

Drilling

K1~K76

Product Lineup

K2~K3

MagicDrill DRA

K4~K17

SS-DRA	Drilling Depth: 3xD type	Straight Shank	K9
SS-DRA	Drilling Depth: 5xD type	Straight Shank	K10
SS-DRA	Drilling Depth: 8xD type	Straight Shank	K11
SF-DRA	Drilling Depth: 3xD type	Flanged Shank	K12
SF-DRA	Drilling Depth: 5xD type	Flanged Shank	K13
SF-DRA	Drilling Depth: 8xD type	Flanged Shank	K14

MagicDrill DRC

K18~K33

SS-DRC	Drilling Depth: 3xD type	Straight Shank	K21
SS-DRC	Drilling Depth: 5xD type	Straight Shank	K22
SS-DRC	Drilling Depth: 8xD type	Straight Shank	K23
Chamfering attachment for Straight Shank SS-DRC			K24
SF-DRC	Drilling Depth: 3xD type	Flanged Shank	K26
SF-DRC	Drilling Depth: 5xD type	Flanged Shank	K27
SF-DRC	Drilling Depth: 8xD type	Flanged Shank	K28

MagicDrill DRX

K34~K52

DRX	Drilling Depth: 2xD type	φ12~φ60	K40
DRX	Drilling Depth: 3xD type	φ12~φ60	K42
DRX	Drilling Depth: 4xD type	φ12~φ60	K44
DRX	Drilling Depth: 5xD type	φ12~φ60	K46

MagicDrill DRS & DRZ

K53~K66

DRS (MagicDrill Mini)		φ10~φ12.5	K54
DRZ	Drilling Depth: 2xD type	φ13~φ59	K56
DRZ	Drilling Depth: 3xD type	φ13~φ59	K58
DRZ	Drilling Depth: 4xD type	φ13~φ50	K60
DRZ	Drilling Depth: 5xD type	φ27~φ50	K62
DRZ-CR	Cartridge type	φ60~	K63

MagicDrill DRW

K67~K71

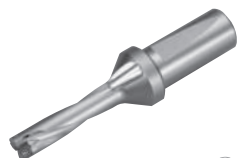
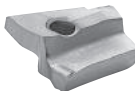
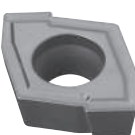
DRW	Drilling Depth: 1xD Type	φ60~φ100	K68
DRW	Drilling Depth: 2xD type	φ60~φ100	K68
DRW	Drilling Depth: 3xD type	φ60~φ100	K69

Fine Micro Drill

K72~K76

FDM			K72
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Product Lineup

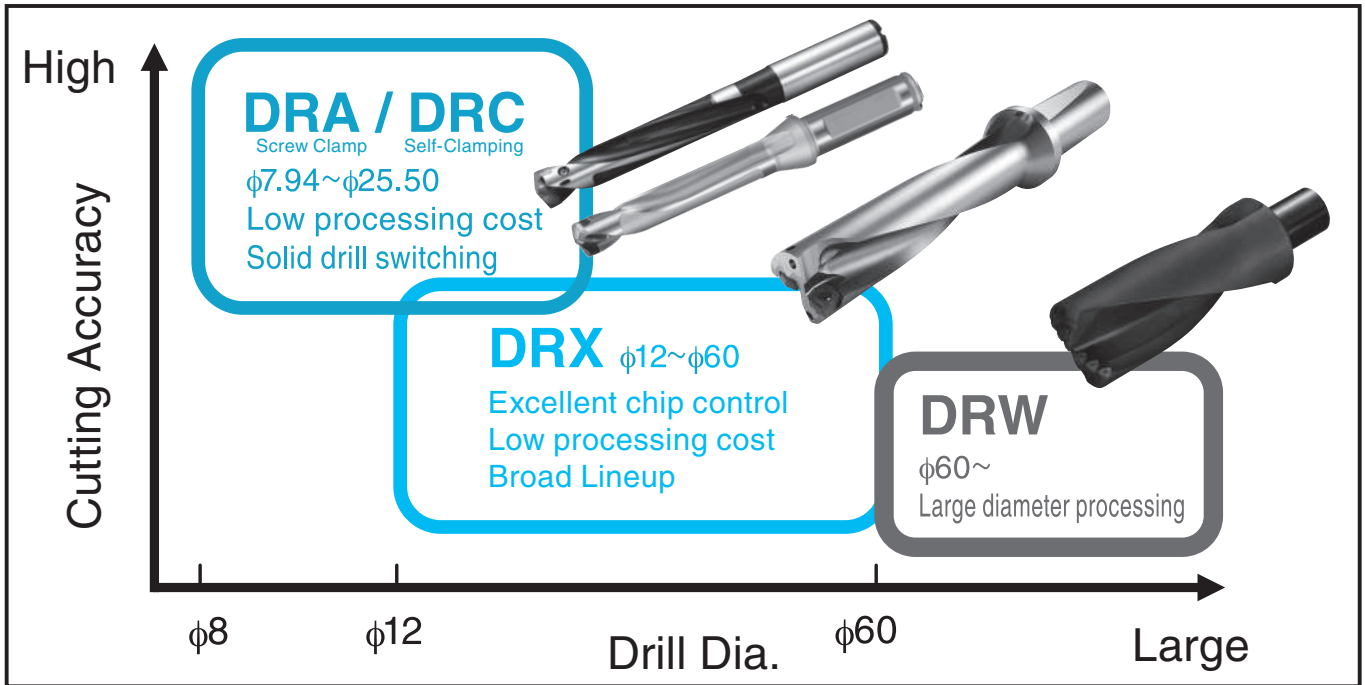
Type	Shape	Drill Dia. (Drilling Depth)	Cutting Edge	Remarks
DRA  Screw Clamp 		$\phi 7.94 \sim \phi 25.50$ (3D/5D/8D)	Module type with double edges 	Line up  SS-DRA  SF-DRA
DRC  Self-Clamping 		$\phi 7.94 \sim \phi 25.50$ (3D/5D/8D)	Module type with double edges 	Line up  SS-DRC  SF-DRC  Chamfering attachment
DRX   Silver Coating 		$\phi 12$ $\phi 12.5$ $\phi 13$ (2D/3D/4D) $\phi 12, \phi 13$ (5D)	Two Cutting Edges per Insert  Outer edge Inner edge ZXMT03	Chip Shape (Workpiece Material: S50C) Drill Dia. $\phi 12$ Chip from outer edge  Chip from inner edge 
		$\phi 13.5 \sim \phi 60$ (2D/3D/4D) $\phi 14 \sim \phi 60$ (5D)	Inner & Outer Edges on One Insert  ZXMT	Chip Shape (Workpiece Material: S50C) Drill Dia. $\phi 24$ Chip from outer edge  Chip from inner edge 
DRS [MagicDrill Mini]  Silver Coating 		$\phi 10 \sim \phi 12.5$ (3.5D)	Inner & Outer Edges on One Insert 	Chip Shape (Workpiece Material: S50C) Drill Dia. $\phi 10$ Chip from outer edge  Chip from inner edge 
DRZ   DRZ- DRZ-CR [Cartridge type] (Made to order) 		$\phi 13 \sim \phi 59$ (2D/3D) $\phi 13 \sim \phi 50$ (4D) $\phi 27 \sim \phi 50$ (5D)	Inner & Outer Edges on One Insert 	Chip Shape (Workpiece Material: S50C) Drill Dia. $\phi 23$ Chip from outer edge  Chip from inner edge 
DRW (Made to order for some products)  		$\phi 60 \sim$ (1D/2D/3D)	Inner & Outer Edges on One Insert 	Custom-order item  BT integral arbor type is also available.  Drilling diameter $\phi 200$ is also possible.

K

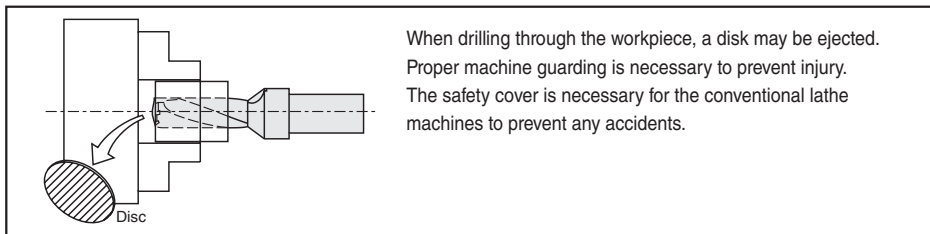


Drilling

● MagicDrill Series Application Map



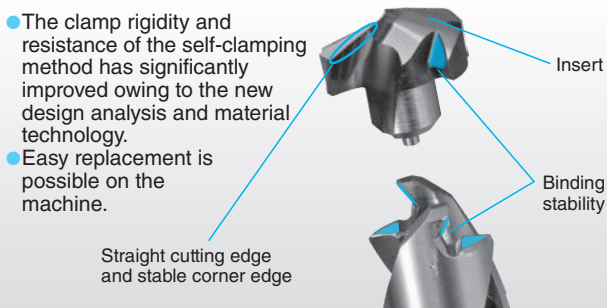
■ Caution



MagicDrill DRC Drill Dia. φ7.94~φ25.50 Drilling Depth 3D-5D-8D

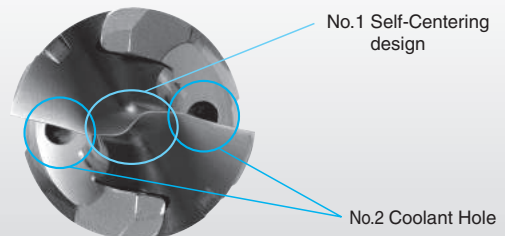
4 unique characteristics of DRC type MagicDrill improve productivity as well as reduce machining costs owing to high speed and high feed rate machining.

Advantages 1. Self-Clamping design



Advantages 2. Self-Centering design

- The S curve geometry of the insert known as the “Self-Centering design” enables smooth drilling, lower cutting forces and a high quality hole surface.



Advantages 3. Multiple Helical Angle Flute design

- Stronger drill body and smooth chip evacuation.



Advantages 4. Direct Cooling design

- The coolant is fed directly into the inserts cutting face, cooling the top of the drill and preventing chip adhesion, which allows for quick and smooth chip evacuation.



K



Drilling

High Efficiency Modular Drill

MagicDrill DRA

Excellent hole accuracy with a low cutting force design

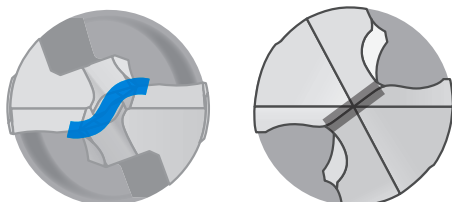
5 advantages to efficiently solve common drilling difficulties

1

Low cutting force design improves hole accuracy

Special chisel edge with S-curve reduces thrust force and controls vibration

Cutting edge image

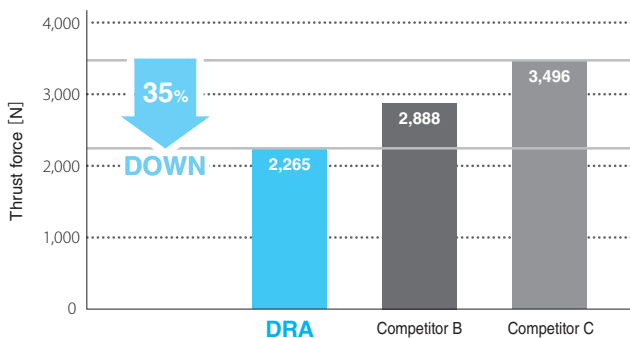


DRA

Standard Drill

Cutting force comparison
(Internal evaluation)

Cutting Conditions : $V_c=120\text{m/min}$, $f=0.25\text{mm/rev}$
Drill Dia. $\phi 14$, Drilling Depth 45mm, Wet
Workpiece Material : S50C

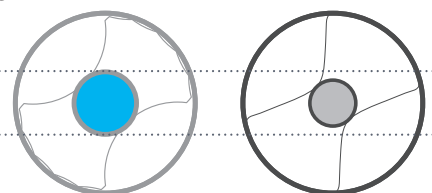


2

Optimal web thickness limits deflection

Improved hole accuracy by controlling drill deflection with a 20% thicker web compared with Competitor A

Web Thickness Comparison

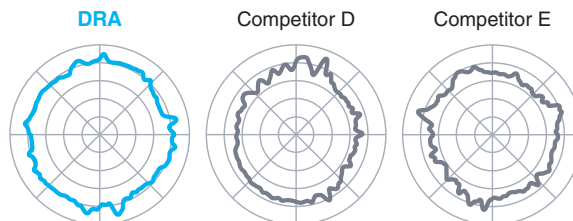


DRA

Competitor A

Roundness ·
Cylindricity
Comparison
(Internal evaluation)

Cutting Conditions : $V_c=120\text{m/min}$, $f=0.3\text{mm/rev}$
Drill Dia. $\phi 14$, Measurement point 55mm, Wet
Workpiece Material : S50C



	DRA	Competitor D	Competitor E
Roundness	18.7 μm	31.1 μm	27.3 μm
Cylindricity	23.6 μm	34.3 μm	30.1 μm

3

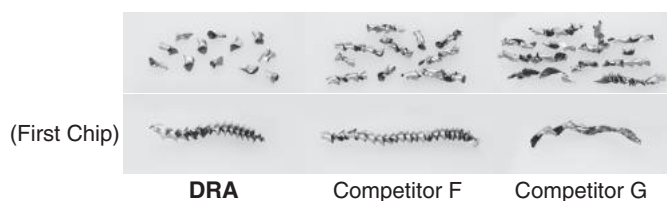
Fine chip breaking even in deep hole drilling applications

Optimized chip thinning for stable chip evacuation

Support groove with wider flute (5D, 8D) enables smooth chip evacuation

Chip
Comparison
(Internal evaluation)

Cutting Conditions : $V_c=60\text{m/min}$, $f=0.2\text{mm/rev}$, Drill Dia. $\phi 14$
Drilling Depth 70mm, Wet Workpiece Material : SUS304

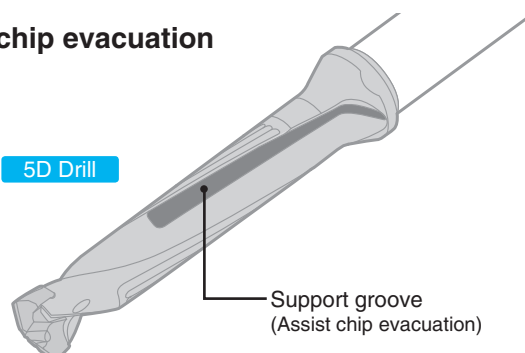


DRA

Competitor F

Competitor G

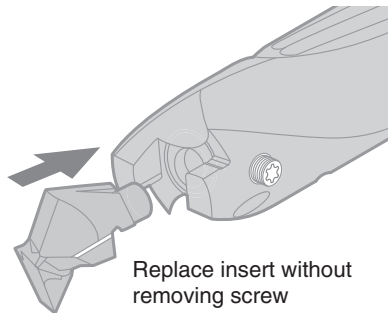
5D Drill



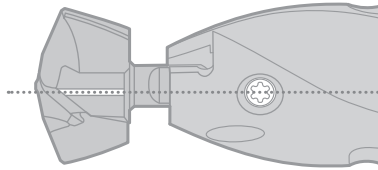
Support groove
(Assist chip evacuation)

4 Easy insert replacement

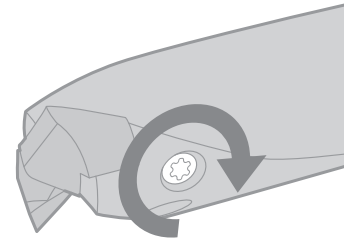
Replace insert without removing screw



Replace insert without removing screw



Install the insert onto toolholder
(align insert guide line with screw position)



Fix the insert by tightening the screw

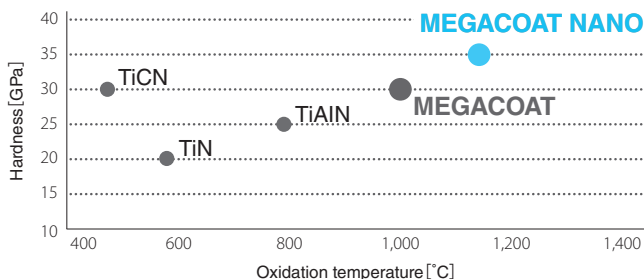
5 Long tool life and stable machining of various workpieces

MEGACOAT NANO grade PR1535 is used to machine various materials from steel to stainless steel, with the combination of a tough substrate and a special nano layer coating

Recommended Insert Grades

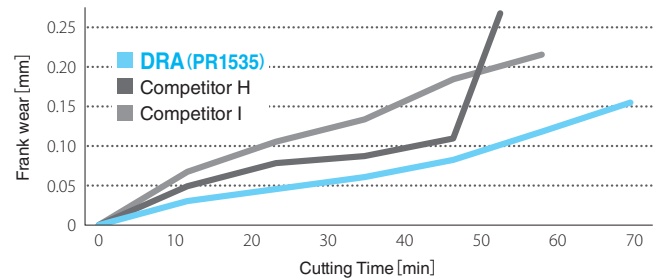
Steel, Stainless Steel	Cast Iron
PR1535	PR1525

Properties of PVD Coating



Low Oxidation resistance High

Wear Resistance Comparison (Internal evaluation)



Cutting Conditions : $V_c=100\text{m/min}$, $f=0.25\text{mm/rev}$, Drill Dia. $\phi 14$,
Drilling Depth 45mm, Wet
Workpiece Material : SCM440H

Case Studies

Attachment SS400

$V_c=70\text{m/min}$ ($n=1,240\text{min}^{-1}$)
 $f=0.23\text{mm/rev}$ ($V_f=285\text{mm/min}$)
Drilling Depth 100mm
Wet (Internal coolant)
With spot drilling
SF25-DRA180M-8
DA1800M-GM PR1535

Cutting Time

DRA $\phi 18\text{-}8\text{D}$

45 sec

30%
Cutting Time

Competitor J $\phi 18\text{-}7\text{D}$
(Modular Drill)

65 sec

Competitor J applied a step feeding to avoid chip clogging.
DRA controlled chip evacuation without pecking.
(Evaluation by the user)

Plate SUS304

$V_c=60\text{m/min}$ ($n=2,120\text{min}^{-1}$)
 $f=0.12\text{mm/rev}$ ($V_f=254\text{mm/min}$)
Drilling Depth 15mm
Wet (Internal coolant)
SS10-DRA090M-3
DA0900M-GM PR1535

Number of holes

DRA $\phi 9\text{-}3\text{D}$

500 holes

Tool life
5 times

Competitor K $\phi 9\text{-}3\text{D}$
(Modular Drill)

100 holes

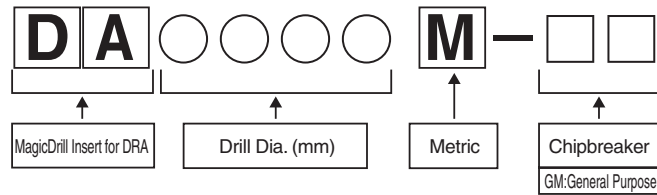
DRA extended the tool life by 5 times compared to Competitor K. DRA maintained stable machining and excellent surface finish with less cutting noise.
(Evaluation by the user)

K

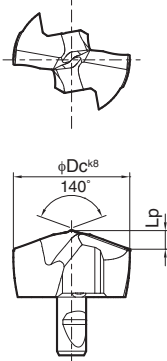


Drilling

Description Identification System (Insert)



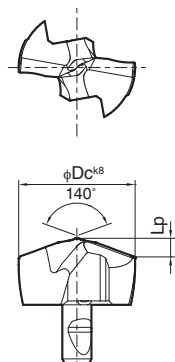
Applicable Inserts

Insert		Description	Dimension (mm)		MEGACOAT NANO		Applicable Toolholders K9~K14
			ϕD_c	L_p	PR1535	PR1525	
 K  Drilling 		DA 0794M-GM	7.94	1.34	●	●	SS10-DRA080M-○ SF12-DRA080M-○
		0800M-GM	8.00	1.35	●	●	
		0810M-GM	8.10	1.37	●	●	
		0820M-GM	8.20	1.38	●	●	
		0830M-GM	8.30	1.40	●	●	
		0840M-GM	8.40	1.42	●	●	
		DA 0850M-GM	8.50	1.44	●	●	SS10-DRA085M-○ SF12-DRA085M-○
		0860M-GM	8.60	1.46	●	●	
		0870M-GM	8.70	1.48	●	●	
		0880M-GM	8.80	1.49	●	●	
		0890M-GM	8.90	1.51	●	●	
		DA 0900M-GM	9.00	1.52	●	●	SS10-DRA090M-○ SF12-DRA090M-○
		0910M-GM	9.10	1.54	●	●	
		0920M-GM	9.20	1.56	●	●	
		0930M-GM	9.30	1.58	●	●	
		0940M-GM	9.40	1.59	●	●	
		DA 0950M-GM	9.50	1.61	●	●	SS10-DRA095M-○ SF12-DRA095M-○
		0960M-GM	9.60	1.63	●	●	
		0970M-GM	9.70	1.65	●	●	
		0980M-GM	9.80	1.67	●	●	
		0990M-GM	9.90	1.68	●	●	
		DA 1000M-GM	10.00	1.70	●	●	SS12-DRA100M-○ SF16-DRA100M-○
		1010M-GM	10.10	1.72	●	●	
		1020M-GM	10.20	1.74	●	●	
		1030M-GM	10.30	1.75	●	●	
		1040M-GM	10.40	1.77	●	●	
		DA 1050M-GM	10.50	1.79	●	●	SS12-DRA105M-○ SF16-DRA105M-○
		1060M-GM	10.60	1.81	●	●	
		1070M-GM	10.70	1.83	●	●	
		1080M-GM	10.80	1.85	●	●	
		1090M-GM	10.90	1.86	●	●	
		DA 1100M-GM	11.00	1.87	●	●	SS12-DRA110M-○ SF16-DRA110M-○
		1110M-GM	11.10	1.89	●	●	
		1120M-GM	11.20	1.91	●	●	
		1130M-GM	11.30	1.92	●	●	
		1140M-GM	11.40	1.94	●	●	
		DA 1150M-GM	11.50	1.96	●	●	SS12-DRA115M-○ SF16-DRA115M-○
		1160M-GM	11.60	1.98	●	●	
		1170M-GM	11.70	2.00	●	●	
		1180M-GM	11.80	2.01	●	●	
		1190M-GM	11.90	2.03	●	●	
		DA 1200M-GM	12.00	2.03	●	●	SS14-DRA120M-○ SF16-DRA120M-○
		1210M-GM	12.10	2.05	●	●	
		1220M-GM	12.20	2.07	●	●	
		1230M-GM	12.30	2.08	●	●	
		1240M-GM	12.40	2.10	●	●	

k8 tolerance

ϕD_c	k8(mm)
7.94 ~ 10.00	+0.022 0
10.10 ~ 18.00	+0.027 0
18.10 ~ 25.50	+0.033 0

k8 is the dimension tolerance of the insert.
It is not the dimension tolerance of the hole diameter.

Insert		Description	Dimension (mm)		MEGACOAT NANO		Applicable Toolholders								
			φDc	Lp	PR1535	PR1525	 K9~K14								
  k8 tolerance <table><tr><th>φDc</th><th>k8(mm)</th></tr><tr><td>7.94 ⌢ 10.00</td><td>+0.022 0</td></tr><tr><td>10.10 ⌢ 18.00</td><td>+0.027 0</td></tr><tr><td>18.10 ⌢ 25.50</td><td>+0.033 0</td></tr></table> k8 is the dimension tolerance of the insert. It is not the dimension tolerance of the hole diameter.	φDc	k8(mm)	7.94 ⌢ 10.00	+0.022 0	10.10 ⌢ 18.00	+0.027 0	18.10 ⌢ 25.50	+0.033 0	DA	1250M-GM	12.50	2.12			SS14-DRA125M-  SF16-DRA125M- 
	φDc	k8(mm)													
	7.94 ⌢ 10.00	+0.022 0													
	10.10 ⌢ 18.00	+0.027 0													
	18.10 ⌢ 25.50	+0.033 0													
	1260M-GM	12.60	2.14												
	1270M-GM	12.70	2.16												
	1280M-GM	12.80	2.17												
	1290M-GM	12.90	2.19												
	DA	1300M-GM	13.00	2.20			SS14-DRA130M-  SF16-DRA130M- 								
	1310M-GM	13.10	2.22												
	1320M-GM	13.20	2.24												
	1330M-GM	13.30	2.25												
	1340M-GM	13.40	2.27												
	DA	1350M-GM	13.50	2.29			SS14-DRA135M-  SF16-DRA135M- 								
	1360M-GM	13.60	2.31												
	1370M-GM	13.70	2.33												
	1380M-GM	13.80	2.35												
	1390M-GM	13.90	2.36												
	DA	1400M-GM	14.00	2.33			SS16-DRA140M-  SF16-DRA140M- 								
	1410M-GM	14.10	2.34												
	1420M-GM	14.20	2.36												
	1430M-GM	14.30	2.38												
	1440M-GM	14.40	2.40												
	DA	1450M-GM	14.50	2.42			SS16-DRA145M-  SF16-DRA145M- 								
	1460M-GM	14.60	2.43												
	1470M-GM	14.70	2.45												
	1480M-GM	14.80	2.47												
	1490M-GM	14.90	2.49												
	DA	1500M-GM	15.00	2.52			SS16-DRA150M-  SF20-DRA150M- 								
	1510M-GM	15.10	2.54												
	1520M-GM	15.20	2.55												
	1530M-GM	15.30	2.57												
	1540M-GM	15.40	2.59												
	1550M-GM	15.50	2.61												
	1560M-GM	15.60	2.63												
	1570M-GM	15.70	2.65												
	1580M-GM	15.80	2.66												
	1590M-GM	15.90	2.68												
	DA	1600M-GM	16.00	2.69			SS18-DRA160M-  SF20-DRA160M- 								
	1610M-GM	16.10	2.71												
	1620M-GM	16.20	2.73												
	1630M-GM	16.30	2.75												
	1640M-GM	16.40	2.76												
	1650M-GM	16.50	2.78												
	1660M-GM	16.60	2.80												
	1670M-GM	16.70	2.82												
	1680M-GM	16.80	2.84												
	1690M-GM	16.90	2.86												
	DA	1700M-GM	17.00	2.86			SS18-DRA170M-  SF20-DRA170M- 								
1710M-GM	17.10	2.88													
1720M-GM	17.20	2.90													
1730M-GM	17.30	2.92													
1740M-GM	17.40	2.93													
1750M-GM	17.50	2.95													
1760M-GM	17.60	2.97													
1770M-GM	17.70	2.99													
1780M-GM	17.80	3.01													
1790M-GM	17.90	3.03													
DA	1800M-GM	18.00	3.04			SS20-DRA180M-  SF25-DRA180M- 									
1810M-GM	18.10	3.06													
1820M-GM	18.20	3.07													
1830M-GM	18.30	3.09													
1840M-GM	18.40	3.11													
1850M-GM	18.50	3.13													
1860M-GM	18.60	3.15													
1870M-GM	18.70	3.17													
1880M-GM	18.80	3.18													
1890M-GM	18.90	3.20													

● : Std. Item

DA inserts are
sold in 1 piece boxes

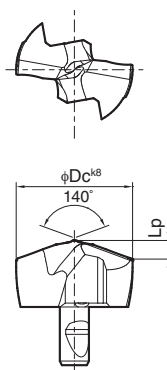
K



Drilling

K7

MagicDrill Insert for DRA **NEW**

Insert		Description	Dimension (mm)		MEGACOAT NANO		Applicable Toolholders ⚙️ K9~K14								
			φDc	Lp	PR1535	PR1525									
  k8 tolerance <table border="1"><thead><tr><th>φDc</th><th>k8(mm)</th></tr></thead><tbody><tr><td>7.94 ⌢ 10.00</td><td>+0.022 0</td></tr><tr><td>10.10 ⌢ 18.00</td><td>+0.027 0</td></tr><tr><td>18.10 ⌢ 25.50</td><td>+0.033 0</td></tr></tbody></table> k8 is the dimension tolerance of the insert. It is not the dimension tolerance of the hole diameter.	φDc	k8(mm)	7.94 ⌢ 10.00	+0.022 0	10.10 ⌢ 18.00	+0.027 0	18.10 ⌢ 25.50	+0.033 0	DA	1900M-GM	19.00	3.21	●	●	SS20-DRA190M-○ SF25-DRA190M-○
	φDc	k8(mm)													
	7.94 ⌢ 10.00	+0.022 0													
	10.10 ⌢ 18.00	+0.027 0													
	18.10 ⌢ 25.50	+0.033 0													
	1910M-GM	19.10	3.23	●	●										
	1920M-GM	19.20	3.25	●	●										
	1930M-GM	19.30	3.27	●	●										
	1940M-GM	19.40	3.29	●	●										
	1950M-GM	19.50	3.30	●	●										
	1960M-GM	19.60	3.32	●	●										
	1970M-GM	19.70	3.34	●	●										
	1980M-GM	19.80	3.36	●	●										
	1990M-GM	19.90	3.38	●	●										
	DA	2000M-GM	20.00	3.37	●	●	SS25-DRA200M-○ SF25-DRA200M-○								
	2010M-GM	20.10	3.39	●	●										
	2020M-GM	20.20	3.41	●	●										
	2030M-GM	20.30	3.43	●	●										
	2040M-GM	20.40	3.45	●	●										
	2050M-GM	20.50	3.46	●	●										
	2060M-GM	20.60	3.48	●	●										
	2070M-GM	20.70	3.50	●	●										
	2080M-GM	20.80	3.52	●	●										
	2090M-GM	20.90	3.54	●	●										
	DA	2100M-GM	21.00	3.54	●	●	SS25-DRA210M-○ SF25-DRA210M-○								
	2150M-GM	21.50	3.63	●	●										
	DA	2200M-GM	22.00	3.71	●	●	SS25-DRA220M-○ SF25-DRA220M-○								
	2250M-GM	22.50	3.80	●	●										
DA	2300M-GM	23.00	3.87	●	●	SS25-DRA230M-○ SF25-DRA230M-○									
2350M-GM	23.50	3.96	●	●											
DA	2400M-GM	24.00	4.04	●	●	SS25-DRA240M-○ SF25-DRA240M-○									
2450M-GM	24.50	4.13	●	●											
DA	2500M-GM	25.00	4.20	●	●	SS32-DRA250M-○ SF25-DRA250M-○									
2550M-GM	25.50	4.29	●	●											

K



Drilling

DRA

DRC

DRX

DRS

DRZ

DRW

Fine
Micro

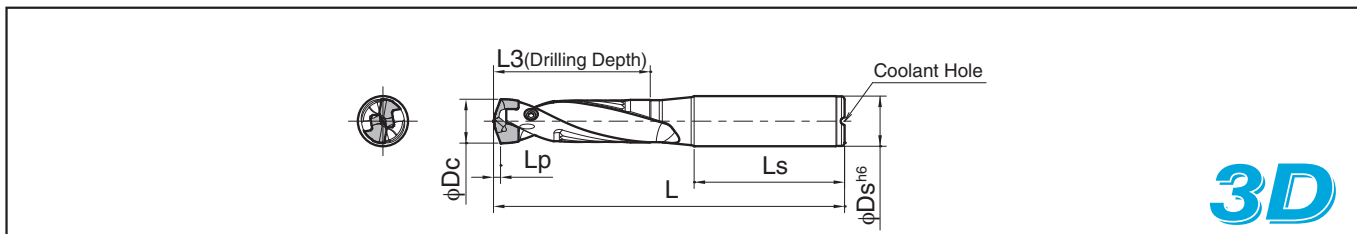
DA inserts are
sold in 1 piece boxes

● : Std. Item

Description Identification System (Toolholder)



SS-DRA (Drilling Depth: $3 \times D$)



For Lp indicates distance from drill point to corner edge **K6~K8**

Toolholder Dimensions

Description		Std.	Dimension (mm)						Spare Parts		Applicable Inserts 🌀 K6~K8
			Applicable Insert Dia. φDc		φDs (h6)	L	L3	Ls	Clamp Screw	Wrench	
			min.	max.							
SS10-	DRA080M-3	●	7.94	8.49	10	79	25.5	40	HS-2524TRP	FTP-5	DA0794M-GM~DA0840M-GM
	DRA085M-3	●	8.50	8.99		81	27.0				DA0850M-GM~DA0890M-GM
	DRA090M-3	●	9.00	9.49		83	28.5				DA0900M-GM~DA0940M-GM
	DRA095M-3	●	9.50	9.99		85	30.0				DA0950M-GM~DA0990M-GM
SS12-	DRA100M-3	●	10.00	10.49	12	92	31.5	45	HS-2534TRP		DA1000M-GM~DA1040M-GM
	DRA105M-3	●	10.50	10.99		94	33.0				DA1050M-GM~DA1090M-GM
	DRA110M-3	●	11.00	11.49		97	34.5				DA1100M-GM~DA1140M-GM
	DRA115M-3	●	11.50	11.99		99	36.0				DA1150M-GM~DA1190M-GM
SS14-	DRA120M-3	●	12.00	12.49	14	101	37.5	50	HS-2534TRP	DA1200M-GM~DA1240M-GM	
	DRA125M-3	●	12.50	12.99		103	39.0			DA1250M-GM~DA1290M-GM	
	DRA130M-3	●	13.00	13.49		105	40.5			DA1300M-GM~DA1340M-GM	
	DRA135M-3	●	13.50	13.99		107	42.0			DA1350M-GM~DA1390M-GM	
SS16-	DRA140M-3	●	14.00	14.49	16	112	43.5	48	HS-3048TRP	FTP-6	DA1400M-GM~DA1440M-GM
	DRA145M-3	●	14.50	14.99		114	45.0				DA1450M-GM~DA1490M-GM
	DRA150M-3	●	15.00	15.99		119	48.0				DA1500M-GM~DA1590M-GM
SS18-	DRA160M-3	●	16.00	16.99	18	124	51.0	50	HS-3048TRP		DA1600M-GM~DA1690M-GM
	DRA170M-3	●	17.00	17.99		128	54.0				DA1700M-GM~DA1790M-GM
SS20-	DRA180M-3	●	18.00	18.99	20	135	57.0	50	HS-3048TRP		FTP-7
	DRA190M-3	●	19.00	19.99		139	60.0			DA1900M-GM~DA1990M-GM	
SS25-	DRA200M-3	●	20.00	20.99	25	149	63.0	56	HS-4067TRP	DA2000M-GM~DA2090M-GM	
	DRA210M-3	●	21.00	21.99		153	66.0			DA2100M-GM~DA2150M-GM	
	DRA220M-3	●	22.00	22.99		158	69.0			DA2200M-GM~DA2250M-GM	
	DRA230M-3	●	23.00	23.99		162	72.0			DA2300M-GM~DA2350M-GM	
	DRA240M-3	●	24.00	24.99		166	75.0			DA2400M-GM~DA2450M-GM	
SS32-	DRA250M-3	●	25.00	25.50	32	174	78.0	60		DA2500M-GM~DA2550M-GM	

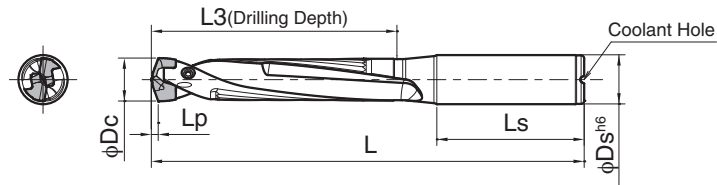
● : Std. Item

K



Drilling

SS-DRA (Drilling Depth:5xD)



5D

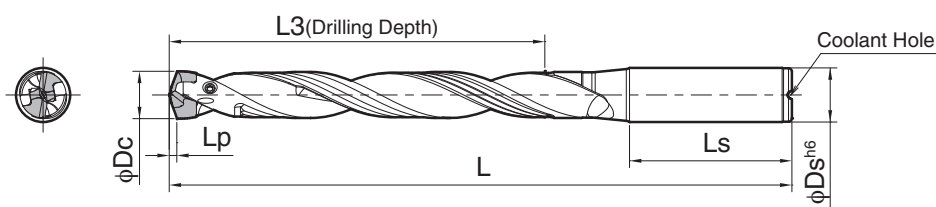
For Lp indicates distance from drill point to corner edge K6~K8

Toolholder Dimensions

Description		Std.	Dimension (mm)					Spare Parts		Applicable Inserts 🌀 K6~K8	
			Applicable Insert Dia. φDc		φDs (h6)	L	L3	Ls	Clamp Screw		Wrench
			min.	max.							
SS10-	DRA080M-5	●	7.94	8.49	10	96	42.5	40	HS-2524TRP	FTP-5	DA0794M-GM~DA0840M-GM
	DRA085M-5	●	8.50	8.99		99	45.0				DA0850M-GM~DA0890M-GM
	DRA090M-5	●	9.00	9.49		102	47.5				DA0900M-GM~DA0940M-GM
	DRA095M-5	●	9.50	9.99		105	50.0				DA0950M-GM~DA0990M-GM
SS12-	DRA100M-5	●	10.00	10.49	12	113	52.5	45	HS-2534TRP		DA1000M-GM~DA1040M-GM
	DRA105M-5	●	10.50	10.99		116	55.0				DA1050M-GM~DA1090M-GM
	DRA110M-5	●	11.00	11.49		120	57.5				DA1100M-GM~DA1140M-GM
	DRA115M-5	●	11.50	11.99		123	60.0				DA1150M-GM~DA1190M-GM
SS14-	DRA120M-5	●	12.00	12.49	14	126	62.5	48	HS-3048TRP	DA1200M-GM~DA1240M-GM	
	DRA125M-5	●	12.50	12.99		129	65.0			DA1250M-GM~DA1290M-GM	
	DRA130M-5	●	13.00	13.49		132	67.5			DA1300M-GM~DA1340M-GM	
	DRA135M-5	●	13.50	13.99		135	70.0			DA1350M-GM~DA1390M-GM	
SS16-	DRA140M-5	●	14.00	14.49	16	141	72.5	50	HS-3048TRP	FTP-6	DA1400M-GM~DA1440M-GM
	DRA145M-5	●	14.50	14.99		144	75.0				DA1450M-GM~DA1490M-GM
	DRA150M-5	●	15.00	15.99		151	80.0				DA1500M-GM~DA1590M-GM
SS18-	DRA160M-5	●	16.00	16.99	18	158	85.0	56	HS-4067TRP	FTP-7	DA1600M-GM~DA1690M-GM
	DRA170M-5	●	17.00	17.99		164	90.0				DA1700M-GM~DA1790M-GM
SS20-	DRA180M-5	●	18.00	18.99	20	173	95.0	60	HS-4067TRP	FTP-7	DA1800M-GM~DA1890M-GM
	DRA190M-5	●	19.00	19.99		179	100.0				DA1900M-GM~DA1990M-GM
SS25-	DRA200M-5	●	20.00	20.99	25	191	105.0	60	HS-4067TRP	FTP-7	DA2000M-GM~DA2090M-GM
	DRA210M-5	●	21.00	21.99		197	110.0				DA2100M-GM~DA2150M-GM
	DRA220M-5	●	22.00	22.99		204	115.0				DA2200M-GM~DA2250M-GM
	DRA230M-5	●	23.00	23.99		210	120.0				DA2300M-GM~DA2350M-GM
	DRA240M-5	●	24.00	24.99		216	125.0				DA2400M-GM~DA2450M-GM
SS32-	DRA250M-5	●	25.00	25.50	32	226	130.0	60	HS-4067TRP	FTP-7	DA2500M-GM~DA2550M-GM

● : Std. Item

SS-DRA (Drilling Depth:8xD)



8D

For Lp indicates distance from drill point to corner edge **K6~K8**

Toolholder Dimensions

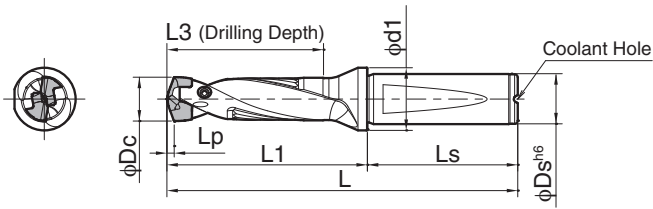
Description		Std.	Dimension (mm)						Spare Parts		Applicable Inserts 🌀 K6~K8
			Applicable Insert Dia. φDc		φDs (h6)	L	L3	Ls	Clamp Screw	Wrench	
			min.	max.							
SS10-	DRA080M-8	●	7.94	8.49	10	121	68.0	40	HS-2524TRP	FTP-5	DA0794M-GM~DA0840M-GM
	DRA085M-8	●	8.50	8.99		126	72.0				DA0850M-GM~DA0890M-GM
	DRA090M-8	●	9.00	9.49		130	76.0				DA0900M-GM~DA0940M-GM
	DRA095M-8	●	9.50	9.99		135	80.0				DA0950M-GM~DA0990M-GM
SS12-	DRA100M-8	●	10.00	10.49	12	144	84.0	45	HS-2534TRP		DA1000M-GM~DA1040M-GM
	DRA105M-8	●	10.50	10.99		149	88.0				DA1050M-GM~DA1090M-GM
	DRA110M-8	●	11.00	11.49		154	92.0				DA1100M-GM~DA1140M-GM
	DRA115M-8	●	11.50	11.99		159	96.0				DA1150M-GM~DA1190M-GM
SS14-	DRA120M-8	●	12.00	12.49	14	163	100.0	48	HS-3048TRP	DA1200M-GM~DA1240M-GM	
	DRA125M-8	●	12.50	12.99		168	104.0			DA1250M-GM~DA1290M-GM	
	DRA130M-8	●	13.00	13.49		172	108.0			DA1300M-GM~DA1340M-GM	
	DRA135M-8	●	13.50	13.99		177	112.0			DA1350M-GM~DA1390M-GM	
SS16-	DRA140M-8	●	14.00	14.49	16	184	116.0	48	HS-3048TRP	FTP-6	DA1400M-GM~DA1440M-GM
	DRA145M-8	●	14.50	14.99		189	120.0				DA1450M-GM~DA1490M-GM
	DRA150M-8	●	15.00	15.99		199	128.0				DA1500M-GM~DA1590M-GM
SS18-	DRA160M-8	●	16.00	16.99	18	209	136.0	50	HS-4067TRP	FTP-7	DA1600M-GM~DA1690M-GM
	DRA170M-8	●	17.00	17.99		218	144.0				DA1700M-GM~DA1790M-GM
SS20-	DRA180M-8	●	18.00	18.99	20	230	152.0	56	HS-4067TRP	DA1800M-GM~DA1890M-GM	
	DRA190M-8	●	19.00	19.99		239	160.0			DA1900M-GM~DA1990M-GM	
SS25-	DRA200M-8	●	20.00	20.99	25	254	168.0	60	HS-4067TRP	DA2000M-GM~DA2090M-GM	
	DRA210M-8	●	21.00	21.99		263	176.0			DA2100M-GM~DA2150M-GM	
	DRA220M-8	●	22.00	22.99		273	184.0			DA2200M-GM~DA2250M-GM	
	DRA230M-8	●	23.00	23.99		282	192.0			DA2300M-GM~DA2350M-GM	
	DRA240M-8	●	24.00	24.99		291	200.0			DA2400M-GM~DA2450M-GM	
SS32-	DRA250M-8	●	25.00	25.50	32	304	208.0	60		DA2500M-GM~DA2550M-GM	

K



Drilling

SF-DRA (Drilling Depth:3xD)



3D

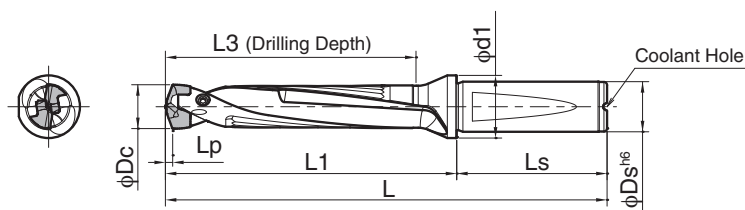
For Lp indicates distance from drill point to corner edge ● K6~K8

Toolholder Dimensions

Description		Std.	Dimension (mm)								Spare Parts		Applicable Inserts 🌀 K6~K8				
			Applicable Insert Dia. φDc		φDs (h6)	L	L1	L3	Ls	φd1	Clamp Screw	Wrench					
			min.	max.													
SF12-	DRA080M-3	●	7.94	8.49	12	84	39	25.5	45	16	HS-2524TRP	FTP-5	DA0794M-GM~DA0840M-GM				
	DRA085M-3	●	8.50	8.99		86	41	27.0					DA0850M-GM~DA0890M-GM				
	DRA090M-3	●	9.00	9.49		88	43	28.5					DA0900M-GM~DA0940M-GM				
	DRA095M-3	●	9.50	9.99		90	45	30.0					DA0950M-GM~DA0990M-GM				
SF16-	DRA100M-3	●	10.00	10.49	16	95	47	31.5	48	20	HS-2534TRP		DA1000M-GM~DA1040M-GM				
	DRA105M-3	●	10.50	10.99		97	49	33.0					DA1050M-GM~DA1090M-GM				
	DRA110M-3	●	11.00	11.49		100	52	34.5					DA1100M-GM~DA1140M-GM				
	DRA115M-3	●	11.50	11.99		102	54	36.0					DA1150M-GM~DA1190M-GM				
	DRA120M-3	●	12.00	12.49		104	56	37.5					DA1200M-GM~DA1240M-GM				
	DRA125M-3	●	12.50	12.99		106	58	39.0					DA1250M-GM~DA1290M-GM				
	DRA130M-3	●	13.00	13.49		108	60	40.5					DA1300M-GM~DA1340M-GM				
	DRA135M-3	●	13.50	13.99		110	62	42.0					DA1350M-GM~DA1390M-GM				
	DRA140M-3	●	14.00	14.49		112	64	43.5			HS-3048TRP	FTP-6	DA1400M-GM~DA1440M-GM				
	DRA145M-3	●	14.50	14.99		114	66	45.0					DA1450M-GM~DA1490M-GM				
	SF20-	DRA150M-3	●	15.00		15.99	20	121					71	48.0	50	25	DA1500M-GM~DA1590M-GM
		DRA160M-3	●	16.00		16.99		126					76	51.0			DA1600M-GM~DA1690M-GM
DRA170M-3		●	17.00	17.99	130	80		54.0	DA1700M-GM~DA1790M-GM								
SF25-	DRA180M-3	●	18.00	18.99	25	141	85	57.0	56	32	HS-4067TRP	FTP-7	DA1800M-GM~DA1890M-GM				
	DRA190M-3	●	19.00	19.99		145	85	60.0					DA1900M-GM~DA1990M-GM				
	DRA200M-3	●	20.00	20.99		149	93	63.0					DA2000M-GM~DA2090M-GM				
	DRA210M-3	●	21.00	21.99		153	97	66.0					DA2100M-GM~DA2150M-GM				
	DRA220M-3	●	22.00	22.99		158	102	69.0					DA2200M-GM~DA2250M-GM				
	DRA230M-3	●	23.00	23.99		162	106	72.0					DA2300M-GM~DA2350M-GM				
	DRA240M-3	●	24.00	24.99		166	110	75.0					DA2400M-GM~DA2450M-GM				
	DRA250M-3	●	25.00	25.50		170	114	78.0					DA2500M-GM~DA2550M-GM				

● : Std. Item

SF-DRA (Drilling Depth:5×D)



5D

For Lp indicates distance from drill point to corner edge **K6~K8**

Toolholder Dimensions

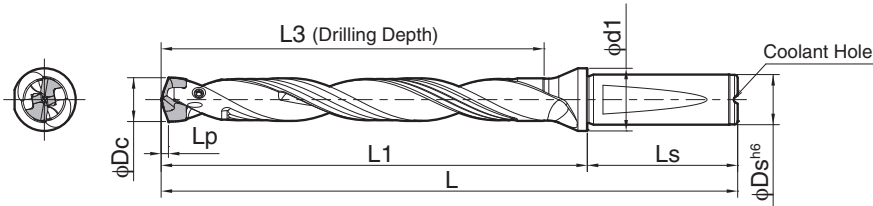
Description		Std.	Dimension (mm)							Spare Parts		Applicable Inserts 🔩 K6~K8	
			Applicable Insert Dia. φDc		φDs (h6)	L	L1	L3	Ls	φd1	Clamp Screw		Wrench
			min.	max.									
SF12-	DRA080M-5	●	7.94	8.49	12	101	56	42.5	45	16	HS-2524TRP	FTP-5	DA0794M-GM-DA0840M-GM
	DRA085M-5	●	8.50	8.99		104	59	45.0					DA0850M-GM-DA0890M-GM
	DRA090M-5	●	9.00	9.49		107	62	47.5					DA0900M-GM-DA0940M-GM
	DRA095M-5	●	9.50	9.99		110	65	50.0					DA0950M-GM-DA0990M-GM
SF16-	DRA100M-5	●	10.00	10.49	16	116	68	52.5	48	20	HS-2534TRP		DA1000M-GM-DA1040M-GM
	DRA105M-5	●	10.50	10.99		119	71	55.0					DA1050M-GM-DA1090M-GM
	DRA110M-5	●	11.00	11.49		123	75	57.5					DA1100M-GM-DA1140M-GM
	DRA115M-5	●	11.50	11.99		126	78	60.0					DA1150M-GM-DA1190M-GM
	DRA120M-5	●	12.00	12.49		129	81	62.5					DA1200M-GM-DA1240M-GM
	DRA125M-5	●	12.50	12.99		132	84	65.0					DA1250M-GM-DA1290M-GM
	DRA130M-5	●	13.00	13.49		135	87	67.5					DA1300M-GM-DA1340M-GM
	DRA135M-5	●	13.50	13.99		138	90	70.0					DA1350M-GM-DA1390M-GM
	DRA140M-5	●	14.00	14.49		141	93	72.5			HS-3048TRP	FTP-6	DA1400M-GM-DA1440M-GM
	DRA145M-5	●	14.50	14.99		144	96	75.0					DA1450M-GM-DA1490M-GM
SF20-	DRA150M-5	●	15.00	15.99	20	153	103	80.0	50	25	HS-3048TRP	DA1500M-GM-DA1590M-GM	
	DRA160M-5	●	16.00	16.99		160	110	85.0				DA1600M-GM-DA1690M-GM	
	DRA170M-5	●	17.00	17.99		166	116	90.0				DA1700M-GM-DA1790M-GM	
SF25-	DRA180M-5	●	18.00	18.99	25	179	123	95.0	56	32	HS-4067TRP	FTP-7	DA1800M-GM-DA1890M-GM
	DRA190M-5	●	19.00	19.99		185	129	100.0					DA1900M-GM-DA1990M-GM
	DRA200M-5	●	20.00	20.99		191	135	105.0					DA2000M-GM-DA2090M-GM
	DRA210M-5	●	21.00	21.99		197	141	110.0					DA2100M-GM-DA2150M-GM
	DRA220M-5	●	22.00	22.99		204	148	115.0					DA2200M-GM-DA2250M-GM
	DRA230M-5	●	23.00	23.99		210	154	120.0					DA2300M-GM-DA2350M-GM
	DRA240M-5	●	24.00	24.99		216	160	125.0					DA2400M-GM-DA2450M-GM
	DRA250M-5	●	25.00	25.50		222	166	130.0					DA2500M-GM-DA2550M-GM

● : Std. Item



Drilling

SF-DRA (Drilling Depth:8xD)



8D

For Lp indicates distance from drill point to corner edge K6~K8

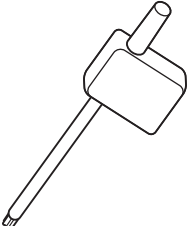
Toolholder Dimensions

Description		Std.	Dimension (mm)								Spare Parts		Applicable Inserts ⚙️ K6~K8
			Applicable Insert Dia. φDc		φDs (h6)	L	L1	L3	Ls	φd1	Clamp Screw	Wrench	
			min.	max.									
SF12-	DRA080M-8	●	7.94	8.49	12	126	81	68.0	45	16	HS-2524TRP	FTP-5	DA0794M-GM~DA0840M-GM
	DRA085M-8	●	8.50	8.99		131	86	72.0					DA0850M-GM~DA0890M-GM
	DRA090M-8	●	9.00	9.49		135	90	76.0					DA0900M-GM~DA0940M-GM
	DRA095M-8	●	9.50	9.99		140	95	80.0					DA0950M-GM~DA0990M-GM
SF16-	DRA100M-8	●	10.00	10.49	16	147	99	84.0	48	20	HS-2534TRP		DA1000M-GM~DA1040M-GM
	DRA105M-8	●	10.50	10.99		152	104	88.0					DA1050M-GM~DA1090M-GM
	DRA110M-8	●	11.00	11.49		157	109	92.0					DA1100M-GM~DA1140M-GM
	DRA115M-8	●	11.50	11.99		162	114	96.0					DA1150M-GM~DA1190M-GM
	DRA120M-8	●	12.00	12.49		166	118	100.0					DA1200M-GM~DA1240M-GM
	DRA125M-8	●	12.50	12.99		171	123	104.0					DA1250M-GM~DA1290M-GM
	DRA130M-8	●	13.00	13.49		175	127	108.0					DA1300M-GM~DA1340M-GM
	DRA135M-8	●	13.50	13.99		180	132	112.0					DA1350M-GM~DA1390M-GM
	DRA140M-8	●	14.00	14.49		184	136	116.0			HS-3048TRP	FTP-6	DA1400M-GM~DA1440M-GM
	DRA145M-8	●	14.50	14.99		189	141	120.0					DA1450M-GM~DA1490M-GM
SF20-	DRA150M-8	●	15.00	15.99	20	201	151	128.0	50	25	HS-3048TRP	FTP-6	DA1500M-GM~DA1590M-GM
	DRA160M-8	●	16.00	16.99		211	161	136.0					DA1600M-GM~DA1690M-GM
	DRA170M-8	●	17.00	17.99		220	170	144.0					DA1700M-GM~DA1790M-GM
SF25-	DRA180M-8	●	18.00	18.99	25	236	180	152.0	56	32	HS-4067TRP	FTP-7	DA1800M-GM~DA1890M-GM
	DRA190M-8	●	19.00	19.99		245	189	160.0					DA1900M-GM~DA1990M-GM
	DRA200M-8	●	20.00	20.99		254	198	168.0					DA2000M-GM~DA2090M-GM
	DRA210M-8	●	21.00	21.99		263	207	176.0					DA2100M-GM~DA2150M-GM
	DRA220M-8	●	22.00	22.99		273	217	184.0					DA2200M-GM~DA2250M-GM
	DRA230M-8	●	23.00	23.99		282	226	192.0					DA2300M-GM~DA2350M-GM
	DRA240M-8	●	24.00	24.99		291	235	200.0					DA2400M-GM~DA2450M-GM
	DRA250M-8	●	25.00	25.50		300	244	208.0					DA2500M-GM~DA2550M-GM

● : Std. Item

Spare Parts

Clamp Screw	Description
	HS-2524TRP
	HS-2534TRP
	HS-3048TRP
	HS-4067TRP

Wrench	Description	Tightening Torque (N·m)
	FTP-5	0.4
	FTP-6	0.5
	FTP-7	0.8

Recommended Cutting Conditions

Workpiece Material	Recommended Insert Grades / Cutting Speed Vc (m/min)		n (min ⁻¹)	Drill Dia. ϕ Dc(mm)						Remarks
	PR1535	PR1525		f (mm/rev)	ϕ 8	ϕ 11	ϕ 14	ϕ 18	ϕ 22	
Low Carbon Steel	★ 100-180	☆ 100-180	n (min ⁻¹)	3,980 - 7,160	2,890 - 5,210	2,270 - 4,090	1,770 - 3,180	1,450 - 2,600	1,270 - 2,290	Coolant 🔵 K16
			f (mm/rev)	0.12 - 0.24	0.12 - 0.31	0.16 - 0.36	0.16 - 0.4	0.2 - 0.45	0.2 - 0.45	
Carbon Steel	★ 100-150	☆ 100-150	n (min ⁻¹)	3,980 - 5,970	2,890 - 4,340	2,270 - 3,410	1,770 - 2,650	1,450 - 2,170	1,270 - 1,910	
			f (mm/rev)	0.12 - 0.24	0.12 - 0.31	0.16 - 0.36	0.16 - 0.4	0.2 - 0.45	0.2 - 0.45	
Alloy Steel	★ 70-120	☆ 70-120	n (min ⁻¹)	2,790 - 4,780	2,030 - 3,470	1,590 - 2,730	1,240 - 2,120	1,010 - 1,740	890 - 1,530	
			f (mm/rev)	0.12 - 0.24	0.12 - 0.31	0.16 - 0.36	0.16 - 0.4	0.2 - 0.45	0.2 - 0.45	
Mold Steel	★ 50-90	☆ 50-90	n (min ⁻¹)	1,990 - 3,580	1,450 - 2,600	1,140 - 2,050	880 - 1,590	720 - 1,300	640 - 1,150	
			f (mm/rev)	0.08 - 0.17	0.08 - 0.22	0.11 - 0.25	0.11 - 0.28	0.14 - 0.32	0.14 - 0.32	
Stainless Steel	★ 40-70	☆ 40-70	n (min ⁻¹)	1,590 - 2,790	1,160 - 2,030	910 - 1,590	710 - 1,240	580 - 1,010	510 - 890	
			f (mm/rev)	0.1 - 0.24	0.1 - 0.24	0.12 - 0.3	0.15 - 0.3	0.15 - 0.3	0.15 - 0.35	
			*Feed Rate 0.15 mm/rev or less is recommended until drilling depth reaches 0.5D							
Gray Cast Iron	☆ 90-170	★ 90-170	n (min ⁻¹)	3,580 - 6,760	2,600 - 4,920	2,050 - 3,870	1,590 - 3,010	1,300 - 2,460	1,150 - 2,170	
			f (mm/rev)	0.14 - 0.29	0.14 - 0.37	0.19 - 0.43	0.19 - 0.45	0.24 - 0.45	0.24 - 0.45	
Nodular Cast Iron	☆ 40-120	★ 40-120	n (min ⁻¹)	1,590 - 4,780	1,160 - 3,470	910 - 2,730	710 - 2,120	580 - 1,740	510 - 1,530	
			f (mm/rev)	0.12 - 0.24	0.12 - 0.31	0.16 - 0.36	0.16 - 0.4	0.2 - 0.45	0.2 - 0.45	

★1st Recommendation ☆2nd Recommendation

As drilling depth increases (3D 5D 8D), feed rates should be reduced.
Recommended feed rate: 3D type = 100%, 5D type = 80% or less, 8D type = 70% or less.

K



Drilling



Coolant

K16



Drilling



Coolant

K16



Drilling



Coolant

K16



Drilling



Coolant

K16



Drilling



Coolant

K16



Drilling



Coolant

K16



Drilling



Coolant

K16



Drilling



Coolant

K16



Drilling



Coolant

K16



Drilling

MagicDrill DRA

Coolant

1st Recommendation

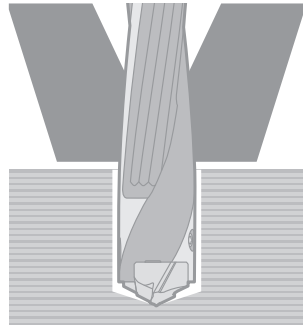
Internal coolant

The combination of internal and external coolant is recommended for stainless steel or high-feed machining.

In case of external coolant

Lathe: 3D or less
Vertical M/C: 1.5D or less

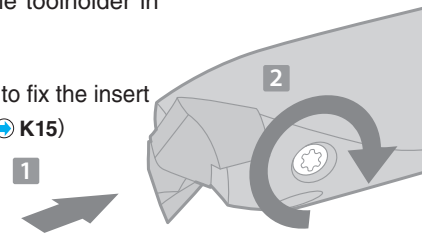
* Dry machining is not recommended.



How to attach inserts

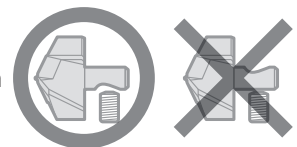
1 Install insert onto the toolholder in the right direction.

2 Tighten clamp screw to fix the insert
(Tightening Torque $\rightarrow$ K15)



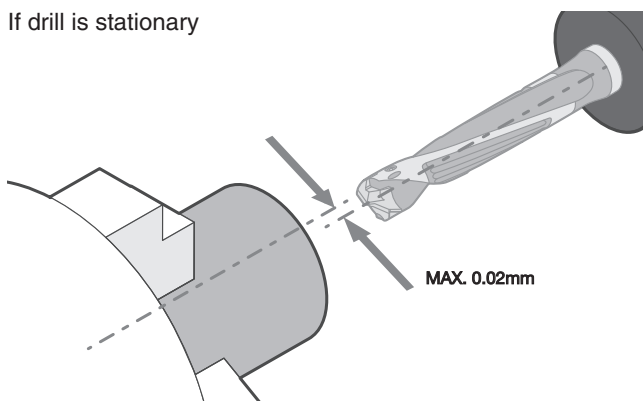
- * 1 Remove dust on insert pocket using air blow for every replacement.
- * 2 Make sure that the locating surfaces of the insert closely contacts the toolholder.

Be careful of the insert direction



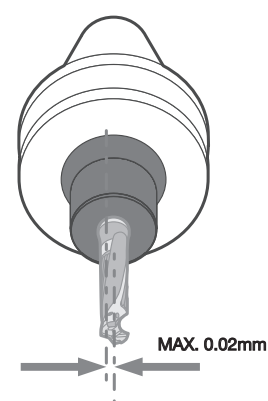
Core Deviation

If drill is stationary



This is be used with a boring sleeve and collet chuck, please be sure to set deviation amount under 0.02mm between workpiece and drill.

If drill is rotating



Make sure to use arbor that is not deformed.
Center of arbor deviation must be within 0.02mm.

Cautions for installation on Machining Center

For installation of MagicDrill DRA

1st Choice

use Hydro Chuck, Power Chuck, Collet Chuck, etc.

Hydro Chuck

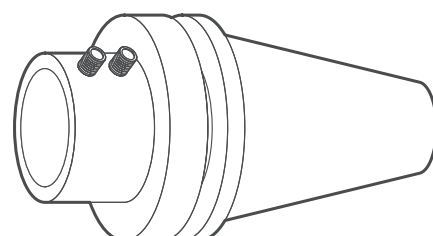
Power Chuck

Collet Chuck

Install MagicDrill DRA
to above chuck

2nd choice

Side lock arbor

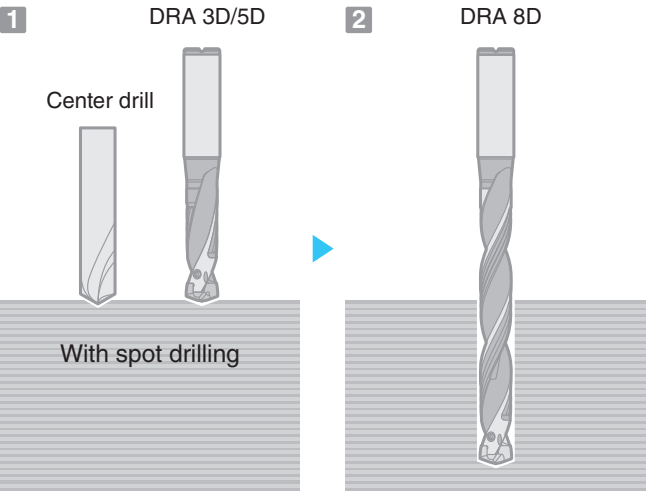


Example of side lock arbor

Cautions for machining with 8D holder

Recommended machining

- 1 Make a center spot using DRA 3D/5D type or a commercially available center drill which has a vertex angle of about 140°. (Center spot should be at least half of cutting diameter)
- 2 Then drill the hole using DRA (8D type).



Applicable workpiece

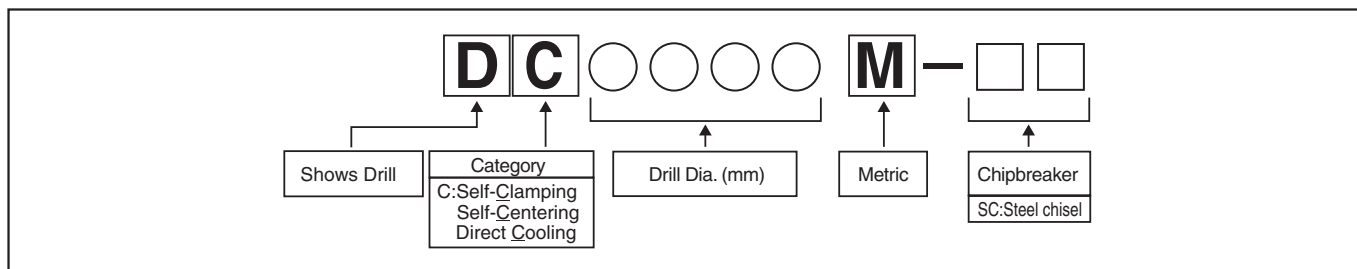
Applications	Shape of Workpiece	Caution for machining
Plain Surface		1.When machining stainless steel, for hole depths of up to 0.5D, keep feed rate at less than 0.15mm/rev. 2.Internal coolant is recommended for smooth chip removal. For stainless steel, the combination of internal and external coolant is recommended.
Stacked Plates		1.Fix stacked plates securely to ensure they do not slip while machining.
Concave Surface		1.When machining concave holes, set the feed rate at less than half of recommended feed for continuous hole machining. 2.Utilize a step feeding if chips are not broken short at the inlet.
Pipe Material		1.Hole machining above the centerline of the pipe is possible. 2.Do not machine on curved surface areas.

Not Recommended workpieces

Applications	Shape of Workpiece	Applications	Shape of Workpiece
Hole Expansion		Slant Surface	
Half Cylindrical		Cored Hole	

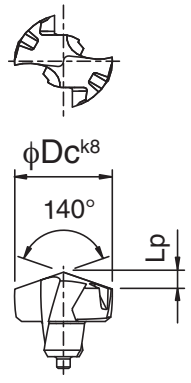
MagicDrill Insert for DRC

Description Identification System (Insert)



Insert Grades PR0315

PR0315 is tough super micro grain carbide grade with TiAlN coating, with excellent wear resistance and fracture resistance. It enables stable machining of carbon steel, alloy steel and cast iron.

Insert	Description	Dimension (mm)		PVD Coated Carbide	Applicable Toolholders K21-K23, K26-K28
		φDc	Lp	PR0315	
 	DC 0794M-SC	7.94	1.44	●	SS10-DRC080M-○ SF12-DRC080M-○
	0800M-SC	8.00	1.46	●	
	0810M-SC	8.10	1.47	●	
	0820M-SC	8.20	1.49	●	
	0830M-SC	8.30	1.51	●	
	0840M-SC	8.40	1.53	●	
	DC 0850M-SC	8.50	1.55	●	SS10-DRC085M-○ SF12-DRC085M-○
	0860M-SC	8.60	1.56	●	
	0870M-SC	8.70	1.58	●	
	0880M-SC	8.80	1.60	●	
	0890M-SC	8.90	1.62	●	
	DC 0900M-SC	9.00	1.64	●	SS10-DRC090M-○ SF12-DRC090M-○
	0910M-SC	9.10	1.66	●	
	0920M-SC	9.20	1.67	●	
	0930M-SC	9.30	1.69	●	
	0940M-SC	9.40	1.71	●	
	DC 0950M-SC	9.50	1.73	●	SS10-DRC095M-○ SF12-DRC095M-○
	0960M-SC	9.60	1.75	●	
	0970M-SC	9.70	1.76	●	
	0980M-SC	9.80	1.78	●	
	0990M-SC	9.90	1.80	●	
	DC 1000M-SC	10.00	1.82	●	SS12-DRC100M-○ SF16-DRC100M-○
	1010M-SC	10.10	1.84	●	
	1020M-SC	10.20	1.86	●	
	1030M-SC	10.30	1.87	●	
	1040M-SC	10.40	1.89	●	
	DC 1050M-SC	10.50	1.91	●	SS12-DRC105M-○ SF16-DRC105M-○
	1060M-SC	10.60	1.93	●	
	1070M-SC	10.70	1.95	●	
	1080M-SC	10.80	1.96	●	
	1090M-SC	10.90	1.98	●	
	DC 1100M-SC	11.00	2.00	●	SS12-DRC110M-○ SF16-DRC110M-○
	1110M-SC	11.10	2.02	●	
	1120M-SC	11.20	2.04	●	
	1130M-SC	11.30	2.06	●	
	1140M-SC	11.40	2.07	●	
	DC 1150M-SC	11.50	2.09	●	SS12-DRC115M-○ SF16-DRC115M-○
	1160M-SC	11.60	2.11	●	
	1170M-SC	11.70	2.13	●	
	1180M-SC	11.80	2.15	●	
	1190M-SC	11.90	2.16	●	
	DC 1200M-SC	12.00	2.18	●	SS14-DRC120M-○ SF16-DRC120M-○
	1210M-SC	12.10	2.20	●	
	1220M-SC	12.20	2.22	●	
	1230M-SC	12.30	2.24	●	
	1240M-SC	12.40	2.26	●	

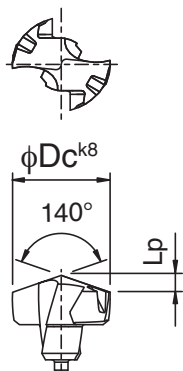
k8 tolerance

φDc	k8(mm)
7.94 ~ 10.00	+0.022 0
10.10 ~ 18.00	+0.027 0
18.10 ~ 25.50	+0.033 0

k8 is the dimension tolerance of the insert.
It is not the dimension tolerance of the hole diameter.

DC inserts are sold in 1 piece boxes

● : Std. Item

Insert		Description	Dimension (mm)		PVD Coated Carbide	Applicable Toolholders ● K21-K23, K26-K28
			φDc	Lp	PR0315	
 	140° φDc^{k8} Lp	DC 1250M-SC	12.50	2.27	●	SS14-DRC125M-○ SF16-DRC125M-○
		1260M-SC	12.60	2.29	●	
		1270M-SC	12.70	2.31	●	
		1280M-SC	12.80	2.33	●	
		1290M-SC	12.90	2.35	●	
		DC 1300M-SC	13.00	2.36	●	SS14-DRC130M-○ SF16-DRC130M-○
		1310M-SC	13.10	2.38	●	
		1320M-SC	13.20	2.40	●	
		1330M-SC	13.30	2.42	●	
		1340M-SC	13.40	2.44	●	
		DC 1350M-SC	13.50	2.46	●	SS14-DRC135M-○ SF16-DRC135M-○
		1360M-SC	13.60	2.47	●	
		1370M-SC	13.70	2.49	●	
		1380M-SC	13.80	2.51	●	
		1390M-SC	13.90	2.53	●	
		DC 1400M-SC	14.00	2.55	●	SS16-DRC140M-○ SF16-DRC140M-○
		1410M-SC	14.10	2.56	●	
		1420M-SC	14.20	2.58	●	
		1430M-SC	14.30	2.60	●	
		1440M-SC	14.40	2.62	●	
		DC 1450M-SC	14.50	2.64	●	SS16-DRC145M-○ SF16-DRC145M-○
		1460M-SC	14.60	2.66	●	
		1470M-SC	14.70	2.67	●	
		1480M-SC	14.80	2.69	●	
		1490M-SC	14.90	2.71	●	
		DC 1500M-SC	15.00	2.73	●	SS16-DRC150M-○ SF20-DRC150M-○
		1510M-SC	15.10	2.75	●	
		1520M-SC	15.20	2.76	●	
		1530M-SC	15.30	2.78	●	
		1540M-SC	15.40	2.80	●	
		1550M-SC	15.50	2.82	●	
		1560M-SC	15.60	2.84	●	
		1570M-SC	15.70	2.86	●	
		1580M-SC	15.80	2.87	●	
		DC 1600M-SC	16.00	2.91	●	
		1610M-SC	16.10	2.93	●	SS18-DRC160M-○ SF20-DRC160M-○
		1620M-SC	16.20	2.95	●	
		1630M-SC	16.30	2.96	●	
		1640M-SC	16.40	2.98	●	
		1650M-SC	16.50	3.00	●	
		1660M-SC	16.60	3.02	●	
		1670M-SC	16.70	3.04	●	
		1680M-SC	16.80	3.06	●	
		1690M-SC	16.90	3.07	●	
		DC 1700M-SC	17.00	3.09	●	SS18-DRC170M-○ SF20-DRC170M-○
		1710M-SC	17.10	3.11	●	
		1720M-SC	17.20	3.13	●	
		1730M-SC	17.30	3.15	●	
		1740M-SC	17.40	3.16	●	
		1750M-SC	17.50	3.18	●	
		1760M-SC	17.60	3.20	●	
		1770M-SC	17.70	3.22	●	
		1780M-SC	17.80	3.24	●	
		1790M-SC	17.90	3.26	●	
		DC 1800M-SC	18.00	3.27	●	SS20-DRC180M-○ SF25-DRC180M-○
		1810M-SC	18.10	3.29	●	
		1820M-SC	18.20	3.31	●	
		1830M-SC	18.30	3.33	●	
		1840M-SC	18.40	3.35	●	
		1850M-SC	18.50	3.36	●	
		1860M-SC	18.60	3.38	●	
		1870M-SC	18.70	3.40	●	
		1880M-SC	18.80	3.42	●	
		1890M-SC	18.90	3.44	●	

k8 tolerance

φDc	k8(mm)
7.94 ~ 10.00	+0.022 0
10.10 ~ 18.00	+0.027 0
18.10 ~ 25.50	+0.033 0

k8 is the dimension tolerance of the insert.
It is not the dimension tolerance of the hole diameter.

● : Std. Item

DC inserts are
sold in 1 piece boxes

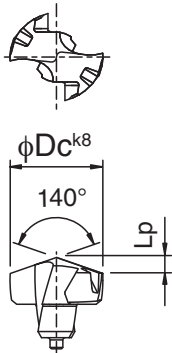
K



Drilling

K19

MagicDrill Insert for DRC

Insert		Description	Dimension (mm)		PVD Coated Carbide	Applicable Toolholders ➡ K21-K23,K26-K28								
			φDc	Lp	PR0315									
  k8 tolerance<table><tr><th>φDc</th><th>k8(mm)</th></tr><tr><td>7.94 ≥ 10.00</td><td>+0.022 0</td></tr><tr><td>10.10 ≥ 18.00</td><td>+0.027 0</td></tr><tr><td>18.10 ≥ 25.50</td><td>+0.033 0</td></tr></table> k8 is the dimension tolerance of the insert. It is not the dimension tolerance of the hole diameter.	φDc	k8(mm)	7.94 ≥ 10.00	+0.022 0	10.10 ≥ 18.00	+0.027 0	18.10 ≥ 25.50	+0.033 0	DC	1900M-SC	19.00	3.46	●	SS20-DRC190M-○ SF25-DRC190M-○
	φDc	k8(mm)												
	7.94 ≥ 10.00	+0.022 0												
	10.10 ≥ 18.00	+0.027 0												
	18.10 ≥ 25.50	+0.033 0												
	1910M-SC	19.10	3.47	●										
	1920M-SC	19.20	3.49	●										
	1930M-SC	19.30	3.51	●										
	1940M-SC	19.40	3.53	●										
	1950M-SC	19.50	3.55	●										
	1960M-SC	19.60	3.56	●										
	1970M-SC	19.70	3.58	●										
	1980M-SC	19.80	3.60	●										
	1990M-SC	19.90	3.62	●										
	DC	2000M-SC	20.00	3.64	●	SS25-DRC200M-○ SF25-DRC200M-○								
		2010M-SC	20.10	3.66	●									
		2020M-SC	20.20	3.67	●									
		2030M-SC	20.30	3.69	●									
		2040M-SC	20.40	3.71	●									
		2050M-SC	20.50	3.73	●									
		2060M-SC	20.60	3.75	●									
		2070M-SC	20.70	3.77	●									
		2080M-SC	20.80	3.78	●									
		2090M-SC	20.90	3.80	●									
	2099M-SC	20.99	3.82	●										
	DC	2100M-SC	21.00	3.82	●	SS25-DRC210M-○ SF25-DRC210M-○								
		2150M-SC	21.50	3.91	●									
		2200M-SC	22.00	4.00	●									
		2250M-SC	22.50	4.09	●									
		2300M-SC	23.00	4.18	●									
2350M-SC		23.50	4.27	●										
2400M-SC		24.00	4.37	●										
2450M-SC		24.50	4.46	●										
2500M-SC		25.00	4.55	●										
2550M-SC		25.50	4.64	●										

Q&A

Q-1 Is re-grinding available?

A-1 We don't recommend it. Grinding of edge nose chisel is not possible.

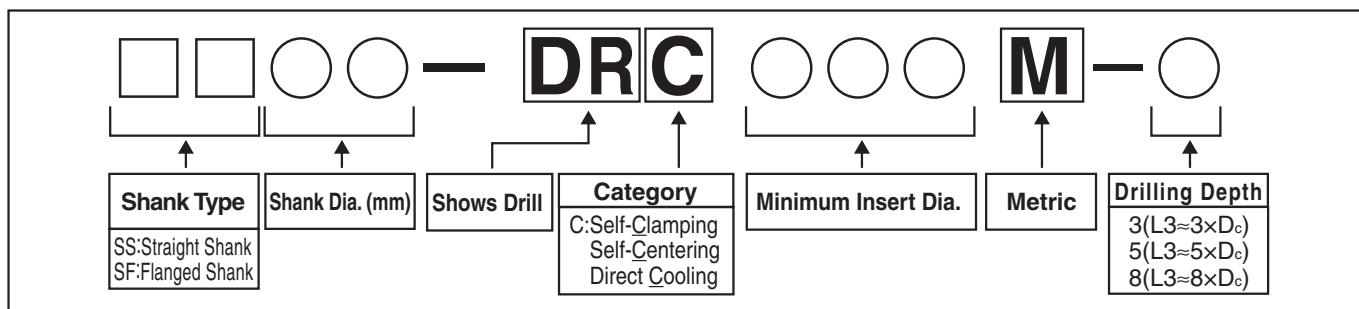
Q-2 How large would the machining hole be to the insert diameter (φDc)?

A-2 The machining hole with SCM435, comparing to the insert diameter(φDc), will be about +0.020~+0.040mm.

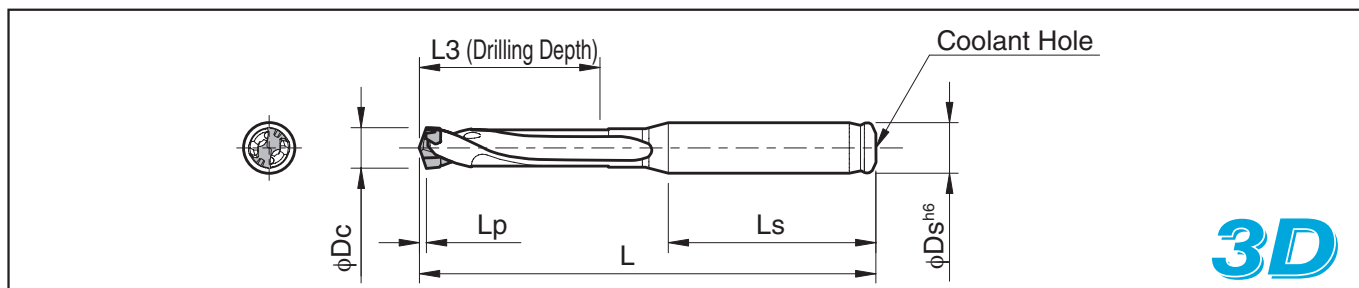
DC inserts are
sold in 1 piece boxes

● : Std. Item

Description Identification System (Toolholder)



SS-DRC (Drilling Depth: 3×D)



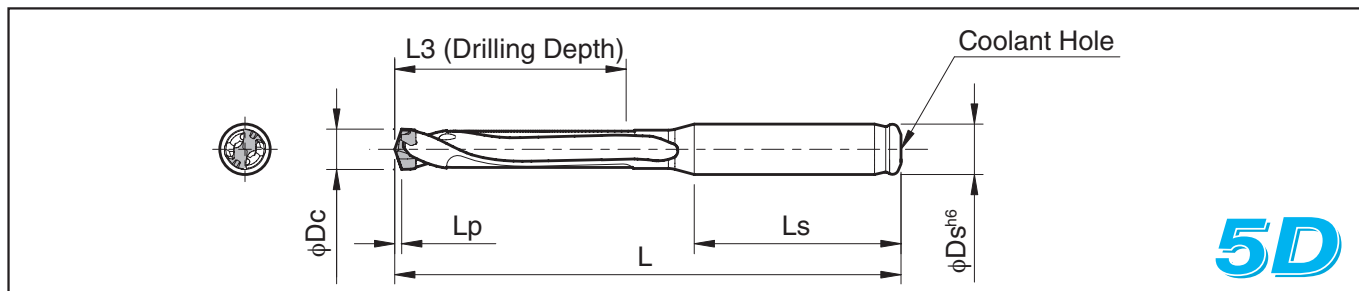
For Lp indicates distance from drill point to corner edge **K18-K20**

Toolholder Dimensions

Description		Std.	Dimension (mm)					Spare Parts	Applicable Inserts 🔄 K18-K20	Applicable chamfering Holder and Insert description		
			Applicable Insert Dia. φDc		φDs (h6)	L	L3	Ls		Wrench 🔧 K29	Holder	Insert
			min.	max.								
SS10-	DRC080M-3	●	7.94	8.49	10	79	25.5	40	WDRC8 (WDRC17)	DC0794M-SC~DC0840M-SC	S20-CH10	CT08T2-45A
	DRC085M-3	●	8.50	8.99		81	27.0			DC0850M-SC~DC0890M-SC		
	DRC090M-3	●	9.00	9.49		83	28.5			DC0900M-SC~DC0940M-SC		
	DRC095M-3	●	9.50	9.99		85	30.0			DC0950M-SC~DC0990M-SC		
SS12-	DRC100M-3	●	10.00	10.49	12	92	31.5	45	WDRC10 (WDRC17)	DC1000M-SC~DC1040M-SC	S32-CH12	
	DRC105M-3	●	10.50	10.99		94	33.0			DC1050M-SC~DC1090M-SC		
	DRC110M-3	●	11.00	11.49		96	34.5			DC1100M-SC~DC1140M-SC		
	DRC115M-3	●	11.50	11.99		98	36.0			DC1150M-SC~DC1190M-SC		
SS14-	DRC120M-3	●	12.00	12.49	14	101	37.5	48	WDRC12 (WDRC17)	DC1200M-SC~DC1240M-SC	S32-CH14	CT12T3-45A
	DRC125M-3	●	12.50	12.99		103	39.0			DC1250M-SC~DC1290M-SC		
	DRC130M-3	●	13.00	13.49		105	40.5			DC1300M-SC~DC1340M-SC		
	DRC135M-3	●	13.50	13.99		107	42.0			DC1350M-SC~DC1390M-SC		
SS16-	DRC140M-3	●	14.00	14.49	16	112	43.5	48	WDRC14 (WDRC17)	DC1400M-SC~DC1440M-SC	S32-CH16	
	DRC145M-3	●	14.50	14.99		114	45.0			DC1450M-SC~DC1490M-SC		
	DRC150M-3	●	15.00	15.99		118	48.0			DC1500M-SC~DC1580M-SC		
SS18-	DRC160M-3	●	16.00	16.99	18	122	51.0	50	WDRC16 (WDRC17)	DC1600M-SC~DC1690M-SC	S32-CH18	
	DRC170M-3	●	17.00	17.99		127	54.0			DC1700M-SC~DC1790M-SC		
SS20-	DRC180M-3	●	18.00	18.99	20	133	57.0	50	WDRC18 (WDRC17)	DC1800M-SC~DC1890M-SC		
	DRC190M-3	●	19.00	19.99		137	60.0			DC1900M-SC~DC1990M-SC		
SS25-	DRC200M-3	●	20.00	20.99	25	147	63.0	56	WDRC17	DC2000M-SC~DC2099M-SC	-	-
	DRC210M-3	●	21.00	21.99		151	66.0			DC2100M-SC~DC2150M-SC		
	DRC220M-3	●	22.00	22.99		156	69.0			DC2200M-SC~DC2250M-SC		
	DRC230M-3	●	23.00	23.99		160	72.0			DC2300M-SC~DC2350M-SC		
	DRC240M-3	●	24.00	24.99		164	75.0			DC2400M-SC~DC2450M-SC		
SS32-	DRC250M-3	●	25.00	25.50	32	172	78.0	60	WDRC17	DC2500M-SC~DC2550M-SC		

● : Std. Item

SS-DRC (Drilling Depth:5xD)



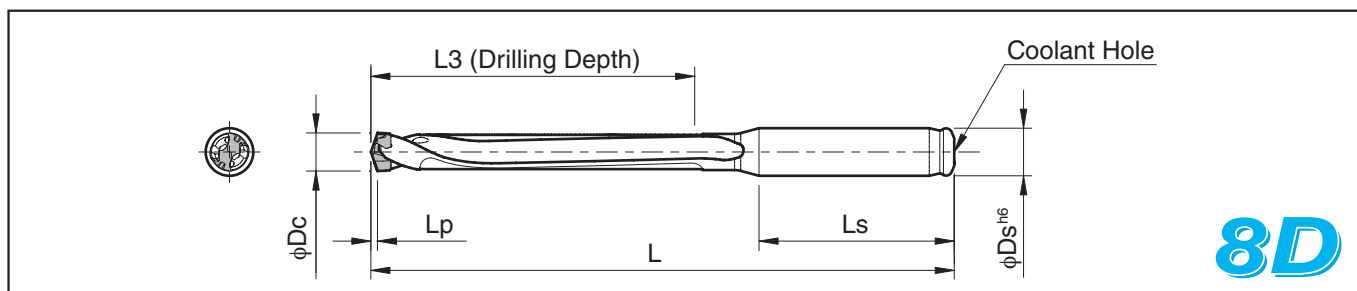
For Lp indicates distance from drill point to corner edge **K18-K20**

Toolholder Dimensions

Description		Std.	Dimension (mm)					Spare Parts	Applicable Inserts 🌀 K18-K20	Applicable chamfering Holder and Insert description		
			Applicable Insert Dia. ϕDc		ϕDs (h6)	L	L3	Ls		Wrench 🌀 K29	Holder	Insert
			min.	max.								
SS10-	DRC080M-5	●	7.94	8.49	10	97	42.5	40	WDRC8 (WDRC17)	DC0794M-SC~DC0840M-SC	S20-CH10	CT08T2-45A
	DRC085M-5	●	8.50	8.99		100	45.0			DC0850M-SC~DC0890M-SC		
	DRC090M-5	●	9.00	9.49		103	47.5			DC0900M-SC~DC0940M-SC		
	DRC095M-5	●	9.50	9.99		107	50.0			DC0950M-SC~DC0990M-SC		
SS12-	DRC100M-5	●	10.00	10.49	12	115	52.5	45	WDRC10 (WDRC17)	DC1000M-SC~DC1040M-SC	S32-CH12	
	DRC105M-5	●	10.50	10.99		118	55.0			DC1050M-SC~DC1090M-SC		
	DRC110M-5	●	11.00	11.49		121	57.5			DC1100M-SC~DC1140M-SC		
	DRC115M-5	●	11.50	11.99		124	60.0			DC1150M-SC~DC1190M-SC		
SS14-	DRC120M-5	●	12.00	12.49	14	127	62.5	45	WDRC12 (WDRC17)	DC1200M-SC~DC1240M-SC	S32-CH14	CT12T3-45A
	DRC125M-5	●	12.50	12.99		130	65.0			DC1250M-SC~DC1290M-SC		
	DRC130M-5	●	13.00	13.49		133	67.5			DC1300M-SC~DC1340M-SC		
	DRC135M-5	●	13.50	13.99		137	70.0			DC1350M-SC~DC1390M-SC		
SS16-	DRC140M-5	●	14.00	14.49	16	143	72.5	48	WDRC14 (WDRC17)	DC1400M-SC~DC1440M-SC	S32-CH16	
	DRC145M-5	●	14.50	14.99		146	75.0			DC1450M-SC~DC1490M-SC		
	DRC150M-5	●	15.00	15.99		152	80.0			DC1500M-SC~DC1580M-SC		
SS18-	DRC160M-5	●	16.00	16.99	18	158	85.0	48		DC1600M-SC~DC1690M-SC	S32-CH18	
	DRC170M-5	●	17.00	17.99		165	90.0			DC1700M-SC~DC1790M-SC		
SS20-	DRC180M-5	●	18.00	18.99	20	173	95.0	50		DC1800M-SC~DC1890M-SC		
	DRC190M-5	●	19.00	19.99		179	100.0			DC1900M-SC~DC1990M-SC		
SS25-	DRC200M-5	●	20.00	20.99	25	191	105.0	56	WDRC17	DC2000M-SC~DC2099M-SC	-	-
	DRC210M-5	●	21.00	21.99		198	110.0			DC2100M-SC~DC2150M-SC		
	DRC220M-5	●	22.00	22.99		204	115.0			DC2200M-SC~DC2250M-SC		
	DRC230M-5	●	23.00	23.99		210	120.0			DC2300M-SC~DC2350M-SC		
	DRC240M-5	●	24.00	24.99		216	125.0			DC2400M-SC~DC2450M-SC		
	SS32-	DRC250M-5	●	25.00		25.50	32			227		

● : Std. Item

SS-DRC (Drilling Depth:8xD)



For Lp indicates distance from drill point to corner edge **K18-K20**

Toolholder Dimensions

Description		Std.	Dimension (mm)					Spare Parts	Applicable Inserts 🌀 K18-K20	Applicable chamfering Holder and Insert description		
			Applicable Insert Dia. ϕDc		ϕDs (h6)	L	L3	Ls		Wrench 🌀 K29	Holder	Insert
			min.	max.								
SS10-	DRC080M-8	●	7.94	8.49	10	122.5	68	40	WDRC8 (WDRC17)	DC0794M-SC~DC0840M-SC	S20-CH10	CT08T2-45A
	DRC085M-8	●	8.50	8.99		127.0	72			DC0850M-SC~DC0890M-SC		
	DRC090M-8	●	9.00	9.49		131.5	76			DC0900M-SC~DC0940M-SC		
	DRC095M-8	●	9.50	9.99		137.0	80			DC0950M-SC~DC0990M-SC		
SS12-	DRC100M-8	●	10.00	10.49	12	146.5	84	45	WDRC10 (WDRC17)	DC1000M-SC~DC1040M-SC	S32-CH12	
	DRC105M-8	●	10.50	10.99		151.0	88			DC1050M-SC~DC1090M-SC		
	DRC110M-8	●	11.00	11.49		155.5	92			DC1100M-SC~DC1140M-SC		
	DRC115M-8	●	11.50	11.99		160.0	96			DC1150M-SC~DC1190M-SC		
SS14-	DRC120M-8	●	12.00	12.49	14	164.5	100	45	WDRC12 (WDRC17)	DC1200M-SC~DC1240M-SC	S32-CH14	CT12T3-45A
	DRC125M-8	●	12.50	12.99		169.0	104			DC1250M-SC~DC1290M-SC		
	DRC130M-8	●	13.00	13.49		173.5	108			DC1300M-SC~DC1340M-SC		
	DRC135M-8	●	13.50	13.99		179.0	112			DC1350M-SC~DC1390M-SC		
SS16-	DRC140M-8	●	14.00	14.49	16	186.5	116	48	WDRC14 (WDRC17)	DC1400M-SC~DC1440M-SC	S32-CH16	
	DRC145M-8	●	14.50	14.99		191.0	120			DC1450M-SC~DC1490M-SC		
	DRC150M-8	●	15.00	15.99		200.0	128			DC1500M-SC~DC1580M-SC		
SS18-	DRC160M-8	●	16.00	16.99	18	209.0	136			DC1600M-SC~DC1690M-SC	S32-CH18	
	DRC170M-8	●	17.00	17.99		219.0	144			DC1700M-SC~DC1790M-SC		
SS20-	DRC180M-8	●	18.00	18.99	20	230.0	152	50		DC1800M-SC~DC1890M-SC		
	DRC190M-8	●	19.00	19.99		239.0	160			DC1900M-SC~DC1990M-SC		
SS25-	DRC200M-8	●	20.00	20.99	25	254.0	168	56	WDRC17	DC2000M-SC~DC2099M-SC	-	-
	DRC210M-8	●	21.00	21.99		264.0	176			DC2100M-SC~DC2150M-SC		
	DRC220M-8	●	22.00	22.99		273.0	184			DC2200M-SC~DC2250M-SC		
	DRC230M-8	●	23.00	23.99		282.0	192			DC2300M-SC~DC2350M-SC		
	DRC240M-8	●	24.00	24.99		291.0	200			DC2400M-SC~DC2450M-SC		
SS32-	DRC250M-8	●	25.00	25.50	32	305.0	208	60		DC2500M-SC~DC2550M-SC		

● : Std. Item

K



Drilling

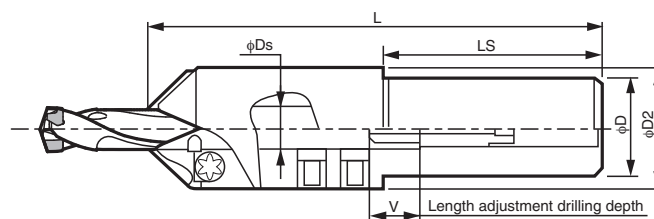
Chamfering attachment

Drilling and chamfering simultaneously

By using the chamfering attachment, the SS-DRC type can drill and chamfer simultaneously.



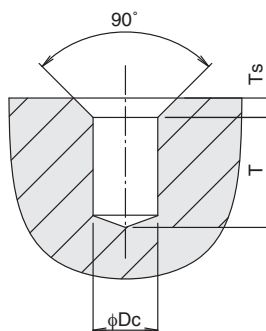
Holder



Description	Std.	Applicable Drill Shank Dia. ϕD_s	Dimension (mm)					Applicable Inserts
			ϕD	ϕD_2	L	LS	V	
S20-CH10	●	10	20	29	122	52	17	CT08T2-45A
S32-CH12	●	12	32	38	133	62	21	CT12T3-45A
S32-CH14	●	14		40	137		16	
S32-CH16	●	16		42	141		19	
S32-CH18	●	18		47	144		15	

Note) Chamfering attachment is dedicated for Straight Shank SS-DRC type.
It cannot be used for Flanged Shank SF-DRC type.

Drilling and chamfering depths

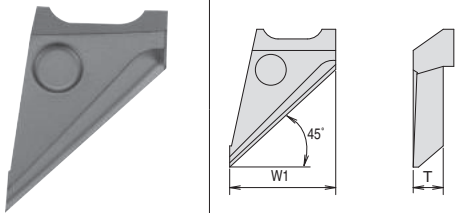
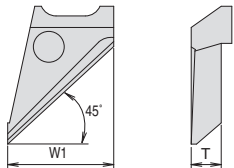


Drill Dia. (mm)		Drilling Depth (mm)						Chamfering dimension (mm)		Applicable Chamfering Holder
φDc		T (3D Drilling)		T (5D Drilling)		T (8D Drilling)		Ts		
min.	max.	min.	max.	min.	max.	min.	max.	Ts 100	Ts max.	
φ7.94	φ8.49	11	19	21	37	47	63	2.5	5.0	S20-CH10
φ8.50	φ8.99	12	21	24	40	51	67			
φ9.00	φ9.49	12	23	27	43	56	72			
φ9.50	φ9.99	13	25	31	47	61	77			
φ10.00	φ10.49	13	26	28	49	60	81	3.5	7.0	S32-CH12
φ10.50	φ10.99	14	28	31	52	64	85			
φ11.00	φ11.49	14	30	34	55	69	90			
φ11.50	φ11.99	15	32	37	58	73	94			
φ12.00	φ12.49	15	30	41	56	79	94	4.0	8.0	S32-CH14
φ12.50	φ12.99	17	32	44	59	83	96			
φ13.00	φ13.49	19	34	47	62	88	103			
φ13.50	φ13.99	21	36	51	66	93	108			
φ14.00	φ14.49	19	37	50	68	94	112	4.0	8.0	S32-CH16
φ14.50	φ14.99	21	39	53	71	98	116			
φ15.00	φ15.99	25	43	59	77	107	125			
φ16.00	φ16.99	30	44	66	80	117	131			
φ17.00	φ17.99	35	49	73	87	127	141	4.0	8.0	S32-CH18

Ts 100: Max. chamfering dimension at the full feed.
Ts max.: Max. chamfering dimension at a 50% feed reduction.
(Max. chamfering dimension of machining possible without step feeding)

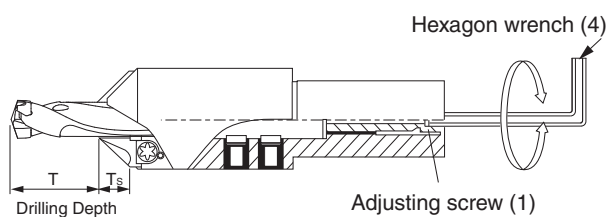
● : Std. Item

● Applicable Inserts

Insert		Description	Dimension (mm)		PVD Coated Carbide	Applicable Chamfering Holder
			W1	T	PR0315	
		CT08T2-45A	8	2.83	●	S20-CH10
		CT12T3-45A	12	3.98	●	S32-CH12 S32-CH18

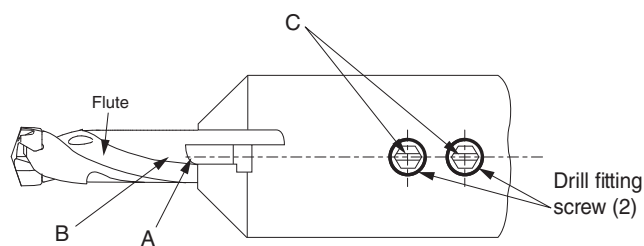
● Method to use DRC chamfering attachment

I. Drilling Depth adjustment



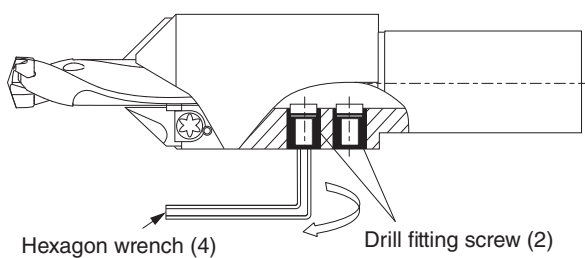
Insert drill into chamfering holder.
Next, temporarily attach the chamfering insert A.
Turn the adjusting screw (1) with the hexagon wrench (4) to set the drilling depth T.

II. Drill location check



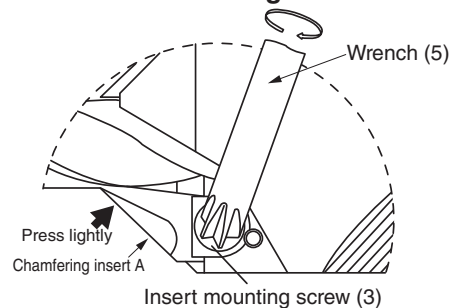
Rotate the drill so that the lower end of the chamfering insert A is aligned with the body clearance B of the drill.
Set it so that slot C and the drill fitting screws (2) are lined up as shown in the figure above.

III. Fix the drill



Tighten the drill fitting screws (2) with the hexagon wrench (4).
(In the case of using a torque wrench, then please refer to the table below)

IV. Installation of the chamfering insert



Press the chamfering insert A lightly into the drill and tighten the insert mounting screw (3) with wrench (5).

Chamfering Holder	Tightening Torque [N·m]	Adjusting screw (1)	Drill fitting screw (2)	Insert mounting screw (3)	Hexagon wrench (4)	Wrench (5)
S20-CH10	10	AJ-6×38	FS-10	MT-3	LW-3	DT-9
S32-CH12	15	AJ-8×44-9.5	FS-12	MT-4	LW-4	DT-15
S32-CH14	20	AJ-10×46	FS-14		LW-5	
S32-CH16	30		FS-16			
S32-CH18	45		FS-18			

Technical drawing of a drill bit showing dimensions and labels:

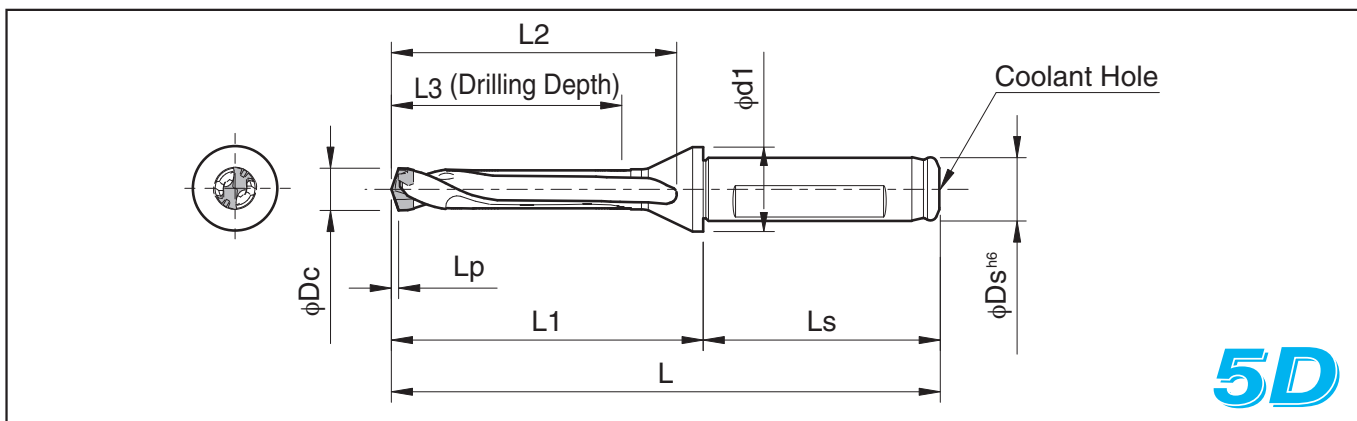
- L3 (Drilling Depth)**: Dimension for the drilling depth.
- L2**: Dimension for the length of the cutting edge.
- $\phi d1$** : Dimension for the diameter of the cutting edge.
- Coolant Hole**: Label for the hole at the end of the drill bit.
- ϕDc** : Dimension for the diameter of the cutting edge.
- Lp**: Dimension for the length of the cutting edge.
- L1**: Dimension for the length of the cutting edge.
- Ls**: Dimension for the length of the cutting edge.
- L**: Dimension for the length of the cutting edge.
- $\phi Ds \pm f/6$** : Dimension for the diameter of the cutting edge.

● Toolholder Dimensions

Description		Std.	Dimension (mm)									Spare Parts		Applicable Inserts 🔩 K18~K20				
			Applicable Insert Dia. ϕDc		ϕDs (h6)	L	L1	L2	L3	Ls	ϕd1	Wrench 🔩 K29						
			min.	max.														
SF12-	DRC080M-3	●	7.94	8.49	12	86	41	35	26	45	16	WDRC8 (WDRC17)	DC0794M-SC~DC0840M-SC					
	DRC085M-3	●	8.50	8.99		88	43	37	27				DC0850M-SC~DC0890M-SC					
	DRC090M-3	●	9.00	9.49		90	45	39	29				DC0900M-SC~DC0940M-SC					
	DRC095M-3	●	9.50	9.99		92	47	41	30				DC0950M-SC~DC0990M-SC					
SF16-	DRC100M-3	●	10.00	10.49	16	97	49	43	32	48	20	WDRC10 (WDRC17)	DC1000M-SC~DC1040M-SC					
	DRC105M-3	●	10.50	10.99		99	51	45	33				DC1050M-SC~DC1090M-SC					
	DRC110M-3	●	11.00	11.49		101	53	47	35				DC1100M-SC~DC1140M-SC					
	DRC115M-3	●	11.50	11.99		103	55	49	36				DC1150M-SC~DC1190M-SC					
	DRC120M-3	●	12.00	12.49		106	58	52	38			WDRC12 (WDRC17)	DC1200M-SC~DC1240M-SC					
	DRC125M-3	●	12.50	12.99		108	60	54	39				DC1250M-SC~DC1290M-SC					
	DRC130M-3	●	13.00	13.49		110	62	56	41				DC1300M-SC~DC1340M-SC					
	DRC135M-3	●	13.50	13.99		112	64	58	42				DC1350M-SC~DC1390M-SC					
	DRC140M-3	●	14.00	14.49		114	66	60	44			WDRC14 (WDRC17)	DC1400M-SC~DC1440M-SC					
	DRC145M-3	●	14.50	14.99		116	68	62	45				DC1450M-SC~DC1490M-SC					
	SF20-	DRC150M-3	●	15.00		15.99	20	122	72				66	48	50	25	WDRC17	DC1500M-SC~DC1580M-SC
		DRC160M-3	●	16.00		16.99		126	76				70	51				DC1600M-SC~DC1690M-SC
DRC170M-3		●	17.00	17.99	131	81		75	54	DC1700M-SC~DC1790M-SC								
SF25-	DRC180M-3	●	18.00	18.99	25	141	85	79	57	56	32	WDRC17	DC1800M-SC~DC1890M-SC					
	DRC190M-3	●	19.00	19.99		145	89	83	60				DC1900M-SC~DC1990M-SC					
	DRC200M-3	●	20.00	20.99		149	93	87	63				DC2000M-SC~DC2099M-SC					
	DRC210M-3	●	21.00	21.99		153	97	91	66				DC2100M-SC~DC2150M-SC					
	DRC220M-3	●	22.00	22.99		158	102	96	69				DC2200M-SC~DC2250M-SC					
	DRC230M-3	●	23.00	23.99		162	106	100	72				DC2300M-SC~DC2350M-SC					
	DRC240M-3	●	24.00	24.99		166	110	104	75				DC2400M-SC~DC2450M-SC					
	DRC250M-3	●	25.00	25.50		170	114	108	78				DC2500M-SC~DC2550M-SC					

● : Std. Item

SF-DRC (Drilling Depth:5×D)



For Lp indicates distance from drill point to corner edge **K18-K20**

Toolholder Dimensions

Description		Std.	Dimension (mm)									Spare Parts		Applicable Inserts 🔩 K18-K20			
			Applicable Insert Dia. ϕDc		ϕDs (h6)	L	L1	L2	L3	Ls	ϕd1	Wrench 🔩 K29					
			min.	max.													
SF12- DRC080M-5	●	7.94	8.49	12	104	59	53	43	45	16	WDRC8 (WDRC17)	DC0794M-SC~DC0840M-SC					
	●	8.50	8.99		107	62	56	45				DC0850M-SC~DC0890M-SC					
	●	9.00	9.49		110	65	59	48				DC0900M-SC~DC0940M-SC					
	●	9.50	9.99		114	69	63	50				DC0950M-SC~DC0990M-SC					
SF16- DRC100M-5	●	10.00	10.49	16	120	72	66	53	48	20	WDRC10 (WDRC17)	DC1000M-SC~DC1040M-SC					
	●	10.50	10.99		123	75	69	55				DC1050M-SC~DC1090M-SC					
	●	11.00	11.49		126	78	72	58				DC1100M-SC~DC1140M-SC					
	●	11.50	11.99		129	81	75	60				DC1150M-SC~DC1190M-SC					
	●	12.00	12.49		132	84	78	63			WDRC12 (WDRC17)	DC1200M-SC~DC1240M-SC					
	●	12.50	12.99		135	87	81	65				DC1250M-SC~DC1290M-SC					
	●	13.00	13.49		138	90	84	68				DC1300M-SC~DC1340M-SC					
	●	13.50	13.99		142	94	88	70				DC1350M-SC~DC1390M-SC					
	●	14.00	14.49		145	97	91	73			WDRC14 (WDRC17)	DC1400M-SC~DC1440M-SC					
	●	14.50	14.99		148	100	94	75				DC1450M-SC~DC1490M-SC					
	SF20- DRC150M-5	●	15.00		15.99	20	156	106				100	80	50	25	WDRC14 (WDRC17)	DC1500M-SC~DC1580M-SC
		●	16.00		16.99		162	112				106	85				DC1600M-SC~DC1690M-SC
●		17.00	17.99	169	119		113	90	DC1700M-SC~DC1790M-SC								
SF25- DRC180M-5	●	18.00	18.99	25	181	125	119	95	56	32	WDRC17	DC1800M-SC~DC1890M-SC					
	●	19.00	19.99		187	131	125	100				DC1900M-SC~DC1990M-SC					
	●	20.00	20.99		193	137	131	105				DC2000M-SC~DC2099M-SC					
	●	21.00	21.99		200	144	138	110				DC2100M-SC~DC2150M-SC					
	●	22.00	22.99		206	150	144	115				DC2200M-SC~DC2250M-SC					
	●	23.00	23.99		212	156	150	120				DC2300M-SC~DC2350M-SC					
	●	24.00	24.99		218	162	156	125				DC2400M-SC~DC2450M-SC					
	●	25.00	25.50		225	169	163	130				DC2500M-SC~DC2550M-SC					

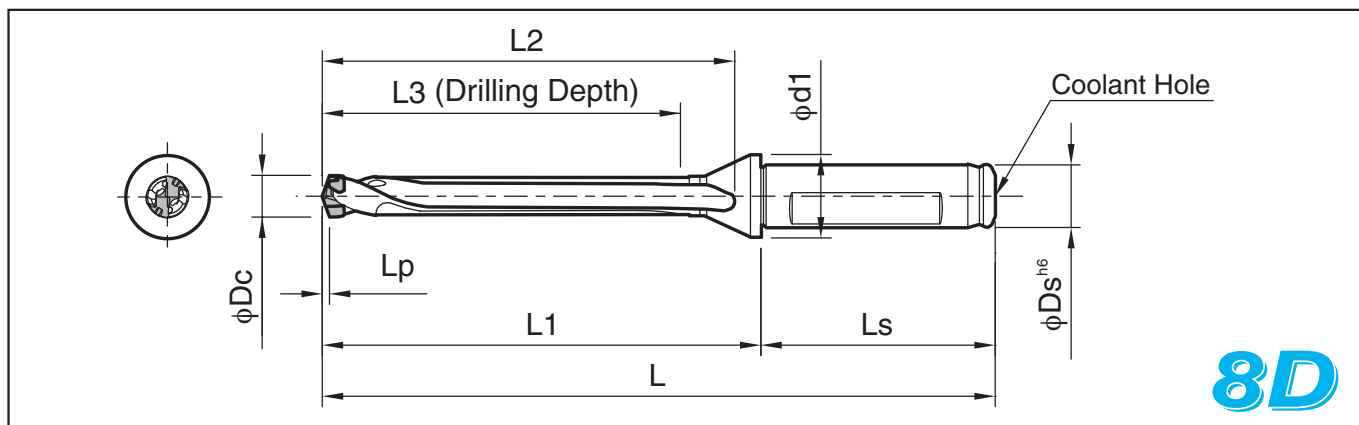
● : Std. Item

K



Drilling

SF-DRC (Drilling Depth:8xD)



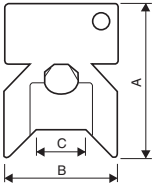
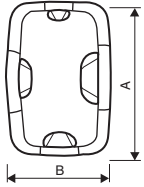
For Lp indicates distance from drill point to corner edge **K18-K20**

Toolholder Dimensions

Description		Std.	Dimension (mm)								Spare Parts		Applicable Inserts 🔩 K18-K20					
			Applicable Insert Dia. φDc		φDs (h6)	L	L1	L2	L3	Ls	φd1	Wrench 🔩 K29						
			min.	max.														
SF12-	DRC080M-8	●	7.94	8.49	12	129	84	79	68	45	16	WDRC8 (WDRC17)	DC0794M-SC~DC0840M-SC					
	DRC085M-8	●	8.50	8.99		134	89	83	72				DC0850M-SC~DC0890M-SC					
	DRC090M-8	●	9.00	9.49		138	93	88	76				DC0900M-SC~DC0940M-SC					
	DRC095M-8	●	9.50	9.99		144	99	93	80				DC0950M-SC~DC0990M-SC					
SF16-	DRC100M-8	●	10.00	10.49	16	151	103	97	84	48	20	WDRC10 (WDRC17)	DC1000M-SC~DC1040M-SC					
	DRC105M-8	●	10.50	10.99		156	108	102	88				DC1050M-SC~DC1090M-SC					
	DRC110M-8	●	11.00	11.49		160	112	107	92				DC1100M-SC~DC1140M-SC					
	DRC115M-8	●	11.50	11.99		165	117	111	96				DC1150M-SC~DC1190M-SC					
	DRC120M-8	●	12.00	12.49		169	121	116	100			WDRC12 (WDRC17)	DC1200M-SC~DC1240M-SC					
	DRC125M-8	●	12.50	12.99		174	126	120	104				DC1250M-SC~DC1290M-SC					
	DRC130M-8	●	13.00	13.49		178	130	124	108				DC1300M-SC~DC1340M-SC					
	DRC135M-8	●	13.50	13.99		184	136	130	112				DC1350M-SC~DC1390M-SC					
	DRC140M-8	●	14.00	14.49		188	140	134	116			WDRC14 (WDRC17)	DC1400M-SC~DC1440M-SC					
	DRC145M-8	●	14.50	14.99		193	145	139	120				DC1450M-SC~DC1490M-SC					
	SF20-	DRC150M-8	●	15.00		15.99	20	204	154				148	128	50	25	WDRC17 (WDRC17)	DC1500M-SC~DC1580M-SC
		DRC160M-8	●	16.00		16.99		213	163				157	136				DC1600M-SC~DC1690M-SC
DRC170M-8		●	17.00	17.99	223	173		167	144		DC1700M-SC~DC1790M-SC							
SF25-	DRC180M-8	●	18.00	18.99	25	238	182	176	152	56	32	WDRC17	DC1800M-SC~DC1890M-SC					
	DRC190M-8	●	19.00	19.99		247	191	185	160				DC1900M-SC~DC1990M-SC					
	DRC200M-8	●	20.00	20.99		256	200	194	168				DC2000M-SC~DC2099M-SC					
	DRC210M-8	●	21.00	21.99		266	210	204	176				DC2100M-SC~DC2150M-SC					
	DRC220M-8	●	22.00	22.99		275	219	213	184				DC2200M-SC~DC2250M-SC					
	DRC230M-8	●	23.00	23.99		284	228	222	192				DC2300M-SC~DC2350M-SC					
	DRC240M-8	●	24.00	24.99		293	237	231	200				DC2400M-SC~DC2450M-SC					
	DRC250M-8	●	25.00	25.50		303	247	241	208				DC2500M-SC~DC2550M-SC					

● : Std. Item

Wrench

Shape		Description	Dimension (mm)			Remarks
			A	B	C	
 		WDR8	43	33	φ10.2	 Description is printed in this area.
		WDR10			φ12.2	
		WDR12			φ14.2	
		WDR14			φ17.2	
 		WDR17	77	52	-	· WDR17(Multiple type wrench) has four insert entry points. If using an insert ranging from DC1700M-SC to DC2099M-SC, use the entry point printed as "φ17.00~φ20.99". · WDR17 can be used instead of WDR8~14 wrench.

Method to change DRC type MagicDrill inserts

How to attach inserts



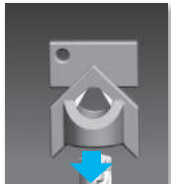
- (1) Fix drill holder on arbor. For insert exchange, fix arbor on the machine or set on toolpresetter.
- (2) Use compressed air to remove dust.



- (3) Install insert onto holder.
(Use gloves to protect your hand from any danger.)



- (4) Turn lightly in a clockwise direction.
(Use gloves to protect your hand from any danger.)



- (5) Align the wrench properly with the insert.



- (6) Make sure the wrench is aligned with the wrench slots on the insert.



(Improper alignment shown)

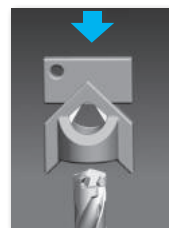


Slot for wrench



- (7) Turn the wrench in a slow counterclockwise direction.
- (8) Completed.

How to detach inserts



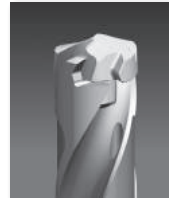
- (1) Use compressed air to remove dust.
- (2) Align the wrench properly with the insert.



- (3) Make sure the wrench is aligned with the wrench slots on the insert.



- (4) Turn the wrench in a counterclockwise direction.



- (5) Once lock is released, insert can be turned by fingers.
(Use gloves to protect your hand from any danger.)



- (6) Remove insert.
(Use gloves to protect your hand from any danger.)

K



Drilling

◆ Recommended Cutting Conditions

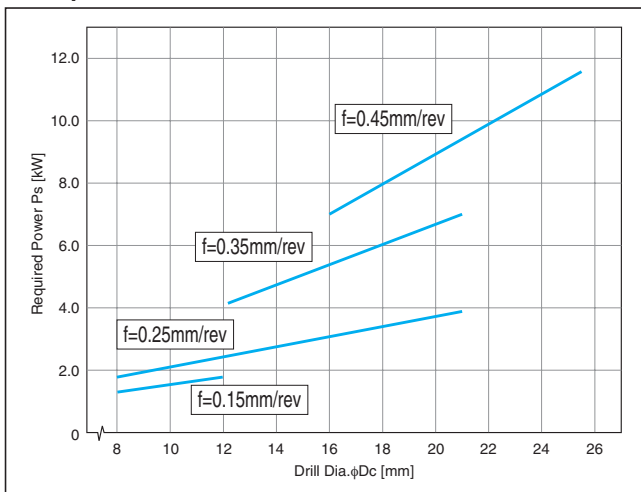
Workpiece Material		Hardness (HB)	Cutting Conditions		Drill Dia. φDc(mm)								Remarks
			Cutting Speed Vc (m/min)	n (min ⁻¹) f (mm/rev)	φ8	φ10	φ12	φ14	φ16	φ18	φ20	φ25	
Low Carbon Steel	SS400 S10C~S25C	125	120 - 180	n (min ⁻¹)	4,780 - 7,170	3,820 - 5,730	3,180 - 4,780	2,730 - 4,090	2,390 - 3,580	2,120 - 3,180	1,910 - 2,870	1,530 - 2,290	Coolant (Ref. to Page K31)
				f (mm/rev)	0.11 - 0.20	0.13 - 0.24	0.14 - 0.28	0.17 - 0.32	0.19 - 0.35	0.23 - 0.38	0.25 - 0.41	0.30 - 0.50	
Carbon Steel	S30C~S58C (Annealed)	190	100 - 150	n (min ⁻¹)	3,980 - 5,970	3,180 - 4,780	2,650 - 3,980	2,270 - 3,410	1,990 - 2,990	1,770 - 2,650	1,590 - 2,390	1,270 - 1,910	
				f (mm/rev)	0.13 - 0.24	0.15 - 0.29	0.17 - 0.33	0.19 - 0.36	0.22 - 0.41	0.25 - 0.46	0.28 - 0.48	0.32 - 0.60	
	S30C~S58C (Heat treated)	250	80 - 120	n (min ⁻¹)	3,180 - 4,780	2,550 - 3,820	2,120 - 3,180	1,820 - 2,730	1,590 - 2,390	1,420 - 2,120	1,270 - 1,910	1,020 - 1,530	
				f (mm/rev)	0.13 - 0.21	0.15 - 0.25	0.18 - 0.31	0.21 - 0.39	0.23 - 0.45	0.25 - 0.53	0.28 - 0.61	0.38 - 0.64	
		300	50 - 75	n (min ⁻¹)	1,990 - 2,990	1,590 - 2,390	1,330 - 1,990	1,140 - 1,710	1,000 - 1,490	880 - 1,330	800 - 1,190	640 - 960	
				f (mm/rev)	0.11 - 0.19	0.12 - 0.23	0.16 - 0.28	0.21 - 0.32	0.23 - 0.35	0.25 - 0.41	0.28 - 0.41	0.32 - 0.45	
Alloy Steel	SCM,SCr etc. (Annealed)	180	70 - 95	n (min ⁻¹)	2,790 - 3,780	2,230 - 3,030	1,860 - 2,520	1,590 - 2,160	1,390 - 1,890	1,240 - 1,680	1,110 - 1,510	890 - 1,210	
				f (mm/rev)	0.15 - 0.28	0.16 - 0.35	0.21 - 0.37	0.23 - 0.46	0.25 - 0.46	0.25 - 0.51	0.30 - 0.51	0.35 - 0.60	
	SCM,SCr etc. (Heat treated)	275	70 - 95	n (min ⁻¹)	2,790 - 3,780	2,230 - 3,030	1,860 - 2,520	1,590 - 2,160	1,390 - 1,890	1,240 - 1,680	1,110 - 1,510	890 - 1,210	
				f (mm/rev)	0.11 - 0.21	0.14 - 0.25	0.19 - 0.30	0.21 - 0.33	0.23 - 0.37	0.28 - 0.43	0.28 - 0.46	0.32 - 0.58	
		300	60 - 90	n (min ⁻¹)	2,390 - 3,580	1,910 - 2,870	1,590 - 2,390	1,360 - 2,050	1,190 - 1,790	1,060 - 1,590	960 - 1,430	760 - 1,150	
				f (mm/rev)	0.11 - 0.19	0.12 - 0.23	0.16 - 0.26	0.18 - 0.31	0.21 - 0.33	0.23 - 0.36	0.25 - 0.38	0.30 - 0.50	
		350	50 - 75	n (min ⁻¹)	1,990 - 2,990	1,590 - 2,390	1,330 - 1,990	1,140 - 1,710	1,000 - 1,490	880 - 1,330	800 - 1,190	640 - 960	
				f (mm/rev)	0.11 - 0.20	0.12 - 0.23	0.16 - 0.25	0.17 - 0.29	0.18 - 0.32	0.20 - 0.36	0.23 - 0.38	0.28 - 0.50	
Stainless Steel	SUS304 SUS316	220	60 - 80	n (min ⁻¹)	2,390 - 3,180	1,910 - 2,550	1,590 - 2,120	1,360 - 1,820	1,190 - 1,590	1,060 - 1,420	960 - 1,270	760 - 1,020	
				f (mm/rev)	0.11 - 0.19	0.12 - 0.23	0.16 - 0.26	0.18 - 0.31	0.21 - 0.33	0.23 - 0.36	0.25 - 0.38	0.28 - 0.42	
	SUS630	300	50 - 70	n (min ⁻¹)	1,990 - 2,790	1,590 - 2,230	1,330 - 1,860	1,140 - 1,590	1,000 - 1,390	880 - 1,240	800 - 1,110	640 - 890	
				f (mm/rev)	0.11 - 0.20	0.12 - 0.23	0.16 - 0.25	0.17 - 0.29	0.18 - 0.32	0.20 - 0.36	0.23 - 0.38	0.25 - 0.40	
Gray Cast Iron	FC150-FC200	180	120 - 170	n (min ⁻¹)	4,780 - 6,770	3,820 - 5,410	3,180 - 4,510	2,730 - 3,870	2,390 - 3,380	2,120 - 3,010	1,910 - 2,710	1,530 - 2,170	
				f (mm/rev)	0.17 - 0.32	0.20 - 0.37	0.23 - 0.43	0.27 - 0.48	0.30 - 0.55	0.33 - 0.61	0.33 - 0.61	0.40 - 0.74	
	FC250-FC350	260	90 - 120	n (min ⁻¹)	3,580 - 4,780	2,870 - 3,820	2,390 - 3,180	2,050 - 2,730	1,790 - 2,390	1,590 - 2,120	1,430 - 1,910	1,150 - 1,530	
				f (mm/rev)	0.14 - 0.25	0.16 - 0.31	0.19 - 0.35	0.23 - 0.42	0.26 - 0.47	0.28 - 0.53	0.30 - 0.58	0.36 - 0.70	
Nodular Cast Iron	FCD400-FCD500	160	60 - 90	n (min ⁻¹)	2,390 - 3,580	1,910 - 2,870	1,590 - 2,390	1,360 - 2,050	1,190 - 1,790	1,060 - 1,590	960 - 1,430	760 - 1,150	
				f (mm/rev)	0.14 - 0.25	0.16 - 0.30	0.19 - 0.35	0.22 - 0.40	0.24 - 0.45	0.28 - 0.51	0.28 - 0.56	0.34 - 0.67	
	FCD600-FCD800	250	40 - 65	n (min ⁻¹)	1,590 - 2,590	1,270 - 2,070	1,060 - 1,730	910 - 1,480	800 - 1,290	710 - 1,150	640 - 1,040	510 - 830	
				f (mm/rev)	0.10 - 0.19	0.12 - 0.22	0.14 - 0.25	0.16 - 0.31	0.19 - 0.35	0.23 - 0.51	0.25 - 0.53	0.30 - 0.60	

As drilling depth increases (3D 5D 8D), feed rates should be reduced.

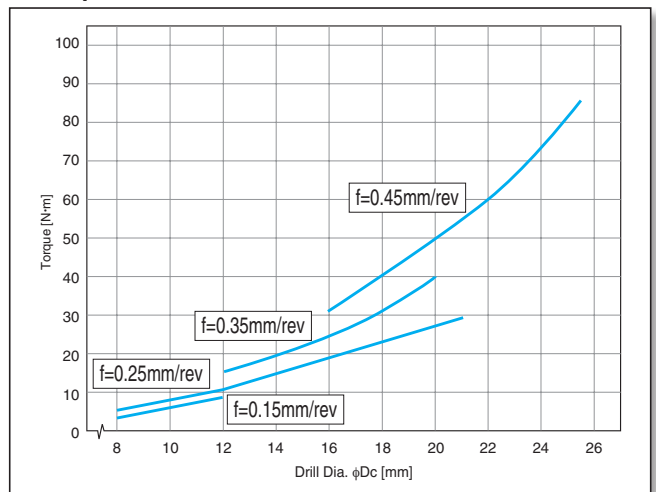
■ Reference charts

<Cutting Conditions>: Workpiece Material Heat treated steel (Hardness 240HB) Vc=80m/min, Wet

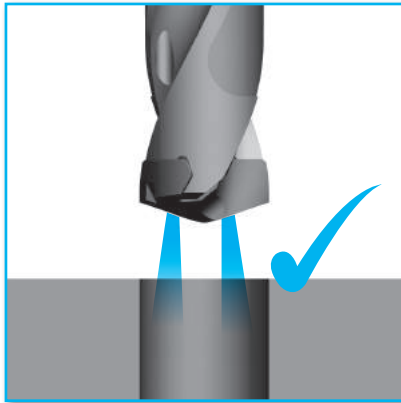
● Required Power



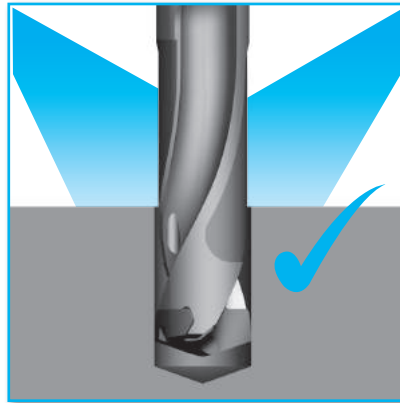
● Torque



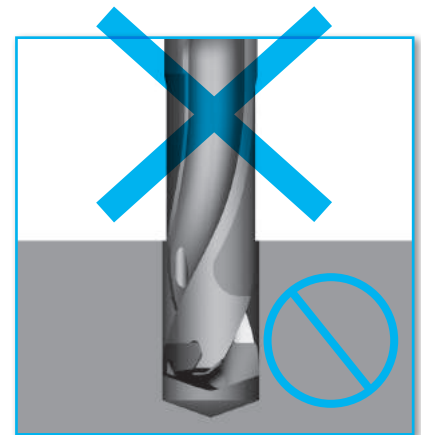
Coolant



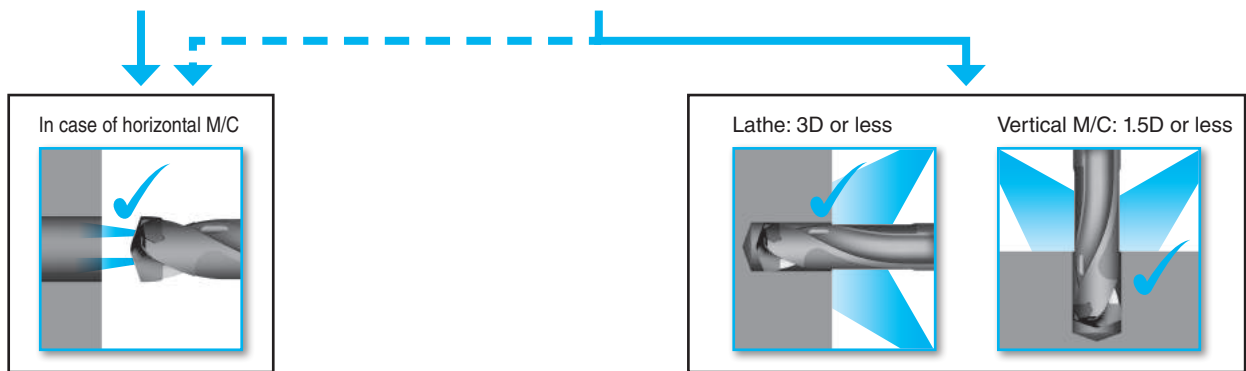
1) Internal coolant is recommended.



2) In case of external coolant.



3) Dry machining is not recommended.

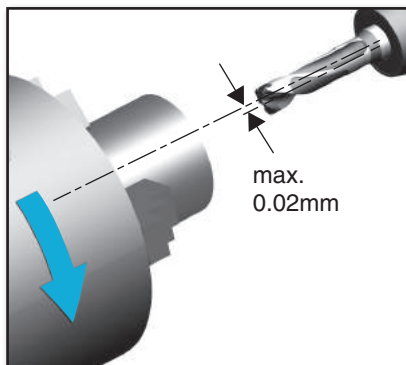


Internal coolant is recommended for horizontal machining center because external coolant may not sufficiently be applied to inside because the tool is revolving.

Precautions for use

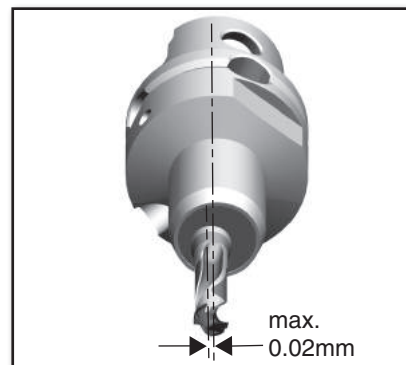
Core Deviation

1) If drill is stationary



This is be used with a boring sleeve (screw clamp) and collet chuck, please be sure to set deviation amount under 0.02mm between workpiece and drill.

2) If drill is rotating



Make sure to use arbor that is not deformed. Center of arbor deviation must be within 0.02mm.

Cautions for installation on Machining Center

For installation of MagicDrill DRC,
1st choice...use Hydro Chuck, Power Chuck, Collet Chuck, etc.
2nd choice...Side lock arbor

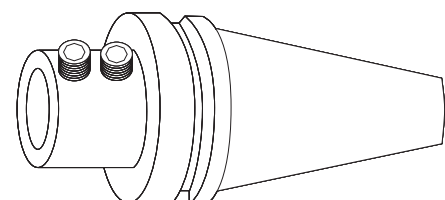
Hydro Chuck

Power Chuck

Collet Chuck

Install MagicDrill DRC
to above chuck

1st choice



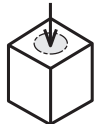
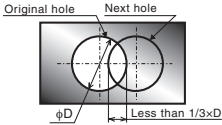
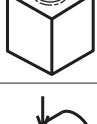
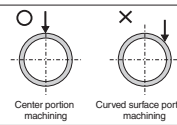
Example of side lock arbor
2nd choice

K

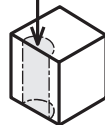


Drilling

Applicable workpiece

Applications	Shape of Workpiece	Caution for machining
Plain Surface		- Due to good chip control, step machining is not necessary for Low Carbon Steel. - When machining SUS304, for hole depths of more than 2.5D, utilize the step machining process. - In order to have smooth chip removal, we recommend internal coolant.
Stacked Plates		Fix stacked plates securely to ensure they do not slip while machining.
Hole Expansion		If the overlap amount is less than $1/3 \times D$, machining is possible. 
Concave Surface		When machining concave holes set the feed rates at half or less than continuous hole machining.
Pipe Material		- Hole machining above the centerline of the pipe is possible. - Do not machine on curved surface areas. 

Not Recommended workpieces

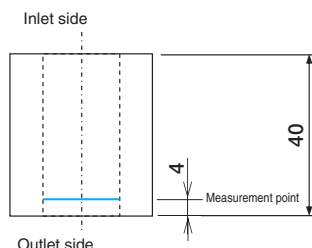
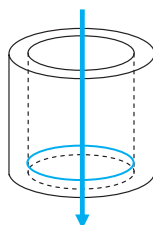
Applications	Shape of Workpiece
Slant Surface	
Half Cylindrical	
Cored Hole	

Comparison of Machining Precision

Cutting Condition and Measurement Point

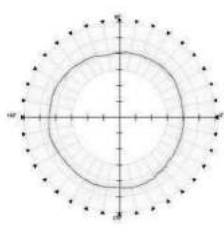
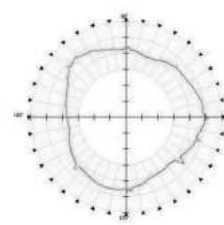
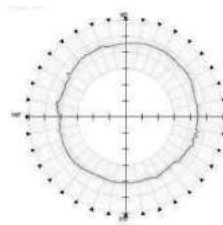
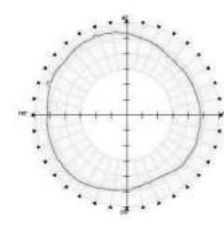
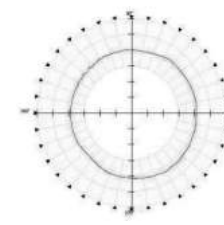
<Cutting Conditions>

Workpiece Material	S45C
Vc (m/min)	100
f (mm/rev)	0.2mm/rev, 0.3mm/rev
Drilling Depth H (mm)	Through hole (40mm)
Coolant	Wet (Internal coolant)
Tool	$\phi 14 \times 3D$ type
Machine	M/C



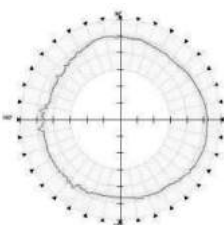
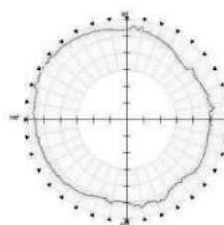
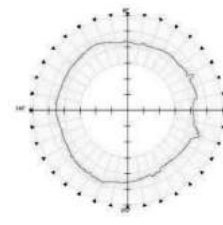
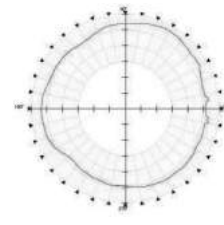
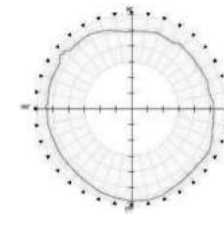
Roundness

1) Roundness (f=0.2mm/rev)

Indexable drill		Carbide solid drill		
Kyocera	Competitor F	Competitor B	Competitor C	Competitor N
				
Roundness: 5.5 μ m	Roundness: 22.5 μ m	Roundness: 6.4 μ m	Roundness: 9.8 μ m	Roundness: 5.2 μ m

(Internal evaluation)

2) Roundness (f=0.3mm/rev)

Indexable drill		Carbide solid drill		
Kyocera	Competitor F	Competitor B	Competitor C	Competitor N
				
Roundness: 10.7 μ m	Roundness: 15.2 μ m	Roundness: 12.0 μ m	Roundness: 11.8 μ m	Roundness: 12.3 μ m

(Internal evaluation)

K



Drilling

DRA

DRC

DRX

DRS

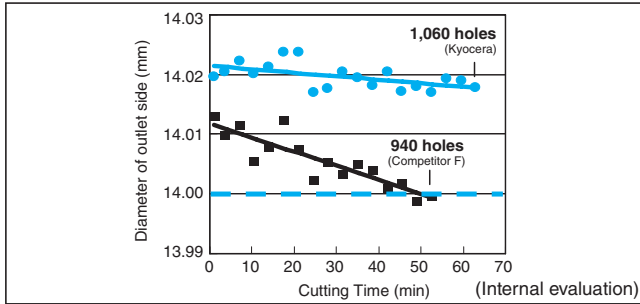
DRZ

DRW

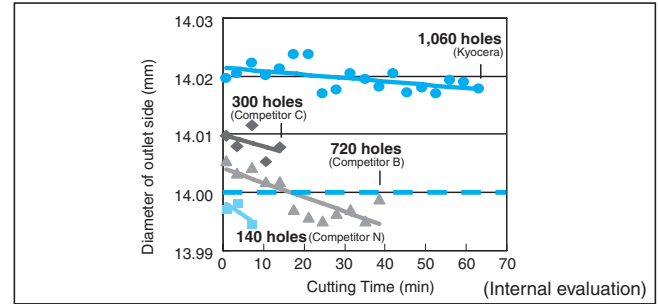
Fine Micro

● Comparison of Hole Dia. (f=0.3mm/rev)

1) Comparison with indexable drill



2) Comparison with carbide solid drill



Q&A

Q-3 Drilling deep hole machining using DRC (8D type), dimension variation of diameters has occurred at inlet and far (outlet) side possibly due to deflection. Is there any countermeasure?

A-3 There are some countermeasures as follows to prevent deflection (to improve bite of drill).

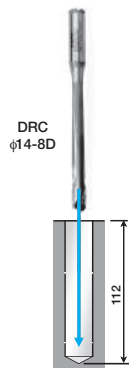
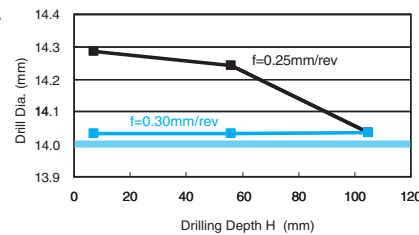
Countermeasures 1

• Increasing the feed rate

Increasing the feed rate may keep the processing diameters constant.

(Estimated rate: Current rate + 0.03 to 0.05 mm/rev)

<Cutting Conditions>
S55C Vc=80m/min H=112mm
f=0.25mm/rev → 0.30mm/rev
Wet (Internal coolant)
SS16-DRC140M-8
DC1400M-SC (PR0315)



If increasing the feed rate is not possible because rigidity of machine or clamp is weak.

Countermeasures 2

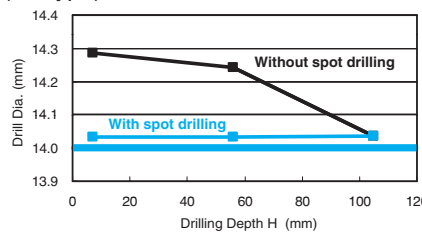
• Make a center spot

1) Make a center spot using the DRC drill or a commercially available center drill which has a vertex angle of about 140°.

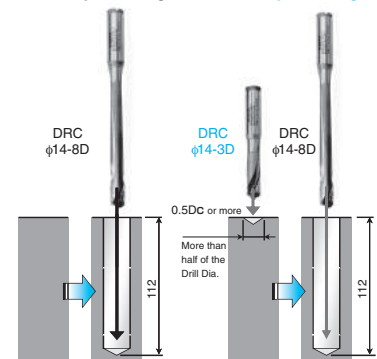
(If the center drill can be modified, make its vertex angle larger than 140°)

2) Then drill the hole using the DRC drill (8D type).

<Cutting Conditions>
S55C Vc=80m/min
f=0.25mm/rev H=112mm
Wet (Internal coolant)
SS16-DRC140M-3
SS16-DRC140M-8
DC1400M-SC (PR0315)



<Without spot drilling> <With spot drilling>



K



Drilling

Case Studies

S50C	
- Flange - Vc=97m/min (n=2,490min⁻¹) - H=32mm - f=0.3mm/rev (Vf=747mm/min) - Wet (Internal coolant) - DC1250M-SC (PR0315)	
SS14-DRC120M-3	3,000 holes/insert
Competitor A	1,800 holes/drill
Compared to competitor's drill A, MagicDrill DRC type has reduced burr and reduced more than 10% of the power required. Tool life has also improved greatly. (Evaluation by the user)	

SCM440	
- Housing - Vc=83m/min (n=2,400min⁻¹) - H=32mm - f=0.24mm/rev (Vf=576mm/min) - Wet (Internal coolant) - DC1100M-SC (PR0315)	
SS12-DRC110M-3	2,400 holes/insert
Competitor B	2,000 holes/drill
Compared to competitor's solid drill B, MagicDrill DRC type has greatly reduced preparation time with its easy insert replacement feature. Also, the costs of spare tools for re-grinding has been reduced, and tool life has improved. (Evaluation by the user)	

DRX enables stable and efficient drilling

Change I

■ New Technology: Twisted Coolant Holes

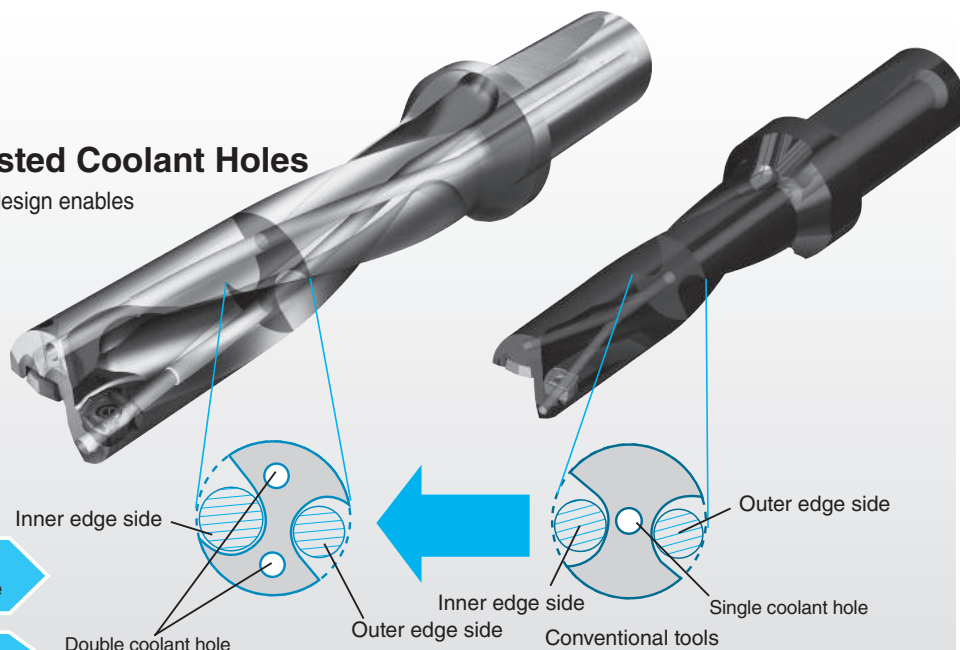
Twisted Coolant Holes technology design enables



Superior Chip Evacuation

Better chip evacuation through the flute space of the internal cutting edge

1.25 times higher cooling performance



The special alloy enables toolholder stability and increased reliability.

Change II

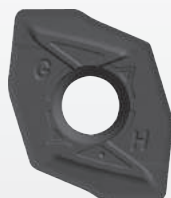
■ Chipbreaker design with new concept: The three chipbreakers

- Covers a variety of workpiece materials

- The problem of sticky chip trouble when machining stainless steel or low carbon steel workpieces is solved.



GM Chipbreaker
Carbon Steel, Cast Iron
General Purpose



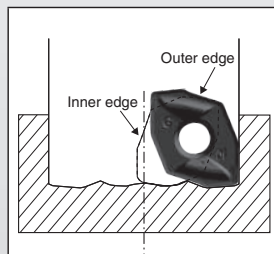
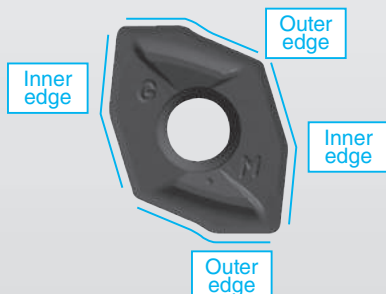
GH Chipbreaker
Hard materials,
interrupted drilling
Tough Edge



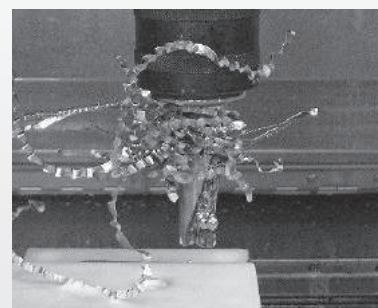
SM Chipbreaker
Stainless Steel,
Low Carbon Steel and
Non-ferrous Metals
Sharp cutting for deeper drilling

- Economical 4 edged type

2 inner pocket cutting edges and 2 outer pocket cutting edges



Positioning of outer edge and inner edge



Long entangled chips (Competitor A)



Chips by SM chipbreaker (SUS304)

K

Drilling

DRA

DRC

DRX

DRS

DRZ

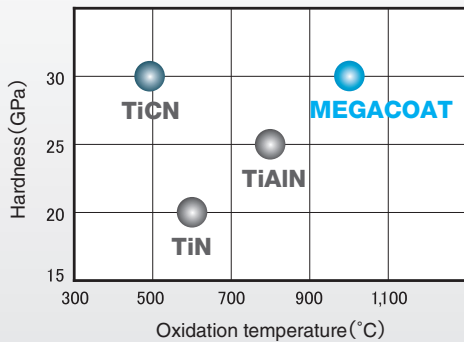
DRW

Fine

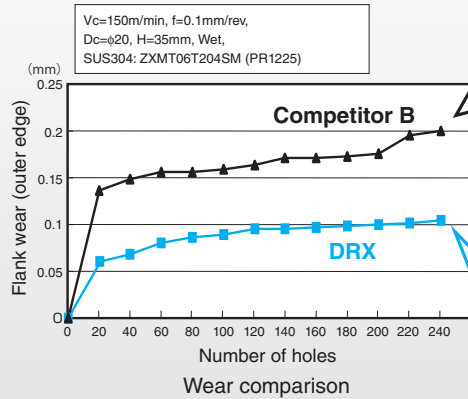
Micro

Insert Grades : Four Insert Grades

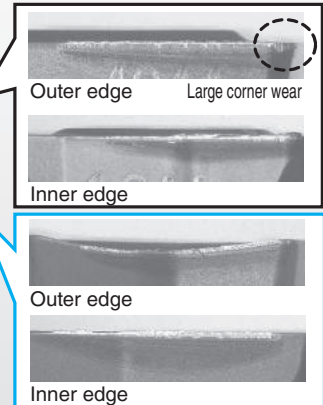
(PR1230:for Steel, PR1225:for Stainless Steel / Low Carbon Steel, PR1210:for Cast Iron, GW15:for Non-ferrous Metals)



MEGACOAT's High oxidation resistance
MEGACOAT is used to enable longer Tool Life



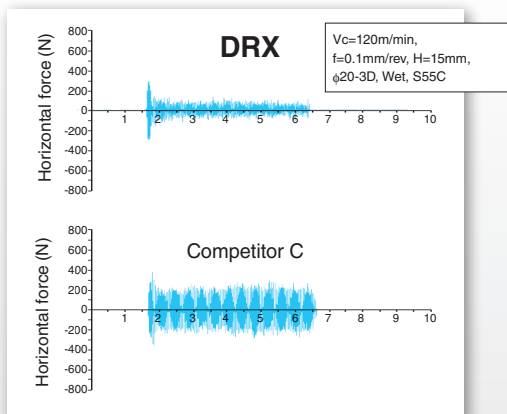
Better wear resistance than competitor B
Achieving long Tool Life



(Internal evaluation)

High Precision: Balanced System

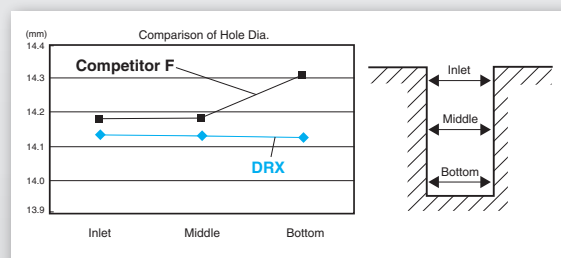
Vibration comparison



Less vibration due to well balanced at Drilling

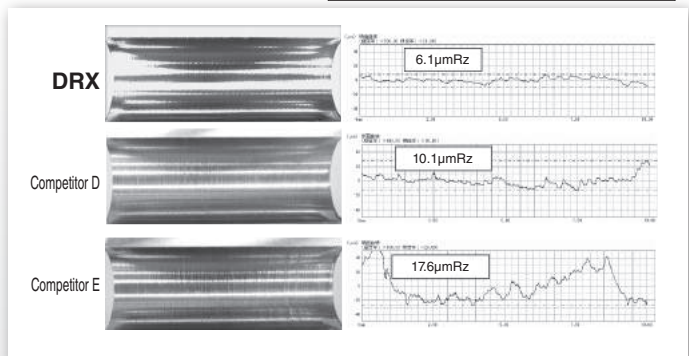
Better finished surface

Variation of Hole Dia.



Finished surface comparison

VC=180m/min, f=0.15mm/rev, H=60mm (through hole), φ20-3D, Wet, S45C, NC Lathe



Better finished surface than Competitor D and E

Possible to extend tool life of next process

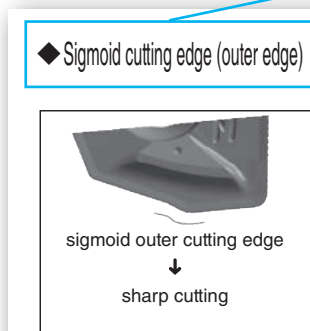
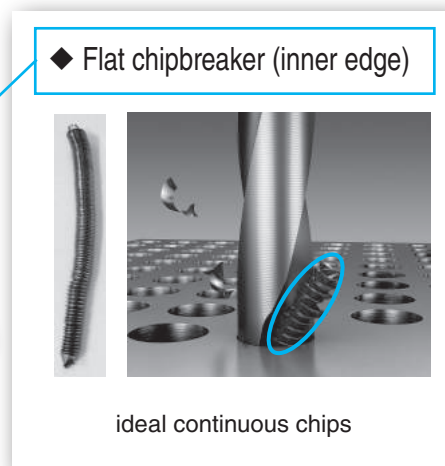
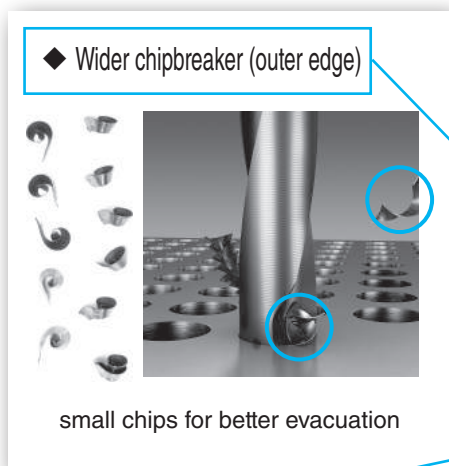
VC=180m/min, f=0.08mm/rev, H=56mm (blind hole), φ14-4D, Wet, S50C

Comparing to competitor F, its excellent chip evacuation performance provides a maintained good balance and less variation in hole dia.
Drastically improved straight machining capability

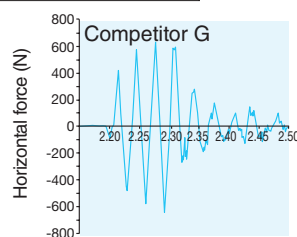
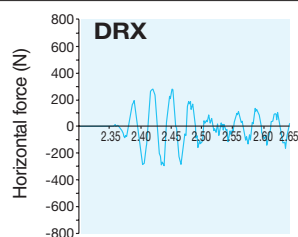
(Internal evaluation)

Covers a variety of workpiece materials with new chipbreaker

New chipbreaker features



$V_c=120\text{m/min}$, $f=0.1\text{mm/rev}$, $H=15\text{mm}$, $\phi 20\text{-}3\text{D}$, Wet, S55C

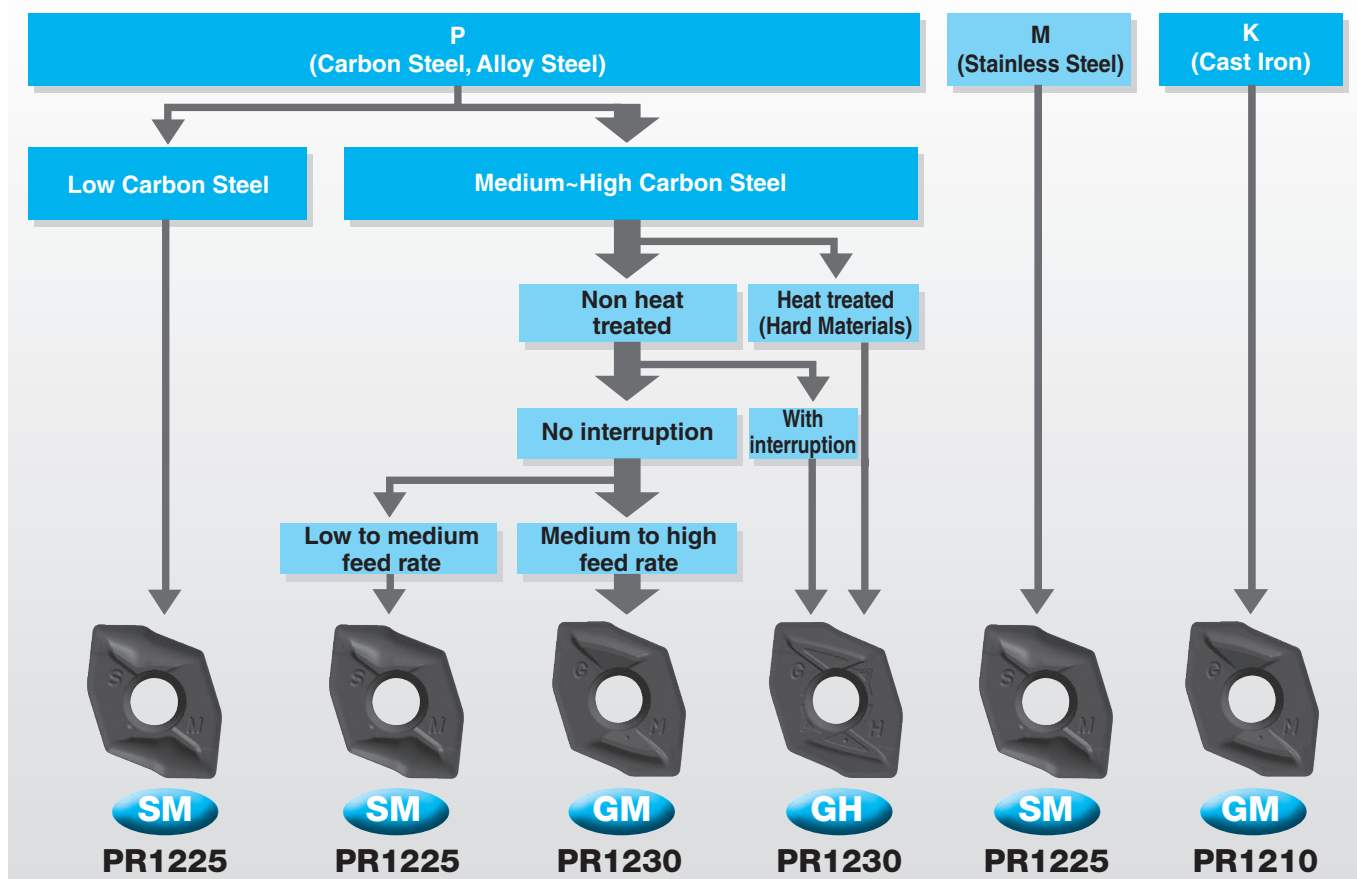


Lowered impact force at the start

Reduces sudden breakage

Cutting force comparison of outer edge at the start of drilling

Chipbreaker selection



K



Drilling

DRA

DRC

DRX

DRS

DRZ

DRW

Fine Micro

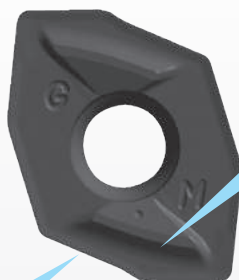
design developed through comprehensive technology

● 3 chipbreakers to cover various materials

◆ GM Chipbreaker...General Purpose

for Steel: **PR1230**

for Cast Iron: **PR1210**



(1) Wider chipbreaker can cover variety of materials

(2) Good balance of cutting edge strength and sharp cutting

for general drilling

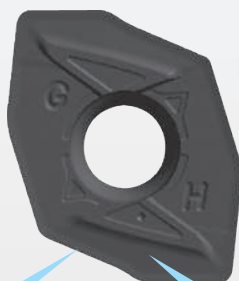


Optimized cutting edge strength, sharpness and chip control

◆ GH Chipbreaker...Tough Edge

Hard materials, interrupted drilling: **PR1230**

·Fracture resistance comparison

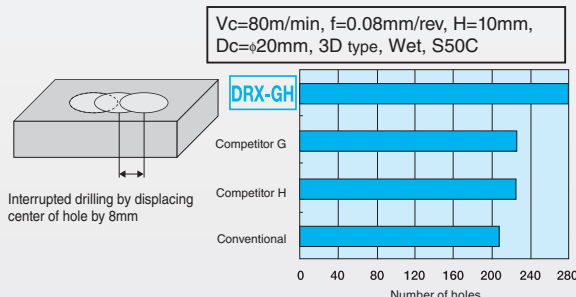


1st recommended chipbreaker for hard materials interrupted operation

Cutting edge strength oriented design of Chipbreaker

(2) Cutting edge strength oriented design

(1) Wider chipbreaker control breakage by pressed chips



Better fracture resistance than competitors

◆ SM Chipbreaker...Sharp Cutting for Deeper Drilling

for Stainless Steel / Low Carbon Steel: **PR1225**

for Non-ferrous Metals: **GW15**

For deep drilling of difficult to control chip materials such as stainless steel and low carbon steel

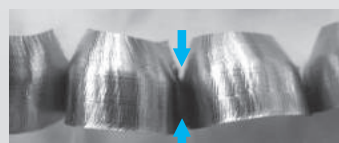


(2) Sharp cutting with large rake angle

(1) U-shaped cutting edge
Breaks chips by creating cracks from both ends

**Sharp cutting with large rake angle
Stable chip control owing to newly designed chipbreaker and U-shaped cutting edge**

Outstanding chip control achieved by splitting chips from the leading edges



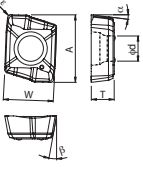
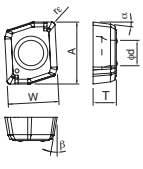
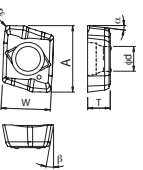
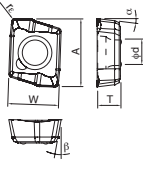
Chip breaking system of SM chipbreaker (Outer edge)



Applicable Inserts (for DRX)

Classification of usage
 ● : 1st Choice
 ○ : 2nd Choice
 (Steel; non heat treated)

P	Carbon Steel / Alloy Steel	●	○		
	Mold Steel	●			
M	Stainless Steel	○	●		
K	Cast Iron			●	
N	Non-ferrous Metals				●

Insert	Description	Dimension (mm)					Angle		MEGACOAT				Carbide	Applicable Toolholders Ref. to Page
		A	T	φd	W	rε	α	β	PR1230	PR1225	PR1210	GW15		
 For outer edge / General Purpose	 ZXMT 030203GM-E	6.4	2.30	2.4	4.8	0.3	7°	10°	●		●			K40 K42 K44 K46
 For inner edge / General Purpose	 ZXMT 030203GM-I	5.9	2.30	2.4	4.8	0.3	7°	10°	●	●	●	●		
 For outer edge / Tough Edge	 ZXMT 030203GH-E	6.4	2.30	2.4	4.8	0.3	7°	10°	●					
 For outer edge / Sharp Cutting	 ZXMT 030203SM-E	6.4	2.30	2.4	4.8	0.3	7°	10°		●			●	
 General Purpose	ZXMT 040203GM	6.2	2.60	2.4	5.1	0.3	13°	10°	●		●			K40 K41 K42 K43 K44 K45 K46
	05T203GM	7.3	2.76	2.5	5.5	0.3		7°	●		●			
	06T204GM	8.6	2.89	2.8	6.4	0.4			●		●			
	070305GM	10.2	3.24	3.0	8.0	0.5			●		●			
	09T306GM	12.2	4.03	3.6	9.6	0.6			●		●			
	11T306GM	14.5	4.06	4.6	11.6	0.6			●		●			
	140408GM	18.0	4.88	5.7	14.4	0.8			●		●			
	170608GM	22.1	6.58	6.8	17.7	0.8			●		●			
 Tough Edge	ZXMT 040203GH	6.2	2.60	2.4	5.1	0.3	13°	10°	●					
	05T203GH	7.3	2.76	2.5	5.5	0.3		7°	●					
	06T204GH	8.6	2.89	2.8	6.4	0.4			●					
	070305GH	10.2	3.24	3.0	8.0	0.5			●					
	09T306GH	12.2	4.03	3.6	9.6	0.6			●					
	11T306GH	14.5	4.06	4.6	11.6	0.6			●					
	140408GH	18.0	4.88	5.7	14.4	0.8			●					
	170608GH	22.1	6.58	6.8	17.7	0.8			●					
 Sharp Cutting / for Deeper Drilling	ZXMT 040203SM	6.2	2.60	2.4	5.1	0.3	13°	10°		●		●		
	05T203SM	7.3	2.76	2.5	5.5	0.3		7°		●		●		
	06T204SM	8.6	2.89	2.8	6.4	0.4				●		●		
	070305SM	10.2	3.24	3.0	8.0	0.5				●		●		
	09T306SM	12.2	4.03	3.6	9.6	0.6				●		●		
	11T306SM	14.5	4.06	4.6	11.6	0.6				●		●		
	140408SM	18.0	4.88	5.7	14.4	0.8				●		●		
	170608SM	22.1	6.58	6.8	17.7	0.8				●		●		

● : Std. Item

Suitable Chipbreaker (ZXMT)

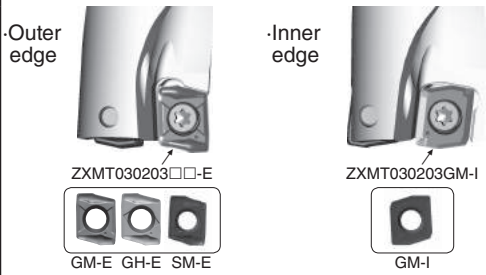
Workpiece Material	Insert Type	ZXMT											
	Chipbreaker	GM				GH				SM			
	Drilling Depth	2D	3D	4D	5D	2D	3D	4D	5D	2D	3D	4D	5D
Low Carbon Steel		☆	☆	☆	☆					★	★	★	★
Carbon Steel		★	★	★	☆	☆	☆	☆	☆	☆	☆	☆	★
Alloy Steel		★	★	★	☆	☆	☆	☆	☆	☆	☆	☆	★
Mold Steel		☆	☆	☆	☆	★	★	★	★				
Stainless Steel										★	★	★	★
Cast Iron		★	★	★	★								
Aluminum Alloys										★	★	★	★
Brass										★	★	★	★
Titanium Alloys										★	★	★	★

★: 1st Choice ☆: 2nd Choice

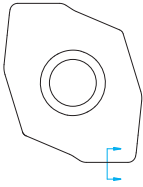
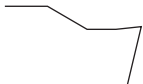
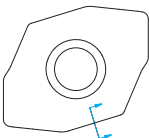
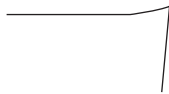
How to select ZXMT03

ZXMT03 type (Drill Dia.: $\phi 12 \sim \phi 13$)

- 1) For outer edge, please select "E" insert from three different chipbreakers for each application.
- 2) For inner edge, please select "I" insert (GM chipbreaker only).



Features of the Chipbreaker

Chipbreaker			GM (General purpose)	GH (Tough Edge)	SM (Sharp Cutting / for Deeper Drilling)
Insert					
Features			1st. recommendation for carbon steel and alloy steel, 1st. recommendation for cast iron.	1st. recommendation for interrupted drilling and hard materials. Cutting edge strength oriented design.	Suitable for sticky materials such as stainless steel and low carbon steel.
			Good balance of sharp cutting and cutting edge strength	Middle to high feed rates of steel drilling, GM Chipbreaker alternative.	Sharp cutting, prevents chattering. For low to medium feed rates of steel.
Outer edge side	 Wide chipbreaker	Chipbreaker Cross-section			
		Chips from Outer edge			
Inner edge side	 Flat chipbreaker	Chipbreaker Cross-section			
		Chips from Inner edge			
Workpiece Material			S50C	S50C	SUS304

Indication of tool life of MagicDrill

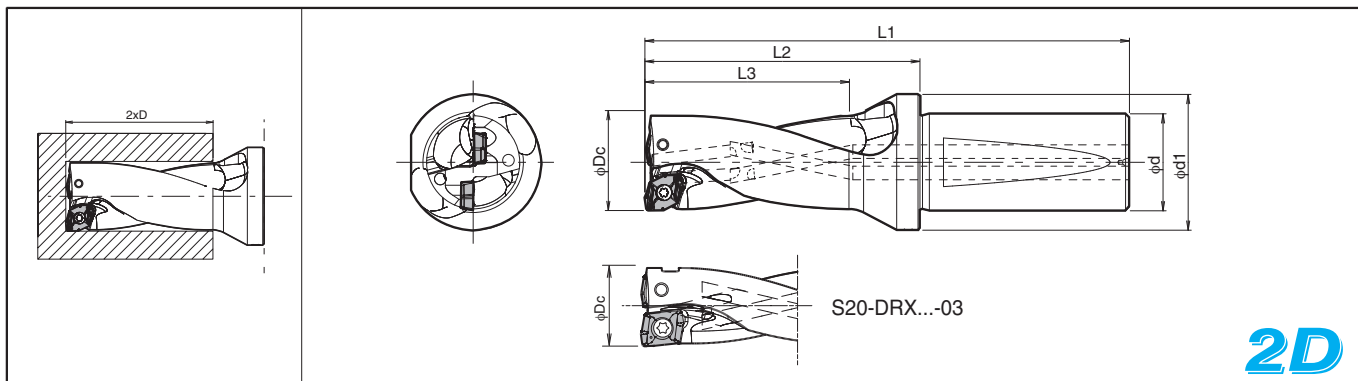
How to judge tool life	Indication of judging tool life
Judgement of tool condition and insert wear	- When an insert is new the toolholder is slightly bent to the side during drilling. (therefore, the drill diameter is slightly bigger during drilling). Once drilling is finished, the toolholder will return back to normal size. - No tool marks will appear on the finished surface (although this depends on workpiece and cutting condition: during external drilling slight tool mark might appear.) - When an insert is at the end of its tool life, Gradually the external corner part gets worn out, the toolholder does not bend slightly outwards, it starts to bend inwards. After the drilling is finished, the toolholder returns to the normal position. - When taking off a toolholder under this condition the cutting edge of the insert creates external tool marks on the finished surface of the workpiece.
Checking hole diameter	When hole diameter is measured, suddenly it shows small diameter. In this case, a worn out insert can be the cause.
Checking the surface on the outlet side	If insert wear progresses, the burrs of penetrated hole entrance becomes bigger. This is a clear indication that the tool must be exchanged.
Variation of drilling noise	Light drilling noise at the beginning turns to brady noise which contains vibration noise.
Variation of vibration	As the end of tool life is getting closer, there is more vibration and the drilling noise changes. However, when drilling smaller diameters these factors are difficult to detect.

K



Drilling

DRX (Drilling Depth:2xD)



Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts		Applicable Inserts  K38
			φDc	L1	L2	L3	φd	φd1		Clamp Screw	Wrench	
												
S20 -DRX120M-2-03 -DRX125M-2-03 -DRX130M-2-03 -DRX135M-2-04 -DRX140M-2-04 -DRX145M-2-04 -DRX150M-2-04	● ● ● ● ● ● ●	2 2 2	12 12.5 13 13.5 14 14.5 15	88 89 90 91 92 93 94	45 46 47 48 49 50 51	24 25 26 27 28 29 30	20 20 20	27 27 27	+0.5 +0.4 +0.3 +0.5 +0.4 +0.3 +0.2	SB-2042TRG SB-2042TRG SB-2042TRG	DTM-6 DTM-6 DTM-6	Outer edge ZXMT030203□□-E Inner edge ZXMT030203GM-I ZXMT040203□□ ZXMT040203□□
S25 -DRX155M-2-05 -DRX160M-2-05 -DRX165M-2-05 -DRX170M-2-05 -DRX175M-2-05 -DRX180M-2-05 -DRX185M-2-06 -DRX190M-2-06 -DRX195M-2-06 -DRX200M-2-06 -DRX205M-2-06 -DRX210M-2-06 -DRX215M-2-06 -DRX220M-2-07 -DRX225M-2-07 -DRX230M-2-07 -DRX235M-2-07 -DRX240M-2-07 -DRX245M-2-07 -DRX250M-2-07 -DRX255M-2-07 -DRX260M-2-07	● 											

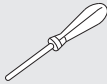
-When offset drilling, reduce feed rate to 0.08mm/rev or less.
-Ref. to page K49 for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions K48

Trouble shooting K47

● : Std. Item

● Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts		Applicable Inserts  K38
			φDc	L1	L2	L3	φd	φd1		Clamp Screw	Wrench	
												
S40 -DRX320M-2-11	●	2	32	169	100	64	40	54	+2.2	SB-4085TR	DTM-15	ZXMT11T306□□
-DRX330M-2-11	●		33	171	102	66			+1.9			
-DRX340M-2-11	●		34	173	104	68			+1.7			
-DRX350M-2-11	●		35	175	106	70			+1.4			
-DRX360M-2-11	●		36	177	108	72			+1.2			
-DRX370M-2-11	●		37	179	110	74			+0.9			
-DRX380M-2-11	●		38	181	112	76			+0.7			
-DRX390M-2-14	●	2	39	179	110	78	40	54	+2.8	SB-5090TR	DT-20	ZXMT140408□□
-DRX400M-2-14	●		40	181	112	80			+2.5			
-DRX410M-2-14	●		41	183	114	82			+2.3			
-DRX420M-2-14	●		42	185	116	84			+2.0			
-DRX430M-2-14	●		43	187	118	86		59	+1.8			
-DRX440M-2-14	●		44	189	120	88			+1.5			
-DRX450M-2-14	●		45	191	122	90			+1.3			
-DRX460M-2-14	●	2	46	193	124	92	40	59	+1.0	SB-60120TR	DT-25	ZXMT170608□□
-DRX470M-2-14	●		47	195	126	94			+0.8			
-DRX480M-2-17	●		48	194	125	96		59	+3.8			
-DRX490M-2-17	●		49	196	127	98			+3.5			
-DRX500M-2-17	●		50	198	129	100			+3.3			
-DRX510M-2-17	●		51	200	131	102		64	+3.0			
-DRX520M-2-17	●		52	202	133	104			+2.8			
-DRX530M-2-17	●	2	53	204	135	106		64	+2.5			
-DRX540M-2-17	●		54	206	137	108			+2.3			
-DRX550M-2-17	●		55	208	139	110			+2.0			
-DRX560M-2-17	●		56	210	141	112			+1.8			
-DRX570M-2-17	●		57	212	143	114		64	+1.5			
-DRX580M-2-17	●		58	214	145	116			+1.3			
-DRX590M-2-17	●		59	216	147	118			+1.0			
-DRX600M-2-17	●		60	218	149	120			+0.8			

· When offset drilling, reduce feed rate to 0.08mm/rev or less.

· Ref. to page K49 for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions ➡ K48

Trouble shooting ➡ K47

· Hole Dia. Tolerance (2D type)

Dc	Hole Dia. Tolerance (mm)
φ12~φ26	+0.20 -0.10
φ27~φ38	+0.25 -0.15
φ39~φ60	+0.30 -0.20

* Above is numeric guideline.

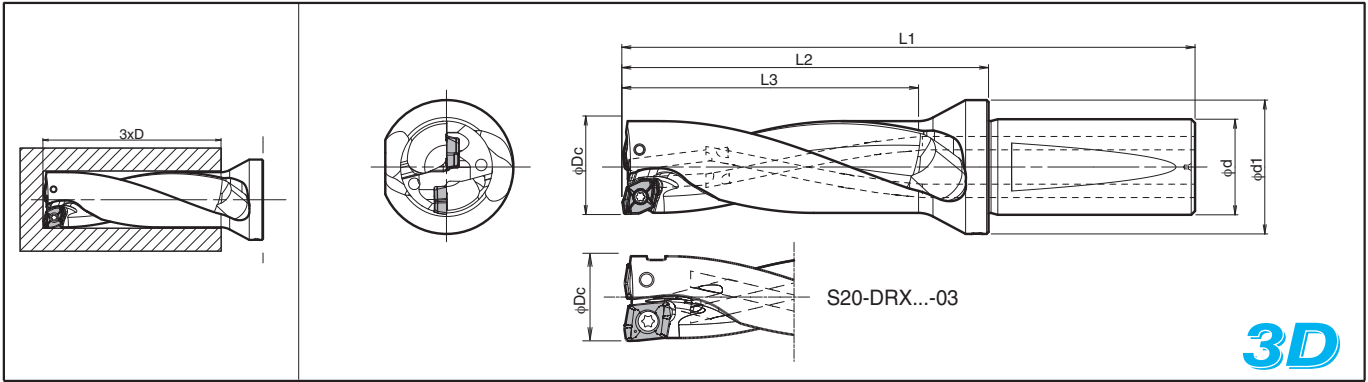
It may vary depending on machines / workpieces / clamping status / cutting conditions.

K



Drilling

DRX (Drilling Depth:3xD)



Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts		Applicable Inserts  K38						
			φDc	L1	L2	L3	φd	φd1		Clamp Screw	Wrench							
																		
S20 -DRX120M-3-03 -DRX125M-3-03 -DRX130M-3-03 -DRX135M-3-04 -DRX140M-3-04 -DRX145M-3-04 -DRX150M-3-04	● ● ● ● ● ● ●	2	12 12.5 13	100 102 103	57 59 60	36 37.5 39	20	27	+0.5 +0.4 +0.3	SB-2042TRG	DTM-6	Outer edge ZXMT030203□□-E Inner edge ZXMT030203GM-I						
	2		13.5 14 14.5 15	105 106 108 109	62 63 65 66	40.5 42 43.5 45			+0.5 +0.4 +0.3 +0.2				SB-2042TRG	DTM-6	ZXMT040203□□			
			S25 -DRX155M-3-05 -DRX160M-3-05 -DRX165M-3-05 -DRX170M-3-05 -DRX175M-3-05 -DRX180M-3-05 -DRX185M-3-06 -DRX190M-3-06 -DRX195M-3-06 -DRX200M-3-06 -DRX205M-3-06 -DRX210M-3-06 -DRX215M-3-06 -DRX220M-3-07 -DRX225M-3-07 -DRX230M-3-07 -DRX235M-3-07 -DRX240M-3-07 -DRX245M-3-07 -DRX250M-3-07 -DRX255M-3-07 -DRX260M-3-07	2	15.5 16 16.5 17 17.5 18	124 126 127 129 130 132			70 72 73 75 76 78							46.5 48 49.5 51 52.5 54	+0.8 +0.7 +0.5 +0.4 +0.3 +0.2	SB-2045TR
		2			18.5 19 19.5 20 20.5 21 21.5	131 132 134 135 137 138 140	77 78 80 81 83 84 86	55.5 57 58.5 60 61.5 63 64.5	+0.9 +0.8 +0.7 +0.5 +0.4 +0.3 +0.2	SB-2250TR	DTM-7	ZXMT06T204□□						
					2	22 22.5 23 23.5 24 24.5 25 25.5 26	141 142 144 145 147 148 150 151 153	87 88 90 91 93 94 96 97 99	66 67.5 69 70.5 72 73.5 75 76.5 78							+1.2 +1.0 +0.9 +0.8 +0.7 +0.5 +0.4 +0.3 +0.2	SB-2570TR	
	S32 -DRX265M-3-09 -DRX270M-3-09 -DRX275M-3-09 -DRX280M-3-09 -DRX285M-3-09 -DRX290M-3-09 -DRX295M-3-09 -DRX300M-3-09 -DRX305M-3-09 -DRX310M-3-09 -DRX315M-3-09			2		26.5 27 27.5 28 28.5	161 163 164 166 167	102 104 105 107 108	79.5 81 82.5 84 85.5				32	41	+1.7 +1.6 +1.5 +1.3 +1.2	SB-3080TR		DTM-10
		2				29 29.5 30 30.5 31 31.5	169 169 172 173 175 176	110 111 113 114 116 117	87 87.5 90 91.5 93 94.5	+1.1 +1.1 +0.8 +0.7 +0.6 +0.5	SB-3080TR	DTM-10			ZXMT09T306□□			
2					32 33 34 35 36 37 38	201 204 207 210 213 216 219	132 135 138 141 144 147 150	96 99 102 105 108 111 114	+2.2 +1.9 +1.7 +1.4 +1.2 +0.9 +0.7	SB-4085TR							DTM-15	
			2	32 33 34 35 36 37 38	201 204 207 210 213 216 219	132 135 138 141 144 147 150	96 99 102 105 108 111 114	+2.2 +1.9 +1.7 +1.4 +1.2 +0.9 +0.7	SB-4085TR				DTM-15	ZXMT11T306□□				
		2		32 33 34 35 36 37 38	201 204 207 210 213 216 219	132 135 138 141 144 147 150	96 99 102 105 108 111 114	+2.2 +1.9 +1.7 +1.4 +1.2 +0.9 +0.7			SB-4085TR	DTM-15			ZXMT11T306□□			
2				32 33 34 35 36 37 38	201 204 207 210 213 216 219	132 135 138 141 144 147 150	96 99 102 105 108 111 114	+2.2 +1.9 +1.7 +1.4 +1.2 +0.9 +0.7		SB-4085TR						DTM-15	ZXMT11T306□□	
			2	32 33 34 35 36 37 38	201 204 207 210 213 216 219	132 135 138 141 144 147 150	96 99 102 105 108 111 114	+2.2 +1.9 +1.7 +1.4 +1.2 +0.9 +0.7	SB-4085TR				DTM-15	ZXMT11T306□□				
		2		32 33 34 35 36 37 38	201 204 207 210 213 216 219	132 135 138 141 144 147 150	96 99 102 105 108 111 114	+2.2 +1.9 +1.7 +1.4 +1.2 +0.9 +0.7			SB-4085TR	DTM-15			ZXMT11T306□□			
2				32 33 34 35 36 37 38	201 204 207 210 213 216 219	132 135 138 141 144 147 150	96 99 102 105 108 111 114	+2.2 +1.9 +1.7 +1.4 +1.2 +0.9 +0.7		SB-4085TR						DTM-15	ZXMT11T306□□	

•When offset drilling, reduce feed rate to 0.08mm/rev or less.

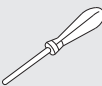
•Ref. to page K49 for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions K48

Trouble shooting K47

● : Std. Item

● Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts		Applicable Inserts 
			φDc	L1	L2	L3	φd	φd1		Clamp Screw	Wrench	
												
S40 -DRX390M-3-14 -DRX400M-3-14 -DRX410M-3-14 -DRX420M-3-14 -DRX430M-3-14 -DRX440M-3-14 -DRX450M-3-14 -DRX460M-3-14 -DRX470M-3-14	● ● ● ● ● ● ● ● ●	2	39 40 41 42 43 44 45 46 47	218 221 224 227 230 233 236 239 242	149 152 155 158 161 164 167 170 173	117 120 123 126 129 132 135 138 141	40	54 59	+2.8 +2.5 +2.3 +2.0 +1.8 +1.5 +1.3 +1.0 +0.8	SB-5090TR	DT-20	ZXMT140408□□
-DRX480M-3-17 -DRX490M-3-17 -DRX500M-3-17 -DRX510M-3-17 -DRX520M-3-17 -DRX530M-3-17 -DRX540M-3-17 -DRX550M-3-17 -DRX560M-3-17 -DRX570M-3-17 -DRX580M-3-17 -DRX590M-3-17 -DRX600M-3-17	● ● ● ● ● ● ● ● ● ● ● ● ●	2	48 49 50 51 52 53 54 55 56 57 58 59 60	242 245 248 251 254 257 260 263 266 269 272 275 278	173 176 179 182 185 188 191 194 197 200 203 206 209	144 147 150 153 156 159 162 165 168 171 174 177 180	40	59 64	+3.8 +3.5 +3.3 +3.0 +2.8 +2.5 +2.3 +2.0 +1.8 +1.5 +1.3 +1.0 +0.8	SB-60120TR	DT-25	ZXMT170608□□

· When offset drilling, reduce feed rate to 0.08mm/rev or less.

· Ref. to page **K49** for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions ● **K48**

Trouble shooting ● **K47**

· Hole Dia. Tolerance (3D type)

Dc	Hole Dia. Tolerance (mm)
φ12~φ26	+0.20 -0.10
φ26.5~φ38	+0.25 -0.15
φ39~φ60	+0.30 -0.20

* Above is numeric guideline.

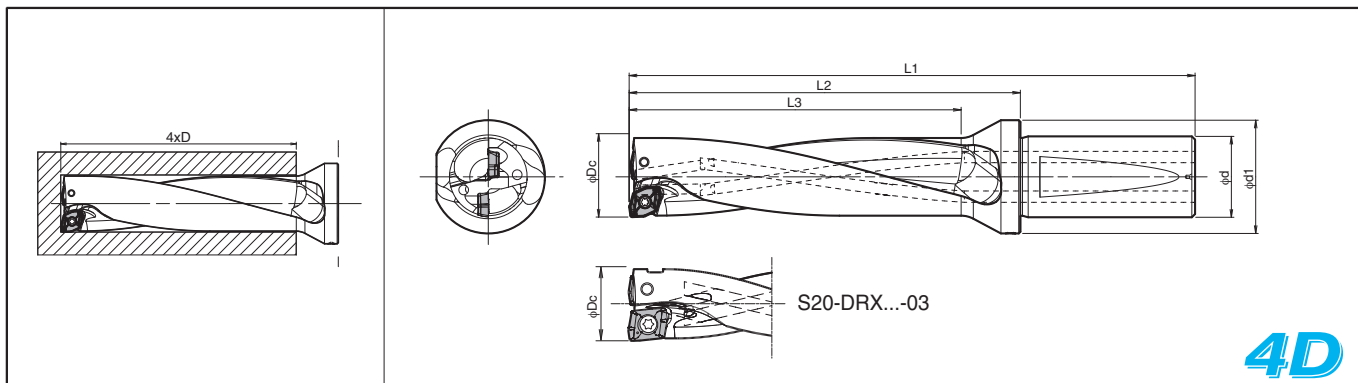
It may vary depending on machines / workpieces / clamping status / cutting conditions.

K

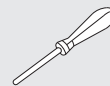


Drilling

DRX (Drilling Depth:4xD)



Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts		Applicable Inserts  K38
			φDc	L1	L2	L3	φd	φd1		Clamp Screw	Wrench	
												
S20 -DRX120M-4-03 -DRX125M-4-03 -DRX130M-4-03 -DRX135M-4-04 -DRX140M-4-04 -DRX145M-4-04 -DRX150M-4-04	      	2 2 2	12 12.5 13 13.5 14 14.5 15	112 114 116 118 120 122 124	69 71 73 75 77 79 81	48 50 52 54 56 58 60	20 20 20	27 27 27	+0.5 +0.4 +0.3 +0.5 +0.4 +0.3 +0.2	SB-2042TRG SB-2042TRG SB-2042TRG	DTM-6 DTM-6 DTM-6	Outer edge ZXMT030203□□-E Inner edge ZXMT030203GM-I ZXMT040203□□ ZXMT040203□□
S25 -DRX155M-4-05 -DRX160M-4-05 -DRX165M-4-05 -DRX170M-4-05 -DRX175M-4-05 -DRX180M-4-05 -DRX185M-4-06 -DRX190M-4-06 -DRX195M-4-06 -DRX200M-4-06 -DRX205M-4-06 -DRX210M-4-06 -DRX215M-4-06 -DRX220M-4-07 -DRX225M-4-07 -DRX230M-4-07 -DRX235M-4-07 -DRX240M-4-07 -DRX245M-4-07 -DRX250M-4-07 -DRX255M-4-07 -DRX260M-4-07	                       	2 2 <										

• When offset drilling, reduce feed rate to 0.06mm/rev or less.

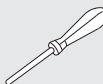
• Ref. to page K49 for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions K48

Trouble shooting K47

● : Std. Item

● Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts		Applicable Inserts  K38
			φDc	L1	L2	L3	φd	φd1		Clamp Screw	Wrench	
												
S40 -DRX390M-4-14 -DRX400M-4-14 -DRX410M-4-14 -DRX420M-4-14 -DRX430M-4-14 -DRX440M-4-14 -DRX450M-4-14 -DRX460M-4-14 -DRX470M-4-14	● ● ● ● ● ● ● ● ●	2	39 40 41 42 43 44 45 46 47	257 261 265 269 273 277 281 285 289	188 192 196 200 204 208 212 216 220	156 160 164 168 172 176 180 184 188	40	54 59	+2.8 +2.5 +2.3 +2.0 +1.8 +1.5 +1.3 +1.0 +0.8	SB-5090TR	DT-20	ZXMT140408□□
S50 -DRX480M-4-17 -DRX490M-4-17 -DRX500M-4-17 -DRX510M-4-17 -DRX520M-4-17 -DRX530M-4-17 -DRX540M-4-17 -DRX550M-4-17 -DRX560M-4-17 -DRX570M-4-17 -DRX580M-4-17 -DRX590M-4-17 -DRX600M-4-17	● ● ● ● ● ● ● ● ● ● ● ● ●	2	48 49 50 51 52 53 54 55 56 57 58 59 60	290 294 298 302 306 310 314 318 322 326 330 334 338	221 225 229 233 237 241 245 249 253 257 261 265 269	192 196 200 204 208 212 216 220 224 228 232 236 240	50	59 64	+3.8 +3.5 +3.3 +3.0 +2.8 +2.5 +2.3 +2.0 +1.8 +1.5 +1.3 +1.0 +0.8	SB-60120TR	DT-25	ZXMT170608□□

· When offset drilling, reduce feed rate to 0.06mm/rev or less.

· Ref. to page **K49** for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions ● **K48**

Trouble shooting ● **K47**

· Hole Dia. Tolerance (4D type)

Dc	Hole Dia. Tolerance (mm)
φ12~φ26	+ 0.25 - 0.10
φ27~φ38	+ 0.30 - 0.15
φ39~φ60	+ 0.35 - 0.20

* Above is numeric guideline.

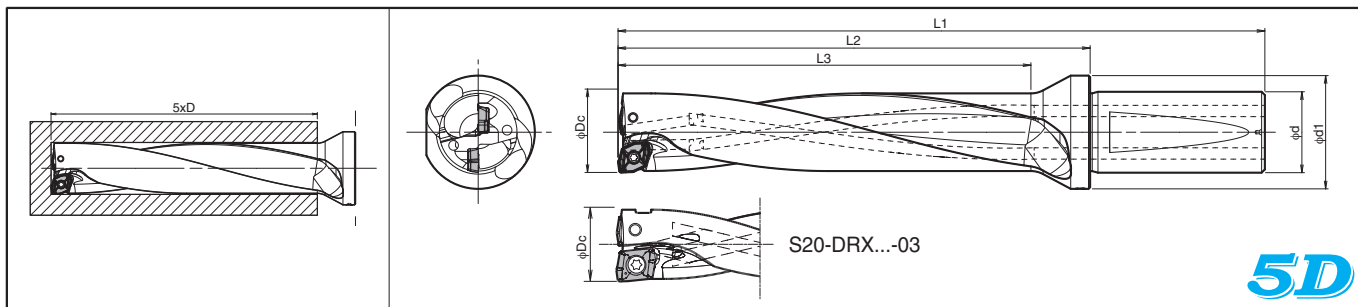
It may vary depending on machines / workpieces / clamping status / cutting conditions.

K



Drilling

DRX (Drilling Depth:5xD)



Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts		Applicable Inserts K38
			φDc	L1	L2	L3	φd	φd1		Clamp Screw	Wrench	
S20 -DRX120M-5-03 -DRX130M-5-03 -DRX140M-5-04 -DRX150M-5-04	●	2	12 13 14 15	120 125 134 139	77 82 91 96	60 65 70 75	20 20	27 27	+0.5 +0.3 +0.4 +0.2	SB-2042TRG	DTM-6	Outer edge ZXMT030203□□-E Inner edge ZXMT030203GM-I
S25 -DRX160M-5-05 -DRX170M-5-05 -DRX180M-5-05 -DRX190M-5-06 -DRX200M-5-06 -DRX210M-5-06 -DRX220M-5-07 -DRX230M-5-07 -DRX240M-5-07 -DRX250M-5-07 -DRX260M-5-07	●	2	16 17 18 19 20 21 22 23 24 25 26	158 163 168 170 175 180 185 190 195 200 205	104 109 114 116 121 126 131 136 141 146 151	80 85 90 95 100 105 110 115 120 125 130	25 25	32 32 33	+0.7 +0.4 +0.2 +0.8 +0.5 +0.3 +1.2 +0.9 +0.7 +0.4 +0.2	SB-2045TR SB-2250TR SB-2570TR	DTM-6 DTM-7 DTM-8	ZXMT05T203□□ ZXMT06T204□□ ZXMT070305□□
S32 -DRX270M-5-09 -DRX280M-5-09 -DRX290M-5-09 -DRX300M-5-09 -DRX310M-5-09	●	2	27 28 29 30 31	217 222 227 232 237	158 163 168 173 178	135 140 145 150 155	32	41 43	+1.6 +1.3 +1.1 +0.8 +0.6	SB-3080TR	DTM-10	ZXMT09T306□□
S40 -DRX320M-5-11 -DRX330M-5-11 -DRX340M-5-11 -DRX350M-5-11 -DRX360M-5-11 -DRX370M-5-11 -DRX380M-5-11 -DRX390M-5-14 -DRX400M-5-14 -DRX410M-5-14 -DRX420M-5-14 -DRX430M-5-14 -DRX440M-5-14 -DRX450M-5-14 -DRX460M-5-14 -DRX470M-5-14	●	2	32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47	255 260 265 270 275 280 285 296 301 306 311 316 321 326 331 336	186 191 196 201 206 211 216 227 232 237 242 247 252 257 262 267	160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235	40	49 54 59	+2.2 +1.9 +1.7 +1.4 +1.2 +0.9 +0.7 +2.8 +2.5 +2.3 +2.0 +1.8 +1.5 +1.3 +1.0 +0.8	SB-4085TR SB-5090TR	DTM-15 DT-20	ZXMT11T306□□ ZXMT140408□□
S50 -DRX480M-5-17 -DRX490M-5-17 -DRX500M-5-17 -DRX510M-5-17 -DRX520M-5-17 -DRX530M-5-17 -DRX540M-5-17 -DRX550M-5-17 -DRX560M-5-17 -DRX570M-5-17 -DRX580M-5-17 -DRX590M-5-17 -DRX600M-5-17	●	2	48 49 50 51 52 53 54 55 56 57 58 59 60	338 343 348 353 358 363 368 373 378 383 388 393 398	269 274 279 284 289 294 299 304 309 314 319 324 329	240 245 250 255 260 265 270 275 280 285 290 295 300	50	59 64	+3.8 +3.5 +3.3 +3.0 +2.8 +2.5 +2.3 +2.0 +1.8 +1.5 +1.3 +1.0 +0.8	SB-60120TR	DT-25	ZXMT170608□□

When offset drilling, reduce feed rate to 0.05mm/rev or less.

Ref. to page K49 for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions K48

Trouble shooting K47

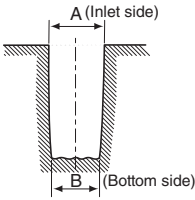
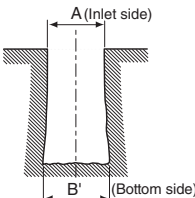
Hole Dia. Tolerance (5D type)

Dc	Hole Dia. Tolerance (mm)	Dc	Hole Dia. Tolerance (mm)	Dc	Hole Dia. Tolerance (mm)
φ12~φ26	+ 0.30 - 0.10	φ27~φ38	+ 0.35 - 0.15	φ39~φ60	+ 0.40 - 0.20

* The values shown in the left are only estimation.
It may vary depending on machines /
workpieces / clamping status / cutting conditions.

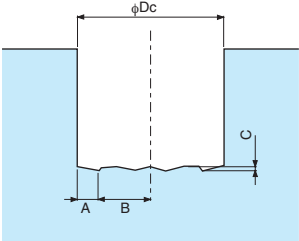
● : Std. Item

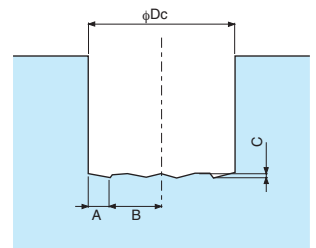
Trouble shooting (DRX)

Trouble condition	Condition		Cause	Countermeasures
Hole diameter is small (at hole bottom)		There is no problem for inlet, however gradually hole diameter is getting smaller at the bottom. $A > B$	Chip jam (External or Internal edge chip stuck)	Change the cutting conditions · Increase the cutting speed · Lower the feed rate ➡ Ref. to page K48 for "Recommended Cutting Conditions"
Hole diameter becomes larger (at hole bottom)		There is no problem for inlet, however gradually hole diameter is getting larger at the bottom. $A < B'$	Internal edge chip jam.	Change the cutting conditions · Increase the cutting speed · Lower the feed rate ➡ Ref. to page K48 for "Recommended Cutting Conditions" · Check the core height ➡ Ref. to page K50~K51
Hole diameter is small (from the hole inlet)		Hole diameter is small from inlet. (At turning moment)	Inappropriate adjustment of hole diameter.	In case of using lathe machine, use X-axis and adjustment hole diameter. ➡ Ref. to page K50
			No core at internal edge. (No core remains)	Adjust the center height. ➡ Ref. to page K50~K51

◆ MagicDrill (DRX) Hole Bottom Shape (mm)

φDc	A	B	C	φDc	A	B	C	φDc	A	B	C
12.0	1.8	4.2	0.5	24.5	3.2	9.1	0.8	39.0	5.8	13.7	1.5
12.5		4.5		25.0		9.3	40.0	14.2			
13.0		4.7		25.5		9.6	41.0	14.7			
13.5	2	4.8	0.5	26.0	9.8	42.0	15.2				
14.0		5.0		26.5	9.4	43.0	15.7				
14.5		5.3		27.0	9.6	44.0	16.2				
15.0		5.5	27.5	9.9	45.0	16.7					
15.5		5.8	0.6	28.0	10.1	46.0	17.2				
16.0		6.0		28.5	10.4	47.0	17.7				
16.5		6.3		29.0	10.6	48.0	16.9				
17.0		6.5	29.5	10.9	49.0	17.4					
17.5	6.8	30.0	11.1	50.0	17.9						
18.0	7.0	30.5	11.4	51.0	18.4						
18.5	2.4	6.9	0.7	31.0	11.6	52.0	18.9				
19.0		7.1		31.5	11.9	53.0	19.4				
19.5		7.4		32.0	11.3	54.0	19.9				
20.0		7.6	33.0	11.8	55.0	20.4					
20.5		7.9	34.0	12.3	56.0	20.9					
21.0		8.1	0.8	35.0	12.8	57.0	21.4				
21.5		8.4		36.0	13.3	58.0	21.9				
22.0		7.8		37.0	13.8	59.0	22.4				
22.5	8.1	38.0	14.3	60.0	22.9						
23.0	3.2	8.3	0.8	Common for 2xD, 3xD, 4xD, 5xD type * Figures above are nominal sizes (Varies within ±0.1mm depending on workpiece materials and cutting conditions)							
23.5		8.6									
24.0		8.8									





DRX Recommended Cutting Conditions (Coolant)

Workpiece Material	Recommended Insert Grades (Cutting Speed Vc:m/min)				Drill Dia. φDc (mm)	Drill type								
	MEGACOAT			Carbide		2D~3D			4D			5D		
	PR1230	PR1225	PR1210	GW15		f (mm/rev)								
	GM GH	SM	GM	SM		GM	GH	SM	GM	GH	SM	GM	GH	SM
Low Carbon Steel	☆ 120-240	★ 120-240			φ12~φ15	0.06~0.10	0.06~0.10	0.04~0.10	0.05~0.08	0.05~0.08	0.04~0.08	0.04~0.07	0.04~0.07	0.04~0.08
					φ15.5~φ18	0.06~0.12	0.06~0.12	0.06~0.12	0.05~0.10	0.05~0.10	0.05~0.10	0.05~0.08	0.05~0.08	0.04~0.09
					φ18.5~φ26	0.08~0.14	0.08~0.14	0.06~0.14	0.06~0.12	0.08~0.12	0.05~0.12	0.06~0.10	0.06~0.10	0.04~0.10
					φ26.5~φ60	0.08~0.14	0.08~0.14	0.06~0.14	0.06~0.12	0.08~0.12	0.05~0.12	0.06~0.10	0.06~0.10	0.04~0.10
Carbon Steel	★ 100-180	☆ 100-180			φ12~φ15	0.04~0.14	0.04~0.14	0.04~0.10	0.04~0.10	0.04~0.10	0.04~0.08	0.04~0.08	0.04~0.08	0.04~0.07
					φ15.5~φ18	0.06~0.16	0.06~0.16	0.06~0.12	0.05~0.12	0.05~0.12	0.05~0.10	0.05~0.10	0.05~0.10	0.05~0.08
					φ18.5~φ26	0.08~0.20	0.08~0.20	0.06~0.14	0.07~0.16	0.07~0.16	0.05~0.12	0.06~0.12	0.06~0.12	0.05~0.10
					φ26.5~φ60	0.08~0.20	0.08~0.20	0.06~0.14	0.07~0.16	0.07~0.16	0.05~0.12	0.06~0.12	0.06~0.12	0.05~0.10
Alloy Steel	★ 100-160	☆ 100-160			φ12~φ15	0.04~0.14	0.04~0.14	0.04~0.10	0.04~0.10	0.04~0.10	0.04~0.08	0.04~0.08	0.04~0.08	0.04~0.07
					φ15.5~φ18	0.06~0.16	0.06~0.16	0.06~0.12	0.05~0.12	0.05~0.12	0.05~0.10	0.05~0.10	0.05~0.10	0.05~0.08
					φ18.5~φ26	0.08~0.20	0.08~0.20	0.06~0.14	0.07~0.16	0.07~0.16	0.05~0.12	0.06~0.12	0.06~0.12	0.05~0.10
					φ26.5~φ60	0.08~0.20	0.08~0.20	0.06~0.14	0.07~0.16	0.07~0.16	0.05~0.12	0.06~0.12	0.06~0.12	0.05~0.10
Mold Steel	★ 80-150	☆ 80-150			φ12~φ15	0.04~0.08	0.04~0.08	0.04~0.08	0.04~0.07	0.04~0.07	0.04~0.07	0.04~0.06	0.04~0.06	0.04~0.06
					φ15.5~φ18	0.06~0.12	0.06~0.12	0.06~0.10	0.05~0.10	0.05~0.10	0.05~0.08	0.04~0.08	0.04~0.08	0.04~0.07
					φ18.5~φ26	0.08~0.15	0.08~0.15	0.06~0.12	0.06~0.12	0.06~0.12	0.06~0.10	0.05~0.10	0.05~0.10	0.05~0.08
					φ26.5~φ60	0.08~0.15	0.08~0.15	0.06~0.12	0.06~0.12	0.06~0.12	0.06~0.10	0.05~0.10	0.05~0.10	0.05~0.08
Stainless Steel (Austenitic related)	☆ 70-140	★ 70-140			φ12~φ15	0.06~0.10	0.06~0.10	0.04~0.10	0.05~0.08	0.05~0.08	0.04~0.08	0.04~0.07	0.04~0.08	0.04~0.08
					φ15.5~φ18	0.06~0.10	0.06~0.10	0.06~0.12	0.05~0.08	0.05~0.08	0.05~0.11	0.04~0.07	0.04~0.07	0.04~0.10
					φ18.5~φ26	0.08~0.12	0.08~0.12	0.06~0.14	0.07~0.10	0.07~0.10	0.06~0.12	0.07~0.10	0.07~0.10	0.06~0.12
					φ26.5~φ60	0.08~0.12	0.08~0.12	0.06~0.14	0.07~0.10	0.07~0.10	0.06~0.12	0.07~0.10	0.07~0.10	0.06~0.12
Gray Cast Iron			★ 100-150		φ12~φ15	0.08~0.14	-	-	0.06~0.12	-	-	0.04~0.10	-	-
					φ15.5~φ18	0.08~0.18	-	-	0.08~0.16	-	-	0.06~0.12	-	-
					φ18.5~φ26	0.08~0.20	-	-	0.08~0.18	-	-	0.06~0.14	-	-
					φ26.5~φ60	0.08~0.20	-	-	0.08~0.18	-	-	0.06~0.14	-	-
Nodular Cast Iron			★ 80-120		φ12~φ15	0.08~0.12	-	-	0.06~0.10	-	-	0.04~0.08	-	-
					φ15.5~φ18	0.08~0.16	-	-	0.08~0.14	-	-	0.06~0.10	-	-
					φ18.5~φ26	0.08~0.18	-	-	0.08~0.16	-	-	0.06~0.12	-	-
					φ26.5~φ60	0.08~0.18	-	-	0.08~0.16	-	-	0.06~0.12	-	-
Non-ferrous Metals			★ 200-600		φ12~φ15	-	-	0.06~0.12	-	-	0.05~0.10	-	-	0.04~0.08
					φ15.5~φ18	-	-	0.08~0.14	-	-	0.06~0.12	-	-	0.05~0.10
					φ18.5~φ26	-	-	0.08~0.16	-	-	0.06~0.14	-	-	0.05~0.12
					φ26.5~φ60	-	-	0.08~0.20	-	-	0.08~0.16	-	-	0.07~0.14
Titanium Alloys			★ 40-70		φ12~φ15	-	-	0.05~0.08	-	-	0.04~0.07	-	-	0.04~0.06
					φ15.5~φ18	-	-	0.05~0.08	-	-	0.04~0.07	-	-	0.04~0.06
					φ18.5~φ26	-	-	0.06~0.10	-	-	0.06~0.08	-	-	0.05~0.07
					φ26.5~φ60	-	-	0.06~0.10	-	-	0.06~0.08	-	-	0.05~0.07

Apply a sufficient amount of coolant.

★ : 1st Recommendation ☆ : 2nd Recommendation

Cutting Conditions by Application

Applications		Plain Surface	Slant Surface	Half Cylindrical	Hole Expansion	Concave Surface	Cored Hole*	Stacked Plates
Shape of Workpiece								
DRX	Cutting Speed (m/min)	120	120	120	120	120	120	Not Available
	f (mm/rev)	0.1	0.05	0.05	0.05	Concave Surface 0.05 Continuous Part 0.1	0.05	Not Available
Coolant (Internal)		Yes	Yes	Yes	Yes	Yes	Yes	Not Available

* Cutting width (Torus-shaped part) when drilling cored hole.

Drill type	2D~3D	4D	5D
Cutting width (Torus-shaped part)	0.1×Dc or less	Less than corner radius	Not recommended

◆ Max. Depth for Drilling with External Coolant

In case of using external coolant system, chip evacuation will be bad. Therefore ap should be measured within 1.5 times (1.5×Dc) of drill diameter (φDc).

K



Drilling

DRA

DRC

DRX

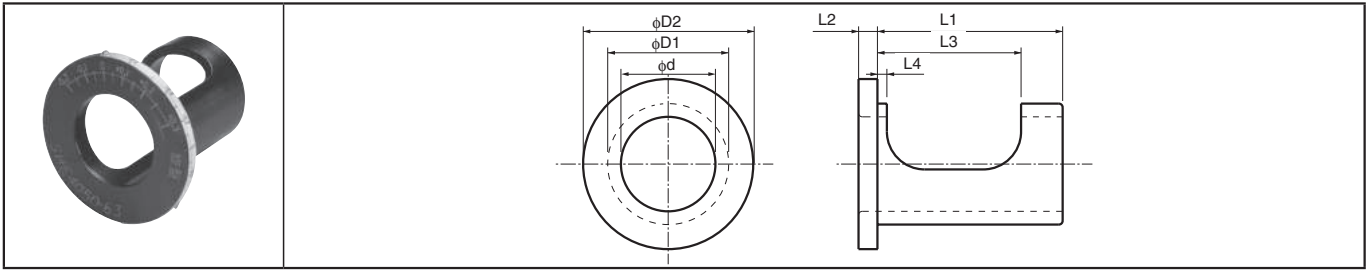
DRS

DRZ

DRW

Fine Micro

SHE



Sleeve Dimensions

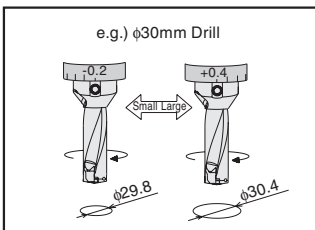
Description	Std.	Dimension (mm)							* Drill Dia. Adjustable Range	Center Height Adjustable Range
		φd	φD1	φD2	L1	L2	L3	L4		
SHE 2025-43	●	20	25	41	43	4	36	3.0	+0.4~-0.2	+0.2~-0.15
2532-48	●	25	32	49	48	6	38	2.5	+0.4~-0.2	+0.2~-0.15
3240-53	●	32	40	58	53	6	43	2.5	+0.4~-0.2	+0.2~-0.15
4050-63	●	40	50	74	63	6	49	3.0	+0.6~-0.2	+0.2~-0.2

* Diameter Adjustment Range adjusts the drill diameter.

● : Std. Item

SHE type is for MagicDrill DRX / DRZ. It is not suitable for MagicDrill DRS type, because large correction amount is required.

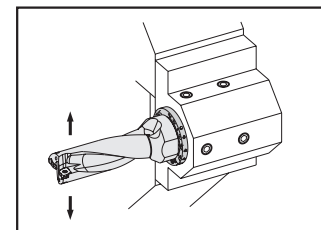
1. Diameter Adjustment ~For Machining Center~



● Diameter Adjustment Range (mm)

Shank Dia.	Adjustment Range
φ20	+0.4~-0.2
φ25	
φ32	
φ40	+0.6~-0.2

2. Center Height Adjustment ~Fewer problems owing to height adjustment for lathes~



● Center Height Adjustment Range (mm)

Shank Dia.	Adjustment Range
φ20	+0.2~-0.15
φ25	
φ32	
φ40	+0.3~-0.2

◆ How to Use the Adjustable Sleeve

1. Hole Diameter Adjustment when Drilling

- (1) Adjust the scale at the flange periphery of the sleeve to the center of the drill coolant plug. (Fig.1)
- (2) When making the hole diameter larger, rotate the sleeve in (+) direction and to make it smaller, rotate the sleeve in (-) direction.
- (3) When rotating the sleeve, insert the wrench supplied with the drill into the hole on the flange periphery to rotate the sleeve.
- (4) Using the bottom screw of the side-lock arbor, firmly tighten on the drill directly through the sleeve's window.

The upper screw should be tightened slightly so that the sleeve will not be damage.

Caution:

- Not applicable for Collet Chuck type Arbor.
- Scale on the sleeve is the reference value.
- Check the actual hole diameter after adjusting.

DRX

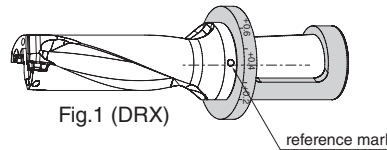


Fig.1 (DRX)

Upper Screw (Tighten Slightly)
Bottom Screw (Tighten Firmly)

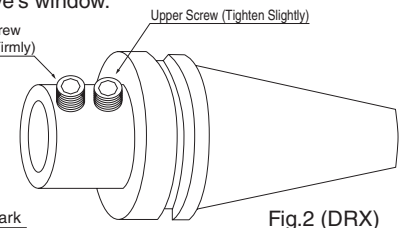


Fig.2 (DRX)

DRZ

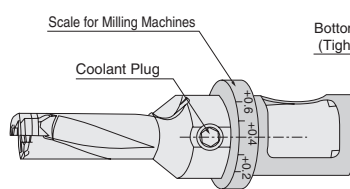


Fig.1 (DRZ)

Upper Screw (Tighten Slightly)
Bottom Screw (Tighten Firmly)

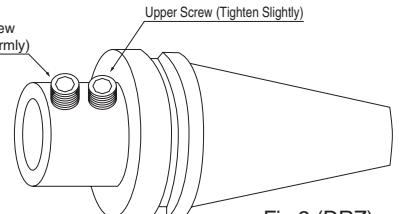


Fig.2 (DRZ)

(Example of Adjusting the Hole Dia. +0.4mm)

2. Center-Height Adjustment for Lathes

Most Lathe problem occur due to Center Height Deviation.

The Center Height is appropriate if a core approximately 0.5mm diameter remains at the center of the end face. (Fig.3)

Center-height adjustment is necessary for the case as follows:

- ◆ No core remains or ◆ Core diameter is more than 1mm

- (1) Align the drill with the outer insert face parallel to the X-axis of the tool turret. (Fig.4)
- (2) Align the scale (for the lathe) on the flange face of the sleeve to the center of the drill coolant plug.
- (3) When no core remains, rotate the sleeve to (+) direction to make the core larger, and when the core diameter is more than 1mm, rotate the sleeve to (-) direction to make the core smaller.
- (4) When rotating the sleeve, insert the wrench supplied with the drill into the hole on the flange periphery to rotate the sleeve.
- (5) After Completing the adjustment, firmly tighten on the drill directly through the sleeve's window.

Note: Depending on amount of the center height adjustment, the hole diameter may change. It is recommended that the hole diameter is checked after the center height adjustment.

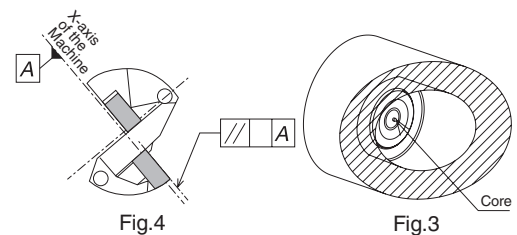


Fig.4

Fig.3

Lathe Installation

- (1) The top face of the outer insert should be parallel to the X-axis to allow for offset machining.
Drill diameter can be changed by moving X-axis.
- (2) It is recommended to set the outer insert as shown in Fig.1 with the outer insert facing the operator. (Fig.1)
(It is also possible to use it by setting it in 180° reverse position)
If the lathe has two turrets, when installing the drill into the lower turret, the outer insert should be set to face the operator.
(It is also possible to use it by setting at 180° reverse position)

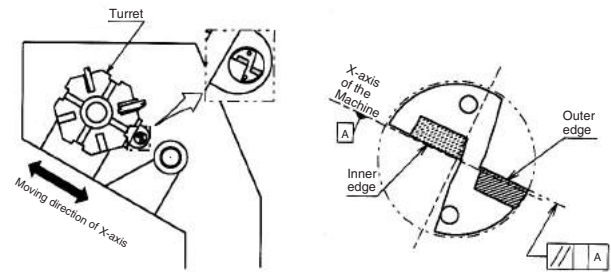


Fig.1 Installed to the Lathe

Drill Diameter Adjustment

1. Drill Diameter Adjustment

- (1) Drill diameter is adjusted by moving X-axis.
The moving direction of the X-axis depends on the position of the toolholder.
- (2) In case of making the hole diameter larger, slide the tool along the X-axis toward the outer insert side. (Fig.2, Fig.3)
For making the hole diameter smaller, slide the tool along the X-axis in the opposite direction.
(This movement of the axis is called "Offset")
However, be sure not to make the hole diameter smaller than the drill diameter by 0.2mm or more. Otherwise, the toolholder will interfere with the drilled hole. (Fig.4)
e.g.) In case of using $\phi 20$ drill, the hole diameter must not be smaller than 19.8mm.

2. Offset Limit of the Drill Diameter

For the maximum limit of the drill diameter, refer to "Max. Offset (Radial)" in the Toolholder Dimensions table.
(The figure in the table shows how much it is possible the offset the drill in the radial direction.)
e.g.) In case of using $\phi 20$ drill, it is possible to make a hole up to $\phi 21$ since "Max. Offset (Radial)" is +0.5mm.

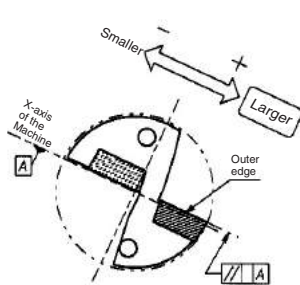


Fig.2 Outer insert Facing Up

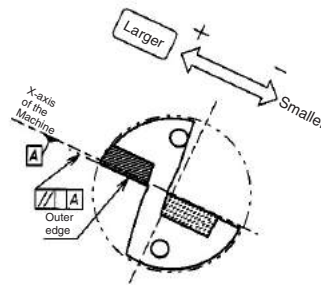


Fig.3 Outer insert Facing Down

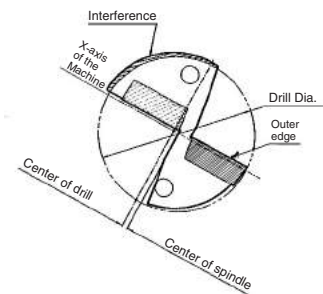


Fig.4 Excessive offset
(For Smaller Hole Diameter)

Center Height Adjustment

1. Center Height of the Inner Insert

When installing inner insert as shown in Fig.1, it will be set around 0.2mm below the Center of Spindle. (Fig.5)
This is the normal position of the center height and the drill is designed to be handled in this condition.
However, in case that the turret of the lathe is out of the center of Spindle, sometimes the inner insert may be set above the center, or excessively below the center.
For stable drilling, it is essential to **check the Center Height carefully.**

2. How to Check the Center Height

For checking the center height of the inner insert, see the core which remains at the center of the end face of the drilled hole. (Fig.6)

If the center height is in the normal condition, the core about 0.5mm in diameter, will remain after drilling
In the following cases, it is necessary to adjust the Center Height.

- No core remains
- Core diameter is more than 1mm
- * To test the Center Height, drill a shallow hole about 10mm in depth at low feed rate, less than 0.1mm/rev.

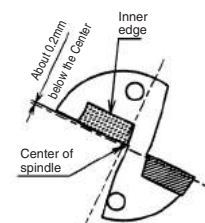


Fig.5 Front View of the Drill

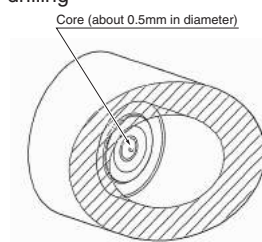


Fig.6 Center Core

3. Center Height Adjustment

a) No core remains / Core with Excessively Small Diameter

This happens when the Inner Insert is set above the Center Height.
In this case, adjustment is necessary since insert breakage will be probable at the center of the drill. (Fig.7)

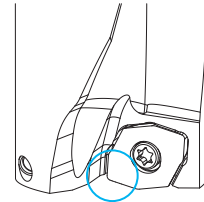


Fig.7 Insert breakage near the center of the drill

[How to Adjust]

- (1) Install the drill rotated 180°.
Most problems will be solved by this method.
(Fig.8)

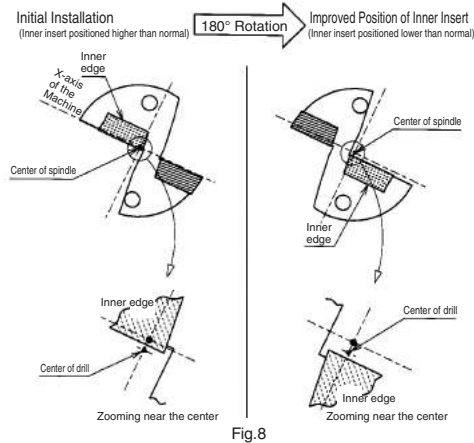


Fig.8

[How to Adjust]

- (2) If the core diameter becomes too large after the above adjustment, install the drill by rotating 90° counter-clockwise as shown in Fig.9 (outer insert is positioned lower) and adjust the center height by moving the tool in the X-axis direction. (However, this makes it impossible to adjust the drill diameter)

Caution: In case of installing the drill in the reverse direction (outer insert is positioned above), the hole diameter will become smaller, which may cause the drill body to interfere with the drilled hole.
The best solution is to readjust the center position of the turret itself.

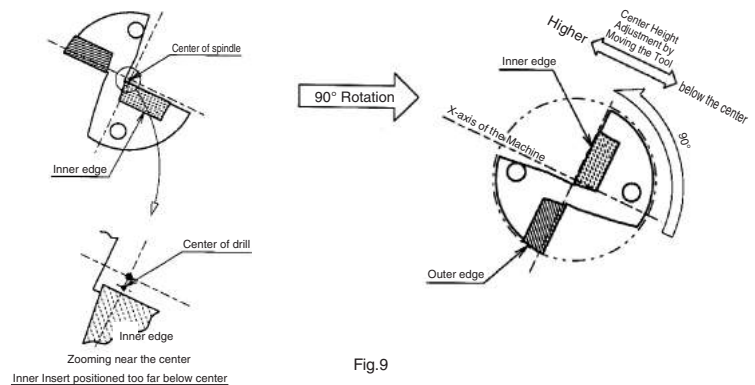


Fig.9

b) Core with excessively large diameter (More than 1mm)

This occurs when the inner insert is excessively below the center.
This condition causes poor chip evacuation and an adjustment is required.

[How to Adjust]

Install the drill rotating 90° as shown in Fig.10. (outer insert is positioned on the upper side) and adjust the center height by moving tool in the X-axis direction.
(However, this makes it impossible to adjust the drill diameter)

Caution: In case of installing the drill in the opposite direction (outer insert is positioned lower), the hole diameter will become smaller, which may cause the drill body to interfere with the drilled hole.
The best solution is to readjust the center position of the turret itself.

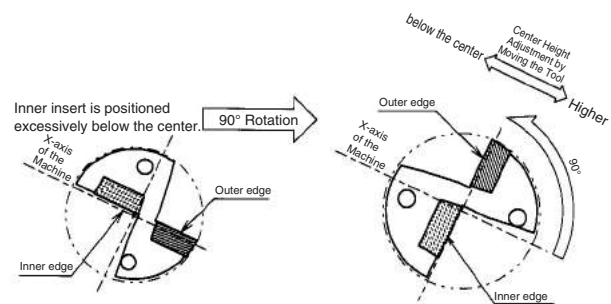


Fig.10

Case Studies

SKD62 (45HRC)	
·Vc=60m/min ·f=0.05mm/rev ·H=50mm (through hole) ·Wet (Internal coolant) ·S25-DRX250M-4-07 ·ZXMT070305GH (PR1230)	
MagicDrill DRX	6 holes/edge
Competitor J	4 holes/edge (breakage)
· MagicDrill DRX has 1.5 times longer life than Competitor J · Breakage is confirmed after machining 4 holes for Competitor J · Interrupted drilling is still possible after drilling 6 holes with MagicDrill DRX · Finishing is not necessary because MagicDrill DRX provides a good finished surface. (Evaluation by the user)	

SUS303	
·Vc=75m/min ·f=0.1mm/rev ·H=10mm (through hole) ·Wet (Internal coolant) ·S25-DRX200M-3-06 ·ZXMT06T204SM (PR1225)	
MagicDrill DRX	1,300 holes/edge
Competitor K	500 holes/edge
· MagicDrill DRX had no sudden breakage that occurred for Competitor K and achieved stable drilling with 2.6 times longer tool life. (Evaluation by the user)	

SCM420HV (Cold Forging)	
·Vc=118m/min ·f=0.08mm/rev (0.05 at the beginning) ·H=30mm (through hole) ·Wet (Internal coolant) ·S25-DRX250M-3-07 ·ZXMT070305SM (PR1225)	
MagicDrill DRX	Less adhesion, continue to use even after 400 holes
Competitor L	Large adhesion after 400 holes
· MagicDrill DRX had a good chip control and low adhesion for drilling of the same number comparing to Competitor L. (Evaluation by the user)	

SKT4 (42HRC)	
·Vc=100m/min ·f=0.07~0.08mm/rev ·H=100mm (through hole) ·Wet (External Coolant) ·S25-DRX250M-4-07 ·ZXMT070305GM (PR1230)	
MagicDrill DRX	Machining time: 28 min/pc
Conventional tool M	Machining time: 58 min/pc
· For deep hole drilling (4xD), MagicDrill DRX had no chip stuck and enabled drilling without step feeding (machining time was reduced in half) despite use of external coolant · MagicDrill DRX has improved 3 times longer tool life than Conventional tool M (Evaluation by the user)	

K



Drilling

DRA

DRC

DRX

DRS

DRZ

DRW

Fine Micro

Applicable Inserts (for DRS / DRZ)

Applicable Inserts (for DRS / DRZ)

Classification of usage		P	Carbon Steel / Alloy Steel					●	○			○		Applicable Toolholders Ref. to Page
		M	Mold Steel					●				○		
● : 1st Choice ○ : 2nd Choice (Steel; non heat treated)		K	Stainless Steel					○	●					
		N	Cast Iron							●				
Description		Dimension (mm)					Angle	MEGACOAT			PVD Coated Carbide		Carbide	
		A	T	φd	W	re	α	PR1230	PR1225	PR1210	PR660	PR830	KW10	
DS	100	8.8	3.5	-	9.0	0.2	-	●		●	○			
	105	9.3	3.7		9.7			●		●	○			
	110	9.8	3.9		10.0			●		●	○			
	115	10.2	4.1		10.3			●		●	○			
	120	10.8	4.3		10.9			0.25	●		●	○		
ZCMT	050203	5.9	2.38	2.3	5.0	0.3	7°	●	●	●	○	●	●	K56 , K63
	06T204	7.0	2.80	2.5	6.0	0.4		●	●	●	○	●	●	
	080304	9.7	3.18	2.9	8.2			●	●	●	○	●	●	
	10T304	12.0	3.97	4.4	10.4			0.6	●	●	●	○	●	
	12T306	14.3	3.97	5.6	12.8	●			●	●	○	●	●	
	150408	17.8	4.76	5.6	15.8	0.8			●	●	●	○	●	
	200608	22.8	6.35	6.5	20.3			●	●	●	○	●	●	
ZCMT	050203SP	5.9	2.38	2.3	5.0	0.3	7°	●	●		○	●	●	K56 , K63
	06T204SP	7.0	2.80	2.5	6.0	0.4		●	●		○	●	●	
	080304SP	9.7	3.18	2.9	8.2			●	●		○	●	●	
	10T304SP	12.0	3.97	4.4	10.4			0.6	●	●		○	●	
	12T304SP	14.3	3.97	5.6	12.8	●			●		○	●	●	
	150406SP	17.8	4.76	5.6	15.8	0.6			●	●		○	●	
ZCMT	050203SU	5.9	2.38	2.3	5.0	0.3	7°	●	●		○	●		
	06T204SU	7.0	2.80	2.5	6.0	0.4		●	●		○	●		

- * Features of SP Chipbreaker... 1. Less cutting force due to large rake angle.
2. Suitable for chip control of sticky materials such as stainless steel or soft steel.
3. Larger size inserts have smaller corner-R(re) than standard chipbreaker type and can reduce burrs.

Suitable Chipbreaker (ZCMT)

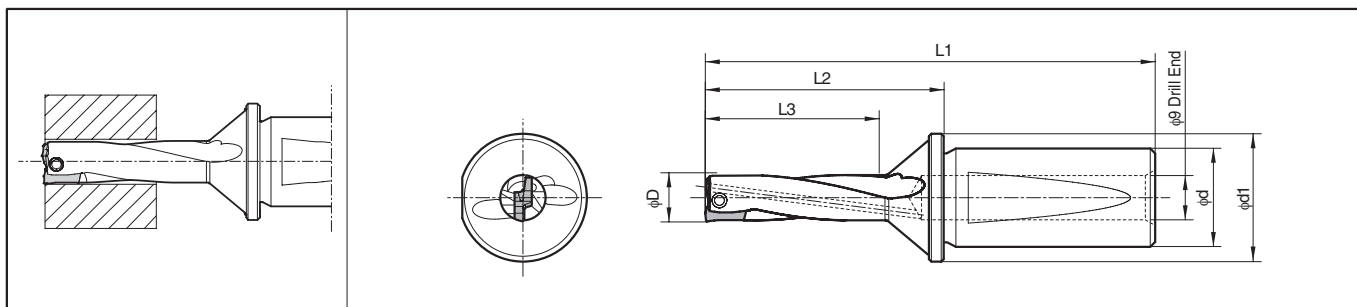
Workpiece Material	Insert Size		ZCMT05												ZCMT06												ZCMT08											
	Chipbreaker		Standard			SP			SU			Standard			SP			SU			Standard			SP														
	Drilling Depth		2D	3D	4D	2D	3D	4D	2D	3D	4D	2D	3D	4D	2D	3D	4D	2D	3D	4D	2D	3D	4D	2D	3D	4D												
Low Carbon Steel			☆	☆	-	★	★	★	-	-	-	☆	☆	-	★	★	★	☆	☆	☆	☆	☆	-	★	★	★												
Carbon Steel			★	★	☆	☆	☆	★	-	-	-	★	★	☆	☆	☆	★	-	-	-	★	★	☆	☆	☆	★												
Alloy Steel			★	★	☆	☆	☆	★	-	-	-	★	★	☆	☆	☆	★	-	-	-	★	★	☆	☆	☆	★												
Mold Steel			★	★	☆	☆	☆	★	-	-	-	★	★	☆	☆	☆	★	-	-	-	★	★	☆	☆	☆	★												
Stainless Steel			☆	☆	-	★	★	★	☆	☆	-	-	-	-	☆	☆	☆	★	★	★	☆	☆	-	★	★	★												
Cast Iron			★	★	★	☆	☆	☆	-	-	-	★	★	★	☆	☆	☆	-	-	-	★	★	★	☆	☆	☆												
Aluminum Alloys			☆	☆	☆	★	★	★	-	-	-	☆	☆	☆	★	★	★	-	-	-	☆	☆	☆	★	★	★												
Brass			★	★	★	☆	☆	☆	-	-	-	★	★	★	☆	☆	☆	-	-	-	★	★	★	☆	☆	☆												
Titanium Alloys			☆	☆	☆	★	★	★	-	-	-	☆	☆	☆	★	★	★	-	-	-	☆	☆	☆	★	★	★												

Workpiece Material	Insert Size		ZCMT10								ZCMT12								ZCMT15								ZCMT20			
	Chipbreaker		Standard				SP				Standard				SP				Standard				SP				Standard			
	Drilling Depth		2D	3D	4D	5D	2D	3D	4D	5D	2D	3D	4D	5D	2D	3D	4D	5D	2D	3D	4D	5D	2D	3D	4D	5D				
Low Carbon Steel			☆	☆	-	-	★	★	★	★	☆	☆	-	-	★	★	★	★	☆	☆	-	-	★	★	★	★	★	★	★	★
Carbon Steel			★	★	☆	☆	☆	☆	★	★	★	☆	☆	☆	☆	☆	★	★	☆	☆	☆	☆	☆	☆	★	★	★	★	★	
Alloy Steel			★	★	☆	☆	☆	☆	★	★	★	★	★	☆	☆	☆	★	★	★	★	★	☆	☆	☆	★	★	★	★	★	
Mold Steel			★	★	☆	☆	☆	☆	★	★	★	★	☆	☆	☆	☆	☆	★	★	☆	☆	☆	☆	☆	☆	★	★	★	★	
Stainless Steel			☆	☆	-	-	★	★	★	★	☆	☆	-	-	★	★	★	★	☆	☆	-	-	★	★	★	★	★	★	★	
Cast Iron			★	★	★	★	☆	☆	☆	☆	★	★	★	★	☆	☆	☆	☆	★	★	★	★	☆	☆	☆	☆	★	★	★	
Aluminum Alloys			☆	☆	☆	☆	☆	★	★	★	★	☆	☆	☆	☆	☆	★	★	★	★	☆	☆	☆	☆	★	★	★	★	★	
Brass			★	★	★	★	☆	☆	☆	☆	★	★	★	★	☆	☆	☆	☆	★	★	★	★	☆	☆	☆	☆	★	★	★	
Titanium Alloys			☆	☆	☆	☆	★	★	★	★	☆	☆	☆	☆	★	★	★	★	☆	☆	☆	☆	★	★	★	★	★	★	★	

- Standard chipbreakers (without symbol) may function better with interrupted drilling.
· When drilling aluminum alloys, chips become long and difficult to be discharged at the depth over 2D.
· 5D type is the same as 4D type.

★ : 1st Choice ☆ : 2nd Choice

DRS

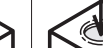


Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts ● K53
			φD	L1	L2	L3	φd	φd1		Clamp Screw	Wrench	Wrench	
S20 -DRS10035	●	1	10.0	92	49	35.0	20	26	+0.2	SB-2080TR	FT-6	-	DS100
-DRS10336	●	1	10.3	92	49	36.0			+0.1				DS105
-DRS10537	●	1	10.5	93	50	37.0			+0.2				DS110
-DRS11038	●	1	11.0	96	53	38.5			+0.2	SB-2290TR	-	-	DS115
-DRS11540	●	1	11.5	97	54	40.5			+0.2				DS120
-DRS12042	●	1	12.0	99	56	42.0			+0.4	SB-25100TR	-	DT-7	DS120
-DRS12544	●	1	12.5	101	58	44.0			+0.2				

Cutting Conditions by Application

[Workpiece Material: S50C]

Applications		Plain Surface	Slant Surface	Half Cylindrical	Hole Expansion	Concave Surface	Cored Hole	Stacked Plates
Shape of Workpiece								
DRS	Vc (m/min)	80	80	Not recommended	Not recommended	80	Not recommended	Not Available
	f (mm/rev)	0.08	0.04	Not recommended	Not recommended	Concave Surface 0.04	Not recommended	Not Available
						Continuous Part 0.08		
Coolant (Internal)		Yes	Yes	–	–	Yes	–	–

-In case of using external coolant system, chip evacuation will be bad. Therefore ap should be measured within 1.5 times (1.5xD) of drill diameter (φD).

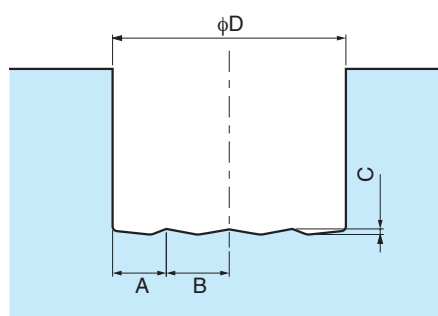
DRS Recommended Cutting Conditions (Coolant)

Workpiece Material	Recommended Insert Grades Vc (m/min)			f (mm/rev)
	MEGACOAT		PVD Coated Carbide	
	PR1230	PR1210	PR660	
Low Carbon Steel	★ 80 ~ 100	-	☆ 80 ~ 100	0.06
Carbon Steel	★ 80 ~ 100	-	☆ 80 ~ 100	0.08 ~ 0.1
Alloy Steel	★ 80	-	☆ 80	0.04 ~ 0.06
Mold Steel	★ 80	-	☆ 80	0.04 ~ 0.06
Stainless Steel (Austenitic related)	★ 70 ~ 80	-	☆ 70 ~ 80	0.05 ~ 0.06
Gray Cast Iron	-	★ 80 ~ 100	-	0.08 ~ 0.1

★ : 1st Recommendation ☆ : 2nd Recommendation

DRS Hole Bottom Shape (mm)

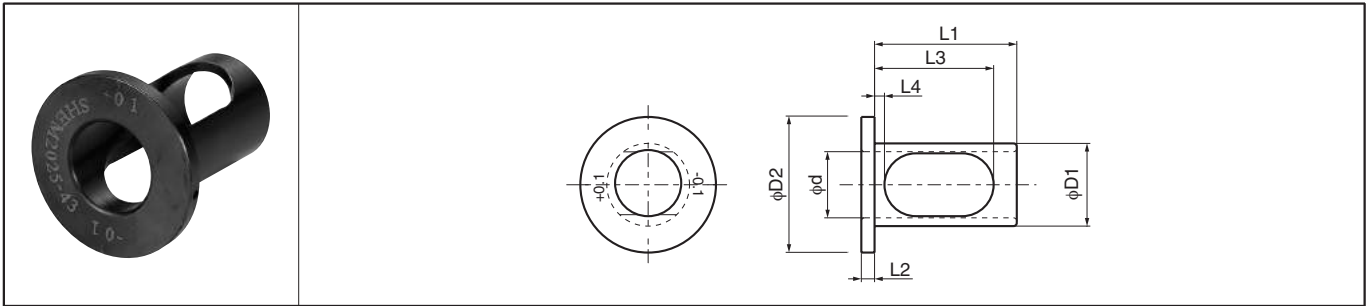
φD	A	B	C
10.0	2.2	2.80	0.2
10.3	2.3	2.85	0.2
10.5	2.3	2.95	0.2
11.0	2.4	3.10	0.2
11.5	2.5	3.25	0.2
12.0	2.8	3.20	0.3
12.5	2.9	3.35	0.4



1. Apply a sufficient amount of coolant.
2. If cutting speed is decreased too much from above condition, chip evacuation performance will deteriorate.
If the feed rate is increased too much from above condition, inner edge chip evacuation will deteriorate.
If the feed rate is decreased too much from above condition, outer edge chip evacuation will deteriorate.
3. If chips are too long when low carbon steel drilling, increased the cutting speed to 120~150m/min.
If this does not solve the problem, try step feeding.
[How to step feeding] (1) Cut 1~2mm (2) Return 0.1mm (3) Repeat (1) and (2)

● : Std. Item

SHEM



Sleeve Dimensions

Description	Std.	Dimension (mm)							* Drill Dia. Adjustable Range
		ϕd	$\phi D1$	$\phi D2$	L1	L2	L3	L4	
SHEM 2025-43	●	20	25	41	43	4	36	3.0	+0.1, -0.1
2032-43	●		32	49		6		2.5	+0.1, -0.1

* Diameter Adjustment Range adjusts the drill diameter.

How to Use the Adjustable Sleeve

- SHEM is designed for only MagicDrill Mini (DRS-type)
- SHEM is for drill diameter adjustment only. (up to +0.1mm or -0.1mm)
- SHEM is not for center height adjustment like conventional adjustable sleeve (SHE-type)
- Apply SHEM when adjusting the hole diameter for pre-drilling before threading.

- Set the outer edge horizontally with 90° to making line on the sleeve. (Fig.1)
- When making the hole diameter larger, align the +0.1 mark on the sleeve with the flat on the drill shank.
To adjust to smaller diameter, align the -0.1 mark on the sleeve with the flat on the drill shank. (Fig.1)
- Using the bottom screw of the side-lock arbor, firmly tighten on the drill directly through the sleeve's window.
The upper screw should be tightened slightly so that the sleeve will not be damage. (Fig.2.)

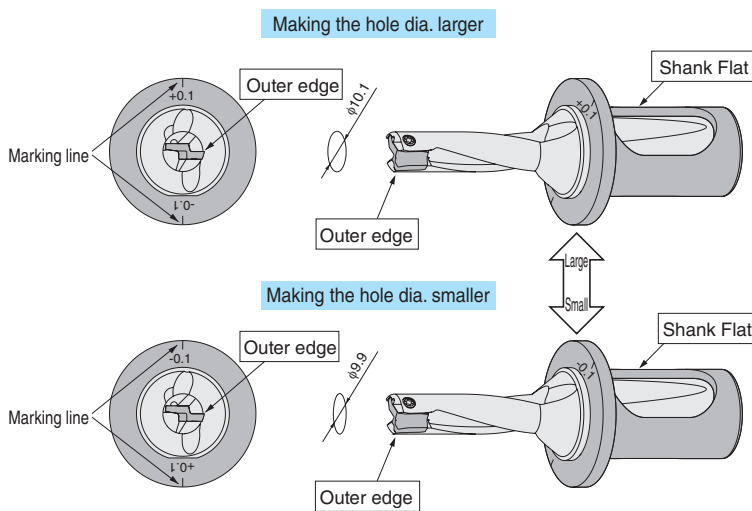


Fig.1 Diameter Adjustment Method (e.g.) $\phi 10$ Drill

Caution: Not applicable for Collet Chuck type Arbor.

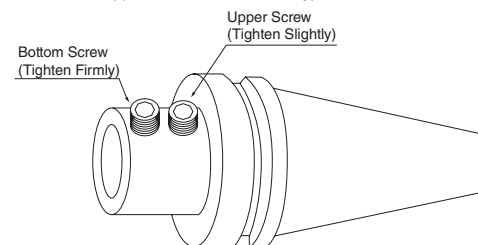
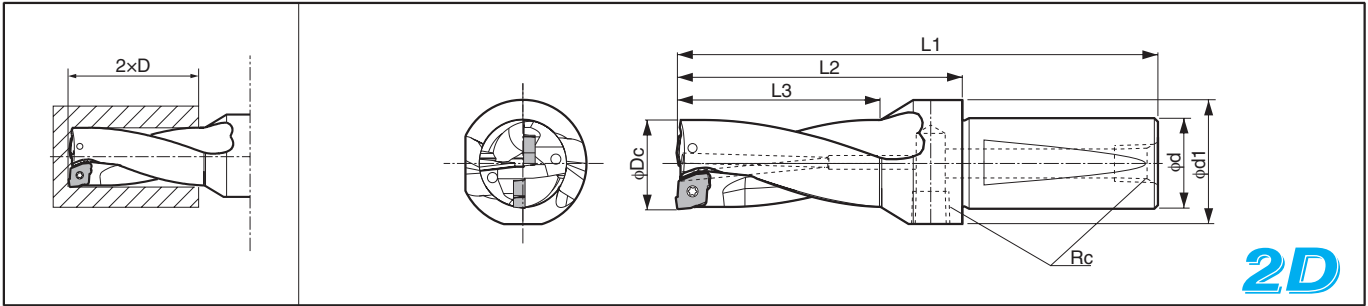


Fig.2

DRZ (Drilling Depth:2xD)



Toolholder Dimensions

Description	Std. No. of Inserts	Dimension (mm)							Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts K53
		φDc	L1	L2	L3	φd	φd1	Rc		Clamp Screw	Wrench	Plug	
S20 -DRZ1326-05	●	13	95	52	26				+0.5				ZCMT050203 ZCMT050203SP ZCMT050203SU
-DRZ135270-05	●	13.5	95	52	27				+0.5				
-DRZ1428-05	●	14	98	55	28				+0.5				
-DRZ145290-05	●	14.5	98	55	29	20	27	Rc1/8	+0.5	SB-2045TR	FT-6	GP-1	
-DRZ1530-05	●	15	100	57	30				+0.5				
-DRZ155310-05	●	15.5	100	57	31				+0.5				
S25 -DRZ1632-06	●	16	115	61	32				+1.1				ZCMT06T204 ZCMT06T204SP ZCMT06T204SU
-DRZ165330-06	●	16.5	115	61	33				+0.9				
-DRZ1734-06	●	17	116	62	34				+0.8				
-DRZ175350-06	●	17.5	116	62	35				+0.7				
-DRZ1836-06	●	18	118	64	36				+0.6				
-DRZ185370-06	●	18.5	118	64	37	25	32	Rc1/8	+0.6	SB-2260TR	DT-7	GP-1	ZCMT06T204 ZCMT06T204SP ZCMT06T204SU
-DRZ1938-06	●	19	120	66	38				+0.5				
-DRZ195390-06	●	19.5	120	66	39				+0.5				
-DRZ2040-06	●	20	123	69	40				+0.5				
-DRZ205410-06	●	20.5	125	71	41				+0.3				
-DRZ2142-06	●	21	125	71	42				+0.2				
-DRZ215430-08	●	21.5	128	74	43				+1.8				ZCMT080304 ZCMT080304SP
-DRZ2244-08	●	22	128	74	44				+1.6				
-DRZ225450-08	●	22.5	128	74	45		33		+1.4				
-DRZ2346-08	●	23	130	76	46				+1.3				
-DRZ235470-08	●	23.5	130	76	47				+1.2				
-DRZ2448-08	●	24	131	77	48	25		Rc1/8	+1.1	SB-2570TR	DT-8	GP-1	
-DRZ245490-08	●	24.5	131	77	49				+0.9				
-DRZ2550-08	●	25	133	79	50				+0.8				
-DRZ255510-08	●	25.5	133	79	51		35		+0.7				
-DRZ2652-08	●	26	135	81	52				+0.6				
-DRZ265530-08	●	26.5	135	81	53				+0.5				
S32 -DRZ2754-10	●	27	149	90	54				+2.5				ZCMT10T304 ZCMT10T304SP
-DRZ275550-10	●	27.5	149	90	55				+2.3				
-DRZ2856-10	●	28	151	92	56		42		+2.2				
-DRZ285570-10	●	28.5	151	92	57				+2.1				
-DRZ2958-10	●	29	153	94	58				+2.0				
-DRZ295590-10	●	29.5	153	94	59	32		Rc1/4	+1.8	SB-4085TR	DT-15	GP-2	
-DRZ3060-10	●	30	154	95	60				+1.7				
-DRZ305610-10	●	30.5	154	95	61				+1.5				
-DRZ3162-10	●	31	155	96	62				+1.5				
-DRZ315630-10	●	31.5	155	96	63		45		+1.3				
-DRZ3264-10	●	32	158	99	64				+1.2				
-DRZ325650-10	●	32.5	158	99	65				+1.0				

· When offset drilling, reduce feed rate to 0.08mm/rev or less.

Recommended Cutting Conditions K65

● : Std. Item

● Toolholder Dimensions

Description	Std. No. of Inserts	Dimension (mm)							Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts  K53	
		φDc	L1	L2	L3	φd	φd1	Rc		Clamp Screw	Wrench	Plug		
														
S40 -DRZ3366-12	●	33	173	104	66	40	55	Rc1/4	+2.9	SB-5085TR	DT-20	GP-2	ZCMT12T306 ZCMT12T304SP	
-DRZ3468-12	●	34	176	107	68				+2.7					
-DRZ3570-12	●	35	177	108	70				+2.4					
-DRZ3672-12	●	36	180	111	72				+2.2					
-DRZ3774-12	●	37	181	112	74				+1.9					
-DRZ3876-12	●	38	183	114	76				+1.7					
-DRZ3978-12	●	39	185	116	78				+1.4					
-DRZ4080-12	●	40	185	116	80				+1.2					
-DRZ4182-15	●	41	186	117	82	40	55	Rc1/4	+4.0	SB-5085TR	DT-20	GP-2	ZCMT150408 ZCMT150406SP	
-DRZ4284-15	●	42	188	119	84				+3.7					
-DRZ4386-15	●	43	190	121	86				+3.5					
-DRZ4488-15	●	44	192	123	88				+3.2					
-DRZ4590-15	●	45	192	123	90		60		+3.0					
-DRZ4692-15	●	46	198	129	92				+2.7					
-DRZ4794-15	●	47	201	132	94				+2.5					
-DRZ4896-15	●	48	203	134	96				+2.2					
-DRZ4998-15	●	49	204	135	98				+2.0					
-DRZ50100-15	●	50	204	135	100				+1.7					
-DRZ51102-15	●	51	205	136	102				+1.2					
-DRZ52104-15	●	52	205	136	104				+1.0					
-DRZ53106-15	●	53	208	139	106				+0.7					
-DRZ54108-20	●	54	214	145	108	40	65	Rc1/4	+5.0	SB-60120TR	DT-25	GP-2	ZCMT200608	
-DRZ55110-20	●	55	215	146	110				+4.7					
-DRZ56112-20	●	56	217	148	112				+4.4					
-DRZ57114-20	●	57	219	150	114				+4.1					
-DRZ58116-20	●	58	221	152	116				+3.8					
-DRZ59118-20	●	59	223	154	118				+3.5					

· When offset drilling, reduce feed rate to 0.08mm/rev or less.

Recommended Cutting Conditions ● K65

· Hole Dia. Tolerance (2D type)

Dc	Hole Dia. Tolerance (mm)
φ13~φ26.5	+ 0.20 - 0.10
φ27~φ40	+ 0.25 - 0.15
φ41~φ59	+ 0.30 - 0.20

* Above is numeric guideline.

It may vary depending on machines / workpieces / clamping status / cutting conditions.

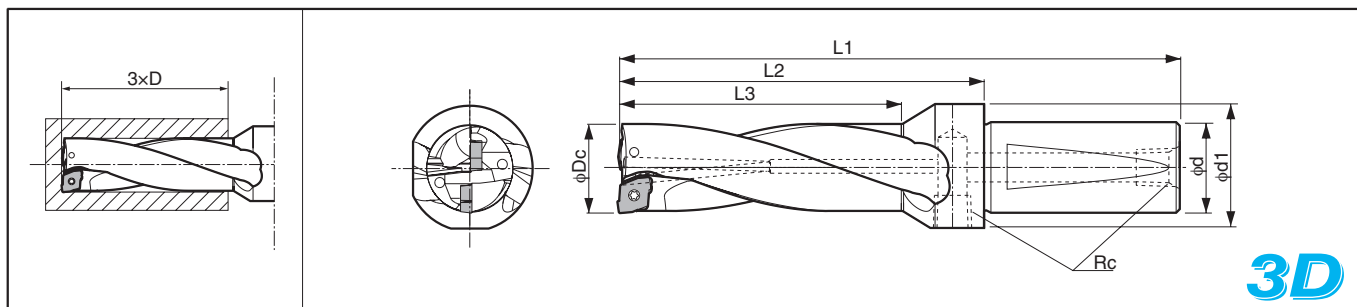
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Drilling

MagicDrill DRZ

■ **DRZ** (Drilling Depth:3×D)



● Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts  K53	
			φDc	L1	L2	L3	φd	φd1		Rc	Clamp Screw	Wrench		Plug
												 FT  DT		
S20 -DRZ1339-05 -DRZ135405-05 -DRZ1442-05 -DRZ145435-05 -DRZ1545-05 -DRZ155465-05	●	13	108	65	39	20	27	Rc1/8	+0.5	SB-2045TR	FT-6	GP-1	ZCMT050203 ZCMT050203SP ZCMT050203SU	
	●	13.5	108	65	40.5				+0.5					
	●	14	112	69	42				+0.5					
	●	14.5	112	69	43.5				+0.5					
	●	15	115	72	45				+0.5					
	●	15.5	115	72	46.5				+0.5					
S25 -DRZ1648-06 -DRZ165495-06 -DRZ1751-06 -DRZ175525-06 -DRZ1854-06 -DRZ185555-06 -DRZ1957-06 -DRZ195585-06 -DRZ2060-06 -DRZ205615-06 -DRZ2163-06 -DRZ215645-08 -DRZ2266-08 -DRZ225675-08 -DRZ2369-08 -DRZ235705-08 -DRZ2472-08 -DRZ245735-08 -DRZ2575-08 -DRZ255765-08 -DRZ2678-08 -DRZ265795-08	●	16	131	77	48	25	32	Rc1/8	+1.1	SB-2260TR	DT-7	GP-1	ZCMT06T204 ZCMT06T204SP ZCMT06T204SU	
	●	16.5	131	77	49.5				+0.9					
	●	17	133	79	51				+0.8					
	●	17.5	133	79	52.5				+0.7					
	●	18	136	82	54				+0.6					
	●	18.5	136	82	55.5				+0.6					
	●	19	139	85	57				+0.5					
	●	19.5	139	85	58.5				+0.5					
	●	20	143	89	60				+0.5					
	●	20.5	146	92	61.5				+0.3					
	●	21	146	92	63				+0.2					
	●	21.5	147	93	64.5				+1.8					
	●	22	147	93	66				+1.6					
	●	22.5	147	93	67.5				+1.4					
	●	23	150	96	69				+1.3					
	●	23.5	150	96	70.5				+1.2					
	●	24	152	98	72				+1.1					
	●	24.5	152	98	73.5				+0.9					
●	25	155	101	75	+0.8									
●	25.5	155	101	76.5	+0.7									
●	26	158	104	78	+0.6									
●	26.5	158	104	79.5	+0.5									
S32 -DRZ2781-10 -DRZ275825-10 -DRZ2884-10 -DRZ285855-10 -DRZ2987-10 -DRZ295885-10 -DRZ3090-10 -DRZ305915-10 -DRZ3193-10 -DRZ315945-10 -DRZ3296-10 -DRZ325975-10	●	27	173	114	81	32	42	Rc1/4	+2.5	SB-4085TR	DT-15	GP-2	ZCMT10T304 ZCMT10T304SP	
	●	27.5	173	114	82.5				+2.3					
	●	28	176	117	84				+2.2					
	●	28.5	176	117	85.5				+2.1					
	●	29	179	120	87				+2.0					
	●	29.5	179	120	88.5				+1.8					
	●	30	181	122	90				+1.7					
	●	30.5	181	122	91.5				+1.5					
	●	31	183	124	93				+1.5					
	●	31.5	183	124	94.5				+1.3					
	●	32	187	128	96				+1.2					
	●	32.5	187	128	97.5				+1.0					
S33 -DRZ3399-12 -DRZ34102-12 -DRZ35105-12 -DRZ36108-12 -DRZ37111-12 -DRZ38114-12 -DRZ39117-12 -DRZ40120-12	●	33	193	134	99	32	55	Rc1/4	+2.9	SB-5085TR	DT-20	GP-2	ZCMT12T306 ZCMT12T304SP	
	●	34	197	138	102				+2.7					
	●	35	199	140	105				+2.4					
	●	36	203	144	108				+2.2					
	●	37	205	146	111				+1.9					
	●	38	208	149	114				+1.7					
	●	39	211	152	117				+1.4					
	●	40	212	153	120				+1.2					

• When offset drilling, reduce feed rate to 0.08mm/rev or less.

Recommended Cutting Conditions ➡ **K65**

● : Std. Item

● Toolholder Dimensions

Description	Std. No. of Inserts	Dimension (mm)							Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts  K53
		φDc	L1	L2	L3	φd	φd1	Rc		Clamp Screw	Wrench	Plug	
													
S40 -DRZ3399-12	●	33	203	134	99	40	55	Rc1/4	+2.9	SB-5085TR	DT-20	GP-2	ZCMT12T306 ZCMT12T304SP
-DRZ34102-12	●	34	207	138	102				+2.7				
-DRZ35105-12	●	35	209	140	105				+2.4				
-DRZ36108-12	●	36	213	144	108				+2.2				
-DRZ37111-12	●	37	215	146	111				+1.9				
-DRZ38114-12	●	38	218	149	114				+1.7				
-DRZ39117-12	●	39	221	152	117				+1.4				
-DRZ40120-12	●	40	222	153	120				+1.2				
-DRZ41123-15	●	41	224	155	123	40	55	Rc1/4	+4.0	SB-5085TR	DT-20	GP-2	ZCMT150408 ZCMT150406SP
-DRZ42126-15	●	42	227	158	126				+3.7				
-DRZ43129-15	●	43	230	161	129				+3.5				
-DRZ44132-15	●	44	233	164	132				+3.2				
-DRZ45135-15	●	45	234	165	135		60		+3.0				
-DRZ46138-15	●	46	241	172	138				+2.7				
-DRZ47141-15	●	47	245	176	141				+2.5				
-DRZ48144-15	●	48	248	179	144				+2.2				
-DRZ49147-15	●	49	250	181	147				+2.0				
-DRZ50150-15	●	50	251	182	150				+1.7				
-DRZ51153-15	●	51	254	185	153				+1.2				
-DRZ52156-15	●	52	257	188	156				+1.0				
-DRZ53159-15	●	53	260	191	159				+0.7				
-DRZ54162-20	●	54	266	197	162	40	65	Rc1/4	+5.0	SB-60120TR	DT-25	GP-2	ZCMT200608
-DRZ55165-20	●	55	269	200	165				+4.7				
-DRZ56168-20	●	56	272	203	168				+4.4				
-DRZ57171-20	●	57	275	206	171				+4.1				
-DRZ58174-20	●	58	278	209	174				+3.8				
-DRZ59177-20	●	59	281	212	177				+3.5				

* When offset drilling, reduce feed rate to 0.08mm/rev or less.

Recommended Cutting Conditions ● K65

· Hole Dia. Tolerance (3D type)

Dc	Hole Dia. Tolerance (mm)
φ13~φ26.5	+ 0.20 - 0.10
φ27~φ40	+ 0.25 - 0.15
φ41~φ59	+ 0.30 - 0.20

* Above is numeric guideline.

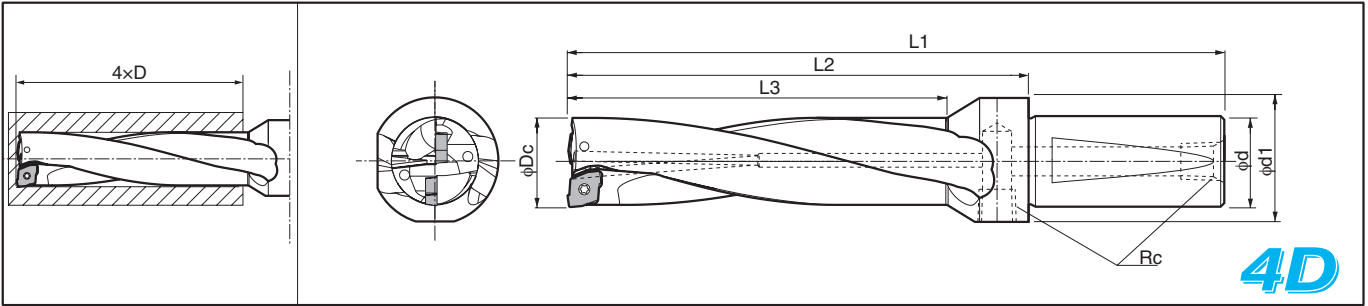
It may vary depending on machines / workpieces / clamping status / cutting conditions.

K



Drilling

DRZ (Drilling Depth:4xD)



Toolholder Dimensions

Description	Std. No. of Inserts	Dimension (mm)							Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts ● K53
		φDc	L1	L2	L3	φd	φd1	Rc		Clamp Screw 	Wrench FT 	Plug 	
S20 -DRZ1352-05	●	13	121	78	52				+0.5				ZCMT050203 ZCMT050203SP ZCMT050203SU
-DRZ135540-05	●	13.5	121	78	54				+0.5				
-DRZ1456-05	●	14	126	83	56				+0.5				
-DRZ145580-05	●	14.5	126	83	58				+0.5				
-DRZ1560-05	●	15	130	87	60				+0.5				
-DRZ155620-05	●	15.5	130	87	62				+0.5				
S25 -DRZ1664-06	●	16	147	93	64				+1.1				ZCMT06T204 ZCMT06T204SP ZCMT06T204SU
-DRZ165660-06	●	16.5	147	93	66				+0.9				
-DRZ1768-06	●	17	149	95	68				+0.8				
-DRZ175700-06	●	17.5	149	95	70				+0.7				
-DRZ1872-06	●	18	153	99	72				+0.6				
-DRZ185740-06	●	18.5	153	99	74				+0.6				
-DRZ1976-06	●	19	157	103	76				+0.5				
-DRZ195780-06	●	19.5	157	103	78				+0.5				
-DRZ2080-06	●	20	156	102	80				+0.5				
-DRZ205820-06	●	20.5	161	107	82				+0.3				
-DRZ2184-06	●	21	161	107	84				+0.2				
-DRZ215860-08	●	21.5	169	115	86				+1.8				ZCMT080304 ZCMT080304SP
-DRZ2288-08	●	22	169	115	88				+1.6				
-DRZ225900-08	●	22.5	169	115	90				+1.4				
-DRZ2392-08	●	23	173	119	92				+1.3				
-DRZ235940-08	●	23.5	173	119	94				+1.2				
-DRZ2496-08	●	24	176	122	96				+1.1				
-DRZ245980-08	●	24.5	176	122	98				+0.9				
-DRZ25100-08	●	25	180	126	100				+0.8				
-DRZ2551020-08	●	25.5	180	126	102				+0.7				
-DRZ26104-08	●	26	184	130	104				+0.6				
-DRZ2651060-08	●	26.5	184	130	106				+0.5				
S32 -DRZ27108-10	●	27	200	141	108				+2.5				ZCMT10T304 ZCMT10T304SP
-DRZ2751100-10	●	27.5	200	141	110				+2.3				
-DRZ28112-10	●	28	204	145	112				+2.2				
-DRZ2851140-10	●	28.5	204	145	114				+2.1				
-DRZ29116-10	●	29	208	149	116				+2.0				
-DRZ2951180-10	●	29.5	208	149	118				+1.8				
-DRZ30120-10	●	30	211	152	120				+1.7				
-DRZ3051220-10	●	30.5	211	152	122				+1.5				
-DRZ31124-10	●	31	214	155	124				+1.5				
-DRZ3151260-10	●	31.5	214	155	126				+1.3				
-DRZ32128-10	●	32	219	160	128				+1.2				
-DRZ3251300-10	●	32.5	219	160	130				+1.0				
-DRZ33132-12	●	33	226	167	132				+2.9				ZCMT12T306 ZCMT12T304SP
-DRZ34136-12	●	34	231	172	136				+2.7				
-DRZ35140-12	●	35	234	175	140				+2.4				
-DRZ36144-12	●	36	239	180	144				+2.2				
-DRZ37148-12	●	37	242	183	148				+1.9				
-DRZ38152-12	●	38	246	187	152				+1.7				
-DRZ39156-12	●	39	250	191	156				+1.4				
-DRZ40160-12	●	40	252	193	160				+1.2				

· When offset drilling, reduce feed rate to 0.06mm/rev or less.

Recommended Cutting Conditions ● K65

● : Std. Item

● Toolholder Dimensions

Description	Std. No. of Inserts	Dimension (mm)							Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts  K53	
		φDc	L1	L2	L3	φd	φd1	Rc		Clamp Screw	Wrench	Plug		
														
S40 -DRZ33132-12	●	33	236	167	132	40	55	Rc1/4	+2.9	SB-5085TR	DT-20	GP-2	ZCMT12T306 ZCMT12T304SP	
-DRZ34136-12	●	34	241	172	136				+2.7					
-DRZ35140-12	●	35	244	175	140				+2.4					
-DRZ36144-12	●	36	249	180	144				+2.2					
-DRZ37148-12	●	37	252	183	148				+1.9					
-DRZ38152-12	●	38	256	187	152				+1.7					
-DRZ39156-12	●	39	260	191	156				+1.4					
-DRZ40160-12	●	40	262	193	160				+1.2					
-DRZ41164-15	●	41	265	196	164	40	55	Rc1/4	+4.0	SB-5085TR	DT-20	GP-2	ZCMT150408 ZCMT150406SP	
-DRZ42168-15	●	42	269	200	168				+3.7					
-DRZ43172-15	●	43	273	204	172				+3.5					
-DRZ44176-15	●	44	277	208	176				+3.2					
-DRZ45180-15	●	45	279	210	180		60		+3.0					
-DRZ46184-15	●	46	287	218	184				+2.7					
-DRZ47188-15	●	47	292	223	188				+2.5					
-DRZ48192-15	●	48	296	227	192				+2.2					
-DRZ49196-15	●	49	300	231	196	40	55	Rc1/4	+2.0	SB-5085TR	DT-20	GP-2	ZCMT150408 ZCMT150406SP	
-DRZ50200-15	●	50	301	232	200				+1.7					

· When offset drilling, reduce feed rate to 0.06mm/rev or less.

Recommended Cutting Conditions ● K65

· Hole Dia. Tolerance (4D type)

Dc	Hole Dia. Tolerance (mm)
φ13~φ26.5	+ 0.25 - 0.10
φ27~φ40	+ 0.30 - 0.15
φ41~φ50	+ 0.35 - 0.20

* Above is numeric guideline.

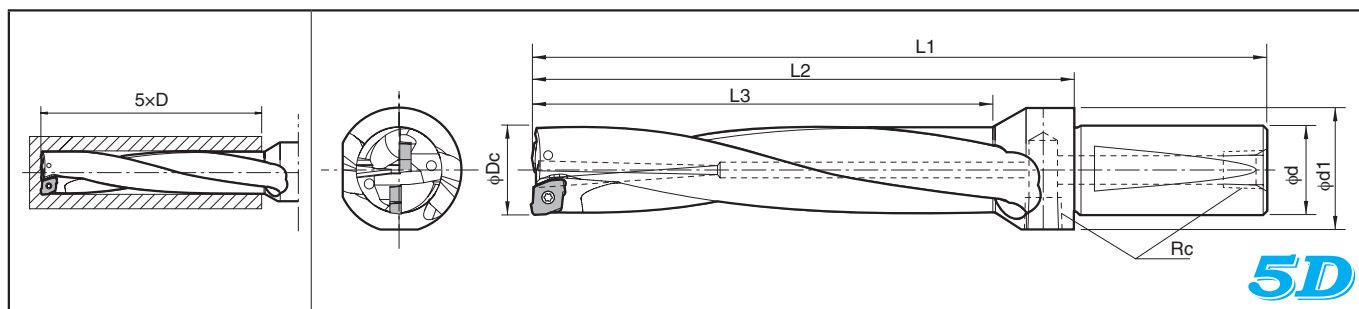
It may vary depending on machines / workpieces / clamping status / cutting conditions.

K



Drilling

DRZ (Drilling Depth:5xD)



Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)							Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts ● K53
			φDc	L1	L2	L3	φd	φd1	Rc		Clamp Screw	Wrench	Plug	
S32 -DRZ27135-10	●	2	27	227	168	135	32	42	Rc1/4	+2.5	SB-4085TR	DT-15	GP-2	ZCMT10T304 ZCMT10T304SP
-DRZ28140-10	●		28	232	173	140								
-DRZ29145-10	●		29	237	178	145								
-DRZ30150-10	●		30	241	182	150								
-DRZ31155-10	●		31	245	186	155								
-DRZ32160-10	●		32	251	192	160								
S40 -DRZ33165-12	●	2	33	269	200	165	40	55	Rc1/4	+2.9	SB-5085TR	DT-20	GP-2	ZCMT12T306 ZCMT12T304SP
-DRZ34170-12	●		34	275	206	170								
-DRZ35175-12	●		35	279	210	175								
-DRZ36180-12	●		36	285	216	180								
-DRZ37185-12	●		37	289	220	185								
-DRZ38190-12	●		38	294	225	190								
-DRZ39195-12	●	2	39	299	230	195	40	55	Rc1/4	+2.2	SB-5085TR	DT-20	GP-2	ZCMT150408 ZCMT150406SP
-DRZ40200-12	●		40	302	233	200								
-DRZ41205-15	●		41	306	237	205								
-DRZ42210-15	●		42	311	242	210								
-DRZ43215-15	●		43	316	247	215								
-DRZ44220-15	●		44	321	252	220								
-DRZ45225-15	●	2	45	324	255	225	40	60	Rc1/4	+3.0	SB-5085TR	DT-20	GP-2	ZCMT150408 ZCMT150406SP
-DRZ46230-15	●		46	333	264	230								
-DRZ47235-15	●		47	339	270	235								
-DRZ48240-15	●		48	344	275	240								
-DRZ49245-15	●		49	349	280	245								
-DRZ50250-15	●		50	351	282	250								

· When offset drilling, reduce feed rate to 0.05mm/rev or less.

Recommended Cutting Conditions ● K65

Hole Dia. Tolerance (5D type)

Dc	Hole Dia. Tolerance (mm)
φ27~φ40	+ 0.35 - 0.15
φ41~φ50	+ 0.40 - 0.20

* Above is numeric guideline.

It may vary depending on machines / workpieces / clamping status / cutting conditions.

K

Drilling

DRA

DRC

DRX

DRS

DRZ

DRW

Fine

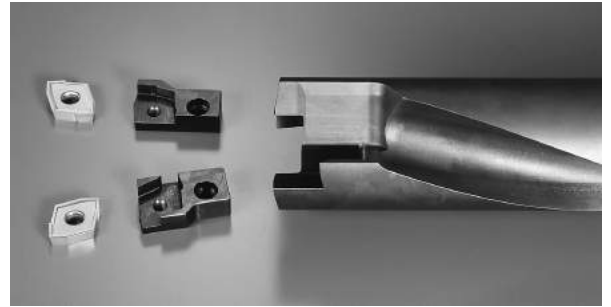
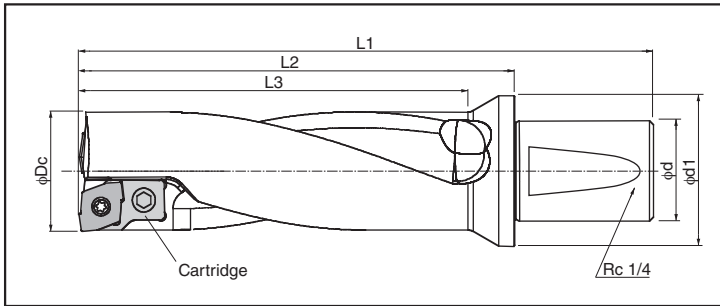
Micro

MagicDrill DRZ

■ MagicDrill for Large Dia. (over $\phi 60$)

- MagicDrill for large diameters (over $\phi 60$) are available as Custom Orders.
(Ask your regional sales staff for details such as drill dia. / shank type, etc.)

● DRZ-CR (Cartridge type)



● Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts				Applicable Inserts  K53	
			φDc	L1	L2	L3	φd	φd1		Cartridge		Clamp Screw	Wrench		
										 For outer edge	 For inner edge				
S50	-DRZ60180-20CR	MTO	2	60	286	217	195	50	75	+3.0	DR20CR-OUT (1pc)	DR20CR-IN (1pc)	SB-60120TR	DT-25	ZCMT200608
	-DRZ65195-20CR	MTO	2	65	296	227	206			+1.5					
	-DRZ70210-20CR	MTO	2	70	308	239	220			+0.2					
	-DRZ75225-12CR	MTO	4	75	330	261	225	50	80	Offset N.A.	DR12CR-OUT (2pc)	DR12CR-IN (2pc)	SB-5085TR	DT-20	ZCMT12T306 ZCMT12T304SP
	-DRZ80240-12CR	MTO	4	80	340	271	240								

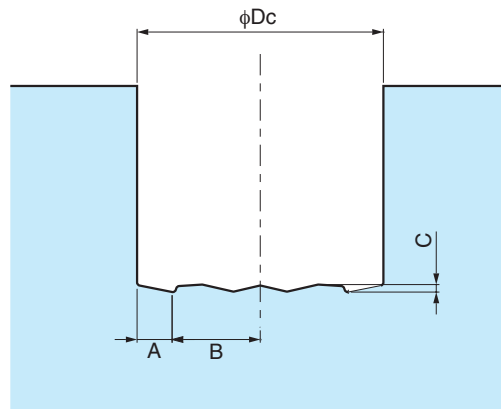
· Clamp screws for cartridges are included in toolholders: HH6×12 for **DR20CR** and HH4×12 for **DR12CR**.

Recommended Cutting Conditions ➡ K65

DRZ Hole Bottom Shape (Available for 2×D, 3×D, 4×D, 5×D type) (mm)

φDc	A	B	C	φDc	A	B	C	φDc	A	B	C
13.0	2.1	4.4	0.4	21.5	3.1	7.7	0.6	33.0	5.7	10.8	0.8
13.5		4.7		22.0		7.9		34.0		11.3	
14.0		4.9	0.5	22.5		8.2		35.0		11.8	
14.5		5.2		23.0		8.4	0.7	36.0		12.3	0.9
15.0		5.4		23.5		8.7		37.0		12.8	
15.5	2.7	5.7	0.6	24.0	4.0	8.9		38.0	6.5	13.3	1.0
16.0		5.3		24.5		9.2	0.7	39.0		13.8	
16.5		5.6		25.0		9.4		40.0		14.3	
17.0		5.8		25.5		9.7		41.0		14.0	
17.5		6.1	0.7	26.0		9.9	0.8	42.0		14.5	1.1
18.0	2.1	6.3		26.5		10.2		43.0		15.0	
18.5		6.6		27.0		9.5		44.0		15.5	
19.0		6.8		27.5		9.8	0.7	45.0		16.0	1.2
19.5		7.1	0.8	28.0		10.0		46.0		16.5	
20.0		7.3		28.5		10.3		47.0		17.0	
20.5	2.7	7.6		29.0		10.5	0.8	48.0		17.5	1.1
21.0		7.8		29.5		10.8		49.0		18.0	
				30.0		11.0		50.0		18.5	
				30.5		11.3	0.8	51.0		19.0	1.2
				31.0		11.5		52.0		19.5	
				31.5		11.8		53.0		20.0	
				32.0		12.0	0.8	54.0		18.5	1.2
				32.5		12.3		55.0		19.0	
								56.0		19.5	
								57.0		20.0	1.2
								58.0		20.5	
								59.0		21.0	

* Above amount is standard value
(Varies within ±0.1mm depending on workpiece materials and cutting conditions)



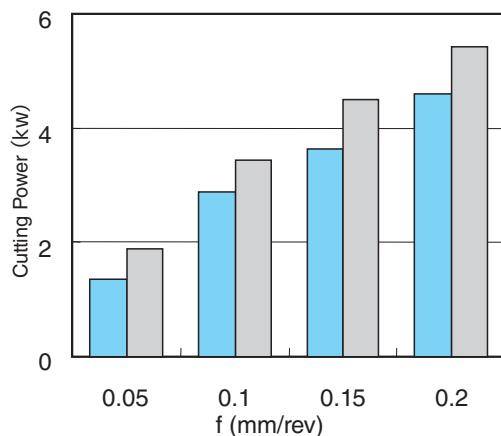
Cutting Power

φ20 Cutting Power Comparison

- MagicDrill DRZ
- Competitor A

Vc=100m/min, (n=1,600min⁻¹)
φ20 Indexable Drill
SCM415 Wet (Internal coolant)

Comparison of Cutting Power



Case Study

MagicDrill Dia.		φ16	φ27		φ50		
Machine		Competitor A	Competitor B		Competitor C	Competitor D	
Machine Power		AC 5.5/7.5 kW	AC 5.5/7.5 kW		AC 5.5/7.5 kW	AC 7.5/11 kW	
Cutting Conditions	Vc (mm/min)	150	130	150	120	110	157
	f (mm/rev)	0.06	0.13		0.1	0.08	0.12
Workpiece Material		SS400	SCM435		SCM415	SS400	
Required Power (Load Meter Values)		60%	80%	95%	100%	60%	100%
Remarks		-	-		With conventional drill, limited up to φ40	-	

Formula for calculating required power (approximate value) ➡ R35

Recommended Cutting Conditions

DRZ Recommended Cutting Conditions (Coolant)

Workpiece Material	Recommended Insert Grades (Vc: m/min)						Drill Dia. φDc (mm)	Drill type (Drilling Depth)			
	MEGACOAT			PVD Coated Carbide		Carbide		2D	3D	4D	5D
	PR1230	PR1225	PR1210	PR660	PR830	KW10					
	Standard SP SU	Standard SP SU	Standard	Standard SP SU	Standard SP	Standard SP					
								f (mm/rev)			
Low Carbon Steel	★ 120~220	☆ 120~220	-	☆ 120~220	☆ 120~240	-	φ13~φ15.5	0.06~0.10	0.06~0.10	0.04~0.08	—
							φ16~φ26.5	0.08~0.15	0.08~0.15	0.06~0.12	—
							φ27~φ50	0.08~0.18	0.08~0.15	0.06~0.12	0.05~0.09
							φ50~	0.08~0.18	0.08~0.15	0.06~0.12	—
Carbon Steel	★ 100~160	☆ 100~160	-	☆ 100~160	☆ 120~180	-	φ13~φ15.5	0.06~0.10	0.06~0.10	0.04~0.08	—
							φ16~φ26.5	0.08~0.15	0.08~0.15	0.06~0.12	—
							φ27~φ50	0.08~0.18	0.08~0.15	0.06~0.12	0.05~0.09
							φ50~	0.08~0.18	0.08~0.15	0.06~0.12	—
Alloy Steel	★ 80~140	☆ 80~140	-	☆ 80~140	☆ 100~160	-	φ13~φ15.5	0.06~0.10	0.06~0.10	0.04~0.08	—
							φ16~φ26.5	0.08~0.15	0.08~0.15	0.06~0.12	—
							φ27~φ50	0.08~0.18	0.08~0.15	0.06~0.12	0.05~0.09
							φ50~	0.08~0.18	0.08~0.15	0.06~0.12	—
Mold Steel	★ 70~130	☆ 70~130	-	☆ 70~130	☆ 80~150	-	φ13~φ15.5	0.04~0.08	0.04~0.08	0.03~0.07	—
							φ16~φ26.5	0.08~0.12	0.06~0.10	0.06~0.08	—
							φ27~φ50	0.08~0.15	0.06~0.12	0.06~0.10	0.04~0.07
							φ50~	0.08~0.15	0.06~0.12	0.06~0.10	—
Stainless Steel (Austenitic related)	☆ 60~120	★ 60~120	-	☆ 60~120	☆ 70~140	-	φ13~φ15.5	0.04~0.08	0.04~0.08	0.03~0.06	—
							φ16~φ26.5	0.06~0.10	0.06~0.10	0.04~0.08	—
							φ27~φ50	0.06~0.10	0.06~0.12	0.04~0.10	0.04~0.07
							φ50~	0.06~0.12	0.06~0.12	0.04~0.10	—
Gray Cast Iron	-	-	★ 100~150	-	-	☆ 100~120	φ13~φ15.5	0.08~0.12	0.08~0.10	0.06~0.08	—
							φ16~φ26.5	0.10~0.18	0.10~0.15	0.08~0.12	—
							φ27~φ50	0.10~0.20	0.10~0.18	0.08~0.15	0.06~0.10
							φ50~	0.10~0.20	0.10~0.18	0.08~0.15	—
Nodular Cast Iron	-	-	★ 80~120	-	-	☆ 80~100	φ13~φ15.5	0.08~0.12	0.08~0.10	0.06~0.08	—
							φ16~φ26.5	0.10~0.18	0.10~0.15	0.08~0.12	—
							φ27~φ50	0.10~0.20	0.10~0.18	0.08~0.15	0.06~0.10
							φ50~	0.10~0.20	0.10~0.18	0.08~0.15	—
Non-ferrous Metals	-	-	-	-	-	★ 200~600	φ13~φ15.5	0.06~0.12	0.06~0.10	0.04~0.08	—
							φ16~φ26.5	0.08~0.18	0.08~0.15	0.06~0.15	—
							φ27~φ50	0.08~0.20	0.08~0.18	0.06~0.15	0.05~0.10
							φ50~	0.08~0.20	0.08~0.18	0.06~0.15	—
Titanium Alloys	-	-	-	-	-	★ 40~70	φ13~φ15.5	0.05~0.06	0.05~0.06	0.05~0.06	—
							φ16~φ26.5	0.05~0.07	0.05~0.07	0.05~0.07	—
							φ27~φ50	0.06~0.08	0.06~0.08	0.06~0.08	0.04~0.05
							φ50~	0.06~0.08	0.06~0.08	0.06~0.08	—

· Apply a sufficient amount of coolant.

★:1st Recommendation ☆:2nd Recommendation

Cutting Conditions by Application

[Workpiece Material: S50C]

Applications		Plain Surface	Slant Surface	Half Cylindrical	Hole Expansion	Concave Surface	Cored Hole	Stacked Plates
Shape of Workpiece								
DRZ	Vc (m/min)	120	120	120	120	120	120	Not Available
	f (mm/rev)	0.1	0.05	0.05	0.05	Concave Surface 0.05 Continuous Part 0.1	*0.05	Not Available
Coolant (Internal)		Yes	Yes	Yes	Yes	Yes	Yes	Not Available

* Cutting width (Torus-shaped part) when drilling cored hole. (Same as when using a Boring Bar).

Drill type	2D~3D type	4D~5D type
Cutting width (Torus-shaped part)	0.1xDc or less	Not recommended

e.g.) In case of drilling using DRZ3090-10 (3xD type)

(1) For milling, pre-drilled hole should be cut bigger than $\phi 24$ ($\phi 30 \sim 0.1 \times 30 \times 2$)

(2) For turning, ap should be set under ap = 3mm (0.1x30)

Max. Depth for Drilling with External Coolant

In case of using external coolant system, chip evacuation will be bad.

Therefore ap should be measured within 1.5 times (1.5xDc) of drill diameter (ϕD_c).



Trouble shooting

Trouble shooting (DRS / DRX / DRZ)

Trouble condition	Condition	Cause	Countermeasures
Hole diameter is small (at hole bottom)	A (Inlet side) B (Bottom side) $A > B$ There is no problem for inlet, however gradually hole diameter is getting smaller at the bottom.	Chip jam (External or Internal edge chip stuck)	Change the cutting conditions · Increase the cutting speed · Lower the feed rate ⚙ Ref. to page, K48, K54 or K65 for "Recommended Cutting Conditions".
Hole diameter becomes larger (at hole bottom)	A (Inlet side) B' (Bottom side) $A < B'$ There is no problem for inlet, however gradually hole diameter is getting larger at the bottom.	Internal edge chip jam.	Change the cutting conditions · Increase the cutting speed · Lower the feed rate ⚙ Ref. to page, K48, K54 or K65 for "Recommended Cutting Conditions". · Check the core height ⚙ Ref. to page K50-K51
Hole diameter is small (from the hole inlet)		Inappropriate adjustment of hole diameter.	In case of using lathe machine, use X-axis and adjustment hole diameter. ⚙ Ref. to page K50
		No core at internal edge. (No core remains)	Adjust the center height. ⚙ Ref. to page K50-K51

K



Drilling

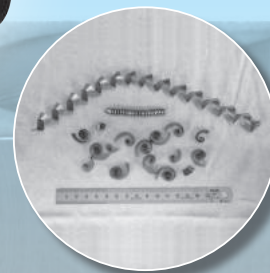
Indication of tool life of MagicDrill (DRS / DRX / DRZ)

How to judge tool life	Indication of judging tool life
Judgement of tool condition and insert wear	• When an insert is new, The toolholder is slightly bent to the side during drilling. (therefore, the drill diameter is slightly bigger during drilling.) Once drilling is finished, the toolholder will return back to normal size. No tool marks will appear on the finished surface. (although this depends on workpiece and cutting condition: during external drilling slight tool mark might appear.) • When an insert is at the end of its tool life, Gradually the external corner part gets worn out, the toolholder dose not bend slightly outwards, it starts to bend inwards. After the drilling is finished, the toolholder returns to the normal position. When taking off a toolholder under this condition the cutting edge of the insert creates external tool marks on the finished surface of the workpiece.
Checking hole diameter	When hole diameter is measured, suddenly it shows small diameter. In this case, a worn out insert can be the cause.
Checking the surface on the outlet side	If insert wear progresses, the burrs of penetrated hole entrance becomes bigger. This is a clear indication that the tool must be exchanged.
Variation of drilling noise	DRX / DRZ → Light drilling noise at the beginning turns to brady noise which contains vibration noise. DRS → Light drilling noise at the beginning turns to whirl noise. Although, it is difficult to recognize DRX / DRZ type's smaller drill diameter or DRS type's variation of drilling noise because of main motor noise or projection of coolant.
Variation of vibration	As the end of tool life is getting closer, there is more vibration and the drilling noise changes. However, when drilling smaller diameters these factors are difficult to detect.

Large Diameter MagicDrill DRW

Features

- Sharp cutting
- Enhanced chip evacuation
- Superior fracture resistance and long tool life with MEGACOAT NANO PR1535 grade



K

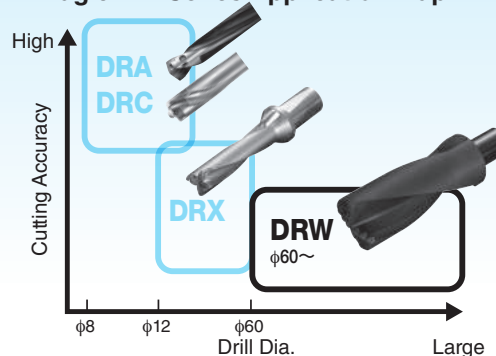


Drilling

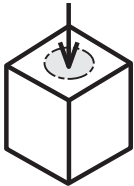
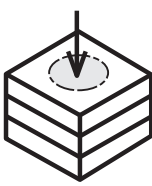
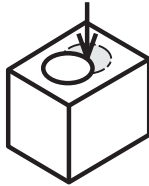


Applicable diameter: $\phi 60$ to $\phi 100$ (Max. $\phi 200$ is possible)
Drilling Depth: 1D, 2D, 3D (Max. 5D is possible)
 Use single type of insert.

● MagicDrill Series Application Map



■ Applicable workpiece

Plain Surface	Stacked Plates	Hole Expansion	Slant Surface
			

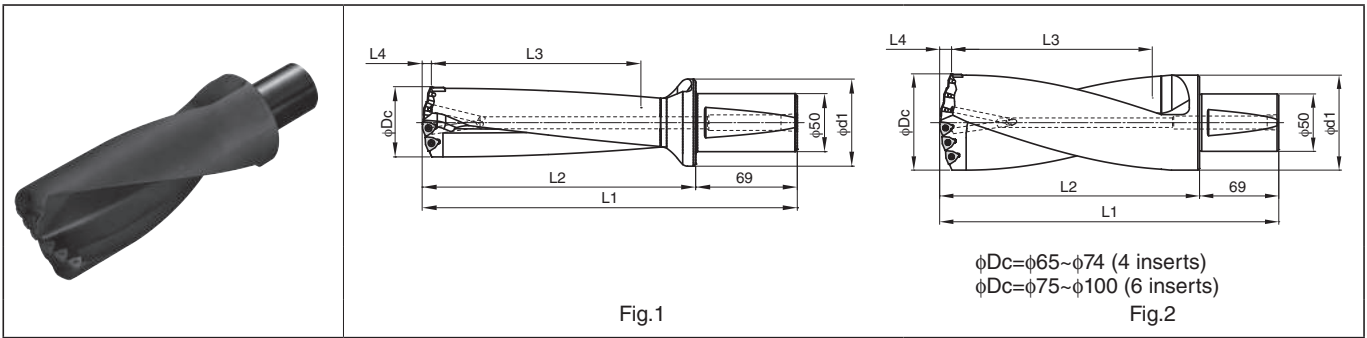
* Hole expansion: Overlap amount of through hole must be $1/5D$ ($0.2 \times \phi Dc$) or less.

Expansion of blind holes is not possible because chips are built up in the next hole and will cause chip biting.

● Toolholder Identification System

S50	-	DRW	-	0600M	-	1	-	06
Straight Shank $\phi 50$		Type		Drill Dia.(mm) 0600M : $\phi 60$		Drilling Depth 1 : 1xD		Insert Size

DRW



● Toolholder Dimensions (Drilling Depth: 1xD)

1D

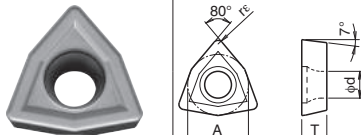
Description	Std.	No. of Inserts	Dimension (mm)						Drawing
			φDc	L1	L2	L3	L4	φd1	
S50- DRW0600M-1-06	MTO	4	60	175	106	60	7.6	63	Fig.1
DRW0610M-1-06	MTO		61	176	107	61	7.7	63	
DRW0620M-1-06	MTO		62	178	109	62	7.8	63	
DRW0630M-1-06	MTO		63	179	110	63	7.9	63	
DRW0640M-1-06	MTO		64	182	113	64	8.0	63	Fig.2
DRW0650M-1-06	MTO		65	184	115	65	8.2	63	
DRW0660M-1-06	MTO		66	185	116	66	8.3	64	
DRW0670M-1-06	MTO		67	187	118	67	8.4	65	
DRW0680M-1-06	MTO		68	189	120	68	8.5	66	
DRW0690M-1-06	MTO		69	190	121	69	8.6	67	
DRW0700M-1-06	MTO		70	192	123	70	8.7	68	
DRW0710M-1-06	MTO		71	193	124	71	8.8	69	
DRW0720M-1-06	MTO		72	195	126	72	9.0	70	
DRW0730M-1-06	MTO		73	198	129	73	9.1	71	
DRW0740M-1-06	MTO		74	199	130	74	9.2	72	
S50- DRW0750M-1-06	MTO	6	75	201	132	75	9.3	73	Fig.2
DRW0760M-1-06	MTO		76	203	134	76	9.4	74	
DRW0770M-1-06	MTO		77	204	135	77	9.5	75	
DRW0780M-1-06	MTO		78	206	137	78	9.7	76	
DRW0790M-1-06	MTO		79	207	138	79	9.8	77	
DRW0800M-1-06	MTO		80	207	138	80	9.9	78	
DRW0810M-1-06	MTO		81	208	139	81	9.9	79	
DRW0820M-1-06	MTO		82	210	141	82	9.9	80	
DRW0830M-1-06	MTO		83	210	141	83	9.9	81	
DRW0840M-1-06	MTO		84	210	141	84	9.9	82	
DRW0850M-1-06	MTO		85	211	142	85	10.5	83	
DRW0860M-1-06	MTO		86	213	144	86	10.5	84	
DRW0870M-1-06	MTO		87	215	146	87	10.5	85	
DRW0880M-1-06	MTO		88	216	147	88	10.5	86	
DRW0890M-1-06	MTO		89	218	149	89	10.5	87	
DRW0900M-1-06	MTO		90	219	150	90	11.0	88	
DRW0910M-1-06	MTO		91	220	151	91	11.0	89	
DRW0920M-1-06	MTO		92	222	153	92	11.0	90	
DRW0930M-1-06	MTO		93	223	154	93	11.0	91	
DRW0940M-1-06	MTO		94	225	156	94	11.0	92	
DRW0950M-1-06	MTO		95	226	157	95	11.6	93	
DRW0960M-1-06	MTO		96	228	159	96	11.6	94	
DRW0970M-1-06	MTO		97	228	159	97	11.6	95	
DRW0980M-1-06	MTO		98	230	161	98	11.6	96	
DRW0990M-1-06	MTO		99	231	162	99	11.6	97	
DRW1000M-1-06	MTO		100	232	163	100	12.2	98	

● Toolholder Dimensions (Drilling Depth: 2xD)

2D

Description	Std.	No. of Inserts	Dimension (mm)						Drawing
			φDc	L1	L2	L3	L4	φd1	
S50- DRW0600M-2-06	●	4	60	235	166	120	7.6	63	Fig.1
DRW0610M-2-06	MTO		61	237	168	122	7.7	63	
DRW0620M-2-06	MTO		62	240	171	124	7.8	63	
DRW0630M-2-06	MTO		63	242	173	126	7.9	63	
DRW0640M-2-06	MTO		64	246	177	128	8.0	63	Fig.2
DRW0650M-2-06	●		65	249	180	130	8.2	63	
DRW0660M-2-06	MTO		66	251	182	132	8.3	64	
DRW0670M-2-06	MTO		67	254	185	134	8.4	65	
DRW0680M-2-06	MTO		68	257	188	136	8.5	66	
DRW0690M-2-06	MTO		69	259	190	138	8.6	67	
DRW0700M-2-06	●		70	262	193	140	8.7	68	
DRW0710M-2-06	MTO		71	264	195	142	8.8	69	
DRW0720M-2-06	MTO		72	267	198	144	9.0	70	
DRW0730M-2-06	MTO		73	271	202	146	9.1	71	
DRW0740M-2-06	●		74	273	204	148	9.2	72	
S50- DRW0750M-2-06	●	6	75	276	207	150	9.3	73	Fig.2
DRW0760M-2-06	MTO		76	279	210	152	9.4	74	
DRW0770M-2-06	MTO		77	281	212	154	9.5	75	
DRW0780M-2-06	MTO		78	284	215	156	9.7	76	
DRW0790M-2-06	MTO		79	286	217	158	9.8	77	
DRW0800M-2-06	●		80	287	218	160	9.9	78	
DRW0810M-2-06	MTO		81	289	220	162	9.9	79	
DRW0820M-2-06	MTO		82	292	223	164	9.9	80	
DRW0830M-2-06	MTO		83	293	224	166	9.9	81	
DRW0840M-2-06	MTO		84	294	225	168	9.9	82	
DRW0850M-2-06	●		85	296	227	170	10.5	83	
DRW0860M-2-06	MTO		86	299	230	172	10.5	84	
DRW0870M-2-06	MTO		87	302	233	174	10.5	85	
DRW0880M-2-06	MTO		88	304	235	176	10.5	86	
DRW0890M-2-06	MTO		89	307	238	178	10.5	87	
DRW0900M-2-06	●		90	309	240	180	11.0	88	
DRW0910M-2-06	MTO		91	311	242	182	11.0	89	
DRW0920M-2-06	MTO		92	314	245	184	11.0	90	
DRW0930M-2-06	MTO		93	316	247	186	11.0	91	
DRW0940M-2-06	●		94	319	250	188	11.0	92	
DRW0950M-2-06	●		95	321	252	190	11.6	93	
DRW0960M-2-06	MTO		96	324	255	192	11.6	94	
DRW0970M-2-06	MTO		97	325	256	194	11.6	95	
DRW0980M-2-06	MTO		98	328	259	196	11.6	96	
DRW0990M-2-06	MTO		99	330	261	198	11.6	97	
DRW1000M-2-06	●		100	332	263	200	12.2	98	

■ Applicable Inserts

Insert	Description	Dimension (mm)				Angle α	MEGACOAT PR1230	MEGACOAT NANO PR1535	CVD Coated Carbide CA6535	Applicable Toolholders
		A	T	ϕd	r ϵ					
	WCMT06T308	9.525	3.97	3.7	0.8	7°	●	●	●	S50-DRW...-06
	WCMT050308	7.94	3.18	3.2			●			(Custom-order toolholder)

* WCMT050308 is for custom-order ($\phi 22$ or larger).

● Toolholder Dimensions (Drilling Depth:3×D)

3D

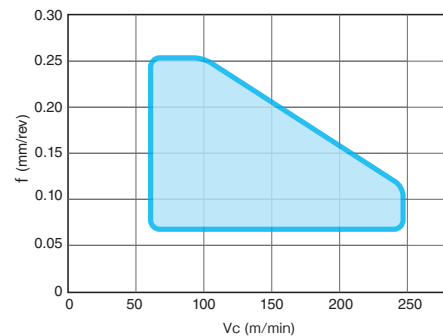
Description	Std.	No. of Inserts	Dimension (mm)						Drawing
			ϕDc	L1	L2	L3	L4	$\phi d1$	
S50- DRW0600M-3-06	●	4	60	295	226	180	7.6	63	Fig.1
DRW0610M-3-06	MTO		61	298	229	183	7.7	63	
DRW0620M-3-06	MTO		62	302	233	186	7.8	63	
DRW0630M-3-06	MTO		63	305	236	189	7.9	63	
DRW0640M-3-06	MTO		64	310	241	192	8.0	63	
DRW0650M-3-06	●		65	314	245	195	8.2	63	
DRW0660M-3-06	MTO		66	317	248	198	8.3	64	Fig.2
DRW0670M-3-06	MTO		67	321	252	201	8.4	65	
DRW0680M-3-06	MTO		68	325	256	204	8.5	66	
DRW0690M-3-06	MTO		69	328	259	207	8.6	67	
DRW0700M-3-06	●		70	332	263	210	8.7	68	
DRW0710M-3-06	MTO		71	335	266	213	8.9	69	
DRW0720M-3-06	MTO	6	72	339	270	216	9.0	70	Fig.2
DRW0730M-3-06	MTO		73	344	275	219	9.1	71	
DRW0740M-3-06	●		74	347	278	222	9.2	72	
S50- DRW0750M-3-06	●		75	351	282	225	9.3	73	
DRW0760M-3-06	MTO		76	355	286	228	9.4	74	
DRW0770M-3-06	MTO		77	358	289	231	9.5	75	
DRW0780M-3-06	MTO		78	362	293	234	9.7	76	
DRW0790M-3-06	MTO		79	365	296	237	9.8	77	
DRW0800M-3-06	●		80	367	298	240	9.9	78	
DRW0810M-3-06	MTO		81	370	301	243	9.9	79	
DRW0820M-3-06	MTO		82	374	305	246	9.9	80	
DRW0830M-3-06	MTO		83	376	307	249	9.9	81	
DRW0840M-3-06	MTO		84	378	309	252	9.9	82	
DRW0850M-3-06	●		85	381	312	255	10.5	83	
DRW0860M-3-06	MTO		86	385	316	258	10.5	84	
DRW0870M-3-06	MTO		87	389	320	261	10.5	85	
DRW0880M-3-06	MTO		88	392	323	264	10.5	86	
DRW0890M-3-06	MTO		89	396	327	267	10.5	87	
DRW0900M-3-06	●		90	399	330	270	11.0	88	
DRW0910M-3-06	MTO		91	402	333	273	11.0	89	
DRW0920M-3-06	MTO		92	406	337	276	11.0	90	
DRW0930M-3-06	MTO		93	409	340	279	11.0	91	
DRW0940M-3-06	●		94	413	344	282	11.0	92	
DRW0950M-3-06	●		95	416	347	285	11.6	93	
DRW0960M-3-06	MTO		96	420	351	288	11.6	94	
DRW0970M-3-06	MTO		97	422	353	291	11.6	95	
DRW0980M-3-06	MTO		98	426	357	294	11.6	96	
DRW0990M-3-06	MTO		99	429	360	297	11.6	97	
DRW1000M-3-06	●		100	432	363	300	12.2	98	

◆ Recommended Cutting Conditions

Workpiece Material	Vc (m/min)	f (mm/rev)
Carbon Steel	80~200	0.07~0.25
Alloy Steel	80~160	0.07~0.25
Mold Steel	70~150	0.06~0.20
Gray Cast Iron	100~240	0.07~0.30
Nodular Cast Iron	80~150	0.07~0.25

- Apply enough amount of coolant (internal supply).
- Feed rate should be calculated as single insert.

■ Application Map (Carbon Steel / Alloy Steel)



● Spare Parts

Description	Clamp Screw	Wrench
		
S50-DRW...-06	SB-3592TR	DT-10

● Hole Dia. Tolerance

Dc	Hole Dia. Tolerance (mm)
$\phi 60 \sim \phi 100$	0~+0.4

* Above is numeric guideline.

It may vary depending on machines / workpieces / clamping status / cutting conditions.

● Offset Drilling

Offset for DRW type should be 0 to +0.15 mm in radius (0 to +0.3 mm in diameter).

Do not set it to a negative value to make the diameter smaller.

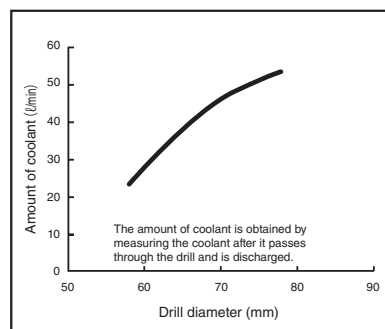
Q-1

Is it possible to use external coolant?

A-1

External coolant is not recommended because the amount of chips will be enormous. Use internal coolant.
Ref. to the graph of "Drill diameter and coolant amount"

◆ Drill diameter and coolant amount



Q-2

What level of spindle output is required?

A-2

Higher output is preferable.
What is important is enough torque rather than high spindle rate.
Ref. to the examples of required power as below.

Drill Dia.	Workpiece Material	Machine	Cutting Conditions	Spindle Power	*Required Power
φ75 (2D)	SCM415	M/C	Vc=130m/min (n=550min ⁻¹) f=0.12mm/rev (Vf=66mm/min)	22kW	60%
φ85 (2D)	SCM	M/C	Vc=150m/min (n=560min ⁻¹) f=0.1mm/rev (Vf=56mm/min)	30kW	85%
φ94 (2D)	S45C	NC Lathe	Vc=120m/min (n=410min ⁻¹) f=0.1mm/rev (Vf=41mm/min)	20kW	100%
φ94 (2D)	SUS304	NC Lathe	Vc=80m/min (n=270min ⁻¹) f=0.2mm/rev (Vf=54mm/min)	20kW	40%

* The required power was read on the load meter.

Q-3

The workpiece material is elastic and the chips are stretched and tangled. Is there any countermeasure?

A-3

When chips of elastic material are stretched and tangled, try "low rate + large feed", "high rate + small feed" or other settings. Chips are usually stretched well between the inlet and 10mm inside, and not any more stretched further inside. Therefore changing the condition of entrance only will also be effective.

- [Low cutting speed + Large feed]
This setting makes the chips thicker so that they easily break off.
E.g. Vc=80 m/min, f=0.2 to 0.25 mm/rev
- [High cutting speed + Small feed]
This setting makes the chips thinner and uses centrifugal force to cut them off.
E.g. Vc=200m/min, f=0.07 to 0.09mm/rev
- [Step machining at inlet]
E.g. Inlet to 10 mm deep: 1 mm step drilling
E.g. 10 mm deep or more: Vc=150 m/min, f=0.15 mm/rev (Continuous drilling)

Q-4

Chattering occurs. Is there any countermeasure?

A-4

Chattering usually occurs during chamfering and when the feed rate per revolution is not high enough. Try changing the cutting conditions as follows.

- Increase the feed rate if it is small.
If the feed rate is f=0.06 mm/rev, for example, increase it to f=0.08 to 0.12 mm/rev.
Increasing the feed rate will improve chamfering and thus prevent chattering.
- If the cutting speed is too high, lower it to Vc=100 to 150 m/min.
- If the chamfering point and pass-through point are not plain, or if the workpiece clamping rigidity is low, lower the feed rate to f=0.07 to 0.08 mm/rev.
- If chattering occurs on the full contact surface (e.g. during step drilling), make adjustments by increasing the feed rate during chamfering or lowering the cutting speed.
Once chattering occurs during chamfering, it will continue through drilling.



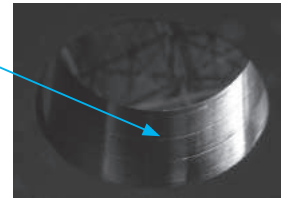
Q-5

Tool markings are made on the finished surface. Is there any countermeasure?

A-5

During processing, force of deflection is applied to the center of the drill.
If the drill is just pulled out from the position where processing is finished, tool markings will be made.
To prevent tool markings, perform offset before pulling out the drill.

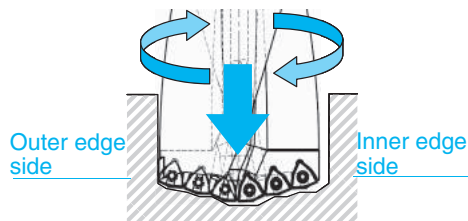
Tool marking



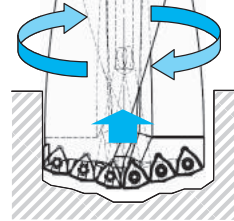
Example of tool marking

· How to prevent tool markings

(1) Drilling the hole. (The spindle revolves.)



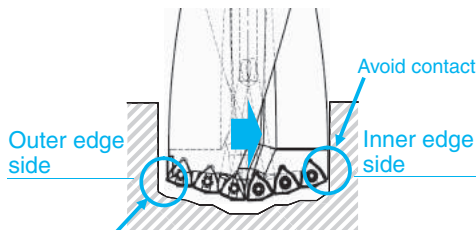
(2) Turn back approximately 0.5 mm. (The spindle revolves.)



Chips are adhering to the bottom when drilling stops.

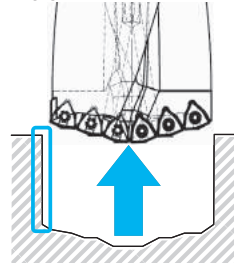
- Without turning back, chips remains adhering to the bottom.
- If offset (3) is performed without turning back, the bottom of drill contacts with the inner surface of hole.
- Turning back is necessary for blind holes but not for through holes.

(3) Stop revolution and perform offset. (The spindle stops.)



Make a clearance to prevent the tool from contacting when pulling out.
(Approximately 0.1 to 0.2 mm)

(4) Pull out the drill



Tool markings are not made (or are only slight even if made).

Example of drilling program

```
G90G54G0G43X0Y0Z100.0H10
S477M03
Z2.5M8
G01Z-80.0F48
Z-79.5M19 ← The spindle stops
X0.2Y0.2 at the specified position
Z100.0M9
```

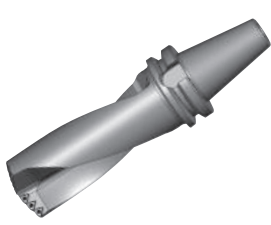
* The M code and X and Y moving directions are unique to the equipment.

K



Drilling

DRW custom-order item Applicable drill dia.: $\phi 22 \sim \phi 200$

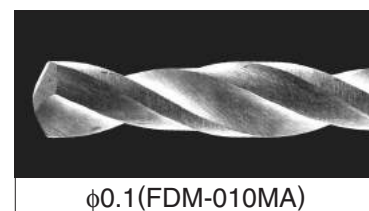
 BT shank integral type is also applicable	<Standard item>  Straight Shank (1D~3D)
Max. $\phi 200$ is applicable	

● Applicable Inserts

Insert	Description	Dimension (mm)				Angle	MEGACOAT	MEGACOAT NANO	CVD Coated Carbide	Applicable Toolholders
		A	T	ϕd	rE		PR1230	PR1535	CA6535	
	WCMT06T308	9.525	3.97	3.7	0.8	7°	●	●	●	S50-DRW...-06
	WCMT050308	7.94	3.18	3.2			●			(Custom-order toolholder)

* WCMT050308 is for custom-order ($\phi 22$ or larger).

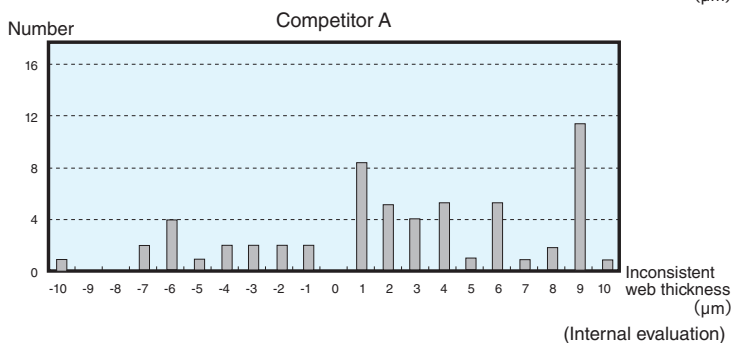
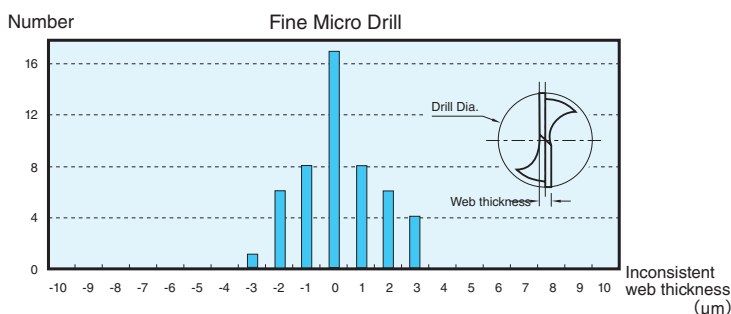
1. High-grade cutting edge is realized by Kyocera prominent minute grind technology
2. Improve stable cutting edge strength and fracture resistance by tough super micro-grain carbide
3. More high efficiency and long tool life drilling is possible due to high performance special thin coating (FS coat)



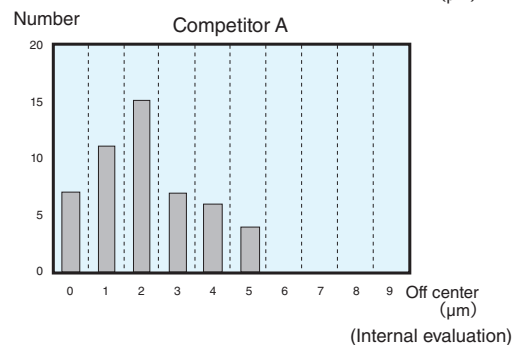
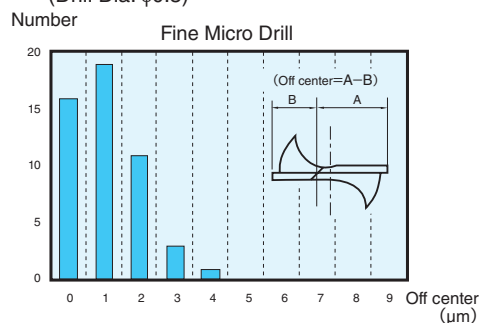
	Cutting edge condition		Burr condition on the exit side		Cutting Conditions Workpiece Material :SUS304 (t=0.5mm) Drill Dia. :φ0.3mm FDM-030 (FSA) Cutting Speed :Vc=10m/min (n=10,600min ⁻¹) Feed :f=0.001mm/rev Coolant :Wet (Water soluble coolant) Drilling Depth :0.5mm (Through hole) Step feeding depth :0.025mm/time Number of holes :200holes (Internal evaluation)
	Fine Micro Drill	Competitor A (Coated)	Fine Micro Drill	Competitor A (Coated)	
After drilling condition					

● Comparison of inconsistent web thickness

(Drill Dia. $\phi 0.3$)



- **Comparison of inconsistent cutting edge center**
(Drill Dia. $\phi 0.3$)



FDM-M (Shank Dia. $\phi 3$, Coated)

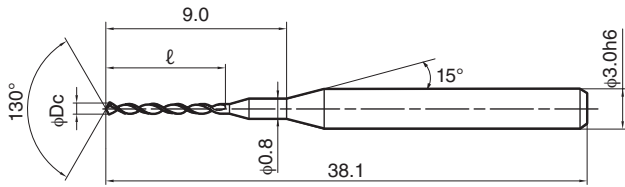


Fig.1

Drill Dia. ϕD_c Tolerance
 $D_c \leq 0.50 (+0, -0.005)$
 $D_c > 0.50 (+0, -0.007)$

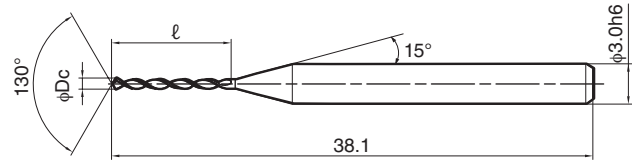


Fig.2

Helix Angle 30°

Description	Dimension (mm)		Drawing	Grades
	Drill Dia.	Flute Length		Coated
				FSA
FDM-010M(1)	0.10	1.3	Fig.1	●
FDM-011M(1)	0.11			●
FDM-012M(1)	0.12	1.5		●
FDM-013M(1)	0.13			●
FDM-014M(1)	0.14	1.7		●
FDM-015M(1)	0.15			●
FDM-016M(1)	0.16	1.9		●
FDM-017M(1)	0.17			●
FDM-018M(1)	0.18	2.2		●
FDM-019M(1)	0.19			●
FDM-020M(1)	0.20	2.4		●
FDM-021M(1)	0.21			●
FDM-022M(1)	0.22	2.7		●
FDM-023M(1)	0.23			●
FDM-024M(1)	0.24	2.9		●
FDM-025M(1)	0.25			●
FDM-026M(1)	0.26	3.1		●
FDM-027M(1)	0.27			●
FDM-028M(1)	0.28	3.3		●
FDM-029M(1)	0.29			●
FDM-030M(1)	0.30	5.0		●
FDM-031M(1)	0.31			●

Description	Dimension (mm)		Drawing	Grades
	Drill Dia.	Flute Length		
	ϕD_c	l		
FDM-032M(1)	0.32	5.0	Fig.1	●
FDM-033M(1)	0.33			●
FDM-034M(1)	0.34			●
FDM-035M(1)	0.35			●
FDM-036M(1)	0.36	6.0		●
FDM-037M(1)	0.37			●
FDM-038M(1)	0.38			●
FDM-039M(1)	0.39	6.0		●
FDM-040M(1)	0.40			●
FDM-041M(1)	0.41	7.0	Fig.2	●
FDM-042M(1)	0.42			●
FDM-043M(1)	0.43			●
FDM-044M(1)	0.44			●
FDM-045M(1)	0.45			●
FDM-046M(1)	0.46			●
FDM-047M(1)	0.47			●
FDM-048M(1)	0.48			●
FDM-049M(1)	0.49			●
FDM-050M(1)	0.50			●
FDM-060M(1)	0.60	8.0		●
FDM-070M(1)	0.70			●
FDM-080M(1)	0.80			●
		10.0		●

Identification System

FDM - ○○○ **M** **(1)** **FSA**

Drill Dia.

M: Shank Dia. 3.0mm

(1): 1 piece boxes

Grades

Fine Micro Drill

FDM-M (Shank Dia. $\phi 3$, Uncoated)

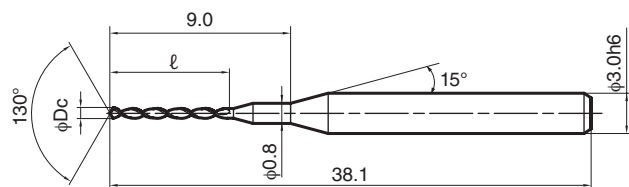


Fig.1

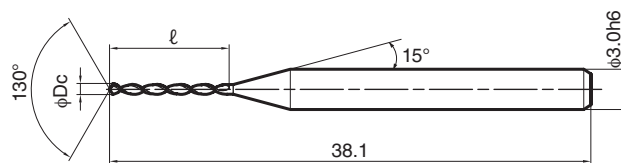


Fig.2

Drill Dia. ϕD_c Tolerance
 $D_c \leq 0.50 (+0, -0.005)$
 $D_c > 0.50 (+0, -0.007)$

Helix Angle 30°

Description	Dimension (mm)		Drawing	Grades
	Drill Dia.	Flute Length		Uncoated
				φDc
FDM-010M(1)	0.10	1.3	Fig.1	●
FDM-011M(1)	0.11			●
FDM-012M(1)	0.12	1.5		●
FDM-013M(1)	0.13			●
FDM-014M(1)	0.14	1.7		●
FDM-015M(1)	0.15			●
FDM-016M(1)	0.16	1.9		●
FDM-017M(1)	0.17			●
FDM-018M(1)	0.18	2.2		●
FDM-019M(1)	0.19			●
FDM-020M(1)	0.20	2.4		●
FDM-021M(1)	0.21			●
FDM-022M(1)	0.22	2.7		●
FDM-023M(1)	0.23			●
FDM-024M(1)	0.24	2.9		●
FDM-025M(1)	0.25			●
FDM-026M(1)	0.26	3.1		●
FDM-027M(1)	0.27			●
FDM-028M(1)	0.28	3.3		●
FDM-029M(1)	0.29			●
FDM-030M(1)	0.30	5.0		●
FDM-031M(1)	0.31			●

Description	Dimension (mm)		Drawing	Grades
	Drill Dia.	Flute Length		Uncoated
				φDc
FDM-032M(1)	0.32	5.0	Fig.1	●
FDM-033M(1)	0.33			●
FDM-034M(1)	0.34			●
FDM-035M(1)	0.35			●
FDM-036M(1)	0.36	6.0		●
FDM-037M(1)	0.37			●
FDM-038M(1)	0.38			●
FDM-039M(1)	0.39	6.0	Fig.2	●
FDM-040M(1)	0.40	7.0		●
FDM-041M(1)	0.41			●
FDM-042M(1)	0.42			●
FDM-043M(1)	0.43			●
FDM-044M(1)	0.44			●
FDM-045M(1)	0.45			●
FDM-046M(1)	0.46			●
FDM-047M(1)	0.47			●
FDM-048M(1)	0.48			●
FDM-049M(1)	0.49			●
FDM-050M(1)	0.50			●
FDM-060M(1)	0.60	8.0		●
FDM-070M(1)	0.70		●	
FDM-080M(1)	0.80	10.0	●	

Identification System

FDM - ○○○ **M (1)** **A**

Drill Dia. M: Shank Dia. 3.0mm (1): 1 piece boxes Grades

● : Std. Item

FDM (Shank Dia. $\phi 3.175$, Coated)

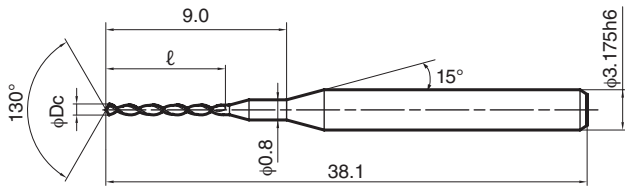


Fig.1

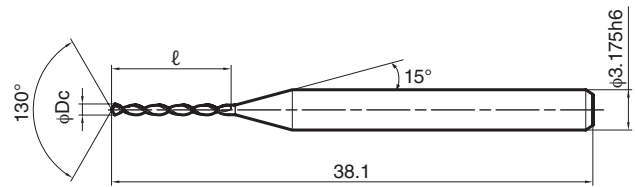


Fig.2

Drill Dia. ϕD_c Tolerance
 $D_c \leq 0.50 (+0, -0.005)$

Helix Angle 30°

Description	Dimension (mm)		Drawing	Grades
	Drill Dia.	Flute Length		Coated
				FSA
FDM-010	0.10	1.3	Fig.1	○
FDM-011	0.11			○
FDM-012	0.12			1.5
FDM-013	0.13	○		
FDM-014	0.14	1.7		
FDM-015	0.15			○
FDM-016	0.16			1.9
FDM-017	0.17	○		
FDM-018	0.18	2.2		
FDM-019	0.19			○
FDM-020	0.20			2.4
FDM-021	0.21	○		
FDM-022	0.22	2.7		
FDM-023	0.23			○
FDM-024	0.24			2.9
FDM-025	0.25	○		
FDM-026	0.26	3.1		
FDM-027	0.27			○
FDM-028	0.28			3.3
FDM-029	0.29	○		
FDM-030	0.30	5.0		
FDM-031	0.31			○

Description	Dimension (mm)		Drawing	Grades
	Drill Dia.	Flute Length		
	ϕD_c	ℓ		
FDM-032	0.32	5.0	Fig.1	○
FDM-033	0.33			○
FDM-034	0.34			○
FDM-035	0.35	6.0	Fig.2	○
FDM-036	0.36			○
FDM-037	0.37			○
FDM-038	0.38	6.0	Fig.2	○
FDM-039	0.39			○
FDM-040	0.40			○
FDM-041	0.41	7.0	Fig.2	○
FDM-042	0.42			○
FDM-043	0.43			○
FDM-044	0.44			○
FDM-045	0.45			○
FDM-046	0.46			○
FDM-047	0.47			○
FDM-048	0.48			○
FDM-049	0.49			○
FDM-050	0.50			○

● Identification System ([10 piece boxes] are stocked)

FDM - ○ ○ ○
 Drill Dia.

FSA
 Grades

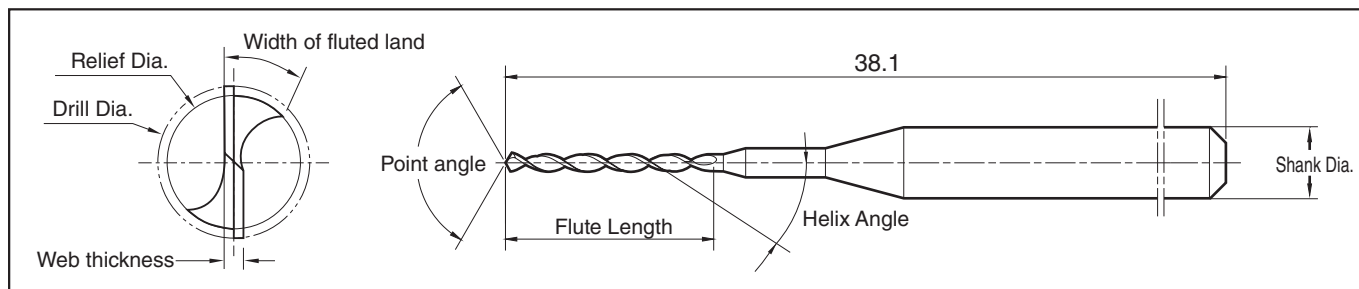
Recommended Cutting Conditions

Custom-order item

Non stock size are also available

- (1) Drill Dia. ($\phi 0.1 \sim 0.8\text{mm}$)
- (2) Drill Dia. tolerance
- (3) Flute Length
- (4) Shank Dia.: $\phi 3.0$ / $\phi 3.175$
- (5) Please inform us about FSA(coated) or A(uncoated) and so on

Small change such as changing only flute length is available in short read time.
Ask us for the change such as point angle, helix angle, and so on.



Recommended Cutting Conditions

	Carbon Steel / Alloy Steel		Stainless Steel		Cast Iron		Aluminum / Copper	
Drill Dia. (mm)	Vc (m/min)	f (mm/rev)	Vc (m/min)	f (mm/rev)	Vc (m/min)	f (mm/rev)	Vc (m/min)	f (mm/rev)
0.10~0.19	2~6	0.0005~0.002	2~6	0.0003~0.001	2~10	0.0005~0.003	4~15	0.0005~0.003
0.20~0.29	4~10	0.001~0.004	4~10	0.0005~0.002	5~15	0.001~0.005	10~20	0.001~0.005
0.30~0.50	6~15	0.002~0.010	6~10	0.001~0.005	10~20	0.004~0.015	15~30	0.004~0.015
0.60~0.80	8~24	0.004~0.015	8~15	0.002~0.007	10~30	0.005~0.020	20~45	0.005~0.020

Caution

- The above is only a guide. It will change by hardness of workpiece and machine condition
- Apply coolant. Water-insoluble cutting oil is recommended
- Use high precision chuck and use as short overhang length as possible
- When drilling depth is more than 3D, utilize the step machining process
- Step depth is 10%~50% of drill diameter. When hole depth is deeper, shorten the step depth.

Case Studies

Free cutting prehardened steel		SK3		SUS316L	
·Plate ·n=16,000min ⁻¹ ·H=1mm (Through hole) ·Vf=22mm/min ·Wet (Oil-base) ·FDM-010M (A) (φ0.10mm)		·Gauge ·n=10,000min ⁻¹ ·H=3.5mm ·Vf=100mm/min ·Wet (Oil-base) ·FDM-036M (FSA) (φ0.36mm)		·Plate ·n=8,000min ⁻¹ ·H=2.7mm ·Vf=45mm/min ·Wet (Oil-base) ·XFDM-040 (FSA) (φ0.40mm)	
Fine Micro Drill	600 holes / pcs	Fine Micro Drill	5,200 holes / pcs	Fine Micro Drill	2,400 holes / pcs
Competitor B (Coated)	200 holes / pcs (Broken)	Competitor C (Coated)	4,000 holes / pcs	Competitor D (Coated High-speed steel)	300 holes / pcs
·Competitor B is broken at 200 holes / pcs ·Regardless of uncoated(A), Fine micro drill achieved 3 times longer tool life compared with Competitor B (Evaluation by the user)		·Fine micro drill achieved 30% longer tool life compared with Competitor C (Evaluation by the user)		·Fine micro drill achieved 8 times longer tool life compared with Competitor D (Evaluation by the user)	

K



Drilling

DRA

DRC

DRX

DRS

DRZ

DRW

Fine Micro