

Drilling

K1~K57

Product Lineup

K2

MagicDrill DRC

K3~K19

SS-DRC	Drilling Depth: 3xD type	Straight Shank	K7
SS-DRC	Drilling Depth: 5xD type	Straight Shank	K8
SS-DRC	Drilling Depth: 8xD type	Straight Shank	K9
Chamfering attachment	For Straight Shank SS-DRC type		K10
SF-DRC	Drilling Depth: 3xD type	Flanged Shank	K12
SF-DRC	Drilling Depth: 5xD type	Flanged Shank	K13
SF-DRC	Drilling Depth: 8xD type	Flanged Shank	K14

MagicDrill DRX

K20~K38

DRX	Drilling Depth: 2xD type	φ12~φ60	K26
DRX	Drilling Depth: 3xD type	φ12~φ60	K28
DRX	Drilling Depth: 4xD type	φ12~φ60	K30
DRX	Drilling Depth: 5xD type	φ12~φ60	K32

MagicDrill DRS & DRZ

K39~K52

DRS (Magic Drill Mini)		φ10~φ12.5	K40
DRZ	Drilling Depth: 2xD type	φ13~φ59	K42
DRZ	Drilling Depth: 3xD type	φ13~φ59	K44
DRZ	Drilling Depth: 4xD type	φ13~φ50	K46
DRZ	Drilling Depth: 5xD type	φ27~φ50	K48
DRZ-CR	Cartridge type	φ60~	K49

MagicDrill DRW

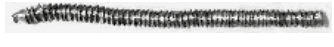
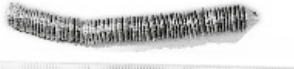
K53~K57

DRW	Drilling Depth: 1xD type	φ60~φ100	K54
DRW	Drilling Depth: 2xD type	φ60~φ100	K54
DRW	Drilling Depth: 3xD type	φ60~φ100	K55

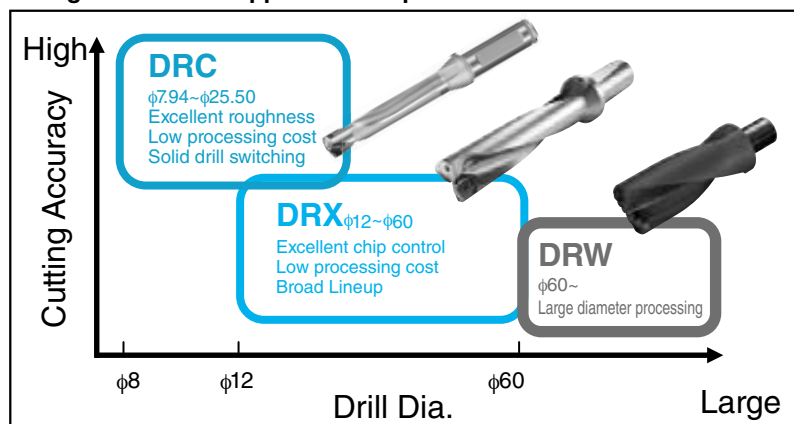
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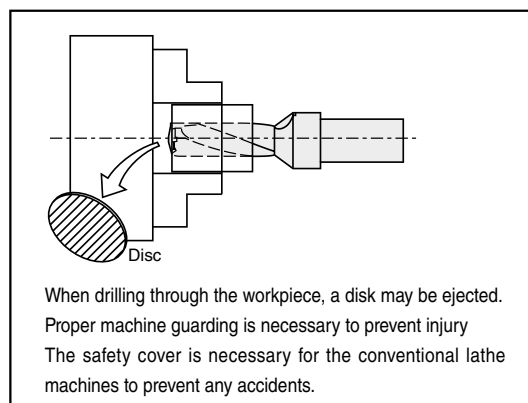
Product Lineup

Type	Shape	Drill Dia. (Drilling Depth)	Cutting Edge	Remarks
DRC K3		$\phi 7.94 \sim \phi 25.50$ (3D/5D/8D)	Module type with double edges 	Line up  SS-DRC  SF-DRC  Chamfering attachment
DRX K20		$\phi 12$ $\phi 12.5$ $\phi 13$ (2D/3D/4D)	Two Cutting Edges per Insert  Outer edge Inner edge ZXMT03	Chip Shape (Work 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 (Work Material: S50C) Drill Dia. $\phi 24$ Chip from outer edge  Chip from inner Edge 
DRS [MagicDrill Mini] K39	 Silver Coating	$\phi 10 \sim \phi 12.5$ (3.5D)	Inner & Outer Edges on One Insert 	Chip Shape (Work Material: S50C) Drill Dia. $\phi 10$ Chip from outer edge  Chip from inner Edge 
DRZ K42	 DRZ	$\phi 13 \sim \phi 59$ (2D, 3D) $\phi 13 \sim \phi 50$ (4D) $\phi 27 \sim \phi 50$ (5D)	Inner & Outer Edges on One Insert 	Chip Shape (Work Material: S50C) Drill Dia. $\phi 23$ Chip from outer edge  Chip from inner Edge 
DRZ-CR [Cartridge type] (Made to order) K49	 DRZ-CR	$\phi 60 \sim$ (2D/3D/4D)		
DRW (Made to order for some products) K53		$\phi 60 \sim$ (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.

MagicDrill Series Application Map



Caution



High efficiency drill module Drill Dia. $\phi 7.94 \sim \phi 25.50$ Drilling Depth 3D · 5D · 8D

Straight Shank
SS-DRC



Flanged Shank
SF-DRC



SS-DRC
+ Chamfering attachment



High efficiency

High Feed Rate

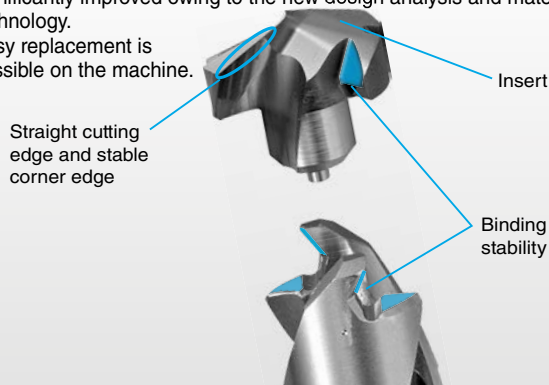
High reliability

High quality

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

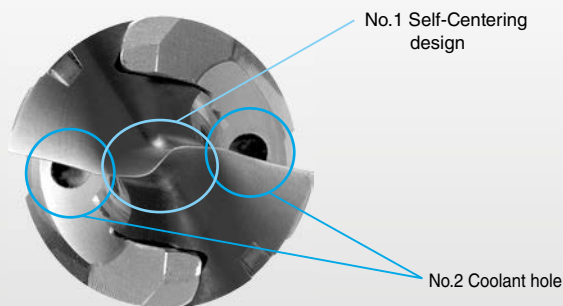
Advantages 1. Self-Clamping design

- The clamp rigidity and resistance of the self-clamping method has significantly improved owing to the new design analysis and material technology.
- Easy replacement is possible on the machine.



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.



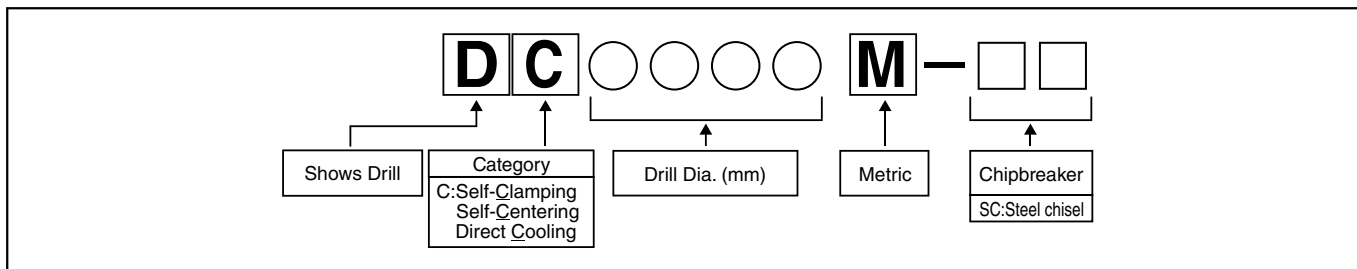
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Drilling

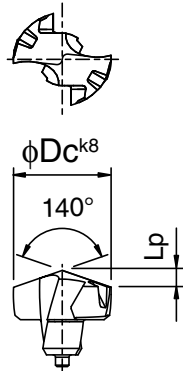
MagicDrill Insert for DRC

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 K7-K9, K12-K14
		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	●	SS10-DRC085M-○ SF12-DRC085M-○
	DC 0850M-SC	8.50	1.55	●	
	0860M-SC	8.60	1.56	●	
	0870M-SC	8.70	1.58	●	
	0880M-SC	8.80	1.60	●	
	0890M-SC	8.90	1.62	●	SS10-DRC090M-○ SF12-DRC090M-○
	DC 0900M-SC	9.00	1.64	●	
	0910M-SC	9.10	1.66	●	
	0920M-SC	9.20	1.67	●	
	0930M-SC	9.30	1.69	●	
	0940M-SC	9.40	1.71	●	SS10-DRC095M-○ SF12-DRC095M-○
	DC 0950M-SC	9.50	1.73	●	
	0960M-SC	9.60	1.75	●	
	0970M-SC	9.70	1.76	●	
	0980M-SC	9.80	1.78	●	
	0990M-SC	9.90	1.80	●	SS12-DRC100M-○ SF16-DRC100M-○
	DC 1000M-SC	10.00	1.82	●	
	1010M-SC	10.10	1.84	●	
	1020M-SC	10.20	1.86	●	
	1030M-SC	10.30	1.87	●	
	1040M-SC	10.40	1.89	●	SS12-DRC105M-○ SF16-DRC105M-○
	DC 1050M-SC	10.50	1.91	●	
	1060M-SC	10.60	1.93	●	
	1070M-SC	10.70	1.95	●	
	1080M-SC	10.80	1.96	●	
	1090M-SC	10.90	1.98	●	SS12-DRC110M-○ SF16-DRC110M-○
	DC 1100M-SC	11.00	2.00	●	
	1110M-SC	11.10	2.02	●	
	1120M-SC	11.20	2.04	●	
	1130M-SC	11.30	2.06	●	
	1140M-SC	11.40	2.07	●	SS12-DRC115M-○ SF16-DRC115M-○
	DC 1150M-SC	11.50	2.09	●	
	1160M-SC	11.60	2.11	●	
	1170M-SC	11.70	2.13	●	
	1180M-SC	11.80	2.15	●	
	1190M-SC	11.90	2.16	●	SS14-DRC120M-○ SF16-DRC120M-○
	DC 1200M-SC	12.00	2.18	●	
	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.

K

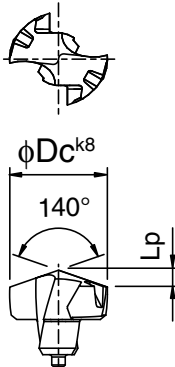
Drilling

K4

DC inserts are sold in 1 piece boxes

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● : Std. Item

Insert		Description	Dimension (mm)		PVD Coated Carbide	Applicable Toolholders K7-K9, K12-K14									
			φDc	Lp	PR0315										
 	k8 tolerance <table border="1"><thead><tr><th>φDc</th><th>k8(mm)</th></tr></thead><tbody><tr><td>7.94 ι 10.00</td><td>+0.022 0</td></tr><tr><td>10.10 ι 18.00</td><td>+0.027 0</td></tr><tr><td>18.10 ι 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 ι 10.00	+0.022 0	10.10 ι 18.00	+0.027 0	18.10 ι 25.50	+0.033 0	DC	1250M-SC	12.50	2.27	●	SS14-DRC125M-○ SF16-DRC125M-○
		φDc	k8(mm)												
		7.94 ι 10.00	+0.022 0												
		10.10 ι 18.00	+0.027 0												
		18.10 ι 25.50	+0.033 0												
		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	●	SS18-DRC160M-○ SF20-DRC160M-○								
		1610M-SC	16.10	2.93	●										
		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	●										
		DC	1690M-SC	16.90	3.07	●	SS18-DRC160M-○ SF20-DRC160M-○								
		1700M-SC	17.00	3.09	●										
		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	●												
DC	1780M-SC	17.80	3.24	●	SS18-DRC170M-○ SF20-DRC170M-○										
1790M-SC	17.90	3.26	●												
1800M-SC	18.00	3.27	●												
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	●												
DC	1870M-SC	18.70	3.40	●	SS20-DRC180M-○ SF25-DRC180M-○										
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

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DC inserts are sold in
1 piece boxes

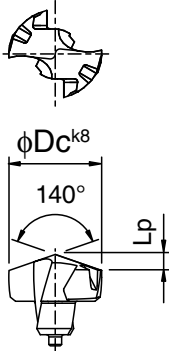
K



Drilling

K5

MagicDrill Insert for DRC

Insert		Description	Dimension (mm)		PVD Coated Carbide	Applicable Toolholders ➡ K7~K9, K12~K14								
			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	●	SS25-DRC220M-○ SF25-DRC220M-○									
	2250M-SC	22.50	4.09	●										
	2300M-SC	23.00	4.18	●	SS25-DRC230M-○ SF25-DRC230M-○									
2350M-SC	23.50	4.27	●											
2400M-SC	24.00	4.37	●	SS25-DRC240M-○ SF25-DRC240M-○										
2450M-SC	24.50	4.46	●											
2500M-SC	25.00	4.55	●	SS32-DRC250M-○ SF25-DRC250M-○										
2550M-SC	25.50	4.64	●											

K



Drilling

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.

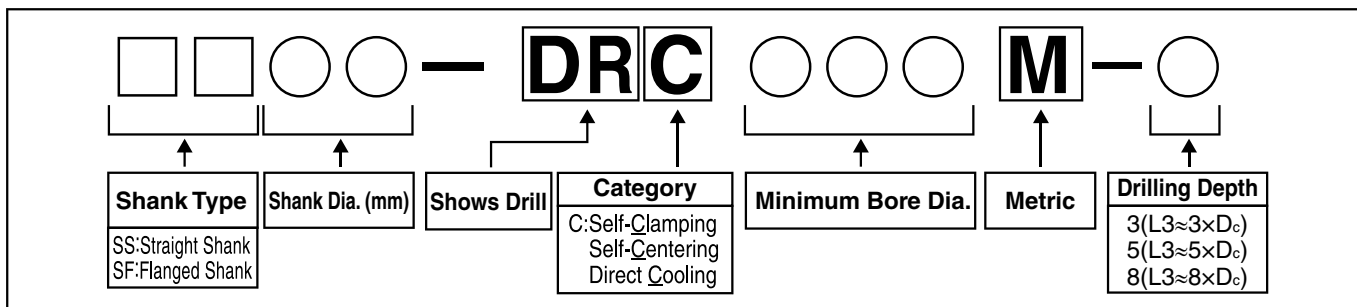
DC inserts are sold in
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● : Std. Item

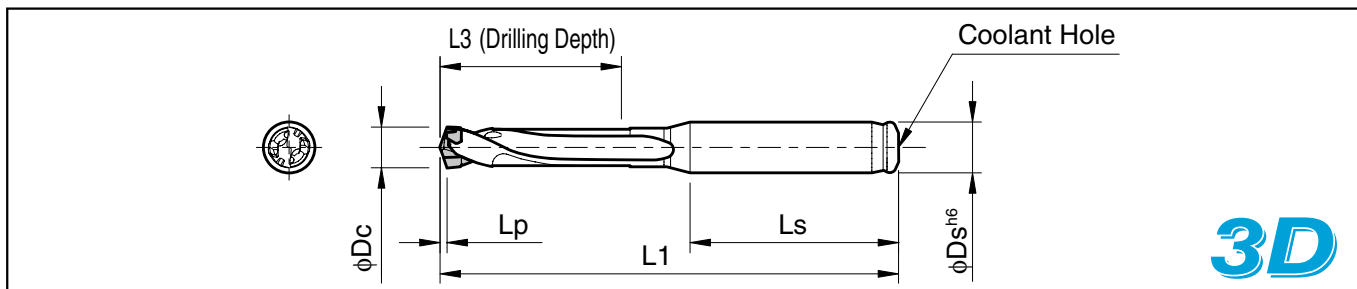
K6

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Description Identification System (Toolholder)



SS-DRC (Drilling Depth: 3×D)



For Lp indicates distance from drill point to corner edge **K4-K6**

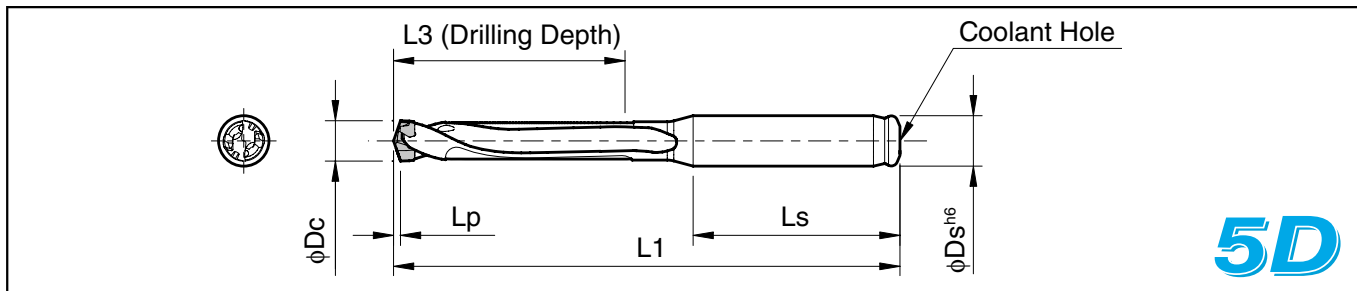
Toolholder Dimensions

Description		Std.	Dimension (mm)						Spare Parts	Applicable Inserts  K4-K6	Applicable chamfering Holder and Insert description	
			Applicable Insert Dia. ϕD_c		ϕD_s (h6)	L1	L3	Ls	Wrench  K15		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		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		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		DC2500M-SC~DC2550M-SC		

● : Std. Item



SS-DRC (Drilling Depth:5xD)



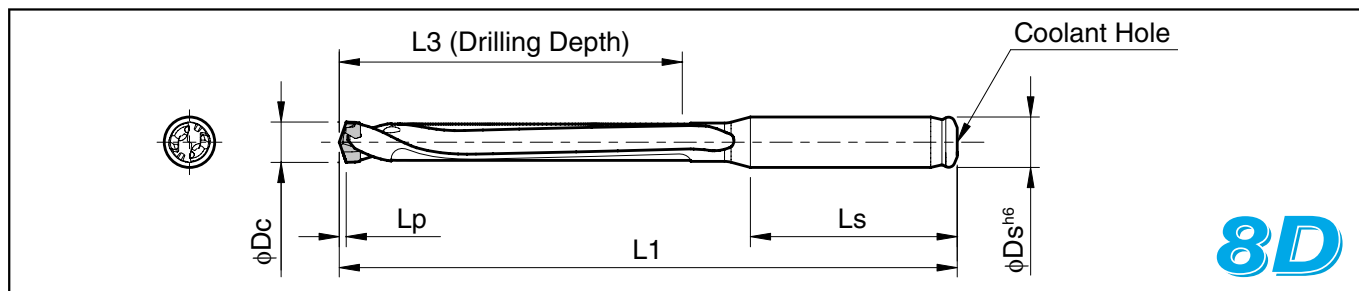
For Lp indicates distance from drill point to corner edge K4-K6

Toolholder Dimensions

Description		Std.	Dimension (mm)					Spare Parts		Applicable Inserts 🌀 K4-K6	Applicable chamfering Holder and Insert description	
			Applicable Insert Dia. φDc		φDs (h6)	L1	L3	Ls	Wrench 🌀 K15		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	
	●	8.50	8.99		100	45.0			DC0850M-SC~DC0890M-SC			
	●	9.00	9.49		103	47.5			DC0900M-SC~DC0940M-SC			
	●	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	CT12T3-45A	
	●	10.50	10.99		118	55.0			DC1050M-SC~DC1090M-SC			
	●	11.00	11.49		121	57.5			DC1100M-SC~DC1140M-SC			
	●	11.50	11.99		124	60.0			DC1150M-SC~DC1190M-SC			
SS14- DRC120M-5	●	12.00	12.49	14	127	62.5	48	WDRC12 (WDRC17)	DC1200M-SC~DC1240M-SC	S32-CH14		
	●	12.50	12.99		130	65.0			DC1250M-SC~DC1290M-SC			
	●	13.00	13.49		133	67.5			DC1300M-SC~DC1340M-SC			
	●	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		
	●	14.50	14.99		146	75.0			DC1450M-SC~DC1490M-SC			
	●	15.00	15.99		152	80.0			DC1500M-SC~DC1580M-SC			
SS18- DRC160M-5	●	16.00	16.99	18	158	85.0	50	WDRC17	DC1600M-SC~DC1690M-SC	S32-CH18		
	●	17.00	17.99		165	90.0			DC1700M-SC~DC1790M-SC			
SS20- DRC180M-5	●	18.00	18.99	20	173	95.0	50	WDRC17	DC1800M-SC~DC1890M-SC	-	-	
	●	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			
	●	21.00	21.99		198	110.0			DC2100M-SC~DC2150M-SC			
	●	22.00	22.99		204	115.0			DC2200M-SC~DC2250M-SC			
	●	23.00	23.99		210	120.0			DC2300M-SC~DC2350M-SC			
	●	24.00	24.99		216	125.0			DC2400M-SC~DC2450M-SC			
SS32- DRC250M-5	●	25.00	25.50	32	227	130.0	60		DC2500M-SC~DC2550M-SC			

● : Std. Item

SS-DRC (Drilling Depth: 8×D)



For Lp indicates distance from drill point to corner edge ➡ K4-K6

Toolholder Dimensions

Description		Std.	Dimension (mm)					Spare Parts		Applicable Inserts 🔩 K4-K6	Applicable chamfering Holder and Insert description	
			Applicable Insert Dia. φDc		φDs (h6)	L1	L3	Ls	Wrench 🔩 K15		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



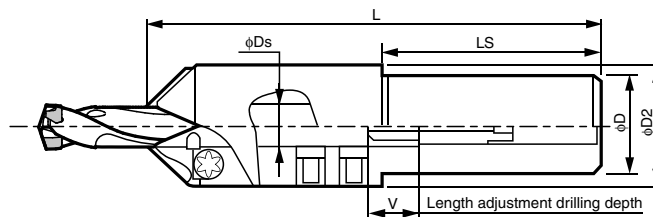
Chamfering attachment

Drilling and chamfering simultaneously

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



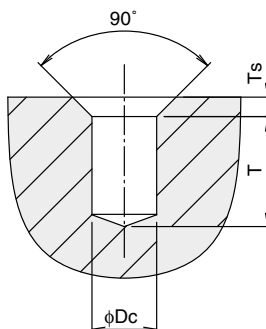
Holder



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



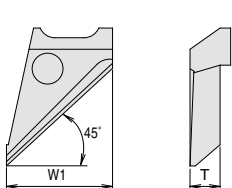
Drill Dia. (mm)		Drilling Depth (mm)						Chamfering dimension (mm)		Applicable Chamfering Holder
φDc		T(3D Drill)		T(5D Drill)		T(8D Drill)		Ts		
min.	max.	min.	max.	min.	max.	min.	max.	Ts 100	Ts max	
φ7.94	φ8.49	11	19	21	37	47	63	2.5	5.0	S20-CH10
φ8.50	φ8.99	12	21	24	40	51	67			
φ9.00	φ9.49	12	23	27	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

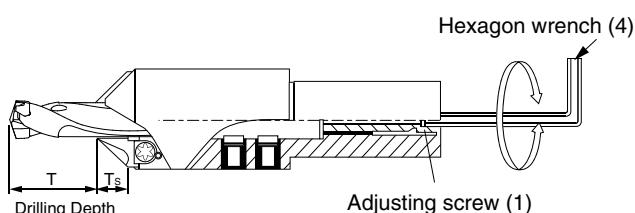


● Applicable Inserts

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

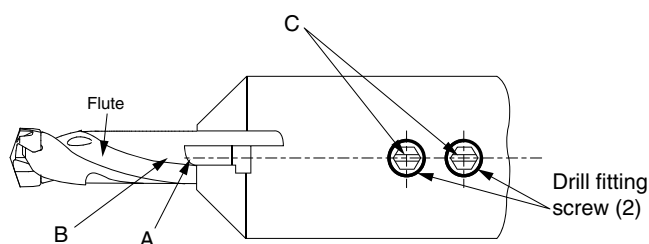
● Method to use DRC chamfering attachment

I. Drilling Depth adjustment



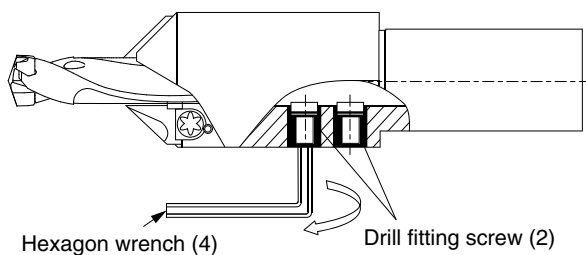
Insert drill into chamfering attachment.
Next, temporarily attach the chamfering insert A.
Turn the adjusting screw (1) with the hexagon wrench (4) to set the drilling depth T.

II. Drill location check



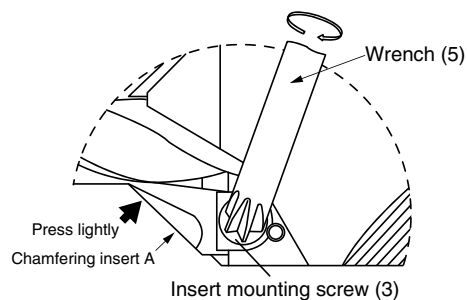
Rotate the drill so that the lower end of the chamfering insert A is aligned with the body clearance B of the drill.
Set it so that slot C and the drill fitting screws (2) are lined up as shown in the figure above.

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×S46	FS-14		LW-5	
S32-CH16	30		FS-16			
S32-CH18	45		FS-18			

Technical drawing of a double-flute drill bit. The drawing includes a side view and a top view. Key dimensions and features are labeled:

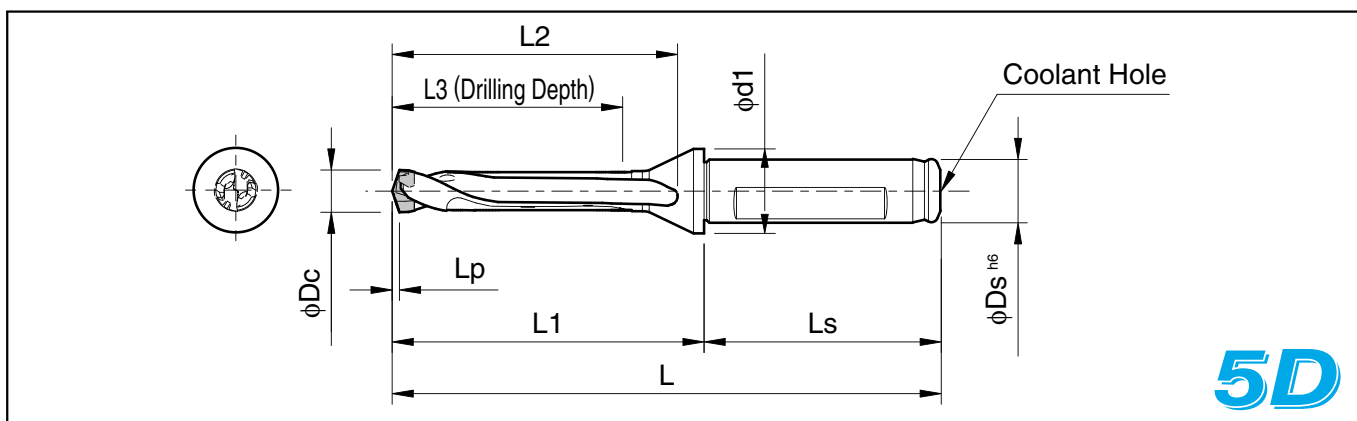
- L3 (Drilling Depth)**: The length of the drill bit.
- L2**: The length of the cutting edge.
- Lp**: The length of the cutting edge.
- L1**: The length of the cutting edge.
- L**: The total length of the drill bit.
- Ls**: The length of the shank.
- $\phi d1$** : The diameter of the cutting edge.
- ϕDc** : The diameter of the cutting edge.
- ϕDs^{h6}** : The diameter of the shank.
- Coolant Hole**: A hole in the shank for coolant.

● Toolholder Dimensions

Description		Std.	Dimension (mm)								Spare Parts		Applicable Inserts 🔧 K4~K6																													
			Applicable Insert Dia. φDc		φDs (h6)	L	L1	L2	L3	Ls	φd1	Wrench 🔧 K15																														
			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	DC1500M-SC~DC1580M-SC
		DRC160M-3	●	16.00																														16.99								DC1600M-SC~DC1690M-SC
DRC170M-3		●	17.00	17.99	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:5xD)



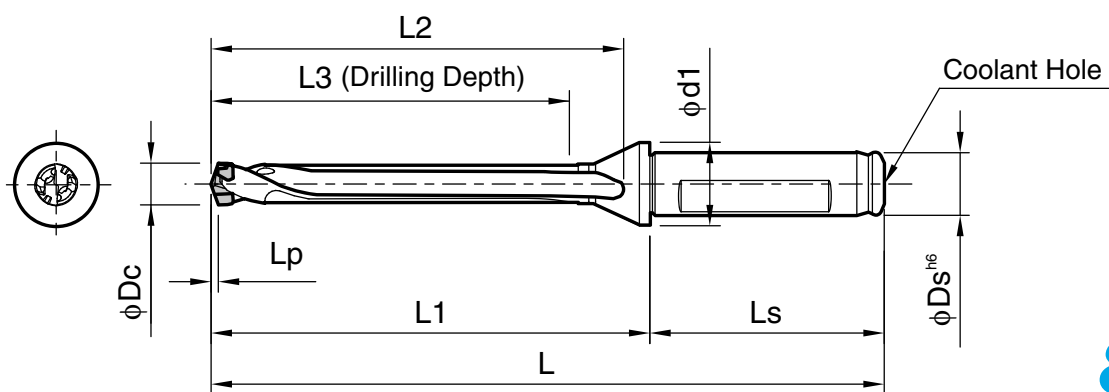
For Lp indicates distance from drill point to corner edge **K4-K6**

Toolholder Dimensions

Description		Std.	Dimension (mm)									Spare Parts		Applicable Inserts 🔩 K4-K6
			Applicable Insert Dia. ϕDc		ϕDs (h6)	L	L1	L2	L3	Ls	ϕd1	Wrench 🔩 K15		
			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	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

- **Toolholder Dimensions**

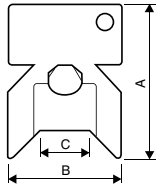
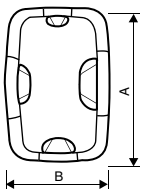


● Toolholder Dimensions

Description		Std.	Dimension (mm)								Spare Parts		Applicable Inserts 🔧 K4~K6	
			Applicable Insert Dia. φDc		φDs (h6)	L	L1	L2	L3	Ls	φd1	Wrench 🔧 K15		
			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) Remove dust using air blow.



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



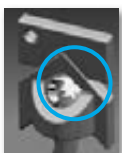
- (4) Turn lightly in a clockwise direction.
(Use gloves to protect your hand from any danger.)



- (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

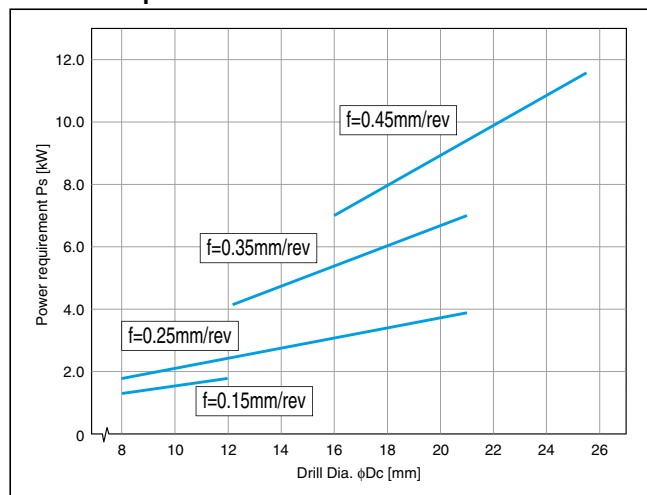
Workpiece Material		Hardness (HB)	Cutting Conditions		Drill Dia. ϕ Dc (mm)								Remarks
			Cutting Speed Vc (m/min)	$n(\text{min}^{-1})$ $f(\text{mm/rev})$	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 18$	$\phi 20$	$\phi 25$	
Low Carbon Steel	SS400 S10C-S25C	125	120 - 180	$n(\text{min}^{-1})$	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 K17)
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	$n(\text{min}^{-1})$	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	
				$f(\text{mm/rev})$	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	

· The longer drilling depth gets (3D → 5D → 8D), the lower of the recommended feed rate should be set for f.

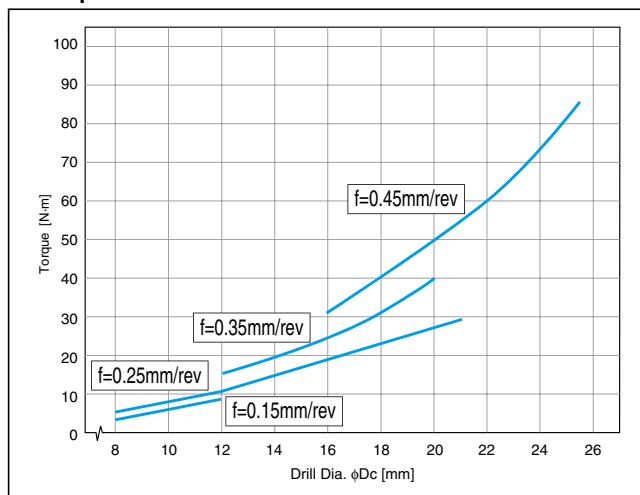
Reference charts

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

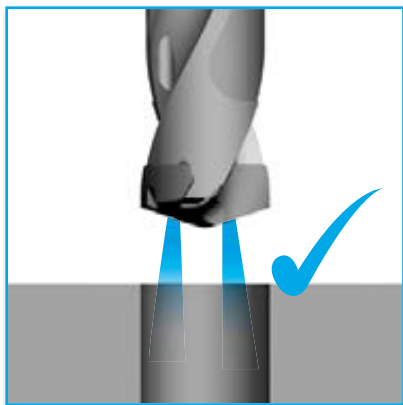
Power requirement



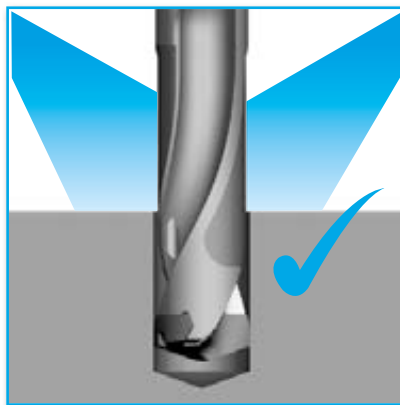
Torque



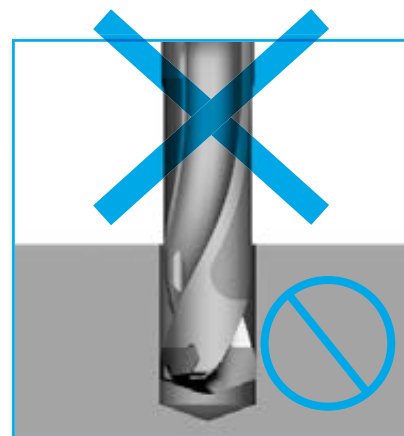
Coolant



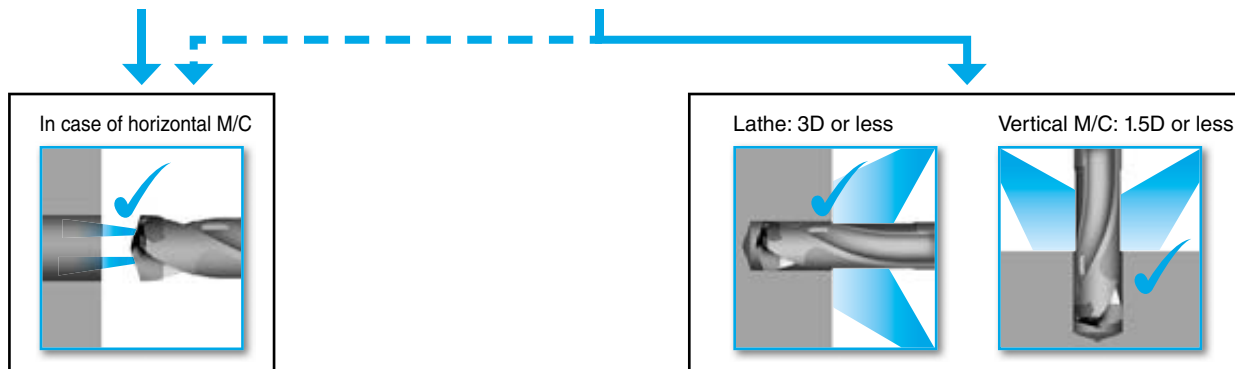
1) Internal coolant is recommended.



2) In case of external coolant.



3) Dry machining is not recommended.

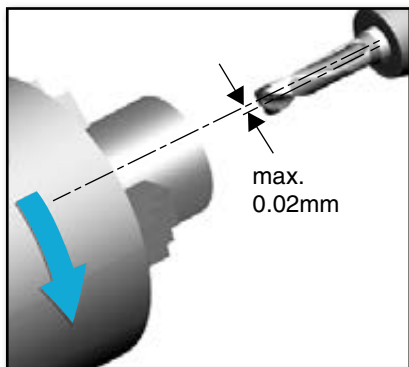


Internal coolant is recommended for horizontal machining center because external coolant may not sufficiently be applied to inside because the tool is revolving.

Precautions for use

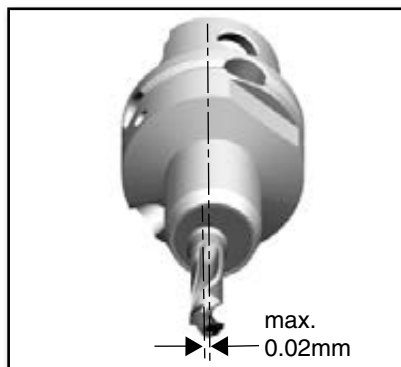
Core Deviation

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

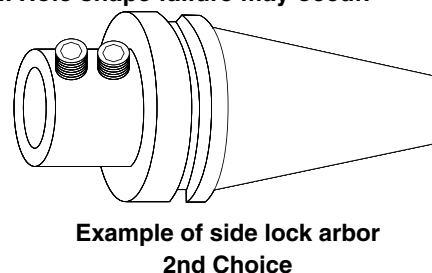
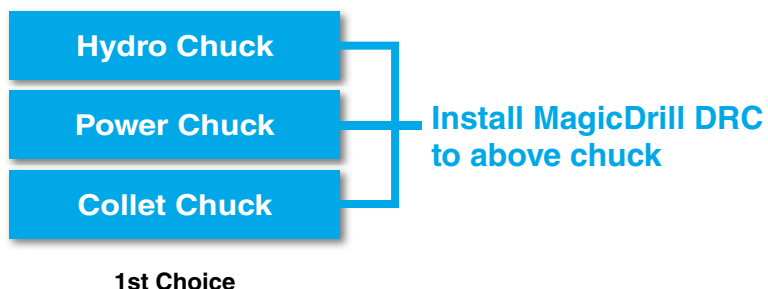


Make sure to use arbor that is not deformed. Center of arbor deviation must be within 0.02mm.

Cautions for installation on Machining Center

For installation of DRC type MagicDrill, use Hydro Chuck, Power Chuck, Collet Chuck, etc.

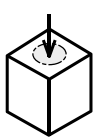
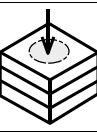
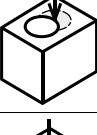
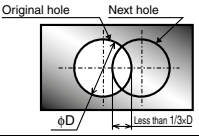
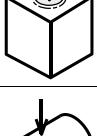
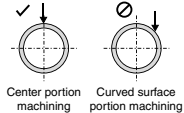
For side lock arbor, tool life is shortened due to drilling center deviation. Hole shape failure may occur.



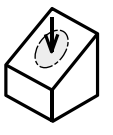
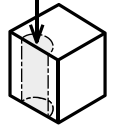
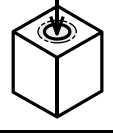
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Applicable workpiece

Applications	Shape of Workpiece	Caution for machining
Plain Surface		1. Due to good chip control, step machining is not necessary for Low Carbon Steel. 2. When machining SUS304, for hole depths of more than 2.5D, utilize the step machining process. 3. In order to have smooth chip removal, we recommend internal coolant.
Stacked Plates		1. Fix stacked plates securely to ensure they do not slip while machining.
Hole Expansion		1. If the overlap amount is less than $1/3 \times D$, machining is possible. 
Concave Surface		1. When machining concave holes set the feed rates at half or less than continuous hole machining.
Pipe Material		1. Hole machining above the centerline of the pipe is possible. 2. Do not machine on curved surface areas. 

Not Recommended workpieces

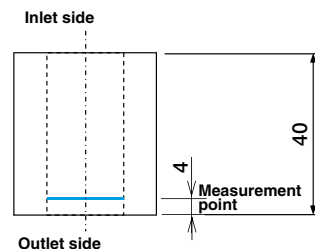
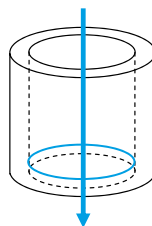
Applications	Shape of Workpiece
Slant Surface	
Half Cylindrical	
Cored Hole	

Comparison of Machining Precision

Cutting Condition and Measurement Point

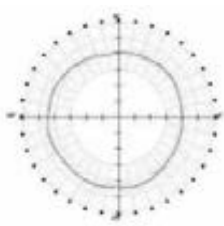
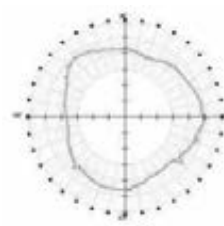
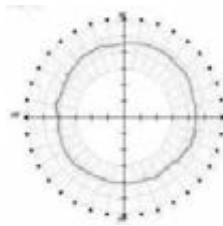
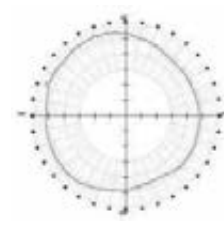
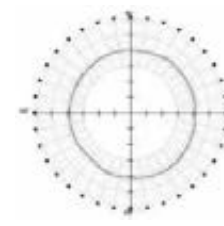
<Cutting Conditions>

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



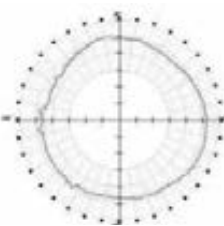
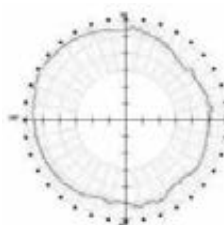
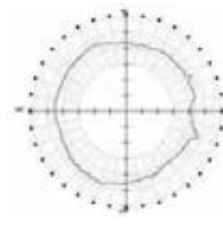
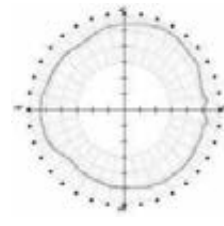
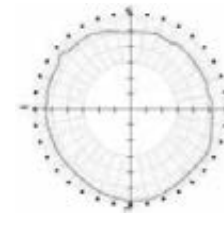
Roundness

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)

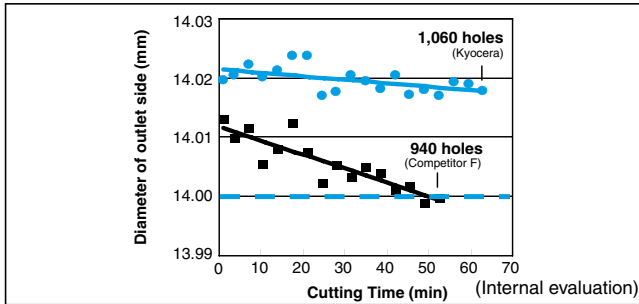
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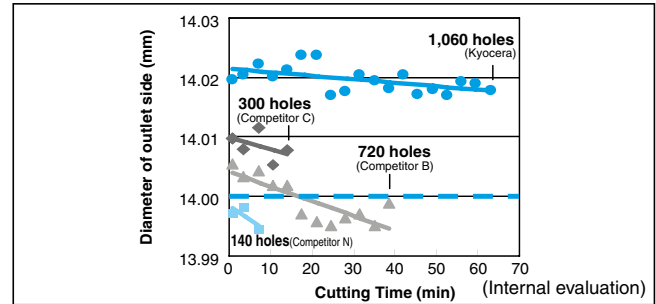
Drilling

● Drill 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 entrance and far (outlet) side possibly due to deflection. Is there any countermeasure?

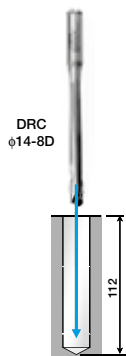
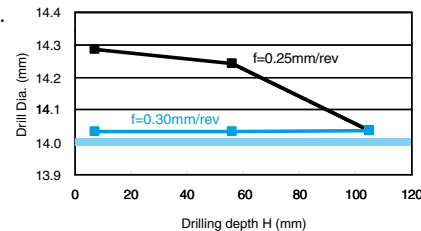
A-3 There are some countermeasures as follows to prevent deflection (to improve bite of drill).

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

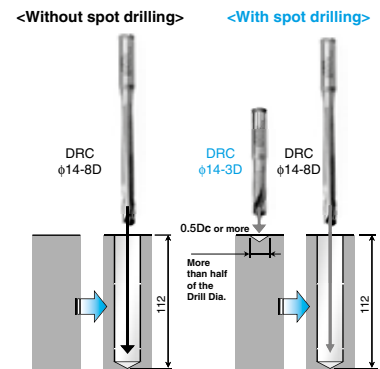
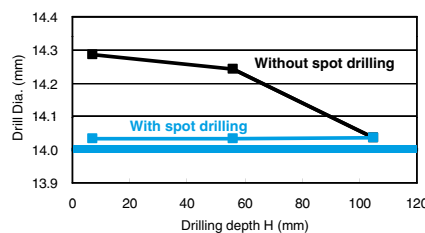
● Make a center spot

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)



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

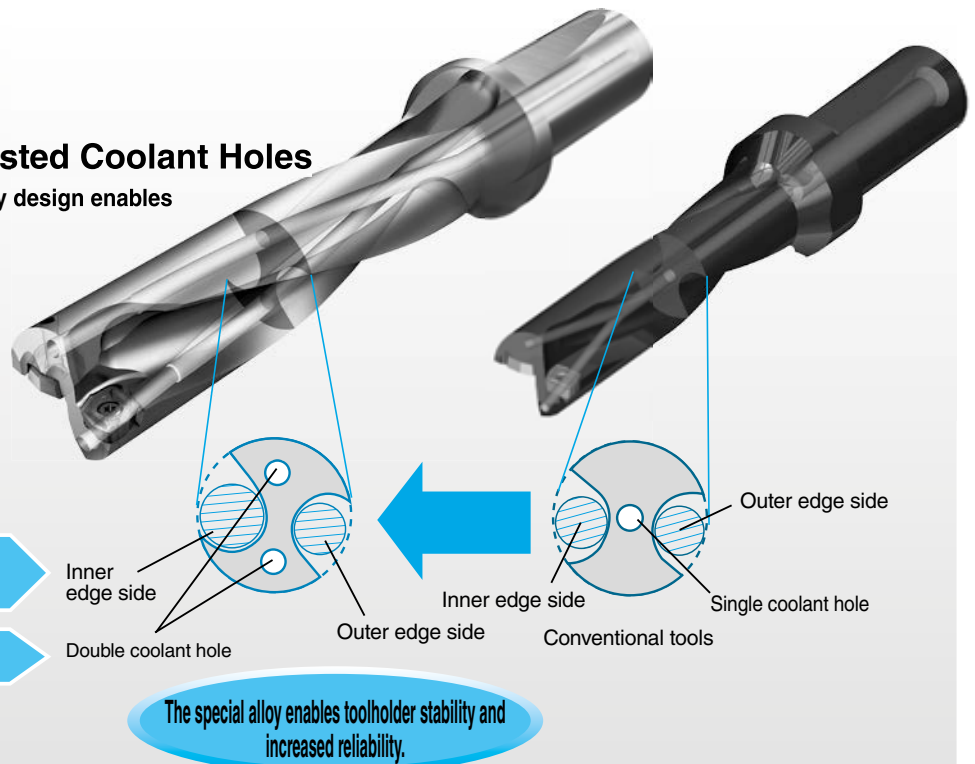
New Technology: Twisted Coolant Holes

Twisted Coolant Hole technology design enables

Superior Chip Evacuation

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

1.25 times higher cooling performance



K



Drilling

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



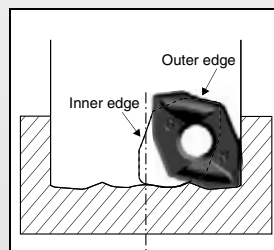
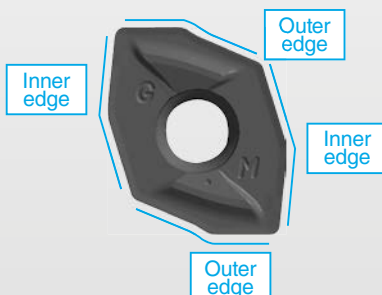
GH Chipbreaker
Hard materials,
heavy interruption
for hard materials
Edge strengthened type



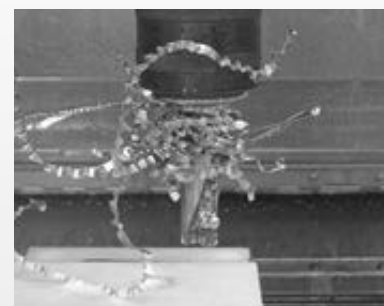
SM Chipbreaker
Stainless Steel, Low Carbon
Steel and Non-ferrous Metals
Sharp cutting for deeper
drilling

- Economical 4 edged type

2 inner pocket cutting edges and 2 outer pocket cutting edges



Positioning of outer edge and inner edge



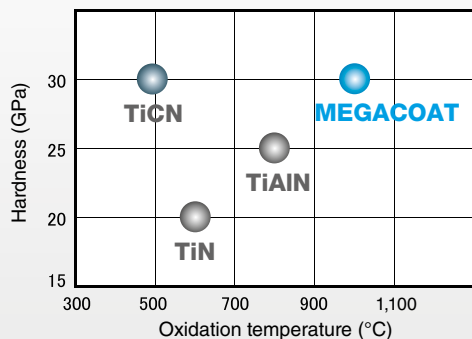
Long entangled chips (Competitor A)



Chips by SM chipbreaker (SUS304)

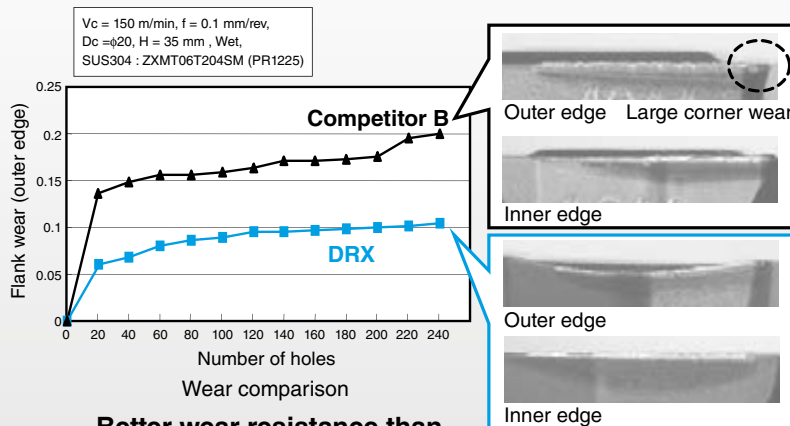
Insert Grades : Four Insert Grades

(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

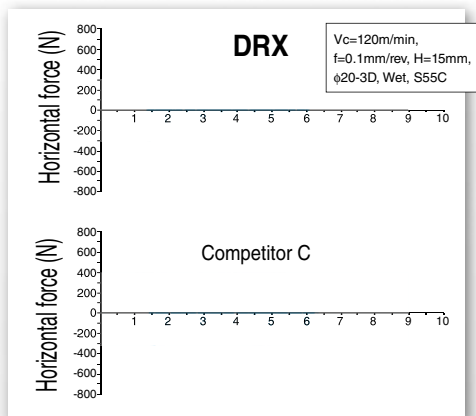


**Better wear resistance than competitor B
Achieving long Tool Life**

(Internal evaluation)

High Precision: Balanced System

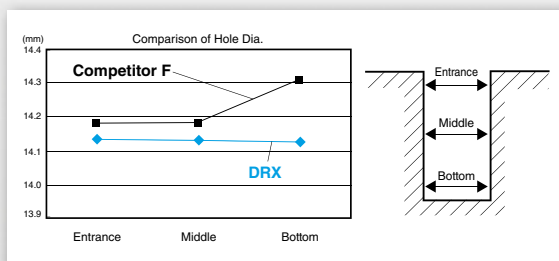
Vibration comparison



Less vibration due to well balanced at Drilling

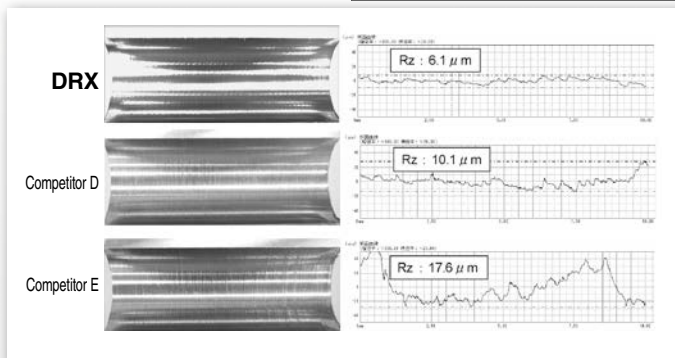
Better finished surface

Variation of Hole Dia.



Finished surface comparison

Vc=180m/min, f=0.15mm/rev, H=60mm (through hole), ϕ 20-3D, Wet, C45, NC Lathe



Better finished surface than Competitor D and E

Possible to extend tool life of next process

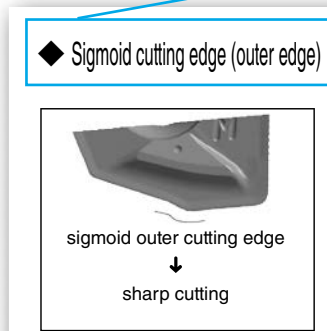
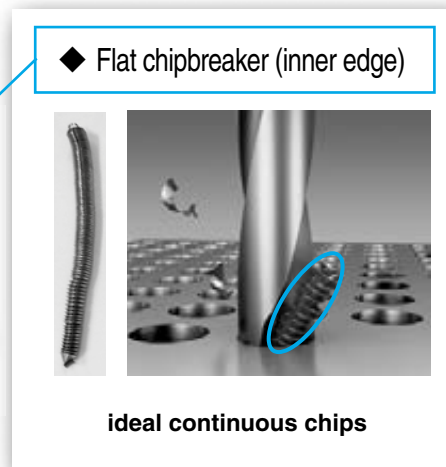
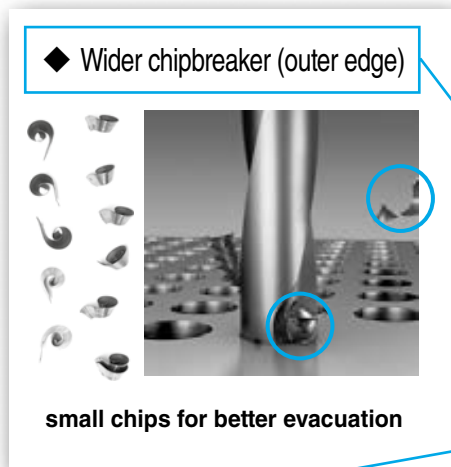
Vc=180m/min, f=0.08mm/rev, H=56mm (blind hole), ϕ 14-4D, Wet, C50

**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**

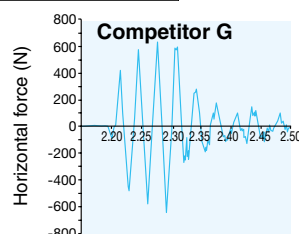
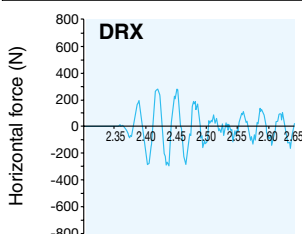
(Internal evaluation)

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, C55

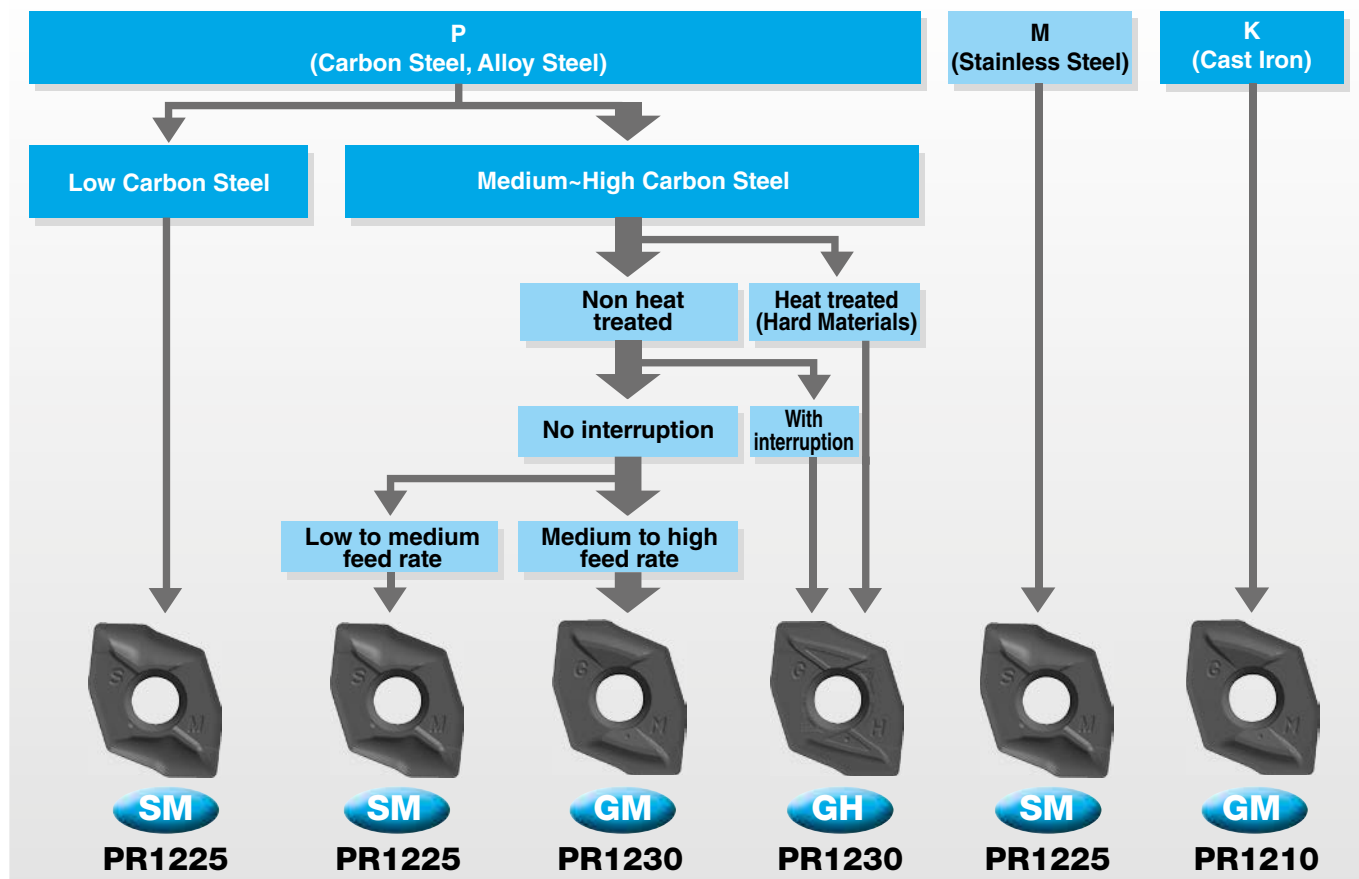


Lowered impact force at the start

Reduces sudden breakage

Cutting force comparison of outer edge at the start of drilling

Chipbreaker selection



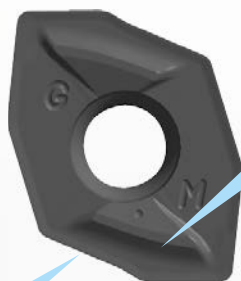
design developed through comprehensive technology

● 3 chipbreakers to cover various materials

◆ GM Chipbreaker...General Drilling

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

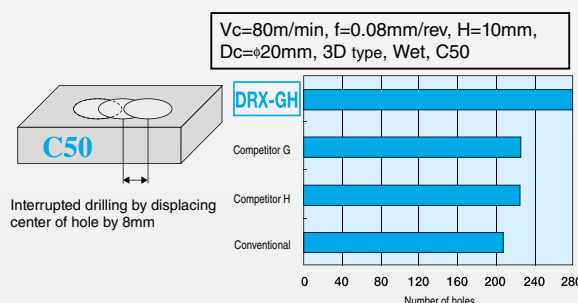


1st recommended chipbreaker for hard materials interrupted operation

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

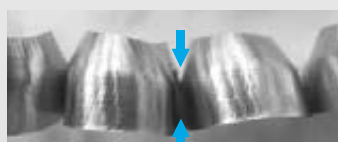


(2) Sharp cutting with large rake angle

(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



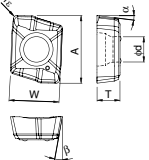
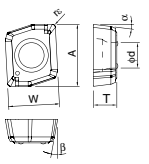
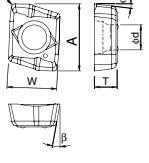
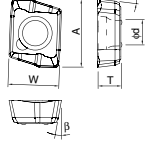
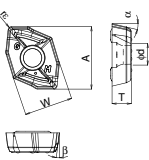
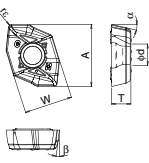
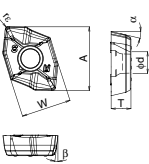
Chip breaking system of SM chipbreaker (Outer edge)



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.	
			A	T	φd	W	rε	α	β	PR1230	PR1225	PR1210	GW15				
 For outer edge		ZXMT 030203GM-E	6.4	2.30	2.4	4.8	0.3	7°	10°						K26 K28 K30 K32		
 For inner edge		ZXMT 030203GM-I	5.9	2.30	2.4	4.8	0.3	7°	10°								
 For outer edge		ZXMT 030203GH-E	6.4	2.30	2.4	4.8	0.3	7°	10°								
 For outer edge		ZXMT 030203SM-E	6.4	2.30	2.4	4.8	0.3	7°	10°								
 		ZXMT 040203GM	6.2	2.60	2.4	5.1	0.3	13°	7°		10°				K26 K27 K28 K29 K30 K31 K32		
		05T203GM	7.3	2.76	2.5	5.5	0.3										
		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										
 		ZXMT 040203GH	6.2	2.60	2.4	5.1	0.3	13°	7°		10°						
		05T203GH	7.3	2.76	2.5	5.5	0.3										
		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										
 		ZXMT 040203SM	6.2	2.60	2.4	5.1	0.3	13°	7°		10°						
		05T203SM	7.3	2.76	2.5	5.5	0.3										
		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)

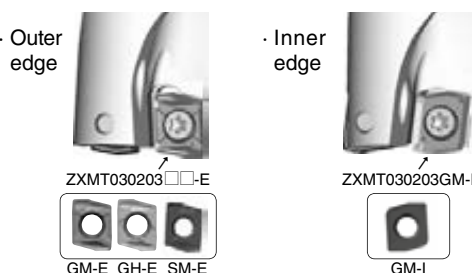
Workpiece Material	Insert Type	ZXMT type											
	Chipbreaker	GM				GH				SM			
	Drilling Depth	2D	3D	4D	5D	2D	3D	4D	5D	2D	3D	4D	5D
Low Carbon Steel		☆	☆	☆	☆					★	★	★	★
Carbon Steel		★	★	★	☆	☆	☆	☆	☆	☆	☆	☆	★
Alloy Steel		★	★	★	☆	☆	☆	☆	☆	☆	☆	☆	★
Mold steel		☆	☆	☆	☆	★	★	★	★				
Stainless Steel					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

★: 1st Choice ☆: 2nd Choice

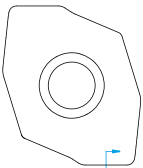
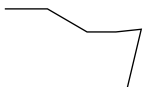
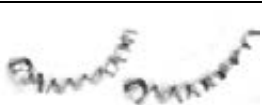
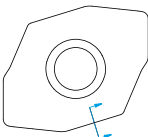
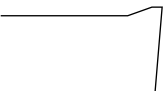
How to select ZXMT03

ZXMT03 type (Drill Dia.:φ12~φ13)

- 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).



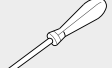
Features of the Chipbreaker

Chipbreaker			GM (General purpose)	GH (Tough Edge)	SM (Sharp Cutting)
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 exit 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.

● Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts		Applicable Inserts  K24
			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			+3.0			
-DRX520M-2-17	●		52	202	133	104		64	+2.8			
-DRX530M-2-17	●		53	204	135	106			+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			+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 K35 for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions ➡ K34

Trouble shooting ➡ K33

· 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.

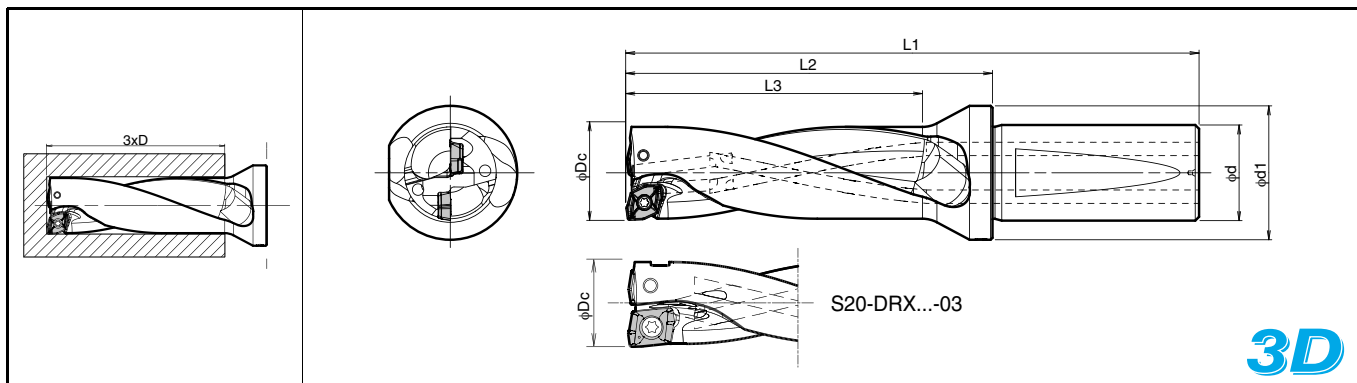
It may vary depending on machines / workpieces / clamping status / cutting conditions.

K



Drilling

DRX (Drilling Depth:3xD)



Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts		Applicable Inserts K24
			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 13.5 14 14.5 15	100 102 103 105 106 108 109	57 59 60 62 63 65 66	36 37.5 39 40.5 42 43.5 45	20 20	27 27	+0.5 +0.4 +0.3 +0.5 +0.4 +0.3 +0.2	SB-2042TRG	DTM-6	Outer edge ZXMT030203□□-E Inner edge ZXMT030203GM-I
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	25	32	+0.8 +0.7 +0.5 +0.4 +0.3 +0.2	SB-2045TR	DTM-6	ZXMT05T203□□
-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	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	25	32	+0.9 +0.8 +0.7 +0.5 +0.4 +0.3 +0.2	SB-2250TR	DTM-7	ZXMT06T204□□
-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	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	25	33	+1.2 +1.0 +0.9 +0.8 +0.7 +0.5 +0.4 +0.3 +0.2	SB-2570TR	DTM-8	ZXMT070305□□
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 29 29.5 30 30.5 31 31.5	161 163 164 166 167 169 170 172 173 175 176	102 104 105 107 108 110 111 113 114 116 117	79.5 81 82.5 84 85.5 87 88.5 90 91.5 93 94.5	32 41 43	41 43	+1.7 +1.6 +1.5 +1.3 +1.2 +1.1 +1.1 +0.8 +0.7 +0.6 +0.5	SB-3080TR	DTM-10	ZXMT09T306□□
S40 -DRX320M-3-11 -DRX330M-3-11 -DRX340M-3-11 -DRX350M-3-11 -DRX360M-3-11 -DRX370M-3-11 -DRX380M-3-11	●	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	40	54	+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.

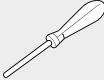
• Ref. to page K35 for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions K34

Trouble shooting K33

● : Std. Item

● Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset Offset (Radial) (mm)	Spare Parts		Applicable Inserts  K24
			φDc	L1	L2	L3	φd	φd1		Clamp Screw	Wrench	
												
S40 -DRX390M-3-14	●	2	39	218	149	117	40	54	+2.8	SB-5090TR	DT-20	ZXMT140408 ☐ ☐
-DRX400M-3-14	●		40	221	152	120			+2.5			
-DRX410M-3-14	●		41	224	155	123			+2.3			
-DRX420M-3-14	●		42	227	158	126			+2.0			
-DRX430M-3-14	●		43	230	161	129	59	+1.8				
-DRX440M-3-14	●		44	233	164	132		+1.5				
-DRX450M-3-14	●		45	236	167	135		+1.3				
-DRX460M-3-14	●		46	239	170	138		+1.0				
-DRX470M-3-14	●		47	242	173	141		+0.8				
-DRX480M-3-17	●	2	48	242	173	144	40	59	+3.8	SB-60120TR	DT-25	ZXMT170608 ☐ ☐
-DRX490M-3-17	●		49	245	176	147			+3.5			
-DRX500M-3-17	●		50	248	179	150			+3.3			
-DRX510M-3-17	●		51	251	182	153			+3.0			
-DRX520M-3-17	●		52	254	185	156			+2.8			
-DRX530M-3-17	●		53	257	188	159	64	+2.5				
-DRX540M-3-17	●		54	260	191	162		+2.3				
-DRX550M-3-17	●		55	263	194	165		+2.0				
-DRX560M-3-17	●		56	266	197	168		+1.8				
-DRX570M-3-17	●		57	269	200	171		+1.5				
-DRX580M-3-17	●		58	272	203	174		+1.3				
-DRX590M-3-17	●		59	275	206	177		+1.0				
-DRX600M-3-17	●		60	278	209	180		+0.8				

- When offset drilling, reduce feed rate to 0.08mm/rev or less.
- Ref. to page K35 for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions ● K34

Trouble shooting ● K33

• 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.

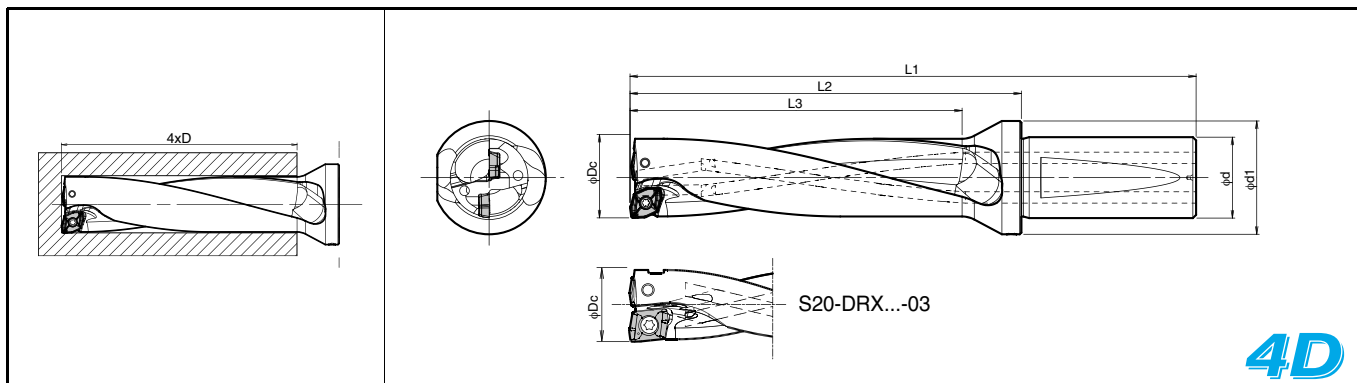
It may vary depending on machines / workpieces / clamping status / cutting conditions.

K



Drilling

DRX (Drilling Depth:4xD)



Toolholder Dimensions

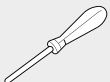
Description	Std.	No. of Inserts	Dimension (mm)							Spare Parts		Applicable Inserts K24
			φDc	L1	L2	L3	φd	φd1	Max. Offset (Radial) (mm)	Clamp Screw 	Wrench 	
S20 -DRX120M-4-03 -DRX125M-4-03 -DRX130M-4-03 -DRX135M-4-04 -DRX140M-4-04 -DRX145M-4-04 -DRX150M-4-04	●	2	12	112	69	48	20	27	+0.5 +0.4 +0.3	SB-2042TRG	DTM-6	Outer edge ZXMT030203□□-E Inner edge ZXMT030203GM-I
-DRX155M-4-05 -DRX160M-4-05 -DRX165M-4-05 -DRX170M-4-05 -DRX175M-4-05 -DRX180M-4-05	●	2	13.5	118	75	54	20	27	+0.5 +0.4 +0.3 +0.2	SB-2042TRG	DTM-6	ZXMT040203□□
-DRX185M-4-06 -DRX190M-4-06 -DRX195M-4-06 -DRX200M-4-06 -DRX205M-4-06 -DRX210M-4-06 -DRX215M-4-06	●	2	15.5	140	86	62	25	32	+0.8 +0.7 +0.5 +0.4 +0.3 +0.2	SB-2045TR	DTM-6	ZXMT05T203□□
-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	18.5	149	95	74	25	32	+0.9 +0.8 +0.7 +0.5 +0.4 +0.3 +0.2	SB-2250TR	DTM-7	ZXMT06T204□□
-DRX270M-4-09 -DRX280M-4-09 -DRX290M-4-09 -DRX300M-4-09 -DRX310M-4-09	●	2	20.5	157	103	82	25	33	+1.2 +1.0 +0.9 +0.8 +0.7 +0.5 +0.4 +0.3 +0.2	SB-2570TR	DTM-8	ZXMT070305□□
-DRX320M-4-11 -DRX330M-4-11 -DRX340M-4-11 -DRX350M-4-11 -DRX360M-4-11 -DRX370M-4-11 -DRX380M-4-11	●	2	21.5	161	107	86	40	49	+1.6 +1.3 +1.1 +0.8 +0.6	SB-3080TR	DTM-10	ZXMT09T306□□
	●	2	22	163	109	88	32	41	+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 0.06mm/rev or less.
· Ref. to page K35 for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions K34
Trouble shooting K33

● : Std. Item

● Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset Offset (Radial) (mm)	Spare Parts		Applicable Inserts  K24
			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 K35 for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions ● K34

Trouble shooting ● K33

● 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.

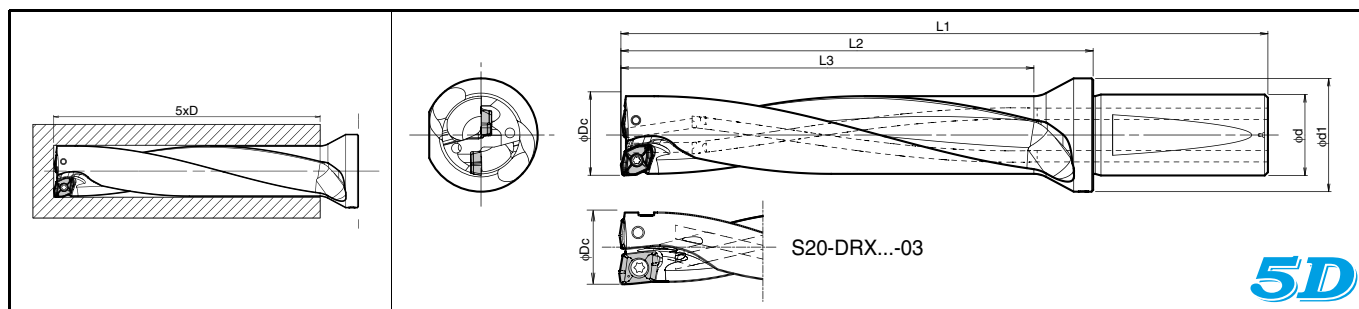
It may vary depending on machines / workpieces / clamping status / cutting conditions.

K



Drilling

DRX (Drilling Depth:5xD)



Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts		Applicable Inserts K24
			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	27	+0.5 +0.3 +0.4 +0.2	SB-2042TRG	DTM-6	Outer edge ZXMT030203□□-E Inner edge ZXMT030203GM-I ZXMT040203□□
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	32	+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 K35 for Adjustable Sleeve (SHE type).

Recommended Cutting Conditions K34
Trouble shooting K33

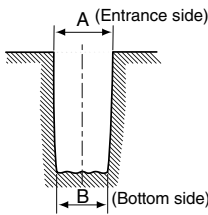
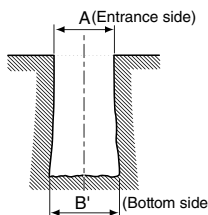
Hole Dia. Tolerance (5D type)

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 entrance, 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 K34 for "Recommended Cutting Conditions"
Hole diameter becomes larger (at hole bottom)		There is no problem for entrance, 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 K34 for "Recommended Cutting Conditions" · Check the core height ➔ Ref. to page K36-K37
Hole diameter is small (from the hole entrance)		Hole diameter is small from entrance. (At turning moment)	Inappropriate adjustment of hole diameter.	In case of using lathe machine, use X-axis and adjustment hole diameter. ➔ Ref. to page K36
			No core at internal edge. (No core remains)	Adjust the core height. ➔ Ref. to page K36-K37

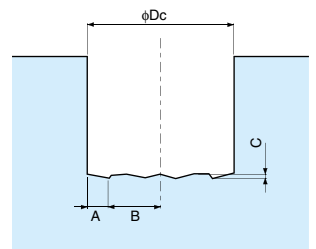
K



Drilling

◆ 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	0.9	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	3.9	9.8	1.0	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	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	7.1	16.9	1.6		
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	0.7	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	1.1	55.0	20.4		1.8			
20.5		7.9	34.0		12.3	56.0			20.9		
21.0		8.1	35.0	12.8	57.0	21.4		1.9			
21.5		8.4	0.8	36.0	13.3	58.0		21.9	2.0		
22.0	3.2	7.8	0.8	37.0	13.8	59.0		22.4			
22.5		8.1		38.0	14.3	60.0		22.9	2.1		
23.0		8.3		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)	Toolholder Type								
	MEGACOAT			Carbide		2D~3D			4D			5D		
	PR1230	PR1225	PR1210	GW15										
	GM GH	SM	GM	SM		f (mm/rev)								
	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

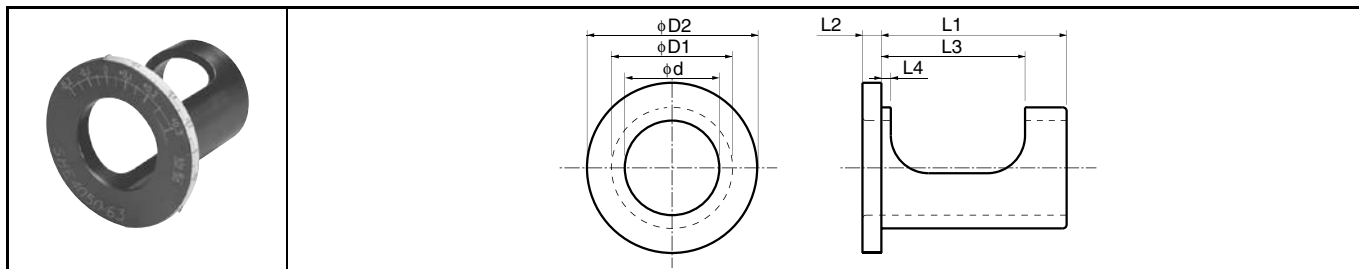
* Cutting width (Torus-shaped part) when drilling cored hole.

Drill type	2D~3D	4D	5D
Cutting width (Torus-shaped part)	1/10xD or less	Less than corner radius	Not recommended

Max. Depth for Drilling with Outer Coolant

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

SHE



Sleeve Dimensions

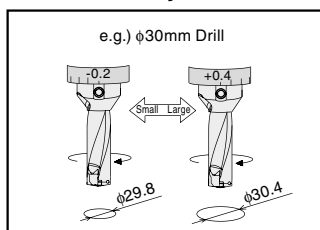
Description	Std.	Dimension (mm)							* Drill Dia. Adjustable Range	Center Height Adjustable Range
		φd	φD1	φD2	L1	L2	L3	L4		
SHE 2025-43	●	20	25	41	43	4	36	3.0	+0.4~-0.2	+0.2~-0.15
2532-48	●	25	32	49	48	6	38	2.5	+0.4~-0.2	+0.2~-0.15
3240-53	●	32	40	58	53	6	43	2.5	+0.4~-0.2	+0.2~-0.15
4050-63	●	40	50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

· Diameter Adjustment Range adjusts the drill diameter.

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

● : Std. Item

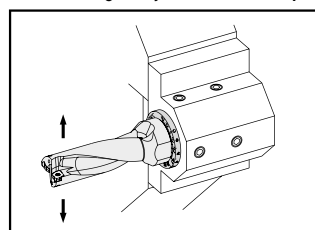
1. Diameter Adjustment ~ For Machining Center ~



● 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

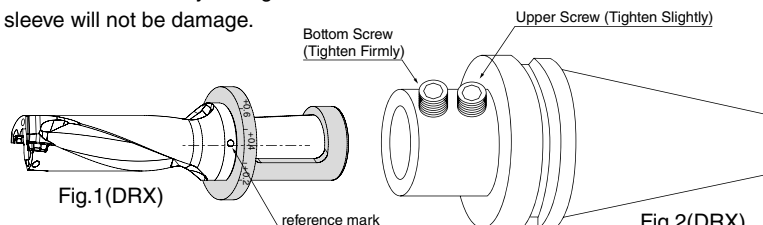
- (1) Adjust the scale at the flange periphery of the sleeve to the center of the coolant plug of the drill. (Fig.1)
- (2) When making the hole diameter bigger, rotate the sleeve in (+) direction and to make it smaller, rotate the sleeve in (-) direction.
- (3) When rotating the sleeve, insert the wrench 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.

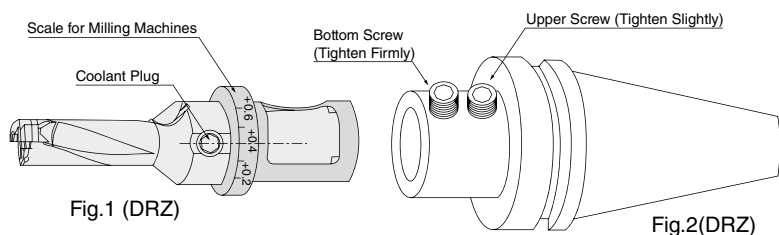
Caution:

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

DRX



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 of the flange and then rotate the sleeve.
- (5) After Completing the adjustment, tighten the drill directly through the window on the sleeve.

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.



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)

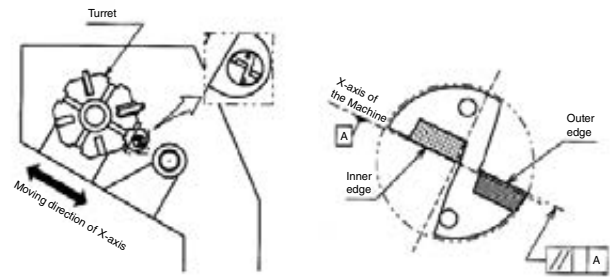


Fig.1 Installed to the Lathe

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.

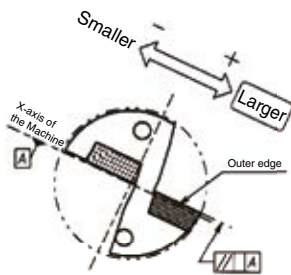


Fig.2 Outer insert Facing Up

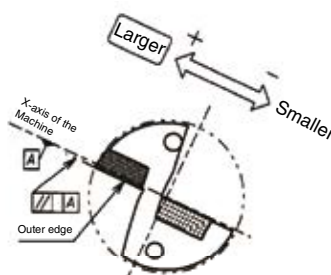


Fig.3 Outer insert Facing Down

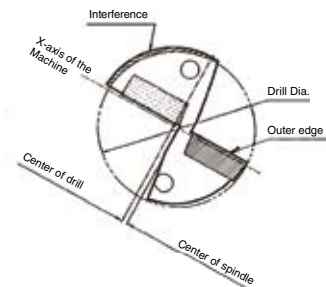


Fig.4 Excessive offset
(For Smaller Hole Diameter)

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.

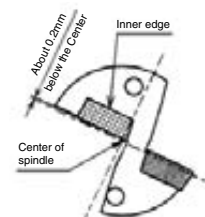


Fig.5 Front View
of the Drill

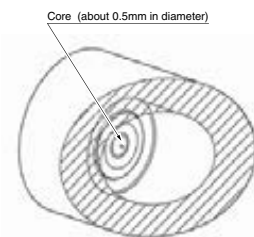


Fig.6 Center Core

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)

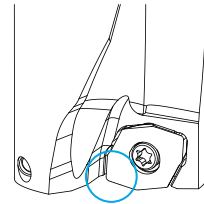


Fig.7 Insert breakage near the center of the drill

[How to Adjust]

- (1) Install the drill rotated 180°.

Most problems will be solved by this method.
(Fig.8)

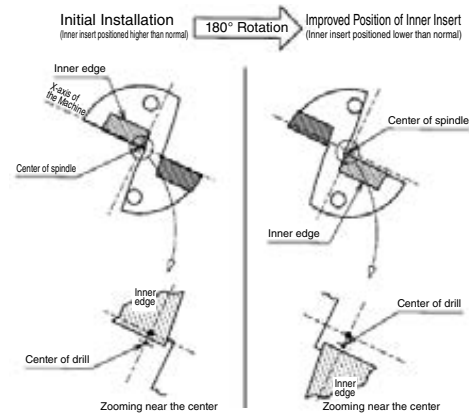


Fig.8

[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.

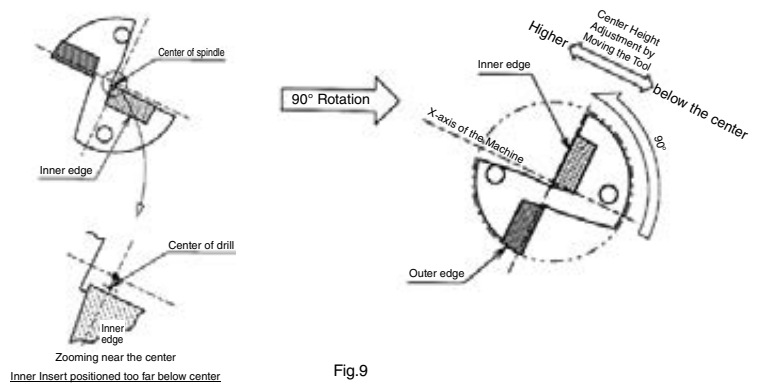


Fig.9

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: When 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.

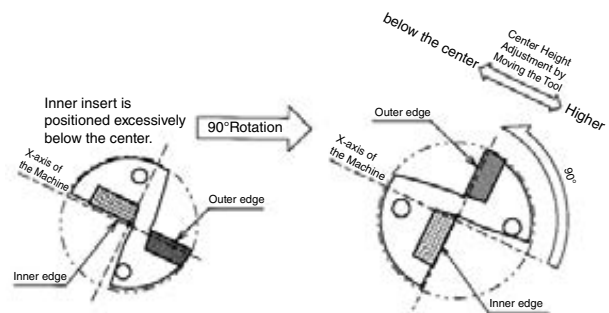
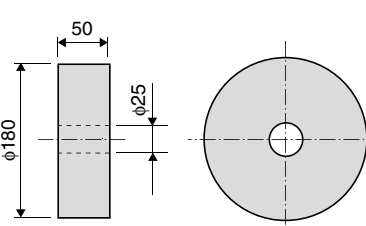
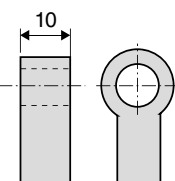
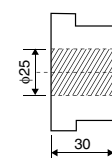
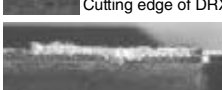


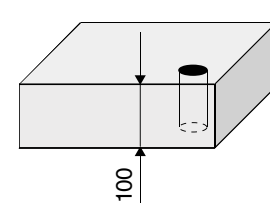
Fig.10

Case Studies

X40CrMoV51 (45HRC)	
- Vc=60 m/min - f=0.05 mm/rev - H=50 mm (through hole) - Wet (Internal Coolant) - ZXMT070305GH (PR1230) - S25-DRX250M-4-07	
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)	

X10CrNiS18 9	
- Vc=75 m/min - f=0.1 mm/rev - H=10 mm (through hole) - Wet (Internal Coolant) - ZXMT06T204SM (PR1225) - S25-DRX200M-3-06	 with partial interruption
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=118 m/min - f=0.08 mm/rev (0.05 at the beginning) - H=30 mm (through hole) - Wet (Internal Coolant) - ZXMT070305SM (PR1225) - S25-DRX250M-3-07	  Cutting edge of DRX (after 400 holes)  Cutting edge of competitors (after 400 holes)
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)	

55NiCrMoV6 (42HRC)	
- Vc=100 m/min - f=0.07~0.08 mm/rev - H=101 mm (through hole) - Wet (External Coolant) - ZXMT070305GM (PR1230) - S25-DRX250M-4-07	 Mold component $\phi 25 \times 100$ mm (through hole) 24 locations
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 outer coolant - MagicDrill DRX has improved 3 times longer tool life than Conventional tool M (Evaluation by the user)	

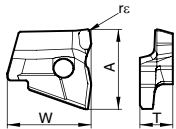
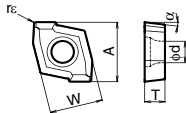
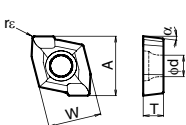
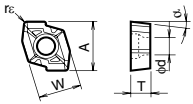
K



Drilling

Applicable Inserts for DRS / DRZ

Applicable Inserts (for DRS / DRZ)

Applicable Inserts (for DRS / DRZ)		Classification of usage		P		M		K		N		MEGACOAT		PVD Coated Carbide		Carbide		Applicable Toolholders Ref. to Page
		● : 1st Choice ○ : 2nd Choice (Steel; non heat treated)		Carbon Steel / Alloy Steel Mold Steel		Stainless Steel		Cast Iron		Non-ferrous Metals								
Insert		Description		Dimension (mm)					Angle (°)									
				A	T	φd	W	rε	α	PR1230	PR1225	PR1210	PR660	PR830	KW10			
		DS	100	8.8	3.5	-	9.0	0.2	-	●	○	○	○	○	○		K40	
			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			●	○	○	○	○				
		ZCMT	050203	5.9	2.38	2.3	5.0	0.3	7°	●	●	●	●	●	●		K42 K49	
			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			●	●	●	●	●	●			
			12T306	14.3	3.97	5.6	12.8	0.6		●	●	●	●	●	●			
			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°	●	●			●
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		●	●	●	●		●	●			
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 (rε) than standard chipbreaker type and can reduce burrs.

Suitable Chipbreaker (zcmt)

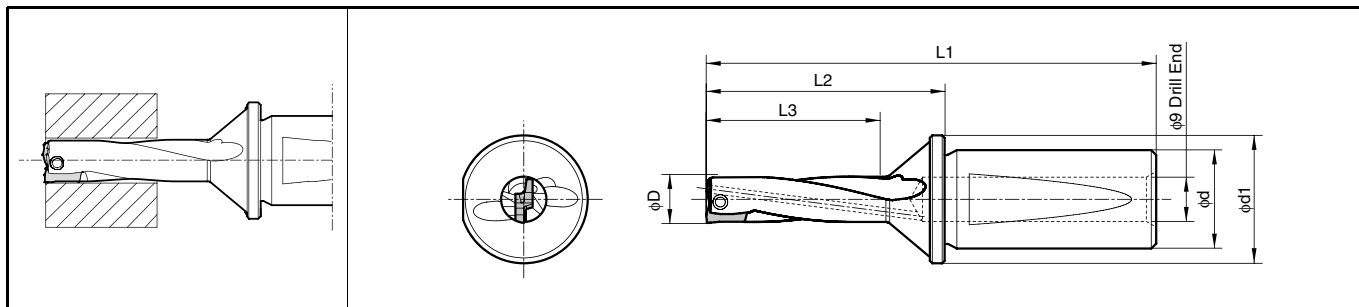
Workpiece Material	Insert Size		ZCMT05								ZCMT06								ZCMT08							
	Chipbreaker		Standard				SP				Standard				SP				Standard				SP			
	Drilling Depth		2D	3D	4D	2D	3D	4D	2D	3D	4D	2D	3D	4D	2D	3D	4D	2D	3D	4D	2D	3D	4D	2D	3D	4D
Low Carbon Steel	☆	☆	-	-	-	★	★	★	-	-	-	☆	☆	-	★	★	★	☆	☆	☆	☆	☆	☆	☆	☆	☆
Carbon 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	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, 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

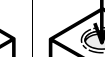
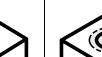
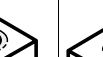


Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts K39
			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	-	DT-7	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				DS120

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	–	–

When drilling with outer coolant, Max. depth should be 1.5 times (1.5xD) of the drill diameter (φD), because chip evacuation performance drops.

DRS Recommended Cutting Conditions (Coolant)

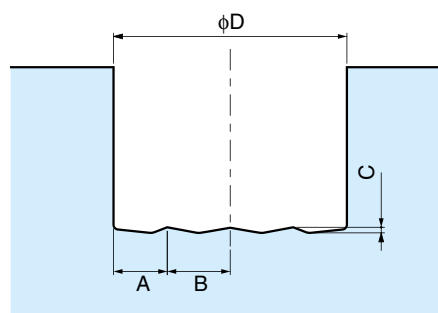
Workpiece Material	Recommended Insert Grades Vc (m/min)			f (mm/rev)
	MEGACORT		PVD Coated Carbide	
	PR1230	PR1210	PR660	
Low Carbon Steel	★ 80~100	-	☆ 80~100	0.06
Carbon Steel	★ 80~100	-	☆ 80~100	0.08~0.1
Alloy Steel	★ 80	-	☆ 80	0.04~0.06
Mold Steel	★ 80	-	☆ 80	0.04~0.06
Stainless Steel (Austenitic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

★: 1st Recommendation ☆: 2nd Recommendation

- Apply a sufficient amount of coolant.
- 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.
- 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 peck feeding.
[How to peck feed] (1) Cut 1~2mm (2) Return 0.1mm (3) Repeat (1) and (2)

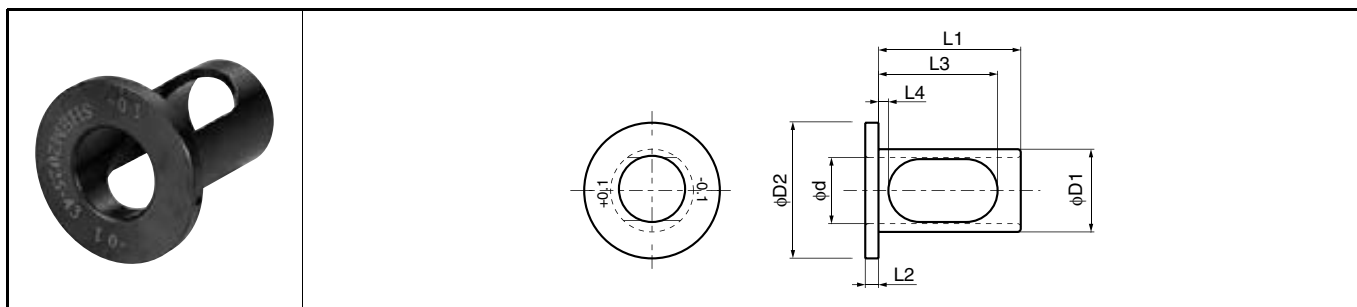
DRS Hole Bottom Shape (mm)

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



●: Std. Item

SHEM



Sleeve Dimensions

Description	Std.	Dimension (mm)							* Dia. Adjustment Range
		φd	φD1	φD2	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.

- (1) Set the outer edge horizontally with 90° to making line on the sleeve. (Fig.1)
- (2) To adjust to larger diameter, 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)
- (3) Tighten the bottom screw firmly which is directly touching the drill. Slightly tighten the upper screw which is directly touching the sleeve.
The upper screw should be tightened slightly so that the sleeve will not be damage. (Fig.2.)

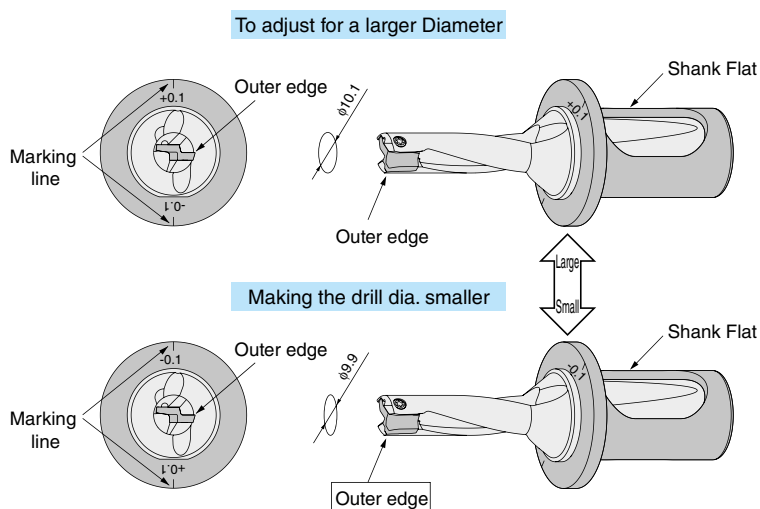


Fig.1 Diameter Adjustment Method (e.g.) φ10 Drill

Caution: Not for use with Collet Chuck type Arbor.

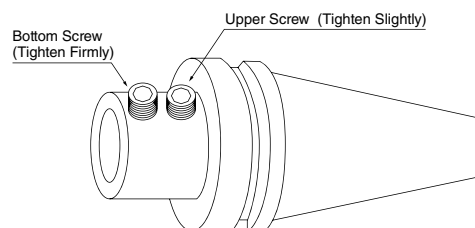
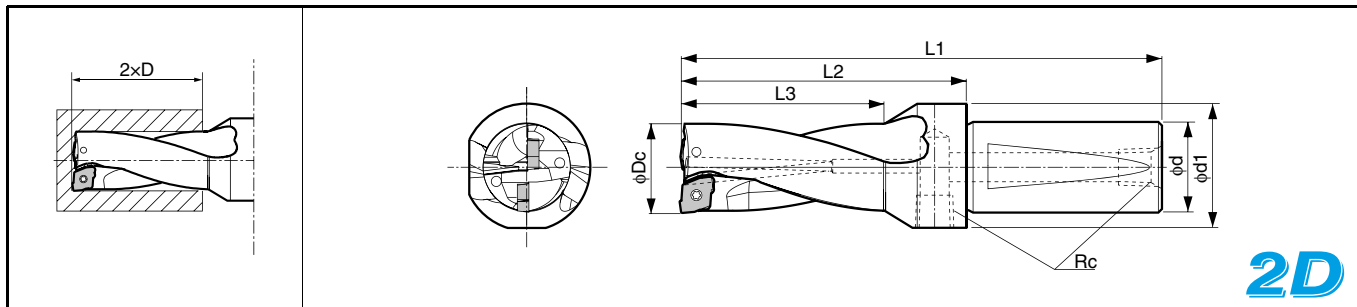


Fig.2

DRZ (Drilling Depth:2xD)



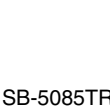
Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)							Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts  K39
			φDc	L1	L2	L3	φd	φd1	Rc		Clamp Screw	Wrench	Plug	
												 DT		
S20 -DRZ1326-05 -DRZ135270-05 -DRZ1428-05 -DRZ145290-05 -DRZ1530-05 -DRZ155310-05	● ● ● ● ● ●	2	13 13.5 14 14.5 15 15.5	95 95 98 98 100 100	52 52 55 55 57 57	26 27 28 29 30 31	20	27	Rc1/8	+0.5 +0.5 +0.5 +0.5 +0.5 +0.5	SB-2045TR	FT-6	GP-1	ZCMT050203 ZCMT050203SP ZCMT050203SU
S25 -DRZ1632-06 -DRZ165330-06 -DRZ1734-06 -DRZ175350-06 -DRZ1836-06 -DRZ185370-06 -DRZ1938-06 -DRZ195390-06 -DRZ2040-06 -DRZ205410-06 -DRZ2142-06 -DRZ215430-08 -DRZ2244-08 -DRZ225450-08 -DRZ2346-08 -DRZ235470-08 -DRZ2448-08 -DRZ245490-08 -DRZ2550-08 -DRZ255510-08 -DRZ2652-08 -DRZ265530-08	● ●<													

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

Recommended Cutting Conditions ● K51

● Toolholder Dimensions

Description	Std. No. of Inserts	Dimension (mm)							Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts  K39
		φDc	L1	L2	L3	φd	φd1	Rc		Clamp Screw	Wrench	Plug	
													
S40 -DRZ3366-12	●	33	173	104	66				+2.9				ZCMT12T306 ZCMT12T304SP
-DRZ3468-12	●	34	176	107	68				+2.7				
-DRZ3570-12	●	35	177	108	70				+2.4				
-DRZ3672-12	●	36	180	111	72	40	55	Rc1/4	+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				+4.0				ZCMT150408 ZCMT150406SP
-DRZ4284-15	●	42	188	119	84				+3.7				
-DRZ4386-15	●	43	190	121	86		55		+3.5				
-DRZ4488-15	●	44	192	123	88				+3.2				
-DRZ4590-15	●	45	192	123	90				+3.0				
-DRZ4692-15	●	46	198	129	92				+2.7				
-DRZ4794-15	●	47	201	132	94	40		Rc1/4	+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		60		+1.2				
-DRZ52104-15	●	52	205	136	104				+1.0				
-DRZ53106-15	●	53	208	139	106				+0.7				
-DRZ54108-20	●	54	214	145	108				+5.0				ZCMT200608
-DRZ55110-20	●	55	215	146	110				+4.7				
-DRZ56112-20	●	56	217	148	112	40	65	Rc1/4	+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 ● K51

• 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.

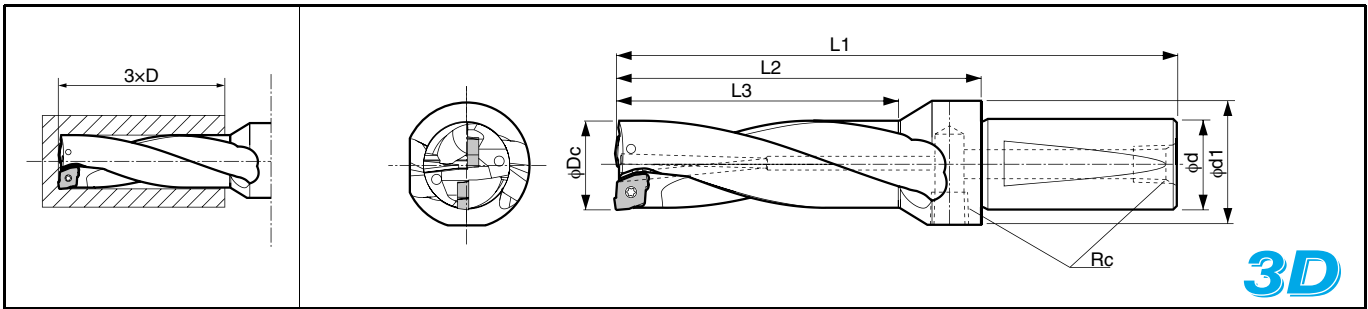
K



Drilling

MagicDrill DRZ

DRZ (Drilling Depth:3xD)



● Toolholder Dimensions

[illegible]

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

Recommended Cutting Conditions ➡ **K51**

● : Std. Item

● Toolholder Dimensions

Description	Std. No. of Inserts	Dimension (mm)							Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts  K39
		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				+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 ● K51

• 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

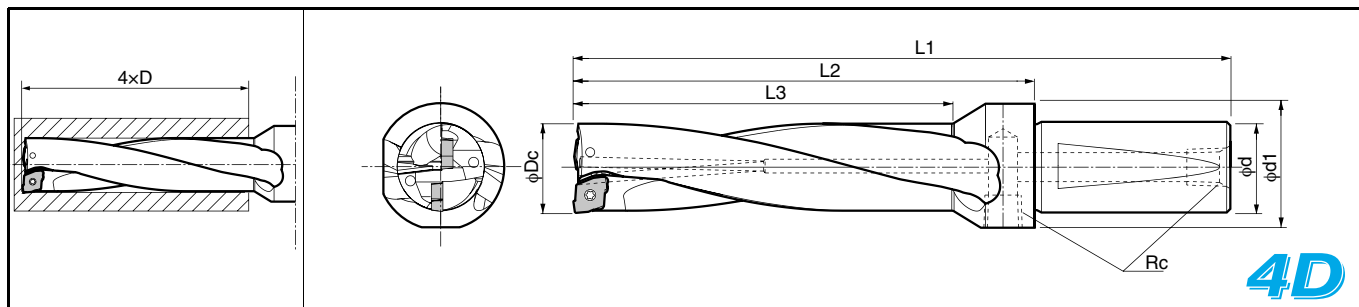
* Above is numeric guideline.

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



MagicDrill DRZ

DRZ (Drilling Depth:4xD)



Toolholder Dimensions

Description	Std. No. of Inserts	Dimension (mm)							Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts ● K39
		φDc	L1	L2	L3	φd	φd1	Rc		Clamp Screw 	Wrench FT 	Plug 	
S20 -DRZ1352-05 -DRZ135540-05 -DRZ1456-05 -DRZ145580-05 -DRZ1560-05 -DRZ155620-05	● ● ● ● ● ●	13 13.5 14 14.5 15 15.5	121 121 126 126 130 130	78 78 83 83 87 87	52 54 56 58 60 62	20	27	Rc1/8	+0.5 +0.5 +0.5 +0.5 +0.5 +0.5	SB-2045TR	FT-6	GP-1	ZCMT050203 ZCMT050203SP ZCMT050203SU
S25 -DRZ1664-06 -DRZ165660-06 -DRZ1768-06 -DRZ175700-06 -DRZ1872-06 -DRZ185740-06 -DRZ1976-06 -DRZ195780-06 -DRZ2080-06 -DRZ205820-06 -DRZ2184-06	● ● ● ● ● ● ● ● ● ● ●	16 16.5 17 17.5 18 18.5 19 19.5 20 20.5 21	147 147 149 149 153 153 157 157 156 161 161	93 93 95 95 99 99 103 103 102 107 107	64 66 68 70 72 74 76 78 80 82 84	25	32	Rc1/8	+1.1 +0.9 +0.8 +0.7 +0.6 +0.6 +0.5 +0.5 +0.5 +0.3 +0.2	SB-2260TR	DT-7	GP-1	ZCMT06T204 ZCMT06T204SP ZCMT06T204SU
-DRZ215860-08 -DRZ2288-08 -DRZ225900-08 -DRZ2392-08 -DRZ235940-08 -DRZ2496-08 -DRZ245980-08 -DRZ25100-08 -DRZ2551020-08 -DRZ26104-08 -DRZ2651060-08	● ● ● ● ● ● ● ● ● ● ●	21.5 22 22.5 23 23.5 24 24.5 25 25.5 26 26.5	169 169 169 173 173 176 176 180 180 184 184	115 115 115 119 119 122 122 126 126 130 130	86 88 90 92 94 96 98 100 102 104 106	25	33 35	Rc1/8	+1.8 +1.6 +1.4 +1.3 +1.2 +1.1 +0.9 +0.8 +0.7 +0.6 +0.5	SB-2570TR	DT-8	GP-1	ZCMT080304 ZCMT080304SP
S32 -DRZ27108-10 -DRZ2751100-10 -DRZ28112-10 -DRZ2851140-10 -DRZ29116-10 -DRZ2951180-10 -DRZ30120-10 -DRZ3051220-10 -DRZ31124-10 -DRZ3151260-10 -DRZ32128-10 -DRZ3251300-10	● ● ● ● ● ● ● ● ● ● ● ●	27 27.5 28 28.5 29 29.5 30 30.5 31 31.5 32 32.5	200 200 204 204 208 208 211 211 214 214 219 219	141 141 145 145 149 149 152 152 155 155 160 160	108 110 112 114 116 118 120 122 124 126 128 130	32	42 45	Rc1/4	+2.5 +2.3 +2.2 +2.1 +2.0 +1.8 +1.7 +1.5 +1.5 +1.3 +1.2 +1.0	SB-4085TR	DT-15	GP-2	ZCMT10T304 ZCMT10T304SP
-DRZ33132-12 -DRZ34136-12 -DRZ35140-12 -DRZ36144-12 -DRZ37148-12 -DRZ38152-12 -DRZ39156-12 -DRZ40160-12	● ● ● ● ● ● ● ●	33 34 35 36 37 38 39 40	226 231 234 239 242 246 250 252	167 172 175 180 183 187 191 193	132 136 140 144 148 152 156 160	32	55	Rc1/4	+2.9 +2.7 +2.4 +2.2 +1.9 +1.7 +1.4 +1.2	SB-5085TR	DT-20	GP-2	ZCMT12T306 ZCMT12T304SP

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

Recommended Cutting Conditions ● K51

● : Std. Item

● Toolholder Dimensions

Description	Std. No. of Inserts	Dimension (mm)							Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts  K39
		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				+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				+2.0				
-DRZ50200-15	●	50	301	232	200				+1.7				

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

Recommended Cutting Conditions ● K51

· 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

Description	Std. No. of Inserts	Dimension (mm)							Max. Offset (Radial) (mm)	Spare Parts			Applicable Inserts K39
		φDc	L1	L2	L3	φd	φd1	Rc		Clamp Screw	Wrench	Plug	
S32 -DRZ27135-10	●	27	227	168	135				+2.5	SB-4085TR	DT-15	GP-2	ZCMT10T304 ZCMT10T304SP
-DRZ28140-10	●	28	232	173	140		42		+2.2				
-DRZ29145-10	●	29	237	178	145	32		Rc1/4	+2.0				
-DRZ30150-10	●	30	241	182	150				+1.7				
-DRZ31155-10	●	31	245	186	155		45		+1.5				
-DRZ32160-10	●	32	251	192	160				+1.2				
S40 -DRZ33165-12	●	33	269	200	165				+2.9	SB-5085TR	DT-20	GP-2	ZCMT12T306 ZCMT12T304SP
-DRZ34170-12	●	34	275	206	170				+2.7				
-DRZ35175-12	●	35	279	210	175				+2.4				
-DRZ36180-12	●	36	285	216	180	40	55	Rc1/4	+2.2				
-DRZ37185-12	●	37	289	220	185				+1.9				
-DRZ38190-12	●	38	294	225	190				+1.7				
-DRZ39195-12	●	39	299	230	195				+1.4				
-DRZ40200-12	●	40	302	233	200				+1.2				
-DRZ41205-15	●	41	306	237	205				+4.0	SB-5085TR	DT-20	GP-2	ZCMT150408 ZCMT150406SP
-DRZ42210-15	●	42	311	242	210		55		+3.7				
-DRZ43215-15	●	43	316	247	215				+3.5				
-DRZ44220-15	●	44	321	252	220				+3.2				
-DRZ45225-15	●	45	324	255	225	40		Rc1/4	+3.0				
-DRZ46230-15	●	46	333	264	230				+2.7				
-DRZ47235-15	●	47	339	270	235				+2.5				
-DRZ48240-15	●	48	344	275	240		60		+2.2				
-DRZ49245-15	●	49	349	280	245				+2.0				
-DRZ50250-15	●	50	351	282	250				+1.7				

Recommended Cutting Conditions ➡ **K51**

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

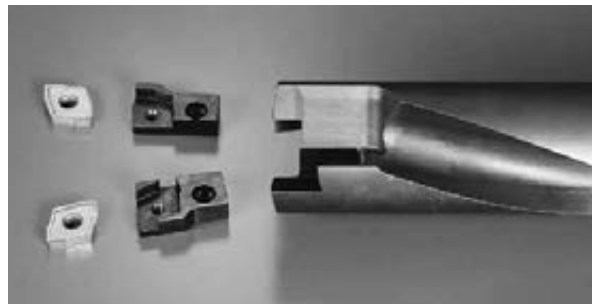
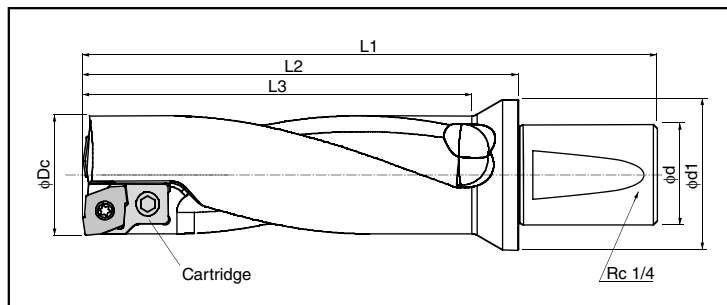
It may vary depending on machines / workpieces / clamping status / cutting conditions.

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  K39
			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	DR12CR-OUT (2pc)	DR12CR-IN (2pc)	SB-5085TR	DT-20	ZCMT12T306 ZCMT12T304SP
-DRZ80240-12CR	MTO	4	80	340	271	240			N.A.					

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

Recommended Cutting Conditions ➡ K51

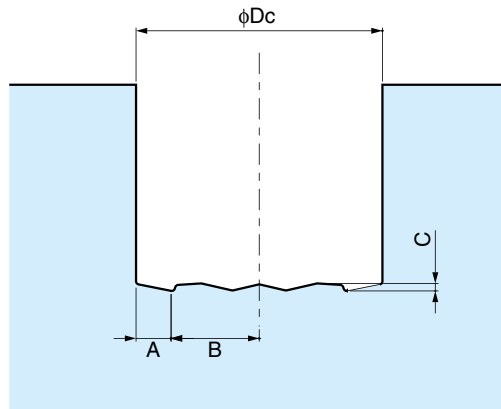
K



Drilling

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

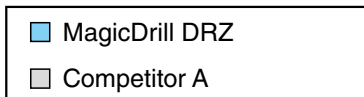
φDc	A	B	C	φDc	A	B	C	φDc	A	B	C	
13.0	2.1	4.4	0.4	21.5	3.1	7.7	0.6	33.0	5.7	10.8	0.8	
13.5		4.7		22.0		7.9		34.0		11.3		
14.0		4.9	22.5	8.2		35.0		11.8				
14.5		5.2	23.0	8.4		36.0	12.3					
15.0		5.4	23.5	8.7		37.0	12.8					
15.5	2.7	5.7	0.5	24.0	4.0	8.9	0.7	38.0	6.5	13.3	0.9	
16.0		5.3		24.5		9.2		39.0		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		26.0		9.9	42.0	14.5				
18.0		6.3	26.5	10.2		43.0	15.0					
18.5	2.7	6.6	0.6	27.0	4.0	9.5	0.7	44.0	8.5	15.5	1.0	
19.0		6.8		27.5		9.8		45.0		16.0		
19.5		7.1		28.0		10.0		46.0		16.5		
20.0		7.3		28.5		10.3	47.0	17.0				
20.5		7.6		29.0		10.5	48.0	17.5				
21.0		7.8	29.5	10.8		49.0	18.0					
* Above amount is standard value (Varies within ±0.1mm depending on workpiece materials and cutting conditions)				30.0	4.0	11.0	0.7	50.0	8.5	18.5	1.1	
				30.5		11.3		51.0		19.0		
				31.0		11.5		52.0		19.5		
				31.5		11.8	0.8	53.0		20.0	1.2	
				32.0		12.0		54.0		18.5		
32.5		12.3	55.0	19.0								
				56.0		19.5						
								57.0		20.0		
								58.0		20.5		
								59.0		21.0		



K

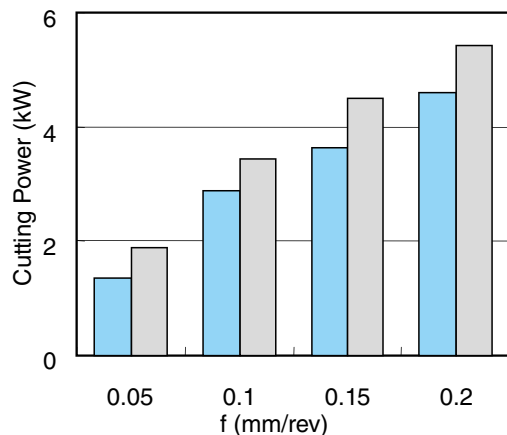
Required Power

φ20 Cutting Power Comparison



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

Comparison of Cutting Power



Case Study

MagicDrill Dia.		φ16	φ27		φ50	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 (m/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	
Power requirement (Load Meter Values)		60%	80%	95%	100%	60%	100%
Remarks		-	-		With conventional drill, limited up to φ40	-	

Formula for calculating required power (approximate value) R33

Recommended Cutting Conditions

DRZ Recommended Cutting Conditions (Coolant)

Workpiece Material	Recommended Insert Grades (Vc m/min)										Drill Dia. φDc (mm)	Toolholder Type (Drilling Depth)				
	MEGACOAT			PVD Coated Carbide						Carbide		2D	3D	4D	5D	
	PR1230	PR1225	PR1210	PR660	PR830	PR915	PR1025	PR930	PR905							KW10
	Standard SP SU	Standard SP SU	Standard	Standard SP SU	Standard SP	Standard	Standard SP SU	Standard SP	Standard							Standard SP
f (mm/rev)																
Low Carbon Steel	★ 120~220	☆ 120~220	-	☆ 120~220	☆ 120~240	☆ 120~240	☆ 120~220	☆ 120~220	-	-	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	☆ 120~180	☆ 100~160	☆ 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	-	
Alloy Steel	★ 80~140	☆ 80~140	-	☆ 80~140	☆ 100~160	☆ 100~160	☆ 80~140	☆ 80~140	-	-	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	☆ 80~150	☆ 70~130	☆ 70~130	-	-	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	☆ 70~140	☆ 60~120	☆ 60~120	-	-	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	-	-	-	-	-	☆ 100~150	☆ 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	-	-	-	-	-	☆ 80~120	☆ 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 Alloy	-	-	-	-	-	-	-	-	-	★ 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	Not Available
	f (mm/rev)	0.1	0.05	0.05	0.05	Concave Surface 0.05 Continuous Part 0.1	*0.05
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
ap	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 φ24 (φ30-0.1x30x2)

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

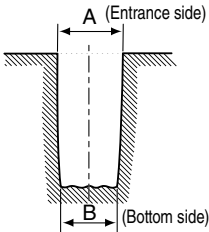
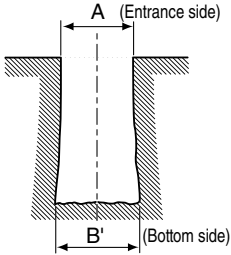
Max. Depth for Machining with Outer Coolant

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

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

Trouble shooting

Trouble shooting (DRS / DRX / DRZ)

Trouble condition	Condition	Cause	Countermeasures
Hole diameter is small (at hole bottom)	 There is no problem for entrance, 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, K34, K40 or K51 for “Recommended Cutting Conditions”
Hole diameter becomes larger (at hole bottom)	 There is no problem for entrance, 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, K34, K40 or K51 for “Recommended Cutting Conditions” · Check the core height ➔ Ref. to page K36-K37
Hole diameter is small (from the hole entrance)		Hole diameter is small from entrance. (At turning moment)	Inappropriate adjustment of hole diameter. ➔ Ref. to page K36
		No core at internal edge. (No core remains)	Adjust the core height. ➔ Ref. to page, K36-K37

K



Drilling

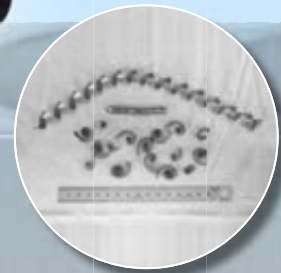
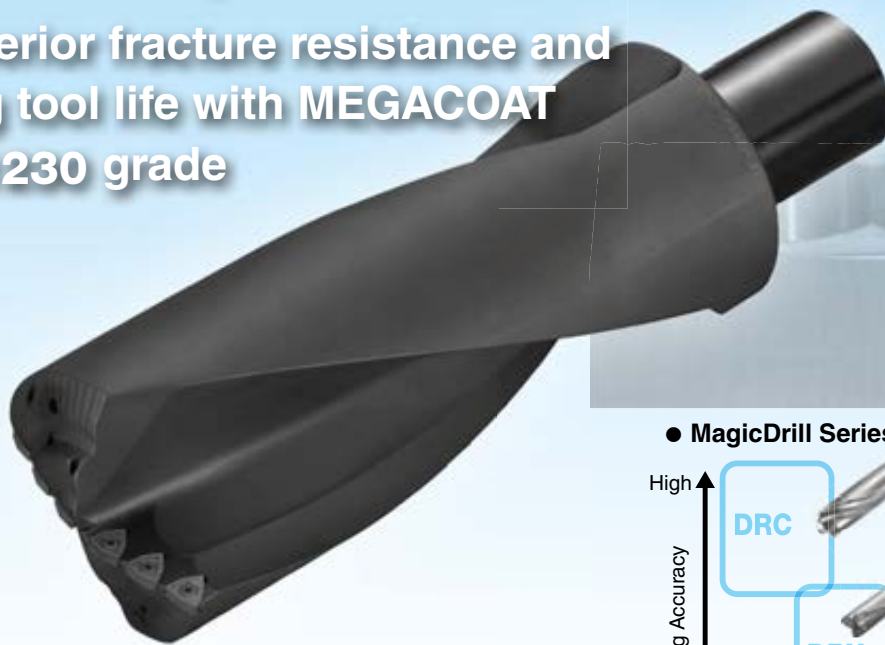
Indication of tool life of MagicDrill (DRS / DRX / DRZ)

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 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 exit 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

Advantages

- Sharp cutting
- Enhanced chip evacuation
- Superior fracture resistance and long tool life with MEGACOAT PR1230 grade

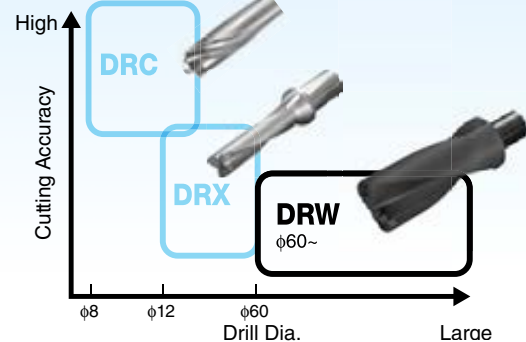


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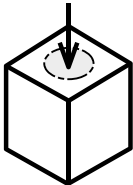
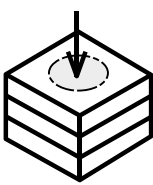
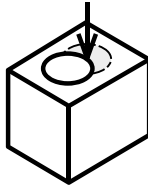
Drilling

● MagicDrill Series Application Map



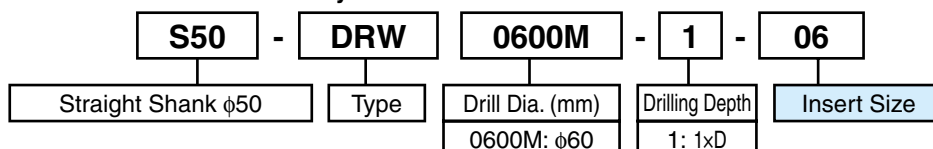
Applicable diameter: $\phi 60$ to $\phi 100$ (Max. $\phi 200$ is possible)
Drilling Depth: 1D, 2D, 3D (Max. 5D is possible)
 Use single type of insert.

■ Possible Drilling Applications

Plain Surface	Stacked Plates	Hole Expansion	Slant Surface
			

* Hole expansion: Overlap amount of through hole must be 1/5D (0.2x ϕ 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



DRW

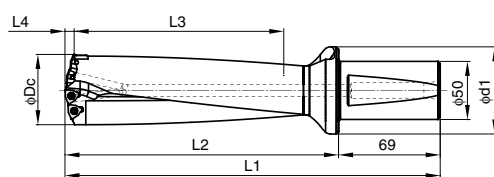
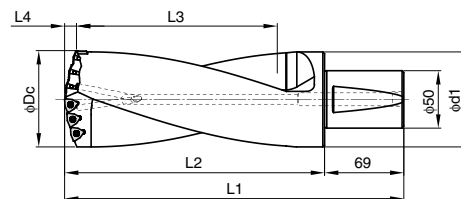


Fig.1



φDc=φ65~φ74 (4 inserts)
φDc=φ75~φ100 (6 inserts)

Fig.2

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	
DRW0650M-1-06	MTO		65	184	115	65	8.2	63	
DRW0660M-1-06	MTO		66	185	116	66	8.3	64	Fig.2
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	
DRW0650M-2-06	●		65	249	180	130	8.2	63	Fig.2
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	

● : Std. Item

MTO : Made to order

■ Applicable Inserts

Insert	Description	Dimension (mm)				Angle (°)	MEGACOAT PR1230	MEGACOAT NANO PR1535	CVD Coated Carbide CA6535	Applicable Toolholders
		A	T	φd	rε					
	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 (φ22 or larger).

● Toolholder Dimensions (Drilling Depth: 3xD)



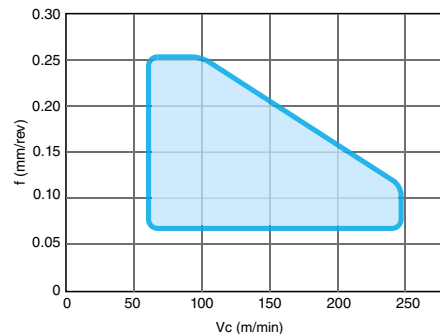
Description		Std.	No. of Inserts	Dimension (mm)						Drawing
				φDc	L1	L2	L3	L4	φd1	
S50-	DRW0600M-3-06	●	4	60	295	226	180	7.6	63	Fig.1
	DRW0610M-3-06	MTO		61	298	229	183	7.7	63	
	DRW0620M-3-06	MTO		62	302	233	186	7.8	63	
	DRW0630M-3-06	MTO		63	305	236	189	7.9	63	
	DRW0640M-3-06	MTO		64	310	241	192	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		72	339	270	216	9.0	70	
	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		●	6	75	351	282	225	9.3
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

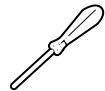
Workpiece Material	Vc (m/min)	f (mm/rev)
Carbon Steel	80~200	0.07~0.25
Alloy Steel	80~160	0.07~0.25
Mold Steel	70~150	0.06~0.20
Gray Cast Iron	100~240	0.07~0.30
Nodular Cast Iron	80~150	0.07~0.25

- 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)
φ60~φ100	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.

● : Std. Item
MTO : Made to order

Q-1

Is it possible to use outer coolant?

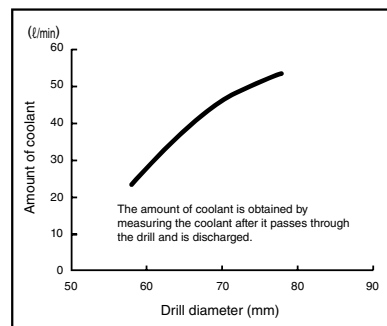
A-1

Outer 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 entrance and 10mm inside, and not any more stretched further inside. Therefore changing the condition of entrance only will also be effective.

· [Low rate + 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 rate + 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 entrance]

E.g. Entrance 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.



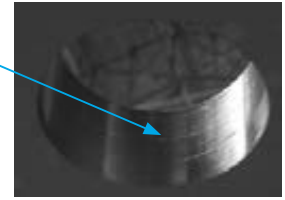
Q-5

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.

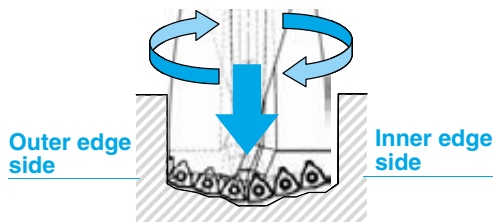
Tool marking



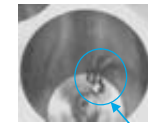
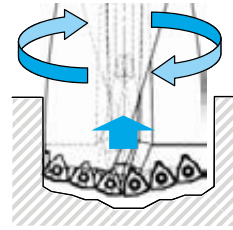
Example of tool marking

How to prevent tool markings

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



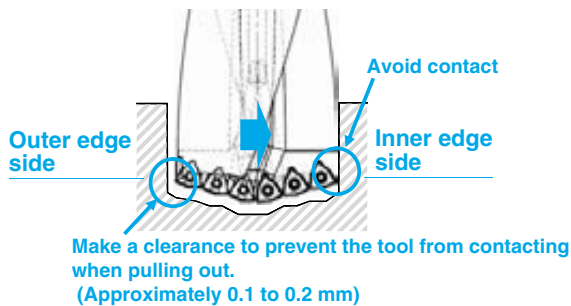
(2) Turn back approximately 0.5 mm. (The spindle revolves.)



Chips are adhering to the bottom when drilling stops.

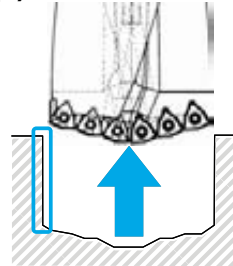
- Without turning back, chips remains adhering to the bottom.
- If offset (3) is performed without turning back, the bottom of drill contacts with the inner surface of hole.
- Turning back is necessary for blind holes but not for through holes.

(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 at
X0.2Y0.2 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	$r\epsilon$					
	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).