

Large Diameter MagicDrill DRW

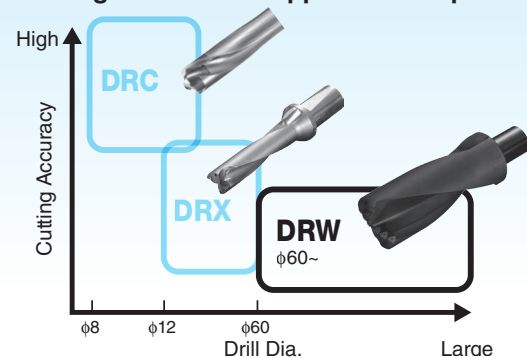
Advantages

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



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

● MagicDrill Series Application Map

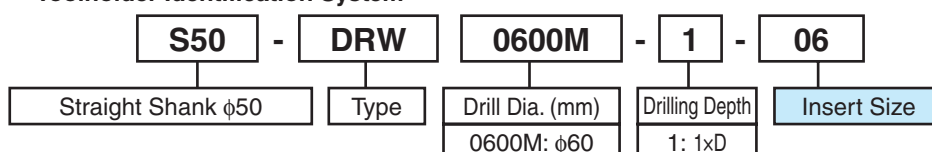


■ Possible Drilling Applications

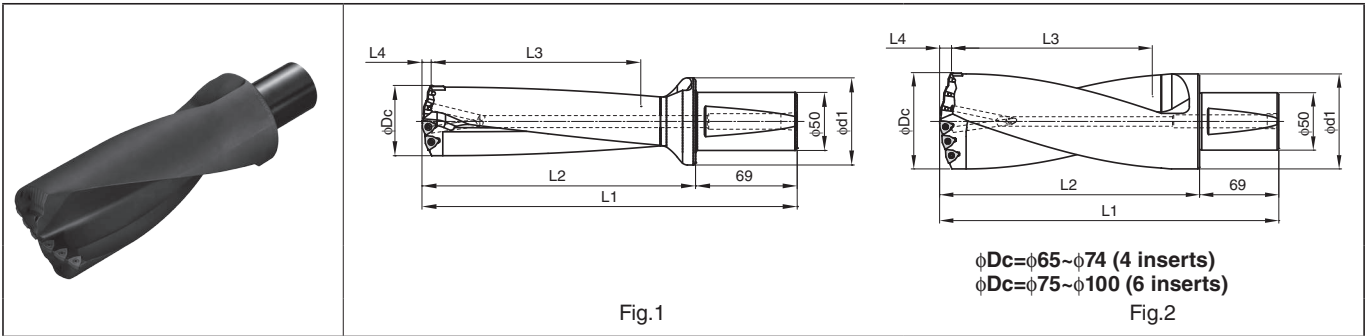
Plain Surface	Stacked Plates	Hole Expansion	Slant Surface

* Hole expansion: Overlap amount of through hole must be $1/5D$ ($0.2 \times \phi Dc$) or less.
 Expansion of blind holes is not possible because chips are built up in the next hole and will cause chip biting.

● Toolholder Identification System



DRW



Toolholder Dimensions (Drilling Depth: 1xD)

1D

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

Toolholder Dimensions (Drilling Depth: 2xD)

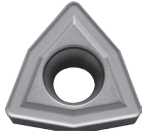
2D

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

● : 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)



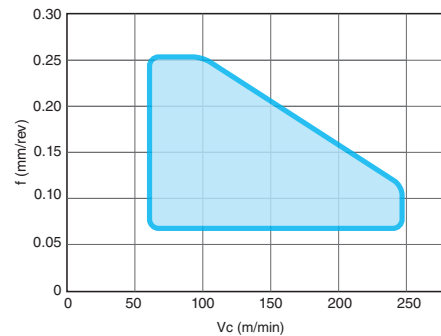
Description		Std.	No. of Inserts	Dimension (mm)						Drawing
				φDc	L1	L2	L3	L4	φd1	
S50-	DRW0600M-3-06	●	4	60	295	226	180	7.6	63	Fig.1
	DRW0610M-3-06	MTO		61	298	229	183	7.7	63	
	DRW0620M-3-06	MTO		62	302	233	186	7.8	63	
	DRW0630M-3-06	MTO		63	305	236	189	7.9	63	
	DRW0640M-3-06	MTO		64	310	241	192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

Inserts are sold
in 10 piece boxes

K55

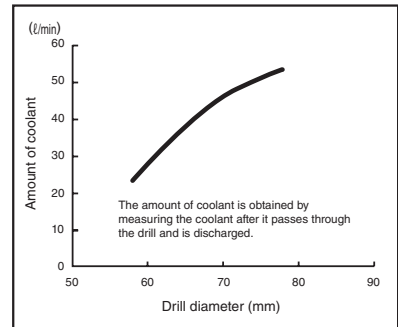
Q-1

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.



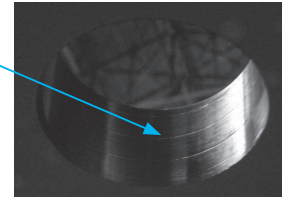
Q-5

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.

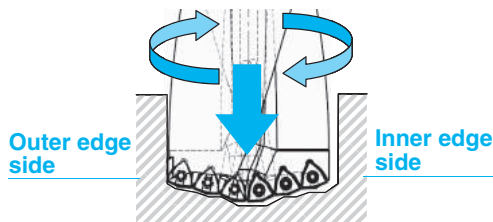
Tool marking



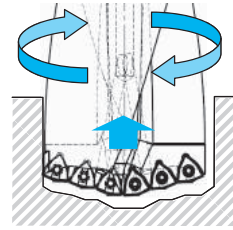
Example of tool marking

How to prevent tool markings

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



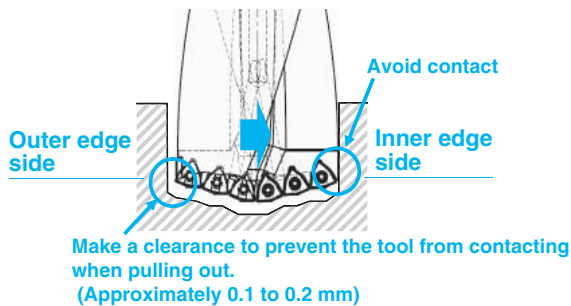
(2) Turn back approximately 0.5 mm. (The spindle revolves.)



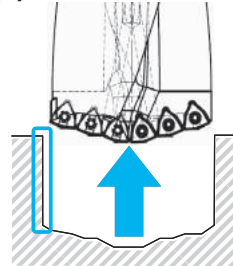
Chips are adhering to the bottom when drilling stops.

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

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



(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 the specified position
X0.2Y0.2
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).