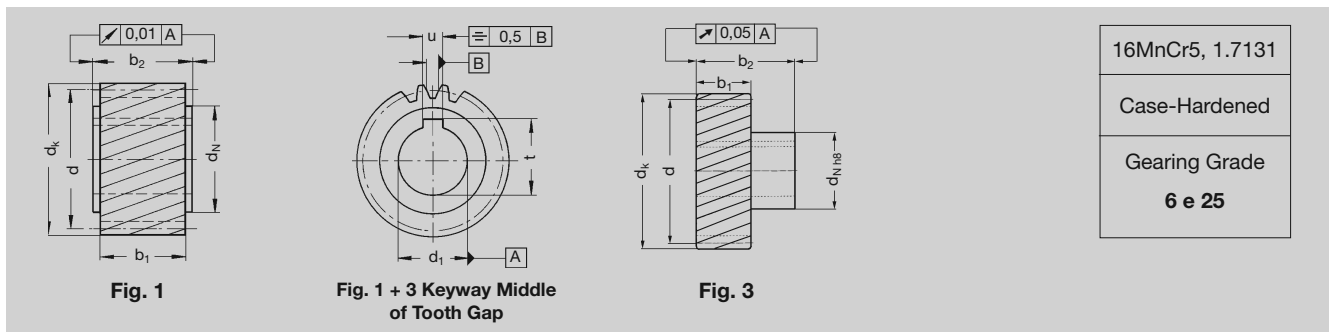


Calculation of center distance a between gearwheel and rack.





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



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

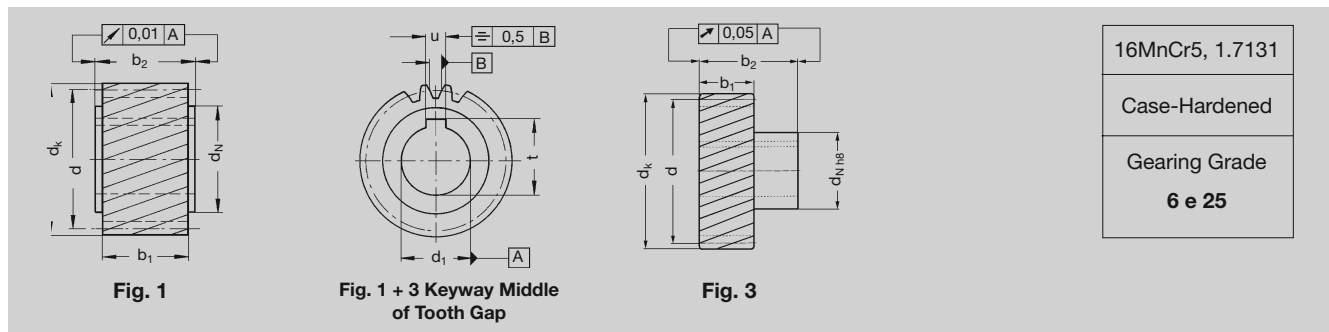
Order Code	Fig.	N° of Teeth z	d	d*PI	d _k	d ₁ H6	d _N	b ₁	b ₂	u	t	kg	Shrink-Disk on Page GH-1
Module 1.5													
24 11 520 ¹⁾	1	20	31.83	100.00	34.83	11	25	20	22	4	12.8	0.13	
24 14 520 ¹⁾	1	20	31.83	100.00	34.83	14	25	20	22	5	16.3	0.13	
24 16 520 ¹⁾	1	20	31.83	100.00	34.83	16	25	20	22	5	18.3	0.13	
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



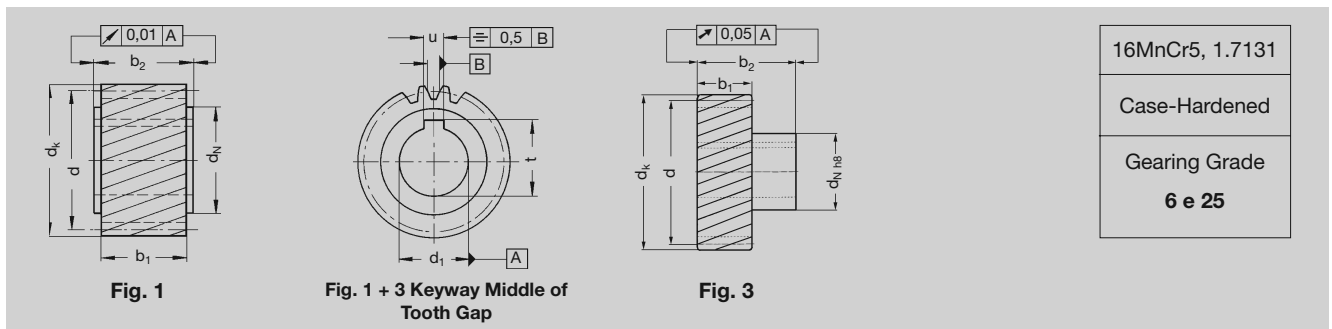
Order Code	Fig.	N° of Teeth z	d	d*PI	d _k	d ₁ ^{H6}	d _N	b ₁	b ₂	u	t	kg	Shrink-Disk on Page GH-1
Module 3													
24 30 320	3	20	63.66	200.00	69.7	22	36	28	56	6	24.8	0.6	80 84 036
24 31 320	3	20	63.66	200.00	69.7	25	44	28	60	8	28.3	0.7	80 80 044
24 34 520	1	20	63.66	200.00	69.7	30	45	28	30	8	33.3	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



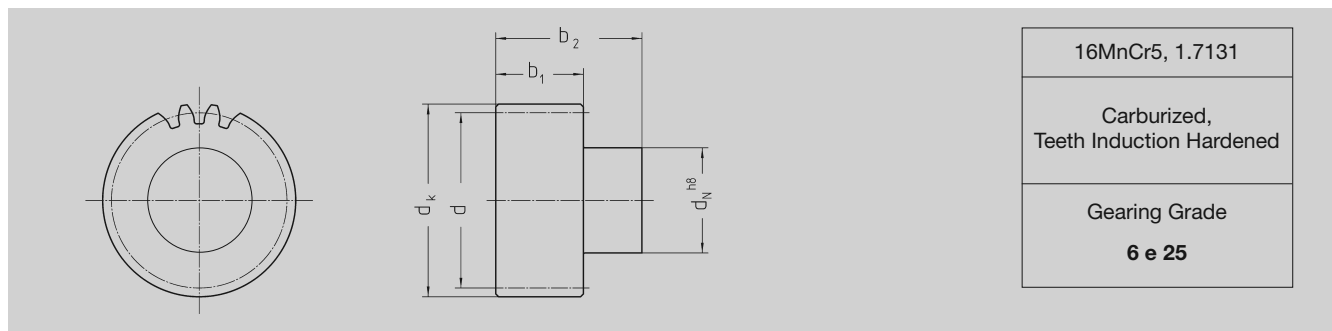
16MnCr5, 1.7131
Case-Hardened
Gearing Grade
6 e 25

Order Code	Fig.	N° of Teeth z	d	d*Pl	dk	d1 ^{H6}	dN	b1	b2	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 46 520	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



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



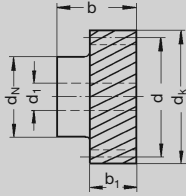
¹⁾ With bore Ø40^{H7}

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

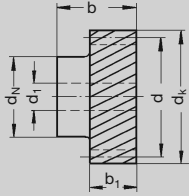
Order Code	N° of Teeth	b ₁	b	d	d _k	d ₁ ^(J8)	d _N	kg
Module 1.5								
21 15 520	20	17	30	31.83	34.8	9	25	0.14
21 15 525	25	17	30	39.79	42.8	9	30	0.22
Module 2								
21 20 520	20	28	35	42.44	46.4	9	30	0.35
21 20 525	25	28	35	53.05	57.1	12	35	0.54
21 20 530	30	28	35	63.66	67.7	12	40	0.76
Module 3								
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	
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.

