NovoSys X® Milling heads for steel, stainless steel and titanium 715 – 725

NovoSys X® Milling heads for 3D machining 727 – 753

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Accessories and information on NovoSys X®
Assembly instructions 766 – 770

NovoSys X® Milling heads for steel, stainless steel and titanium

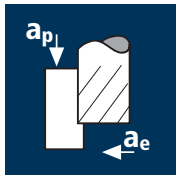
Smooth-edged, cylindrical

N° NV-10-01-04-02-10	d1 10 – 20	HM UT	45°	Rm <850-1300			717
N° NV-11-01-04-02-10	d1 11 – 22	HM UT	45°	Rm <850-1300			719
N° N-10-01-04-01-10	d1 10 – 20	HM UT	45°	Rm <850-1300			721
N° N-10-01-03-01-10	d1 10 – 20	HM UT	45°	Rm <850-1300			723

Profiled, cylindrical

N° NR-10-01-04-03-10	d1 10 – 20	HM UT	45°	Rm <850-1100			725

VII

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_e [mm]	a_e [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	220	0.180	6.0	1.0	7005	5045	0.80	•
		12	4	220	0.200	8.0	1.2	5835	4670	1.00	•
		16	4	220	0.240	12.0	1.6	4375	4200	1.30	•
		20	4	220	0.280	14.0	2.0	3500	3920	1.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	220	0.180	6.0	1.2	7005	5045	1.00	•
		12	4	220	0.200	8.0	1.4	5835	4670	1.10	•
		16	4	220	0.240	12.0	1.9	4375	4200	1.50	•
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	180	0.180	6.0	1.0	5730	4125	0.80	•
		12	4	180	0.200	8.0	1.2	4775	3820	1.00	•
		16	4	180	0.240	12.0	1.6	3580	3435	1.30	•
		20	4	180	0.280	14.0	2.0	2865	3210	1.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	180	0.180	6.0	1.2	5730	4125	1.00	•
		12	4	180	0.200	8.0	1.4	4775	3820	1.10	•
		16	4	180	0.240	12.0	1.9	3580	3435	1.50	•
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	80	0.160	6.0	1.0	2545	1630	0.80	•
		12	4	80	0.180	8.0	1.2	2120	1525	1.00	•
		16	4	80	0.215	12.0	1.6	1590	1365	1.30	•
		20	4	80	0.250	14.0	2.0	1275	1275	1.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	80	0.160	6.0	1.2	2545	1630	1.00	•
		12	4	80	0.180	8.0	1.4	2120	1525	1.10	•
		16	4	80	0.215	12.0	1.9	1590	1365	1.50	•
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	180	0.180	6.0	1.0	5730	4125	0.80	•
		12	4	180	0.200	8.0	1.2	4775	3820	1.00	•
		16	4	180	0.240	12.0	1.6	3580	3435	1.30	•
		20	4	180	0.280	14.0	2.0	2865	3210	1.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	180	0.180	6.0	1.2	5730	4125	1.00	•
		12	4	180	0.200	8.0	1.4	4775	3820	1.10	•
		16	4	180	0.240	12.0	1.9	3580	3435	1.50	•

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_p [mm]	a_p [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	200	0.080	2.0	10.0	6365	2035	1.80	•
		12	4	200	0.100	2.4	12.0	5305	2120	2.20	•
		16	4	200	0.140	3.2	16.0	3980	2230	2.90	•
		20	4	200	0.180	4.0	20.0	3185	2295	3.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	200	0.080	2.5	10.0	6365	2035	2.00	•
		12	4	200	0.100	3.0	12.0	5305	2120	2.40	•
		16	4	200	0.140	4.0	16.0	3980	2230	3.20	•
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	160	0.080	2.0	10.0	5095	1630	1.80	•
		12	4	160	0.100	2.4	12.0	4245	1700	2.20	•
		16	4	160	0.140	3.2	16.0	3185	1785	2.90	•
		20	4	160	0.180	4.0	20.0	2545	1830	3.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	160	0.080	2.5	10.0	5095	1630	2.00	•
		12	4	160	0.100	3.0	12.0	4245	1700	2.40	•
		16	4	160	0.140	4.0	16.0	3185	1785	3.20	•
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	60	0.070	2.0	10.0	1910	535	1.80	•
		12	4	60	0.090	2.4	12.0	1590	570	2.20	•
		16	4	60	0.125	3.2	16.0	1195	600	2.90	•
		20	4	60	0.160	4.0	20.0	955	610	3.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	60	0.070	2.5	10.0	1910	535	2.00	•
		12	4	60	0.090	3.0	12.0	1590	570	2.40	•
		16	4	60	0.125	4.0	16.0	1195	600	3.20	•
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	160	0.080	2.0	10.0	5095	1630	1.80	•
		12	4	160	0.100	2.4	12.0	4245	1700	2.20	•
		16	4	160	0.140	3.2	16.0	3185	1785	2.90	•
		20	4	160	0.180	4.0	20.0	2545	1830	3.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	160	0.080	2.5	10.0	5095	1630	2.00	•
		12	4	160	0.100	3.0	12.0	4245	1700	2.40	•
		16	4	160	0.140	4.0	16.0	3185	1785	3.20	•

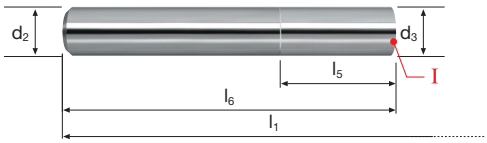
Cylindrical end mills

Smooth-edged

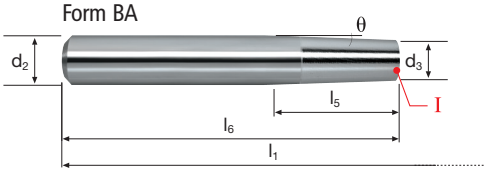
NovoSys X®

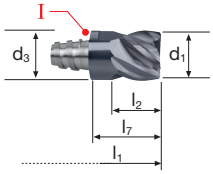
HM UT	λ **40°** γ **0°**
45°	
Vario	

Form AA



Form BA



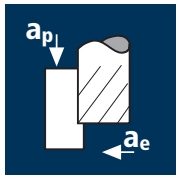


I = Interface

Rm < 850	Rm 850-1100	Rm 1100-1300	Rm 1300-1500				Inox Stainless	Ti Titanium	GG(G)

Milling heads										POLYCUT-A
Order-N°.	d_1 e8	d_3	l_2	l_7	45°	z	i	I		
NV-10-01-04-02-10	10	9.8	7	13.0	0.2	4	8	10		●
NV-12-01-04-02-12	12	11.8	9	16.5	0.2	4	10	12		●
NV-16-01-04-02-16	16	15.8	13	20.5	0.2	4	13	16		●
NV-20-01-04-02-20	20	19.8	15	25.5	0.2	4	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d_2 h6	d_3	l_1	l_5	l_6	θ	L-Type	I		
AA-10-065-000-10	10		78.0		65		N	10		●
AA-10-080-040-10	10	9.8	93.0	40	80		M	10		●
AA-10-120-080-10	10	9.8	133.0	80	120		L	10		●
AA-12-070-000-12	12		86.5		70		N	12		●
AA-12-085-040-12	12	11.8	101.5	40	85		M	12		●
AA-12-120-075-12	12	11.8	136.5	75	120		L	12		●
AA-16-080-032-16	16	15.8	100.5	32	80		N	16		●
AA-16-110-062-16	16	15.8	130.5	62	110		M	16		●
AA-20-090-040-20	20	19.8	115.5	40	90		N	20		●
AA-20-150-100-20	20	19.8	175.5	100	150		L	20		●
BA-12-080-032-10	12	9.8	93.0	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	133.0	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	136.5	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	156.5	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	140.5	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	180.5	80	160	1.5°	L	16		●

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_e [mm]	a_e [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		11	4	220	0.180	6.0	1.0	6365	4585	0.80	•
		13	4	220	0.200	8.0	1.2	5385	4310	1.00	•
		18	4	220	0.240	12.0	1.6	3890	3735	1.30	•
		22	4	220	0.280	14.0	2.0	3185	3565	1.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		11	4	220	0.180	6.0	1.2	6365	4585	1.00	•
		13	4	220	0.200	8.0	1.4	5385	4310	1.10	•
		18	4	220	0.240	12.0	1.9	3890	3735	1.50	•
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		11	4	180	0.180	6.0	1.0	5210	3750	0.80	•
		13	4	180	0.200	8.0	1.2	4405	3525	1.00	•
		18	4	180	0.240	12.0	1.6	3185	3060	1.30	•
		22	4	180	0.280	14.0	2.0	2605	2920	1.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		11	4	180	0.180	6.0	1.2	5210	3750	1.00	•
		13	4	180	0.200	8.0	1.4	4405	3525	1.10	•
		18	4	180	0.240	12.0	1.9	3185	3060	1.50	•
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		11	4	80	0.160	6.0	1.0	2315	1480	0.80	•
		13	4	80	0.180	8.0	1.2	1960	1410	1.00	•
		18	4	80	0.215	12.0	1.6	1415	1215	1.30	•
		22	4	80	0.250	14.0	2.0	1155	1155	1.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		11	4	80	0.160	6.0	1.2	2315	1480	1.00	•
		13	4	80	0.180	8.0	1.4	1960	1410	1.10	•
		18	4	80	0.215	12.0	1.9	1415	1215	1.50	•
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		11	4	180	0.180	6.0	1.0	5210	3750	0.80	•
		13	4	180	0.200	8.0	1.2	4405	3525	1.00	•
		18	4	180	0.240	12.0	1.6	3185	3060	1.30	•
		22	4	180	0.280	14.0	2.0	2605	2920	1.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		11	4	180	0.180	6.0	1.2	5210	3750	1.00	•
		13	4	180	0.200	8.0	1.4	4405	3525	1.10	•
		18	4	180	0.240	12.0	1.9	3185	3060	1.50	•

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_p [mm]	a_p [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		11	4	200	0.080	2.0	11.0	5785	1850	1.80	•
		13	4	200	0.100	2.4	13.0	4895	1960	2.20	•
		18	4	200	0.140	3.2	18.0	3535	1980	2.90	•
		22	4	200	0.180	4.0	22.0	2895	2085	3.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		11	4	200	0.080	2.5	11.0	5785	1850	2.00	•
		13	4	200	0.100	3.0	13.0	4895	1960	2.40	•
		18	4	200	0.140	4.0	18.0	3535	1980	3.20	•
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		11	4	160	0.080	2.0	11.0	4630	1480	1.80	•
		13	4	160	0.100	2.4	13.0	3920	1570	2.20	•
		18	4	160	0.140	3.2	18.0	2830	1585	2.90	•
		22	4	160	0.180	4.0	22.0	2315	1665	3.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		11	4	160	0.080	2.5	11.0	4630	1480	2.00	•
		13	4	160	0.100	3.0	13.0	3920	1570	2.40	•
		18	4	160	0.140	4.0	18.0	2830	1585	3.20	•
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		11	4	60	0.070	2.0	11.0	1735	485	1.80	•
		13	4	60	0.090	2.4	13.0	1470	530	2.20	•
		18	4	60	0.125	3.2	18.0	1060	530	2.90	•
		22	4	60	0.160	4.0	22.0	870	555	3.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		11	4	60	0.070	2.5	11.0	1735	485	2.00	•
		13	4	60	0.090	3.0	13.0	1470	530	2.40	•
		18	4	60	0.125	4.0	18.0	1060	530	3.20	•
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		11	4	160	0.080	2.0	11.0	4630	1480	1.80	•
		13	4	160	0.100	2.4	13.0	3920	1570	2.20	•
		18	4	160	0.140	3.2	18.0	2830	1585	2.90	•
		22	4	160	0.180	4.0	22.0	2315	1665	3.60	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		11	4	160	0.080	2.5	11.0	4630	1480	2.00	•
		13	4	160	0.100	3.0	13.0	3920	1570	2.40	•
		18	4	160	0.140	4.0	18.0	2830	1585	3.20	•

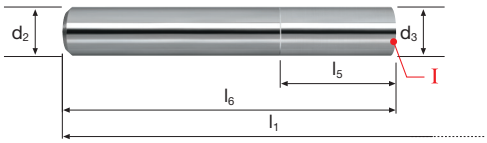
Cylindrical end mills

Smooth-edged, d1 cutting diameter with excess

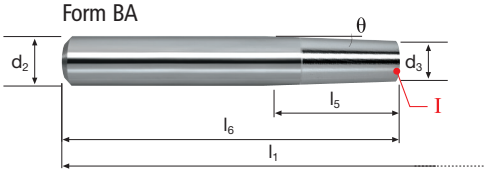
NovoSys X®

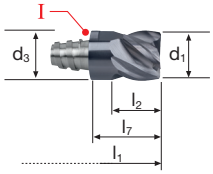
HM UT	λ **40°** γ **0°**
45°	
Vario	

Form AA



Form BA



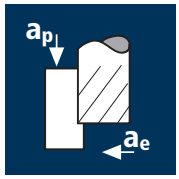


I = Interface

Rm < 850	Rm 850-1100	Rm 1100-1300	Rm 1300-1500				Inox Stainless	Ti Titanium	GG(G)

Milling heads										POLYCUT-A
Order-N°.	d1 e8	d3	l2	l7	45°	z	i	I		
NV-11-01-04-02-10	11	9.8	8	18	0.20	4	8	10		●
NV-13-01-04-02-12	13	11.8	10	20	0.20	4	10	12		●
NV-18-01-04-02-16	18	15.8	14	32	0.20	4	13	16		●
NV-22-01-04-02-20	22	19.8	16	36	0.25	4	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_e [mm]	a_e [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	220	0.130	6.0	0.8	7005	3645	0.60	•
		12	4	220	0.150	8.0	1.0	5835	3500	0.80	•
		16	4	220	0.200	12.0	1.2	4375	3500	1.00	•
		20	4	220	0.230	14.0	1.6	3500	3220	1.30	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	220	0.130	6.0	1.0	7005	3645	0.80	•
		12	4	220	0.150	8.0	1.2	5835	3500	1.00	•
		16	4	220	0.200	12.0	1.6	4375	3500	1.30	•
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	180	0.130	6.0	0.8	5730	2980	0.60	•
		12	4	180	0.150	8.0	1.0	4775	2865	0.80	•
		16	4	180	0.200	12.0	1.2	3580	2865	1.00	•
		20	4	180	0.230	14.0	1.6	2865	2635	1.30	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	180	0.130	6.0	1.0	5730	2980	0.80	•
		12	4	180	0.150	8.0	1.2	4775	2865	1.00	•
		16	4	180	0.200	12.0	1.6	3580	2865	1.30	•
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	80	0.110	6.0	0.8	2545	1120	0.60	•
		12	4	80	0.130	8.0	1.0	2120	1100	0.80	•
		16	4	80	0.180	12.0	1.2	1590	1145	1.00	•
		20	4	80	0.200	14.0	1.6	1275	1020	1.30	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	80	0.110	6.0	1.0	2545	1120	0.80	•
		12	4	80	0.130	8.0	1.2	2120	1100	1.00	•
		16	4	80	0.180	12.0	1.6	1590	1145	1.30	•
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	180	0.130	6.0	0.8	5730	2980	0.60	•
		12	4	180	0.150	8.0	1.0	4775	2865	0.80	•
		16	4	180	0.200	12.0	1.2	3580	2865	1.00	•
		20	4	180	0.230	14.0	1.6	2865	2635	1.30	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	180	0.130	6.0	1.0	5730	2980	0.80	•
		12	4	180	0.150	8.0	1.2	4775	2865	1.00	•
		16	4	180	0.200	12.0	1.6	3580	2865	1.30	•

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_p [mm]	a_p [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	200	0.065	1.5	10.0	6365	1655	1.30	•
		12	4	200	0.080	2.0	12.0	5305	1700	1.80	•
		16	4	200	0.110	2.6	16.0	3980	1750	2.40	•
		20	4	200	0.150	3.5	20.0	3185	1910	3.20	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	200	0.065	1.8	10.0	6365	1655	1.60	•
		12	4	200	0.080	2.4	12.0	5305	1700	2.20	•
		16	4	200	0.110	3.0	16.0	3980	1750	2.70	•
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	160	0.065	1.5	10.0	5095	1325	1.30	•
		12	4	160	0.080	2.0	12.0	4245	1360	1.80	•
		16	4	160	0.110	2.6	16.0	3185	1400	2.40	•
		20	4	160	0.150	3.5	20.0	2545	1525	3.20	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	160	0.065	1.8	10.0	5095	1325	1.60	•
		12	4	160	0.080	2.4	12.0	4245	1360	2.20	•
		16	4	160	0.110	3.0	16.0	3185	1400	2.70	•
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	60	0.055	1.5	10.0	1910	420	1.30	•
		12	4	60	0.070	2.0	12.0	1590	445	1.80	•
		16	4	60	0.090	2.6	16.0	1195	430	2.40	•
		20	4	60	0.140	3.5	20.0	955	535	3.20	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	60	0.055	1.8	10.0	1910	420	1.60	•
		12	4	60	0.070	2.4	12.0	1590	445	2.20	•
		16	4	60	0.090	3.0	16.0	1195	430	2.70	•
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	160	0.065	1.5	10.0	5095	1325	1.30	•
		12	4	160	0.080	2.0	12.0	4245	1360	1.80	•
		16	4	160	0.110	2.6	16.0	3185	1400	2.40	•
		20	4	160	0.150	3.5	20.0	2545	1525	3.20	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	160	0.065	1.8	10.0	5095	1325	1.60	•
		12	4	160	0.080	2.4	12.0	4245	1360	2.20	•
		16	4	160	0.110	3.0	16.0	3185	1400	2.70	•

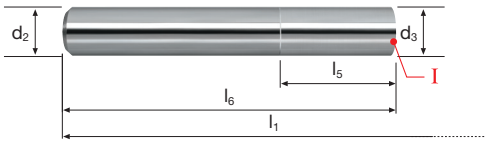
Cylindrical end mills

Smooth-edged

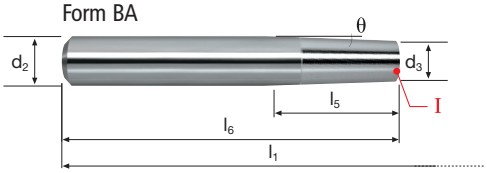
NovoSys X®

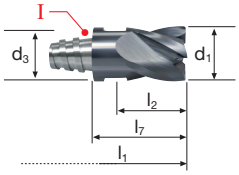
HM UT	λ 30° γ 9°
45°	

Form AA



Form BA





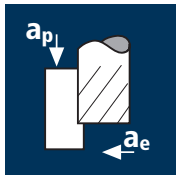
I = Interface

Rm < 850	Rm 850-1100	Rm 1100-1300	Rm 1300-1500				Inox Stainless	Ti Titanium	GG(G)

Milling heads										POLYCUT-A
Order-N°.	d1 e8	d3	l2	l7	45°	z	i	I		
N-10-01-04-01-10	10	9.8	8	18	0.15	4	8	10		●
N-12-01-04-01-12	12	11.8	10	20	0.15	4	10	12		●
N-16-01-04-01-16	16	15.8	14	32	0.15	4	13	16		●
N-20-01-04-01-20	20	19.8	16	36	0.15	4	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

Application



Material

d1 [mm]	z	vc [m/min]	fz [mm]	ap [mm]	ae [mm]	n [min⁻¹]	vf [mm/min]	ae [mm]	ae [mm]
Steel < 850 N/mm²									
	Carbide shanks, cylindrical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	220	0.130	6.0	0.8	7005	2730	0.60	•
12	3	220	0.150	8.0	1.0	5835	2625	0.80	•
16	3	220	0.200	12.0	1.2	4375	2625	1.00	•
20	3	220	0.230	14.0	1.6	3500	2415	1.30	•
	Carbide shanks, conical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	220	0.130	6.0	1.0	7005	2730	0.80	•
12	3	220	0.150	8.0	1.2	5835	2625	1.00	•
16	3	220	0.200	12.0	1.6	4375	2625	1.30	•
Steel 850 - 1100 N/mm²									
	Carbide shanks, cylindrical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	180	0.130	6.0	0.8	5730	2235	0.60	•
12	3	180	0.150	8.0	1.0	4775	2150	0.80	•
16	3	180	0.200	12.0	1.2	3580	2150	1.00	•
20	3	180	0.230	14.0	1.6	2865	1975	1.30	•
	Carbide shanks, conical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	180	0.130	6.0	1.0	5730	2235	0.80	•
12	3	180	0.150	8.0	1.2	4775	2150	1.00	•
16	3	180	0.200	12.0	1.6	3580	2150	1.30	•
Cold work tool steel (12% Cr), high alloyed [1.2379]									
	Carbide shanks, cylindrical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	80	0.110	6.0	0.8	2545	840	0.60	•
12	3	80	0.130	8.0	1.0	2120	825	0.80	•
16	3	80	0.180	12.0	1.2	1590	860	1.00	•
20	3	80	0.200	14.0	1.6	1275	765	1.30	•
	Carbide shanks, conical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	80	0.110	6.0	1.0	2545	840	0.80	•
12	3	80	0.130	8.0	1.2	2120	825	1.00	•
16	3	80	0.180	12.0	1.6	1590	860	1.30	•
Cast iron (lamellar / spheroidal)									
	Carbide shanks, cylindrical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	180	0.130	6.0	0.8	5730	2235	0.60	•
12	3	180	0.150	8.0	1.0	4775	2150	0.80	•
16	3	180	0.200	12.0	1.2	3580	2150	1.00	•
20	3	180	0.230	14.0	1.6	2865	1975	1.30	•
	Carbide shanks, conical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	180	0.130	6.0	1.0	5730	2235	0.80	•
12	3	180	0.150	8.0	1.2	4775	2150	1.00	•
16	3	180	0.200	12.0	1.6	3580	2150	1.30	•

Application

Material

d1 [mm]	z	vc [m/min]	fz [mm]	ap [mm]	ae [mm]	n [min⁻¹]	vf [mm/min]	ap [mm]	ap [mm]
Steel < 850 N/mm²									
	Carbide shanks, cylindrical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	200	0.065	1.5	10.0	6365	1240	1.30	•
12	3	200	0.080	2.0	12.0	5305	1275	1.80	•
16	3	200	0.110	2.6	16.0	3980	1315	2.40	•
20	3	200	0.150	3.5	20.0	3185	1435	3.20	•
	Carbide shanks, conical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	200	0.065	1.8	10.0	6365	1240	1.60	•
12	3	200	0.080	2.4	12.0	5305	1275	2.20	•
16	3	200	0.110	3.0	16.0	3980	1315	2.70	•
Steel 850 - 1100 N/mm²									
	Carbide shanks, cylindrical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	160	0.065	1.5	10.0	5095	995	1.30	•
12	3	160	0.080	2.0	12.0	4245	1020	1.80	•
16	3	160	0.110	2.6	16.0	3185	1050	2.40	•
20	3	160	0.150	3.5	20.0	2545	1145	3.20	•
	Carbide shanks, conical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	160	0.065	1.8	10.0	5095	995	1.60	•
12	3	160	0.080	2.4	12.0	4245	1020	2.20	•
16	3	160	0.110	3.0	16.0	3185	1050	2.70	•
Cold work tool steel (12% Cr), high alloyed [1.2379]									
	Carbide shanks, cylindrical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	60	0.055	1.5	10.0	1910	315	1.30	•
12	3	60	0.070	2.0	12.0	1590	335	1.80	•
16	3	60	0.090	2.6	16.0	1195	325	2.40	•
20	3	60	0.140	3.5	20.0	955	400	3.20	•
	Carbide shanks, conical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	60	0.055	1.8	10.0	1910	315	1.60	•
12	3	60	0.070	2.4	12.0	1590	335	2.20	•
16	3	60	0.090	3.0	16.0	1195	325	2.70	•
Cast iron (lamellar / spheroidal)									
	Carbide shanks, cylindrical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	160	0.065	1.5	10.0	5095	995	1.30	•
12	3	160	0.080	2.0	12.0	4245	1020	1.80	•
16	3	160	0.110	2.6	16.0	3185	1050	2.40	•
20	3	160	0.150	3.5	20.0	2545	1145	3.20	•
	Carbide shanks, conical, L-Type: N							**L-Type: M**	**L-Type: L**
10	3	160	0.065	1.8	10.0	5095	995	1.60	•
12	3	160	0.080	2.4	12.0	4245	1020	2.20	•
16	3	160	0.110	3.0	16.0	3185	1050	2.70	•

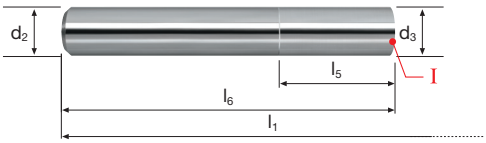
Cylindrical end mills

Smooth-edged

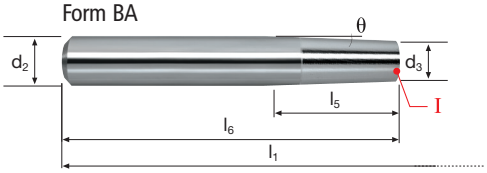
NovoSys X®

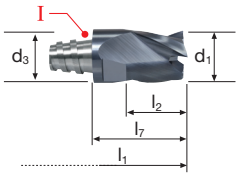
HM UT	λ 30° γ 9°
45°	

Form AA



Form BA



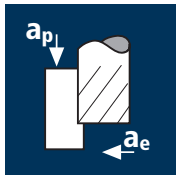


I = Interface

Rm < 850	Rm 850-1100	Rm 1100-1300	Rm 1300-1500				Inox Stainless	Ti Titanium	GG(G)

Milling heads										POLYCUT-A
Order-N°.	d1 e8	d3	l2	l7	45°	z	i	I		
N-10-01-03-01-10	10	9.8	8	18	0.15	3	8	10		●
N-12-01-03-01-12	12	11.8	10	20	0.15	3	10	12		●
N-16-01-03-01-16	16	15.8	14	32	0.15	3	13	16		●
N-20-01-03-01-20	20	19.8	16	36	0.15	3	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_e [mm]	a_e [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	200	0.040	6.0	4.0	6365	1020	3.20	•
		12	4	200	0.050	8.0	4.8	5305	1060	3.80	•
		16	5	200	0.070	12.0	6.4	3980	1395	5.10	•
		20	6	200	0.090	14.0	8.0	3185	1720	6.40	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	200	0.040	6.0	4.4	6365	1020	3.50	•
		12	4	200	0.050	8.0	5.3	5305	1060	4.20	•
		16	5	200	0.070	12.0	7.0	3980	1395	5.60	•
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	160	0.030	6.0	4.0	5095	610	3.20	•
		12	4	160	0.040	8.0	4.8	4245	680	3.80	•
		16	5	160	0.055	12.0	6.4	3185	875	5.10	•
		20	6	160	0.070	14.0	8.0	2545	1070	6.40	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	160	0.030	6.0	4.4	5095	610	3.50	•
		12	4	160	0.040	8.0	5.3	4245	680	4.20	•
		16	5	160	0.055	12.0	7.0	3185	875	5.60	•
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	60	0.030	6.0	4.0	1910	230	3.20	•
		12	4	60	0.040	8.0	4.8	1590	255	3.80	•
		16	5	60	0.055	12.0	6.4	1195	330	5.10	•
		20	6	60	0.070	14.0	8.0	955	400	6.40	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	60	0.030	6.0	4.4	1910	230	3.50	•
		12	4	60	0.040	8.0	5.3	1590	255	4.20	•
		16	5	60	0.055	12.0	7.0	1195	330	5.60	•
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	160	0.040	6.0	4.0	5095	815	3.20	•
		12	4	160	0.050	8.0	4.8	4245	850	3.80	•
		16	5	160	0.070	12.0	6.4	3185	1115	5.10	•
		20	6	160	0.090	14.0	8.0	2545	1375	6.40	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	160	0.040	6.0	4.4	5095	815	3.50	•
		12	4	160	0.050	8.0	5.3	4245	850	4.20	•
		16	5	160	0.070	12.0	7.0	3185	1115	5.60	•

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_p [mm]	a_p [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	180	0.040	4.0	10.0	5730	915	3.20	•
		12	4	180	0.050	4.8	12.0	4775	955	3.80	•
		16	5	180	0.065	6.4	16.0	3580	1165	5.10	•
		20	6	180	0.080	8.0	20.0	2865	1375	6.40	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	180	0.040	4.4	10.0	5730	915	3.50	•
		12	4	180	0.050	5.3	12.0	4775	955	4.20	•
		16	5	180	0.065	7.0	16.0	3580	1165	5.60	•
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	140	0.030	4.0	10.0	4455	535	3.20	•
		12	4	140	0.040	4.8	12.0	3715	595	3.80	•
		16	5	140	0.050	6.4	16.0	2785	695	5.10	•
		20	6	140	0.065	8.0	20.0	2230	870	6.40	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	140	0.030	4.4	10.0	4455	535	3.50	•
		12	4	140	0.040	5.3	12.0	3715	595	4.20	•
		16	5	140	0.050	7.0	16.0	2785	695	5.60	•
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	50	0.030	4.0	10.0	1590	190	3.20	•
		12	4	50	0.040	4.8	12.0	1325	210	3.80	•
		16	5	50	0.050	6.4	16.0	995	250	5.10	•
		20	6	50	0.065	8.0	20.0	795	310	6.40	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	50	0.030	4.4	10.0	1590	190	3.50	•
		12	4	50	0.040	5.3	12.0	1325	210	4.20	•
		16	5	50	0.050	7.0	16.0	995	250	5.60	•
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
		10	4	140	0.040	4.0	10.0	4455	715	3.20	•
		12	4	140	0.050	4.8	12.0	3715	745	3.80	•
		16	5	140	0.065	6.4	16.0	2785	905	5.10	•
		20	6	140	0.080	8.0	20.0	2230	1070	6.40	•
		Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
		10	4	140	0.040	4.4	10.0	4455	715	3.50	•
		12	4	140	0.050	5.3	12.0	3715	745	4.20	•
		16	5	140	0.065	7.0	16.0	2785	905	5.60	•

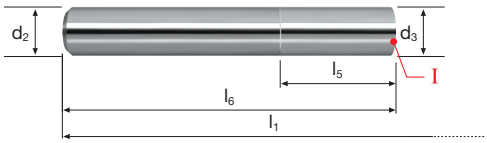
Cylindrical end mills

Profiled

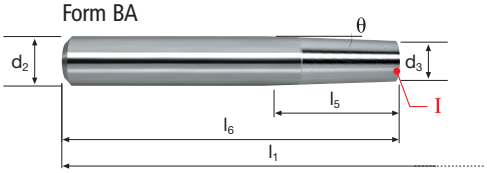
NovoSys X®

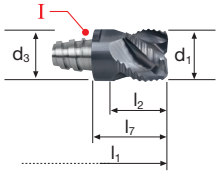
HM UT	λ 45° γ 8°
45°	

Form AA



Form BA





I = Interface

Rm < 850	Rm 850-1100	Rm 1100-1300						Ti Titanium	GG(G)

Milling heads										POLYCUT-A
Order-N°.	d1 e8	d3	l2	l7	45°	z	i	I		
NR-10-01-04-03-10	10	9.8	7	13.0	0.35	4	8	10		●
NR-12-01-04-03-12	12	11.8	9	16.5	0.35	4	10	12		●
NR-16-01-05-04-16	16	15.8	13	20.5	0.45	5	13	16		●
NR-20-01-06-04-20	20	19.8	15	25.5	0.45	6	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		78.0		65		N	10		●
AA-10-080-040-10	10	9.8	93.0	40	80		M	10		●
AA-10-120-080-10	10	9.8	133.0	80	120		L	10		●
AA-12-070-000-12	12		86.5		70		N	12		●
AA-12-085-040-12	12	11.8	101.5	40	85		M	12		●
AA-12-120-075-12	12	11.8	136.5	75	120		L	12		●
AA-16-080-032-16	16	15.8	100.5	32	80		N	16		●
AA-16-110-062-16	16	15.8	130.5	62	110		M	16		●
AA-20-090-040-20	20	19.8	115.5	40	90		N	20		●
AA-20-150-100-20	20	19.8	175.5	100	150		L	20		●
BA-12-080-032-10	12	9.8	93.0	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	133.0	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	136.5	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	156.5	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	140.5	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	180.5	80	160	1.5°	L	16		●

fraisa

NovoSys X® milling heads for 3D machining

Ball nose, Tolerance r ±0.01

N° X-10-200-02-50-10	d1 10 – 20	HM XT		Rm 1100-1500	HRC 48-60		729
N° X-11-201-02-55-10	d1 11 – 22	HM XT		Rm 1100-1500	HRC 48-60		731
N° X-10-202-02-50-10	d1 10 – 20	HM XA		Rm 1100-1500	HRC 48- > 60		733
N° H-10-03-02-50-10	d1 10 – 20	HM UT		Rm 1100-1500	HRC 48-60		735
N° N-10-03-02-50-10	d1 10 – 20	HM UT		Rm 850-1500			737

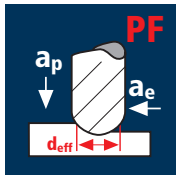
Corner radius

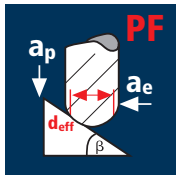
N° X-10-100-06-05-10	d1 10 – 20 r 0.5	HM XT		Rm 1100-1500	HRC 48- > 60		739
N° X-10-101-06-10-10	d1 10 – 20 r 1.0	HM XT		Rm 1100-1500	HRC 48- > 60		741
N° H-10-02-04-05-10	d1 10 – 20 r 0.5	HM UT		Rm 1100-1500	HRC 48-60		743
N° H-10-02-04-10-10	d1 10 – 20 r 1.0	HM UT		Rm 1100-1500	HRC 48-60		745
N° N-10-02-04-05-10	d1 10 – 20 r 0.5	HM UT		Rm <850-1300			747
N° N-10-02-04-10-10	d1 10 – 20 r 1.0	HM UT		Rm <850-1300			749
N° N-10-02-04-15-10	d1 10 – 20 r 1.5	HM UT		Rm <850-1300			751

High Feed Cutting (HFC)

N° X-10-300-04-09-10	d1 10 – 20	HM XT	HFC	Rm 850-1500	HRC 48- > 60		753

VII

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm]	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	n [min⁻¹]
	Hardened tool steel 42 - 48 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	160	0.145	0.80	1.20	5.43	9380	2720	0.48	11910
		12	2	160	0.150	0.96	1.44	6.51	7825	2350	0.58	9895
		16	2	160	0.160	1.28	1.92	8.68	5865	1875	0.77	7435
		20	2	160	0.170	1.60	2.40	10.85	4695	1595	0.96	5955
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	160	0.150	0.80	1.20	5.43	9380	2815	0.48	11910
		12	2	160	0.160	0.96	1.44	6.51	7825	2505	0.58	9895
		16	2	160	0.170	1.28	1.92	8.68	5865	1995	0.77	7435
	Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	130	0.135	0.80	1.20	5.43	7620	2055	0.48	9680
		12	2	130	0.140	0.96	1.44	6.51	6355	1780	0.58	8040
		16	2	130	0.145	1.28	1.92	8.68	4765	1380	0.77	6040
		20	2	130	0.155	1.60	2.40	10.85	3815	1185	0.96	4840
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	130	0.140	0.80	1.20	5.43	7620	2135	0.48	9680
		12	2	130	0.145	0.96	1.44	6.51	6355	1845	0.58	8040
		16	2	130	0.155	1.28	1.92	8.68	4765	1475	0.77	6040
	Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	110	0.125	0.80	1.20	5.43	6450	1615	0.48	8190
		12	2	110	0.130	0.96	1.44	6.51	5380	1400	0.58	6800
		16	2	110	0.135	1.28	1.92	8.68	4035	1090	0.77	5110
		20	2	110	0.145	1.60	2.40	10.85	3225	935	0.96	4095
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	110	0.130	0.80	1.20	5.43	6450	1675	0.48	8190
		12	2	110	0.135	0.96	1.44	6.51	5380	1455	0.58	6800
		16	2	110	0.145	1.28	1.92	8.68	4035	1170	0.77	5110
	Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	50	0.085	0.24	0.72	3.06	5200	885	0.14	6775
		12	2	50	0.090	0.29	0.86	3.69	4315	775	0.17	5610
		16	2	50	0.095	0.38	1.15	4.87	3270	620	0.23	4180
		20	2	50	0.100	0.48	1.44	6.12	2600	520	0.29	3330
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	50	0.090	0.24	0.72	3.06	5200	935	0.14	6775
		12	2	50	0.095	0.29	0.86	3.69	4315	820	0.17	5610
		16	2	50	0.100	0.38	1.15	4.87	3270	655	0.23	4180

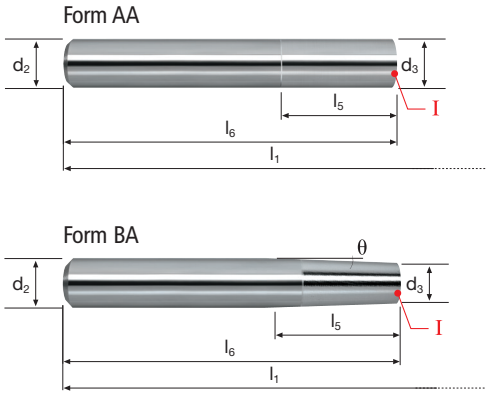
Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	n [min⁻¹]
	Hardened tool steel 42 - 48 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	180	0.145	0.80	0.80	9.78	5860	1700	0.56	6010
		12	2	180	0.150	0.96	0.96	11.73	4885	1465	0.67	5010
		16	2	180	0.160	1.28	1.28	15.64	3665	1175	0.90	3755
		20	2	180	0.170	1.60	1.60	19.55	2930	995	1.12	3005
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	180	0.150	0.80	0.80	9.78	5860	1760	0.56	6010
		12	2	180	0.160	0.96	0.96	11.73	4885	1565	0.67	5010
		16	2	180	0.170	1.28	1.28	15.64	3665	1245	0.90	3755
	Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	150	0.135	0.80	0.80	9.78	4880	1320	0.56	5010
		12	2	150	0.140	0.96	0.96	11.73	4070	1140	0.67	4175
		16	2	150	0.145	1.28	1.28	15.64	3055	885	0.90	3130
		20	2	150	0.155	1.60	1.60	19.55	2440	755	1.12	2505
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	150	0.140	0.80	0.80	9.78	4880	1365	0.56	5010
		12	2	150	0.145	0.96	0.96	11.73	4070	1180	0.67	4175
		16	2	150	0.155	1.28	1.28	15.64	3055	945	0.90	3130
	Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	120	0.125	0.80	0.80	9.78	3905	975	0.56	4010
		12	2	120	0.130	0.96	0.96	11.73	3255	845	0.67	3340
		16	2	120	0.135	1.28	1.28	15.64	2440	660	0.90	2505
		20	2	120	0.145	1.60	1.60	19.55	1955	565	1.12	2005
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	120	0.130	0.80	0.80	9.78	3905	1015	0.56	4010
		12	2	120	0.135	0.96	0.96	11.73	3255	880	0.67	3340
		16	2	120	0.145	1.28	1.28	15.64	2440	710	0.90	2505
	Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	60	0.100	0.40	0.40	9.28	2060	410	0.28	2120
		12	2	60	0.105	0.48	0.48	11.13	1715	360	0.34	1765
		16	2	60	0.110	0.64	0.64	14.84	1285	285	0.45	1325
		20	2	60	0.120	0.80	0.80	18.55	1030	245	0.56	1060
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	60	0.105	0.40	0.40	9.28	2060	435	0.28	2120
		12	2	60	0.110	0.48	0.48	11.13	1715	375	0.34	1765
		16	2	60	0.120	0.64	0.64	14.84	1285	310	0.45	1325

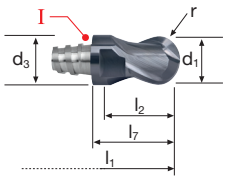
Ball nose end mills Sphero-XR

Tolerance r ±0.01

NovoSys X®

HM XT	λ 30° γ-10°



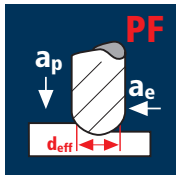


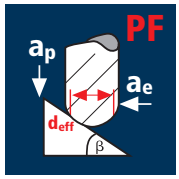
I = Interface

	Rm 850-1100	Rm 1100-1300	Rm 1300-1500	HRC 48-56	HRC 56-60	HRC > 60

Milling heads									X-AL
Order-N°.	d_1 0/-0.02	d_3	l_2	l_7	r ±0.01	z	i	I	
X-10-200-02-50-10	10	9.8	8	18	5.0	2	8	10	●
X-12-200-02-60-12	12	11.8	10	20	6.0	2	10	12	●
X-16-200-02-80-16	16	15.8	14	32	8.0	2	13	16	●
X-20-200-02-100-20	20	19.8	16	36	10.0	2	17	20	●

Carbide shanks, Form AA / BA									
Order-N°.	d_2 h6	d_3	l_1	l_5	l_6	θ	L-Type	I	
AA-10-065-000-10	10		83		65		N	10	●
AA-10-080-040-10	10	9.8	98	40	80		M	10	●
AA-10-120-080-10	10	9.8	138	80	120		L	10	●
AA-12-070-000-12	12		90		70		N	12	●
AA-12-085-040-12	12	11.8	105	40	85		M	12	●
AA-12-120-075-12	12	11.8	140	75	120		L	12	●
AA-16-080-032-16	16	15.8	112	32	80		N	16	●
AA-16-110-062-16	16	15.8	142	62	110		M	16	●
AA-20-090-040-20	20	19.8	126	40	90		N	20	●
AA-20-150-100-20	20	19.8	186	100	150		L	20	●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10	●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10	●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12	●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12	●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16	●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16	●

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm]	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	n [min⁻¹]
	Hardened tool steel 42 - 48 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		11	2	160	0.145	0.88	1.32	5.97	8530	2475	0.53	10810
		13	2	160	0.150	1.04	1.56	7.05	7225	2170	0.62	9190
		18	2	160	0.160	1.44	2.16	9.77	5215	1670	0.86	6635
		22	2	160	0.170	1.76	2.64	11.94	4265	1450	1.06	5405
		Carbide shanks, conical, L-Type: N									L-Type: M	
		11	2	160	0.150	0.88	1.32	5.97	8530	2560	0.53	10810
		13	2	160	0.160	1.04	1.56	7.05	7225	2310	0.62	9190
		18	2	160	0.170	1.44	2.16	9.77	5215	1775	0.86	6635
	Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		11	2	130	0.135	0.88	1.32	5.97	6930	1870	0.53	8785
		13	2	130	0.140	1.04	1.56	7.05	5870	1645	0.62	7470
		18	2	130	0.145	1.44	2.16	9.77	4235	1230	0.86	5390
		22	2	130	0.155	1.76	2.64	11.94	3465	1075	1.06	4390
		Carbide shanks, conical, L-Type: N									L-Type: M	
		11	2	130	0.140	0.88	1.32	5.97	6930	1940	0.53	8785
		13	2	130	0.145	1.04	1.56	7.05	5870	1700	0.62	7470
		18	2	130	0.155	1.44	2.16	9.77	4235	1315	0.86	5390
	Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		11	2	110	0.125	0.88	1.32	5.97	5865	1465	0.53	7430
		13	2	110	0.130	1.04	1.56	7.05	4965	1290	0.62	6320
		18	2	110	0.135	1.44	2.16	9.77	3585	970	0.86	4560
		22	2	110	0.145	1.76	2.64	11.94	2935	850	1.06	3715
		Carbide shanks, conical, L-Type: N									L-Type: M	
		11	2	110	0.130	0.88	1.32	5.97	5865	1525	0.53	7430
		13	2	110	0.135	1.04	1.56	7.05	4965	1340	0.62	6320
		18	2	110	0.145	1.44	2.16	9.77	3585	1040	0.86	4560
	Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		11	2	50	0.085	0.26	0.79	3.34	4765	810	0.16	6040
		13	2	50	0.090	0.31	0.94	3.97	4010	720	0.19	5100
		18	2	50	0.095	0.43	1.30	5.50	2895	550	0.26	3705
		22	2	50	0.100	0.53	1.58	6.75	2360	470	0.32	3020
		Carbide shanks, conical, L-Type: N									L-Type: M	
		11	2	50	0.090	0.26	0.79	3.34	4765	860	0.16	6040
		13	2	50	0.095	0.31	0.94	3.97	4010	760	0.19	5100
		18	2	50	0.100	0.43	1.30	5.50	2895	580	0.26	3705

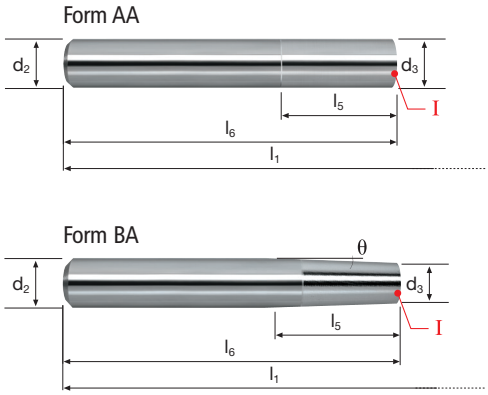
Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	n [min⁻¹]
	Hardened tool steel 42 - 48 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		11	2	180	0.145	0.88	0.88	10.75	5330	1545	0.62	5460
		13	2	180	0.150	1.04	1.04	12.71	4510	1355	0.73	4625
		18	2	180	0.160	1.44	1.44	17.60	3255	1040	1.01	3340
		22	2	180	0.170	1.76	1.76	21.51	2665	905	1.23	2735
		Carbide shanks, conical, L-Type: N									L-Type: M	
		11	2	180	0.150	0.88	0.88	10.75	5330	1600	0.62	5460
		13	2	180	0.160	1.04	1.04	12.71	4510	1445	0.73	4625
		18	2	180	0.170	1.44	1.44	17.60	3255	1105	1.01	3340
	Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		11	2	150	0.135	0.88	0.88	10.75	4440	1200	0.62	4550
		13	2	150	0.140	1.04	1.04	12.71	3755	1050	0.73	3855
		18	2	150	0.145	1.44	1.44	17.60	2715	785	1.01	2785
		22	2	150	0.155	1.76	1.76	21.51	2220	690	1.23	2275
		Carbide shanks, conical, L-Type: N									L-Type: M	
		11	2	150	0.140	0.88	0.88	10.75	4440	1245	0.62	4550
		13	2	150	0.145	1.04	1.04	12.71	3755	1090	0.73	3855
		18	2	150	0.155	1.44	1.44	17.60	2715	840	1.01	2785
	Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		11	2	120	0.125	0.88	0.88	10.75	3555	890	0.62	3640
		13	2	120	0.130	1.04	1.04	12.71	3005	780	0.73	3080
		18	2	120	0.135	1.44	1.44	17.60	2170	585	1.01	2225
		22	2	120	0.145	1.76	1.76	21.51	1775	515	1.23	1820
		Carbide shanks, conical, L-Type: N									L-Type: M	
		11	2	120	0.130	0.88	0.88	10.75	3555	925	0.62	3640
		13	2	120	0.135	1.04	1.04	12.71	3005	810	0.73	3080
		18	2	120	0.145	1.44	1.44	17.60	2170	630	1.01	2225
	Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		11	2	60	0.100	0.44	0.44	10.20	1870	375	0.31	1925
		13	2	60	0.105	0.52	0.52	12.06	1585	335	0.36	1630
		18	2	60	0.110	0.72	0.72	16.70	1145	250	0.50	1180
		22	2	60	0.120	0.88	0.88	20.41	935	225	0.62	965
		Carbide shanks, conical, L-Type: N									L-Type: M	
		11	2	60	0.105	0.44	0.44	10.20	1870	395	0.31	1925
		13	2	60	0.110	0.52	0.52	12.06	1585	350	0.36	1630
		18	2	60	0.120	0.72	0.72	16.70	1145	275	0.50	1180

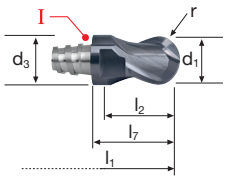
Ball nose end mills Sphero-XR

Tolerance r ±0.01, d1 cutting diameter with excess

NovoSys X®

HM XT	λ 30° γ-10°



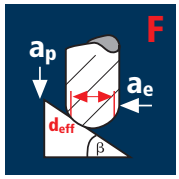


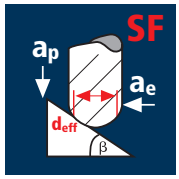
I = Interface

	Rm 850-1100	Rm 1100-1300	Rm 1300-1500	HRC 48-56	HRC 56-60	HRC > 60

Milling heads									X-AL
Order-N°.	d1 0/-0.02	d3	l2	l7	r ±0.01	z		I	
X-11-201-02-55-10	11	9.8	8	18	5.5	2	8	10	●
X-13-201-02-65-12	13	11.8	10	20	6.5	2	10	12	●
X-18-201-02-90-16	18	15.8	14	32	9.0	2	13	16	●
X-22-201-02-110-20	22	19.8	16	36	11.0	2	17	20	●

Carbide shanks, Form AA / BA									
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I	
AA-10-065-000-10	10		83		65		N	10	●
AA-10-080-040-10	10	9.8	98	40	80		M	10	●
AA-10-120-080-10	10	9.8	138	80	120		L	10	●
AA-12-070-000-12	12		90		70		N	12	●
AA-12-085-040-12	12	11.8	105	40	85		M	12	●
AA-12-120-075-12	12	11.8	140	75	120		L	12	●
AA-16-080-032-16	16	15.8	112	32	80		N	16	●
AA-16-110-062-16	16	15.8	142	62	110		M	16	●
AA-20-090-040-20	20	19.8	126	40	90		N	20	●
AA-20-150-100-20	20	19.8	186	100	150		L	20	●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10	●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10	●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12	●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12	●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16	●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16	●

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
	Hardened tool steel 42 - 48 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	300	0.100	0.20	0.20	8.77	10890	2180	0.18	0.12
		12	2	300	0.105	0.25	0.25	10.56	9045	1900	0.23	0.15
		16	2	300	0.110	0.30	0.30	13.96	6840	1505	0.27	0.18
		20	2	300	0.120	0.35	0.35	17.36	5500	1320	0.32	0.21
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	300	0.105	0.20	0.20	8.77	10890	2285	0.18	0.12
		12	2	300	0.110	0.25	0.25	10.56	9045	1990	0.23	0.15
		16	2	300	0.120	0.30	0.30	13.96	6840	1640	0.27	0.18
	Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	250	0.095	0.20	0.20	8.77	9075	1725	0.18	0.12
		12	2	250	0.100	0.25	0.25	10.56	7535	1505	0.23	0.15
		16	2	250	0.105	0.30	0.30	13.96	5700	1195	0.27	0.18
		20	2	250	0.115	0.35	0.35	17.36	4585	1055	0.32	0.21
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	250	0.100	0.20	0.20	8.77	9075	1815	0.18	0.12
		12	2	250	0.105	0.25	0.25	10.56	7535	1580	0.23	0.15
		16	2	250	0.115	0.30	0.30	13.96	5700	1310	0.27	0.18
	Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	200	0.090	0.20	0.20	8.77	7260	1305	0.18	0.12
		12	2	200	0.095	0.25	0.25	10.56	6030	1145	0.23	0.15
		16	2	200	0.100	0.30	0.30	13.96	4560	910	0.27	0.18
		20	2	200	0.110	0.35	0.35	17.36	3665	805	0.32	0.21
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	200	0.095	0.20	0.20	8.77	7260	1380	0.18	0.12
		12	2	200	0.100	0.25	0.25	10.56	6030	1205	0.23	0.15
		16	2	200	0.110	0.30	0.30	13.96	4560	1005	0.27	0.18
	Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	150	0.085	0.20	0.20	8.77	5445	925	0.18	0.12
		12	2	150	0.090	0.25	0.25	10.56	4520	815	0.23	0.15
		16	2	150	0.095	0.30	0.30	13.96	3420	650	0.27	0.18
		20	2	150	0.100	0.35	0.35	17.36	2750	550	0.32	0.21
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	150	0.090	0.20	0.20	8.77	5445	980	0.18	0.12
		12	2	150	0.095	0.25	0.25	10.56	4520	860	0.23	0.15
		16	2	150	0.100	0.30	0.30	13.96	3420	685	0.27	0.18

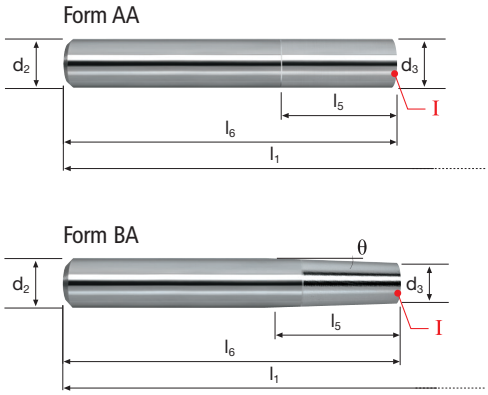
Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
	Hardened tool steel 42 - 48 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	400	0.070	0.04	0.04	7.91	16095	2255	0.04	0.03
		12	2	400	0.075	0.04	0.04	9.41	13530	2030	0.04	0.03
		16	2	400	0.080	0.05	0.05	12.51	10180	1630	0.05	0.04
		20	2	400	0.085	0.05	0.05	15.48	8225	1400	0.05	0.04
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	400	0.070	0.04	0.04	7.91	16095	2255	0.04	0.03
		12	2	400	0.075	0.04	0.04	9.41	13530	2030	0.04	0.03
		16	2	400	0.080	0.05	0.05	12.51	10180	1630	0.05	0.04
	Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	350	0.065	0.04	0.04	7.91	14085	1830	0.04	0.03
		12	2	350	0.070	0.04	0.04	9.41	11840	1660	0.04	0.03
		16	2	350	0.075	0.05	0.05	12.51	8905	1335	0.05	0.04
		20	2	350	0.080	0.05	0.05	15.48	7195	1150	0.05	0.04
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	350	0.065	0.04	0.04	7.91	14085	1830	0.04	0.03
		12	2	350	0.070	0.04	0.04	9.41	11840	1660	0.04	0.03
		16	2	350	0.075	0.05	0.05	12.51	8905	1335	0.05	0.04
	Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	280	0.060	0.04	0.04	7.91	11270	1350	0.04	0.03
		12	2	280	0.065	0.04	0.04	9.41	9470	1230	0.04	0.03
		16	2	280	0.070	0.05	0.05	12.51	7125	1000	0.05	0.04
		20	2	280	0.070	0.05	0.05	15.48	5760	805	0.05	0.04
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	280	0.060	0.04	0.04	7.91	11270	1350	0.04	0.03
		12	2	280	0.065	0.04	0.04	9.41	9470	1230	0.04	0.03
		16	2	280	0.070	0.05	0.05	12.51	7125	1000	0.05	0.04
	Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	180	0.055	0.04	0.04	7.91	7245	795	0.04	0.03
		12	2	180	0.055	0.04	0.04	9.41	6090	670	0.04	0.03
		16	2	180	0.060	0.05	0.05	12.51	4580	550	0.05	0.04
		20	2	180	0.065	0.05	0.05	15.48	3700	480	0.05	0.04
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	180	0.055	0.04	0.04	7.91	7245	795	0.04	0.03
		12	2	180	0.055	0.04	0.04	9.41	6090	670	0.04	0.03
		16	2	180	0.060	0.05	0.05	12.51	4580	550	0.05	0.04

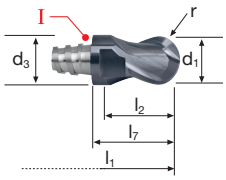
Ball nose end mills Sphero-XF

Tolerance r ±0.01

NovoSys X®

HM XA	λ 30° γ-10°



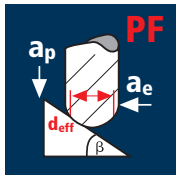


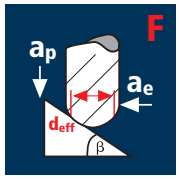
I = Interface

	Rm 850-1100	Rm 1100-1300	Rm 1300-1500	HRC 48-56	HRC 56-60	HRC > 60		Ti Titanium	Copper

Milling heads										X-AL
Order-N°.	d1 0/-0.02	d3	l2	l7	r ±0.01	z	i	I		
X-10-202-02-50-10	10	9.8	8	18	5.0	2	8	10		●
X-12-202-02-60-12	12	11.8	10	20	6.0	2	10	12		●
X-16-202-02-80-16	16	15.8	14	32	8.0	2	13	16		●
X-20-202-02-100-20	20	19.8	16	36	10.0	2	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	n [min⁻¹]
	Hardened tool steel 42 - 48 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	160	0.125	0.40	0.50	9.28	5490	1375	0.28	5655
		12	2	160	0.130	0.48	0.60	11.13	4575	1190	0.34	4705
		16	2	160	0.140	0.64	0.80	14.84	3430	960	0.45	3530
		20	2	160	0.150	0.80	1.00	18.55	2745	825	0.56	2825
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	160	0.130	0.40	0.50	9.28	5490	1425	0.28	5655
		12	2	160	0.140	0.48	0.60	11.13	4575	1280	0.34	4705
		16	2	160	0.150	0.64	0.80	14.84	3430	1030	0.45	3530
	Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	120	0.115	0.40	0.50	9.28	4115	945	0.28	4240
		12	2	120	0.120	0.48	0.60	11.13	3430	825	0.34	3530
		16	2	120	0.130	0.64	0.80	14.84	2575	670	0.45	2650
		20	2	120	0.140	0.80	1.00	18.55	2060	575	0.56	2120
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	120	0.120	0.40	0.50	9.28	4115	990	0.28	4240
		12	2	120	0.130	0.48	0.60	11.13	3430	890	0.34	3530
		16	2	120	0.140	0.64	0.80	14.84	2575	720	0.45	2650
	Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	100	0.105	0.40	0.50	9.28	3430	720	0.28	3535
		12	2	100	0.110	0.48	0.60	11.13	2860	630	0.34	2940
		16	2	100	0.120	0.64	0.80	14.84	2145	515	0.45	2210
		20	2	100	0.130	0.80	1.00	18.55	1715	445	0.56	1765
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	100	0.110	0.40	0.50	9.28	3430	755	0.28	3535
		12	2	100	0.120	0.48	0.60	11.13	2860	685	0.34	2940
		16	2	100	0.130	0.64	0.80	14.84	2145	560	0.45	2210
	Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	50	0.090	0.20	0.25	8.77	1815	325	0.14	1865
		12	2	50	0.090	0.24	0.30	10.52	1515	275	0.17	1555
		16	2	50	0.100	0.32	0.40	14.03	1135	225	0.22	1165
		20	2	50	0.105	0.40	0.50	17.54	905	190	0.28	930
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	50	0.090	0.20	0.25	8.77	1815	325	0.14	1865
		12	2	50	0.100	0.24	0.30	10.52	1515	305	0.17	1555
		16	2	50	0.105	0.32	0.40	14.03	1135	240	0.22	1165

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
	Hardened tool steel 42 - 48 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	250	0.080	0.20	0.20	8.77	9075	1450	0.18	0.10
		12	2	250	0.095	0.25	0.25	10.56	7535	1430	0.23	0.13
		16	2	250	0.105	0.30	0.30	13.96	5700	1195	0.27	0.15
		20	2	250	0.100	0.35	0.35	17.36	4585	915	0.32	0.18
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	250	0.105	0.20	0.20	8.77	9075	1905	0.18	0.10
		12	2	250	0.110	0.25	0.25	10.56	7535	1660	0.23	0.13
		16	2	250	0.120	0.30	0.30	13.96	5700	1370	0.27	0.15
	Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	200	0.075	0.20	0.20	8.77	7260	1090	0.18	0.10
		12	2	200	0.090	0.25	0.25	10.56	6030	1085	0.23	0.13
		16	2	200	0.100	0.30	0.30	13.96	4560	910	0.27	0.15
		20	2	200	0.095	0.35	0.35	17.36	3665	695	0.32	0.18
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	200	0.100	0.20	0.20	8.77	7260	1450	0.18	0.10
		12	2	200	0.105	0.25	0.25	10.56	6030	1265	0.23	0.13
		16	2	200	0.115	0.30	0.30	13.96	4560	1050	0.27	0.15
	Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	180	0.070	0.20	0.20	8.77	6535	915	0.18	0.10
		12	2	180	0.080	0.25	0.25	10.56	5425	870	0.23	0.13
		16	2	180	0.095	0.30	0.30	13.96	4105	780	0.27	0.15
		20	2	180	0.090	0.35	0.35	17.36	3300	595	0.32	0.18
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	180	0.095	0.20	0.20	8.77	6535	1240	0.18	0.10
		12	2	180	0.100	0.25	0.25	10.56	5425	1085	0.23	0.13
		16	2	180	0.110	0.30	0.30	13.96	4105	905	0.27	0.15
	Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	120	0.070	0.20	0.20	8.77	4355	610	0.18	0.10
		12	2	120	0.070	0.25	0.25	10.56	3615	505	0.23	0.13
		16	2	120	0.090	0.30	0.30	13.96	2735	490	0.27	0.15
		20	2	120	0.085	0.35	0.35	17.36	2200	375	0.32	0.18
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	120	0.090	0.20	0.20	8.77	4355	785	0.18	0.10
		12	2	120	0.095	0.25	0.25	10.56	3615	685	0.23	0.13
		16	2	120	0.100	0.30	0.30	13.96	2735	545	0.27	0.15

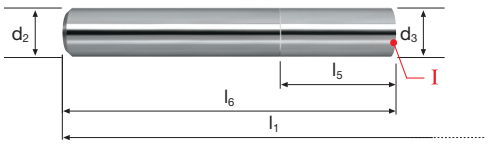
Ball nose end mills

Tolerance r ±0.01

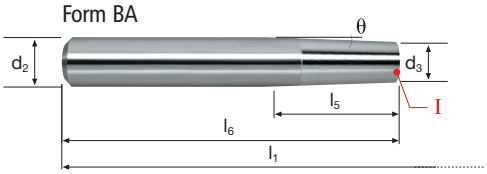
NovoSys X®

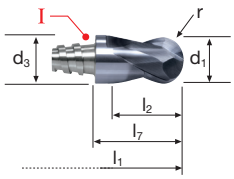
HM UT	λ 30° γ 0°

Form AA



Form BA



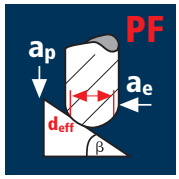


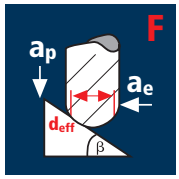
I = Interface

	Rm 850-1100	Rm 1100-1300	Rm 1300-1500	HRC 48-56	HRC 56-60	HRC > 60			

Milling heads										POLYCUT-A
Order-N°.	d1 ±0.02	d3	l2	l7	r ±0.01	z	i	I		
H-10-03-02-50-10	10	9.8	8	18	5.0	2	8	10		●
H-12-03-02-60-12	12	11.8	10	20	6.0	2	10	12		●
H-16-03-02-80-16	16	15.8	12	32	8.0	2	13	16		●
H-20-03-02-100-20	20	19.8	14	36	10.0	2	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	n [min⁻¹]
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	200	0.135	0.40	0.50	9.28	6860	1850	0.28	7065
		12	2	200	0.140	0.48	0.60	11.13	5720	1600	0.34	5885
		16	2	200	0.150	0.64	0.80	14.84	4290	1285	0.45	4415
		20	2	200	0.160	0.80	1.00	18.55	3430	1100	0.56	3535
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	200	0.140	0.40	0.50	9.28	6860	1920	0.28	7065
		12	2	200	0.150	0.48	0.60	11.13	5720	1715	0.34	5885
		16	2	200	0.155	0.64	0.80	14.84	4290	1330	0.45	4415
	Steel 1100 - 1300 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	180	0.125	0.40	0.50	9.28	6175	1545	0.28	6360
		12	2	180	0.130	0.48	0.60	11.13	5150	1340	0.34	5295
		16	2	180	0.140	0.64	0.80	14.84	3860	1080	0.45	3975
		20	2	180	0.145	0.80	1.00	18.55	3090	895	0.56	3180
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	180	0.130	0.40	0.50	9.28	6175	1605	0.28	6360
		12	2	180	0.140	0.48	0.60	11.13	5150	1440	0.34	5295
		16	2	180	0.145	0.64	0.80	14.84	3860	1120	0.45	3975
	Steel 1300 - 1500 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	150	0.115	0.40	0.50	9.28	5145	1185	0.28	5300
		12	2	150	0.120	0.48	0.60	11.13	4290	1030	0.34	4415
		16	2	150	0.130	0.64	0.80	14.84	3215	835	0.45	3310
		20	2	150	0.135	0.80	1.00	18.55	2575	695	0.56	2650
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	150	0.120	0.40	0.50	9.28	5145	1235	0.28	5300
		12	2	150	0.130	0.48	0.60	11.13	4290	1115	0.34	4415
		16	2	150	0.130	0.64	0.80	14.84	3215	835	0.45	3310
	Stainless steel [Cr-Ni-Mo-.../1.4571]	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
		10	2	60	0.095	0.20	0.25	8.77	2180	415	0.14	2240
		12	2	60	0.100	0.24	0.30	10.52	1815	365	0.17	1865
		16	2	60	0.105	0.32	0.40	14.03	1360	285	0.22	1400
		20	2	60	0.110	0.40	0.50	17.54	1090	240	0.28	1120
		Carbide shanks, conical, L-Type: N									L-Type: M	
		10	2	60	0.100	0.20	0.25	8.77	2180	435	0.14	2240
		12	2	60	0.105	0.24	0.30	10.52	1815	380	0.17	1865
		16	2	60	0.110	0.32	0.40	14.03	1360	300	0.22	1400

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	350	0.080	0.20	0.20	8.77	12705	2035	0.18	0.10
		12	2	350	0.095	0.25	0.25	10.56	10550	2005	0.23	0.13
		16	2	350	0.105	0.30	0.30	13.96	7980	1675	0.27	0.15
		20	2	350	0.100	0.35	0.35	17.36	6420	1285	0.32	0.18
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	350	0.105	0.20	0.20	8.77	12705	2670	0.18	0.10
		12	2	350	0.110	0.25	0.25	10.56	10550	2320	0.23	0.13
		16	2	350	0.120	0.30	0.30	13.96	7980	1915	0.27	0.15
	Steel 1100 - 1300 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	280	0.075	0.20	0.20	8.77	10165	1525	0.18	0.10
		12	2	280	0.090	0.25	0.25	10.56	8440	1520	0.23	0.13
		16	2	280	0.100	0.30	0.30	13.96	6385	1275	0.27	0.15
		20	2	280	0.095	0.35	0.35	17.36	5135	975	0.32	0.18
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	280	0.100	0.20	0.20	8.77	10165	2035	0.18	0.10
		12	2	280	0.105	0.25	0.25	10.56	8440	1770	0.23	0.13
		16	2	280	0.115	0.30	0.30	13.96	6385	1470	0.27	0.15
	Steel 1300 - 1500 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	200	0.070	0.20	0.20	8.77	7260	1015	0.18	0.10
		12	2	200	0.080	0.25	0.25	10.56	6030	965	0.23	0.13
		16	2	200	0.095	0.30	0.30	13.96	4560	865	0.27	0.15
		20	2	200	0.090	0.35	0.35	17.36	3665	660	0.32	0.18
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	200	0.095	0.20	0.20	8.77	7260	1380	0.18	0.10
		12	2	200	0.100	0.25	0.25	10.56	6030	1205	0.23	0.13
		16	2	200	0.110	0.30	0.30	13.96	4560	1005	0.27	0.15
	Stainless steel [Cr-Ni-Mo-.../1.4571]	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	2	100	0.065	0.20	0.20	8.77	3630	470	0.18	0.10
		12	2	100	0.065	0.25	0.25	10.56	3015	390	0.23	0.13
		16	2	100	0.085	0.30	0.30	13.96	2280	390	0.27	0.15
		20	2	100	0.080	0.35	0.35	17.36	1835	295	0.32	0.18
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	2	100	0.085	0.20	0.20	8.77	3630	615	0.18	0.10
		12	2	100	0.090	0.25	0.25	10.56	3015	545	0.23	0.13
		16	2	100	0.095	0.30	0.30	13.96	2280	435	0.27	0.15

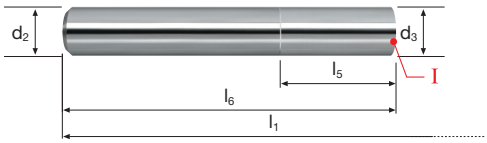
Ball nose end mills

Tolerance r ±0.01

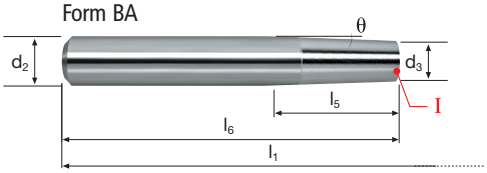
NovoSys X®

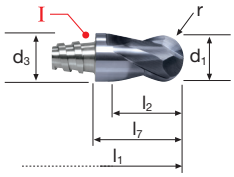
HM UT	λ 30° γ 9°

Form AA



Form BA





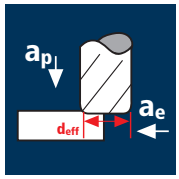
I = Interface

Rm < 850	Rm 850-1100	Rm 1100-1300	Rm 1300-1500				Inox Stainless		GG(G)

Milling heads										POLYCUT-A
Order-N°.	d1 ±0.02	d3	l2	l7	r ±0.01	z	i	I		
N-10-03-02-50-10	10	9.8	8	18	5.0	2	8	10		●
N-12-03-02-60-12	12	11.8	10	20	6.0	2	10	12		●
N-16-03-02-80-16	16	15.8	12	32	8.0	2	13	16		●
N-20-03-02-100-20	20	19.8	14	36	10.0	2	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

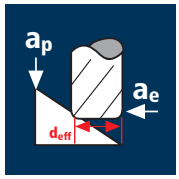
Application



Material

d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm]	n [min⁻¹]	v_f [mm/min]	a_e [mm]	a_e [mm]
Hardened tool steel 48 - 52 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	150	0.095	0.24	3.50	9.85	4845	2760	2.50	1.50
12	6	150	0.115	0.25	4.20	11.87	4020	2775	3.00	1.80
16	6	150	0.130	0.28	5.60	15.90	3005	2345	4.00	2.40
20	8	150	0.145	0.30	7.00	19.92	2395	2780	5.00	3.00
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	150	0.105	0.24	3.50	9.85	4845	3050	2.50	1.50
12	6	150	0.125	0.25	4.20	11.87	4020	3015	3.00	1.80
16	6	150	0.140	0.28	5.60	15.90	3005	2525	4.00	2.40
Hardened tool steel 52 - 56 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	120	0.085	0.24	3.50	9.85	3880	1980	2.50	1.50
12	6	120	0.105	0.25	4.20	11.87	3220	2030	3.00	1.80
16	6	120	0.115	0.28	5.60	15.90	2400	1655	4.00	2.40
20	8	120	0.130	0.30	7.00	19.92	1920	1995	175.00	105.00
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	120	0.095	0.24	3.50	9.85	3880	2210	2.50	1.50
12	6	120	0.115	0.25	4.20	11.87	3220	2220	3.00	1.80
16	6	120	0.125	0.28	5.60	15.90	2400	1800	4.00	2.40
Hardened tool steel 56 - 60 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	80	0.080	0.24	3.50	9.85	2585	1240	2.50	1.50
12	6	80	0.095	0.25	4.20	11.87	2145	1225	3.00	1.80
16	6	80	0.105	0.28	5.60	15.90	1600	1010	4.00	2.40
20	8	80	0.120	0.30	7.00	19.92	1280	1230	5.00	3.00
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	80	0.085	0.24	3.50	9.85	2585	1320	2.50	1.50
12	6	80	0.105	0.25	4.20	11.87	2145	1350	3.00	1.80
16	6	80	0.115	0.28	5.60	15.90	1600	1105	4.00	2.40
Hardened tool steel > 60 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	40	0.055	0.24	3.50	9.85	1295	425	2.50	1.50
12	6	40	0.065	0.25	4.20	11.87	1075	420	3.00	1.80
16	6	40	0.075	0.28	5.60	15.90	800	360	4.00	2.40
20	8	40	0.085	0.30	7.00	19.92	640	435	5.00	3.00
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	40	0.060	0.24	3.50	9.85	1295	465	2.50	1.50
12	6	40	0.075	0.25	4.20	11.87	1075	485	3.00	1.80
16	6	40	0.080	0.28	5.60	15.90	800	385	4.00	2.40

Application



Material

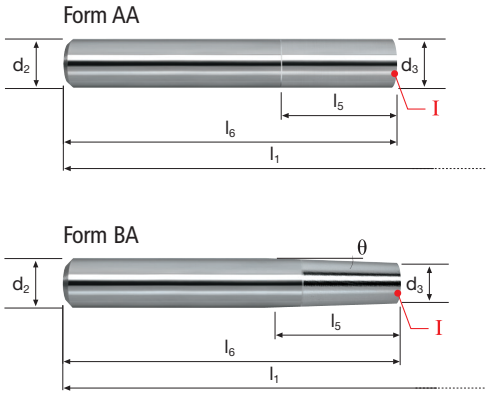
d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
Hardened tool steel 48 - 52 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	360	0.185	0.15	0.15	10.00	11460	12720	0.14	0.11
12	6	360	0.225	0.18	0.18	12.00	9550	12895	0.16	0.14
16	6	360	0.250	0.24	0.24	15.97	7175	10765	0.22	0.18
20	8	360	0.285	0.30	0.30	19.93	5750	13110	0.27	0.23
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	360	0.185	0.15	0.15	10.00	11460	12720	0.14	0.11
12	6	360	0.225	0.18	0.18	12.00	9550	12895	0.16	0.14
16	6	360	0.250	0.24	0.24	15.97	7175	10765	0.22	0.18
Hardened tool steel 52 - 56 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	250	0.175	0.15	0.15	10.00	7960	8360	0.14	0.11
12	6	250	0.215	0.18	0.18	12.00	6630	8555	0.16	0.14
16	6	250	0.240	0.24	0.24	15.97	4985	7180	0.22	0.18
20	8	250	0.270	0.30	0.30	19.93	3995	8630	0.27	0.23
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	250	0.175	0.15	0.15	10.00	7960	8360	0.14	0.11
12	6	250	0.215	0.18	0.18	12.00	6630	8555	0.16	0.14
16	6	250	0.240	0.24	0.24	15.97	4985	7180	0.22	0.18
Hardened tool steel 56 - 60 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	180	0.160	0.15	0.15	10.00	5730	5500	0.14	0.11
12	6	180	0.195	0.18	0.18	12.00	4775	5585	0.16	0.14
16	6	180	0.215	0.24	0.24	15.97	3590	4630	0.22	0.18
20	8	180	0.245	0.30	0.30	19.93	2875	5635	0.27	0.23
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	180	0.160	0.15	0.15	10.00	5730	5500	0.14	0.11
12	6	180	0.195	0.18	0.18	12.00	4775	5585	0.16	0.14
16	6	180	0.215	0.24	0.24	15.97	3590	4630	0.22	0.18
Hardened tool steel > 60 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	100	0.095	0.15	0.15	10.00	3185	1815	0.14	0.11
12	6	100	0.115	0.18	0.18	12.00	2655	1830	0.16	0.14
16	6	100	0.125	0.24	0.24	15.97	1995	1495	0.22	0.18
20	8	100	0.145	0.30	0.30	19.93	1595	1850	0.27	0.23
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	100	0.095	0.15	0.15	10.00	3185	1815	0.14	0.11
12	6	100	0.115	0.18	0.18	12.00	2655	1830	0.16	0.14
16	6	100	0.125	0.24	0.24	15.97	1995	1495	0.22	0.18

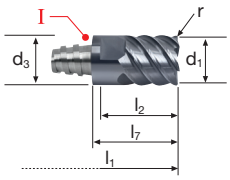
Corner radius end mills XSpeed

Tolerance r 0/+0.02

NovoSys X®

HM XT	λ 55° γ-10°





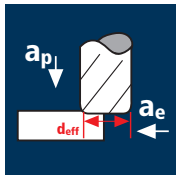
I = Interface

	Rm 850-1100	Rm 1100-1300	Rm 1300-1500	HRC 48-56	HRC 56-60	HRC > 60		Ti Titanium	HSS

Milling heads										X-AL
Order-N°.	d1 0/-0.02	d3	l2	l7	r 0/+0.02	z	i	I		
X-10-100-06-05-10	10	9.8	8	18	0.5	6	8	10		●
X-12-100-06-05-12	12	11.8	10	20	0.5	6	10	12		●
X-16-100-06-05-16	16	15.8	14	32	0.5	6	13	16		●
X-20-100-08-05-20	20	19.8	16	36	0.5	8	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

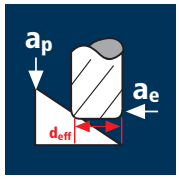
Application



Material

d1 [mm]	z	vc [m/min]	fz [mm]	ap [mm]	ae [mm]	deff [mm]	n [min⁻¹]	vf [mm/min]	ae [mm]	ae [mm]
Hardened tool steel 48 - 52 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	150	0.095	0.24	3.50	9.30	5135	2925	2.50	1.50
12	6	150	0.115	0.25	4.20	11.32	4220	2910	3.00	1.80
16	6	150	0.130	0.28	5.60	15.39	3100	2420	4.00	2.40
20	8	150	0.145	0.30	7.00	19.43	2455	2850	5.00	3.00
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	150	0.105	0.24	3.50	9.30	5135	3235	2.50	1.50
12	6	150	0.125	0.25	4.20	11.32	4220	3165	3.00	1.80
16	6	150	0.140	0.28	5.60	15.39	3100	2605	4.00	2.40
Hardened tool steel 52 - 56 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	120	0.085	0.24	3.50	9.30	4105	2095	2.50	1.50
12	6	120	0.105	0.25	4.20	11.32	3375	2125	3.00	1.80
16	6	120	0.115	0.28	5.60	15.39	2480	1710	4.00	2.40
20	8	120	0.130	0.30	7.00	19.43	1965	2045	175.00	105.00
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	120	0.095	0.24	3.50	9.30	4105	2340	2.50	1.50
12	6	120	0.115	0.25	4.20	11.32	3375	2330	3.00	1.80
16	6	120	0.125	0.28	5.60	15.39	2480	1860	4.00	2.40
Hardened tool steel 56 - 60 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	80	0.080	0.24	3.50	9.30	2740	1315	2.50	1.50
12	6	80	0.095	0.25	4.20	11.32	2250	1285	3.00	1.80
16	6	80	0.105	0.28	5.60	15.39	1655	1045	4.00	2.40
20	8	80	0.120	0.30	7.00	19.43	1310	1260	5.00	3.00
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	80	0.085	0.24	3.50	9.30	2740	1395	2.50	1.50
12	6	80	0.105	0.25	4.20	11.32	2250	1420	3.00	1.80
16	6	80	0.115	0.28	5.60	15.39	1655	1140	4.00	2.40
Hardened tool steel > 60 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	40	0.055	0.24	3.50	9.30	1370	450	2.50	1.50
12	6	40	0.065	0.25	4.20	11.32	1125	440	3.00	1.80
16	6	40	0.075	0.28	5.60	15.39	825	370	4.00	2.40
20	8	40	0.085	0.30	7.00	19.43	655	445	5.00	3.00
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	40	0.060	0.24	3.50	9.30	1370	495	2.50	1.50
12	6	40	0.075	0.25	4.20	11.32	1125	505	3.00	1.80
16	6	40	0.080	0.28	5.60	15.39	825	395	4.00	2.40

Application



Material

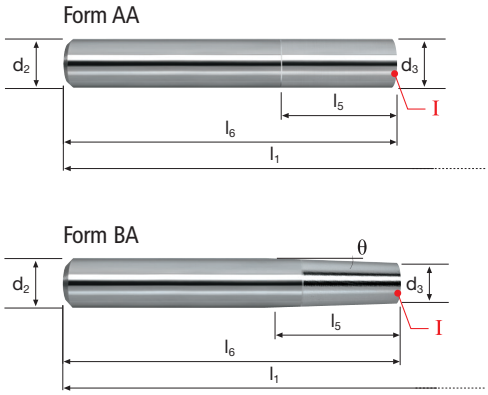
d1 [mm]	z	vc [m/min]	fz [mm]	ap [mm]	ae [mm]	deff [mm] β = 45°	n [min⁻¹]	vf [mm/min]	ae / ap [mm]	ae / ap [mm]
Hardened tool steel 48 - 52 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	360	0.185	0.15	0.15	9.95	11515	12780	0.14	0.11
12	6	360	0.225	0.18	0.18	11.97	9575	12925	0.16	0.14
16	6	360	0.250	0.24	0.24	15.99	7165	10750	0.22	0.18
20	8	360	0.285	0.30	0.30	20.00	5730	13065	0.27	0.23
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	360	0.185	0.15	0.15	9.95	11515	12780	0.14	0.11
12	6	360	0.225	0.18	0.18	11.97	9575	12925	0.16	0.14
16	6	360	0.250	0.24	0.24	15.99	7165	10750	0.22	0.18
Hardened tool steel 52 - 56 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	250	0.175	0.15	0.15	9.95	8000	8400	0.14	0.11
12	6	250	0.215	0.18	0.18	11.97	6650	8580	0.16	0.14
16	6	250	0.240	0.24	0.24	15.99	4975	7165	0.22	0.18
20	8	250	0.270	0.30	0.30	20.00	3980	8595	0.27	0.23
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	250	0.175	0.15	0.15	9.95	8000	8400	0.14	0.11
12	6	250	0.215	0.18	0.18	11.97	6650	8580	0.16	0.14
16	6	250	0.240	0.24	0.24	15.99	4975	7165	0.22	0.18
Hardened tool steel 56 - 60 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	180	0.160	0.15	0.15	9.95	5760	5530	0.14	0.11
12	6	180	0.195	0.18	0.18	11.97	4785	5600	0.16	0.14
16	6	180	0.215	0.24	0.24	15.99	3585	4625	0.22	0.18
20	8	180	0.245	0.30	0.30	20.00	2865	5615	0.27	0.23
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	180	0.160	0.15	0.15	9.95	5760	5530	0.14	0.11
12	6	180	0.195	0.18	0.18	11.97	4785	5600	0.16	0.14
16	6	180	0.215	0.24	0.24	15.99	3585	4625	0.22	0.18
Hardened tool steel > 60 HRC										
	Carbide shanks, cylindrical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	100	0.095	0.15	0.15	9.95	3200	1825	0.14	0.11
12	6	100	0.115	0.18	0.18	11.97	2660	1835	0.16	0.14
16	6	100	0.125	0.24	0.24	15.99	1990	1495	0.22	0.18
20	8	100	0.145	0.30	0.30	20.00	1590	1845	0.27	0.23
	Carbide shanks, conical, L-Type: N								**L-Type: M**	**L-Type: L**
10	6	100	0.095	0.15	0.15	9.95	3200	1825	0.14	0.11
12	6	100	0.115	0.18	0.18	11.97	2660	1835	0.16	0.14
16	6	100	0.125	0.24	0.24	15.99	1990	1495	0.22	0.18

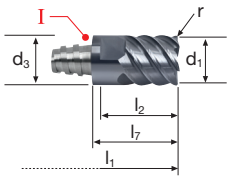
Corner radius end mills XSpeed

Tolerance r 0/+0.02

NovoSys X®

HM XT	λ 55° γ-10°





I = Interface

	Rm 850-1100	Rm 1100-1300	Rm 1300-1500	HRC 48-56	HRC 56-60	HRC > 60		Ti Titanium	HSS

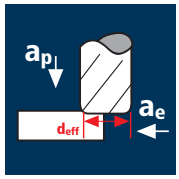
Milling heads

Order-N°.	d1 0/-0.02	d3	l2	l7	r 0/+0.02	z	i	I		X-AL
X-10-101-06-10-10	10	9.8	8	18	1.0	6	8	10		●
X-12-101-06-10-12	12	11.8	10	20	1.0	6	10	12		●
X-16-101-06-10-16	16	15.8	14	32	1.0	6	13	16		●
X-20-101-08-10-20	20	19.8	16	36	1.0	8	17	20		●

Carbide shanks, Form AA / BA

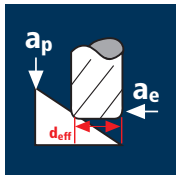
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

Application



Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm]	n [min⁻¹]	v_f [mm/min]	a_e [mm]	a_e [mm]
Hardened tool steel 42 - 48 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	180	0.105	0.24	3.50	9.85	5815	2440	2.50	1.50
	12	4	180	0.125	0.25	4.20	11.87	4825	2415	3.00	1.80
	16	4	180	0.145	0.28	5.60	15.90	3605	2090	4.00	2.40
	20	4	180	0.160	0.30	7.00	19.92	2875	1840	5.00	3.00
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	180	0.115	0.24	3.50	9.85	5815	2675	2.50	1.50
	12	4	180	0.135	0.25	4.20	11.87	4825	2605	3.00	1.80
	16	4	180	0.155	0.28	5.60	15.90	3605	2235	4.00	2.40
Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	140	0.095	0.24	3.50	9.85	4525	1720	2.50	1.50
	12	4	140	0.115	0.25	4.20	11.87	3755	1725	3.00	1.80
	16	4	140	0.130	0.28	5.60	15.90	2805	1460	4.00	2.40
	20	4	140	0.145	0.30	7.00	19.92	2235	1295	5.00	3.00
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	140	0.105	0.24	3.50	9.85	4525	1900	2.50	1.50
	12	4	140	0.120	0.25	4.20	11.87	3755	1800	3.00	1.80
	16	4	140	0.140	0.28	5.60	15.90	2805	1570	4.00	2.40
Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	110	0.085	0.24	3.50	9.85	3555	1210	2.50	1.50
	12	4	110	0.105	0.25	4.20	11.87	2950	1240	3.00	1.80
	16	4	110	0.120	0.28	5.60	15.90	2200	1055	4.00	2.40
	20	4	110	0.130	0.30	7.00	19.92	1760	915	5.00	3.00
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	110	0.095	0.24	3.50	9.85	3555	1350	2.50	1.50
	12	4	110	0.110	0.25	4.20	11.87	2950	1300	3.00	1.80
	16	4	110	0.125	0.28	5.60	15.90	2200	1100	4.00	2.40
Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	70	0.075	0.24	3.50	9.85	2260	680	2.50	1.50
	12	4	70	0.090	0.25	4.20	11.87	1875	675	3.00	1.80
	16	4	70	0.105	0.28	5.60	15.90	1400	590	4.00	2.40
	20	4	70	0.115	0.30	7.00	19.92	1120	515	5.00	3.00
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	70	0.085	0.24	3.50	9.85	2260	770	2.50	1.50
	12	4	70	0.095	0.25	4.20	11.87	1875	715	3.00	1.80
	16	4	70	0.110	0.28	5.60	15.90	1400	615	4.00	2.40

Application



Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
Hardened tool steel 42 - 48 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	360	0.195	0.15	0.15	10.00	11460	8940	0.14	0.11
	12	4	360	0.230	0.18	0.18	12.00	9550	8785	0.16	0.14
	16	4	360	0.265	0.24	0.24	15.97	7175	7605	0.22	0.18
	20	4	360	0.300	0.30	0.30	19.93	5750	6900	0.27	0.23
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	360	0.195	0.15	0.15	10.00	11460	8940	0.14	0.11
	12	4	360	0.230	0.18	0.18	12.00	9550	8785	0.16	0.14
	16	4	360	0.265	0.24	0.24	15.97	7175	7605	0.22	0.18
Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	300	0.185	0.15	0.15	10.00	9550	7065	0.14	0.11
	12	4	300	0.220	0.18	0.18	12.00	7960	7005	0.16	0.14
	16	4	300	0.250	0.24	0.24	15.97	5980	5980	0.22	0.18
	20	4	300	0.285	0.30	0.30	19.93	4790	5460	0.27	0.23
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	300	0.185	0.15	0.15	10.00	9550	7065	0.14	0.11
	12	4	300	0.220	0.18	0.18	12.00	7960	7005	0.16	0.14
	16	4	300	0.250	0.24	0.24	15.97	5980	5980	0.22	0.18
Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	220	0.175	0.15	0.15	10.00	7005	4905	0.14	0.11
	12	4	220	0.205	0.18	0.18	12.00	5835	4785	0.16	0.14
	16	4	220	0.240	0.24	0.24	15.97	4385	4210	0.22	0.18
	20	4	220	0.270	0.30	0.30	19.93	3515	3795	0.27	0.23
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	220	0.175	0.15	0.15	10.00	7005	4905	0.14	0.11
	12	4	220	0.205	0.18	0.18	12.00	5835	4785	0.16	0.14
	16	4	220	0.240	0.24	0.24	15.97	4385	4210	0.22	0.18
Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	160	0.155	0.15	0.15	10.00	5095	3160	0.14	0.11
	12	4	160	0.185	0.18	0.18	12.00	4245	3140	0.16	0.14
	16	4	160	0.210	0.24	0.24	15.97	3190	2680	0.22	0.18
	20	4	160	0.240	0.30	0.30	19.93	2555	2455	0.27	0.23
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	160	0.155	0.15	0.15	10.00	5095	3160	0.14	0.11
	12	4	160	0.185	0.18	0.18	12.00	4245	3140	0.16	0.14
	16	4	160	0.210	0.24	0.24	15.97	3190	2680	0.22	0.18

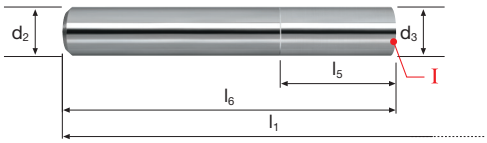
Corner radius end mills

Tolerance r 0/+0.03

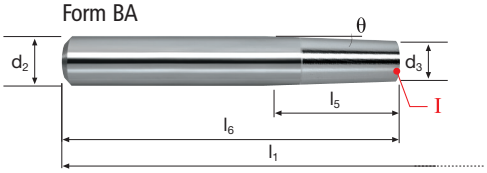
NovoSys X®

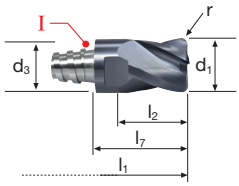
HM UT	λ 30° γ 0°

Form AA



Form BA





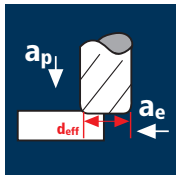
I = Interface

	Rm 850-1100	Rm 1100-1300	Rm 1300-1500	HRC 48-56	HRC 56-60	HRC > 60		Ti Titanium	GG(G)

Milling heads										POLYCUT-A
Order-N°.	d1 e8	d3	l2	l7	r 0/+0.03	z	i	I		
H-10-02-04-05-10	10	9.8	8	18	0.5	4	8	10		●
H-12-02-04-05-12	12	11.8	10	20	0.5	4	10	12		●
H-16-02-04-05-16	16	15.8	14	32	0.5	4	13	16		●
H-20-02-04-05-20	20	19.8	16	36	0.5	4	17	20		●

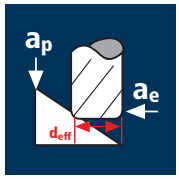
Carbide shanks, Form AA / BA										
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

Application



Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm]	n [min⁻¹]	v_f [mm/min]	a_e [mm]	a_e [mm]
Hardened tool steel 42 - 48 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	180	0.105	0.24	3.50	9.30	6160	2585	2.50	1.50
	12	4	180	0.125	0.25	4.20	11.32	5060	2530	3.00	1.80
	16	4	180	0.145	0.28	5.60	15.39	3725	2160	4.00	2.40
	20	4	180	0.160	0.30	7.00	19.43	2950	1890	5.00	3.00
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	180	0.115	0.24	3.50	9.30	6160	2835	2.50	1.50
	12	4	180	0.135	0.25	4.20	11.32	5060	2730	3.00	1.80
	16	4	180	0.155	0.28	5.60	15.39	3725	2310	4.00	2.40
Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	140	0.095	0.24	3.50	9.30	4790	1820	2.50	1.50
	12	4	140	0.115	0.25	4.20	11.32	3935	1810	3.00	1.80
	16	4	140	0.130	0.28	5.60	15.39	2895	1505	4.00	2.40
	20	4	140	0.145	0.30	7.00	19.43	2295	1330	5.00	3.00
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	140	0.105	0.24	3.50	9.30	4790	2010	2.50	1.50
	12	4	140	0.120	0.25	4.20	11.32	3935	1890	3.00	1.80
	16	4	140	0.140	0.28	5.60	15.39	2895	1620	4.00	2.40
Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	110	0.085	0.24	3.50	9.30	3765	1280	2.50	1.50
	12	4	110	0.105	0.25	4.20	11.32	3095	1300	3.00	1.80
	16	4	110	0.120	0.28	5.60	15.39	2275	1090	4.00	2.40
	20	4	110	0.130	0.30	7.00	19.43	1800	935	5.00	3.00
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	110	0.095	0.24	3.50	9.30	3765	1430	2.50	1.50
	12	4	110	0.110	0.25	4.20	11.32	3095	1360	3.00	1.80
	16	4	110	0.125	0.28	5.60	15.39	2275	1140	4.00	2.40
Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	70	0.075	0.24	3.50	9.30	2395	720	2.50	1.50
	12	4	70	0.090	0.25	4.20	11.32	1970	710	3.00	1.80
	16	4	70	0.105	0.28	5.60	15.39	1450	610	4.00	2.40
	20	4	70	0.115	0.30	7.00	19.43	1145	525	5.00	3.00
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	70	0.085	0.24	3.50	9.30	2395	815	2.50	1.50
	12	4	70	0.095	0.25	4.20	11.32	1970	750	3.00	1.80
	16	4	70	0.110	0.28	5.60	15.39	1450	640	4.00	2.40

Application



Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
Hardened tool steel 42 - 48 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	360	0.195	0.15	0.15	9.95	11515	8980	0.14	0.11
	12	4	360	0.230	0.18	0.18	11.97	9575	8810	0.16	0.14
	16	4	360	0.265	0.24	0.24	15.99	7165	7595	0.22	0.18
	20	4	360	0.300	0.30	0.30	20.00	5730	6875	0.27	0.23
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	360	0.195	0.15	0.15	9.95	11515	8980	0.14	0.11
	12	4	360	0.230	0.18	0.18	11.97	9575	8810	0.16	0.14
	16	4	360	0.265	0.24	0.24	15.99	7165	7595	0.22	0.18
Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	300	0.185	0.15	0.15	9.95	9595	7100	0.14	0.11
	12	4	300	0.220	0.18	0.18	11.97	7980	7020	0.16	0.14
	16	4	300	0.250	0.24	0.24	15.99	5970	5970	0.22	0.18
	20	4	300	0.285	0.30	0.30	20.00	4775	5445	0.27	0.23
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	300	0.185	0.15	0.15	9.95	9595	7100	0.14	0.11
	12	4	300	0.220	0.18	0.18	11.97	7980	7020	0.16	0.14
	16	4	300	0.250	0.24	0.24	15.99	5970	5970	0.22	0.18
Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	220	0.175	0.15	0.15	9.95	7040	4930	0.14	0.11
	12	4	220	0.205	0.18	0.18	11.97	5850	4795	0.16	0.14
	16	4	220	0.240	0.24	0.24	15.99	4380	4205	0.22	0.18
	20	4	220	0.270	0.30	0.30	20.00	3500	3780	0.27	0.23
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	220	0.175	0.15	0.15	9.95	7040	4930	0.14	0.11
	12	4	220	0.205	0.18	0.18	11.97	5850	4795	0.16	0.14
	16	4	220	0.240	0.24	0.24	15.99	4380	4205	0.22	0.18
Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
	10	4	160	0.155	0.15	0.15	9.95	5120	3175	0.14	0.11
	12	4	160	0.185	0.18	0.18	11.97	4255	3150	0.16	0.14
	16	4	160	0.210	0.24	0.24	15.99	3185	2675	0.22	0.18
	20	4	160	0.240	0.30	0.30	20.00	2545	2445	0.27	0.23
	Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
	10	4	160	0.155	0.15	0.15	9.95	5120	3175	0.14	0.11
	12	4	160	0.185	0.18	0.18	11.97	4255	3150	0.16	0.14
	16	4	160	0.210	0.24	0.24	15.99	3185	2675	0.22	0.18

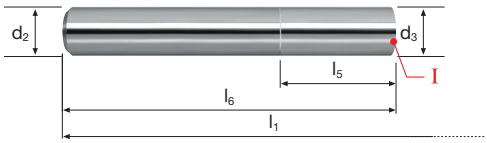
Corner radius end mills

Tolerance r 0/+0.03

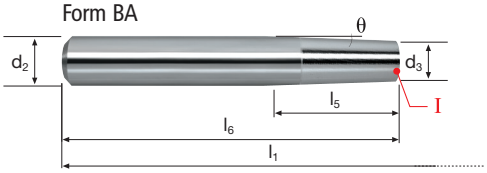
NovoSys X®

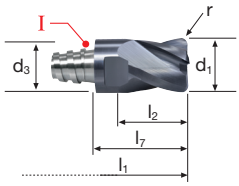
HM UT	λ 30° γ 0°

Form AA



Form BA



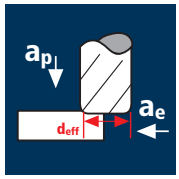


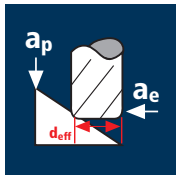
I = Interface

	Rm 850-1100	Rm 1100-1300	Rm 1300-1500	HRC 48-56	HRC 56-60	HRC > 60		Ti Titanium	GG(G)

Milling heads										POLYCUT-A
Order-N°.	d1 e8	d3	l2	l7	r 0/+0.03	z	i	I		
H-10-02-04-10-10	10	9.8	8	18	1.0	4	8	10		●
H-12-02-04-10-12	12	11.8	10	20	1.0	4	10	12		●
H-16-02-04-10-16	16	15.8	14	32	1.0	4	13	16		●
H-20-02-04-10-20	20	19.8	16	36	1.0	4	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm]	n [min⁻¹]	v_f [mm/min]	a_e [mm]	a_e [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	280	0.105	0.24	3.50	9.85	9050	3800	2.50	1.50
		12	4	280	0.125	0.25	4.20	11.87	7510	3755	3.00	1.80
		16	4	280	0.145	0.28	5.60	15.90	5605	3250	4.00	2.40
		20	4	280	0.160	0.30	7.00	19.92	4475	2865	5.00	3.00
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	280	0.115	0.24	3.50	9.85	9050	4165	2.50	1.50
		12	4	280	0.135	0.25	4.20	11.87	7510	4055	3.00	1.80
		16	4	280	0.155	0.28	5.60	15.90	5605	3475	4.00	2.40
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	220	0.095	0.24	3.50	9.85	7110	2700	2.50	1.50
		12	4	220	0.115	0.25	4.20	11.87	5900	2715	3.00	1.80
		16	4	220	0.130	0.28	5.60	15.90	4405	2290	4.00	2.40
		20	4	220	0.145	0.30	7.00	19.92	3515	2040	5.00	3.00
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	220	0.105	0.24	3.50	9.85	7110	2985	2.50	1.50
		12	4	220	0.120	0.25	4.20	11.87	5900	2830	3.00	1.80
		16	4	220	0.140	0.28	5.60	15.90	4405	2465	4.00	2.40
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	80	0.080	0.24	3.50	9.85	2585	825	2.50	1.50
		12	4	80	0.095	0.25	4.20	11.87	2145	815	3.00	1.80
		16	4	80	0.110	0.28	5.60	15.90	1600	705	4.00	2.40
		20	4	80	0.120	0.30	7.00	19.92	1280	615	5.00	3.00
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	80	0.085	0.24	3.50	9.85	2585	880	2.50	1.50
		12	4	80	0.100	0.25	4.20	11.87	2145	860	3.00	1.80
		16	4	80	0.115	0.28	5.60	15.90	1600	735	4.00	2.40
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	260	0.105	0.24	3.50	9.85	8400	3530	2.50	1.50
		12	4	260	0.125	0.25	4.20	11.87	6970	3485	3.00	1.80
		16	4	260	0.145	0.28	5.60	15.90	5205	3020	4.00	2.40
		20	4	260	0.160	0.30	7.00	19.92	4155	2660	5.00	3.00
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	260	0.115	0.24	3.50	9.85	8400	3865	2.50	1.50
		12	4	260	0.135	0.25	4.20	11.87	6970	3765	3.00	1.80
		16	4	260	0.155	0.28	5.60	15.90	5205	3225	4.00	2.40

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	420	0.155	0.15	0.15	10.00	13370	8290	0.14	0.11
		12	4	420	0.185	0.18	0.18	12.00	11140	8245	0.16	0.14
		16	4	420	0.210	0.24	0.24	15.97	8370	7030	0.22	0.18
		20	4	420	0.240	0.30	0.30	19.93	6710	6440	0.27	0.23
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	420	0.155	0.15	0.15	10.00	13370	8290	0.14	0.11
		12	4	420	0.185	0.18	0.18	12.00	11140	8245	0.16	0.14
		16	4	420	0.210	0.24	0.24	15.97	8370	7030	0.22	0.18
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Typ: L
		10	4	350	0.145	0.15	0.15	10.00	11140	6460	0.14	0.11
		12	4	350	0.175	0.18	0.18	12.00	9285	6500	0.16	0.14
		16	4	350	0.200	0.24	0.24	15.97	6975	5580	0.22	0.18
		20	4	350	0.230	0.30	0.30	19.93	5590	5145	0.27	0.23
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	350	0.145	0.15	0.15	10.00	11140	6460	0.14	0.11
		12	4	350	0.175	0.18	0.18	12.00	9285	6500	0.16	0.14
		16	4	350	0.200	0.24	0.24	15.97	6975	5580	0.22	0.18
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	220	0.115	0.15	0.15	10.00	7005	3220	0.14	0.11
		12	4	220	0.140	0.18	0.18	12.00	5835	3270	0.16	0.14
		16	4	220	0.160	0.24	0.24	15.97	4385	2805	0.22	0.18
		20	4	220	0.180	0.30	0.30	19.93	3515	2530	0.27	0.23
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	220	0.115	0.15	0.15	10.00	7005	3220	0.14	0.11
		12	4	220	0.140	0.18	0.18	12.00	5835	3270	0.16	0.14
		16	4	220	0.160	0.24	0.24	15.97	4385	2805	0.22	0.18
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	400	0.155	0.15	0.15	10.00	12730	7895	0.14	0.11
		12	4	400	0.185	0.18	0.18	12.00	10610	7850	0.16	0.14
		16	4	400	0.210	0.24	0.24	15.97	7975	6700	0.22	0.18
		20	4	400	0.240	0.30	0.30	19.93	6390	6135	0.27	0.23
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	400	0.155	0.15	0.15	10.00	12730	7895	0.14	0.11
		12	4	400	0.185	0.18	0.18	12.00	10610	7850	0.16	0.14
		16	4	400	0.210	0.24	0.24	15.97	7975	6700	0.22	0.18

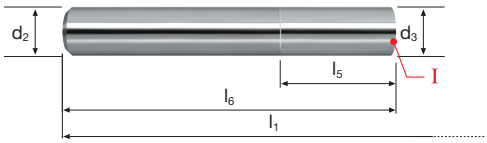
Corner radius end mills

Tolerance r 0/+0.03

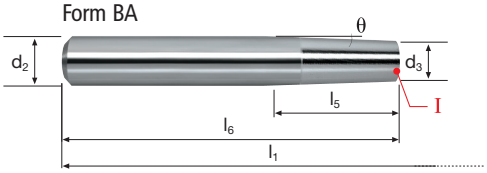
NovoSys X®

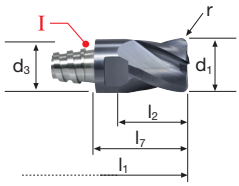
HM UT	λ 30° γ 9°

Form AA



Form BA



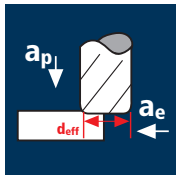


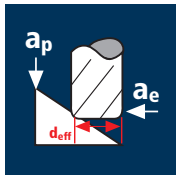
I = Interface

Rm < 850	Rm 850-1100	Rm 1100-1300	Rm 1300-1500				Inox Stainless	Ti Titanium	GG(G)

Milling heads										POLYCUT-A
Order-N°.	d1 e8	d3	l2	l7	r 0/+0.03	z	i	I		
N-10-02-04-05-10	10	9.8	8	18	0.5	4	8	10		●
N-12-02-04-05-12	12	11.8	10	20	0.5	4	10	12		●
N-16-02-04-05-16	16	15.8	14	32	0.5	4	13	16		●
N-20-02-04-05-20	20	19.8	16	36	0.5	4	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm]	n [min⁻¹]	v_f [mm/min]	a_e [mm]	a_e [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	280	0.105	0.24	3.50	9.30	9585	4025	2.50	1.50
		12	4	280	0.125	0.25	4.20	11.32	7875	3940	3.00	1.80
		16	4	280	0.145	0.28	5.60	15.39	5790	3360	4.00	2.40
		20	4	280	0.160	0.30	7.00	19.43	4585	2935	5.00	3.00
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	280	0.115	0.24	3.50	9.30	9585	4410	2.50	1.50
		12	4	280	0.135	0.25	4.20	11.32	7875	4255	3.00	1.80
		16	4	280	0.155	0.28	5.60	15.39	5790	3590	4.00	2.40
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	220	0.095	0.24	3.50	9.30	7530	2860	2.50	1.50
		12	4	220	0.115	0.25	4.20	11.32	6185	2845	3.00	1.80
		16	4	220	0.130	0.28	5.60	15.39	4550	2365	4.00	2.40
		20	4	220	0.145	0.30	7.00	19.43	3605	2090	5.00	3.00
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	220	0.105	0.24	3.50	9.30	7530	3165	2.50	1.50
		12	4	220	0.120	0.25	4.20	11.32	6185	2970	3.00	1.80
		16	4	220	0.140	0.28	5.60	15.39	4550	2550	4.00	2.40
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	80	0.080	0.24	3.50	9.30	2740	875	2.50	1.50
		12	4	80	0.095	0.25	4.20	11.32	2250	855	3.00	1.80
		16	4	80	0.110	0.28	5.60	15.39	1655	730	4.00	2.40
		20	4	80	0.120	0.30	7.00	19.43	1310	630	5.00	3.00
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	80	0.085	0.24	3.50	9.30	2740	930	2.50	1.50
		12	4	80	0.100	0.25	4.20	11.32	2250	900	3.00	1.80
		16	4	80	0.115	0.28	5.60	15.39	1655	760	4.00	2.40
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	260	0.105	0.24	3.50	9.30	8900	3740	2.50	1.50
		12	4	260	0.125	0.25	4.20	11.32	7310	3655	3.00	1.80
		16	4	260	0.145	0.28	5.60	15.39	5380	3120	4.00	2.40
		20	4	260	0.160	0.30	7.00	19.43	4260	2725	5.00	3.00
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	260	0.115	0.24	3.50	9.30	8900	4095	2.50	1.50
		12	4	260	0.135	0.25	4.20	11.32	7310	3945	3.00	1.80
		16	4	260	0.155	0.28	5.60	15.39	5380	3335	4.00	2.40

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	420	0.155	0.15	0.15	9.95	13435	8330	0.14	0.11
		12	4	420	0.185	0.18	0.18	11.97	11170	8265	0.16	0.14
		16	4	420	0.210	0.24	0.24	15.99	8360	7020	0.22	0.18
		20	4	420	0.240	0.30	0.30	20.00	6685	6420	0.27	0.23
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	420	0.155	0.15	0.15	9.95	13435	8330	0.14	0.11
		12	4	420	0.185	0.18	0.18	11.97	11170	8265	0.16	0.14
		16	4	420	0.210	0.24	0.24	15.99	8360	7020	0.22	0.18
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	350	0.145	0.15	0.15	9.95	11195	6495	0.14	0.11
		12	4	350	0.175	0.18	0.18	11.97	9305	6515	0.16	0.14
		16	4	350	0.200	0.24	0.24	15.99	6965	5570	0.22	0.18
		20	4	350	0.230	0.30	0.30	20.00	5570	5125	0.27	0.23
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	350	0.145	0.15	0.15	9.95	11195	6495	0.14	0.11
		12	4	350	0.175	0.18	0.18	11.97	9305	6515	0.16	0.14
		16	4	350	0.200	0.24	0.24	15.99	6965	5570	0.22	0.18
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	220	0.115	0.15	0.15	9.95	7040	3240	0.14	0.11
		12	4	220	0.140	0.18	0.18	11.97	5850	3275	0.16	0.14
		16	4	220	0.160	0.24	0.24	15.99	4380	2805	0.22	0.18
		20	4	220	0.180	0.30	0.30	20.00	3500	2520	0.27	0.23
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	220	0.115	0.15	0.15	9.95	7040	3240	0.14	0.11
		12	4	220	0.140	0.18	0.18	11.97	5850	3275	0.16	0.14
		16	4	220	0.160	0.24	0.24	15.99	4380	2805	0.22	0.18
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	400	0.155	0.15	0.15	9.95	12795	7935	0.14	0.11
		12	4	400	0.185	0.18	0.18	11.97	10635	7870	0.16	0.14
		16	4	400	0.210	0.24	0.24	15.99	7965	6690	0.22	0.18
		20	4	400	0.240	0.30	0.30	20.00	6365	6110	0.27	0.23
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	400	0.155	0.15	0.15	9.95	12795	7935	0.14	0.11
		12	4	400	0.185	0.18	0.18	11.97	10635	7870	0.16	0.14
		16	4	400	0.210	0.24	0.24	15.99	7965	6690	0.22	0.18

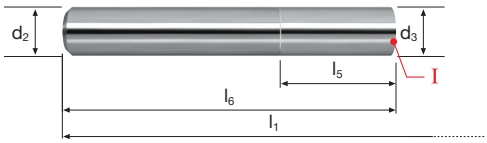
Corner radius end mills

Tolerance r 0/+0.03

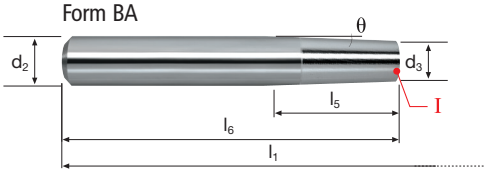
NovoSys X®

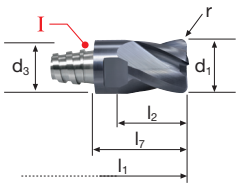
HM UT	λ 30° γ 9°

Form AA



Form BA





I = Interface

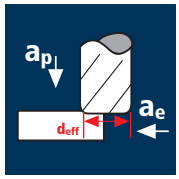
Rm < 850	Rm 850-1100	Rm 1100-1300	Rm 1300-1500				Inox Stainless	Ti Titanium	GG(G)

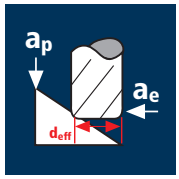
Milling heads

Order-N°.	d1 e8	d3	l2	l7	r 0/+0.03	z	i	I		POLYCUT-A
N-10-02-04-10-10	10	9.8	8	18	1.0	4	8	10		●
N-12-02-04-10-12	12	11.8	10	20	1.0	4	10	12		●
N-16-02-04-10-16	16	15.8	14	32	1.0	4	13	16		●
N-20-02-04-10-20	20	19.8	16	36	1.0	4	17	20		●

Carbide shanks, Form AA / BA

Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm]	n [min⁻¹]	v_f [mm/min]	a_e [mm]	a_e [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	280	0.105	0.24	3.50	8.63	10330	4340	2.50	1.50
		12	4	280	0.125	0.25	4.20	10.66	8360	4180	3.00	1.80
		16	4	280	0.145	0.28	5.60	14.75	6040	3505	4.00	2.40
		20	4	280	0.160	0.30	7.00	18.80	4740	3035	5.00	3.00
		Carbide shanks, conical, L-Type: N									L-Typ: M	L-Type: L
		10	4	280	0.115	0.24	3.50	8.63	10330	4750	2.50	1.50
		12	4	280	0.135	0.25	4.20	10.66	8360	4515	3.00	1.80
		16	4	280	0.155	0.28	5.60	14.75	6040	3745	4.00	2.40
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	220	0.095	0.24	3.50	8.63	8115	3085	2.50	1.50
		12	4	220	0.115	0.25	4.20	10.66	6570	3020	3.00	1.80
		16	4	220	0.130	0.28	5.60	14.75	4750	2470	4.00	2.40
		20	4	220	0.145	0.30	7.00	18.80	3725	2160	5.00	3.00
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	220	0.105	0.24	3.50	8.63	8115	3410	2.50	1.50
		12	4	220	0.120	0.25	4.20	10.66	6570	3155	3.00	1.80
		16	4	220	0.140	0.28	5.60	14.75	4750	2660	4.00	2.40
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	80	0.080	0.24	3.50	8.63	2950	945	2.50	1.50
		12	4	80	0.095	0.25	4.20	10.66	2390	910	3.00	1.80
		16	4	80	0.110	0.28	5.60	14.75	1725	760	4.00	2.40
		20	4	80	0.120	0.30	7.00	18.80	1355	650	5.00	3.00
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	80	0.085	0.24	3.50	8.63	2950	1005	2.50	1.50
		12	4	80	0.100	0.25	4.20	10.66	2390	955	3.00	1.80
		16	4	80	0.115	0.28	5.60	14.75	1725	795	4.00	2.40
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	260	0.105	0.24	3.50	8.63	9590	4030	2.50	1.50
		12	4	260	0.125	0.25	4.20	10.66	7765	3885	3.00	1.80
		16	4	260	0.145	0.28	5.60	14.75	5610	3255	4.00	2.40
		20	4	260	0.160	0.30	7.00	18.80	4400	2815	5.00	3.00
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	260	0.115	0.24	3.50	8.63	9590	4410	2.50	1.50
		12	4	260	0.135	0.25	4.20	10.66	7765	4195	3.00	1.80
		16	4	260	0.155	0.28	5.60	14.75	5610	3480	4.00	2.40

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	420	0.155	0.15	0.15	9.83	13600	8430	0.14	0.11
		12	4	420	0.185	0.18	0.18	11.87	11265	8335	0.16	0.14
		16	4	420	0.210	0.24	0.24	15.93	8390	7050	0.22	0.18
		20	4	420	0.240	0.30	0.30	19.97	6695	6425	0.27	0.23
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	420	0.155	0.15	0.15	9.83	13600	8430	0.14	0.11
		12	4	420	0.185	0.18	0.18	11.87	11265	8335	0.16	0.14
		16	4	420	0.210	0.24	0.24	15.93	8390	7050	0.22	0.18
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	350	0.145	0.15	0.15	9.83	11335	6575	0.14	0.11
		12	4	350	0.175	0.18	0.18	11.87	9385	6570	0.16	0.14
		16	4	350	0.200	0.24	0.24	15.93	6995	5595	0.22	0.18
		20	4	350	0.230	0.30	0.30	19.97	5580	5135	0.27	0.23
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	350	0.145	0.15	0.15	9.83	11335	6575	0.14	0.11
		12	4	350	0.175	0.18	0.18	11.87	9385	6570	0.16	0.14
		16	4	350	0.200	0.24	0.24	15.93	6995	5595	0.22	0.18
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	220	0.115	0.15	0.15	9.83	7125	3280	0.14	0.11
		12	4	220	0.140	0.18	0.18	11.87	5900	3305	0.16	0.14
		16	4	220	0.160	0.24	0.24	15.93	4395	2815	0.22	0.18
		20	4	220	0.180	0.30	0.30	19.97	3505	2525	0.27	0.23
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	220	0.115	0.15	0.15	9.83	7125	3280	0.14	0.11
		12	4	220	0.140	0.18	0.18	11.87	5900	3305	0.16	0.14
		16	4	220	0.160	0.24	0.24	15.93	4395	2815	0.22	0.18
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N									L-Type: M	L-Type: L
		10	4	400	0.155	0.15	0.15	9.83	12955	8030	0.14	0.11
		12	4	400	0.185	0.18	0.18	11.87	10725	7935	0.16	0.14
		16	4	400	0.210	0.24	0.24	15.93	7995	6715	0.22	0.18
		20	4	400	0.240	0.30	0.30	19.97	6375	6120	0.27	0.23
		Carbide shanks, conical, L-Type: N									L-Type: M	L-Type: L
		10	4	400	0.155	0.15	0.15	9.83	12955	8030	0.14	0.11
		12	4	400	0.185	0.18	0.18	11.87	10725	7935	0.16	0.14
		16	4	400	0.210	0.24	0.24	15.93	7995	6715	0.22	0.18

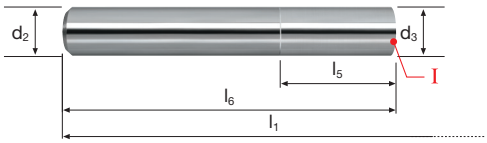
Corner radius end mills

Tolerance r 0/+0.03

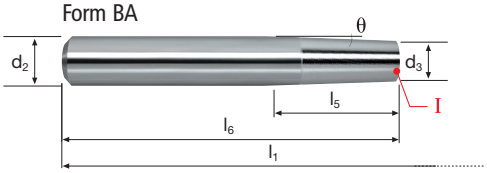
NovoSys X®

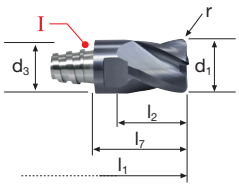
HM UT	λ 30° γ 9°

Form AA



Form BA





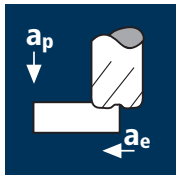
I = Interface

Rm < 850	Rm 850-1100	Rm 1100-1300	Rm 1300-1500				Inox Stainless	Ti Titanium	GG(G)

Milling heads										POLYCUT-A
Order-N°.	d1 e8	d3	l2	l7	r 0/+0.03	z	i	I		
N-10-02-04-15-10	10	9.8	8	18	1.5	4	8	10		●
N-12-02-04-15-12	12	11.8	10	20	1.5	4	10	12		●
N-16-02-04-15-16	16	15.8	14	32	1.5	4	13	16		●
N-20-02-04-15-20	20	19.8	16	36	1.5	4	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

Application



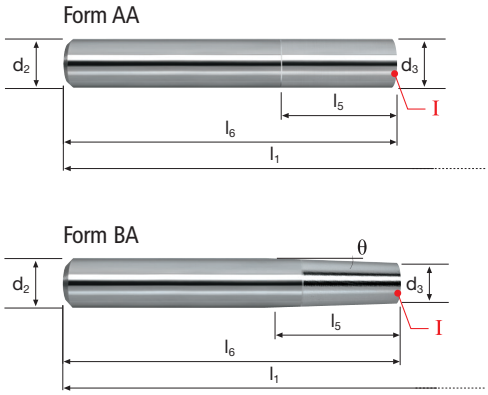
Material	d1 [mm]	z	vc [m/min]	fz [mm]	ap [mm]	ae [mm]	n [min⁻¹]	vf [mm/min]	ae [mm]	ae [mm]
Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	250	0.665	0.32	6.00	7960	21175	4.00	2.00
	12	4	250	0.800	0.40	7.20	6630	21215	4.80	2.40
	16	4	250	1.065	0.48	9.60	4975	21195	6.40	3.20
	20	4	250	1.110	0.56	12.00	3980	17670	8.00	4.00
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	250	0.665	0.32	6.00	7960	21175	4.00	2.00
	12	4	250	0.800	0.40	7.20	6630	21215	4.80	2.40
	16	4	250	1.065	0.48	9.60	4975	21195	6.40	3.20
Steel 1100 - 1300 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	220	0.565	0.32	6.00	7005	15830	4.00	2.00
	12	4	220	0.680	0.40	7.20	5835	15870	4.80	2.40
	16	4	220	0.905	0.48	9.60	4375	15840	6.40	3.20
	20	4	220	0.945	0.56	12.00	3500	13230	8.00	4.00
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	220	0.565	0.32	6.00	7005	15830	4.00	2.00
	12	4	220	0.680	0.40	7.20	5835	15870	4.80	2.40
	16	4	220	0.905	0.48	9.60	4375	15840	6.40	3.20
Steel 1300 - 1500 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	200	0.520	0.29	6.00	6365	13240	4.00	2.00
	12	4	200	0.625	0.36	7.20	5305	13265	4.80	2.40
	16	4	200	0.830	0.43	9.60	3980	13215	6.40	3.20
	20	4	200	0.865	0.50	12.00	3185	11020	8.00	4.00
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	200	0.520	0.29	6.00	6365	13240	4.00	2.00
	12	4	200	0.625	0.36	7.20	5305	13265	4.80	2.40
	16	4	200	0.830	0.43	9.60	3980	13215	6.40	3.20
Hardened tool steel 48 - 52 HRC	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	180	0.400	0.26	6.00	5730	9170	4.00	2.00
	12	4	180	0.480	0.32	7.20	4775	9170	4.80	2.40
	16	4	180	0.640	0.38	9.60	3580	9165	6.40	3.20
	20	4	180	0.665	0.45	12.00	2865	7620	8.00	4.00
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	180	0.400	0.26	6.00	5730	9170	4.00	2.00
	12	4	180	0.480	0.32	7.20	4775	9170	4.80	2.40
	16	4	180	0.640	0.38	9.60	3580	9165	6.40	3.20

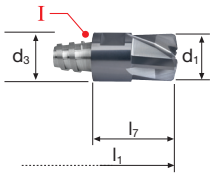
Material	d1 [mm]	z	vc [m/min]	fz [mm]	ap [mm]	ae [mm]	n [min⁻¹]	vf [mm/min]	ae [mm]	ae [mm]
Hardened tool steel 52 - 56 HRC	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	160	0.300	0.22	6.00	5095	6115	4.00	2.00
	12	4	160	0.360	0.28	7.20	4245	6115	4.80	2.40
	16	4	160	0.480	0.34	9.60	3185	6115	6.40	3.20
	20	4	160	0.500	0.39	12.00	2545	5090	8.00	4.00
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	160	0.300	0.22	6.00	5095	6115	4.00	2.00
	12	4	160	0.360	0.28	7.20	4245	6115	4.80	2.40
	16	4	160	0.480	0.34	9.60	3185	6115	6.40	3.20
Hardened tool steel 56 - 60 HRC	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	140	0.185	0.21	6.00	4455	3295	4.00	2.00
	12	4	140	0.225	0.26	7.20	3715	3345	4.80	2.40
	16	4	140	0.300	0.31	9.60	2785	3340	6.40	3.20
	20	4	140	0.310	0.36	12.00	2230	2765	8.00	4.00
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	140	0.185	0.21	6.00	4455	3295	4.00	2.00
	12	4	140	0.225	0.26	7.20	3715	3345	4.80	2.40
	16	4	140	0.300	0.31	9.60	2785	3340	6.40	3.20
Hardened tool steel > 60 HRC	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	80	0.145	0.19	6.00	2545	1475	4.00	2.00
	12	4	80	0.175	0.24	7.20	2120	1485	4.80	2.40
	16	4	80	0.235	0.29	9.60	1590	1495	6.40	3.20
	20	4	80	0.245	0.34	12.00	1275	1250	8.00	4.00
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	80	0.145	0.19	6.00	2545	1475	4.00	2.00
	12	4	80	0.175	0.24	7.20	2120	1485	4.80	2.40
	16	4	80	0.235	0.29	9.60	1590	1495	6.40	3.20
Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	250	0.665	0.32	6.00	7960	21175	4.00	2.00
	12	4	250	0.800	0.40	7.20	6630	21215	4.80	2.40
	16	4	250	1.065	0.48	9.60	4975	21195	6.40	3.20
	20	4	250	1.110	0.56	12.00	3980	17670	8.00	4.00
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	250	0.665	0.32	6.00	7960	21175	4.00	2.00
	12	4	250	0.800	0.40	7.20	6630	21215	4.80	2.40
	16	4	250	1.065	0.48	9.60	4975	21195	6.40	3.20

High feed end mills XFeed

NovoSys X®

HM XT	λ 0° γ 0°
	HFC





I = Interface

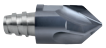
Rm < 850	Rm 850-1100	Rm 1100-1300	Rm 1300-1500	HRC 48-56	HRC 56-60	HRC > 60		Ti Titanium	HSS GG(G)

Milling heads										X-AL
Order-N°.	d_1 0/-0.025	d_3	l_7	$ap_{max.}$	$R_{theo.}$	z		I		
X-10-300-04-09-10	10	9.8	18	0.41	0.90	4	8	10		●
X-12-300-04-11-12	12	11.8	20	0.50	1.08	4	10	12		●
X-16-300-04-15-16	16	15.8	32	0.69	1.44	4	13	16		●
X-20-300-04-18-20	20	19.8	36	0.82	1.80	4	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d_2 h6	d_3	l_1	l_5	l_6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

NovoSys X® special forms

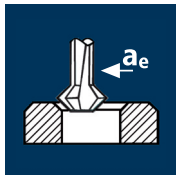
Chamfering

N° NX-12-04-04-90-10	HM UT		Rm <850-1100			757
N° NF-10-04-04-90-10 	HM UT		Rm <850-1100			759
N° NF-10-04-02-90-10	HM UT		Rm <850-1100			761

Drilling

N° NA-10-04-02-60-10	HM UT		Rm <850-1100			763

VII

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_e [mm]	a_e [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N							L-Type: M	L-Type: L
		12	4	150	0.035	0.4	3980	555	0.30	0.20
		16	6	150	0.045	0.5	2985	805	0.40	0.30
		20	6	150	0.055	0.8	2385	785	0.60	0.40
		Carbide shanks, conical, L-Type: N							L-Type: M	L-Type: L
		12	4	150	0.040	0.4	3980	635	0.30	0.20
		16	6	150	0.050	0.5	2985	895	0.40	0.30
		20	6	150	0.060	0.8	2385	860	0.60	0.40
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N							L-Type: M	L-Type: L
		12	4	120	0.035	0.4	3185	445	0.30	0.20
		16	6	120	0.045	0.5	2385	645	0.40	0.30
		20	6	120	0.055	0.8	1910	630	0.60	0.40
		Carbide shanks, conical, L-Type: N							L-Type: M	L-Type: L
		12	4	120	0.040	0.4	3185	510	0.30	0.20
		16	6	120	0.050	0.5	2385	715	0.40	0.30
		20	6	120	0.060	0.8	1910	690	0.60	0.40
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N							L-Type: M	L-Type: L
		12	4	60	0.030	0.4	1590	190	0.30	0.20
		16	6	60	0.040	0.5	1195	285	0.40	0.30
		20	6	60	0.050	0.8	955	285	0.60	0.40
		Carbide shanks, conical, L-Type: N							L-Type: M	L-Type: L
		12	4	60	0.035	0.4	1590	225	0.30	0.20
		16	6	60	0.045	0.5	1195	325	0.40	0.30
		20	6	60	0.055	0.8	955	315	0.60	0.40
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N							L-Type: M	L-Type: L
		12	4	180	0.035	0.4	4775	670	0.30	0.20
		16	6	180	0.045	0.5	3580	965	0.40	0.30
		20	6	180	0.055	0.8	2865	945	0.60	0.40
		Carbide shanks, conical, L-Type: N							L-Type: M	L-Type: L
		12	4	180	0.040	0.4	4775	765	0.30	0.20
		16	6	180	0.050	0.5	3580	1075	0.40	0.30
		20	6	180	0.060	0.8	2865	1030	0.60	0.40

Application	Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_e [mm]	a_e [mm]
	Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N							L-Type: M	L-Type: L
		12	4	150	0.035	0.4	3980	555	0.30	0.20
		16	6	150	0.045	0.5	2985	805	0.40	0.30
		20	6	150	0.055	0.8	2385	785	0.60	0.40
		Carbide shanks, conical, L-Type: N							L-Type: M	L-Type: L
		12	4	150	0.040	0.4	3980	635	0.30	0.20
		16	6	150	0.050	0.5	2985	895	0.40	0.30
		20	6	150	0.060	0.8	2385	860	0.60	0.40
	Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N							L-Type: M	L-Type: L
		12	4	120	0.035	0.4	3185	445	0.30	0.20
		16	6	120	0.045	0.5	2385	645	0.40	0.30
		20	6	120	0.055	0.8	1910	630	0.60	0.40
		Carbide shanks, conical, L-Type: N							L-Type: M	L-Type: L
		12	4	120	0.040	0.4	3185	510	0.30	0.20
		16	6	120	0.050	0.5	2385	715	0.40	0.30
		20	6	120	0.060	0.8	1910	690	0.60	0.40
	Cold work tool steel (12% Cr), high alloyed [1.2379]	Carbide shanks, cylindrical, L-Type: N							L-Type: M	L-Type: L
		12	4	60	0.030	0.4	1590	190	0.30	0.20
		16	6	60	0.040	0.5	1195	285	0.40	0.30
		20	6	60	0.050	0.8	955	285	0.60	0.40
		Carbide shanks, conical, L-Type: N							L-Type: M	L-Type: L
		12	4	60	0.035	0.4	1590	225	0.30	0.20
		16	6	60	0.045	0.5	1195	325	0.40	0.30
		20	6	60	0.055	0.8	955	315	0.60	0.40
	Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N							L-Type: M	L-Type: L
		12	4	160	0.035	0.4	4245	595	0.30	0.20
		16	6	160	0.045	0.5	3185	860	0.40	0.30
		20	6	160	0.055	0.8	2545	840	0.60	0.40
		Carbide shanks, conical, L-Type: N							L-Type: M	L-Type: L
		12	4	160	0.040	0.4	4245	680	0.30	0.20
		16	6	160	0.050	0.5	3185	955	0.40	0.30
		20	6	160	0.060	0.8	2545	915	0.60	0.40

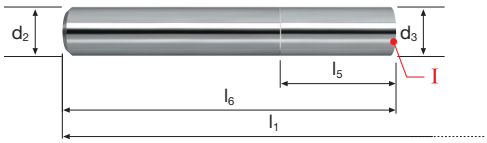
Forward and reverse deburring end mills

45° - Chamfer

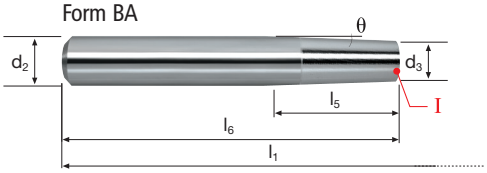
NovoSys X®

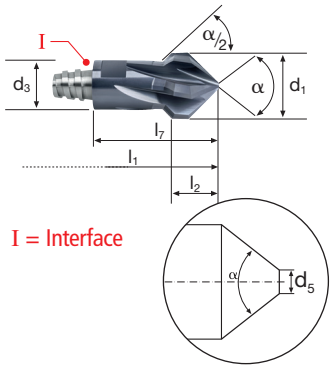
HM UT	λ 10° γ 8°

Form AA



Form BA





Rm < 850	Rm 850-1100	Rm 1100-1300					Inox Stainless	Ti Titanium	GG(G) Aluminium Copper

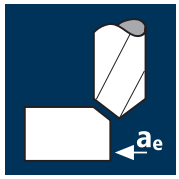
Milling heads

Order-N°.	d1 e8	d3	d5	l2	l7	α 0°/-1°	z	i	I	POLYCUT-A
NX-12-04-04-90-10	12	9.8	1.0	9.50	19.75	90°	4	8	10	●
NX-16-04-06-90-12	16	11.8	1.5	11.25	29.50	90°	6	10	12	●
NX-20-04-06-90-16	20	15.8	1.5	13.25	33.50	90°	6	13	16	●

Carbide shanks, Form AA / BA

Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I	
AA-10-065-000-10	10		84.75		65		N	10	●
AA-10-080-040-10	10	9.8	99.75	40	80		M	10	●
AA-10-120-080-10	10	9.8	139.75	80	120		L	10	●
AA-12-070-000-12	12		99.50		70		N	12	●
AA-12-085-040-12	12	11.8	114.50	40	85		M	12	●
AA-12-120-075-12	12	11.8	149.50	75	120		L	12	●
AA-16-080-032-16	16	15.8	113.50	32	80		N	16	●
AA-16-110-062-16	16	15.8	143.50	62	110		M	16	●
BA-12-080-032-10	12	9.8	99.75	32	80	2.0°	M	10	●
BA-12-120-042-10	12	9.8	139.75	42	120	1.5°	L	10	●
BA-16-120-060-12	16	11.8	149.50	60	120	2.0°	M	12	●
BA-16-140-080-12	16	11.8	169.50	80	140	1.5°	L	12	●
BA-20-120-062-16	20	15.8	153.50	62	120	2.0°	M	16	●
BA-20-160-080-16	20	15.8	193.50	80	160	1.5°	L	16	●

Application



Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	150	0.030	0.3	0.3	4775	575	0.25	0.20
	12	4	150	0.040	0.4	0.4	3980	635	0.30	0.25
	16	6	150	0.050	0.5	0.5	2985	895	0.40	0.30
	20	6	150	0.060	0.8	0.8	2385	860	0.60	0.50
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	150	0.035	0.3	0.3	4775	670	0.25	0.20
	12	4	150	0.045	0.4	0.4	3980	715	0.30	0.25
	16	6	150	0.055	0.5	0.5	2985	985	0.40	0.30
Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	120	0.030	0.3	0.3	3820	460	0.25	0.20
	12	4	120	0.040	0.4	0.4	3185	510	0.30	0.25
	16	6	120	0.050	0.5	0.5	2385	715	0.40	0.30
	20	6	120	0.060	0.8	0.8	1910	690	0.60	0.50
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	120	0.035	0.3	0.3	3820	535	0.25	0.20
	12	4	120	0.045	0.4	0.4	3185	575	0.30	0.25
	16	6	120	0.055	0.5	0.5	2385	785	0.40	0.30
Steel 1100 - 1300 N/mm²	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	70	0.030	0.3	0.3	2230	270	0.25	0.20
	12	4	70	0.040	0.4	0.4	1855	295	0.30	0.25
	16	6	70	0.050	0.5	0.5	1395	420	0.40	0.30
	20	6	70	0.060	0.8	0.8	1115	400	0.60	0.50
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	70	0.035	0.3	0.3	2230	310	0.25	0.20
	12	4	70	0.045	0.4	0.4	1855	335	0.30	0.25
	16	6	70	0.055	0.5	0.5	1395	460	0.40	0.30
Stainless steel [Cr-Ni/1.4301]	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	60	0.030	0.3	0.3	1910	230	0.25	0.20
	12	4	60	0.040	0.4	0.4	1590	255	0.30	0.25
	16	6	60	0.050	0.5	0.5	1195	360	0.40	0.30
	20	6	60	0.060	0.8	0.8	955	345	0.60	0.50
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	60	0.035	0.3	0.3	1910	265	0.25	0.20
	12	4	60	0.045	0.4	0.4	1590	285	0.30	0.25
	16	6	60	0.055	0.5	0.5	1195	395	0.40	0.30

Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	160	0.030	0.3	0.3	5095	610	0.25	0.20
	12	4	160	0.040	0.4	0.4	4245	680	0.30	0.25
	16	6	160	0.050	0.5	0.5	3185	955	0.40	0.30
	20	6	160	0.060	0.8	0.8	2545	915	0.60	0.50
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	160	0.035	0.3	0.3	5095	715	0.25	0.20
	12	4	160	0.045	0.4	0.4	4245	765	0.30	0.25
	16	6	160	0.055	0.5	0.5	3185	1050	0.40	0.30
Unalloyed copper	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	180	0.030	0.3	0.3	5730	690	0.25	0.20
	12	4	180	0.040	0.4	0.4	4775	765	0.30	0.25
	16	6	180	0.050	0.5	0.5	3580	1075	0.40	0.30
	20	6	180	0.060	0.8	0.8	2865	1030	0.60	0.50
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	180	0.035	0.3	0.3	5730	800	0.25	0.20
	12	4	180	0.045	0.4	0.4	4775	860	0.30	0.25
	16	6	180	0.055	0.5	0.5	3580	1180	0.40	0.30
Titanium alloys up to 300 HB [Ti5Al2.5Sn]	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	70	0.030	0.3	0.3	2230	270	0.25	0.20
	12	4	70	0.040	0.4	0.4	1855	295	0.30	0.25
	16	6	70	0.050	0.5	0.5	1395	420	0.40	0.30
	20	6	70	0.060	0.8	0.8	1115	400	0.60	0.50
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	70	0.035	0.3	0.3	2230	310	0.25	0.20
	12	4	70	0.045	0.4	0.4	1855	335	0.30	0.25
	16	6	70	0.055	0.5	0.5	1395	460	0.40	0.30
Wrought aluminium alloys Si < 6%	Carbide shanks, cylindrical, L-Type: N								L-Type: M	L-Type: L
	10	4	200	0.030	0.3	0.3	6365	765	0.25	0.20
	12	4	200	0.040	0.4	0.4	5305	850	0.30	0.25
	16	6	200	0.050	0.5	0.5	3980	1195	0.40	0.30
	20	6	200	0.060	0.8	0.8	3185	1145	0.60	0.50
	Carbide shanks, conical, L-Type: N								L-Type: M	L-Type: L
	10	4	200	0.035	0.3	0.3	6365	890	0.25	0.20
	12	4	200	0.045	0.4	0.4	5305	955	0.30	0.25
	16	6	200	0.055	0.5	0.5	3980	1315	0.40	0.30

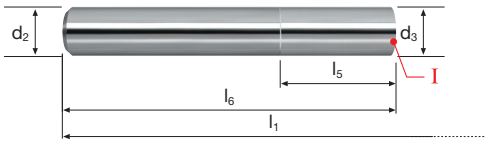
Deburring end mills

45° - Chamfer

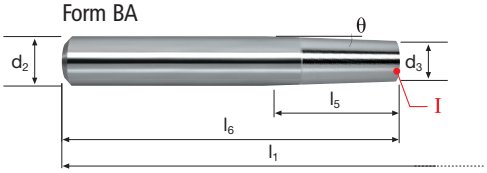
NovoSys X®

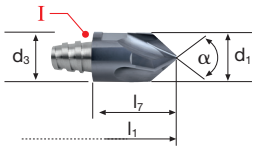
HM UT	λ 10° γ 8°

Form AA

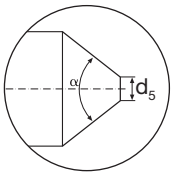


Form BA





I = Interface

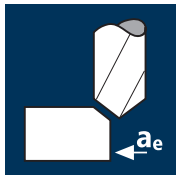


Rm < 850	Rm 850-1100	Rm 1100-1300					Inox Stainless	Ti Titanium	GG(G) Aluminium Copper

Milling heads									POLYCUT-A
Order-N°.	d_1 e8	d_3	d_5	l_7	α 0°/-1°	z	i	I	
NF-10-04-04-90-10	10	9.8	1.0	18	90°	4	8	10	●
NF-12-04-04-90-12	12	11.8	1.0	20	90°	4	10	12	●
NF-16-04-06-90-16	16	15.8	1.5	32	90°	6	13	16	●
NF-20-04-06-90-20	20	19.8	1.5	36	90°	6	17	20	●

Carbide shanks, Form AA / BA									
Order-N°.	d_2 h6	d_3	l_1	l_5	l_6	θ	L-Type	I	
AA-10-065-000-10	10		83		65		N	10	●
AA-10-080-040-10	10	9.8	98	40	80		M	10	●
AA-10-120-080-10	10	9.8	138	80	120		L	10	●
AA-12-070-000-12	12		90		70		N	12	●
AA-12-085-040-12	12	11.8	105	40	85		M	12	●
AA-12-120-075-12	12	11.8	140	75	120		L	12	●
AA-16-080-032-16	16	15.8	112	32	80		N	16	●
AA-16-110-062-16	16	15.8	142	62	110		M	16	●
AA-20-090-040-20	20	19.8	126	40	90		N	20	●
AA-20-150-100-20	20	19.8	186	100	150		L	20	●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10	●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10	●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12	●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12	●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16	●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16	●

Application



Material

d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	a_e / a_p [mm]
Steel < 850 N/mm² (A / A)									
	Carbide shanks, cylindrical, L-Type: N							**L-Type: M**	**L-Type: L**
10	2	150	0.030	0.3	0.3	4775	285	0.25	0.20
12	2	150	0.040	0.4	0.4	3980	320	0.30	0.25
16	2	150	0.050	0.5	0.5	2985	300	0.40	0.30
20	2	150	0.060	0.8	0.8	2385	285	0.60	0.50
	Carbide shanks, conical, L-Type: N							**L-Type: M**	**L-Type: L**
10	2	150	0.035	0.3	0.3	4775	335	0.25	0.20
12	2	150	0.045	0.4	0.4	3980	360	0.30	0.25
16	2	150	0.055	0.5	0.5	2985	330	0.40	0.30
Steel 850 - 1100 N/mm² (A / A)									
	Carbide shanks, cylindrical, L-Type: N							**L-Type: M**	**L-Type: L**
10	2	120	0.030	0.3	0.3	3820	230	0.25	0.20
12	2	120	0.040	0.4	0.4	3185	255	0.30	0.25
16	2	120	0.050	0.5	0.5	2385	240	0.40	0.30
20	2	120	0.060	0.8	0.8	1910	230	0.60	0.50
	Carbide shanks, conical, L-Type: N							**L-Type: M**	**L-Type: L**
10	2	120	0.035	0.3	0.3	3820	265	0.25	0.20
12	2	120	0.045	0.4	0.4	3185	285	0.30	0.25
16	2	120	0.055	0.5	0.5	2385	260	0.40	0.30
Cold work tool steel (12% Cr), high alloyed [1.2379] (A / A)									
	Carbide shanks, cylindrical, L-Type: N							**L-Type: M**	**L-Type: L**
10	2	60	0.030	0.3	0.3	1910	115	0.25	0.20
12	2	60	0.040	0.4	0.4	1590	125	0.30	0.25
16	2	60	0.050	0.5	0.5	1195	120	0.40	0.30
20	2	60	0.060	0.8	0.8	955	115	0.60	0.50
	Carbide shanks, conical, L-Type: N							**L-Type: M**	**L-Type: L**
10	2	60	0.035	0.3	0.3	1910	135	0.25	0.20
12	2	60	0.045	0.4	0.4	1590	145	0.30	0.25
16	2	60	0.055	0.5	0.5	1195	130	0.40	0.30
Cast iron (lamellar / spheroidal) (A / A)									
	Carbide shanks, cylindrical, L-Type: N							**L-Type: M**	**L-Type: L**
10	2	160	0.030	0.3	0.3	5095	305	0.25	0.20
12	2	160	0.040	0.4	0.4	4245	340	0.30	0.25
16	2	160	0.050	0.5	0.5	3185	320	0.40	0.30
20	2	160	0.060	0.8	0.8	2545	305	0.60	0.50
	Carbide shanks, conical, L-Type: N							**L-Type: M**	**L-Type: L**
10	2	160	0.035	0.3	0.3	5095	355	0.25	0.20
12	2	160	0.045	0.4	0.4	4245	380	0.30	0.25
16	2	160	0.055	0.5	0.5	3185	350	0.40	0.30

Application

Material

d1 [mm]	v_c [m/min]	f [mm]	n [min⁻¹]	v_f [mm/min]	v_f [mm/min]	v_f [mm/min]
Steel < 850 N/mm² (A / A)						
	Carbide shanks, cylindrical, L-Type: N				**L-Type: M**	**L-Type: L**
10	150	0.200	4775	955	765	575
12	150	0.240	3980	955	765	575
16	150	0.280	2985	835	670	500
20	150	0.300	2385	715	570	430
	Carbide shanks, conical, L-Type: N				**L-Type: M**	**L-Type: L**
10	150	0.200	4775	955	765	575
12	150	0.240	3980	955	765	575
16	150	0.280	2985	835	670	500
Steel 850 - 1100 N/mm² (A / A)						
	Carbide shanks, cylindrical, L-Type: N				**L-Type: M**	**L-Type: L**
10	120	0.200	3820	765	610	460
12	120	0.240	3185	765	610	460
16	120	0.280	2385	670	535	400
20	120	0.300	1910	575	460	345
	Carbide shanks, conical, L-Type: N				**L-Type: M**	**L-Type: L**
10	120	0.200	3820	765	610	460
12	120	0.240	3185	765	610	460
16	120	0.280	2385	670	535	400
Cold work tool steel (12% Cr), high alloyed [1.2379] (A / A)						
	Carbide shanks, cylindrical, L-Type: N				**L-Type: M**	**L-Type: L**
10	60	0.180	1910	345	275	205
12	60	0.220	1590	350	280	210
16	60	0.250	1195	300	240	180
20	60	0.280	955	265	210	160
	Carbide shanks, conical, L-Type: N				**L-Type: M**	**L-Type: L**
10	60	0.180	1910	345	275	205
12	60	0.220	1590	350	280	210
16	60	0.250	1195	300	240	180
Cast iron (lamellar / spheroidal) (A / A)						
	Carbide shanks, cylindrical, L-Type: N				**L-Type: M**	**L-Type: L**
10	160	0.200	5095	1020	815	610
12	160	0.240	4245	1020	815	610
16	160	0.280	3185	890	710	535
20	160	0.300	2545	765	610	460
	Carbide shanks, conical, L-Type: N				**L-Type: M**	**L-Type: L**
10	160	0.200	5095	1020	815	610
12	160	0.240	4245	1020	815	610
16	160	0.280	3185	890	710	535

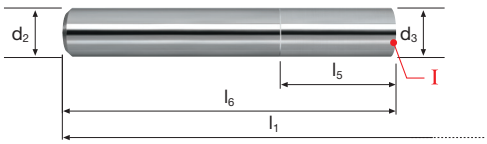
Deburring end mills

45° - Chamfer

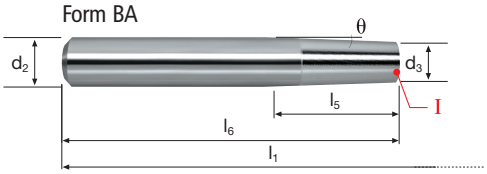
NovoSys X®

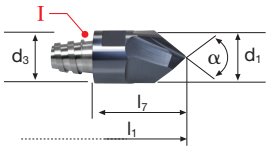
HM UT	λ 7° γ 8°

Form AA

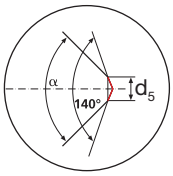


Form BA





I = Interface

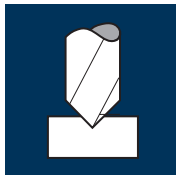


Rm < 850	Rm 850-1100	Rm 1100-1300					Inox Stainless	Ti Titanium	GG(G) Aluminium Copper

Milling heads										POLYCUT-A
Order-N°.	d_1 e8	d_3	d_5	l_7	α 0°/-1°	z		I		
NF-10-04-02-90-10	10	9.8	1.5	18	90°	2	8	10		●
NF-12-04-02-90-12	12	11.8	1.8	20	90°	2	10	12		●
NF-16-04-02-90-16	16	15.8	2.4	32	90°	2	13	16		●
NF-20-04-02-90-20	20	19.8	3.0	36	90°	2	17	20		●

Carbide shanks, Form AA / BA										
Order-N°.	d_2 h6	d_3	l_1	l_5	l_6	θ	L-Type	I		
AA-10-065-000-10	10		83		65		N	10		●
AA-10-080-040-10	10	9.8	98	40	80		M	10		●
AA-10-120-080-10	10	9.8	138	80	120		L	10		●
AA-12-070-000-12	12		90		70		N	12		●
AA-12-085-040-12	12	11.8	105	40	85		M	12		●
AA-12-120-075-12	12	11.8	140	75	120		L	12		●
AA-16-080-032-16	16	15.8	112	32	80		N	16		●
AA-16-110-062-16	16	15.8	142	62	110		M	16		●
AA-20-090-040-20	20	19.8	126	40	90		N	20		●
AA-20-150-100-20	20	19.8	186	100	150		L	20		●
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	152	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	192	80	160	1.5°	L	16		●

Application



Material	d1 [mm]	v_c [m/min]	f [mm]	n [min⁻¹]	v_f [mm/min]	v_f [mm/min]	v_f [mm/min]
Steel < 850 N/mm²	Carbide shanks, cylindrical, L-Type: N					L-Type: M	L-Type: L
A / A	10	150	0.200	4775	955	765	575
	12	150	0.240	3980	955	765	575
	16	150	0.280	2985	835	670	500
	20	150	0.320	2385	765	610	460
	Carbide shanks, conical, L-Type: N					L-Type: M	L-Type: L
	10	150	0.220	4775	1050	840	630
	12	150	0.260	3980	1035	830	620
	16	150	0.300	2985	895	715	535
Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N					L-Type: M	L-Type: L
A / A	10	120	0.200	3820	765	610	460
	12	120	0.240	3185	765	610	460
	16	120	0.280	2385	670	535	400
	20	120	0.320	1910	610	490	365
	Carbide shanks, conical, L-Type: N					L-Type: M	L-Type: L
	10	120	0.220	3820	840	670	505
	12	120	0.260	3185	830	665	500
	16	120	0.300	2385	715	570	430
Steel 1100 - 1300 N/mm²	Carbide shanks, cylindrical, L-Type: N					L-Type: M	L-Type: L
A / A	10	70	0.180	2230	400	320	240
	12	70	0.220	1855	410	330	245
	16	70	0.250	1395	350	280	210
	20	70	0.280	1115	310	250	185
	Carbide shanks, conical, L-Type: N					L-Type: M	L-Type: L
	10	70	0.180	2230	400	320	240
	12	70	0.220	1855	410	330	245
	16	70	0.250	1395	350	280	210
Stainless steel [Cr-Ni/1.4301]	Carbide shanks, cylindrical, L-Type: N					L-Type: M	L-Type: L
A	10	60	0.180	1910	345	275	205
	12	60	0.220	1590	350	280	210
	16	60	0.250	1195	300	240	180
	20	60	0.280	955	265	210	160
	Carbide shanks, conical, L-Type: N					L-Type: M	L-Type: L
	10	60	0.180	1910	345	275	205
	12	60	0.220	1590	350	280	210
	16	60	0.250	1195	300	240	180

Material	d1 [mm]	v_c [m/min]	f [mm]	n [min⁻¹]	v_f [mm/min]	v_f [mm/min]	v_f [mm/min]
Cast iron (lamellar / spheroidal)	Carbide shanks, cylindrical, L-Type: N					L-Type: M	L-Type: L
A / A	10	160	0.200	5095	1020	815	610
	12	160	0.240	4245	1020	815	610
	16	160	0.280	3185	890	710	535
	20	160	0.320	2545	815	650	490
	Carbide shanks, conical, L-Type: N					L-Type: M	L-Type: L
	10	160	0.220	5095	1120	895	670
	12	160	0.260	4245	1105	885	665
	16	160	0.300	3185	955	765	575
Unalloyed copper	Carbide shanks, cylindrical, L-Type: N					L-Type: M	L-Type: L
A	10	180	0.200	5730	1145	915	685
	12	180	0.240	4775	1145	915	685
	16	180	0.280	3580	1000	800	600
	20	180	0.320	2865	915	730	550
	Carbide shanks, conical, L-Type: N					L-Type: M	L-Type: L
	10	180	0.220	5730	1260	1010	755
	12	180	0.260	4775	1240	990	745
	16	180	0.300	3580	1075	860	645
Titanium alloys up to 300 HB [Ti5Al2.5Sn]	Carbide shanks, cylindrical, L-Type: N					L-Type: M	L-Type: L
A	10	70	0.180	2230	400	320	240
	12	70	0.220	1855	410	330	245
	16	70	0.250	1395	350	280	210
	20	70	0.280	1115	310	250	185
	Carbide shanks, conical, L-Type: N					L-Type: M	L-Type: L
	10	70	0.180	2230	400	320	240
	12	70	0.220	1855	410	330	245
	16	70	0.250	1395	350	280	210
Wrought aluminium alloys Si < 6%	Carbide shanks, cylindrical, L-Type: N					L-Type: M	L-Type: L
A	10	200	0.200	6365	1275	1020	765
	12	200	0.240	5305	1275	1020	765
	16	200	0.280	3980	1115	890	670
	20	200	0.320	3185	1020	815	610
	Carbide shanks, conical, L-Type: N					L-Type: M	L-Type: L
	10	200	0.220	6365	1400	1120	840
	12	200	0.260	5305	1380	1105	830
	16	200	0.300	3980	1195	955	715

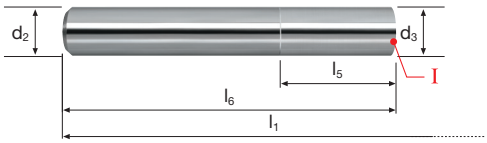
Centering drill

60° - Drilling

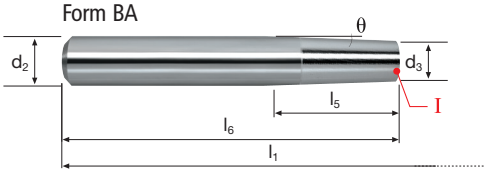
NovoSys X®

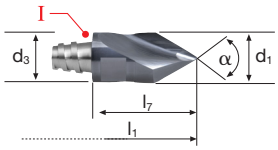
HM UT	λ 25°

Form AA



Form BA





I = Interface

Rm < 850	Rm 850-1100	Rm 1100-1300					Inox Stainless	Ti Titanium	GG(G) Aluminium Copper

Milling heads

Order-N°.	d1 h6	d3	l7	α 0°/-1°	z	i	I		POLYCUT-A
NA-10-04-02-60-10	10	9.8	22.5	60°	2	8	10		●
NA-12-04-02-60-12	12	11.8	25.0	60°	2	10	12		●
NA-16-04-02-60-16	16	15.8	35.0	60°	2	13	16		●
NA-20-04-02-60-20	20	19.8	40.0	60°	2	17	20		●

Carbide shanks, Form AA / BA

Order-N°.	d2 h6	d3	l1	l5	l6	θ	L-Type	I		
AA-10-065-000-10	10		87.5		65		N	10		●
AA-10-080-040-10	10	9.8	102.5	40	80		M	10		●
AA-10-120-080-10	10	9.8	142.5	80	120		L	10		●
AA-12-070-000-12	12		95.0		70		N	12		●
AA-12-085-040-12	12	11.8	110.0	40	85		M	12		●
AA-12-120-075-12	12	11.8	145.0	75	120		L	12		●
AA-16-080-032-16	16	15.8	115.0	32	80		N	16		●
AA-16-110-062-16	16	15.8	145.0	62	110		M	16		●
AA-20-090-040-20	20	19.8	130.0	40	90		N	20		●
AA-20-150-100-20	20	19.8	190.0	100	150		L	20		●
BA-12-080-032-10	12	9.8	102.5	32	80	2.0°	M	10		●
BA-12-120-042-10	12	9.8	142.5	42	120	1.5°	L	10		●
BA-16-120-060-12	16	11.8	145.0	60	120	2.0°	M	12		●
BA-16-140-080-12	16	11.8	165.0	80	140	1.5°	L	12		●
BA-20-120-062-16	20	15.8	155.0	62	120	2.0°	M	16		●
BA-20-160-080-16	20	15.8	195.0	80	160	1.5°	L	16		●

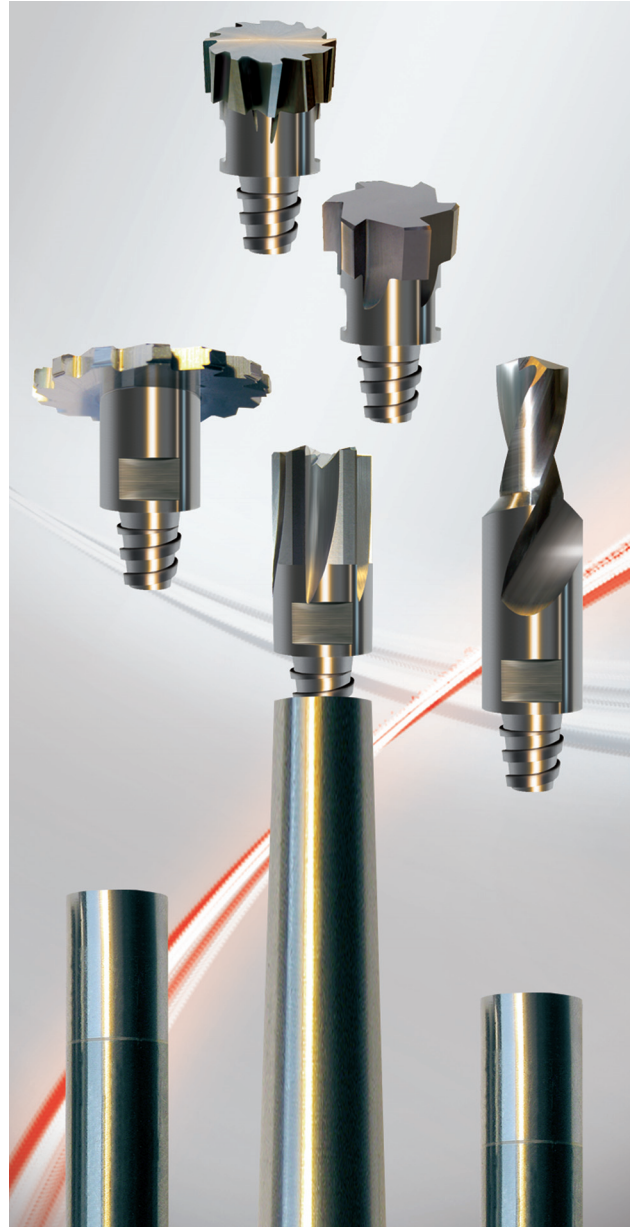
NovoSys X® special tools

Heads, carbide shanks

NovoSys X®

You want it, we'll make it!

Custom tools are tools that are made to measure. Custom products that match your specific needs, in accordance with the current market requirements. At Fraisa, the best machines and materials, the latest technology and the wealth of expertise of the technology leader are all put to use. Our goal is to support your optimisation processes and to minimise your costs. Fraisa custom tools help you deliver custom services. To put it plainly: Concep-Tool optimises processes, increases performance and boosts productivity. This is often achieved simply by combining several standard tools to create one exceptionally productive custom tool.



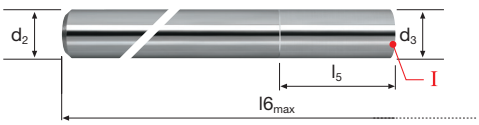
Heads made to measure

Specially adapted for your processes, the most versatile range of custom heads can be produced on the 10, 12, 16, 20 interface holding fixture (now also available in 25 as well).
Processes: milling, chamfering, drilling, counter-boring, grinding, individually or in combination.

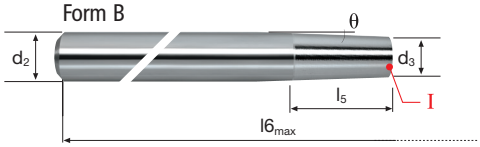
HM shanks made to measure

The made-to-measure HM shanks are produced as basis shanks ($l6_{max}$ = maximum length).
The shape, the total length $l6_{max}$, the neck length l5 and the angle θ are matched to your processes in line with your specifications (●).

Form A



Form B



Carbide shanks, Form A / B								
Order-N°.	d2 h6	d3	l5	l6 max	θ	I		
99991399AA10	10	9.8	●	*240*	–	10		
99991399AA12	12	11.8	●	*240*	–	12		
99991399AA16	16	15.8	●	*300*	–	16		
99991399AA20	20	19.8	●	*300*	–	20		
99991399BA10	12	9.8	●	*240*	●	10		
99991399BA12	16	11.8	●	*300*	●	12		
99991399BA16	20	15.8	●	*300*	●	16		

VII

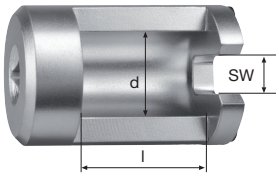
Other carbide shanks

Carbide shanks, Form BA									
Order-N°.	d2 h6	d3	l5	l6	θ	L-Type	I		
BA-12-140-042-10	12	9.8	42	140	1.5°	L	10	●	
BA-16-160-080-12	16	11.8	80	160	1.5°	L	12	●	
BA-20-180-080-16	20	15.8	80	180	1.5°	L	16	●	

Torque limiter with connector 3/8"
Torque is pre-set according to table

Order-N°.	I	Torque	
Y-042-10	10 + 12	10 Nm	●
Y-042-16	16 + 20	18 Nm	●

Adapter with connector 3/8"



Order-N°.	SW	d	l	I	Torque	
Y-040-10	8	18	17	10	10 Nm	●
Y-040-12	10	18	25	12	10 Nm	●
Y-040-16	13	28	35	16	18 Nm	●
Y-040-20	17	28	35	20	18 Nm	●

T-handle with connector 3/8"

Order-N°.		
Y-044-00		●

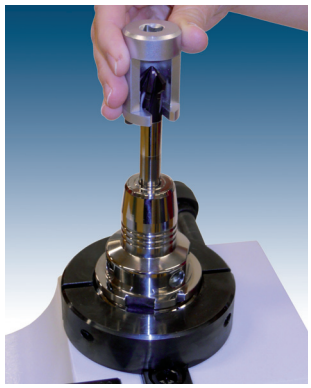
Short wrench

Order-N°.	SW	l	
Y-030-10	8	10	●
Y-030-12	10	12	●
Y-030-16	13	16	●
Y-030-20	17	20	●

Assembly instructions with torque limiter

Attaching the milling head

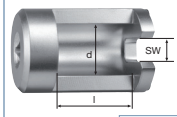
The thread of the head, the shank and the flat surface must be free of dirt. Dirt can affect the positive lock. As a result of this, the tool may break.



Using the adapter

The table below (Accessories, page 656) shows which adapter is required for which interface.

Adapter with connector 3/8"



Order-N°.	SW	d	l	I	Torque
Y-040-10	8	18	17	10	10 Nm
Y-040-12	10	18	25	12	10 Nm
Y-040-16	13	28	35	16	18 Nm
Y-040-20	17	28	35	20	18 Nm

Tightening the milling head

Screw on the head evenly with a T-handle and both hands. Using the torque limiter (table below / Accessories, page 656) ensures that the milling head is mounted with the correct torque.

The head is securely screwed on when no light gap can be seen on the flat surface. If a light gap remains visible after screwing on, the head is to be disconnected and cleaned.

Torque limiter with connector 3/8"
Torque is pre-set according to table

Order-N°.	I	Torque
Y-042-10	10 + 12	10 Nm
Y-042-16	16 + 20	18 Nm

Assembly instructions with short wrench

Holding the shank

In a chuck that satisfies the machining requirements.

Attaching the milling head

The thread of the head, the shank and the flat surface must be free of dirt. Dirt can affect the positive lock. As a result of this, the tool may break.

Tightening the milling head

Carefully screw on the head using a short wrench. Important: because hard metals have virtually no elasticity, care must be taken that the head is not screwed on any further once it comes into contact with the flat surface of the shank.

The head is securely screwed on when no light gap can be seen on the flat surface. If a light gap remains visible after screwing on, the head is to be disconnected and cleaned.

Short wrench

Order-N°.	SW	l
Y-030-10	8	10
Y-030-12	10	12
Y-030-16	13	16
Y-030-20	17	20

Ordering example

1. Select milling head

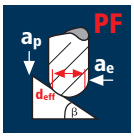
Milling heads									POLYCUT-A
Order-N°.	d_1 ±0.02	d_3	l_2	l_7	r ±0.01	z		I	
N-10-03-02-50-10	10	9.8	8	18	5.0	2	8	10	•
N-12-03-02-60-12	12	11.8	10	20	6.0	2	10	12	•
N-16-03-02-80-16	16	15.8	12	32	8.0	2	13	16	•
N-20-03-02-100-20	20	19.8	14	36	10.0	2	17	20	•

2. Select milling shank with corresponding interface

Carbide shanks, Form AA / BA								
Order-N°.	d_2 h6	d_3	l_1	l_5	l_6	θ	L-Type	I
AA-10-065-000-10	10		83		65		N	10
AA-10-080-040-10	10	9.8	98	40	80		M	10
AA-10-120-080-10	10	9.8	138	80	120		L	10
AA-12-070-000-12	12		90		70		N	12
AA-12-085-040-12	12	11.8	105	40	85		M	12
AA-12-120-075-12	12	11.8	140	75	120		L	12
AA-16-080-032-16	16	15.8	112	32	80		N	16
AA-16-110-062-16	16	15.8	142	62	110		M	16
AA-20-090-040-20	20	19.8	126	40	90		N	20
AA-20-150-100-20	20	19.8	186	100	150		L	20
BA-12-080-032-10	12	9.8	98	32	80	2.0°	M	10
BA-12-120-042-10	12	9.8	138	42	120	1.5°	L	10
BA-16-120-060-12	16	11.8	140	60	120	2.0°	M	12
BA-16-140-080-12	16	11.8	160	80	140	1.5°	L	12

3. Determine cutting data according to cutter diameter and shank type

Application



Material	d1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	d_{eff} [mm] β = 45°	n [min⁻¹]	v_f [mm/min]	a_e / a_p [mm]	n [min⁻¹]
Steel 850 - 1100 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
	10	2	200	0.135	0.40	0.50	9.28	6860	1850	0.28	7065
	12	2	200	0.140	0.48	0.60	11.13	5720	1600	0.34	5885
	16	2	200	0.150	0.64	0.80	14.84	4290	1285	0.45	4415
	20	2	200	0.160	0.80	1.00	18.55	3430	1100	0.56	3535
	Carbide shanks, conical, L-Type: N									L-Type: M	
	10	2	200	0.140	0.40	0.50	9.28	6860	1920	0.28	7065
	12	2	200	0.150	0.48	0.60	11.13	5720	1715	0.34	5885
	16	2	200	0.155	0.64	0.80	14.84	4290	1330	0.45	4415
Steel 1100 - 1300 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
	10	2	180	0.125	0.40	0.50	9.28	6175	1545	0.28	6360
	12	2	180	0.130	0.48	0.60	11.13	5150	1340	0.34	5295
	16	2	180	0.140	0.64	0.80	14.84	3860	1080	0.45	3975
	20	2	180	0.145	0.80	1.00	18.55	3090	895	0.56	3180
	Carbide shanks, conical, L-Type: N									L-Type: M	
	10	2	180	0.130	0.40	0.50	9.28	6175	1605	0.28	6360
	12	2	180	0.140	0.48	0.60	11.13	5150	1440	0.34	5295
	16	2	180	0.145	0.64	0.80	14.84	3860	1120	0.45	3975
Steel 1300 - 1500 N/mm²	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
	10	2	150	0.115	0.40	0.50	9.28	5145	1185	0.28	5300
	12	2	150	0.120	0.48	0.60	11.13	4290	1030	0.34	4415
	16	2	150	0.130	0.64	0.80	14.84	3215	835	0.45	3310
	20	2	150	0.135	0.80	1.00	18.55	2575	695	0.56	2650
	Carbide shanks, conical, L-Type: N									L-Type: M	
	10	2	150	0.120	0.40	0.50	9.28	5145	1235	0.28	5300
	12	2	150	0.130	0.48	0.60	11.13	4290	1115	0.34	4415
	16	2	150	0.130	0.64	0.80	14.84	3215	835	0.45	3310
Stainless steel [Cr-Ni-Mo-.../1.4571]	Carbide shanks, cylindrical, L-Type: N									L-Type: M	
	10	2	60	0.095	0.20	0.25	8.77	2180	415	0.14	2240
	12	2	60	0.100	0.24	0.30	10.52	1815	365	0.17	1865
	16	2	60	0.105	0.32	0.40	14.03	1360	285	0.22	1400
	20	2	60	0.110	0.40	0.50	17.54	1090	240	0.28	1120
	Carbide shanks, conical, L-Type: N									L-Type: M	
	10	2	60	0.100	0.20	0.25	8.77	2180	435	0.14	2240
	12	2	60	0.105	0.24	0.30	10.52	1815	380	0.17	1865
	16	2	60	0.110	0.32	0.40	14.03	1360	300	0.22	1400