

# MPS1

HIGH PERFORMANCE  
SOLID CARBIDE DRILL



**DIAEDGE**

 **mitsubishi MATERIALS**

# MPS1

## HIGH PERFORMANCE SOLID CARBIDE DRILL



LxDC 3 — 8

### STRONG CUTTING EDGE

For high performance drilling



LxDC 10 — 40  
LxDC 2 (PC)

### OPTIMIZED GEOMETRY

For extra deep hole drilling and optimal hole quality

### DP1021

New ALTiCrN PVD coating technology ensures a long tool life and high productivity in standard and high cutting speeds. Suitable in steels, stainless steels and cast iron.

### ACCURACY

The double margin and Tri-Coolant Technology helps to provide high quality hole surface finishes.

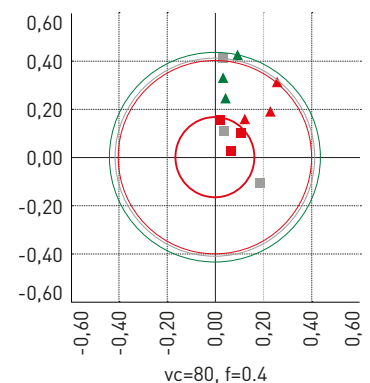
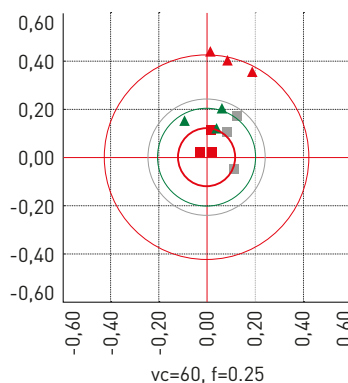


- Increased coolant volume
- Optimized flow at the margin
- Faster chip evacuation

### STABILITY (CAE ANALYSIS)

MPS1 super long drill is designed to achieve 20% higher flexing strength by optimizing the core diameter and the helix angle.

■ MPS1    ■ Competitor 1    ▲ Competitor 2    ▲ Competitor 3

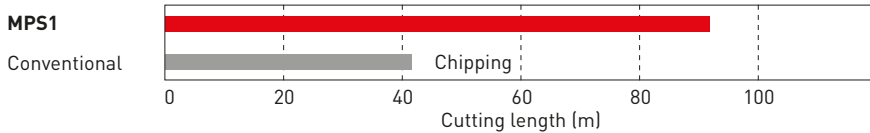


# APPLICATION EXAMPLES

## TOOL LIFE TEST Ø8 MM AT STANDARD CUTTING CONDITIONS

Work material	DIN C50
Hole depth (mm)	40
Cutting speed Vc (m/min)	120
Feed per revolution f (mm/rev)	0.25
Coolant	W.S.O.
Machine	Vertical M/C

Result Tool life of MPS1 was 2.5 times longer.



MPS1

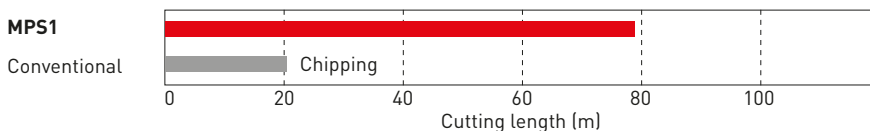


Competitor

## TOOL LIFE TEST Ø8 MM AT HIGH-SPEED CUTTING CONDITIONS

Work material	DIN C50
Hole depth (mm)	40
Cutting speed Vc (m/min)	200
Feed per revolution f (mm/rev)	0.35
Coolant	W.S.O.
Machine	Vertical M/C

Result Tool life of MPS1 was 4 times longer.



MPS1



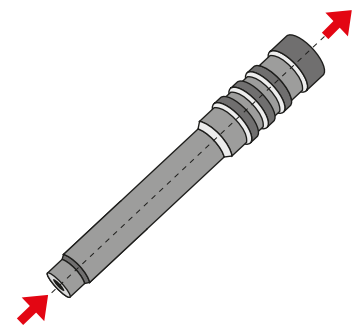
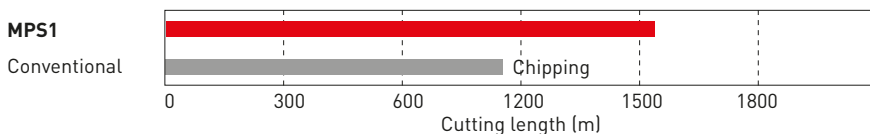
Competitor

# SUPERLONG DRILLS

## DRILLING OF THROUGH CENTRE HOLE

Tool	MPS1-0380-L12C
Work material	115MnPb30
Hole depth (mm)	45 (12 l/d)
Cutting speed Vc (m/min)	75
Feed per revolution f (mm/rev)	0.135
Machine	Sliding Headstock Swiss Machine

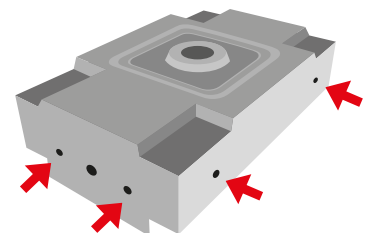
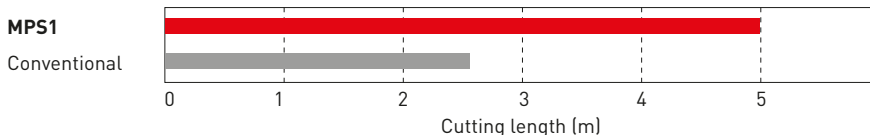
Result Tool life of MPS1 was 36% longer.



## DRILLING OF COOLING HOLES

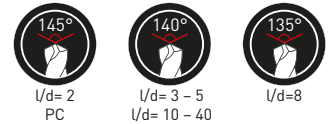
Tool	MPS1-0800-L30C
Work material	CR7 V-L (Cold work steel, 1130 N/mm <sup>2</sup> )
Hole depth (mm)	250 (30 l/d)
Cutting speed Vc (m/min)	120
Feed per revolution f (mm/rev)	0.35
Machine	Horizontal machining centre

Result Tool life of MPS1 was 2 times longer.  
Hole axial straightness less than 0.15mm.



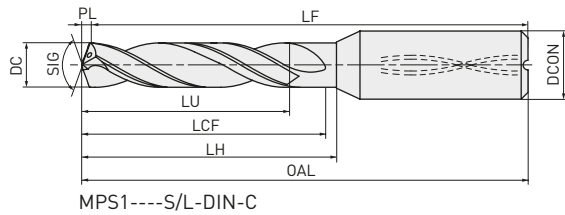
# MPS1

## SOLID CARBIDE DRILL

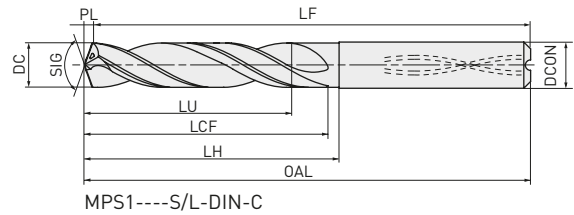


	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
DC Tolerance (DIN / PC)	+0.010	+0.010	+0.005	+0.005
(mm)	-0.002	-0.005	-0.013	-0.016
DC Tolerance (L_C)	0	0	0	0
(mm)	-0.012	-0.015	-0.018	-0.021
DCON Tolerance	0	0	0	0
(mm)	-0.008	-0.009	-0.011	-0.013

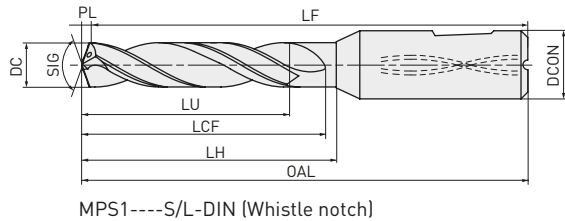
• Type 1 Cylindrical shank type with taper neck



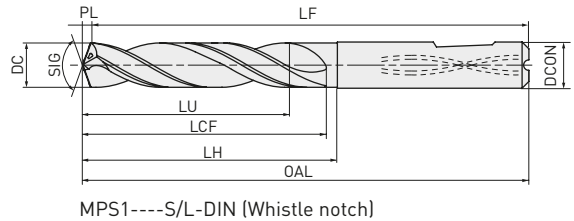
• Type 2 Cylindrical shank type



• Type 3 Whistle notch shank type with taper neck



• Type 4 Whistle notch shank type



\* The coolant holes of drills DC φ4.9 mm or less will be a circular geometry.  
 \* SIG : l/d 3-5 and 10-40 = 140°, 8 = 135°, PC = 145°

Order Number	DC	l/d	OAL	LU	LCF	LH	LF	PL	DCON	DP1021	Type
MPS1-0300S-DIN	3	62	15.0	20	26	61.5	0.5	6	6	□	3
MPS1-0300S-DIN-C	3	62	15.0	20	26	61.5	0.5	6	6	●	1
MPS1-0300L-DIN	5	66	20.0	25	30	65.5	0.5	6	6	□	3
MPS1-0300L-DIN-C	5	66	20.0	25	30	65.5	0.5	6	6	●	1
<b>NEW</b> MPS1-0300-PC	2	55	6.5	16.5	19.22	55	0.5	6	6	●	1
MPS1-0300-L8C	8	77	24.6	34	41	76	0.5	6	6	●	1
<b>NEW</b> MPS1-0300-L10C	10	80	30.5	37.5	43	79	0.5	6	6	□	1
<b>NEW</b> MPS1-0300-L12C	12	86	36.5	43.5	49	85	0.5	6	6	●	1
<b>NEW</b> MPS1-0300-L15C	15	95	45.5	52.5	58	94	0.5	6	6	●	1
<b>NEW</b> MPS1-0300-L20C	20	110	60.5	67.5	73	109	0.5	6	6	●	1
<b>NEW</b> MPS1-0300-L25C	25	125	75.5	82.5	88	124	0.5	6	6	●	1
<b>NEW</b> MPS1-0300-L30C	30	140	90.5	97.5	103	139	0.5	6	6	●	1
<b>NEW</b> MPS1-0300-L35C	35	159	105.5	113.5	122	158	0.5	6	6	□	1
<b>NEW</b> MPS1-0300-L40C	40	174	120.5	128.5	137	173	0.5	6	6	●	1
MPS1-0305S-DIN	3	62	15.0	20	26	61.4	0.6	6	6	□	3
MPS1-0305S-DIN-C	3	62	15.0	20	26	61.4	0.6	6	6	●	1
MPS1-0305L-DIN	5	66	20.0	25	30	65.4	0.6	6	6	□	3
MPS1-0305L-DIN-C	5	66	20.0	25	30	65.4	0.6	6	6	●	1

Order Number	DC	l/d	OAL	LU	LCF	LH	LF	PL	DCON	DP1021	Type
MPS1-0310S-DIN	3	62	14.9	20	26	61.4	0.6	6	6	□	3
MPS1-0310S-DIN-C	3	62	14.9	20	26	61.4	0.6	6	6	●	1
MPS1-0310L-DIN	5	66	19.9	25	30	65.4	0.6	6	6	□	3
MPS1-0310L-DIN-C	5	66	19.9	25	30	65.4	0.6	6	6	●	1
<b>NEW</b> MPS1-0310-PC	2	55	6.7	18.5	21.11	55	0.5	6	6	□	1
MPS1-0310-L8C	8	83	25.4	40	47	82	0.6	6	6	●	1
<b>NEW</b> MPS1-0310-L10C	10	87	31.6	44.6	50	86	0.6	6	6	□	1
<b>NEW</b> MPS1-0310-L12C	12	94	37.8	51.6	57	93	0.6	6	6	□	1
<b>NEW</b> MPS1-0310-L15C	15	104	47.1	61.6	67	103	0.6	6	6	□	1
<b>NEW</b> MPS1-0310-L20C	20	122	62.6	79.6	85	121	0.6	6	6	□	1
<b>NEW</b> MPS1-0310-L25C	25	139	78.1	96.6	102	138	0.6	6	6	□	1
<b>NEW</b> MPS1-0310-L30C	30	157	93.6	114.6	120	156	0.6	6	6	□	1
<b>NEW</b> MPS1-0310-L35C	35	176	109.1	123.6	139	175	0.6	6	6	□	1
<b>NEW</b> MPS1-0310-L40C	40	191	124.6	138.6	154	190	0.6	6	6	□	1







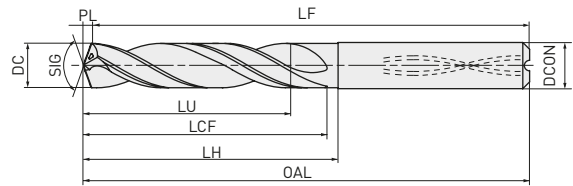








# MPS1



### Order Number

### Order Number

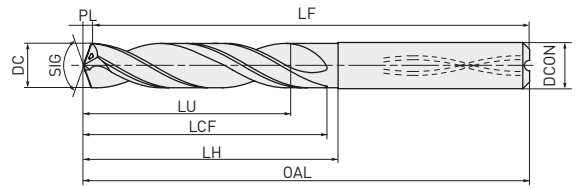
	DC	I(d)	OAL	LU	LCF	LH	LF	PL	DCON	DP1021	Type
MPS1-0680S-DIN	3	79	24.0	34	43	77.8	1.2	8	8	□	4
MPS1-0680S-DIN-C	3	79	24.0	34	43	77.8	1.2	8	8	●	2
MPS1-0680L-DIN	5	91	43.0	53	55	89.8	1.2	8	8	□	4
MPS1-0680L-DIN-C	5	91	43.0	53	55	89.8	1.2	8	8	●	2
<b>NEW</b> MPS1-0680-PC	2	75	14.7	35.1	37	74	1.1	8	8	□	2
MPS1-0680-L8C	8	118	55.8	78	81	117	1.2	8	8	●	2
<b>NEW</b> MPS1-0680-L10C	10	132	69.2	92.2	95	131	1.2	8	8	□	2
<b>NEW</b> MPS1-0680-L12C	12	146	82.8	106.2	109	145	1.2	8	8	□	2
<b>NEW</b> MPS1-0680-L15C	15	167	103.2	127.2	130	166	1.2	8	8	□	2
<b>NEW</b> MPS1-0680-L20C	20	202	137.2	162.2	165	201	1.2	8	8	□	2
<b>NEW</b> MPS1-0680-L25C	25	237	171.2	197.2	200	236	1.2	8	8	□	2
<b>NEW</b> MPS1-0680-L30C	30	272	205.2	232.2	235	271	1.2	8	8	□	2
<b>NEW</b> MPS1-0680-L35C	35	306	239.2	267.2	269	305	1.2	8	8	□	2
<b>NEW</b> MPS1-0680-L40C	40	341	273.2	301.2	304	340	1.2	8	8	□	2
MPS1-0690S-DIN	3	79	23.9	34	43	77.7	1.3	8	8	□	4
MPS1-0690S-DIN-C	3	79	23.9	34	43	77.7	1.3	8	8	●	2
MPS1-0690L-DIN	5	91	42.9	53	55	89.7	1.3	8	8	□	4
MPS1-0690L-DIN-C	5	91	42.9	53	55	89.7	1.3	8	8	●	2
<b>NEW</b> MPS1-0690-PC	2	75	14.9	35.1	37	74	1.1	8	8	□	2
MPS1-0690-L8C	8	118	56.6	78	81	117	1.3	8	8	●	2
<b>NEW</b> MPS1-0690-L10C	10	132	70.3	92.3	95	131	1.3	8	8	□	2
<b>NEW</b> MPS1-0690-L12C	12	146	84.1	106.3	109	145	1.3	8	8	□	2
<b>NEW</b> MPS1-0690-L15C	15	167	104.8	127.3	130	166	1.3	8	8	□	2
<b>NEW</b> MPS1-0690-L20C	20	202	139.3	162.3	165	201	1.3	8	8	□	2
<b>NEW</b> MPS1-0690-L25C	25	237	173.8	197.3	200	236	1.3	8	8	□	2
<b>NEW</b> MPS1-0690-L30C	30	272	208.3	232.3	235	271	1.3	8	8	□	2
<b>NEW</b> MPS1-0690-L35C	35	306	242.8	267.3	269	305	1.3	8	8	□	2
<b>NEW</b> MPS1-0690-L40C	40	341	277.3	301.3	304	340	1.3	8	8	□	2
MPS1-0700S-DIN	3	79	23.8	34	43	77.7	1.3	8	8	□	4
MPS1-0700S-DIN-C	3	79	23.8	34	43	77.7	1.3	8	8	●	2
MPS1-0700L-DIN	5	91	42.8	53	55	89.7	1.3	8	8	□	4
MPS1-0700L-DIN-C	5	91	42.8	53	55	89.7	1.3	8	8	●	2
<b>NEW</b> MPS1-0700-PC	2	75	15.1	35.1	37	74	1.1	8	8	●	2
MPS1-0700-L8C	8	118	57.4	78	81	117	1.3	8	8	●	2
<b>NEW</b> MPS1-0700-L10C	10	132	71.3	92.3	95	131	1.3	8	8	□	2
<b>NEW</b> MPS1-0700-L12C	12	146	85.3	106.3	109	145	1.3	8	8	●	2
<b>NEW</b> MPS1-0700-L15C	15	167	106.3	127.3	130	166	1.3	8	8	●	2
<b>NEW</b> MPS1-0700-L20C	20	202	141.3	162.3	165	201	1.3	8	8	●	2
<b>NEW</b> MPS1-0700-L25C	25	237	176.3	197.3	200	236	1.3	8	8	●	2
<b>NEW</b> MPS1-0700-L30C	30	272	211.3	232.3	235	271	1.3	8	8	●	2
<b>NEW</b> MPS1-0700-L35C	35	306	246.3	267.3	269	305	1.3	8	8	□	2
<b>NEW</b> MPS1-0700-L40C	40	341	281.3	301.3	304	340	1.3	8	8	●	2

	DC	I(d)	OAL	LU	LCF	LH	LF	PL	DCON	DP1021	Type
MPS1-0710S-DIN	3	79	30.6	41	43	77.7	1.3	8	8	□	4
MPS1-0710S-DIN-C	3	79	30.6	41	43	77.7	1.3	8	8	●	2
MPS1-0710L-DIN	5	91	42.6	53	55	89.7	1.3	8	8	□	4
MPS1-0710L-DIN-C	5	91	42.6	53	55	89.7	1.3	8	8	●	2
<b>NEW</b> MPS1-0710-PC	2	80	15.3	35.1	38	79	1.1	8	8	□	2
MPS1-0710-L8C	8	124	58.3	84	87	123	1.3	8	8	●	2
<b>NEW</b> MPS1-0710-L10C	10	139	72.3	99.3	102	138	1.3	8	8	□	2
<b>NEW</b> MPS1-0710-L12C	12	154	86.5	114.3	117	153	1.3	8	8	□	2
<b>NEW</b> MPS1-0710-L15C	15	176	107.8	136.3	139	175	1.3	8	8	□	2
<b>NEW</b> MPS1-0710-L20C	20	214	143.3	174.3	177	213	1.3	8	8	□	2
<b>NEW</b> MPS1-0710-L25C	25	251	178.8	211.3	214	250	1.3	8	8	□	2
<b>NEW</b> MPS1-0710-L30C	30	289	214.3	249.3	252	288	1.3	8	8	□	2
<b>NEW</b> MPS1-0710-L35C	35	325	249.8	286.3	288	324	1.3	8	8	□	2
<b>NEW</b> MPS1-0710-L40C	40	360	285.3	321.3	323	359	1.3	8	8	□	2
MPS1-0720S-DIN	3	79	30.5	41	43	77.7	1.3	8	8	□	4
MPS1-0720S-DIN-C	3	79	30.5	41	43	77.7	1.3	8	8	●	2
MPS1-0720L-DIN	5	91	42.5	53	55	89.7	1.3	8	8	□	4
MPS1-0720L-DIN-C	5	91	42.5	53	55	89.7	1.3	8	8	●	2
<b>NEW</b> MPS1-0720-PC	2	80	15.5	35.1	38	79	1.1	8	8	□	2
MPS1-0720-L8C	8	124	59.1	84	87	123	1.3	8	8	●	2
<b>NEW</b> MPS1-0720-L10C	10	139	73.3	99.3	102	138	1.3	8	8	□	2
<b>NEW</b> MPS1-0720-L12C	12	154	87.7	114.3	117	153	1.3	8	8	□	2
<b>NEW</b> MPS1-0720-L15C	15	176	109.3	136.3	139	175	1.3	8	8	□	2
<b>NEW</b> MPS1-0720-L20C	20	214	145.3	174.3	177	213	1.3	8	8	□	2
<b>NEW</b> MPS1-0720-L25C	25	251	181.3	211.3	214	250	1.3	8	8	□	2
<b>NEW</b> MPS1-0720-L30C	30	289	217.3	249.3	252	288	1.3	8	8	□	2
<b>NEW</b> MPS1-0720-L35C	35	325	253.3	286.3	288	324	1.3	8	8	□	2
<b>NEW</b> MPS1-0720-L40C	40	360	289.3	321.3	323	359	1.3	8	8	□	2
MPS1-0730S-DIN	3	79	30.4	41	43	77.7	1.3	8	8	□	4
MPS1-0730S-DIN-C	3	79	30.4	41	43	77.7	1.3	8	8	●	2
MPS1-0730L-DIN	5	91	42.4	53	55	89.7	1.3	8	8	□	4
MPS1-0730L-DIN-C	5	91	42.4	53	55	89.7	1.3	8	8	●	2
<b>NEW</b> MPS1-0730-PC	2	80	15.8	35.2	38	79	1.2	8	8	□	2
MPS1-0730-L8C	8	125	59.9	84	88	123	1.3	8	8	●	2
<b>NEW</b> MPS1-0730-L10C	10	139	74.3	99.3	102	138	1.3	8	8	□	2
<b>NEW</b> MPS1-0730-L12C	12	154	88.9	114.3	117	153	1.3	8	8	□	2
<b>NEW</b> MPS1-0730-L15C	15	176	110.8	136.3	139	175	1.3	8	8	□	2
<b>NEW</b> MPS1-0730-L20C	20	214	147.3	174.3	177	213	1.3	8	8	□	2
<b>NEW</b> MPS1-0730-L25C	25	251	183.8	211.3	214	250	1.3	8	8	□	2
<b>NEW</b> MPS1-0730-L30C	30	289	220.3	249.3	252	288	1.3	8	8	□	2
<b>NEW</b> MPS1-0730-L35C	35	325	256.8	286.3	288	324	1.3	8	8	□	2
<b>NEW</b> MPS1-0730-L40C	40	360	293.3	321.3	323	359	1.3	8	8	□	2





# MPS1



Order Number	DC	l/(d)	OAL	LU	LCF	LH	LF	PL	DCON	DP1021	Type
MPS1-0820S-DIN	3	88	34.2	46	48	86.5	1.5	10	□	4	
MPS1-0820S-DIN-C	3	88	34.2	46	48	86.5	1.5	10	●	2	
MPS1-0820L-DIN	5	102	48.2	60	62	100.5	1.5	10	□	4	
MPS1-0820L-DIN-C	5	102	48.2	60	62	100.5	1.5	10	●	2	
NEW MPS1-0820-PC	2	85	17.7	38.3	41	84	1.3	10	□	2	
MPS1-0820-L8C	8	140	67.3	95	99	138	1.5	10	●	2	
NEW MPS1-0820-L10C	10	156	83.5	112.5	115	155	1.5	10	□	2	
NEW MPS1-0820-L12C	12	173	99.9	129.5	132	172	1.5	10	□	2	
NEW MPS1-0820-L15C	15	198	124.5	154.5	157	197	1.5	10	□	2	
NEW MPS1-0820-L20C	20	241	165.5	197.5	200	240	1.5	10	□	2	
NEW MPS1-0820-L25C	25	283	206.5	239.5	242	282	1.5	10	□	2	
NEW MPS1-0820-L30C	30	325	247.5	282.5	284	324	1.5	10	□	2	
NEW MPS1-0820-L35C	35	367	288.5	324.5	326	366	1.5	10	□	2	
NEW MPS1-0820-L40C	40	411	329.5	366.5	370	410	1.5	10	□	2	
MPS1-0830S-DIN	3	88	34.1	46	48	86.5	1.5	10	□	4	
MPS1-0830S-DIN-C	3	88	34.1	46	48	86.5	1.5	10	●	2	
MPS1-0830L-DIN	5	102	48.1	60	62	100.5	1.5	10	□	4	
MPS1-0830L-DIN-C	5	102	48.1	60	62	100.5	1.5	10	●	2	
NEW MPS1-0830-PC	2	85	17.9	38.3	41	84	1.3	10	□	2	
MPS1-0830-L8C	8	140	68.1	95	99	138	1.5	10	●	2	
NEW MPS1-0830-L10C	10	157	84.5	112.5	116	155	1.5	10	□	2	
NEW MPS1-0830-L12C	12	174	101.1	129.5	133	172	1.5	10	□	2	
NEW MPS1-0830-L15C	15	199	126	154.5	158	197	1.5	10	□	2	
NEW MPS1-0830-L20C	20	242	167.5	197.5	201	240	1.5	10	□	2	
NEW MPS1-0830-L25C	25	284	209	239.5	243	282	1.5	10	□	2	
NEW MPS1-0830-L30C	30	326	250.5	282.5	285	324	1.5	10	□	2	
NEW MPS1-0830-L35C	35	368	292	324.5	327	366	1.5	10	□	2	
NEW MPS1-0830-L40C	40	412	333.5	366.5	371	410	1.5	10	□	2	
MPS1-0840S-DIN	3	88	33.9	46	48	86.5	1.5	10	□	4	
MPS1-0840S-DIN-C	3	88	33.9	46	48	86.5	1.5	10	●	2	
MPS1-0840L-DIN	5	102	47.9	60	62	100.5	1.5	10	□	4	
MPS1-0840L-DIN-C	5	102	47.9	60	62	100.5	1.5	10	●	2	
NEW MPS1-0840-PC	2	85	18.1	38.3	41	84	1.3	10	□	2	
MPS1-0840-L8C	8	140	68.9	95	99	138	1.5	10	●	2	
NEW MPS1-0840-L10C	10	157	85.5	112.5	116	155	1.5	10	□	2	
NEW MPS1-0840-L12C	12	174	102.3	129.5	133	172	1.5	10	□	2	
NEW MPS1-0840-L15C	15	199	127.5	154.5	158	197	1.5	10	□	2	
NEW MPS1-0840-L20C	20	242	169.5	197.5	201	240	1.5	10	□	2	
NEW MPS1-0840-L25C	25	284	211.5	239.5	243	282	1.5	10	□	2	
NEW MPS1-0840-L30C	30	326	253.5	282.5	285	324	1.5	10	□	2	
NEW MPS1-0840-L35C	35	368	295.5	324.5	327	366	1.5	10	□	2	
NEW MPS1-0840-L40C	40	412	337.5	366.5	371	410	1.5	10	□	2	

Order Number	DC	l/(d)	OAL	LU	LCF	LH	LF	PL	DCON	DP1021	Type
MPS1-0850S-DIN	3	88	33.8	46	48	86.5	1.5	10	□	4	
MPS1-0850S-DIN-C	3	88	33.8	46	48	86.5	1.5	10	●	2	
MPS1-0850L-DIN	5	102	47.8	60	62	100.5	1.5	10	□	4	
MPS1-0850L-DIN-C	5	102	47.8	60	62	100.5	1.5	10	●	2	
NEW MPS1-0850-PC	2	85	18.3	38.3	41	84	1.3	10	□	2	
MPS1-0850-L8C	8	140	69.8	95	99	138	1.5	10	●	2	
NEW MPS1-0850-L10C	10	157	86.5	112.5	116	155	1.5	10	□	2	
NEW MPS1-0850-L12C	12	174	103.5	129.5	133	172	1.5	10	●	2	
NEW MPS1-0850-L15C	15	199	129	154.5	158	197	1.5	10	●	2	
NEW MPS1-0850-L20C	20	242	171.5	197.5	201	240	1.5	10	●	2	
NEW MPS1-0850-L25C	25	284	214	239.5	243	282	1.5	10	●	2	
NEW MPS1-0850-L30C	30	326	256.5	282.5	285	324	1.5	10	●	2	
NEW MPS1-0850-L35C	35	368	299	324.5	327	366	1.5	10	□	2	
NEW MPS1-0850-L40C	40	412	341.5	366.5	371	410	1.5	10	●	2	
MPS1-0860S-DIN	3	88	33.7	46	48	86.4	1.6	10	□	4	
MPS1-0860S-DIN-C	3	88	33.7	46	48	86.4	1.6	10	●	2	
MPS1-0860L-DIN	5	102	47.7	60	62	100.4	1.6	10	□	4	
MPS1-0860L-DIN-C	5	102	47.7	60	62	100.4	1.6	10	●	2	
NEW MPS1-0860-PC	2	85	18.6	41.4	43	84	1.4	10	□	2	
MPS1-0860-L8C	8	145	70.6	100	104	143	1.6	10	●	2	
NEW MPS1-0860-L10C	10	163	87.6	118.6	122	161	1.6	10	□	2	
NEW MPS1-0860-L12C	12	181	104.8	136.6	140	179	1.6	10	□	2	
NEW MPS1-0860-L15C	15	208	130.6	163.6	167	206	1.6	10	□	2	
NEW MPS1-0860-L20C	20	253	173.6	208.6	212	251	1.6	10	□	2	
NEW MPS1-0860-L25C	25	298	216.6	253.6	257	296	1.6	10	□	2	
NEW MPS1-0860-L30C	30	342	259.6	298.6	301	340	1.6	10	□	2	
NEW MPS1-0860-L35C	35	387	302.6	343.6	346	385	1.6	10	□	2	
NEW MPS1-0860-L40C	40	436	345.6	391.6	395	434	1.6	10	□	2	
MPS1-0870S-DIN	3	88	33.5	46	48	86.4	1.6	10	□	4	
MPS1-0870S-DIN-C	3	88	33.5	46	48	86.4	1.6	10	●	2	
MPS1-0870L-DIN	5	102	47.5	60	62	100.4	1.6	10	□	4	
MPS1-0870L-DIN-C	5	102	47.5	60	62	100.4	1.6	10	●	2	
NEW MPS1-0870-PC	2	85	18.8	41.4	43	84	1.4	10	□	2	
MPS1-0870-L8C	8	145	71.4	100	104	143	1.6	10	●	2	
NEW MPS1-0870-L10C	10	163	88.6	118.6	122	161	1.6	10	□	2	
NEW MPS1-0870-L12C	12	181	106	136.6	140	179	1.6	10	□	2	
NEW MPS1-0870-L15C	15	208	132.1	163.6	167	206	1.6	10	□	2	
NEW MPS1-0870-L20C	20	253	175.6	208.6	212	251	1.6	10	□	2	
NEW MPS1-0870-L25C	25	298	219.1	253.6	257	296	1.6	10	□	2	
NEW MPS1-0870-L30C	30	342	262.6	298.6	301	340	1.6	10	□	2	
NEW MPS1-0870-L35C	35	387	306.1	343.6	346	385	1.6	10	□	2	
NEW MPS1-0870-L40C	40	436	349.6	391.6	395	434	1.6	10	□	2	







**Order Number**

	DC	(L/d)	OAL	LU	LCF	LH	LF	PL	DCON	DP1021	Type
<b>NEW</b>											
	10.5										
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
	10.6										
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
	10.7										
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
	10.8										
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
	10.9										
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**Order Number**

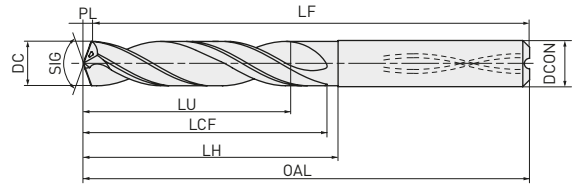
	DC	(L/d)	OAL	LU	LCF	LH	LF	PL	DCON	DP1021	Type
<b>NEW</b>											
	11.1										
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
<b>NEW</b>											
	11.2										
<b>NEW</b>											
<b>NEW</b>											
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	11.6										
<b>NEW</b>											
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<b>NEW</b>											







# MPS1



Order Number	DC	I(d)	OAL	LU	LCF	LH	LF	PL	DCON	DP1021	Type
MPS1-1380S-DIN	3	107	39.8	60	62	104.5	2.5	14	□	4	
MPS1-1380S-DIN-C	3	107	39.8	60	62	104.5	2.5	14	●	2	
MPS1-1380L-DIN	5	124	56.8	77	79	121.5	2.5	14	□	4	
MPS1-1380L-DIN-C	5	124	56.8	77	79	121.5	2.5	14	●	2	
<b>NEW</b> MPS1-1380-PC	2	109	29.8	56.2	56	107	2.2	14	□	2	
MPS1-1380-L8C	13.8	8	206	113.3	156	160	203	2.5	14	●	2
<b>NEW</b> MPS1-1380-L10C	10	233	140.5	184.5	187	231	2.5	14	□	2	
<b>NEW</b> MPS1-1380-L12C	12	261	168.1	212.5	215	259	2.5	14	□	2	
<b>NEW</b> MPS1-1380-L15C	15	303	209.5	254.5	257	301	2.5	14	□	2	
<b>NEW</b> MPS1-1380-L20C	20	373	278.5	324.5	327	371	2.5	14	□	2	
MPS1-1390S-DIN	3	107	39.7	60	62	104.5	2.5	14	□	4	
MPS1-1390S-DIN-C	3	107	39.7	60	62	104.5	2.5	14	●	2	
MPS1-1390L-DIN	5	124	56.7	77	79	121.5	2.5	14	□	4	
MPS1-1390L-DIN-C	5	124	56.7	77	79	121.5	2.5	14	●	2	
<b>NEW</b> MPS1-1390-PC	2	109	30	56.2	56	107	2.2	14	□	2	
MPS1-1390-L8C	13.9	8	206	114.1	156	160	203	2.5	14	●	2
<b>NEW</b> MPS1-1390-L10C	10	233	141.5	184.5	187	231	2.5	14	□	2	
<b>NEW</b> MPS1-1390-L12C	12	261	169.3	212.5	215	259	2.5	14	□	2	
<b>NEW</b> MPS1-1390-L15C	15	303	211	254.5	257	301	2.5	14	□	2	
<b>NEW</b> MPS1-1390-L20C	20	373	280.5	324.5	327	371	2.5	14	□	2	
MPS1-1400S-DIN	3	107	39.5	60	62	104.5	2.5	14	□	4	
MPS1-1400S-DIN-C	3	107	39.5	60	62	104.5	2.5	14	●	2	
MPS1-1400L-DIN	5	124	56.5	77	79	121.5	2.5	14	□	4	
MPS1-1400L-DIN-C	5	124	56.5	77	79	121.5	2.5	14	●	2	
<b>NEW</b> MPS1-1400-PC	2	109	30.2	56.2	56	107	2.2	14	□	2	
MPS1-1400-L8C	14	8	206	114.9	156	160	203	2.5	14	●	2
<b>NEW</b> MPS1-1400-L10C	10	233	142.5	184.5	187	231	2.5	14	□	2	
<b>NEW</b> MPS1-1400-L12C	12	261	170.5	212.5	215	259	2.5	14	□	2	
<b>NEW</b> MPS1-1400-L15C	15	303	212.5	254.5	257	301	2.5	14	□	2	
<b>NEW</b> MPS1-1400-L20C	20	373	282.5	324.5	327	371	2.5	14	□	2	
MPS1-1420S-DIN	3	114	43.3	64	66	111.4	2.6	16	□	4	
MPS1-1420S-DIN-C	3	114	43.3	64	66	111.4	2.6	16	●	2	
MPS1-1420L-DIN	5	132	61.3	82	84	129.4	2.6	16	□	4	
MPS1-1420L-DIN-C	5	132	61.3	82	84	129.4	2.6	16	●	2	
MPS1-1450S-DIN	3	114	42.9	64	66	111.4	2.6	16	□	4	
MPS1-1450S-DIN-C	3	114	42.9	64	66	111.4	2.6	16	●	2	
MPS1-1450L-DIN	5	132	60.9	82	84	129.4	2.6	16	□	4	
MPS1-1450L-DIN-C	5	132	60.9	82	84	129.4	2.6	16	●	2	
MPS1-1500S-DIN	3	114	42.2	64	66	111.3	2.7	16	□	4	
MPS1-1500S-DIN-C	3	114	42.2	64	66	111.3	2.7	16	●	2	
MPS1-1500L-DIN	5	132	60.2	82	84	129.3	2.7	16	□	4	
MPS1-1500L-DIN-C	5	132	60.2	82	84	129.3	2.7	16	●	2	
MPS1-1550S-DIN	3	115	41.6	65	67	112.2	2.8	16	□	4	
MPS1-1550S-DIN-C	3	115	41.6	65	67	112.2	2.8	16	●	2	
MPS1-1550L-DIN	5	133	59.6	83	85	130.2	2.8	16	□	4	
MPS1-1550L-DIN-C	5	133	59.6	83	85	130.2	2.8	16	●	2	
MPS1-1600S-DIN	3	115	40.9	65	67	112.1	2.9	16	□	4	
MPS1-1600S-DIN-C	3	115	40.9	65	67	112.1	2.9	16	●	2	
MPS1-1600L-DIN	5	133	58.9	83	85	130.1	2.9	16	□	4	
MPS1-1600L-DIN-C	5	133	58.9	83	85	130.1	2.9	16	●	2	
MPS1-1650S-DIN	3	123	48.3	73	75	120	3	18	□	4	
MPS1-1650S-DIN-C	3	123	48.3	73	75	120	3	18	●	2	
MPS1-1650L-DIN	5	143	68.3	93	95	140	3	18	□	4	
MPS1-1650L-DIN-C	5	143	68.3	93	95	140	3	18	●	2	

Order Number	DC	I(d)	OAL	LU	LCF	LH	LF	PL	DCON	DP1021	Type
MPS1-1700S-DIN	3	123	47.6	73	75	119.9	3.1	18	□	4	
MPS1-1700S-DIN-C	3	123	47.6	73	75	119.9	3.1	18	●	2	
MPS1-1700L-DIN	5	143	67.6	93	95	139.9	3.1	18	□	4	
MPS1-1700L-DIN-C	5	143	67.6	93	95	139.9	3.1	18	●	2	
MPS1-1750S-DIN	3	123	46.9	73	75	119.8	3.2	18	□	4	
MPS1-1750S-DIN-C	3	123	46.9	73	75	119.8	3.2	18	●	2	
MPS1-1750L-DIN	5	143	66.9	93	95	139.8	3.2	18	□	4	
MPS1-1750L-DIN-C	5	143	66.9	93	95	139.8	3.2	18	●	2	
MPS1-1800S-DIN	3	123	46.3	73	75	119.7	3.3	18	□	4	
MPS1-1800S-DIN-C	3	123	46.3	73	75	119.7	3.3	18	●	2	
MPS1-1800L-DIN	5	143	66.3	93	95	139.7	3.3	18	□	4	
MPS1-1800L-DIN-C	5	143	66.3	93	95	139.7	3.3	18	●	2	
MPS1-1850S-DIN	3	131	51.6	79	81	127.6	3.4	20	□	4	
MPS1-1850S-DIN-C	3	131	51.6	79	81	127.6	3.4	20	●	2	
MPS1-1850L-DIN	5	153	73.6	101	103	149.6	3.4	20	□	4	
MPS1-1850L-DIN-C	5	153	73.6	101	103	149.6	3.4	20	●	2	
MPS1-1900S-DIN	3	131	51.0	79	81	127.5	3.5	20	□	4	
MPS1-1900S-DIN-C	3	131	51.0	79	81	127.5	3.5	20	●	2	
MPS1-1900L-DIN	5	153	73.0	101	103	149.5	3.5	20	□	4	
MPS1-1900L-DIN-C	5	153	73.0	101	103	149.5	3.5	20	●	2	
MPS1-1950S-DIN	3	131	50.3	79	81	127.5	3.5	20	□	4	
MPS1-1950S-DIN-C	3	131	50.3	79	81	127.5	3.5	20	●	2	
MPS1-1950L-DIN	5	153	72.3	101	103	149.5	3.5	20	□	4	
MPS1-1950L-DIN-C	5	153	72.3	101	103	149.5	3.5	20	●	2	
MPS1-2000S-DIN	3	131	49.6	79	81	127.4	3.6	20	□	4	
MPS1-2000S-DIN-C	3	131	49.6	79	81	127.4	3.6	20	●	2	
MPS1-2000L-DIN	5	153	71.6	101	103	149.4	3.6	20	□	4	
MPS1-2000L-DIN-C	5	153	71.6	101	103	149.4	3.6	20	●	2	

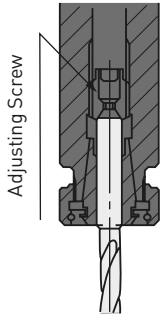


# RECOMMENDED CUTTING CONDITIONS

DC	L x DC	P			M	K			
		Mild Steel	Carbon Steel Alloy Steel		Stainless Steel	Cast Iron	Cast Iron		
		≤ 180 HB	180-250 HB	280-350 HB		≤ 350 MPa	≤ 450 MPa	≤ 800 MPa	
3	3-8	Vc m/min	100 (60-150)	90 (60-140)	80 (50-110)	40 (20-50)	90 (60-100)	80 (50-90)	60 (40-80)
		f mm/rev	0.15 (0.1-0.2)	0.15 (0.1-0.19)	0.12 (0.1-0.14)	0.08 (0.06-0.12)	0.15 (0.1-0.2)	0.12 (0.08-0.16)	0.09 (0.06-0.12)
	10-25	Vc m/min	90 (40-110)	90 (40-110)	80 (40-90)	40 (20-60)	90 (40-110)	90 (40-110)	
		f mm/rev	0.17 (0.1-0.24)	0.17 (0.1-0.24)	0.15 (0.09-0.22)	0.07 (0.05-0.09)	0.19 (0.11-0.26)	0.17 (0.1-0.24)	
	30-40	Vc m/min	75 (40-95)	75 (40-85)	65 (40-75)	30 (20-50)	75 (45-95)	30 (20-50)	
		f mm/rev	0.14 (0.08-0.19)	0.14 (0.08-0.19)	0.15 (0.07-0.18)	0.06 (0.04-0.07)	0.15 (0.09-0.21)	0.14 (0.08-0.19)	
4	3-8	Vc m/min	120 (70-170)	100 (70-160)	90 (60-120)	40 (30-50)	100 (70-110)	90 (60-100)	70 (50-90)
		f mm/rev	0.19 (0.12-0.25)	0.18 (0.12-0.24)	0.15 (0.12-0.18)	0.09 (0.07-0.13)	0.21 (0.12-0.3)	0.17 (0.1-0.24)	0.13 (0.08-0.18)
	10-25	Vc m/min	90 (40-110)	90 (40-110)	80 (40-90)	40 (20-60)	90 (40-110)	90 (40-110)	
		f mm/rev	0.2 (0.12-0.3)	0.2 (0.12-0.3)	0.18 (0.11-0.27)	0.08 (0.06-0.1)	0.22 (0.13-0.33)	0.2 (0.12-0.3)	
	30-40	Vc m/min	75 (40-95)	75 (40-85)	65 (40-75)	30 (20-50)	75 (45-95)	30 (20-50)	
		f mm/rev	0.16 (0.1-0.24)	0.16 (0.1-0.24)	0.18 (0.09-0.22)	0.06 (0.05-0.08)	0.18 (0.1-0.26)	0.16 (0.1-0.24)	
5	3-8	Vc m/min	130 (80-190)	110 (80-180)	90 (70-140)	40 (30-50)	110 (80-130)	90 (70-120)	70 (60-100)
		f mm/rev	0.23 (0.15-0.3)	0.22 (0.15-0.29)	0.19 (0.15-0.22)	0.11 (0.08-0.16)	0.25 (0.15-0.35)	0.21 (0.14-0.28)	0.17 (0.12-0.22)
	10-25	Vc m/min	90 (40-110)	90 (40-110)	80 (40-90)	40 (20-60)	90 (40-110)	90 (40-110)	
		f mm/rev	0.25 (0.15-0.35)	0.25 (0.15-0.35)	0.22 (0.14-0.32)	0.1 (0.07-0.12)	0.28 (0.17-0.39)	0.25 (0.15-0.35)	
	30-40	Vc m/min	75 (40-95)	75 (40-85)	65 (40-75)	30 (20-50)	75 (45-95)	30 (20-50)	
		f mm/rev	0.2 (0.12-0.28)	0.2 (0.12-0.28)	0.22 (0.11-0.26)	0.08 (0.06-0.1)	0.22 (0.13-0.31)	0.2 (0.12-0.28)	
6	3-8	Vc m/min	140 (90-210)	120 (90-190)	100 (80-150)	50 (40-70)	120 (90-140)	100 (80-130)	80 (70-110)
		f mm/rev	0.27 (0.18-0.35)	0.26 (0.18-0.33)	0.22 (0.18-0.25)	0.14 (0.11-0.18)	0.29 (0.18-0.4)	0.25 (0.16-0.34)	0.2 (0.14-0.26)
	10-25	Vc m/min	110 (70-120)	100 (60-110)	90 (40-110)	50 (20-60)	100 (60-110)	100 (60-110)	
		f mm/rev	0.27 (0.17-0.37)	0.24 (0.15-0.33)	0.24 (0.15-0.33)	0.12 (0.08-0.16)	0.3 (0.19-0.41)	0.27 (0.17-0.37)	
	30-40	Vc m/min	90 (40-110)	80 (40-90)	75 (40-85)	40 (20-60)	90 (60-110)	40 (30-60)	
		f mm/rev	0.22 (0.14-0.3)	0.22 (0.14-0.3)	0.24 (0.12-0.26)	0.1 (0.06-0.13)	0.24 (0.15-0.33)	0.22 (0.14-0.3)	
8	3-8	Vc m/min	160 (100-240)	140 (100-220)	120 (90-170)	50 (40-70)	140 (100-160)	120 (90-150)	100 (80-130)
		f mm/rev	0.3 (0.2-0.4)	0.29 (0.2-0.38)	0.24 (0.2-0.27)	0.15 (0.12-0.2)	0.33 (0.2-0.45)	0.28 (0.18-0.38)	0.23 (0.16-0.3)
	10-25	Vc m/min	110 (70-120)	100 (60-110)	90 (40-110)	50 (20-60)	100 (60-110)	100 (60-110)	
		f mm/rev	0.3 (0.2-0.4)	0.3 (0.2-0.4)	0.27 (0.18-0.36)	0.14 (0.1-0.17)	0.33 (0.22-0.44)	0.3 (0.2-0.4)	
	30-40	Vc m/min	90 (40-110)	80 (40-90)	75 (40-85)	40 (20-50)	90 (60-100)	40 (30-60)	
		f mm/rev	0.24 (0.16-0.32)	0.24 (0.16-0.32)	0.27 (0.14-0.29)	0.11 (0.08-0.14)	0.26 (0.18-0.35)	0.24 (0.16-0.32)	
10	3-8	Vc m/min	170 (100-250)	150 (100-230)	130 (90-180)	50 (40-70)	150 (100-170)	130 (90-160)	110 (80-140)
		f mm/rev	0.33 (0.2-0.45)	0.32 (0.2-0.43)	0.25 (0.2-0.3)	0.16 (0.12-0.22)	0.35 (0.2-0.5)	0.29 (0.18-0.4)	0.24 (0.16-0.32)
	10-25	Vc m/min	110 (70-120)	100 (60-110)	90 (40-110)	50 (20-60)	100 (60-110)	100 (60-110)	
		f mm/rev	0.32 (0.22-0.42)	0.32 (0.22-0.42)	0.29 (0.2-0.38)	0.15 (0.12-0.18)	0.35 (0.24-0.46)	0.32 (0.22-0.42)	
	30-40	Vc m/min	90 (40-110)	80 (40-90)	75 (40-95)	40 (20-50)	90 (60-100)	40 (30-60)	
		f mm/rev	0.26 (0.18-0.34)	0.26 (0.18-0.34)	0.29 (0.16-0.3)	0.12 (0.1-0.14)	0.28 (0.19-0.37)	0.26 (0.18-0.34)	
12	3-8	Vc m/min	180 (100-250)	160 (100-230)	140 (90-180)	50 (40-70)	160 (100-170)	140 (90-160)	110 (80-140)
		f mm/rev	0.35 (0.2-0.5)	0.34 (0.2-0.48)	0.27 (0.2-0.34)	0.18 (0.14-0.24)	0.4 (0.2-0.6)	0.31 (0.18-0.44)	0.25 (0.16-0.34)
	10-25	Vc m/min	130 (90-150)	120 (80-140)	100 (60-110)	60 (25-65)	120 (90-140)	120 (90-140)	
		f mm/rev	0.34 (0.24-0.44)	0.34 (0.24-0.44)	0.3 (0.22-0.4)	0.17 (0.14-0.19)	0.37 (0.26-0.48)	0.34 (0.24-0.44)	
	30-40	Vc m/min	105 (55-125)	95 (55-105)	80 (40-100)	50 (20-60)	105 (65-115)	50 (40-70)	
		f mm/rev	0.27 (0.19-0.35)	0.27 (0.19-0.35)	0.3 (0.18-0.32)	0.14 (0.11-0.15)	0.3 (0.21-0.38)	0.27 (0.19-0.35)	
16	3-8	Vc m/min	180 (100-250)	160 (100-230)	140 (90-180)	50 (40-70)	160 (100-170)	140 (90-160)	110 (80-140)
		f mm/rev	0.38 (0.2-0.55)	0.36 (0.2-0.52)	0.28 (0.2-0.36)	0.19 (0.15-0.26)	0.43 (0.2-0.65)	0.33 (0.18-0.48)	0.27 (0.16-0.38)
	10-25	Vc m/min	130 (90-150)	120 (80-140)	100 (60-110)	60 (25-65)	120 (90-140)	120 (90-140)	
		f mm/rev	0.36 (0.26-0.46)	0.36 (0.26-0.46)	0.32 (0.23-0.41)	0.17 (0.14-0.19)	0.4 (0.29-0.48)	0.36 (0.26-0.46)	
20	3-8	Vc m/min	180 (100-250)	160 (100-230)	140 (90-180)	50 (40-70)	160 (100-170)	140 (90-160)	110 (80-140)
		f mm/rev	0.4 (0.2-0.6)	0.39 (0.2-0.57)	0.3 (0.2-0.4)	0.21 (0.16-0.28)	0.45 (0.2-0.7)	0.35 (0.18-0.52)	0.28 (0.16-0.4)

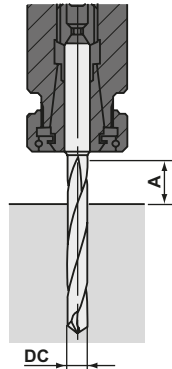
# OPERATIONAL GUIDANCE

## DRILL HOLDING



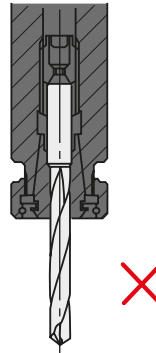
Thrust bearing type collet chuck holds the drill securely.

## DRILL LENGTH



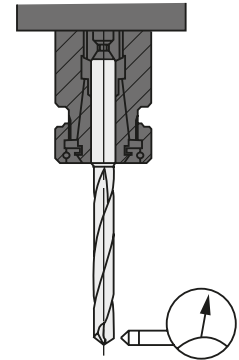
$$A \geq DC \times 1.5$$

## DRILL INSTALLATION



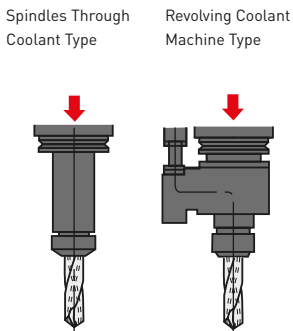
Do not clamp on the flutes.

## INSTALLATION TOLERANCE



Run-out  $\leq 0.03\text{mm}$

## THROUGH COOLANT TYPE

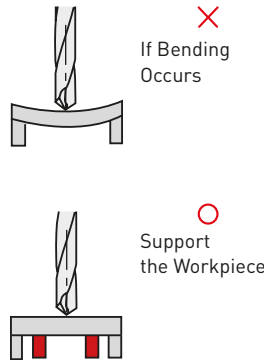


Coolant pressure is approx. 0.5–1MPa (<math>\phi 5:2-3\text{MPa}</math>).

## COOLANT HANDLING

1. Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.
2. Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

## THIN WORKPIECE

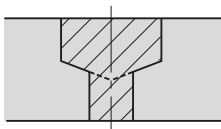


## INTERRUPTED CUTTING

### One Process

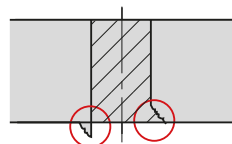
1. Lower the feed when drilling the interrupted part. (Red circle icon)
  2. Spot face with an end mill prior to drilling. (Red triangle icon)
- Requires Prior Machining

## STEPPED HOLES



1. Divide the two processes.
  2. Drill the larger hole first.
- \* A tool for machining both chamfer and spot face can be produced to order.

## BURRING AND WORKPIECE CHIPPING

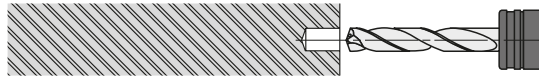


1. Lower the feed rate by 50% at the end of through cutting.
2. Add a 45° chamfer.
3. Change the point angle.

# HOW TO USE LONG TYPE DRILLS

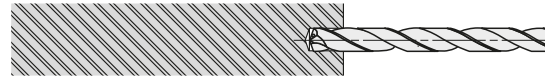
## DRILLING A BLIND HOLE

### 1. Drilling a pilot hole



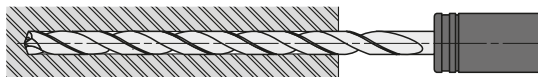
1. Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MPS1 (PC) is recommended.
2. Ensure a high precision hole is drilled for the guide.
3. Drill depth : Approx 1DC or deeper.  
[Adjust the pilot hole depth according to the length of the super long type.]

### 2. Initial cutting with the long type drill



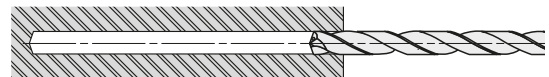
1. Penetrate the pilot hole at low revolution.  
[Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev]
2. Stop the long type drill 1—3mm short of the pilot hole bottom.

### 3. Drill the deep hole



1. Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

### 4. Drill retraction



1. After drilling, lower the cutting revolution about 1—2mm short of the hole end. [Cutting speed of around 20—30m/min]
2. Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
3. Finally, clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.

## DRILLING AND BREAKING THROUGH ON IRREGULAR FACES OR ANGLES

### 1. Spot facing



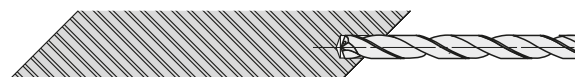
1. Machine a flat on the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

### 2. Drilling a pilot hole



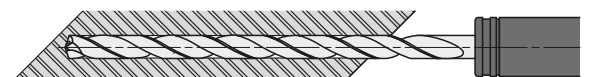
1. Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MPS1 (PC) is recommended.
2. Ensure a high precision hole is drilled for the guide.
3. Drill depth : Approx 1DC or deeper.  
[Adjust the pilot hole depth according to the length of the super long type.]

### 3. Initial cutting with the long type drill



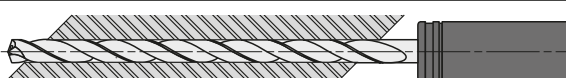
1. Penetrate the pilot hole at a low revolution.  
[Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev]
2. Stop the long type drill 1—3mm short of the pilot hole bottom.

### 4. Drill the deep hole



1. Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.
2. Feed as usual until breaking through.

### 5. Breaking through



1. When breaking through, the cutting edge can be damaged.
2. A feed rate of 0.05—0.1mm/rev is recommended.

### 6. Drill retraction



1. Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
2. Finally clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.

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# MEMO

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# MEMO

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