

THE NEW VALUE FRONTIER



High Efficiency Modular Drill | **DRA**

High Efficiency Modular Drill

MagicDrill **DRA**



Excellent hole accuracy with a low cutting force design

- Optimal web thickness limits deflection
- Fine chip breaking and smooth deep hole cutting
- Easy insert replacement

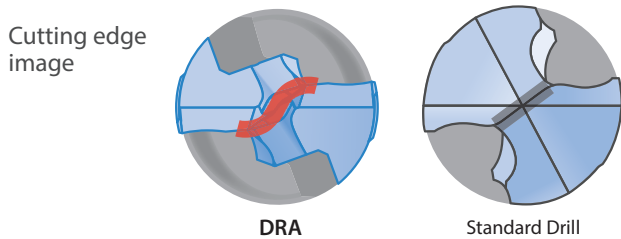


MagicDrill DRA

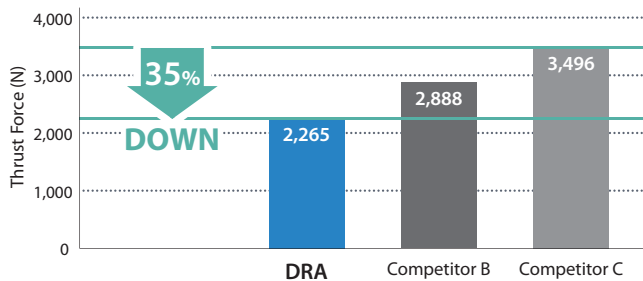
Excellent hole accuracy with a low cutting force-design
5 advantages to efficiently solve common drilling difficulties

Point 1 Low cutting force design improves hole accuracy

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



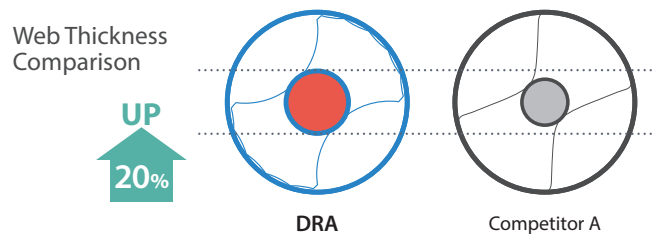
Low Cutting Force Comparison
(In house evaluation)



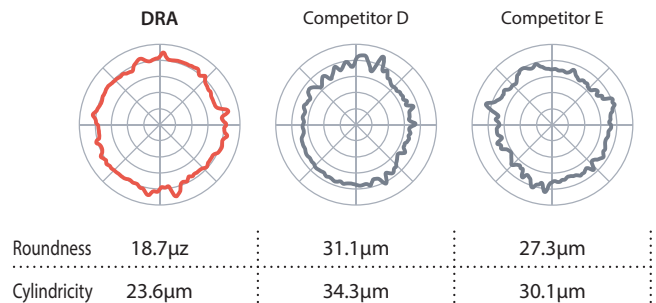
Cutting Conditions : Vc=120m/min, f=0.25mm/rev, Drilling Diameter ϕ 14, Drilling Depth 45mm, Wet Workpiece : S50C

Point 2 Optimal web thickness limits deflection

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



Roundness · Cylindricity Comparison
(In house evaluation)



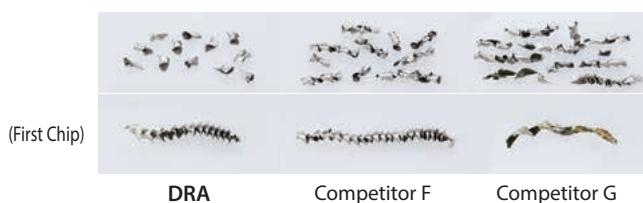
Cutting Conditions : Vc=120m/min, f=0.3mm/rev
Drilling Diameter ϕ 14, Measurement Position 55mm, Wet Workpiece : S50C

Point 3 Fine chip breaking even in deep hole drilling applications

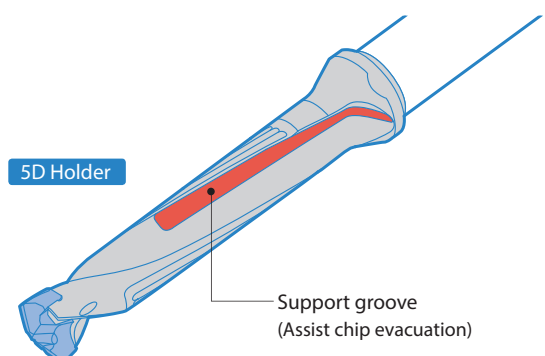
Optimized chip thinning for stable chip evacuation

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

Chip Comparison
(In house evaluation)

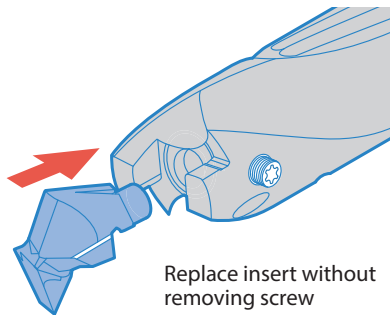


Cutting Conditions : Vc=60m/min, f=0.2mm/rev, Drilling Diameter ϕ 14
Drilling Depth 70mm, Wet Workpiece : SUS304

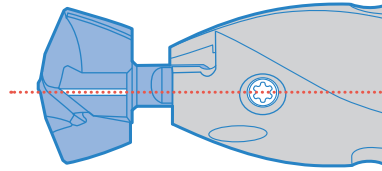


Point 4 Easy insert replacement

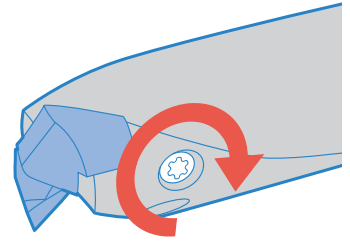
Replace insert without removing screw



Replace insert without removing screw



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



Fix the insert by tightening the screw

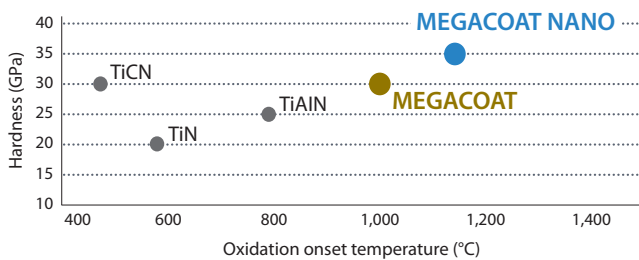
Point 5 Long tool life and stable machining of various workpieces

1st Recommendation

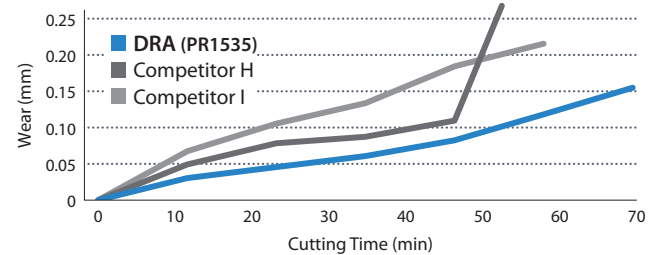
MEGACOAT NANO grade PR1535 is used to machine various materials from steel to stainless steel, with the combination of a tough substrate and a special nano layer coating

Steel · SUS PR1535 Cast Iron PR1525

Coating properties



Wear resistance comparison (In house evaluation)

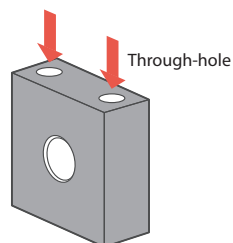


Cutting Conditions : $V_c=100\text{m/min}$, $f=0.25\text{mm/rev}$, Cutting dia. $\phi 14$, Cutting depth 45mm, Wet Workpiece : SCM440H

Case Studies

Attachment SS400

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



Cutting Time

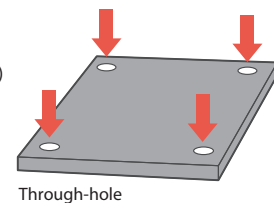


Competitor J applied a peck cycle to avoid chip clogging. DRA controlled chip evacuation without pecking.

(User evaluation)

Plate SUS304

$V_c=60\text{m/min}$ ($n=2,120\text{min}^{-1}$)
 $f=0.12\text{mm/rev}$ ($V_f=254\text{mm/min}$)
 Cutting depth 15mm
 Wet (Internal coolant)
 SS16-DRA090M-3
 DA0900M-GM PR1535



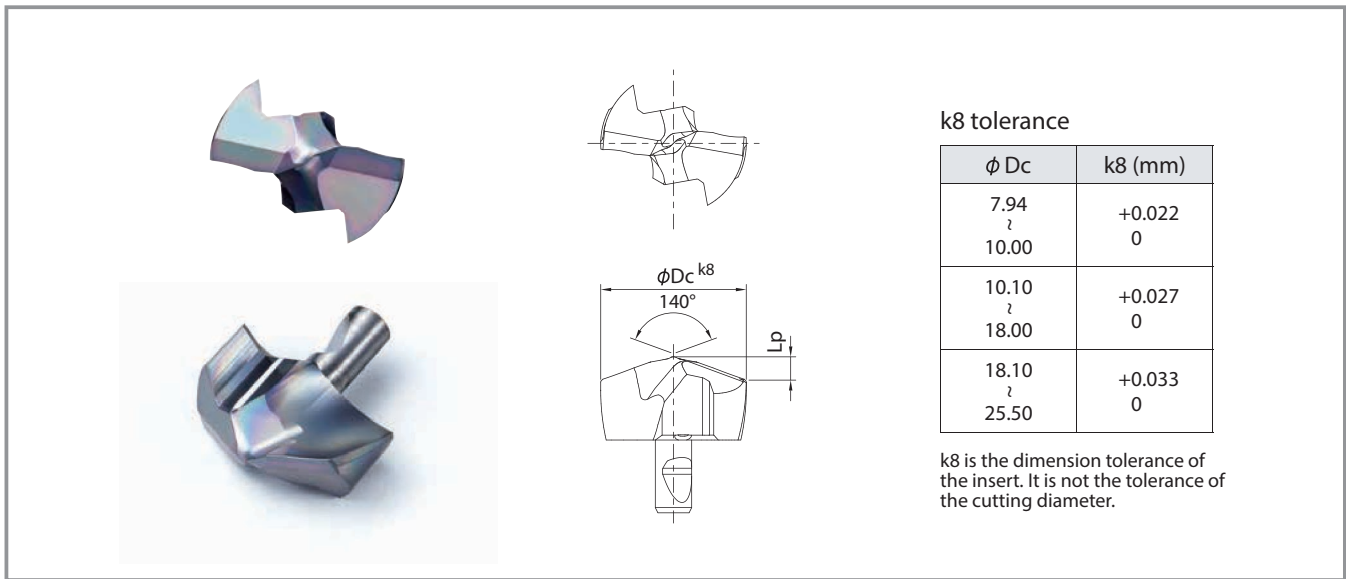
of holes



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

(User evaluation)

Insert for DRA Cutting diameter $\phi 7.94 \sim \phi 25.50$



1st Recommendation

Steel · SUS PR1535	Cast Iron PR1525
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Insert

Description	Dimension (mm)		Grade		Applicable Toolholder
	ϕDc	Lp	PR1535	PR1525	
DA0794M-GM	7.94	1.34	●	●	SS10-DRA080M-○ SF12-DRA080M-○
DA0800M-GM	8.00	1.35	●	●	
DA0810M-GM	8.10	1.37	●	●	
DA0820M-GM	8.20	1.38	●	●	
DA0830M-GM	8.30	1.40	●	●	
DA0840M-GM	8.40	1.42	●	●	
DA0850M-GM	8.50	1.44	●	●	SS10-DRA085M-○ SF12-DRA085M-○
DA0860M-GM	8.60	1.46	●	●	
DA0870M-GM	8.70	1.48	●	●	
DA0880M-GM	8.80	1.49	●	●	
DA0890M-GM	8.90	1.51	●	●	SS10-DRA090M-○ SF12-DRA090M-○
DA0900M-GM	9.00	1.52	●	●	
DA0910M-GM	9.10	1.54	●	●	
DA0920M-GM	9.20	1.56	●	●	
DA0930M-GM	9.30	1.58	●	●	SS10-DRA095M-○ SF12-DRA095M-○
DA0940M-GM	9.40	1.59	●	●	
DA0950M-GM	9.50	1.61	●	●	
DA0960M-GM	9.60	1.63	●	●	
DA0970M-GM	9.70	1.65	●	●	SS12-DRA100M-○ SF16-DRA100M-○
DA0980M-GM	9.80	1.67	●	●	
DA0990M-GM	9.90	1.68	●	●	
DA1000M-GM	10.00	1.70	●	●	
DA1010M-GM	10.10	1.72	●	●	SS12-DRA100M-○ SF16-DRA100M-○
DA1020M-GM	10.20	1.74	●	●	
DA1030M-GM	10.30	1.75	●	●	
DA1040M-GM	10.40	1.77	●	●	

Description	Dimension (mm)		Grade		Applicable Toolholder
	ϕDc	Lp	PR1535	PR1525	
DA1050M-GM	10.50	1.79	●	●	SS12-DRA105M-○ SF16-DRA105M-○
DA1060M-GM	10.60	1.81	●	●	
DA1070M-GM	10.70	1.83	●	●	
DA1080M-GM	10.80	1.85	●	●	
DA1090M-GM	10.90	1.86	●	●	
DA1100M-GM	11.00	1.87	●	●	SS12-DRA110M-○ SF16-DRA110M-○
DA1110M-GM	11.10	1.89	●	●	
DA1120M-GM	11.20	1.91	●	●	
DA1130M-GM	11.30	1.92	●	●	
DA1140M-GM	11.40	1.94	●	●	SS12-DRA115M-○ SF16-DRA115M-○
DA1150M-GM	11.50	1.96	●	●	
DA1160M-GM	11.60	1.98	●	●	
DA1170M-GM	11.70	2.00	●	●	
DA1180M-GM	11.80	2.01	●	●	
DA1190M-GM	11.90	2.03	●	●	SS14-DRA120M-○ SF16-DRA120M-○
DA1200M-GM	12.00	2.03	●	●	
DA1210M-GM	12.10	2.05	●	●	
DA1220M-GM	12.20	2.07	●	●	
DA1230M-GM	12.30	2.08	●	●	SS14-DRA125M-○ SF16-DRA125M-○
DA1240M-GM	12.40	2.10	●	●	
DA1250M-GM	12.50	2.12	●	●	
DA1260M-GM	12.60	2.14	●	●	
DA1270M-GM	12.70	2.16	●	●	
DA1280M-GM	12.80	2.17	●	●	
DA1290M-GM	12.90	2.19	●	●	

Inserts sold in 1 piece boxes
●: Std stock

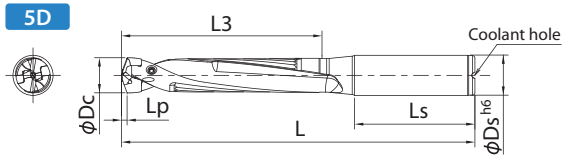
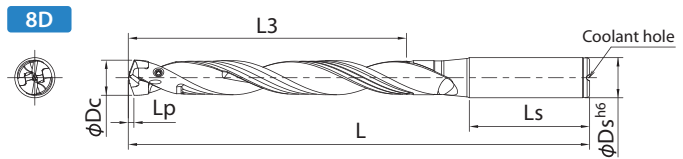
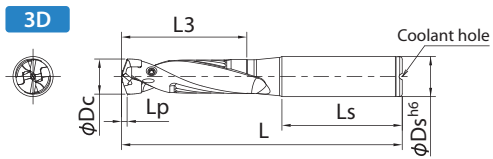
Insert

Description	Dimension (mm)		Grade		Applicable Toolholder
	∅Dc	Lp	PR1535	PR1525	
DA1300M-GM	13.00	2.20	●	●	SS14-DRA130M-○ SF16-DRA130M-○
DA1310M-GM	13.10	2.22	●	●	
DA1320M-GM	13.20	2.24	●	●	
DA1330M-GM	13.30	2.25	●	●	
DA1340M-GM	13.40	2.27	●	●	
DA1350M-GM	13.50	2.29	●	●	SS14-DRA135M-○ SF16-DRA135M-○
DA1360M-GM	13.60	2.31	●	●	
DA1370M-GM	13.70	2.33	●	●	
DA1380M-GM	13.80	2.35	●	●	
DA1390M-GM	13.90	2.36	●	●	
DA1400M-GM	14.00	2.33	●	●	SS16-DRA140M-○ SF16-DRA140M-○
DA1410M-GM	14.10	2.34	●	●	
DA1420M-GM	14.20	2.36	●	●	
DA1430M-GM	14.30	2.38	●	●	
DA1440M-GM	14.40	2.40	●	●	
DA1450M-GM	14.50	2.42	●	●	SS16-DRA145M-○ SF16-DRA145M-○
DA1460M-GM	14.60	2.43	●	●	
DA1470M-GM	14.70	2.45	●	●	
DA1480M-GM	14.80	2.47	●	●	
DA1490M-GM	14.90	2.49	●	●	
DA1500M-GM	15.00	2.52	●	●	SS16-DRA150M-○ SF20-DRA150M-○
DA1510M-GM	15.10	2.54	●	●	
DA1520M-GM	15.20	2.55	●	●	
DA1530M-GM	15.30	2.57	●	●	
DA1540M-GM	15.40	2.59	●	●	
DA1550M-GM	15.50	2.61	●	●	
DA1560M-GM	15.60	2.63	●	●	
DA1570M-GM	15.70	2.65	●	●	
DA1580M-GM	15.80	2.66	●	●	
DA1590M-GM	15.90	2.68	●	●	
DA1600M-GM	16.00	2.69	●	●	SS18-DRA160M-○ SF20-DRA160M-○
DA1610M-GM	16.10	2.71	●	●	
DA1620M-GM	16.20	2.73	●	●	
DA1630M-GM	16.30	2.75	●	●	
DA1640M-GM	16.40	2.76	●	●	
DA1650M-GM	16.50	2.78	●	●	
DA1660M-GM	16.60	2.80	●	●	
DA1670M-GM	16.70	2.82	●	●	
DA1680M-GM	16.80	2.84	●	●	
DA1690M-GM	16.90	2.86	●	●	
DA1700M-GM	17.00	2.86	●	●	SS18-DRA170M-○ SF20-DRA170M-○
DA1710M-GM	17.10	2.88	●	●	
DA1720M-GM	17.20	2.90	●	●	
DA1730M-GM	17.30	2.92	●	●	
DA1740M-GM	17.40	2.93	●	●	

Description	Dimension (mm)		Grade		Applicable Toolholder
	∅Dc	Lp	PR1535	PR1525	
DA1750M-GM	17.50	2.95	●	●	SS18-DRA170M-○ SF20-DRA170M-○
DA1760M-GM	17.60	2.97	●	●	
DA1770M-GM	17.70	2.99	●	●	
DA1780M-GM	17.80	3.01	●	●	
DA1790M-GM	17.90	3.03	●	●	
DA1800M-GM	18.00	3.04	●	●	SS20-DRA180M-○ SF25-DRA180M-○
DA1810M-GM	18.10	3.06	●	●	
DA1820M-GM	18.20	3.07	●	●	
DA1830M-GM	18.30	3.09	●	●	
DA1840M-GM	18.40	3.11	●	●	
DA1850M-GM	18.50	3.13	●	●	
DA1860M-GM	18.60	3.15	●	●	
DA1870M-GM	18.70	3.17	●	●	
DA1880M-GM	18.80	3.18	●	●	
DA1890M-GM	18.90	3.20	●	●	
DA1900M-GM	19.00	3.21	●	●	SS20-DRA190M-○ SF25-DRA190M-○
DA1910M-GM	19.10	3.23	●	●	
DA1920M-GM	19.20	3.25	●	●	
DA1930M-GM	19.30	3.27	●	●	
DA1940M-GM	19.40	3.29	●	●	
DA1950M-GM	19.50	3.30	●	●	
DA1960M-GM	19.60	3.32	●	●	
DA1970M-GM	19.70	3.34	●	●	
DA1980M-GM	19.80	3.36	●	●	
DA1990M-GM	19.90	3.38	●	●	
DA2000M-GM	20.00	3.37	●	●	SS25-DRA200M-○ SF25-DRA200M-○
DA2010M-GM	20.10	3.39	●	●	
DA2020M-GM	20.20	3.41	●	●	
DA2030M-GM	20.30	3.43	●	●	
DA2040M-GM	20.40	3.45	●	●	
DA2050M-GM	20.50	3.46	●	●	
DA2060M-GM	20.60	3.48	●	●	
DA2070M-GM	20.70	3.50	●	●	
DA2080M-GM	20.80	3.52	●	●	
DA2090M-GM	20.90	3.54	●	●	
DA2100M-GM	21.00	3.54	●	●	SS25-DRA210M-○ SF25-DRA210M-○
DA2150M-GM	21.50	3.63	●	●	
DA2200M-GM	22.00	3.71	●	●	SS25-DRA220M-○ SF25-DRA220M-○
DA2250M-GM	22.50	3.80	●	●	
DA2300M-GM	23.00	3.87	●	●	SS25-DRA230M-○ SF25-DRA230M-○
DA2350M-GM	23.50	3.96	●	●	
DA2400M-GM	24.00	4.04	●	●	SS25-DRA240M-○ SF25-DRA240M-○
DA2450M-GM	24.50	4.13	●	●	
DA2500M-GM	25.00	4.20	●	●	SS32-DRA250M-○ SF25-DRA250M-○
DA2550M-GM	25.50	4.29	●	●	

Inserts sold in 1 piece boxes
●: Std stock

DRA Toolholder (Straight Shank)



For Lp dimension, reference insert dimension table

Toolholder Dimension **3D**

Description	Std stock	Dimension (mm)						Applicable Insert	Spare Parts	
		phi Dc		phi Ds	L	L3	Ls		Clamp Screw	Wrench
		min.	max.							
SS10-DRA080M-3	●	7.94	8.49	10	79	25.5	40	DA0794M-GM ~ DA0840M-GM	HS-2524TRP	
SS10-DRA085M-3	●	8.50	8.99		81	27.0		DA0850M-GM ~ DA0890M-GM		
SS10-DRA090M-3	●	9.00	9.49		83	28.5		DA0900M-GM ~ DA0940M-GM		
SS10-DRA095M-3	●	9.50	9.99		85	30.0		DA0950M-GM ~ DA0990M-GM		
SS12-DRA100M-3	●	10.00	10.49	12	92	31.5	45	DA1000M-GM ~ DA1040M-GM	HS-2534TRP	FTP-5
SS12-DRA105M-3	●	10.50	10.99		94	33.0		DA1050M-GM ~ DA1090M-GM		
SS12-DRA110M-3	●	11.00	11.49		97	34.5		DA1100M-GM ~ DA1140M-GM		
SS12-DRA115M-3	●	11.50	11.99		99	36.0		DA1150M-GM ~ DA1190M-GM		
SS14-DRA120M-3	●	12.00	12.49	14	101	37.5	48	DA1200M-GM ~ DA1240M-GM	HS-3048TRP	FTP-6
SS14-DRA125M-3	●	12.50	12.99		103	39.0		DA1250M-GM ~ DA1290M-GM		
SS14-DRA130M-3	●	13.00	13.49		105	40.5		DA1300M-GM ~ DA1340M-GM		
SS14-DRA135M-3	●	13.50	13.99		107	42.0		DA1350M-GM ~ DA1390M-GM		
SS16-DRA140M-3	●	14.00	14.49	16	112	43.5	50	DA1400M-GM ~ DA1440M-GM	HS-4067TRP	FTP-7
SS16-DRA145M-3	●	14.50	14.99		114	45.0		DA1450M-GM ~ DA1490M-GM		
SS16-DRA150M-3	●	15.00	15.99		119	48.0		DA1500M-GM ~ DA1590M-GM		
SS18-DRA160M-3	●	16.00	16.99		124	51.0		DA1600M-GM ~ DA1690M-GM		
SS18-DRA170M-3	●	17.00	17.99	18	128	54.0	56	DA1700M-GM ~ DA1790M-GM		
SS20-DRA180M-3	●	18.00	18.99		135	57.0		DA1800M-GM ~ DA1890M-GM		
SS20-DRA190M-3	●	19.00	19.99		139	60.0		DA1900M-GM ~ DA1990M-GM		
SS25-DRA200M-3	●	20.00	20.99		149	63.0		DA2000M-GM ~ DA2090M-GM		
SS25-DRA210M-3	●	21.00	21.99	25	153	66.0	60	DA2100M-GM ~ DA2150M-GM		
SS25-DRA220M-3	●	22.00	22.99		158	69.0		DA2200M-GM ~ DA2250M-GM		
SS25-DRA230M-3	●	23.00	23.99		162	72.0		DA2300M-GM ~ DA2350M-GM		
SS25-DRA240M-3	●	24.00	24.99		166	75.0		DA2400M-GM ~ DA2450M-GM		
SS32-DRA250M-3	●	25.00	25.50	32	174	78.0	60	DA2500M-GM ~ DA2550M-GM		

● : Std stock

Toolholder Dimension 5D

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

● : Std stock

Toolholder Dimension 8D

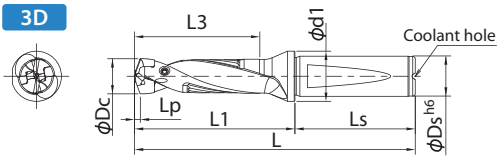
Description	Std stock	Dimension (mm)					Applicable Insert	Spare Parts					
		φ Dc		φ Ds	L	L3		Ls	Clamp Screw	Wrench			
		min.	max.										
SS10-DRA080M-8	●	7.94	8.49	10	121	68.0	40	DA0794M-GM ~ DA0840M-GM	HS-2524TRP	FTP-5			
SS10-DRA085M-8	●	8.50	8.99		126	72.0					DA0850M-GM ~ DA0890M-GM		
SS10-DRA090M-8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

● : Std stock

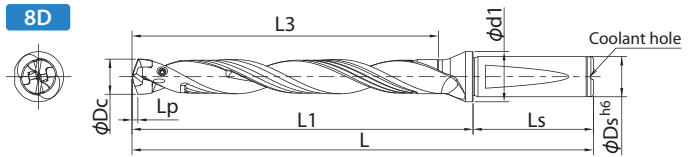
DRA Toolholder (with Flange)



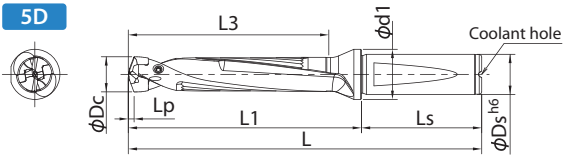
3D



8D



5D



For Lp dimension, reference insert dimension table

Toolholder Dimension **3D**

Description	Std stock	Dimension (mm)								Applicable Insert	Spare Parts						
		phi Dc		phi Ds	L	L1	L3	Ls	phi d1		Clamp Screw	Wrench					
		min.	max.														
SF12-DRA080M-3	●	7.94	8.49	12	84	39	25.5	45	16	DA0794M-GM ~ DA0840M-GM	HS-2524TRP						
SF12-DRA085M-3	●	8.50	8.99		86	41	27.0			DA0850M-GM ~ DA0890M-GM							
SF12-DRA090M-3	●	9.00	9.49		88	43	28.5			DA0900M-GM ~ DA0940M-GM							
SF12-DRA095M-3	●	9.50	9.99		90	45	30.0			DA0950M-GM ~ DA0990M-GM							
SF16-DRA100M-3	●	10.00	10.49	16	95	47	31.5	48	20	DA1000M-GM ~ DA1040M-GM	HS-2534TRP	FTP-5					
SF16-DRA105M-3	●	10.50	10.99		97	49	33.0			DA1050M-GM ~ DA1090M-GM							
SF16-DRA110M-3	●	11.00	11.49		100	52	34.5			DA1100M-GM ~ DA1140M-GM							
SF16-DRA115M-3	●	11.50	11.99		102	54	36.0			DA1150M-GM ~ DA1190M-GM							
SF16-DRA120M-3	●	12.00	12.49		104	56	37.5			DA1200M-GM ~ DA1240M-GM							
SF16-DRA125M-3	●	12.50	12.99		106	58	39.0			DA1250M-GM ~ DA1290M-GM							
SF16-DRA130M-3	●	13.00	13.49		108	60	40.5			DA1300M-GM ~ DA1340M-GM							
SF16-DRA135M-3	●	13.50	13.99		110	62	42.0			DA1350M-GM ~ DA1390M-GM							
SF16-DRA140M-3	●	14.00	14.49		112	64	43.5			DA1400M-GM ~ DA1440M-GM							
SF16-DRA145M-3	●	14.50	14.99		114	66	45.0			DA1450M-GM ~ DA1490M-GM							
SF20-DRA150M-3	●	15.00	15.99		20	121	71			48.0			50	25	DA1500M-GM ~ DA1590M-GM	HS-3048TRP	FTP-6
SF20-DRA160M-3	●	16.00	16.99			126	76			51.0					DA1600M-GM ~ DA1690M-GM		
SF20-DRA170M-3	●	17.00	17.99	130		80	54.0	DA1700M-GM ~ DA1790M-GM									
SF25-DRA180M-3	●	18.00	18.99	25		141	85	57.0	56	32	DA1800M-GM ~ DA1890M-GM	HS-4067TRP			FTP-7		
SF25-DRA190M-3	●	19.00	19.99		145	89	60.0	DA1900M-GM ~ DA1990M-GM									
SF25-DRA200M-3	●	20.00	20.99		149	93	63.0	DA2000M-GM ~ DA2090M-GM									
SF25-DRA210M-3	●	21.00	21.99		153	97	66.0	DA2100M-GM ~ DA2150M-GM									
SF25-DRA220M-3	●	22.00	22.99		158	102	69.0	DA2200M-GM ~ DA2250M-GM									
SF25-DRA230M-3	●	23.00	23.99		162	106	72.0	DA2300M-GM ~ DA2350M-GM									
SF25-DRA240M-3	●	24.00	24.99		166	110	75.0	DA2400M-GM ~ DA2450M-GM									
SF25-DRA250M-3	●	25.00	25.50		170	114	78.0	DA2500M-GM ~ DA2550M-GM									

● : Std stock

Toolholder Dimension 5D

Description	Std stock	Dimension (mm)							Applicable Insert	Spare Parts							
		φ Dc		φ Ds	L	L1	L3	Ls		φ d1	Clamp Screw	Wrench					
		min.	max.														
SF12-DRA080M-5	●	7.94	8.49	12	101	56	42.5	45	16	DA0794M-GM ~ DA0840M-GM	HS-2524TRP						
SF12-DRA085M-5	●	8.50	8.99		104	59	45.0										
SF12-DRA090M-5	●	9.00	9.49		107	62	47.5										
SF12-DRA095M-5	●	9.50	9.99		110	65	50.0										
SF16-DRA100M-5	●	10.00	10.49	16	116	68	52.5	48	20	DA1000M-GM ~ DA1040M-GM	HS-2534TRP	FTP-5					
SF16-DRA105M-5	●	10.50	10.99		119	71	55.0										
SF16-DRA110M-5	●	11.00	11.49		123	75	57.5										
SF16-DRA115M-5	●	11.50	11.99		126	78	60.0										
SF16-DRA120M-5	●	12.00	12.49		129	81	62.5										
SF16-DRA125M-5	●	12.50	12.99		132	84	65.0										
SF16-DRA130M-5	●	13.00	13.49		135	87	67.5										
SF16-DRA135M-5	●	13.50	13.99		138	90	70.0										
SF16-DRA140M-5	●	14.00	14.49		141	93	72.5										
SF16-DRA145M-5	●	14.50	14.99		144	96	75.0										
SF20-DRA150M-5	●	15.00	15.99		20	153	103			80.0			50	25	DA1500M-GM ~ DA1590M-GM	HS-3048TRP	FTP-6
SF20-DRA160M-5	●	16.00	16.99			160	110			85.0							
SF20-DRA170M-5	●	17.00	17.99	166		116	90.0										
SF25-DRA180M-5	●	18.00	18.99	25	179	123	95.0	56	32	DA1800M-GM ~ DA1890M-GM	HS-4067TRP	FTP-7					
SF25-DRA190M-5	●	19.00	19.99		185	129	100.0										
SF25-DRA200M-5	●	20.00	20.99		191	135	105.0										
SF25-DRA210M-5	●	21.00	21.99		197	141	110.0										
SF25-DRA220M-5	●	22.00	22.99		204	148	115.0										
SF25-DRA230M-5	●	23.00	23.99		210	154	120.0										
SF25-DRA240M-5	●	24.00	24.99		216	160	125.0										
SF25-DRA250M-5	●	25.00	25.50		222	166	130.0										


● : Std stock

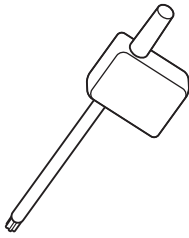
Toolholder Dimension 8D

Description	Std stock	Dimension (mm)							Applicable Insert	Spare Parts							
		φ Dc		φ Ds	L	L1	L3	Ls		φ d1	Clamp Screw	Wrench					
		min.	max.														
SF12-DRA080M-8	●	7.94	8.49	12	126	81	68.0	45	16	DA0794M-GM ~ DA0840M-GM	HS-2524TRP						
SF12-DRA085M-8	●	8.50	8.99		131	86	72.0										
SF12-DRA090M-8	●	9.00	9.49		135	90	76.0										
SF12-DRA095M-8	●	9.50	9.99		140	95	80.0										
SF16-DRA100M-8	●	10.00	10.49	16	147	99	84.0	48	20	DA1000M-GM ~ DA1040M-GM	HS-2534TRP	FTP-5					
SF16-DRA105M-8	●	10.50	10.99		152	104	88.0										
SF16-DRA110M-8	●	11.00	11.49		157	109	92.0										
SF16-DRA115M-8	●	11.50	11.99		162	114	96.0										
SF16-DRA120M-8	●	12.00	12.49		166	118	100.0										
SF16-DRA125M-8	●	12.50	12.99		171	123	104.0										
SF16-DRA130M-8	●	13.00	13.49		175	127	108.0										
SF16-DRA135M-8	●	13.50	13.99		180	132	112.0										
SF16-DRA140M-8	●	14.00	14.49		184	136	116.0										
SF16-DRA145M-8	●	14.50	14.99		189	141	120.0										
SF20-DRA150M-8	●	15.00	15.99		20	201	151			128.0			50	25	DA1500M-GM ~ DA1590M-GM	HS-3048TRP	FTP-6
SF20-DRA160M-8	●	16.00	16.99			211	161			136.0							
SF20-DRA170M-8	●	17.00	17.99	220		170	144.0										
SF25-DRA180M-8	●	18.00	18.99	25	236	180	152.0	56	32	DA1800M-GM ~ DA1890M-GM	HS-4067TRP	FTP-7					
SF25-DRA190M-8	●	19.00	19.99		245	189	160.0										
SF25-DRA200M-8	●	20.00	20.99		254	198	168.0										
SF25-DRA210M-8	●	21.00	21.99		263	207	176.0										
SF25-DRA220M-8	●	22.00	22.99		273	217	184.0										
SF25-DRA230M-8	●	23.00	23.99		282	226	192.0										
SF25-DRA240M-8	●	24.00	24.99		291	235	200.0										
SF25-DRA250M-8	●	25.00	25.50		300	244	208.0										

● : Std stock

Spare Parts

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

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

Recommended Cutting Conditions ★ 1st Recommendation ☆ 2nd Recommendation

Workpiece Material	Recommended Grade / Cutting Speed (m/min)		Spindle Revolution (min ⁻¹)	Cutting Dia. ϕ Dc (mm)						Notes
	PR1535	PR1525		Feed Rate (mm/rev)	ϕ 8	ϕ 11	ϕ 14	ϕ 18	ϕ 22	
Low Carbon Steel	★ 100-180	☆ 100-180	Spindle Revolution (min ⁻¹)	3,980 - 7,160	2,890 - 5,210	2,270 - 4,090	1,770 - 3,180	1,450 - 2,600	1,270 - 2,290	Coolant (See page 10)
			Feed Rate (mm/rev)	0.12 - 0.24	0.12 - 0.31	0.16 - 0.36	0.16 - 0.4	0.2 - 0.45	0.2 - 0.45	
Carbon Steel	★ 100-150	☆ 100-150	Spindle Revolution (min ⁻¹)	3,980 - 5,970	2,890 - 4,340	2,270 - 3,410	1,770 - 2,650	1,450 - 2,170	1,270 - 1,910	
			Feed Rate (mm/rev)	0.12 - 0.24	0.12 - 0.31	0.16 - 0.36	0.16 - 0.4	0.2 - 0.45	0.2 - 0.45	
Alloy Steel	★ 70-120	☆ 70-120	Spindle Revolution (min ⁻¹)	2,790 - 4,780	2,030 - 3,470	1,590 - 2,730	1,240 - 2,120	1,010 - 1,740	890 - 1,530	
			Feed Rate (mm/rev)	0.12 - 0.24	0.12 - 0.31	0.16 - 0.36	0.16 - 0.4	0.2 - 0.45	0.2 - 0.45	
Tool Steel	★ 50-90	☆ 50-90	Spindle Revolution (min ⁻¹)	1,990 - 3,580	1,450 - 2,600	1,140 - 2,050	880 - 1,590	720 - 1,300	640 - 1,150	
			Feed Rate (mm/rev)	0.08 - 0.17	0.08 - 0.22	0.11 - 0.25	0.11 - 0.28	0.14 - 0.32	0.14 - 0.32	
Stainless Steel	★ 40-70	☆ 40-70	Spindle Revolution (min ⁻¹)	1,590 - 2,790	1,160 - 2,030	910 - 1,590	710 - 1,240	580 - 1,010	510 - 890	
			Feed Rate (mm/rev)	0.1 - 0.24	0.1 - 0.24	0.12 - 0.3	0.15 - 0.3	0.15 - 0.3	0.15 - 0.35	
				※ Feed Rate 0.15 mm/rev or less is recommended until drilling depth reaches 0.5D mm.						
Gray Cast Iron	☆ 90-170	★ 90-170	Spindle Revolution (min ⁻¹)	3,580 - 6,760	2,600 - 4,920	2,050 - 3,870	1,590 - 3,010	1,300 - 2,460	1,150 - 2,170	
			Feed Rate (mm/rev)	0.14 - 0.29	0.14 - 0.37	0.19 - 0.43	0.19 - 0.45	0.24 - 0.45	0.24 - 0.45	
Nodular Cast Iron	☆ 40-120	★ 40-120	Spindle Revolution (min ⁻¹)	1,590 - 4,780	1,160 - 3,470	910 - 2,730	710 - 2,120	580 - 1,740	510 - 1,530	
			Feed Rate (mm/rev)	0.12 - 0.24	0.12 - 0.31	0.16 - 0.36	0.16 - 0.4	0.2 - 0.45	0.2 - 0.45	

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

Coolant

1st Recommendation

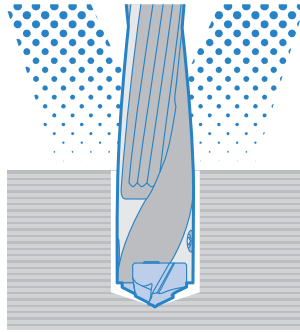
Internal coolant

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

In case of external coolant

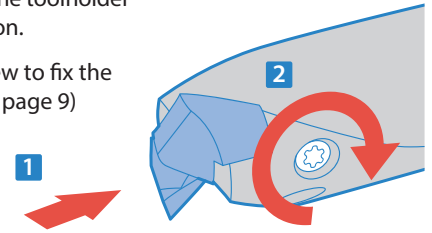
Lathe: Within 3D
Vertical M/C: Within 1.5D

※ Dry cutting is not recommended.



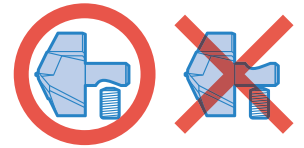
How to attach inserts

- 1 Install insert onto the toolholder in the right direction.
- 2 Tighten clamp screw to fix the insert (Torque: see page 9)



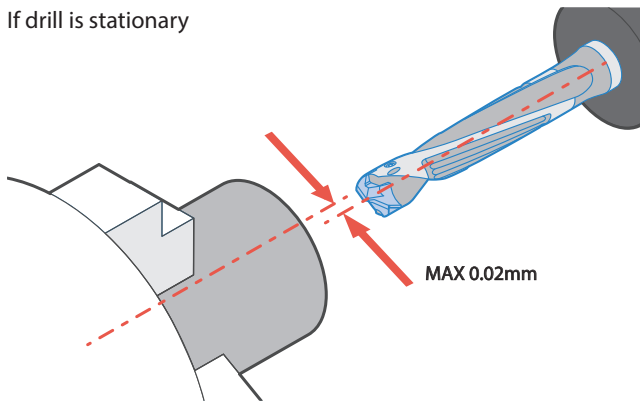
- ※ 1 Remove dust on insert pocket using air blow for every replacement.
- ※ 2 Make sure that the locating surfaces of the insert closely contacts the toolholder.

Be careful of the insert direction



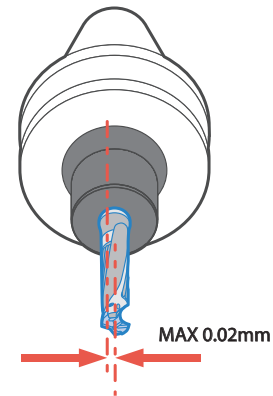
Core Deviation / Alignment Cautions

If drill is stationary



DRA works with both boring sleeve and collet-chuck. Center line deviation should be less than 0.02mm between workpiece and drill.

If drill is rotating



Do not use any arbor whose attachment surface is deformed. Center deviation must be less than 0.02mm.

Cautions for installation on Machining Center

How to install DRA

1st Recommendation

Hydro-chuck, Power-chuck, Collet-chuck

Hydro-chuck

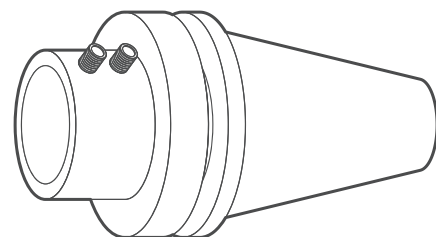
Power-chuck

Collet-chuck

Install DRA into these chucks

2nd Recommendation

Side lock Arbor



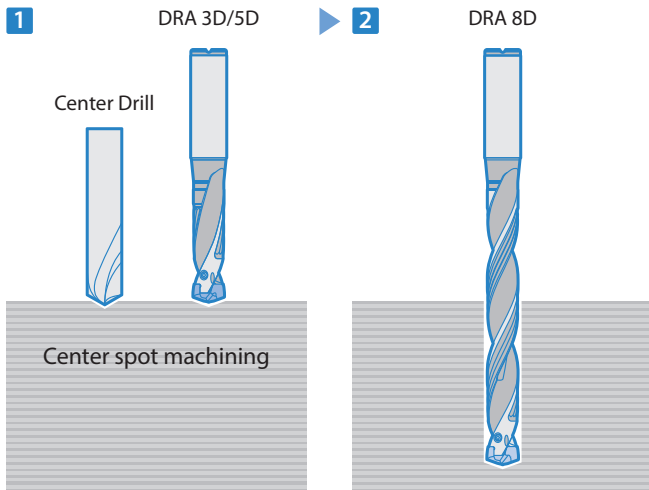
Example of side lock arbor

Other cautions

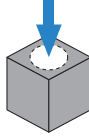
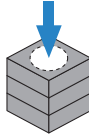
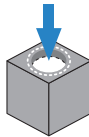
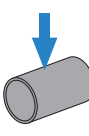
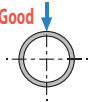
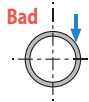


Cautions for machining with 8D holder

Recommended machining

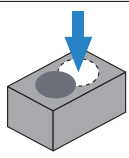
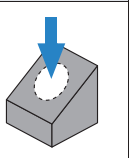
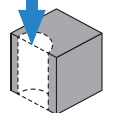
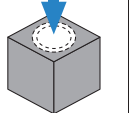
- 1 Make a center spot using DRA 3D/5D type or a commercially available center drill which has a vertex angle of about 140°. (Center spot should be at least half of cutting diameter)
- 2 Then drill the hole using DRA (8D type).



Applicable workpiece

Application	Workpiece Shape	Caution for machining
Plain Surface		<ol style="list-style-type: none"> 1. When machining stainless steel, for hole depths of up to 0.5D, keep feed rate at less than 0.15mm/rev. 2. Internal coolant is recommended for smooth chip removal. For stainless steel, the combination of internal and external coolant is recommended.
Stacked Plates		<ol style="list-style-type: none"> 1. Fix stacked plates securely to ensure they do not slip while machining.
Concave Surface		<ol style="list-style-type: none"> 1. When machining concave holes, set the feed rate at less than half of recommended feed for continuous hole machining. 2. Utilize a pecking cycle if chips are not broken short at the inlet.
Pipe Material		<ol style="list-style-type: none"> 1. Hole machining above the centerline of the pipe is possible.  Good  Bad 2. Do not machine on curved surface areas.  Center Portion Machining  Curved Surface Portion Machining

Non-recommended workpieces

Application	Workpiece Shape	Application	Workpiece Shape
Hole Expansion		Slant Surface	
Half Cylindrical		Cored Hole	

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