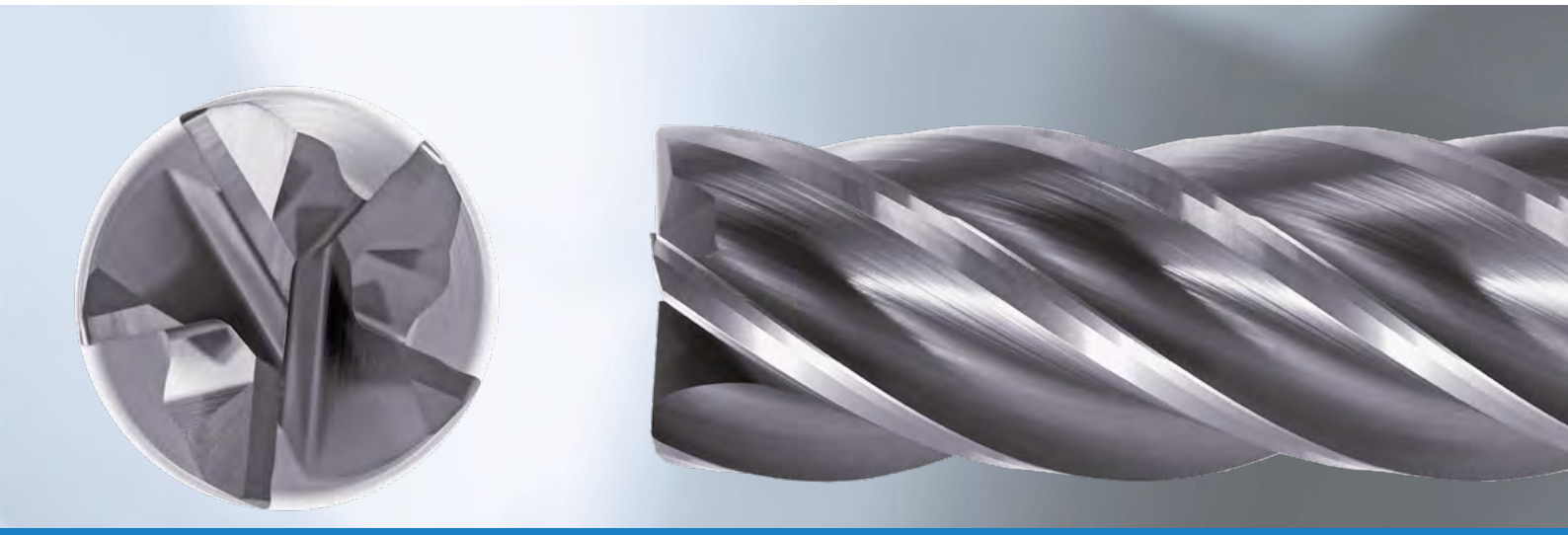
THE NEW VALUE FRONTIER

KYOCERA

Solid end mills
for general machining | Q Series

Q Series



Long tool life and smooth surface finish

For various machining applications from steel to hard materials <68HRC

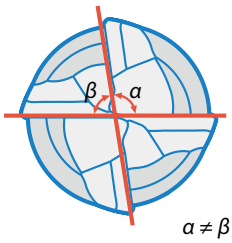
For general machining

Q Series

Long tool life and smooth surface finish in medium – finishing application. Stable machining in steel, stainless steel and hard material <68 HRC.

1 Varied interval flute design

Superior anti vibration performance due to variable pitch flute design



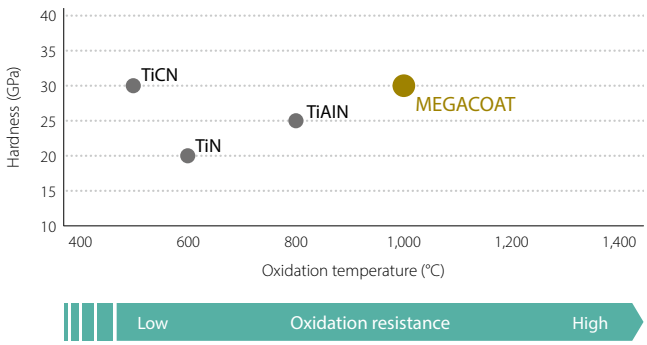
2 Wide variety of machining operations

High efficiency machining for steel, stainless steel and hardened material <68HRC

3 Long tool Life with MEGACOAT

Superior wear and oxidation resistance with MEGACOAT

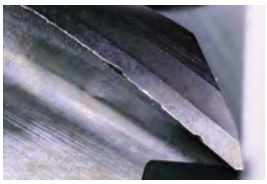
Coating properties (In-house evaluation)



Wear resistance evaluation

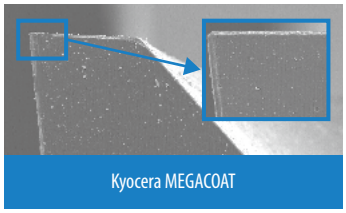
4QFSM-VG
(Cutting distance 3,900 mm)

Competitor A
(Cutting distance 1,900 mm, breakage)

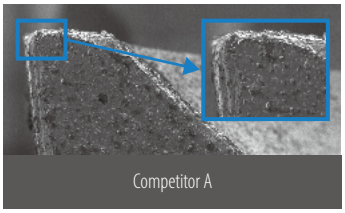


Cutting conditions:
N = 2,918 min^{-1}, Vf = 678 mm/min, ap x ae = 12 x 9.6 mm
Machining diameter ø 12 mm, 4 teeth, slotting, dry
Workpiece: 42CrMo4V

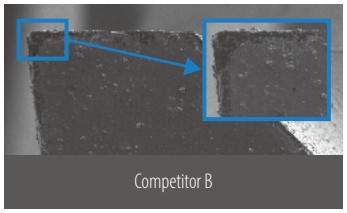
Smooth endmill surface reduces welding and allows stable machining



Smooth and sharp to the tip of the cutting edge.
Longer tool life and improved surface finish.



Coating surface is rough and delamination is visible.
The cutting edge is rounded.



Major delamination of cutting edge and exposed material is noticeable.

1st choice steel machining

2/3QFSM (square type)

Superior cutting edge preparation for extended tool life.
Improved edge strength for high chipping resistance.
MEGACOAT for long tool life.

Kyoceras unique MEGACOAT
PVD coating technology

1st choice steel machining

4QFSM-VG (square type)

Varied interval flute design and with positive rake angle. Superior anti vibration performance and improved edge strength for high chipping resistance.

Kyoceras unique MEGACOAT
PVD coating technology

Varied interval flute design

1st choice steel machining

1st choice stainless steel and heat resistant alloys

4QFSM-VE (square type)

Low cutting force design for smooth cutting operations.
Positive rake angle for smooth chip evacuation.
Varied interval flute design with sharp edge.

AlCrN coating

Varied interval flute design

1st choice stainless steel and heat resistant alloys

4/5QFRM-VE (radius type)

Low cutting force design for smooth cutting operations.
Positive rake angle for smooth chip evacuation.
Varied interval flute design with corner radius.

AlCrN coating

Varied interval flute design

1st choice stainless steel and heat resistant alloys

1st choice hard material <68HRC

4QFSM-H (square type)

Longer tool life and stable machining at hard materials, due to superior wear resistance and high oxidation resistance of MEGACOAT technology.
Stability oriented design for reliable machining process.

Kyoceras unique MEGACOAT
PVD coating technology

1st choice hard material <68HRC

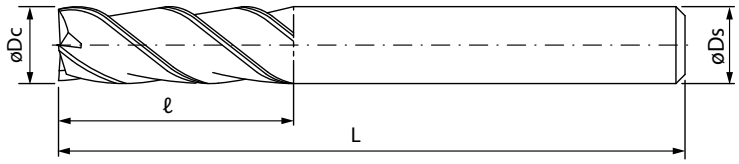
4QFRM-H (radius type)

Longer tool life and stable machining at hard materials, due to superior wear resistance and high oxidation resistance of MEGACOAT technology. Stability oriented design for reliable machining process.

Kyoceras unique MEGACOAT
PVD coating technology

1st choice hard material <68HRC

2/3QFSM (Square type)



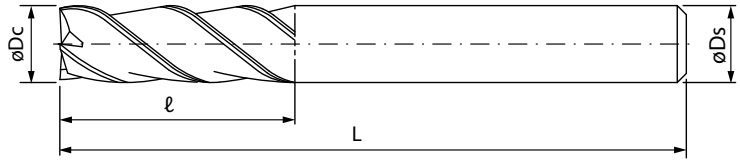
Helix angle: 40°

Dimensions (mm)

Description	Availability	øDc	ℓ	øDs (h6)	L	Z
2QFSM030-090-03	●	3.0	9	3.0	40	2
2QFSM030-090-06	●	3.0	9	6.0	50	2
2QFSM040-120-04	●	4.0	12	4.0	50	2
2QFSM040-120-06	●	4.0	12	6.0	50	2
2QFSM050-150-05	●	5.0	15	5.0	50	2
2QFSM050-150-06	●	5.0	15	6.0	50	2
2QFSM060-160-06	●	6.0	16	6.0	50	2
2QFSM060-200-06	●	6.0	20	6.0	60	2
2QFSM080-200-08	●	8.0	20	8.0	64	2
2QFSM100-220-10	●	10.0	22	10.0	70	2
2QFSM120-250-12	●	12.0	25	12.0	90	2
2QFSM160-320-16	●	16.0	32	16.0	90	2
2QFSM200-380-20	●	20.0	38	20.0	100	2
3QFSM030-090-03	●	3.0	9	3.0	40	3
3QFSM030-090-06	●	3.0	9	6.0	50	3
3QFSM040-120-04	●	4.0	12	4.0	50	3
3QFSM040-120-06	●	4.0	12	6.0	50	3
3QFSM050-150-05	●	5.0	15	5.0	50	3
3QFSM050-150-06	●	5.0	15	6.0	50	3
3QFSM060-160-06	●	6.0	16	6.0	50	3
3QFSM060-200-06	●	6.0	20	6.0	60	3
3QFSM080-200-08	●	8.0	20	8.0	64	3
3QFSM100-220-10	●	10.0	22	10.0	70	3
3QFSM120-250-12	●	12.0	25	12.0	75	3
3QFSM160-320-16	●	16.0	32	16.0	90	3
3QFSM200-380-20	●	20.0	38	20.0	100	3

● : Available

4QFSM-VG (Square type)



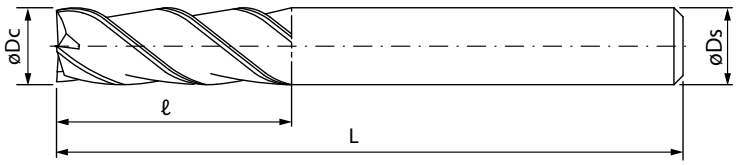
Helix angle: 40°

Dimensions (mm)

Description	Availability	øDc	ℓ	øDs (h6)	L	Z
4QFSM030-090-03-VG	●	3.0	9	3.0	50	4
4QFSM030-090-06-VG	●	3.0	9	6.0	50	4
4QFSM040-120-04-VG	●	4.0	12	4.0	50	4
4QFSM040-120-06-VG	●	4.0	12	6.0	50	4
4QFSM050-150-05-VG	●	5.0	15	5.0	50	4
4QFSM060-160-06-VG	●	6.0	16	6.0	50	4
4QFSM060-200-06-VG	●	6.0	20	6.0	60	4
4QFSM080-220-08-VG	●	8.0	22	8.0	64	4
4QFSM100-270-10-VG	●	10.0	27	10.0	70	4
4QFSM100-220-10-VG	●	10.0	22	10.0	75	4
4QFSM120-320-12-VG	●	12.0	32	12.0	75	4
4QFSM160-320-16-VG	●	16.0	32	16.0	90	4
4QFSM200-380-20-VG	●	20.0	38	20.0	100	4

● : Available

4QFSM-VE (Square type)



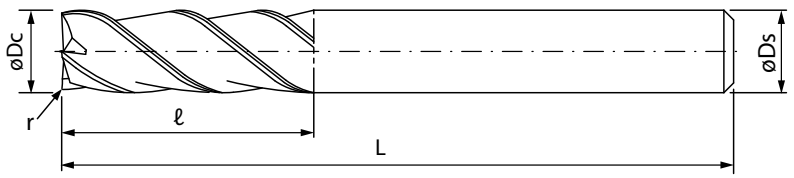
Helix angle: 40°

Dimensions (mm)

Description	Availability	øDc	ℓ	øDs (h6)	L	Z
4QFSM030-090-03-VE	●	3.0	9	6.0	50	4
4QFSM040-120-06-VE	●	4.0	12	6.0	50	4
4QFSM050-130-06-VE	●	5.0	13	6.0	50	4
4QFSM060-130-06-VE	●	6.0	13	6.0	50	4
4QFSM080-200-08-VE	●	8.0	20	8.0	64	4
4QFSM100-220-10-VE	●	10.0	22	10.0	70	4
4QFSM120-260-12-VE	●	12.0	26	12.0	75	4
4QFSM160-320-16-VE	●	16.0	32	16.0	90	4
4QFSM200-380-20-VE	●	20.0	38	20.0	100	4

● : Available

4/5QFRM-VE (Radius type)



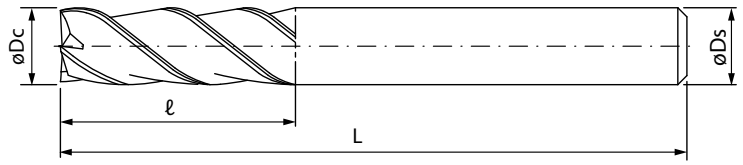
Helix angle: 40°

Dimensions (mm)

Description	Availability	øDc	ℓ	r	øDs (h6)	L	Z
4QFRM030-090-03-R03-VE	●	3.0	9	0.3	3.0	40	4
4QFRM030-090-03-R05-VE	●	3.0	9	0.5	3.0	40	4
4QFRM030-090-06-R03-VE	●	3.0	9	0.3	6.0	50	4
4QFRM030-090-06-R05-VE	●	3.0	9	0.5	6.0	50	4
4QFRM040-120-04-R03-VE	●	4.0	12	0.3	4.0	50	4
4QFRM040-120-04-R05-VE	●	4.0	12	0.5	4.0	50	4
4QFRM040-120-06-R03-VE	●	4.0	12	0.3	6.0	50	4
4QFRM040-120-06-R05-VE	●	4.0	12	0.5	6.0	50	4
4QFRM050-150-06-R03-VE	●	5.0	15	0.3	6.0	50	4
4QFRM050-150-06-R05-VE	●	5.0	15	0.5	6.0	50	4
4QFRM060-160-06-R03-VE	●	6.0	16	0.3	6.0	50	4
4QFRM060-160-06-R05-VE	●	6.0	16	0.5	6.0	50	4
4QFRM060-160-06-R10-VE	●	6.0	16	1.0	6.0	50	4
4QFRM080-200-08-R03-VE	●	8.0	20	0.3	8.0	64	4
4QFRM080-200-08-R05-VE	●	8.0	20	0.5	8.0	64	4
4QFRM080-200-08-R10-VE	●	8.0	20	1.0	8.0	64	4
4QFRM080-200-08-R20-VE	●	8.0	20	2.0	8.0	64	4
4QFRM100-220-10-R05-VE	●	10.0	22	0.5	10.0	70	4
4QFRM100-220-10-R10-VE	●	10.0	22	1.0	10.0	70	4
4QFRM100-220-10-R15-VE	●	10.0	22	1.5	10.0	70	4
4QFRM100-220-10-R20-VE	●	10.0	22	2.0	10.0	70	4
4QFRM120-250-12-R05-VE	●	12.0	25	0.5	12.0	75	4
4QFRM120-250-12-R10-VE	●	12.0	25	1.0	12.0	75	4
4QFRM120-250-12-R20-VE	●	12.0	25	2.0	12.0	75	4
4QFRM120-250-12-R30-VE	●	12.0	25	3.0	12.0	75	4
4QFRM160-320-16-R10-VE	●	16.0	32	1.0	16.0	90	4
4QFRM160-320-16-R20-VE	●	16.0	32	2.0	16.0	90	4
4QFRM160-320-16-R30-VE	●	16.0	32	3.0	16.0	90	4
4QFRM200-380-20-R10-VE	●	20.0	38	1.0	20.0	100	4
4QFRM200-380-20-R20-VE	●	20.0	38	2.0	20.0	100	4
4QFRM200-380-20-R30-VE	●	20.0	38	3.0	20.0	100	4
5QFRM060-250-06-R01-VE	●	6.0	25	0.1	6.0	75	5
5QFRM080-250-08-R02-VE	●	8.0	25	0.2	8.0	75	5
5QFRM100-380-10-R02-VE	●	10.0	38	0.2	10.0	100	5
5QFRM120-450-12-R03-VE	●	12.0	45	0.3	12.0	100	5
5QFRM160-550-16-R03-VE	●	16.0	55	0.3	16.0	125	5
5QFRM200-650-20-R03-VE	●	20.0	65	0.3	20.0	125	5

● : Available

4QFSM- /H (Square type)



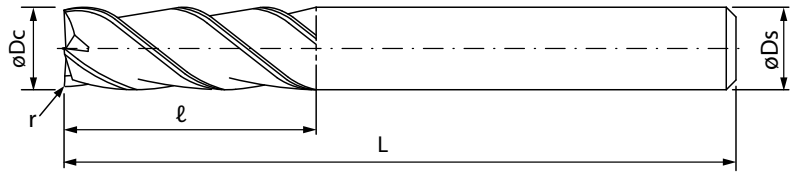
Helix angle: 40°

Dimensions (mm)

Description	Availability	øDc	ℓ	øDs (h6)	L	Z
4QFSM030-090-06-H	●	3.0	9	6.0	50	4
4QFSM040-120-06-H	●	4.0	12	6.0	50	4
4QFSM050-150-06-H	●	5.0	15	6.0	50	4
4QFSM060-160-06-H	●	6.0	16	6.0	50	4
4QFSM080-200-08-H	●	8.0	20	8.0	64	4
4QFSM100-220-10-H	●	10.0	22	10.0	70	4
4QFSM120-250-12-H	●	12.0	25	12.0	75	4
4QFSM160-320-16-H	●	16.0	32	16.0	90	4
4QFSM200-380-20-H	●	20.0	38	20.0	100	4

● : Available

4QFRM- /H (Radius type)



Helix angle: 40°

Dimensions (mm)

Description	Availability	øDc	ℓ	r	øDs (h6)	L	Z
4QFRM030-090-03-R03-H	●	3.0	9	0.3	3.0	40	4
4QFRM030-090-03-R05-H	●	3.0	9	0.5	3.0	40	4
4QFRM030-090-06-R03-H	●	3.0	9	0.3	6.0	50	4
4QFRM030-090-06-R05-H	●	3.0	9	0.5	6.0	50	4
4QFRM040-120-04-R03-H	●	4.0	12	0.3	4.0	50	4
4QFRM040-120-04-R05-H	●	4.0	12	0.5	4.0	50	4
4QFRM040-120-06-R03-H	●	4.0	12	0.3	6.0	50	4
4QFRM040-120-06-R05-H	●	4.0	12	0.5	6.0	50	4
4QFRM050-150-06-R03-H	●	5.0	15	0.3	6.0	50	4
4QFRM050-150-06-R05-H	●	5.0	15	0.5	6.0	50	4
4QFRM060-160-06-R03-H	●	6.0	16	0.3	6.0	50	4
4QFRM060-160-06-R05-H	●	6.0	16	0.5	6.0	50	4
4QFRM060-160-06-R10-H	●	6.0	16	1.0	6.0	50	4
4QFRM080-200-08-R03-H	●	8.0	20	0.3	8.0	64	4
4QFRM080-200-08-R05-H	●	8.0	20	0.5	8.0	64	4
4QFRM080-200-08-R10-H	●	8.0	20	1.0	8.0	64	4
4QFRM080-200-08-R20-H	●	8.0	20	2.0	8.0	64	4
4QFRM100-220-10-R05-H	●	10.0	22	0.5	10.0	70	4
4QFRM100-220-10-R10-H	●	10.0	22	1.0	10.0	70	4
4QFRM100-220-10-R15-H	●	10.0	22	1.5	10.0	70	4
4QFRM100-220-10-R20-H	●	10.0	22	2.0	10.0	70	4
4QFRM120-250-12-R05-H	●	12.0	25	0.5	12.0	75	4
4QFRM120-250-12-R10-H	●	12.0	25	1.0	12.0	75	4
4QFRM120-250-12-R20-H	●	12.0	25	2.0	12.0	75	4
4QFRM120-250-12-R30-H	●	12.0	25	3.0	12.0	75	4
4QFRM160-320-16-R10-H	●	16.0	32	1.0	16.0	90	4
4QFRM160-320-16-R20-H	●	16.0	32	2.0	16.0	90	4
4QFRM160-320-16-R30-H	●	16.0	32	3.0	16.0	90	4
4QFRM200-380-20-R10-H	●	20.0	38	1.0	20.0	100	4
4QFRM200-380-20-R20-H	●	20.0	38	2.0	20.0	100	4
4QFRM200-380-20-R30-H	●	20.0	38	3.0	20.0	100	4

● : Available

Cutting conditions

2QFSM

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Carbon steel	0.80 Dc × 0.45 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	444	455	476	502	525	546	566	613	655
	Stainless steel	0.70 Dc × 0.45 Dc	Revolution [min-1]	8,488	6,366	5,093	4,244	3,183	2,546	2,122	1,592	1,273
			Table feed [mm/min]	306	331	357	382	407	433	458	509	560
	Grey cast iron	0.80 Dc × 0.45 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	444	455	476	502	525	546	566	613	655
	Ductile cast iron	0.65 Dc × 0.45 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228	1,857	1,393	1,114
			Table feed [mm/min]	208	234	258	290	318	343	368	423	479
	Titanium alloy	0.80 Dc × 0.45 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	229	258	290	312	344	371	398	451	506
	Non ferrous metal	0.85 Dc × 0.45 Dc	Revolution [min-1]	16,977	12,732	10,186	8,488	6,366	5,093	4,244	3,183	2,546
			Table feed [mm/min]	509	535	570	594	611	642	671	719	769
Slotting	Carbon steel	0.60 Dc × 1.00 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	257	280	280	303	315	329	338	368	396
	Stainless steel	0.50 Dc × 1.00 Dc	Revolution [min-1]	8,488	6,366	5,093	4,244	3,183	2,546	2,122	1,592	1,273
			Table feed [mm/min]	187	204	224	238	255	270	289	321	351
	Grey cast iron	0.60 Dc × 1.00 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	257	280	280	303	315	329	338	368	396
	Ductile cast iron	0.55 Dc × 1.00 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228	1,857	1,393	1,114
			Table feed [mm/min]	104	123	134	156	167	183	197	226	254
	Titanium alloy	0.45 Dc × 1.00 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	153	172	183	204	224	241	258	294	328
	Non ferrous metal	0.65 Dc × 1.00 Dc	Revolution [min-1]	16,977	12,732	10,186	8,488	6,366	5,093	4,244	3,183	2,546
			Table feed [mm/min]	306	306	326	340	357	377	390	420	453

3QFSM

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Carbon steel	0.80 Dc × 0.45 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	665	683	714	753	788	819	849	919	982
	Stainless steel	0.70 Dc × 0.45 Dc	Revolution [min-1]	8,488	6,366	5,093	4,244	3,183	2,546	2,122	1,592	1,273
			Table feed [mm/min]	458	497	535	573	611	649	688	764	840
	Grey cast iron	0.80 Dc × 0.45 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	665	683	714	753	788	819	849	919	982
	Ductile cast iron	0.65 Dc × 0.45 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228	1,857	1,393	1,114
			Table feed [mm/min]	312	351	388	434	476	515	551	635	719
	Titanium alloy	0.80 Dc × 0.45 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	344	387	435	468	516	556	597	677	759
	Non ferrous metal	0.85 Dc × 0.45 Dc	Revolution [min-1]	16,977	12,732	10,186	8,488	6,366	5,093	4,244	3,183	2,546
			Table feed [mm/min]	764	802	856	891	917	963	1,006	1,079	1,154
Slotting	Carbon steel	0.60 Dc × 1.00 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	385	420	420	455	473	494	508	551	593
	Stainless steel	0.50 Dc × 1.00 Dc	Revolution [min-1]	8,488	6,366	5,093	4,244	3,183	2,546	2,122	1,592	1,273
			Table feed [mm/min]	280	306	336	357	382	405	433	482	527
	Grey cast iron	0.60 Dc × 1.00 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	385	420	420	455	473	494	508	551	593
	Ductile cast iron	0.55 Dc × 1.00 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228	1,857	1,393	1,114
			Table feed [mm/min]	156	184	201	234	251	274	295	338	381
	Titanium alloy	0.45 Dc × 1.00 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	229	258	275	306	337	361	387	440	493
	Non ferrous metal	0.65 Dc × 1.00 Dc	Revolution [min-1]	16,977	12,732	10,186	8,488	6,366	5,093	4,244	3,183	2,546
			Table feed [mm/min]	458	458	489	509	535	565	586	630	680

Cutting conditions

4QFSM-VG

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Carbon steel	1.15 Dc × 0.30 Dc	Revolution [min-1]	21,221	15,915	12,732	10,610	7,958	6,366	5,305	3,979	3,183
			Table feed [mm/min]	764	828	866	849	891	891	955	1,003	1,044
	Alloy steel 520 < Rm < 1200	1.00 Dc × 0.30 Dc	Revolution [min-1]	19,629	14,722	11,777	9,815	7,361	5,889	4,907	3,680	2,944
			Table feed [mm/min]	1,413	1,590	1,602	1,610	1,796	1,790	2,002	2,105	2,202
	Prehardened steel 35 ≤ HRC < 45	1.00 Dc × 0.30 Dc	Revolution [min-1]	14,854	11,141	8,913	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	1,010	980	1,105	1,099	1,248	1,248	1,396	1,549	1,649
	Stainless steel (high machinability)	1.00 Dc × 0.30 Dc	Revolution [min-1]	10,610	7,958	6,366	5,305	3,979	3,183	2,653	1,989	1,592
			Table feed [mm/min]	297	286	357	340	382	382	403	454	547
	Stainless steel (low machinability)	0.70 Dc × 0.30 Dc	Revolution [min-1]	5,305	3,979	3,183	2,653	1,989	1,592	1,326	995	796
			Table feed [mm/min]	170	159	166	170	183	178	202	219	239
	Grey cast iron	1.00 Dc × 0.30 Dc	Revolution [min-1]	16,977	12,732	10,186	8,488	6,366	5,093	4,244	3,183	2,546
			Table feed [mm/min]	1,630	1,630	1,711	1,698	1,808	1,793	1,867	1,948	2,098
	Titanium alloy	0.80 Dc × 0.30 Dc	Revolution [min-1]	27,587	20,690	16,552	13,793	10,345	8,276	6,897	5,173	4,138
			Table feed [mm/min]	993	993	1,059	1,048	1,117	1,092	1,159	1,200	1,258
	Wrought aluminum Si < 9%	1.20 Dc × 0.30 Dc	Revolution [min-1]	24,404	18,303	14,642	12,202	9,151	7,321	6,101	4,576	3,661
			Table feed [mm/min]	879	879	937	927	988	996	1,049	1,098	1,157
	Cast aluminum Si ≥ 9%	1.10 Dc × 0.30 Dc	Revolution [min-1]	8,488	6,366	5,093	4,244	3,183	2,546	2,122	1,592	1,273
			Table feed [mm/min]	815	789	957	951	1,006	998	1,103	1,152	1,202
Slotting	Carbon steel	0.60 Dc × 1.00 Dc	Revolution [min-1]	20,160	15,120	12,096	10,080	7,560	6,048	5,040	3,780	3,024
			Table feed [mm/min]	726	786	823	806	847	847	907	953	1,004
	Alloy steel 520 < Rm < 1200	0.50 Dc × 1.00 Dc	Revolution [min-1]	18,568	13,926	11,141	9,284	6,963	5,570	4,642	3,482	2,785
			Table feed [mm/min]	668	668	713	706	752	758	798	849	902
	Prehardened steel 35 ≤ HRC < 45	0.50 Dc × 1.00 Dc	Revolution [min-1]	12,732	9,549	7,639	6,366	4,775	3,820	3,183	2,387	1,910
			Table feed [mm/min]	560	573	611	611	649	657	700	754	802
	Stainless steel (high machinability)	0.50 Dc × 1.00 Dc	Revolution [min-1]	10,080	7,560	6,048	5,040	3,780	3,024	2,520	1,890	1,512
			Table feed [mm/min]	282	363	339	383	378	399	454	499	550
	Stainless steel (low machinability)	0.30 Dc × 1.00 Dc	Revolution [min-1]	5,305	3,979	3,183	2,653	1,989	1,592	1,326	995	796
			Table feed [mm/min]	106	95	102	95	103	108	111	151	220
	Grey cast iron	0.60 Dc × 1.00 Dc	Revolution [min-1]	14,854	11,141	8,913	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	297	312	321	297	312	321	342	357	401
	Titanium alloy	0.30 Dc × 1.00 Dc	Revolution [min-1]	26,526	19,894	15,915	13,263	9,947	7,958	6,631	4,974	3,979
			Table feed [mm/min]	955	955	1,019	1,008	1,035	1,050	1,088	1,154	1,194
	Wrought aluminum Si < 9%	0.80 Dc × 1.00 Dc	Revolution [min-1]	23,343	17,507	14,006	11,671	8,754	7,003	5,836	4,377	3,501
			Table feed [mm/min]	840	840	896	887	945	952	1,004	1,050	1,106
	Cast aluminum Si ≥ 9%	0.70 Dc × 1.00 Dc	Revolution [min-1]	6,897	5,173	4,138	3,448	2,586	2,069	1,724	1,293	1,035
			Table feed [mm/min]	303	310	314	317	331	331	359	378	401

4QFSM-VE / 4QFRM-VE

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Carbon steel	0.80 Dc × 0.45 Dc	Revolution [min-1]	14,854	11,141	8,913	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	1,070	1,159	1,176	1,248	1,315	1,355	1,411	1,526	1,640
	Alloy steel 520 < Rm < 1200	0.80 Dc × 0.45 Dc	Revolution [min-1]	13,793	10,345	8,276	6,897	5,173	4,138	3,448	2,586	2,069
			Table feed [mm/min]	1,214	1,283	1,324	1,379	1,448	1,506	1,559	1,666	1,779
	Prehardened steel 35 ≤ HRC < 45	0.75 Dc × 0.45 Dc	Revolution [min-1]	12,732	9,549	7,639	6,366	4,775	3,820	3,183	2,387	1,910
			Table feed [mm/min]	917	993	1,039	1,095	1,165	1,222	1,273	1,394	1,513
	Stainless steel (high machinability)	0.70 Dc × 0.45 Dc	Revolution [min-1]	10,610	7,958	6,366	5,305	3,979	3,183	2,653	1,989	1,592
			Table feed [mm/min]	764	828	891	955	1,019	1,082	1,146	1,273	1,401
	Stainless steel (low machinability)	0.65 Dc × 0.45 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	484	554	611	688	754	817	891	1,027	1,161
	Grey cast iron	0.80 Dc × 0.45 Dc	Revolution [min-1]	14,854	11,141	8,913	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	1,070	1,159	1,176	1,248	1,315	1,355	1,411	1,526	1,640
	Ductile cast iron	0.65 Dc × 0.45 Dc	Revolution [min-1]	9,549	7,162	5,730	4,775	3,581	2,865	2,387	1,790	1,432
			Table feed [mm/min]	497	573	642	726	788	859	926	1,060	1,197
	Titanium alloy	0.65 Dc × 0.45 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228	1,857	1,393	1,114
			Table feed [mm/min]	594	646	713	787	858	927	988	1,131	1,266
Slotting	Carbon steel	0.60 Dc × 1.00 Dc	Revolution [min-1]	14,854	11,141	8,913	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	654	668	713	743	780	820	847	914	980
	Alloy steel 520 < Rm < 1200	0.60 Dc × 1.00 Dc	Revolution [min-1]	13,793	10,345	8,276	6,897	5,173	4,138	3,448	2,586	2,069
			Table feed [mm/min]	717	786	795	828	869	894	938	1,003	1,068
	Prehardened steel 35 ≤ HRC < 45	0.55 Dc × 1.00 Dc	Revolution [min-1]	12,732	9,549	7,639	6,366	4,775	3,820	3,183	2,387	1,910
			Table feed [mm/min]	560	611	642	662	707	749	777	859	924
	Stainless steel (high machinability)	0.50 Dc × 1.00 Dc	Revolution [min-1]	10,610	7,958	6,366	5,305	3,979	3,183	2,653	1,989	1,592
			Table feed [mm/min]	467	509	560	594	637	675	722	804	879
	Stainless steel (low machinability)	0.45 Dc × 1.00 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	306	363	397	446	487	535	579	668	756
	Grey cast iron	0.60 Dc × 1.00 Dc	Revolution [min-1]	14,854	11,141	8,913	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	654	668	713	743	780	820	847	914	980
	Ductile cast iron	0.45 Dc × 1.00 Dc	Revolution [min-1]	9,549	7,162	5,730	4,775	3,581	2,865	2,387	1,790	1,432
			Table feed [mm/min]	344	372	413	458	516	561	602	688	779
	Titanium alloy	0.45 Dc × 1.00 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228	1,857	1,393	1,114
			Table feed [mm/min]	386	423	463	505	557	597	646	735	820

Cutting conditions

5QFRM-VE

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Carbon steel	0.80 Dc × 0.45 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	1,560	1,643	1,693	1,764	1,908	2,050
	Alloy steel 520 < Rm < 1200	0.80 Dc × 0.45 Dc	Revolution [min-1]	6,897	5,173	4,138	3,448	2,586	2,069
			Table feed [mm/min]	1,724	1,810	1,883	1,948	2,082	2,224
	Prehardened steel 35 ≤ HRC < 45	0.75 Dc × 0.45 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910
			Table feed [mm/min]	1,369	1,456	1,528	1,592	1,743	1,891
	Stainless steel (high machinability)	0.70 Dc × 0.45 Dc	Revolution [min-1]	5,040	3,780	3,024	2,520	1,890	1,512
			Table feed [mm/min]	1,184	1,266	1,346	1,424	1,588	1,746
	Stainless steel (low machinability)	0.65 Dc × 0.45 Dc	Revolution [min-1]	2,653	1,989	1,592	1,326	995	796
			Table feed [mm/min]	849	945	1,027	1,114	1,283	1,452
	Grey cast iron	0.80 Dc × 0.45 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	1,560	1,643	1,693	1,764	1,908	2,050
	Ductile cast iron	0.65 Dc × 0.45 Dc	Revolution [min-1]	5,305	3,979	3,183	2,653	1,989	1,592
			Table feed [mm/min]	902	975	1,066	1,154	1,323	1,496
	Titanium alloy	0.65 Dc × 0.45 Dc	Revolution [min-1]	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	987	1,074	1,155	1,241	1,409	1,580
Trochoidal	Carbon steel	1.50 Dc × 0.12 Dc	Revolution [min-1]	13,263	9,947	7,958	6,631	4,974	3,979
			Table feed [mm/min]	3,183	3,183	3,183	3,183	3,183	3,183
	Alloy steel 520 < Rm < 1200	1.50 Dc × 0.12 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501
			Table feed [mm/min]	2,451	2,451	2,451	2,451	2,451	2,451
	Prehardened steel 35 ≤ HRC < 45	1.50 Dc × 0.12 Dc	Revolution [min-1]	10,610	7,958	6,366	5,305	3,979	3,183
			Table feed [mm/min]	1,592	1,592	1,592	1,592	1,592	1,592
	Stainless steel (high machinability)	1.50 Dc × 0.12 Dc	Revolution [min-1]	5,305	3,979	3,183	2,653	1,989	1,592
			Table feed [mm/min]	637	637	637	637	637	637
	Stainless steel (low machinability)	1.50 Dc × 0.12 Dc	Revolution [min-1]	4,775	3,581	2,865	2,387	1,790	1,432
			Table feed [mm/min]	573	573	573	573	573	573
	Grey cast iron	1.50 Dc × 0.12 Dc	Revolution [min-1]	10,610	7,958	6,366	5,305	3,979	3,183
			Table feed [mm/min]	2,228	2,228	2,228	2,228	2,228	2,228
	Ductile cast iron	1.50 Dc × 0.12 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	1,114	1,114	1,114	1,114	1,114	1,114
	Titanium alloy	1.50 Dc × 0.12 Dc	Revolution [min-1]	4,775	3,581	2,865	2,387	1,790	1,432
			Table feed [mm/min]	573	573	573	573	573	573

4QFSM-H / 4QFRM-H

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Hard material 45 ≤ HRC < 52	0.40 Dc × 0.30 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	993	1,165	1,115	1,159	1,060	1,001	1,063	979	1,001
	Hard material 52 ≤ HRC ≤ 68	0.30 Dc × 0.30 Dc	Revolution [min-1]	5,305	3,979	3,183	2,653	1,989	1,592	1,326	995	796
			Table feed [mm/min]	891	955	1,019	1,061	963	898	960	879	901
Slotting	Hard material 45 ≤ HRC < 52	0.12 Dc × 1.00 Dc	Revolution [min-1]	5,836	4,377	3,501	2,918	2,188	1,751	1,459	1,094	875
			Table feed [mm/min]	607	665	616	665	560	497	560	481	501
	Hard material 52 ≤ HRC ≤ 68	0.09 Dc × 1.00 Dc	Revolution [min-1]	4,775	3,581	2,865	2,387	1,790	1,432	1,194	895	716
			Table feed [mm/min]	248	244	309	344	322	258	301	251	281