Drills

K

K1 ~ K47

Drill Selection Guide

Legend : 2D (L/D ratio, where L is the depth of hole and D is the drill diameter)

Application		General ⟷ Special		
Solid Type	General Purpose	Super MultiDrill K10 **T Type** φ 1.0～20mm Improved general purpose drill Coated Carbide — 2D 4D	Super MultiDrill K16 **K Type** φ 1.0～20mm General purpose drill Coated Carbide — 2D 3D	Super MultiDrill K16 **G Type** φ 2.8～20mm For Cast Iron & Aluminum Carbide — 2D 3D
		—	—	Super MultiDrill K18 **D Type** φ 1.0～16.1mm Hardened Steel & Exotic Metals Coated Carbide — 3D
	Deep Hole	Super MultiDrill K12 **HT Type** φ 1.5～20mm General purpose drill for deep holes of up to 8D. Coated Carbide, W/ Oil Hole — 3D 5D 8D	Super MultiDrill K20 **HK Type** φ 1.5～25mm General purpose drill with oil-holes Coated Carbide, W/ Oil Hole — 3D 5D 8D	—
Brazed Type	General Purpose	Super MultiDrill K34 **MAK Type** φ 13.6～40.5mm General purpose drill Coated Carbide, W/ Oil Hole — 3D	—	Super MultiDrill K34 **BAK Type** φ 13.6～30.5mm For cast steel structures Coated Carbide, W/ Oil Hole — 3D
	Deep Hole	Super MultiDrill K34 **LAK Type** φ 13.6～40.5mm Deep hole drilling Coated Carbide, W/ Oil Hole — 5D	Super MultiDrill K34 **DAK Type** φ 13.0～30.5mm Good chip removal Coated Carbide, W/ Oil Hole — 7D	—

■ Recommended Conditions by Work Materials

(V C/Speed (m/min), f Feedrate (mm/rev))

Drill \ Work		Steel	Stainless Steel	Cast Iron	Non-Ferrous Metal
Solid Type	**T Type/K Type**	V: 50–130, f: 0.2–0.35	V: 15–70, f: 0.1–0.2	V: 50–110, f: 0.2–0.35	—
	G Type	—	—	V: 25–80, f: 0.25–0.4	V: 80–200, f: 0.25–0.45
	HT Type/HK Type	V: 70–150, f: 0.2–0.35	V: 50–90, f: 0.1–0.25	V: 100–140, f: 0.2–0.35	—
Brazed Type	**AK Type** (MAK/LAK/DAK/BAK)	V: 50–90, f: 0.15–0.35	V: 35–50, f: 0.15–0.25	V: 60–100, f: 0.2–0.35	—

Legend : 2D (L/D ratio, where L is the depth of hole and D is the drill diameter)

Application	General ⟷ Special		
Indexable Drills	SEC-MultiDrill **SMD Type** φ12.0～30.5mm K25 Expansion Coated Carbide · W/ Oil Hole · Indexable · 3D · 5D · 8D	**WDS Drill** K29 High Efficiency and Deep holes φ14～50mm Coated Carbide · W/ Oil Hole · Indexable · 3D · 5D	Chamfer Ring **DC-SMDH Type** φ14～30mm K28 New Coated Carbide · Indexable

Application	Deep Hole	Very Small Hole	Precision Hole
Special Purpose Drills	Super MultiDrill **XHT Type** φ2.97～7.97mm K14 High efficiency drilling of deep holes Expansion Coated Carbide · W/ Oil Hole · 25D	MINI-MultiDrill **MDSS Type** φ0.20～1.00mm K15 Expansion Coated Carbide · 10D	AURORA COAT Drill **DLH Type** φ3.0～16.0mm K23 (For Aluminum) Coated Carbide · W/ Oil Hole · 3D · 5D
	Gun Drill φ3～30mm K44 Deep hole drilling of up to 100D Carbide · W/ Oil Hole · 20D · 100D	**MicroDrill** φ0.05～3.20mm K43 High precision drilling of Printed Circuit Boards Carbide · 5D	**SUMIDIA Drill** φ5～12mm K46 Achieving good hole quality and longer tool life Sintered Diamond · W/ Oil Hole · 3D

Others				
	H's MultiDrill **HMD-S Type** (Short Type) φ1～20mm K36 Coated HSS · 3D	H's MultiDrill **HMD-M Type** (Standard Type) φ2～20mm K38 Coated HSS · 5D	Unique brazing joint design **Brazed Drill** DLS Type DLT Type K41 Carbide · 5~8D · 6~12D	Flutes are unground **VA Drill** VSD Type K40 Carbide · 5~11D

■ Recommended Conditions by Work Materials

V C/Speed (m/min)
f Feedrate (mm/rev)

Drill \ Work	Steel	Stainless Steel	Cast Iron	Non-Ferrous Metal
SEC-MultiDrill (φ20)	80–130 / 0.15–0.35	50–90 / 0.1–0.25	50–100 / 0.2–0.45	100–180 / 0.2–0.4
WDS Drill (φ18)	100–180 / 0.15–0.25	80–150 / 0.15–0.2	100–150 / 0.1–0.25	100–200 / 0.1–0.25
Gun Drill (φ10)	80–130 / 0.0015–0.03	50–80 / 0.01–0.02	80–100 / 0.03–0.05	180–250 / 0.03–0.06
SUMIDIA Drill (φ10)	—	—	—	80–200 / 0.05–0.2

MultiDrill Series

■ Characteristics

- ●Unique curved flute design has proven to enhance chip formation and removal, resulting in better hole accuracy.
- ●High speed and high efficient drilling is made possible with the combination of a special substrate with an advance PVD coating. (10x tool life of HSS drills, 5x the efficiency)
- ●Wide selection range (Diameter : ϕ1.0～40.5mm, Drilling depths L/D : ～25)

■ Solid Type MultiDrill Selection

Type	Series	Drill Shape	Coolant Supply: Internal	Coolant Supply: External	Coating: Yes	Coating: No	Diameter Min~Max	Drilling Depth (Length Code)	Cat. No.	Ref. Page	P: Soft Steel	P: Gen. Steel	H: Hardened Steel 45HRC	H: Hardened Steel 60HRC	M: Stainless Steel	S: Ti-Alloy	S: Inconel	K: Cast Iron	K: Ductile Cast Iron	N: Al-Alloy	N: Copper Alloy
Solid	HT type	Straight	○		○		2.8 ~ 16.0	3D(3)	MDWOOOOHT3	K12	◎	◎	○		◎	○	○	◎	◎	△	○
							1.5 ~ 16.0	5D(5)	MDWOOOOHT5												
							2.0 ~ 12.0	8D(8)	MDWOOOOHT8												
	T type	Straight		○	○		1.5 ~ 20.0	2D(2)	MDWOOOOT2	K10	◎	◎	○		○			◎	◎		
							3.0 ~ 19.0	4D(4)	MDWOOOOT4												
	HK type	Straight	○		○		1.5 ~ 25.0	3D(M)	MDWOOOMHK	K20	◎	◎	○		◎	○	○	◎	◎	△	○
								5D(L)	MDWOOOLHK												
							1.5 ~ 16.0	8D(D)	MDWOOODHK												
	K type	Straight		○	○		1.0 ~ 20.0	2D(S)	MDSOOOSK	K16～	◎	◎	○		○			◎	◎		
							3.0 ~ 20.0	3D(M)	MDSOOOMK												
	Expansion XHT type	Straight	○		○		2.97 ~ 7.97	15D(15)	MDWOOOOXHT15	K14	◎	◎	○		○			◎	◎	○	○
								20D(20)	MDWOOOOXHT20												
								25D(25)	MDWOOOOXHT25												
	Expansion PHT type	Straight	○		○		3.0 ~ 8.0	3D	MDWOOOOPHT	K14	◎	◎	○		○			◎	◎	○	○
	Expansion MDSS type	Straight		○	○		0.2 ~ 1.0	10D	MDSSOOOO	K15	◎	◎	◎	○	◎	○	○	◎	◎	○	○
	G type	Straight		○		○	2.8 ~ 19.5	2D(S)	MDSOOOSG	K16～								◎	○	◎	○
							5.0 ~ 20.0	3D(M)	MDSOOOMG												
	DLH type	Straight	○		○		made-to-order	3D(M)	MDWOOOMDLH	K23								○	○	◎	◎
								5D(L)	MDWOOOLDLH												
	D type	Straight		○	○		1.0 ~ 16.1	3D(M)	MDSOOOMD	K18		○	◎	◎	○	◎	◎	○	○		
	S□HK type	Stepped	○		○		4.3 ~ 10.3	2D(S2)	MDWOOOS2HK	K22	◎	◎	○		◎	○	○	◎	◎		
								3D(S3)	MDWOOOS3HK												
	S□HG type	Stepped	○			○	4.3 ~ 10.3	2D(S2)	MDWOOOS2HG	K22								◎	○	◎	○
								3D(S3)	MDWOOOS3HG												
	S□K type	Stepped		○	○		4.3 ~ 10.3	2D(S2)	MDWOOOS2K	K22	◎	◎	○		◎			◎	◎		
								3D(S3)	MDWOOOS3K												
	S□G type	Stepped		○		○	4.3 ~ 10.3	2D(S2)	MDWOOOS2G	K22								◎	○	◎	○
								3D(S3)	MDWOOOS3G												
Indexable	MTL type	Straight	○		○		12.0 ~ 30.5	3D(M)	SMDHOOOM	K26	◎	◎	○		○			○	◎		○
								5D(L)	SMDHOOOL												
	New MEL type							8D(D)	SMDHOOOD	K26	◎	○			◎	○	○	◎	◎	○	○
Brazed	AK type	Straight	○		○		14.0 ~ 30.5	3D(M)	KDSOOOOMAK	K34	◎	◎	○		○			○	◎	△	○
							14.0 ~ 33.5	5D(L)	KDSOOOOLAK												
							13.0 ~ 30.0	7D(D)	KDSOOOODAK		◎	◎			○			○	◎	△	○
	BAK type	Straight	○		○		18.0 ~ 26.7	3D	KDSOOOOBAK	K34	◎	○			○			○	◎	△	○

(◎ : Best ○ : Good △ : Requires sharp edge)

■ MultiDrill Identification

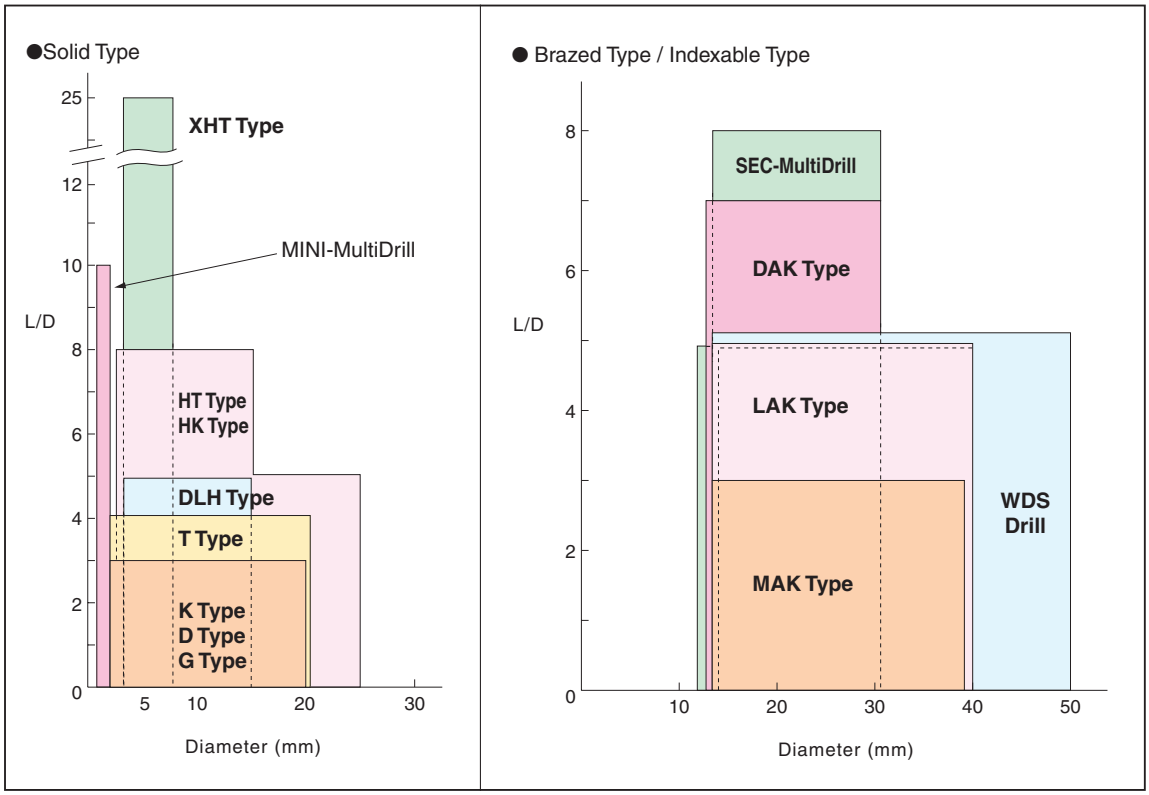
[Ex. 1] **MDW 123 M HK**
- MDW: Classification code
- 123: Drill dia. (ϕ 12.3)
- M: Length code (S,M,L,D,S2,S3)
- HK: Series name

[Ex. 2] **MDW 1230 HT 5**
- MDW: Classification code
- 1230: Drill dia. (ϕ 12.3)
- HT: Series name
- 5: Length code (3,5,8,15,20,25)

■ Classification Code

MDS : Solid Carbide drill without internal oil holes
MDW : Solid carbide drill with internal spiral oil holes
KDS : Brazed carbide-tip drill with internal oil hole

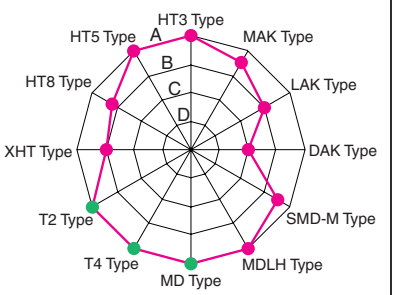
■ Application Map



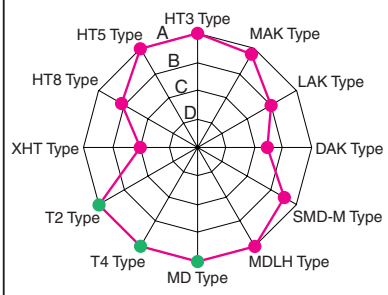
■ Performance Comparison

Thru-Tool Coolant
External Coolant Supply

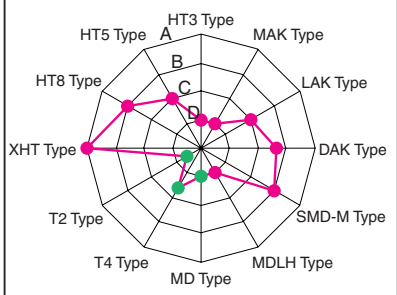
Dimensional Tolerance	
A	IT7～ 8
B	IT8～ 9
C	IT9～10
D	IT10～11



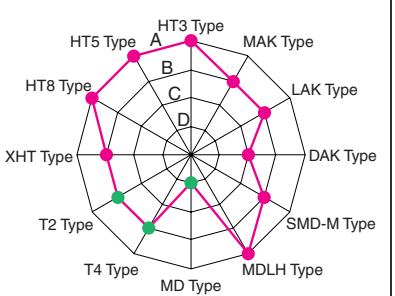
Positioning Accuracy	
A	Below ± 0.05
B	Below ± 0.10
C	Below ± 0.50
D	Above ± 0.50



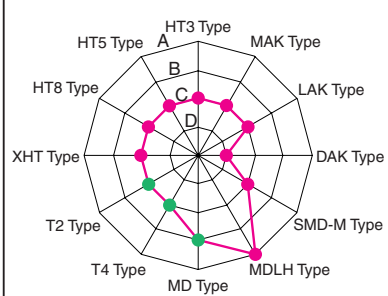
L/D	
A	25D
B	8D
C	5D
D	3D



Efficiency	
A	1000～1500mm/min
B	600～1000mm/min
C	400～ 800mm/min
D	Below 200mm/min



Roughness	
A	Below 6.3Rz
B	6.3～12.5Rz
C	12.5～25.0Rz
D	Above 25.0Rz



Super-MultiDrill T/HT Type

Industry's first, oil-hole drill with 8 times L/D ratio for deep hole drilling of steel

■ General Features

The SUPER MULTIDRILL T type/HT Type utilises a combination of an extra tough substrate, new ZX-coating and a special cutting edge. (HT Type with internal spiral oil holes)

Revolutionizing an industry's first 8D (8x drill diameter) drilling depth, achieving small diameter drilling of deep holes.

■ Characteristics and Application

●Longer tool life
1.5~2.0 times longer tool lifetool life with an optimum substrate and coating combination.

●Low cutting forces
With an improved cutting edge design, thrust force is 30% lower than conventional drills.

●High Efficiency
High speed, high feed drilling can be achieved with the lower thrust force design.

●Shank made to the nearest 1mm
Applicable to the T type (using external coolant supply) and the HT type (using internal coolant supply).

●Eco-Friendly
Compatible with the MQL（Minimum Quantity Lubrication）system.

■ Series

Coolant Supply	Series Code	Diameter Range (mm)	Hole Depth (L/D)
External (T type)	MDW-T2 Type	φ1.0～φ20	～2
	MDW-T4 Type	φ1.0～φ20	～4
Internal (HT type)	MDW-HT3 Type	φ1.5～φ20	～3
	MDW-HT5 Type	φ1.5～φ20	～5
	MDW-HT8 Type	φ1.5～φ20	～8

■ Performance

● Comparison of wear resistance

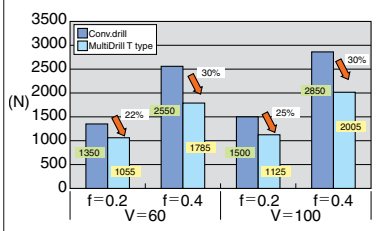
Wear amount after drilling 60m

Super-MultiDrill type

Comp's drill

・Drill: MDW0800T4
・Work: S50C (230HB)
・Ext. coolant: emulsion type
・V=100m/min
・f=0.30mm/rev
・d=30mm (through)

● Comparison of thrust force



・Drill: MDW0800T4
・Work: S50C (230HB)
・Measurement: Kistler Dynamometer

● Using MQL

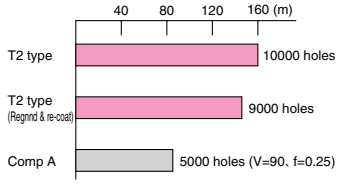
Wear amount after drilling 80m

・Drill: MDW0800T5
・Work: S50C (230HB)
・V=100m/min
・f=0.25mm/rev
・d=40mm (through)

■ Application Examples

● Automotive Parts S50C (230HB)

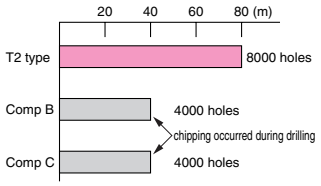
Achieving 1.8x tool life and 1.1x efficiency!



<Drill> MDW1160T2 (φ11.6mm)
<Conditions> V=100m/min (N=2744min⁻¹) f=0.25mm/rev (F=686mm/min) d=16mm (through) Water-soluble coolant oil
<Machine> Vertical type Machining Center BT50

● Automotive Parts S50C (230HB)

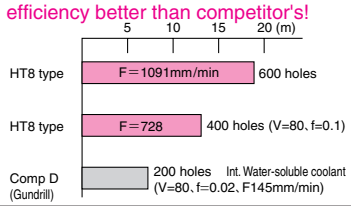
Achieving 2x tool life!



<Drill> MDW0850T2 (φ8.5mm)
<Conditions> V=90m/min (N=3370min⁻¹) f=0.20mm/rev (F=674mm/min) d=10mm (through) Water-soluble coolant oil
<Machine> Vertical type Machining Center BT40

● Machine components S15C (210HB)

Achieving 3x tool life and 7.5x efficiency better than competitor's!



<Drill> MDW0350HT8 (φ3.5mm)
<Conditions> V=100m/min (N=9094min⁻¹) f=0.12mm/rev (F=1091mm/min) d=30mm (through) internal MQL
<Machine> Vertical type Machining Center HSK-A63

Super-MultiDrill XHT/PHT Type

Expansion

■ General Features

The SUPER MULTIDRILL XHT type utilises the basic design of the HT type along with an optimum flute design for excellent chip evacuation, making it a truly revolutionary drill for deep hole drilling.

■ Characteristics and Application

● **Deep hole drilling**

New flute design for improved chip removal capabilities during deep hole drilling.

High efficiency drilling of 25 times drill diameter at F=600mm/min with no pecking cycle.

● **Eco-Friendly**

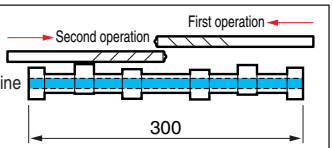
Compatible wtih MQL（Minimum Quantity Lubrication）system.

■ Series

Usage	Series Code	Diameter Range (mm)	Hole Depth (L/D)	Remarks
Deep hole drilling	MDW□□□□XHT15 type	φ2.97～7.97	～15	11 items in stock
	MDW□□□□XHT20 type	φ2.97～7.97	～20	11 items in stock
	MDW□□□□XHT25 type	φ2.97～7.97	～25	11 items in stock
Pilot hole drilling	MDW□□□□PHT type	φ3.00～8.00	～2	11 items in stock

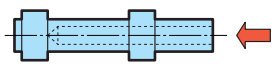
■ Application Examples

● Electrical Appliance Component
S50C（230HB）



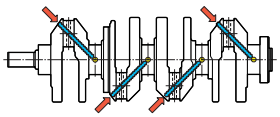
Machine ： Horizontal single axis NC machine
Coolant ： Internal (Emulsion type)
Pump pressure 1.5MPa
Drilling process
1）Dril pilot hole 【φ 6.53 × 13mm drill point angle150 ° 】
V = 80m/min f = 0.15mm/rev
2）Deep hole drilling 【φ 6.50 × 150mm × 2 holes XHTtype】
V = 80m/min f = 0.15mm/rev F = 588mm/min
⇒Tool life: 120components（36 m/reg）

● Automotive Component
SCM420（210HB）



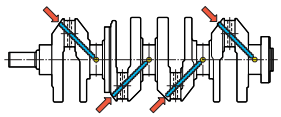
Machine ： NC lathe
Coolant ： Internal (Emulsion type)
Pump pressure 2.0MPa
Drilling process
1）Dril pilot hole 【φ 8.55 × 16mm drill point angle150 ° 】
V = 80m/min f = 0.2mm/rev
2）Deep hole drilling 【φ 8.50 × 210mm XHTtype】
V = 80m/min f = 0.25mm/rev F = 749mm/min
⇒Tool life: 300components（63.0 m/reg）

● Automotive Component
S48C（250HB）



Machine ： Horizontal single axis NC machine
Coolant ： MQL（volume1cc/H）
Air pressure 0.9MPa
Drilling process
1）Dril pilot hole 【φ 5.73 × 12mm drill point angle150 ° 】
V = 80m/min f = 0.2mm/rev
2）Deep hole drilling 【φ 5.70 × 83mm XHTtype】
V = 80m/min f = 0.2mm/rev F = 894mm/min
⇒Tool life: 200components（66.4 m/reg）

● Automotive Component
SCM440（290HB）



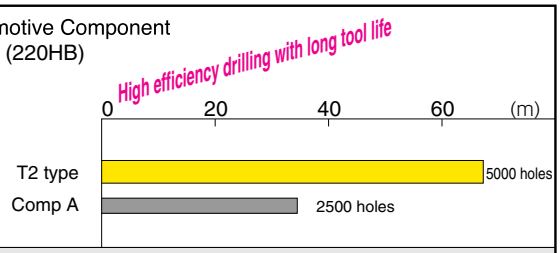
Machine ： Horizontal single axis NC machine
Coolant ： MQL（volume 1.5cc/H）
Air pressure 0.75MPa
Drilling process
1）Dril pilot hole 【φ 7.03 × 14mm drill point angle150 ° 】
V = 60m/min f = 0.2mm/rev
2）Deep hole drilling 【φ 7.00 × 98mm XHTtype】
V = 70m/min f = 0.2mm/rev F = 636mm/min
⇒Tool life: 200components（78.4 m/reg）

Application Examples

High-efficiency Hole Drilling of Small Products

● Automotive Component using T2 type

● Automotive Component
S50C (220HB)

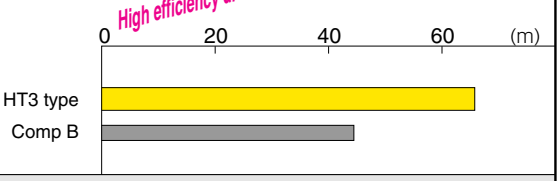


· Drill	· Conditions	· Machine
MDW0850T2 φ8.5mm	V=80m/min (N=2996min⁻¹) f=0.25mm/rev (F=749mm/min) d=14.0mm (through) water soluble coolant	Vertical Machining Center BT30

High-efficiency Hole Drilling of Small Products with BT30 Equipment

● Automotive Component using HT3 type

● Automotive Component
SCM415

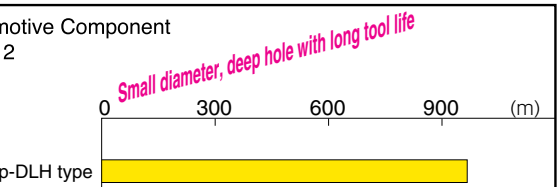


· Drill	· Conditions	· Machine
MDW1200HT3 φ12.0mm	V=120m/min (N=3183min⁻¹) f=0.25mm/rev (F=796mm/min) d=40.0mm (through) water soluble coolant	Vertical Machining Center BT30

Small Diameter, Deep Hole Drilling of Aluminum Alloy

● Automotive Component using SP-DLH type

● Automotive Component
ADC12

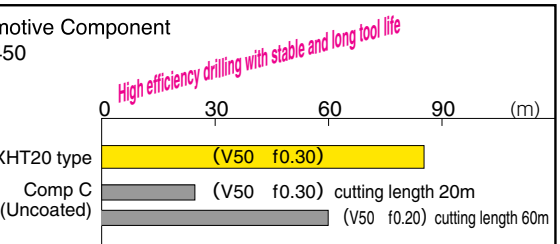


· Drill	· Conditions	· Machine
Sp-MDW0320DLH φ3.2mm flute:75mm	V=120m/min (N=11937min⁻¹) f=0.15mm/rev (F=1790mm/min) d=50.0mm (blind hole) water soluble coolant (7.0MPa)	Horizontal Machining Center BT30

Very Deep Hole Drilling of Ductile Cast Iron (L/D = 19)

● Automotive Component using special XHT20 type

● Automotive Component
FCD450

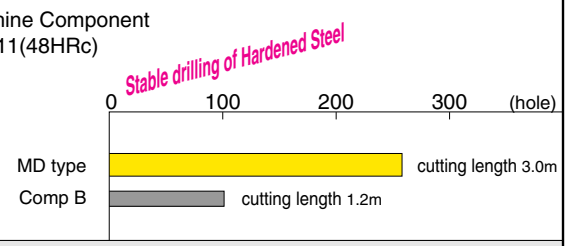


· Drill	· Conditions	· Machine
Sp-MDW0400XHT20 Uncoated product φ4.0mm	V=50m/min (N=3979min⁻¹) f=0.30mm/rev (F=1193mm/min) d=75.0mm (blind hole) MQL (pressure 0.55MPa)	Horizontal 1 spindle Special-purpose Machine (BT40)

Hole Drilling of Hardened Steel

● Machine Component using MD type

● Machine Component
SKD11(48HRc)

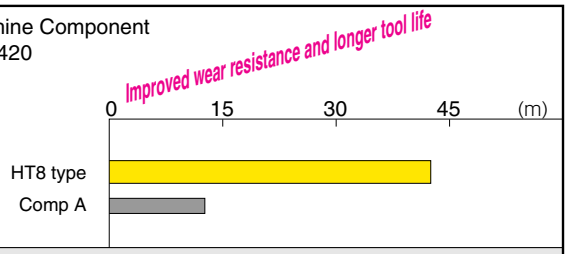


· Drill	· Conditions	· Machine
MDS040MD φ4.0mm	V=20m/min (N=1591min⁻¹) f=0.08mm/rev (F=127mm/min) d=12.0mm (blind hole) oil-base coolant	Vertical Machining Center BT30

Deep Hole Drilling of SCr Material

● Machine Component using HT8 type

● Machine Component
SCR420

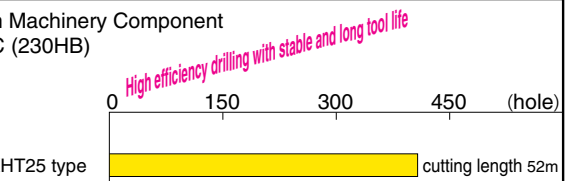


· Drill	· Conditions	· Machine
MDW0700HT8 φ7.0mm	V=60m/min (N=3820min⁻¹) f=0.12mm/rev (F=286mm/min) d=40.0mm (blind hole) water soluble coolant (2MPa)	Vertical Machining Center BT50

High-efficiency Deep Hole Drilling by Internal Coolant Supply (L/D = 21)

● Farm Machinery Component using XHT25 type

● Farm Machinery Component
S50C (230HB)

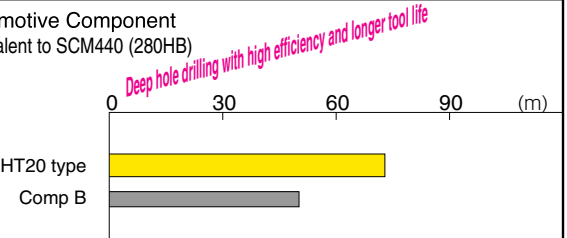


· Drill	· Conditions	· Machine
MDW0597XHT25 φ5.97mm	V=90m/min (N=4798min⁻¹) f=0.28mm/rev (F=1343mm/min) d=130.0mm (through) water soluble coolant	Horizontal Machining Center BT40

High efficiency deep hole drilling of 280HB material (L/D=16)

● Automotive Component using XHT20 type

● Automotive Component
Equivalent to SCM440 (280HB)



· Drill	· Conditions	· Machine
MDW0547XHT20 φ5.47mm	V=70m/min (N=4073min⁻¹) f=0.17mm/rev (F=692mm/min) d=85.0mm (through) MQL (pressure 0.85MPa)	Horizontal Special-Purpose Machine BT40

Drill Maintenance

1. Collet Selection and Maintenance

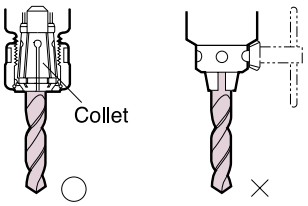
- Ensure proper chucking of drills to prevent vibration. Collet type chucks are recommended, as the grip is strong and can be used with ease.

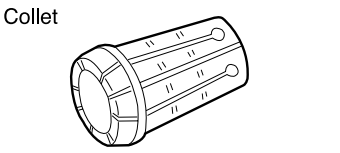
  (drill chucks and keyless chucks are not suitable for MultiDrills as they have a weaker grip force.)
- When changing drills, wash / clean the collet and the internal parts with oil regularly.
  Clear all foreign particles and chips. Remove abrasion marks with an oilstone.

2. Drill Installation

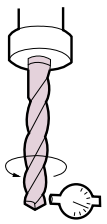
- Drill run-out when fixed on to the machine spindle must be within 0.03mm.
- Do not chuck on the drill flute.

  (If drill flute is inside the holder, chip removal will be obstructed thus causing damage to the drills.)

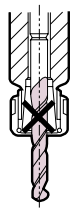




If there are marks, repair with an oilstone or change to a new one.



Edge run-out to be within 0.3mm.



Do not grip on the drill flute.

Using Cutting Oil

1. Choosing of Cutting Oil

- If cutting speed is more than 40m/min, cutting oil JISW1 type 2 is recommended for its good cooling effect & chip removal ability as it is highly soluble.
- For optimum tool life at cutting speeds of less than 40m/min, sulfo-chlorinated oil, JIS 3 type 3, is recommended due to its slippery effect and is non-water soluble.
  Non-water soluble oil may be flammable. To prevent fire, a substantial amount of oil should be used to cool the component so that smoke or heat will not be generated.

2. Supply of Coolant

- External supply of coolant at the hole position must be sufficient.

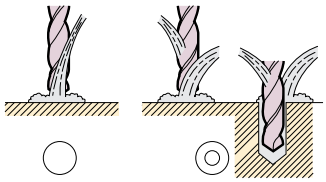
Coolant pressure 0.3~0.5MPa
Coolant volume 3~10litres/min

- Internal coolant supply (Ex. HK Type)
  For ø6 & below, chip removal rate will be greatly reduced if coolant pressure is low. Pressure should be 1.5mPa & above.

For ø6 & above, if L/D is <3, Pressures should be at 0.5~1.0MPa, If L/D is >3, pressures of at least 1.5MPa is recommended.

● External supply of coolant

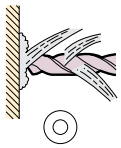
- Vertical drilling



Use high pressure at entrance

Easy usage

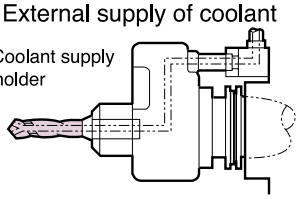
- Horizontal drilling



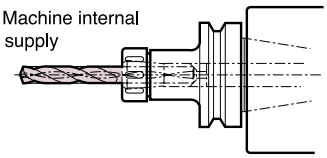
Use high pressure at entrance

● External supply of coolant

- Coolant supply holder

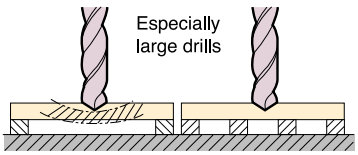


- Machine internal supply



Work Clamping

During high efficiency drilling, high thrust forces and torque are present. These may cause bending of work surface, hence it is important to set up with enough support to prevent bending.



Calculation of Power Consumption and Thrust

$$\text{Power Consumption} = HB \times D^{0.68} \times V^{1.27} \times f^{0.59} / 36{,}000$$

$$\text{Thrust} = 0.24 \times HB \times D^{0.95} \times f^{0.61} \times 9.8$$

Power Consumption: kW
HB : Brinell Hardness
V : Cutting Speed (m/min)
Thrust: N
D : Drill Diameter (mm)
f : Feedrate (mm/rev)

※ When designing the machine, an allowance of 1.6 x Power Consumption and 1.4 x Thrust should be given

Drill Regrinding

● When to regrind

When 1~2 feed marks (lines) appear on the margin, when corner wear reaches the margin width or when small chipping occurs, these indicates that the drill needs to be sent for regrinding.

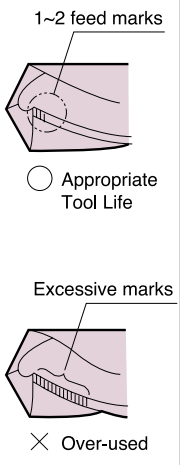
● How and where to regrind

Regrinding with recoating is the best.
Regrinding alone is fine but if work is steel, recoating is recommended to prevent shortening of tool life.
This is particularly necessary for the HK Type Multidrills.
Please engage our company or a regrinding centre recognize by us.

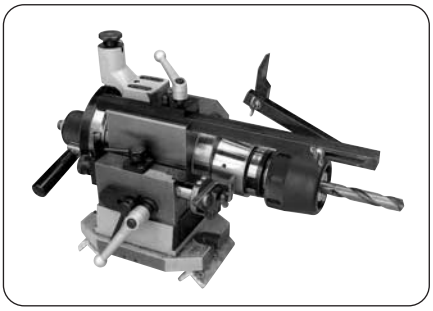
● Regrinding on your own

Please obtain a copy of our regrinding manual for MultiDrill. In the manual, there are recommendations on the types of grinding wheel, our regrinding attachments as well as instructions on how to perform regrinding.

● Tool Life Determinant



MultiDrill Regrinding Attachment DLR-1



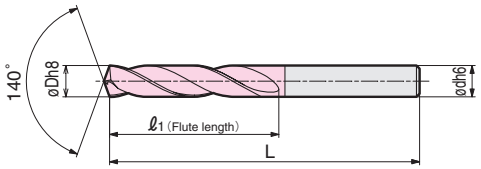
- DLR-1
  A special adaptor exclusively for easy and precise regrinding of MultiDrills.
- Specifications
  - Regrinding diameter range: ø2.8~ø40mm
  - Weight: 30kg
- Characteristics
  - Able to regrind MultiDrills with 3 basic processes in one setting
    (flank face, web thining and cutting-lip generation)
  - Compatible with general purpose grinding machines.
  - Precision grinding possible.
  - Short regrinding time
    (ø6mm drill with 1mm stock takes about 5mins)

T Type

External Coolant Supply (T2 Type／T4 Type)

Coated Carbide 2D 4D

● T Type



● Diameter φ1.0～6.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	2D Type Stock T2	2D Type Dimensions (mm) L	2D Type Dimensions (mm) ℓ1	4D Type Stock T4	4D Type Dimensions (mm) L	4D Type Dimensions (mm) ℓ1
1.0	3.0	MDW0100□□		45	6		49	12
1.1		MDW0110□□						
1.2		MDW0120□□						
1.3		MDW0130□□						
1.4		MDW0140□□						
1.5		MDW0150□□	●					
1.6		MDW0160□□			8			15
1.7		MDW0170□□						
1.8		MDW0180□□						
1.9		MDW0190□□						
2.0		MDW0200□□	●					
2.1		MDW0210□□	●		10			17
2.2		MDW0220□□						
2.3		MDW0230□□						
2.4		MDW0240□□						
2.5		MDW0250□□	●					
2.6		MDW0260□□	●		13			19
2.7		MDW0270□□						
2.8		MDW0280□□	●					
2.9		MDW0290□□	●					
3.0		MDW0300□□	●			●		
3.1	4.0	MDW0310□□	●	54	19		60	24
3.2		MDW0320□□						
3.3		MDW0330□□	●					
3.4		MDW0340□□	●					
3.5		MDW0350□□	●					
3.6		MDW0360□□			21			27
3.7		MDW0370□□	●					
3.8		MDW0380□□	●					
3.9		MDW0390□□						
4.0		MDW0400□□	●			●		
4.1	5.0	MDW0410□□	●	61	23		76	31
4.2		MDW0420□□	●					
4.3		MDW0430□□	●					
4.4		MDW0440□□	●					
4.5		MDW0450□□	●					
4.6		MDW0460□□	●		25			38
4.7		MDW0470□□	●					
4.8		MDW0480□□	●					
4.9		MDW0490□□						
5.0		MDW0500□□	●			●		
5.1	6.0	MDW0510□□	●	65	25	●	81	39
5.2		MDW0520□□	●					
5.3		MDW0530□□	●					
5.4		MDW0540□□	●					
5.5		MDW0550□□	●			●		
5.6		MDW0560□□	●		27	●		41
5.7		MDW0570□□				●		
5.8		MDW0580□□	●			●		
5.9		MDW0590□□						
6.0		MDW0600□□	●			●		

● Diameter φ6.1～11.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	2D Type Stock T2	2D Type Dimensions (mm) L	2D Type Dimensions (mm) ℓ1	4D Type Stock T4	4D Type Dimensions (mm) L	4D Type Dimensions (mm) ℓ1
6.1	7.0	MDW0610□□	●	73	31	●	83	42
6.2		MDW0620□□				●		
6.3		MDW0630□□						
6.4		MDW0640□□				●		
6.5		MDW0650□□				●		
6.6		MDW0660□□			33	●		43
6.7		MDW0670□□				●		
6.8		MDW0680□□	●			●		
6.9		MDW0690□□				●		
7.0		MDW0700□□	●			●		
7.1	8.0	MDW0710□□		78	36		90	45
7.2		MDW0720□□						
7.3		MDW0730□□						
7.4		MDW0740□□				●		
7.5		MDW0750□□						
7.6		MDW0760□□			38			48
7.7		MDW0770□□						
7.8		MDW0780□□	●			●		
7.9		MDW0790□□						
8.0		MDW0800□□	●			●		
8.1	9.0	MDW0810□□	●	82	41		98	53
8.2		MDW0820□□						
8.3		MDW0830□□				●		
8.4		MDW0840□□						
8.5		MDW0850□□	●			●		
8.6		MDW0860□□			45	●		55
8.7		MDW0870□□						
8.8		MDW0880□□	●			●		
8.9		MDW0890□□				●		
9.0		MDW0900□□	●			●		
9.1	10.0	MDW0910□□		87	45		105	58
9.2		MDW0920□□						
9.3		MDW0930□□						
9.4		MDW0940□□						
9.5		MDW0950□□				●		
9.6		MDW0960□□			49			60
9.7		MDW0970□□	●			●		
9.8		MDW0980□□	●			●		
9.9		MDW0990□□						
10.0		MDW1000□□	●			●		
10.1	11.0	MDW1010□□		93	49	●	114	66
10.2		MDW1020□□				●		
10.3		MDW1030□□				●		
10.4		MDW1040□□				●		
10.5		MDW1050□□	●			●		
10.6		MDW1060□□			53	●		68
10.7		MDW1070□□						
10.8		MDW1080□□	●			●		
10.9		MDW1090□□						
11.0		MDW1100□□	●			●		

Grade : ACZ20S

Please indicate T2 or T4 in the □□ when ordering.
(Example: MDW0150T2)

External Coolant Supply (T2 Type／T4 Type)

Coated Carbide 2D 4D

● T Type

● Diameter φ11.1～16.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	2D Type Stock T2	2D Type L	2D Type ℓ1	4D Type Stock T4	4D Type L	4D Type ℓ1
11.1	12.0	MDW1110□□	●	100	45		121	71
11.2		MDW1120□□						
11.3		MDW1130□□						
11.4		MDW1140□□						
11.5		MDW1150□□						
11.6		MDW1160□□			47			73
11.7		MDW1170□□						
11.8		MDW1180□□						
11.9		MDW1190□□						
12.0		MDW1200□□	●			●		
12.1	13.0	MDW1210□□				●	137	76
12.2		MDW1220□□				●		
12.3		MDW1230□□				●		
12.4		MDW1240□□						
12.5		MDW1250□□	●			●		
12.6		MDW1260□□	●		49			78
12.7		MDW1270□□	●			●		
12.8		MDW1280□□						
12.9		MDW1290□□						
13.0		MDW1300□□	●			●		
13.1	14.0	MDW1310□□		105	50	●	147	84
13.2		MDW1320□□						
13.3		MDW1330□□						
13.4		MDW1340□□						
13.5		MDW1350□□						
13.6		MDW1360□□			51			86
13.7		MDW1370□□				●		
13.8		MDW1380□□						
13.9		MDW1390□□						
14.0		MDW1400□□	●			●		
14.1	15.0	MDW1410□□		108	52	●	153	89
14.2		MDW1420□□	●					
14.3		MDW1430□□				●		
14.4		MDW1440□□				●		
14.5		MDW1450□□				●		
14.6		MDW1460□□			53			91
14.7		MDW1470□□						
14.8		MDW1480□□						
14.9		MDW1490□□						
15.0		MDW1500□□	●			●		
15.1	16.0	MDW1510□□		112			160	94
15.2		MDW1520□□						
15.3		MDW1530□□						
15.4		MDW1540□□						
15.5		MDW1550□□	●			●		
15.6		MDW1560□□			55			96
15.7		MDW1570□□						
15.8		MDW1580□□						
15.9		MDW1590□□						
16.0		MDW1600□□	●					

● Diameter φ16.1～20.0mm

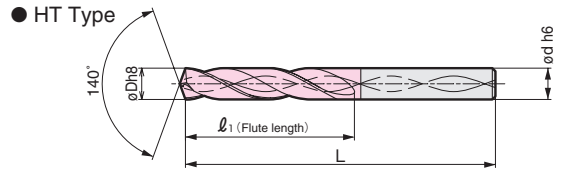
Diameter øD (mm)	Shank ød (mm)	Cat. No.	2D Type Stock T2	2D Type L	2D Type ℓ1	4D Type Stock T4	4D Type L	4D Type ℓ1
16.1	17.0	MDW1610□□		116	56		167	98
16.2		MDW1620□□						
16.3		MDW1630□□						
16.4		MDW1640□□						
16.5		MDW1650□□	●			●		
16.6		MDW1660□□			57			
16.7		MDW1670□□						
16.8		MDW1680□□						
16.9		MDW1690□□						
17.0		MDW1700□□				●		
17.1	18.0	MDW1710□□		120	58			100
17.2		MDW1720□□						
17.3		MDW1730□□						
17.4		MDW1740□□						
17.5		MDW1750□□						
17.6		MDW1760□□			59			102
17.7		MDW1770□□						
17.8		MDW1780□□						
17.9		MDW1790□□						
18.0		MDW1800□□				●		
18.1	19.0	MDW1810□□		123			179	104
18.2		MDW1820□□						
18.3		MDW1830□□						
18.4		MDW1840□□						
18.5		MDW1850□□						
18.6		MDW1860□□			60			106
18.7		MDW1870□□						
18.8		MDW1880□□						
18.9		MDW1890□□						
19.0		MDW1900□□				●		
19.1	20.0	MDW1910□□		127	61			110
19.2		MDW1920□□						
19.3		MDW1930□□						
19.4		MDW1940□□						
19.5		MDW1950□□						
19.6		MDW1960□□			62			114
19.7		MDW1970□□						
19.8		MDW1980□□						
19.9		MDW1990□□						
20.0		MDW2000□□	●					

Grade : ACZ20S

Please indicate T2 or T4 in the □□ when ordering.
(Example: MDW1110T2)

Thru-tool Coolant Supply (HT Type)

Coated Carbide | W/ Oil Hole | 3D | 5D | 8D



● MDW-HT Type, Diameter φ1.5～6.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	3D Type Stock HT3	3D Type Dimensions (mm) L	3D Type Dimensions (mm) ℓ1	5D Type Stock HT5	5D Type Dimensions (mm) L	5D Type Dimensions (mm) ℓ1	8D Type Stock HT8	8D Type Dimensions (mm) L	8D Type Dimensions (mm) ℓ1
1.5	3.0	MDW0150□□□		63	10	●	70	14		76	19
1.6		MDW0160□□□									
1.7		MDW0170□□□			13			19			24
1.8		MDW0180□□□									
1.9		MDW0190□□□									
2.0		MDW0200□□□							●		
2.1	3.0	MDW0210□□□		68	15		78	24		81	28
2.2		MDW0220□□□									
2.3		MDW0230□□□									
2.4		MDW0240□□□									
2.5		MDW0250□□□									
2.6		MDW0260□□□			18			28			33
2.7		MDW0270□□□									
2.8		MDW0280□□□	●								
2.9		MDW0290□□□									
3.0		MDW0300□□□	●			●			●		
3.1	4.0	MDW0310□□□		72	20	●	86	32		92	39
3.2		MDW0320□□□									
3.3		MDW0330□□□	●			●					
3.4		MDW0340□□□	●			●					
3.5		MDW0350□□□	●						●		
3.6		MDW0360□□□			23			36			44
3.7		MDW0370□□□									
3.8		MDW0380□□□									
3.9		MDW0390□□□				●					
4.0		MDW0400□□□	●			●			●		
4.1	5.0	MDW0410□□□		80	25	●	98	40		105	50
4.2		MDW0420□□□	●								
4.3		MDW0430□□□				●					
4.4		MDW0440□□□									
4.5		MDW0450□□□	●								
4.6		MDW0460□□□			28			44			55
4.7		MDW0470□□□	●			●					
4.8		MDW0480□□□									
4.9		MDW0490□□□									
5.0		MDW0500□□□	●			●			●		
5.1	6.0	MDW0510□□□	●	82		●	100			118	
5.2		MDW0520□□□				●					
5.3		MDW0530□□□									61
5.4		MDW0540□□□									
5.5		MDW0550□□□	●			●			●		
5.6		MDW0560□□□	●		30			48			66
5.7		MDW0570□□□									
5.8		MDW0580□□□				●					
5.9		MDW0590□□□				●					
6.0		MDW0600□□□				●			●		

Please indicate HT3, HT5 or HT8 in the □□□ when ordering.
(Example: MDW0150HT5)

● MDW-HT Type, Diameter φ6.1～11.0mm

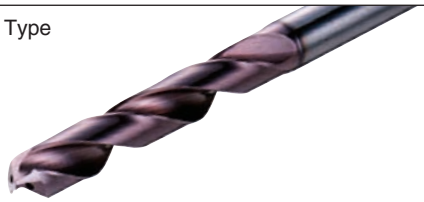
Diameter øD (mm)	Shank ød (mm)	Cat. No.	3D Type Stock HT3	3D Type Dimensions (mm) L	3D Type Dimensions (mm) ℓ1	5D Type Stock HT5	5D Type Dimensions (mm) L	5D Type Dimensions (mm) ℓ1	8D Type Stock HT8	8D Type Dimensions (mm) L	8D Type Dimensions (mm) ℓ1
6.1	7.0	MDW0610□□□		88	33	●	109	52		130	72
6.2		MDW0620□□□									
6.3		MDW0630□□□				●					
6.4		MDW0640□□□									
6.5		MDW0650□□□									
6.6		MDW0660□□□			35			56			77
6.7		MDW0670□□□									
6.8		MDW0680□□□	●			●			●		
6.9		MDW0690□□□									
7.0		MDW0700□□□				●			●		
7.1	8.0	MDW0710□□□		94	38		118	60		142	83
7.2		MDW0720□□□									
7.3		MDW0730□□□									
7.4		MDW0740□□□									
7.5		MDW0750□□□	●								
7.6		MDW0760□□□			40			64			88
7.7		MDW0770□□□									
7.8		MDW0780□□□	●								
7.9		MDW0790□□□									
8.0		MDW0800□□□				●			●		
8.1	9.0	MDW0810□□□		100	43		127	68		154	94
8.2		MDW0820□□□									
8.3		MDW0830□□□									
8.4		MDW0840□□□									
8.5		MDW0850□□□	●			●			●		
8.6		MDW0860□□□	●		45	●		72			99
8.7		MDW0870□□□	●								
8.8		MDW0880□□□	●								
8.9		MDW0890□□□									
9.0		MDW0900□□□	●			●			●		
9.1	10.0	MDW0910□□□	●	106	48		136	76		166	105
9.2		MDW0920□□□	●								
9.3		MDW0930□□□									
9.4		MDW0940□□□									
9.5		MDW0950□□□	●			●					
9.6		MDW0960□□□			50			80			110
9.7		MDW0970□□□									
9.8		MDW0980□□□									
9.9		MDW0990□□□									
10.0		MDW1000□□□	●			●					
10.1	11.0	MDW1010□□□		116	53	●	149	84		182	116
10.2		MDW1020□□□									
10.3		MDW1030□□□	●			●					
10.4		MDW1040□□□									
10.5		MDW1050□□□				●			●		
10.6		MDW1060□□□	●								
10.7		MDW1070□□□									
10.8		MDW1080□□□	●		55	●		88			121
10.9		MDW1090□□□									
11.0		MDW1100□□□	●			●			●		

Grade : ACZ20S

Thru-tool Coolant Supply (HT Type)

Coated Carbide | W/ Oil Hole | 3D | 5D | 8D

● HT Type



● MDW-HT Type, Diameter φ11.1～16.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	3D Type Stock HT3	3D Type Dimensions (mm) L	3D Type Dimensions (mm) ℓ1	5D Type Stock HT5	5D Type Dimensions (mm) L	5D Type Dimensions (mm) ℓ1	8D Type Stock HT8	8D Type Dimensions (mm) L	8D Type Dimensions (mm) ℓ1
11.1	12.0	MDW1110□□□		122	58		158	92		194	127
11.2		MDW1120□□□	●								
11.3		MDW1130□□□									
11.4		MDW1140□□□	●								
11.5		MDW1150□□□	●								
11.6		MDW1160□□□	●								
11.7		MDW1170□□□									
11.8		MDW1180□□□			60			96			132
11.9		MDW1190□□□									
12.0		MDW1200□□□	●			●			●		
12.1	13.0	MDW1210□□□		128	63		167	100		206	138
12.2		MDW1220□□□									
12.3		MDW1230□□□									
12.4		MDW1240□□□									
12.5		MDW1250□□□	●			●					
12.6		MDW1260□□□	●								
12.7		MDW1270□□□									
12.8		MDW1280□□□			65			104			143
12.9		MDW1290□□□									
13.0		MDW1300□□□				●					
13.1	14.0	MDW1310□□□		134	68		176	108		218	149
13.2		MDW1320□□□									
13.3		MDW1330□□□	●								
13.4		MDW1340□□□									
13.5		MDW1350□□□	●								
13.6		MDW1360□□□									
13.7		MDW1370□□□									
13.8		MDW1380□□□			70			112			154
13.9		MDW1390□□□									
14.0		MDW1400□□□	●			●					
14.1	15.0	MDW1410□□□		140	73		185	116		230	160
14.2		MDW1420□□□	●								
14.3		MDW1430□□□									
14.4		MDW1440□□□				●					
14.5		MDW1450□□□	●								
14.6		MDW1460□□□									
14.7		MDW1470□□□									
14.8		MDW1480□□□			75			120			165
14.9		MDW1490□□□									
15.0		MDW1500□□□	●			●					
15.1	16.0	MDW1510□□□		146	78		194	124		242	171
15.2		MDW1520□□□									
15.3		MDW1530□□□									
15.4		MDW1540□□□									
15.5		MDW1550□□□	●								
15.6		MDW1560□□□									
15.7		MDW1570□□□									
15.8		MDW1580□□□			80			128			176
15.9		MDW1590□□□									
16.0		MDW1600□□□	●			●					

● MDW-HT Type, Diameter φ16.1～20.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	3D Type Stock HT3	3D Type Dimensions (mm) L	3D Type Dimensions (mm) ℓ1	5D Type Stock HT5	5D Type Dimensions (mm) L	5D Type Dimensions (mm) ℓ1	8D Type Stock HT8	8D Type Dimensions (mm) L	8D Type Dimensions (mm) ℓ1
16.1～16.5	17.0	MDW1610□□□～MDW1650□□□		152	83		203	132		254	182
16.6～17.0		MDW1660□□□～MDW1700□□□			85			136			187
17.1～17.5	18.0	MDW1710□□□～MDW1750□□□		158	88		214	140		266	193
17.6～18.0		MDW1760□□□～MDW1800□□□			90			144			198
18.1～18.5	19.0	MDW1810□□□～MDW1850□□□		164	93		221	148		278	204
18.6～19.0		MDW1860□□□～MDW1900□□□			95			152			209
19.1～19.5	20.0	MDW1910□□□～MDW1950□□□		170	98		230	156		290	215
19.6～20.0		MDW1960□□□～MDW2000□□□			100			160			220

Grade : ACZ20S

Please indicate HT3, HT5 or HT8 in the □□□ when ordering.
(Example: MDW01120HT3)

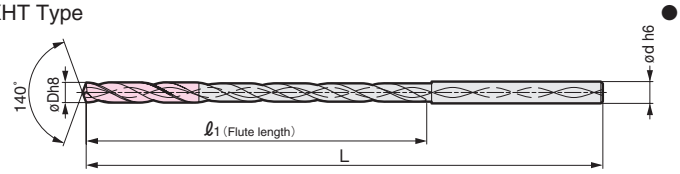
Drills

Thru-tool Coolant Supply (XHT Type/PHT Type)

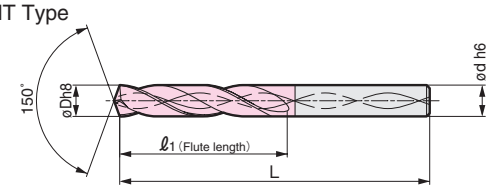
Expansion

W/ Oil Hole | Coated Carbide | 25D

● XHT Type



● PHT Type



● MDW-XHT Type (For Deep Hole)

Diameter øD (mm)	Shank ød (mm)	Cat. No.	15D Type Stock	15D Type Dimensions (mm) L	15D Type Dimensions (mm) ℓ1	20D Type Stock	20D Type Dimensions (mm) L	20D Type Dimensions (mm) ℓ1	25D Type Stock	25D Type Dimensions (mm) L	25D Type Dimensions (mm) ℓ1
			15			20			25		
New 2.97	3.0	MDW 0297 XHT□□	●	108	60	●	123	75	●	138	90
New 3.47	4.0	MDW 0347 XHT□□	●	118	70	●	136	88	●	153	105
3.97		MDW 0397 XHT□□	●	128	80	●	148	100	●	168	120
New 4.47	5.0	MDW 0447 XHT□□	●	140	90	●	163	113	●	185	135
4.97		MDW 0497 XHT□□	●	150	100	●	175	125	●	200	150
5.47	6.0	MDW 0547 XHT□□	●	162	110	●	192	140	●	217	165
5.97		MDW 0597 XHT□□	●	172	120	●	202	150	●	232	180
New 6.47	7.0	MDW 0647 XHT□□	●	183	130	●	216	163	●	248	195
6.97		MDW 0697 XHT□□	●	193	140	●	228	175	●	263	210
New 7.47	8.0	MDW 0747 XHT□□	●	204	150	●	242	188	●	179	225
New 7.97		MDW 0697 XHT□□	●	214	160	●	254	200	●	294	240

● MDW-PHT Type (For Pilot Hole)

Diameter øD (mm)	Shank ød (mm)	Cat. No.	For pilot hole Stock	For pilot hole Dimensions (mm) L	For pilot hole Dimensions (mm) ℓ1
New 3.0	3.0	MDW 0300 PHT	●	68	18
New 3.5	4.0	MDW 0350 PHT	●	72	20
4.0		MDW 0400 PHT	●		23
New 4.5	5.0	MDW 0450 PHT	●	80	25
5.0		MDW 0500 PHT	●		28
5.5	6.0	MDW 0550 PHT	●	82	28
6.0		MDW 0600 PHT	●		30
New 6.5	7.0	MDW 0650 PHT	●	88	33
7.0		MDW 0700 PHT	●		35
New 7.5	8.0	MDW 0750 PHT	●	94	38
New 8.0		MDW 0800 PHT	●		40

Please indicate 15, 20 or 25 in the □□ when ordering.
(Example: MDW0297XHT15)

■ Recommended Conditions

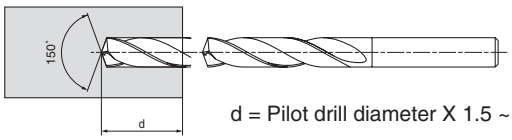
V : Spindle Speed (m/min)、f : Feedrate (mm/rev)

Work Material / Drill Diameter		Soft Steel 180HB SCM415, etc.	General Steel 240HB S50C, etc.	Alloy Steel 300HB SCM440, etc.	Hardened Steel 40HRC SKD	Ductile Cast Iron — FCD
ø3	V	60 ~ 80	70 ~ 90	40 ~ 60	30 ~ 50	50 ~ 70
	f	0.10 ~ 0.15	0.10 ~ 0.15	0.10 ~ 0.15	0.08 ~ 0.12	0.12 ~ 0.18
~ ø5	V	70 ~ 90	70 ~ 100	50 ~ 70	30 ~ 50	50 ~ 70
	f	0.15 ~ 0.25	0.15 ~ 0.25	0.12 ~ 0.17	0.08 ~ 0.12	0.15 ~ 0.30
~ ø10	V	70 ~ 100	70 ~ 110	50 ~ 80	30 ~ 60	60 ~ 80
	f	0.20 ~ 0.35	0.20 ~ 0.35	0.15 ~ 0.20	0.08 ~ 0.15	0.25 ~ 0.40
~ ø16	V	70 ~ 100	70 ~ 110	50 ~ 80	40 ~ 60	60 ~ 80
	f	0.20 ~ 0.35	0.20 ~ 0.35	0.15 ~ 0.20	0.08 ~ 0.12	0.25 ~ 0.35

■ Recommended Drilling Method

① Make a pilot hole using the MDW-PHT type

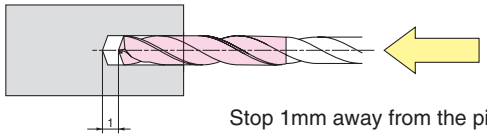
● Use a pilot hole drill with a diameter +0.03 to +0.05 mm larger than that of the MDW-XHT type.



d = Pilot drill diameter X 1.5 ~ 2.0 times

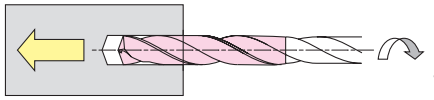
② Feed the MDW-XHT type at a low rotational speed through the pilot hole

● Rotation : 500min^{-1} Feed : 1000～2000mm/min



Stop 1mm away from the pilot hole depth

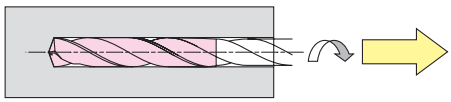
③ Increase to the set rotational speed and start normal drilling operation



Change the rotation to the drilling speed.

④ After drilling, rotational speed is lowered and the drill is retracted from the workpiece

● Rotation: 500 min^{-1}, feed: 1000 to 2000 mm/min



Change the rotation to 500 min^{-1}.

Other notes

- A flat base should be prepared, when the surface for the pilot tool is slanted
- When drilling through a slanted surface, reduce the drill feed to f=0.05mm/rev before the drill exits.
- For internal coolant supply (emulsion):
  - · When drilling soft steel, general steel or alloy steel, set the pump pressure to 1.5 to 2.5 MPa.
  - · If chip elongation occurs when drilling general steel, increase the drilling speed by 20%.

External Coolant Supply (Small Dia.) (MDSS Type)

Expansion

Coated Carbide 10D

Fig1

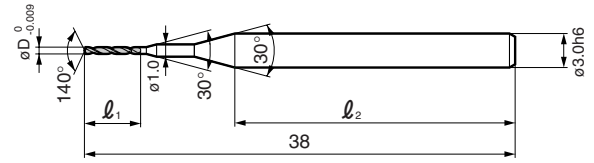
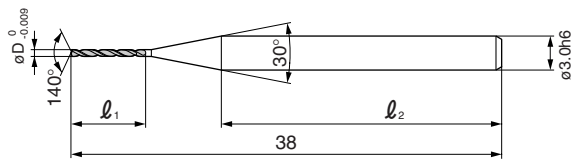


Fig2



● Diameter φ0.20～0.49mm

Diameter øD (mm)	Cat. No.	Stock	Dimensions (mm) ℓ1	Dimensions (mm) ℓ2	Shape
0.20	MDSS0020	●	2.5	28	Fig1
0.21	MDSS0021	●			
0.22	MDSS0022	●			
0.23	MDSS0023	●			
0.24	MDSS0024	●			
0.25	MDSS0025	●			
0.26	MDSS0026	●			
0.27	MDSS0027	●			
0.28	MDSS0028	●			
0.29	MDSS0029	●			
0.30	MDSS0030	●	3		
0.31	MDSS0031	●			
0.32	MDSS0032	●			
0.33	MDSS0033	●			
0.34	MDSS0034	●			
0.35	MDSS0035	●	4		Fig2
0.36	MDSS0036	●			
0.37	MDSS0037	●			
0.38	MDSS0038	●			
0.39	MDSS0039	●			
0.40	MDSS0040	●	5		
0.41	MDSS0041	●			
0.42	MDSS0042	●			
0.43	MDSS0043	●			
0.44	MDSS0044	●			
0.45	MDSS0045	●			
0.46	MDSS0046	●			
0.47	MDSS0047	●			
0.48	MDSS0048	●			
0.49	MDSS0049	●			

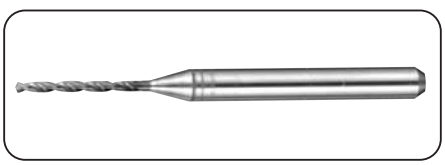
● Diameter φ0.50～0.79mm

Diameter øD (mm)	Cat. No.	Stock	Dimensions (mm) ℓ1	Dimensions (mm) ℓ2	Shape
0.50	MDSS0050	●	6	27	Fig2
0.51	MDSS0051	●			
0.52	MDSS0052	●			
0.53	MDSS0053	●			
0.54	MDSS0054	●			
0.55	MDSS0055	●			
0.56	MDSS0056	●			
0.57	MDSS0057	●			
0.58	MDSS0058	●			
0.59	MDSS0059	●			
0.60	MDSS0060	●	7	26	
0.61	MDSS0061	●			
0.62	MDSS0062	●			
0.63	MDSS0063	●			
0.64	MDSS0064	●			
0.65	MDSS0065	●			
0.66	MDSS0066	●			
0.67	MDSS0067	●			
0.68	MDSS0068	●			
0.69	MDSS0069	●			
0.70	MDSS0070	●	9	24	
0.71	MDSS0071	●			
0.72	MDSS0072	●			
0.73	MDSS0073	●			
0.74	MDSS0074	●			
0.75	MDSS0075	●			
0.76	MDSS0076	●			
0.77	MDSS0077	●			
0.78	MDSS0078	●			
0.79	MDSS0079	●			

● Diameter φ0.80～1.00mm

Diameter øD (mm)	Cat. No.	Stock	Dimensions (mm) ℓ1	Dimensions (mm) ℓ2	Shape
0.80	MDSS0080	●	10	23	Fig2
0.81	MDSS0081	●			
0.82	MDSS0082	●			
0.83	MDSS0083	●			
0.84	MDSS0084	●			
0.85	MDSS0085	●			
0.86	MDSS0086	●			
0.87	MDSS0087	●			
0.88	MDSS0088	●			
0.89	MDSS0089	●			
0.90	MDSS0090	●	11	22	
0.91	MDSS0091	●			
0.92	MDSS0092	●			
0.93	MDSS0093	●			
0.94	MDSS0094	●			
0.95	MDSS0095	●			
0.96	MDSS0096	●			
0.97	MDSS0097	●			
0.98	MDSS0098	●			
0.99	MDSS0099	●			
1.00	MDSS0100	●	12	21	

Grade : ACF40B



■ Recommended Conditions (Wet)

Work / Cond / Dia. mm	Structural Steel、Carbon Steel、Cast Iron SS、SC、FC S/Speed min-1	Feedrate mm/min	Step-feed mm	Alloy Steel、Pre-hardened Steel SCM、NAK S/Speed min-1	Feedrate mm/min	Step-feed mm	Tempered Steel、Hardened Steel (30～40HRC) S/Speed min-1	Feedrate mm/min	Step-feed mm	Hardened Steel (40～50HRC) S/Speed min-1	Feedrate mm/min	Step-feed mm	Hardened Steel (50～55HRC) S/Speed min-1	Feedrate mm/min	Step-feed mm
0.2	31800	60	0.1D	26500	50	0.1D	21200	40	0.1D	12700	30	0.1D	10600	20	0.1D
0.3	31800	100		26500	80		21200	60		12700	40		10600	30	
0.4	31800	130		25900	100		19900	80		12700	50		9900	40	
0.5	31800	190		25500	150		19100	110		12700	60		9500	50	
1.0	23900	360	0.2D~0.5D※	15900	240	0.2D~0.5D※	12700	190	0.2D~0.5D※	8000	100		5600	60	

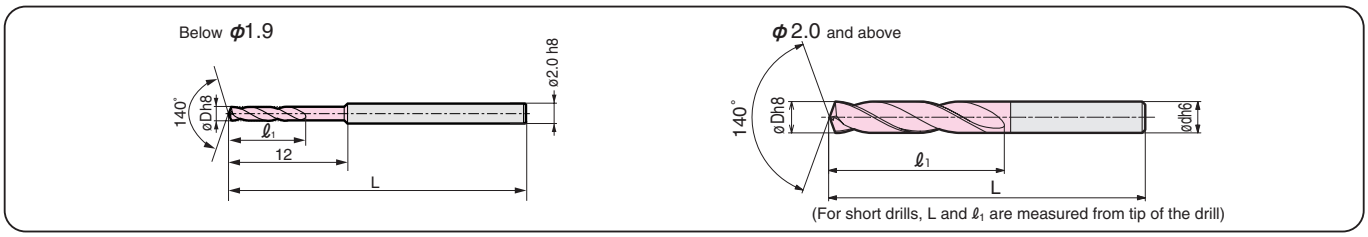
Work / Cond / Dia. mm	Gray Cast Iron FCD450 S/Speed min-1	Feedrate mm/min	Step-feed mm	Stainless Steel SUS S/Speed min-1	Feedrate mm/min	Step-feed mm
0.2	31800	60	0.1D	10600	20	0.1D
0.3	31800	100		10600	30	
0.4	31800	130		9500	40	
0.5	31800	190		9500	50	
1.0	19100	290	0.2D~0.5D※	5600	80	

1. The above conditions are recommended under wet conditions, using water-soluble coolant.
2. If machine noises and vibrations are present, please adjust the cutting conditions accordingly.
3. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.

※ Step feed is recommended for drilling of holes deeper than 3xD.

Solid Type (Without oil hole) (SK Type/SG Type)

Coated Carbide | Carbide | 2D



● Diameter φ1.0～6.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Short Series (2D) Stock SK	SG	Dimensions (mm) L	ℓ1
1.0	2.0	MDS010□□	●		42	8
1.1		MDS011□□	●			9
1.2		MDS012□□	●			10
1.3		MDS013□□	●			
1.4		MDS014□□	●			11
1.5		MDS015□□	●			
1.6		MDS016□□	●			12
1.7		MDS017□□	●			
1.8		MDS018□□	●			
1.9		MDS019□□	●			
2.0		MDS020□□	●			
2.1	2.1	MDS021□□	●			
2.2	2.2	MDS022□□	●		43	13
2.3	2.3	MDS023□□	●			
2.4	2.4	MDS024□□	●		44	14
2.5	2.5	MDS025□□	●			
2.6	2.6	MDS026□□	●			
2.7	2.7	MDS027□□	●		46	16
2.8	2.8	MDS028□□	●	●		
2.9	2.9	MDS029□□	●	●		
3.0	3.0	MDS030□□	●	●		
3.1	3.1	MDS031□□	●	●	49	18
3.2	3.2	MDS032□□	●	●		
3.3	3.3	MDS033□□	●	●		
3.4	3.4	MDS034□□	●	●	52	20
3.5	3.5	MDS035□□	●			
3.6	3.6	MDS036□□	●			
3.7	3.7	MDS037□□	●	●		
3.8	3.8	MDS038□□	●		55	22
3.9	3.9	MDS039□□	●	●		
4.0	4.0	MDS040□□	●	●		
4.1	4.1	MDS041□□	●	▲		
4.2	4.2	MDS042□□	●	●		
4.3	4.3	MDS043□□	●	●	58	24
4.4	4.4	MDS044□□	●			
4.5	4.5	MDS045□□	●	●		
4.6	4.6	MDS046□□	●	●		
4.7	4.7	MDS047□□	●			
4.8	4.8	MDS048□□	●	●	62	26
4.9	4.9	MDS049□□	●			
5.0	5.0	MDS050□□	●	●		
5.1	5.1	MDS051□□	●	●		
5.2	5.2	MDS052□□	●	▲		
5.3	5.3	MDS053□□	●			
5.4	5.4	MDS054□□	●		66	28
5.5	5.5	MDS055□□	●	●		
5.6	5.6	MDS056□□	●			
5.7	5.7	MDS057□□	●			
5.8	5.8	MDS058□□	●	▲		
5.9	5.9	MDS059□□	●			
6.0	6.0	MDS060□□	●	●		

● Diameter φ6.1～11.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Short Series (2D) Stock SK	SG	Dimensions (mm) L	ℓ1
6.1	6.1	MDS061□□	●		70	31
6.2	6.2	MDS062□□	●			
6.3	6.3	MDS063□□	●			
6.4	6.4	MDS064□□	●			
6.5	6.5	MDS065□□	●	●		
6.6	6.6	MDS066□□	●			
6.7	6.7	MDS067□□	●			
6.8	6.8	MDS068□□	●	●	74	34
6.9	6.9	MDS069□□	●			
7.0	7.0	MDS070□□	●	●		
7.1	7.1	MDS071□□	●			
7.2	7.2	MDS072□□	●			
7.3	7.3	MDS073□□	●			
7.4	7.4	MDS074□□	●			
7.5	7.5	MDS075□□	●			
7.6	7.6	MDS076□□	●		79	38
7.7	7.7	MDS077□□	●			
7.8	7.8	MDS078□□	●			
7.9	7.9	MDS079□□	●			
8.0	8.0	MDS080□□	●	●		
8.1	8.1	MDS081□□	●			
8.2	8.2	MDS082□□	●			
8.3	8.3	MDS083□□	●			
8.4	8.4	MDS084□□	●			
8.5	8.5	MDS085□□	●	●		
8.6	8.6	MDS086□□	●	▲	84	40
8.7	8.7	MDS087□□	●			
8.8	8.8	MDS088□□	●			
8.9	8.9	MDS089□□	●			
9.0	9.0	MDS090□□	●	●		
9.1	9.1	MDS091□□	●			
9.2	9.2	MDS092□□	●			
9.3	9.3	MDS093□□	●			
9.4	9.4	MDS094□□	●			
9.5	9.5	MDS095□□	●			
9.6	9.6	MDS096□□	●		89	43
9.7	9.7	MDS097□□	●			
9.8	9.8	MDS098□□	●	▲		
9.9	9.9	MDS099□□	●			
10.0	10.0	MDS100□□	●	●		
10.1	10.1	MDS101□□	●			
10.2	10.2	MDS102□□	●			
10.3	10.3	MDS103□□	●			
10.4	10.4	MDS104□□	●			
10.5	10.5	MDS105□□	●	▲		
10.6	10.6	MDS106□□	●			
10.7	10.7	MDS107□□	●		95	47
10.8	10.8	MDS108□□	●			
10.9	10.9	MDS109□□	●			
11.0	11.0	MDS110□□	●	●		

Grade : SKtype ACZ70
Grade : SG type A1

Please indicate SK or SG in the □□ when ordering.
(Example: MDS010SK)

▲ mark : To be replaced by new item (Please confirm stock availability)

Solid Type (Without oil hole) (SK Type/SG Type)

Coated Carbide | Carbide | 2D

● Diameter φ11.1～16.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Short Series (2D) Stock SK	SG	Dimensions (mm) L	ℓ1
11.1	11.1	MDS111□□	●		95	47
11.2	11.2	MDS112□□	●			
11.3	11.3	MDS113□□	●			
11.4	11.4	MDS114□□	●			
11.5	11.5	MDS115□□	●	▲		
11.6	11.6	MDS116□□	●			
11.7	11.7	MDS117□□	●			
11.8	11.8	MDS118□□	●			
11.9	11.9	MDS119□□	●		102	51
12.0	12.0	MDS120□□	●	●		
12.1	12.1	MDS121□□	●			
12.2	12.2	MDS122□□	●			
12.3	12.3	MDS123□□	●			
12.4	12.4	MDS124□□	●			
12.5	12.5	MDS125□□	●			
12.6	12.6	MDS126□□	●			
12.7	12.7	MDS127□□	●			
12.8	12.8	MDS128□□	●			
12.9	12.9	MDS129□□	●			
13.0	13.0	MDS130□□	●			
13.1	13.1	MDS131□□	●			
13.2	13.2	MDS132□□	●			
13.3	13.3	MDS133□□	●		107	55
13.4	13.4	MDS134□□	●			
13.5	13.5	MDS135□□	●			
13.6	13.6	MDS136□□	●			
13.7	13.7	MDS137□□	●			
13.8	13.8	MDS138□□	●			
13.9	13.9	MDS139□□	●			
14.0	14.0	MDS140□□	●	●		
14.1	14.1	MDS141□□	●		111	56
14.2	14.2	MDS142□□	●			
14.3	14.3	MDS143□□	●			
14.4	14.4	MDS144□□	●			
14.5	14.5	MDS145□□	●	▲		
14.6	14.6	MDS146□□	●			
14.7	14.7	MDS147□□	●			
14.8	14.8	MDS148□□	●			
14.9	14.9	MDS149□□	●			
15.0	15.0	MDS150□□	●	●		
15.1	15.1	MDS151□□	●		115	58
15.2	15.2	MDS152□□	●			
15.3	15.3	MDS153□□	●			
15.4	15.4	MDS154□□	●			
15.5	15.5	MDS155□□	●	▲		
15.6	15.6	MDS156□□	●			
15.7	15.7	MDS157□□	●			
15.8	15.8	MDS158□□	●			
15.9	15.9	MDS159□□	●			
16.0	16.0	MDS160□□	●	●		

● Diameter φ16.1～20.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Short Series (2D) Stock SK	SG	Dimensions (mm) L	ℓ1
16.1	16.1	MDS161□□	●		119	60
16.2	16.2	MDS162□□	●			
16.3	16.3	MDS163□□	●			
16.4	16.4	MDS164□□	●			
16.5	16.5	MDS165□□	●			
16.6	16.6	MDS166□□	●			
16.7	16.7	MDS167□□	●			
16.8	16.8	MDS168□□	●			
16.9	16.9	MDS169□□	●			
17.0	17.0	MDS170□□	●	●		
17.1	17.1	MDS171□□	●		123	62
17.2	17.2	MDS172□□	●			
17.3	17.3	MDS173□□	●			
17.4	17.4	MDS174□□	●			
17.5	17.5	MDS175□□	●			
17.6	17.6	MDS176□□	●			
17.7	17.7	MDS177□□	●			
17.8	17.8	MDS178□□	●			
17.9	17.9	MDS179□□	●			
18.0	18.0	MDS180□□	●	●		
18.1	18.1	MDS181□□	●		127	64
18.2	18.2	MDS182□□	●			
18.3	18.3	MDS183□□	●			
18.4	18.4	MDS184□□	●			
18.5	18.5	MDS185□□	●	▲		
18.6	18.6	MDS186□□	●			
18.7	18.7	MDS187□□	●			
18.8	18.8	MDS188□□	●			
18.9	18.9	MDS189□□	●			
19.0	19.0	MDS190□□	●	●		
19.1	19.1	MDS191□□	●		131	66
19.2	19.2	MDS192□□	●			
19.3	19.3	MDS193□□	●			
19.4	19.4	MDS194□□	●			
19.5	19.5	MDS195□□	●	▲		
19.6	19.6	MDS196□□	●			
19.7	19.7	MDS197□□	●			
19.8	19.8	MDS198□□	●			
19.9	19.9	MDS199□□	●			
20.0	20.0	MDS200□□	●			

Grade : SK type ACZ70
SG type A1

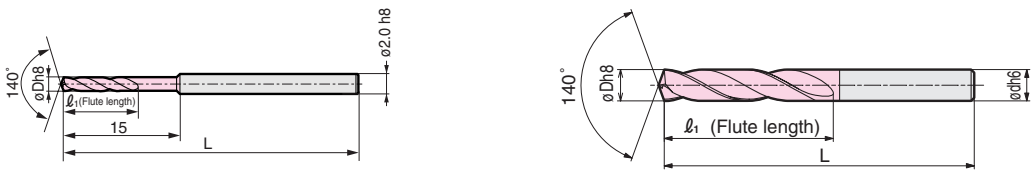
Please indicate SK or SG in the □□ when ordering.
(Example: MDS111SK)

▲mark : To be replaced by new item (Please confirm stock availability)

MK/MD/MG Type

Solid Type (Without oil hole) (MK Type／MD Type／MG Type)

Coated Carbide | Carbide | 3D



● Diameter φ1.0～6.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Standard Series (3D) Stock MK	MD	MG			Dimensions (mm) L	ℓ1
1.0		MDS010□□		●					12
1.1		MDS011□□							13
1.2		MDS012□□		●					14
1.3		MDS013□□							
1.4		MDS014□□		●					15
1.5	2.0	MDS015□□		●				45	
1.6		MDS016□□		●					
1.7		MDS017□□							
1.8		MDS018□□		●					
1.9		MDS019□□							
2.0		MDS020□□		●					
2.1	2.1	MDS021□□							
2.2	2.2	MDS022□□		●				46	16
2.3	2.3	MDS023□□							
2.4	2.4	MDS024□□		●				47	17
2.5	2.5	MDS025□□		●					
2.6	2.6	MDS026□□		●					
2.7	2.7	MDS027□□						49	19
2.8	2.8	MDS028□□		●					
2.9	2.9	MDS029□□							
3.0	3.0	MDS030□□	●	●					
3.1	3.1	MDS031□□						52	21
3.2	3.2	MDS032□□		●					
3.3	3.3	MDS033□□							
3.4	3.4	MDS034□□		●				56	24
3.5	3.5	MDS035□□	●	●					
3.6	3.6	MDS036□□		●					
3.7	3.7	MDS037□□							
3.8	3.8	MDS038□□		●				60	27
3.9	3.9	MDS039□□							
4.0	4.0	MDS040□□	●	●					
4.1	4.1	MDS041□□							
4.2	4.2	MDS042□□		●					
4.3	4.3	MDS043□□		●				65	31
4.4	4.4	MDS044□□		●					
4.5	4.5	MDS045□□		●					
4.6	4.6	MDS046□□		●					
4.7	4.7	MDS047□□							
4.8	4.8	MDS048□□		●				69	33
4.9	4.9	MDS049□□							
5.0	5.0	MDS050□□	●	●	●			76	33
5.1	5.1	MDS051□□	●	●	●				
5.2	5.2	MDS052□□	●	●	●				
5.3	5.3	MDS053□□	●		●				
5.4	5.4	MDS054□□	●	●	●				
5.5	5.5	MDS055□□	●	●	●				
5.6	5.6	MDS056□□	●	●	●			81	36
5.7	5.7	MDS057□□	●						
5.8	5.8	MDS058□□	●	●	●				
5.9	5.9	MDS059□□	●		●				
6.0	6.0	MDS060□□	●	●	●				

● Diameter φ6.1～11.0mm

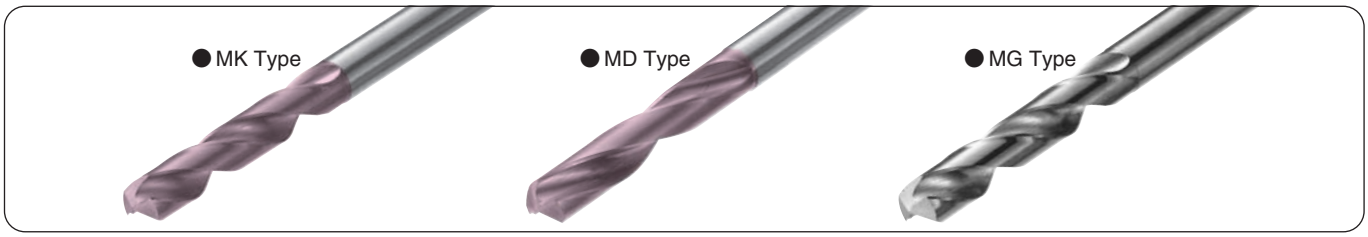
Diameter øD (mm)	Shank ød (mm)	Cat. No.	Standard Series (3D) Stock MK	MD	MG			Dimensions (mm) L	ℓ1
6.1	6.1	MDS061□□	●		●			81	36
6.2	6.2	MDS062□□	●		●				
6.3	6.3	MDS063□□	●		●				
6.4	6.4	MDS064□□	●		●				
6.5	6.5	MDS065□□	●	●	●				
6.6	6.6	MDS066□□	●		●			83	38
6.7	6.7	MDS067□□	●		●				
6.8	6.8	MDS068□□	●	●	●				
6.9	6.9	MDS069□□	●		●				
7.0	7.0	MDS070□□	●	●	●				
7.1	7.1	MDS071□□	●		●			87	40
7.2	7.2	MDS072□□	●		●				
7.3	7.3	MDS073□□	●		●				
7.4	7.4	MDS074□□	●		●				
7.5	7.5	MDS075□□	●	●	●				
7.6	7.6	MDS076□□	●		●			90	43
7.7	7.7	MDS077□□	●		●				
7.8	7.8	MDS078□□	●		●				
7.9	7.9	MDS079□□	●		●				
8.0	8.0	MDS080□□	●	●	●				
8.1	8.1	MDS081□□	●		●			96	48
8.2	8.2	MDS082□□	●		●				
8.3	8.3	MDS083□□	●		●				
8.4	8.4	MDS084□□	●		●				
8.5	8.5	MDS085□□	●	●	●				
8.6	8.6	MDS086□□	●	●	●			98	50
8.7	8.7	MDS087□□	●		●				
8.8	8.8	MDS088□□	●		●				
8.9	8.9	MDS089□□	●		●				
9.0	9.0	MDS090□□	●	●	●				
9.1	9.1	MDS091□□	●		●			102	53
9.2	9.2	MDS092□□	●		●				
9.3	9.3	MDS093□□	●		●				
9.4	9.4	MDS094□□	●		●				
9.5	9.5	MDS095□□	●	●	●				
9.6	9.6	MDS096□□	●					105	55
9.7	9.7	MDS097□□	●		●				
9.8	9.8	MDS098□□	●		●				
9.9	9.9	MDS099□□	●						
10.0	10.0	MDS100□□	●	●	●				
10.1	10.1	MDS101□□	●		●			112	61
10.2	10.2	MDS102□□	●		●				
10.3	10.3	MDS103□□	●	●	●				
10.4	10.4	MDS104□□	●		●				
10.5	10.5	MDS105□□	●	●	●				
10.6	10.6	MDS106□□	●		●			114	63
10.7	10.7	MDS107□□	●		●				
10.8	10.8	MDS108□□	●		●				
10.9	10.9	MDS109□□	●						
11.0	11.0	MDS110□□	●	●	●				

Grade : MK type ACZ70
MD type ACZ51S
MG type A1

Please indicate MK, MD or MG in the □□ when ordering.
(Example: MDS010MD)

Solid Type (Without oil hole) (MK Type／MD Type／MG Type)

Coated Carbide | Carbide | 3D



● Diameter φ11.1～16.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Standard Series (3D) Stock MK	MD	MG			Dimensions (mm) L	ℓ_1
11.1	11.1	MDS111□□	●		●			118	66
11.2	11.2	MDS112□□	●		●				
11.3	11.3	MDS113□□	●						
11.4	11.4	MDS114□□	●		●				
11.5	11.5	MDS115□□	●	●	●				
11.6	11.6	MDS116□□	●		●			121	68
11.7	11.7	MDS117□□	●		●				
11.8	11.8	MDS118□□	●		●				
11.9	11.9	MDS119□□	●						
12.0	12.0	MDS120□□	●	●	●				
12.1	12.1	MDS121□□	●		●			135	71
12.2	12.2	MDS122□□	●						
12.3	12.3	MDS123□□	●		▲				
12.4	12.4	MDS124□□	●		▲				
12.5	12.5	MDS125□□	●	●	●				
12.6	12.6	MDS126□□	●	●	▲			137	73
12.7	12.7	MDS127□□	●		▲				
12.8	12.8	MDS128□□	●						
12.9	12.9	MDS129□□	●						
13.0	13.0	MDS130□□	●	●	●				
13.1	13.1	MDS131□□	●		●			144	79
13.2	13.2	MDS132□□	●		▲				
13.3	13.3	MDS133□□	●						
13.4	13.4	MDS134□□	●						
13.5	13.5	MDS135□□	●	●	●				
13.6	13.6	MDS136□□	●					147	81
13.7	13.7	MDS137□□	●		▲				
13.8	13.8	MDS138□□	●						
13.9	13.9	MDS139□□	●						
14.0	14.0	MDS140□□	●	●	●				
14.1	14.1	MDS141□□	●	●	●			151	84
14.2	14.2	MDS142□□	●						
14.3	14.3	MDS143□□	●						
14.4	14.4	MDS144□□	●						
14.5	14.5	MDS145□□	●	●	●				
14.6	14.6	MDS146□□	●	●				153	86
14.7	14.7	MDS147□□	●						
14.8	14.8	MDS148□□	●						
14.9	14.9	MDS149□□	●						
15.0	15.0	MDS150□□	●	●	●				
15.1	15.1	MDS151□□	●					157	89
15.2	15.2	MDS152□□	●						
15.3	15.3	MDS153□□	●		▲				
15.4	15.4	MDS154□□	●						
15.5	15.5	MDS155□□	●	●					
15.6	15.6	MDS156□□	●	●				160	91
15.7	15.7	MDS157□□	●		▲				
15.8	15.8	MDS158□□	●		▲				
15.9	15.9	MDS159□□	●						
16.0	16.0	MDS160□□	●	●	●				

● Diameter φ16.1～20.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Standard Series (3D) Stock MK	MD	MG			Dimensions (mm) L	ℓ_1
16.1	16.1	MDS161□□		●	●			167	97
16.2	16.2	MDS162□□							
16.3	16.3	MDS163□□							
16.4	16.4	MDS164□□							
16.5	16.5	MDS165□□	●		●				
16.6	16.6	MDS166□□							
16.7	16.7	MDS167□□							
16.8	16.8	MDS168□□							
16.9	16.9	MDS169□□							
17.0	17.0	MDS170□□	●		●				
17.1	17.1	MDS171□□							
17.2	17.2	MDS172□□							
17.3	17.3	MDS173□□							
17.4	17.4	MDS174□□							
17.5	17.5	MDS175□□	●		●				
17.6	17.6	MDS176□□							
17.7	17.7	MDS177□□							
17.8	17.8	MDS178□□			▲				
17.9	17.9	MDS179□□							
18.0	18.0	MDS180□□	●		●				
18.1	18.1	MDS181□□						179	109
18.2	18.2	MDS182□□							
18.3	18.3	MDS183□□							
18.4	18.4	MDS184□□							
18.5	18.5	MDS185□□	●		●				
18.6	18.6	MDS186□□							
18.7	18.7	MDS187□□							
18.8	18.8	MDS188□□							
18.9	18.9	MDS189□□							
19.0	19.0	MDS190□□	●		●				
19.1	19.1	MDS191□□							
19.2	19.2	MDS192□□							
19.3	19.3	MDS193□□							
19.4	19.4	MDS194□□							
19.5	19.5	MDS195□□	●						
19.6	19.6	MDS196□□							
19.7	19.7	MDS197□□							
19.8	19.8	MDS198□□							
19.9	19.9	MDS199□□							
20.0	20.0	MDS200□□	●		●				

Please indicate MK, MD or MG in the □□ when ordering.
(Example: MDS111MK)

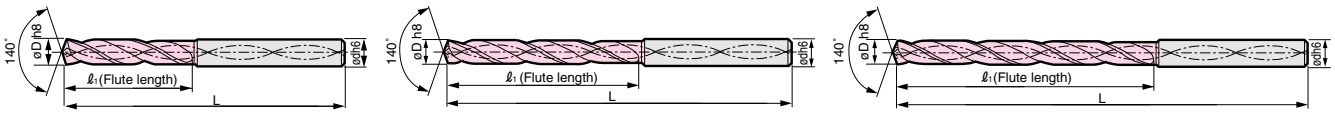
Grade : MK type ACZ70
MD type ACZ51S
MG type A1

▲mark : To be replaced by new item (Please confirm stock availability)

Solid Type (With oil hole) (MHK Type／LHK Type／DHK Type)

Coated Carbide | W/ Oil Hole | 3D | 5D | 8D

● Standard Series (MHK Type) ● Long Series (LHK Type) ● Deep Hole Series (DHK Type)



● Diameter φ1.5～6.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Standard Series (3D) Stock	Standard Series (3D) Dimensions (mm)			Long Series (5D) Stock	Long Series (5D) Dimensions (mm)		Deep Hole Series (8D) Stock	Deep Hole Series (8D) Dimensions (mm)	
			MHK	L	ℓ1		LHK	L	ℓ1	DHK	L	ℓ1
1.5	3.0	MDW015□□□	●	63	10		●	70	14	●	76	19
1.6		MDW016□□□	●		13		●		19			24
1.7		MDW017□□□	●				●					
1.8		MDW018□□□	●				●					
1.9		MDW019□□□	●				●					
2.0		MDW020□□□	●				●			●		
2.1	3.0	MDW021□□□	●	68	15		●	78	24		81	28
2.2		MDW022□□□	●				●					
2.3		MDW023□□□	●				●					
2.4		MDW024□□□	●				●					
2.5		MDW025□□□	●				●			●		
2.6		MDW026□□□	●		18		●		28			33
2.7		MDW027□□□	●				●					
2.8		MDW028□□□	●				●					
2.9		MDW029□□□	●				●					
3.0		MDW030□□□	●				●			●		
3.1	4.0	MDW031□□□	●	72	20		●	86	32		92	39
3.2		MDW032□□□	●				●					
3.3		MDW033□□□	●				●					
3.4		MDW034□□□	●				●					
3.5		MDW035□□□	●				●			●		
3.6		MDW036□□□	●		23		●		36			44
3.7		MDW037□□□	●				●					
3.8		MDW038□□□	●				●					
3.9		MDW039□□□	●				●					
4.0		MDW040□□□	●				●			●		
4.1	5.0	MDW041□□□	●	80	25		●	98	40		105	50
4.2		MDW042□□□	●				●					
4.3		MDW043□□□	●				●					
4.4		MDW044□□□	●				●					
4.5		MDW045□□□	●				●			●		
4.6		MDW046□□□	●		28		●		44			55
4.7		MDW047□□□	●				●					
4.8		MDW048□□□	●				●					
4.9		MDW049□□□	●				●					
5.0		MDW050□□□	●				●			●		
5.1	6.0	MDW051□□□	●	82	28		●	100	44		118	61
5.2		MDW052□□□	●				●					
5.3		MDW053□□□	●				●					
5.4		MDW054□□□	●				●					
5.5		MDW055□□□	●				●			●		
5.6		MDW056□□□	●		30		●		48			66
5.7		MDW057□□□	●				●					
5.8		MDW058□□□	●				●					
5.9		MDW059□□□	●				●					
6.0		MDW060□□□	●				●			●		

● Diameter φ6.1～11.0mm

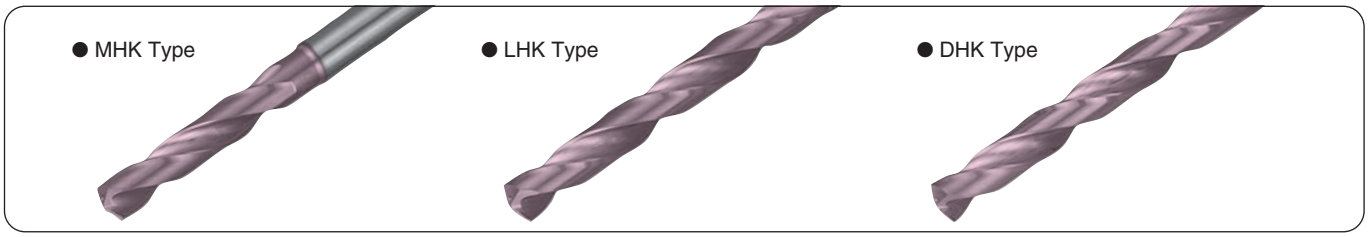
Diameter øD (mm)	Shank ød (mm)	Cat. No.	Standard Series (3D) Stock	Standard Series (3D) Dimensions (mm)			Long Series (5D) Stock	Long Series (5D) Dimensions (mm)		Deep Hole Series (8D) Stock	Deep Hole Series (8D) Dimensions (mm)	
			MHK	L	ℓ1		LHK	L	ℓ1	DHK	L	ℓ1
6.1	7.0	MDW061□□□	●	88	33		●	109	52		130	72
6.2		MDW062□□□	●				●					
6.3		MDW063□□□	●				●					
6.4		MDW064□□□	●				●					
6.5		MDW065□□□	●				●			●		
6.6		MDW066□□□	●		35		●		56			77
6.7		MDW067□□□	●				●					
6.8		MDW068□□□	●				●			●		
6.9		MDW069□□□	●				●					
7.0		MDW070□□□	●				●			●		
7.1	8.0	MDW071□□□	●	94	38		●	118	60		142	83
7.2		MDW072□□□	●				●					
7.3		MDW073□□□	●				●					
7.4		MDW074□□□	●				●					
7.5		MDW075□□□	●				●			●		
7.6		MDW076□□□	●		40		●		64			88
7.7		MDW077□□□	●				●					
7.8		MDW078□□□	●				●					
7.9		MDW079□□□	●				●					
8.0		MDW080□□□	●				●			●		
8.1	9.0	MDW081□□□	●	100	43		●	127	68		154	94
8.2		MDW082□□□	●				●					
8.3		MDW083□□□	●				●					
8.4		MDW084□□□	●				●					
8.5		MDW085□□□	●				●			●		
8.6		MDW086□□□	●		45		●		72			99
8.7		MDW087□□□	●				●					
8.8		MDW088□□□	●				●					
8.9		MDW089□□□	●				●					
9.0		MDW090□□□	●				●			●		
9.1	10.0	MDW091□□□	●	106	48		●	136	76		166	105
9.2		MDW092□□□	●				●					
9.3		MDW093□□□	●				●					
9.4		MDW094□□□	●				●					
9.5		MDW095□□□	●				●			●		
9.6		MDW096□□□	●		50		●		80			110
9.7		MDW097□□□	●				●					
9.8		MDW098□□□	●				●					
9.9		MDW099□□□	●				●					
10.0		MDW100□□□	●				●			●		
10.1	11.0	MDW101□□□	●	116	53		●	149	84		182	116
10.2		MDW102□□□	●				●					
10.3		MDW103□□□	●				●			●		
10.4		MDW104□□□	●				●					
10.5		MDW105□□□	●				●			●		
10.6		MDW106□□□	●		55		●		88			121
10.7		MDW107□□□	●				●					
10.8		MDW108□□□	●				●					
10.9		MDW109□□□	●				●					
11.0		MDW110□□□	●				●			●		

Grade : ACZ70S

Please indicate MHK, LHK or DHK in the □□□ when ordering.
(Example: MDW015MHK)

Solid Type (With oil hole) (MHK Type／LHK Type／DHK Type)

Coated Carbide | W/ Oil Hole | 3D | 5D | 8D



● Diameter φ11.1～16.0mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Standard Series (3D) Stock MHK	L	ℓ1	Long Series (5D) Stock LHK	L	ℓ1	Deep Hole Series (8D) Stock DHK	L	ℓ1
11.1	12.0	MDW111□□□	●	122	58	●	158	92		194	127
11.2		MDW112□□□	●			●					
11.3		MDW113□□□	●			●					
11.4		MDW114□□□	●			●					
11.5		MDW115□□□	●			●			●		
11.6		MDW116□□□	●		60	●		96			132
11.7		MDW117□□□	●			●					
11.8		MDW118□□□	●			●					
11.9		MDW119□□□	●			●					
12.0		MDW120□□□	●			●			●		
12.1	13.0	MDW121□□□	●	128	63	●	167	100		206	138
12.2		MDW122□□□	●			●					
12.3		MDW123□□□	●			●					
12.4		MDW124□□□	●			●					
12.5		MDW125□□□	●			●			●		
12.6		MDW126□□□	●		65	●		104			143
12.7		MDW127□□□	●			●					
12.8		MDW128□□□	●			●					
12.9		MDW129□□□	●			●					
13.0		MDW130□□□	●			●			●		
13.1	14.0	MDW131□□□	●	134	68	●	176	108		218	149
13.2		MDW132□□□	●			●					
13.3		MDW133□□□	●			●					
13.4		MDW134□□□	●			●					
13.5		MDW135□□□	●			●			●		
13.6		MDW136□□□	●		70	●		112			154
13.7		MDW137□□□	●			●					
13.8		MDW138□□□	●			●					
13.9		MDW139□□□	●			●					
14.0		MDW140□□□	●			●			●		
14.1	15.0	MDW141□□□	●	140	73	●	185	116		230	160
14.2		MDW142□□□	●			●			●		
14.3		MDW143□□□	●			●					
14.4		MDW144□□□	●			●					
14.5		MDW145□□□	●			●			●		
14.6		MDW146□□□	●		75	●		120			165
14.7		MDW147□□□	●			●					
14.8		MDW148□□□	●			●					
14.9		MDW149□□□	●			●					
15.0		MDW150□□□	●			●			●		
15.1	16.0	MDW151□□□	●	146	78	●	194	124		242	171
15.2		MDW152□□□	●			●					
15.3		MDW153□□□	●			●					
15.4		MDW154□□□	●			●					
15.5		MDW155□□□	●			●			●		
15.6		MDW156□□□	●		80	●		128			176
15.7		MDW157□□□	●			●					
15.8		MDW158□□□	●			●					
15.9		MDW159□□□	●			●					
16.0		MDW160□□□	●			●			●		

Please indicate MHK, LHK or DHK in the □□□ when ordering.
(Example: MDW111MHK)

● Diameter φ16.1～25.0mm

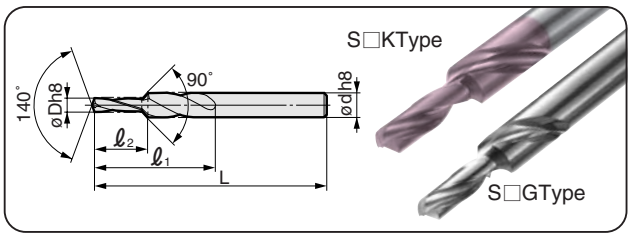
Diameter øD (mm)	Shank ød (mm)	Cat. No.	Standard Series (3D) Stock MHK	L	ℓ1	Long Series (5D) Stock LHK	L	ℓ1	Deep Hole Series (8D) Stock DHK	L	ℓ1
16.1 ~16.4	17.0	MDW161□□□ ~164□□□		152	83		203	132		254	182
16.5		MDW165□□□	●			●					
16.6 ~16.9		MDW166□□□ ~169□□□			85			136			187
17.0		MDW170□□□	●			●					
17.1 ~17.4	18.0	MDW171□□□ ~174□□□		158	88		214	140		266	193
17.5		MDW175□□□	●			●					
17.6 ~17.9		MDW176□□□ ~179□□□			90			144			198
18.0		MDW180□□□	●			●					
18.1 ~18.4	19.0	MDW181□□□ ~184□□□		164	93		221	148		278	204
18.5		MDW185□□□	●			●					
18.6 ~18.9		MDW186□□□ ~189□□□			95			152			209
19.0		MDW190□□□	●			●					
19.1 ~19.4	20.0	MDW191□□□ ~194□□□		170	98		230	156		290	215
19.5		MDW195□□□	●			●					
19.6 ~19.9		MDW196□□□ ~199□□□			100			160			220
20.0		MDW200□□□	●			●					
20.1 ~20.4	21.0	MDW201□□□ ~204□□□		176	103		239	164			
20.5		MDW205□□□	●			●					
20.6 ~20.9		MDW206□□□ ~209□□□			105			168			
21.0		MDW210□□□	●			●					
21.1 ~21.4	22.0	MDW211□□□ ~214□□□		182	108		248	172			
21.5		MDW215□□□	●			●					
21.6 ~21.9		MDW216□□□ ~219□□□			110			176			
22.0		MDW220□□□	●			●					
22.1 ~22.4	23.0	MDW221□□□ ~224□□□		188	113		257	180			
22.5		MDW225□□□	●			●					
22.6 ~22.9		MDW226□□□ ~229□□□			115			184			
23.0		MDW230□□□	●			●					
23.1 ~23.4	24.0	MDW231□□□ ~234□□□		194	118		266	188			
23.5		MDW235□□□	●			●					
23.6 ~23.9		MDW236□□□ ~239□□□			120			192			
24.0		MDW240□□□	●			●					
24.1 ~24.4	25.0	MDW241□□□ ~244□□□		200	123		275	196			
24.5		MDW245□□□	●			●					
24.6 ~24.9		MDW246□□□ ~249□□□			125			200			
25.0		MDW250□□□	●			●					

Grade : ACZ70S

S Type

External Coolant Supply (S□K Type / S□G Type)

Carbide | Coated Carbide | 2D | 3D



Tap Size	øD	ød	Cat. No.	Steel (FC,Al) Stock K	Steel (FC,Al) Stock G	Dimensions(mm) L	ℓ1	ℓ2
M5	4.3	7	MDW043S2□	●	●	78	25	10
			MDW043S3□	●	●	83	30	15
M6	5.1	8	MDW051S2□	●	●	84	30	12
			MDW051S3□	●	●	90	36	18
M8	6.8	10	MDW068S2□	●	●	96	40	16
			MDW068S3□	●	●	104	48	24
M10	8.5	12	MDW085S2□	●	●	112	50	20
			MDW085S3□	●	●	122	60	30
M12	10.3	14	MDW103S2□	●	●	124	60	24
			MDW103S3□	●	●	138	72	36

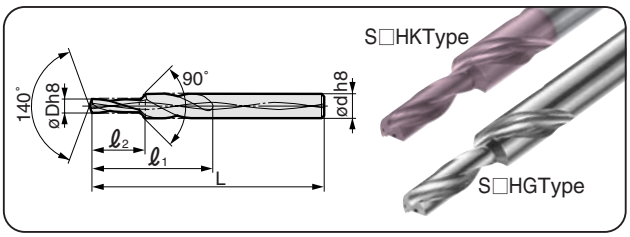
Non-standard sizes can be made to order. Please advise the required dimensions (total length, flute length, diameters etc.)

Grade : S□K type ACZ70
S□G type KH03

Please indicate K or G in the □ when ordering.
(Example: MDW043S2K)

Thru-tool Coolant Supply (S□HK Type / S□HG Type)

Carbide | Coated Carbide | W/ Oil Hole | 2D | 3D



Tap Size	øD	ød	Cat. No.	Steel (FC,Al) Stock HK	Steel (FC,Al) Stock HG	Dimensions(mm) L	ℓ1	ℓ2
M5	4.3	7	MDW043S2□□	●	●	78	25	10
			MDW043S3□□	●	●	83	30	15
M6	5.1	8	MDW051S2□□	●	●	84	30	12
			MDW051S3□□	●	●	90	36	18
M8	6.8	10	MDW068S2□□	●	●	96	40	16
			MDW068S3□□	●	●	104	48	24
M10	8.5	12	MDW085S2□□	●	●	112	50	20
			MDW085S3□□	●	●	122	60	30
M12	10.3	14	MDW103S2□□	●	●	124	60	24
			MDW103S3□□	●	●	138	72	36

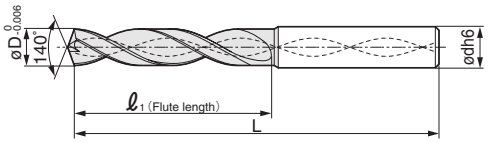
Grade : S□HK type ACZ70S
S□HG type KH03

Please indicate HK or HG in the □□ when ordering.
(Example: MDW043S2HK)

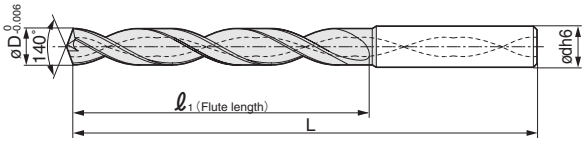
DLH Type

Coated Carbide | W/ Oil Hole | 3D | 5D

● Standard Series (MDLH Type)



● Long Series (LDLH Type)



● Diameter φ3.00～8.00mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Standard Series (3D) Stock MDLH	Standard Series (3D) Dimensions (mm) L	Standard Series (3D) Dimensions (mm) ℓ1	Long Series (5D) Stock LDLH	Long Series (5D) Dimensions (mm) L	Long Series (5D) Dimensions (mm) ℓ1
3.00	3	MDW0300□□□□		68	18		78	28
3.10	4	MDW0310□□□□		72	20		86	32
3.20		MDW0320□□□□						
3.30		MDW0330□□□□						
3.50		MDW0350□□□□						
3.65		MDW0365□□□□			23			36
4.00		MDW0400□□□□						
4.20	5	MDW0420□□□□		80	25		98	40
4.50		MDW0450□□□□						
4.60		MDW0460□□□□			28			44
5.00		MDW0500□□□□						
5.10	6	MDW0510□□□□		82	28		100	44
5.50		MDW0550□□□□						
6.00		MDW0600□□□□			30			48
6.50	7	MDW0650□□□□		88	33		109	52
6.80		MDW0680□□□□			35			56
7.00		MDW0700□□□□						
7.36	8	MDW0736□□□□		94	38		118	60
7.50		MDW0750□□□□						
8.00		MDW0800□□□□			40			64

● Diameter φ8.50～16.00mm

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Standard Series (3D) Stock MDLH	Standard Series (3D) Dimensions (mm) L	Standard Series (3D) Dimensions (mm) ℓ1	Long Series (5D) Stock LDLH	Long Series (5D) Dimensions (mm) L	Long Series (5D) Dimensions (mm) ℓ1
8.50	9	MDW0850□□□□		100	43		127	68
8.80		MDW0880□□□□			45			72
9.00		MDW0900□□□□						
9.20	10	MDW0920□□□□		106	48		136	76
9.50		MDW0950□□□□						
10.00		MDW1000□□□□			50			80
10.30	11	MDW1030□□□□		116	53		149	84
10.50		MDW1050□□□□						
10.80		MDW1080□□□□			55			88
11.00		MDW1100□□□□						
11.10	12	MDW1110□□□□		122	58		158	92
11.50		MDW1150□□□□						
12.00		MDW1200□□□□			60			96
12.50	13	MDW1250□□□□		128	63		167	100
12.96		MDW1296□□□□			65			104
13.00		MDW1300□□□□						
13.50	14	MDW1350□□□□		134	68		176	108
14.00		MDW1400□□□□			70			112
14.50	15	MDW1450□□□□		140	73		185	116
14.96		MDW1496□□□□			75			120
15.00		MDW1500□□□□						
15.50	16	MDW1550□□□□		146	78		194	124
16.00		MDW1600□□□□			80			128

Grade : DL1300

Please indicate MDLH or LDLH in the □□□□ when ordering.
(Example: MDW0300MDLH)

■ Characteristics

● High efficiency drilling
AURORA COAT（DLC）and strong helix design reduces cutting forces and improves edge sharpness.

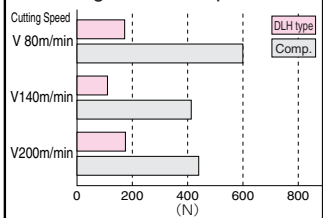
● Precision drilling
Special cutting edge design improves hole precision and quality.

● Longer tool life
With AURORA COAT coupled with the cutting edge design, long and stable tool life can be achieved.

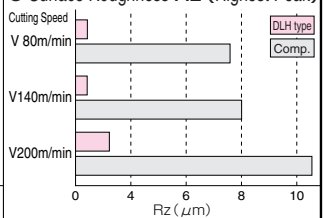
● Deep hole (L/D = 20) drilling
Drills for deep hole drilling can be custom-made.
（Production range ： φ3～φ12mm
total length ： 50 times drill diameter（max.290mm）

■ Performance

● Cutting Force Comparison



● Surface Roughness Rz (Highest Peak)



・Drill: MDW050LDLH (ø5.0)
・Work: A5052
・f=0.3mm/rev, d=25mm, L/D=5
・Internal coolant (4MPa), water soluble

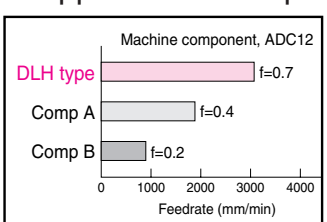
■ Recommended Conditions

Diameter		Aluminum Alloy	Aluminum Die Casting	Copper Alloy
~ ø5	V	80 ~ 160	80 ~ 180	80 ~ 160
	f	0.08 ~ 0.3	0.1 ~ 0.3	0.08 ~ 0.15
~ ø10	V	80 ~ 180	80 ~ 200	60 ~ 180
	f	0.1 ~ 0.3	0.1 ~ 0.35	0.1 ~ 0.2
~ ø16	V	80 ~ 200	80 ~ 200	80 ~ 200
	f	0.15 ~ 0.4	0.1 ~ 0.4	0.1 ~ 0.25

■ Applicable Work Materials

- Aluminum Die Casting
- Aluminum Alloy
- Aluminum Alloy Casting
- Brass Casting
- Bronze Casting

■ Application Example



<Drill> MDW0850LDLH (ø8.5)
<Machine> Vertical machine
<Conditions> V=120m/min d=35mm (through) Internal coolant (4MPa), water soluble

Recommended Conditions

■ Recommended Conditions (Solid Type)

● External Coolant Supply (T Type／K Type／G Type／D Type／S□K Type／S□G Type)

(V : Cutting Speed m/min、f : Feedrate mm/rev)

Drill Diameter \ Work / Series		Soft Steel/General Steel (~200HB)／(~300HB)		Hardended Steel (~45HRC)	Hardended Steel (~60HRC)	Stainless Steel (~200HB)	Gray Cast Iron (FC250)	Ductile Cast Iron (FCD450)	Al-alloy —	Ti-alloy (6Al-4V-Ti)	Inconel (Inco718)
		T4 type	MK type	MD type	MD type	T4 type	T4 type	T4 type	MG type	MD type	MD type
ø1 ~ ø3	V	40 ~ 70	30 ~ 60	20 ~ 40	10 ~ 20	10 ~ 40	40 ~ 70	35 ~ 60	50 ~ 80	20 ~ 30	10 ~ 25
	f	0.12 ~ 0.20	0.10 ~ 0.20	0.06 ~ 0.08	0.05 ~ 0.08	0.06 ~ 0.12	0.15 ~ 0.25	0.12 ~ 0.20	0.20 ~ 0.30	0.08 ~ 0.10	0.05 ~ 0.08
~ ø5	V	50 ~ 100	40 ~ 80	20 ~ 40	10 ~ 20	15 ~ 55	40 ~ 70	40 ~ 60	70 ~ 100	20 ~ 30	10 ~ 25
	f	0.15 ~ 0.25	0.15 ~ 0.25	0.08 ~ 0.10	0.05 ~ 0.08	0.08 ~ 0.15	0.15 ~ 0.30	0.15 ~ 0.25	0.20 ~ 0.35	0.08 ~ 0.10	0.05 ~ 0.08
~ ø10	V	80 ~ 130	50 ~ 110	20 ~ 40	10 ~ 20	15 ~ 60	50 ~ 80	50 ~ 70	90 ~ 100	25 ~ 40	10 ~ 30
	f	0.20 ~ 0.35	0.20 ~ 0.35	0.10 ~ 0.15	0.06 ~ 0.10	0.10 ~ 0.20	0.20 ~ 0.35	0.20 ~ 0.35	0.25 ~ 0.40	0.08 ~ 0.12	0.08 ~ 0.10
~ ø16	V	100 ~ 140	60 ~ 120	20 ~ 40	10 ~ 20	20 ~ 60	60 ~ 100	50 ~ 80	100 ~ 120	25 ~ 40	10 ~ 30
	f	0.25 ~ 0.35	0.25 ~ 0.35	0.10 ~ 0.15	0.08 ~ 0.12	0.10 ~ 0.20	0.25 ~ 0.35	0.25 ~ 0.35	0.30 ~ 0.45	0.10 ~ 0.15	0.08 ~ 0.10
~ ø25	V	100 ~ 140	60 ~ 120	20 ~ 40	10 ~ 20	20 ~ 60	60 ~ 100	60 ~ 80	100 ~ 120	25 ~ 40	10 ~ 30
	f	0.25 ~ 0.40	0.25 ~ 0.40	0.10 ~ 0.15	0.08 ~ 0.12	0.10 ~ 0.20	0.25 ~ 0.40	0.25 ~ 0.40	0.30 ~ 0.50	0.10 ~ 0.15	0.08 ~ 0.10

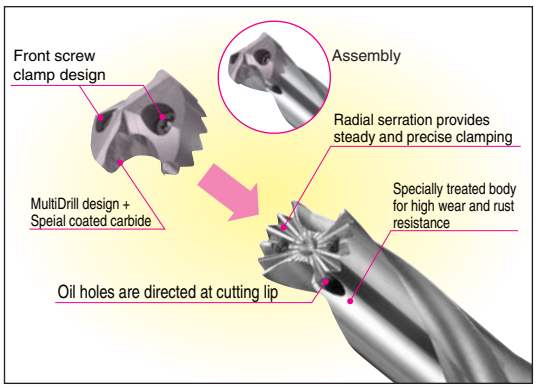
● Thru-tool Coolant Supply (HT Type／HK Type／DLH Type／S□HK Type／S□HG Type)

(V : Cutting Speed m/min、f : Feedrate mm/rev)

Drill Diameter \ Work / Series		Soft Steel/General Steel (~200HB)／(~300HB)		Hardended Steel (~45HRC)	Hardended Steel (~60HRC)	Stainless Steel (~200HB)	Gray Cast Iron (FC250)	Ductile Cast Iron (FCD450)	Al-alloy —	Ti-alloy (6Al-4V-Ti)	Inconel (Inco718)
		HT5 type	LHK type	HT5 type	HT5 type	HT5 type	HT5 type	HT5 type	LDLH type	HT5 type	HT5 type
ø1 ~ ø3	V	50 ~ 100	30 ~ 90	20 ~ 40	10 ~ 20	30 ~ 50	50 ~ 90	40 ~ 80	80 ~ 160	20 ~ 40	10 ~ 30
	f	0.12 ~ 0.20	0.10 ~ 0.20	0.06 ~ 0.08	0.05 ~ 0.08	0.06 ~ 0.12	0.15 ~ 0.25	0.12 ~ 0.20	0.08 ~ 0.30	0.08 ~ 0.10	0.05 ~ 0.08
~ ø5	V	80 ~ 120	50 ~ 100	20 ~ 40	10 ~ 20	30 ~ 60	50 ~ 90	40 ~ 80	80 ~ 160	20 ~ 40	10 ~ 30
	f	0.15 ~ 0.25	0.15 ~ 0.25	0.08 ~ 0.10	0.05 ~ 0.08	0.08 ~ 0.15	0.15 ~ 0.30	0.15 ~ 0.25	0.12 ~ 0.35	0.08 ~ 0.10	0.05 ~ 0.08
~ ø10	V	110 ~ 150	70 ~ 120	20 ~ 40	10 ~ 20	40 ~ 80	60 ~ 100	50 ~ 90	80 ~ 180	25 ~ 40	15 ~ 30
	f	0.20 ~ 0.35	0.20 ~ 0.35	0.10 ~ 0.15	0.06 ~ 0.10	0.10 ~ 0.20	0.20 ~ 0.35	0.20 ~ 0.35	0.15 ~ 0.40	0.08 ~ 0.12	0.08 ~ 0.10
~ ø16	V	120 ~ 160	80 ~ 140	20 ~ 40	10 ~ 20	50 ~ 80	70 ~ 120	60 ~ 100	80 ~ 180	25 ~ 40	20 ~ 35
	f	0.25 ~ 0.35	0.25 ~ 0.35	0.10 ~ 0.15	0.08 ~ 0.12	0.10 ~ 0.20	0.25 ~ 0.35	0.25 ~ 0.35	0.15 ~ 0.45	0.10 ~ 0.15	0.08 ~ 0.10
~ ø25	V	130 ~ 170	80 ~ 150	20 ~ 40	10 ~ 20	50 ~ 80	80 ~ 140	70 ~ 120	80 ~ 200	25 ~ 40	20 ~ 35
	f	0.30 ~ 0.40	0.25 ~ 0.40	0.10 ~ 0.15	0.08 ~ 0.12	0.10 ~ 0.20	0.25 ~ 0.40	0.25 ~ 0.40	0.15 ~ 0.50	0.10 ~ 0.15	0.08 ~ 0.10

SEC-MULTIDRILLS
SMD Type

Expansion



■ General Features

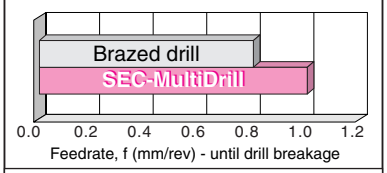
Indexable type drill with exchangeable drill head, which has a radial serration design, for high precision and strength.

An exchangeable drill head provides a new cutting edge, higher productivity and cost efficiency with easy tool management.

■ Characteristics /Application

- Double the tool life of brazed drills
- Providing a regrinding allowance of 1.5 to 3 mm
- New low cutting force MEL type head series
- MEL Type most suitable for stainless steel, soft steel and gray cast iron as well as low rigidity setups.
- Head clamp is stronger than brazed drills
- Precision is similar to brazed drills

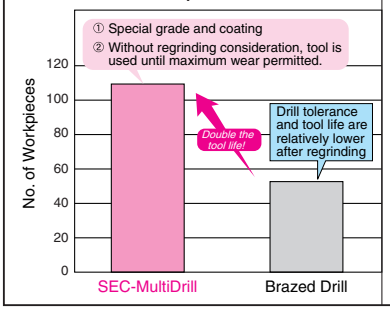
● Durability Comparison



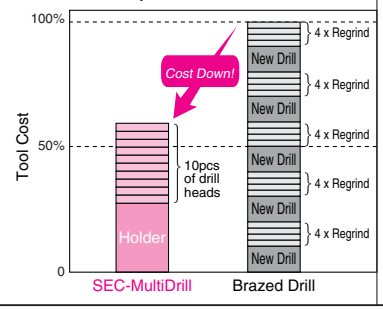
Drill: ø16.0mm
Work: S50C
Cond.: V=80m/min, Drilling depth 38mm

■ Tool Life And Cost

● Tool Life Comparison



● Cost Comparison

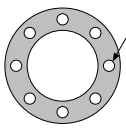


● Results

For regrinding purpose, brazed drill are used only up to 50-70% of its actual tool life potential.
SEC-MultiDrill is used up to 100%

SEC-MultiDrill has Double the tool life of brazed drills!
Shorter tool change time!

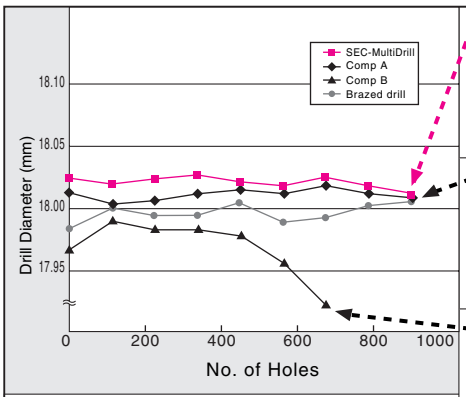
● Workpiece Example



Dia.: ø18.0mm Depth: 50mm

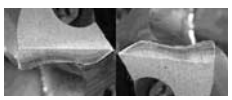
SEC-MultiDrill SMD Type
Insert: SMDT1800MTL
Holder: SMDH180M
Work: Machine parts, S50C Wet

■ Drilling Precision



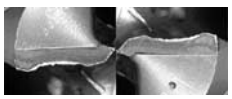
Work: S50C Drill: ø18.0mm
Cond.: V=70m/min, f=0.25mm/rev
Hole depth: 38mm (through), water soluble

SEC-MultiDrill: Normal wear



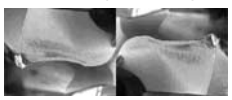
after 900 holes (~34m)

Comp A: Large wear



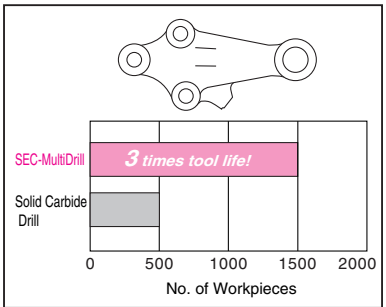
after 900 holes (~34m)

Comp B: Edge chipping



after 670 holes (~25m)

■ Application Examples



Work: Machine parts (SCV15)
Drill: ø14.5mm
Cond.: V=80m/min, f =0.2mm/rev Hole depth: 26mm (thru)
Coolant: water soluble

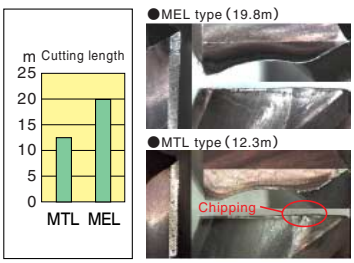
■ Recommended Conditions

V (m/min), f (mm/rev)

Drill (mm)		Soft Steel (~250HB)	General Steel (250~320HB)	Hardened Steel (HRC45)	Stainless Steel (~200HB)	Ductile Cast Iron	Cast Iron
Recommended Head		MEL type	MTL type	MTL type	MEL type	MTL type	MEL type
~φ16.0	V	80 ~ 120 (50 ~ 80)	80 ~ 110 (50 ~ 80)	50 ~ 80 (40 ~ 60)	50 ~ 80 (40 ~ 60)	50 ~ 80 (40 ~ 70)	50 ~ 80 (40 ~ 70)
	f	0.15 ~ 0.30	0.15 ~ 0.30	0.10 ~ 0.20	0.10 ~ 0.20	0.15 ~ 0.30	0.20 ~ 0.30
~φ20.0	V	80 ~ 120 (50 ~ 80)	80 ~ 110 (50 ~ 80)	60 ~ 90 (50 ~ 70)	60 ~ 90 (50 ~ 70)	(50 ~ 80) (40 ~ 70)	60 ~ 90 (50 ~ 80)
	f	0.15 ~ 0.35	0.15 ~ 0.35	0.15 ~ 0.25	0.15 ~ 0.25	0.15 ~ 0.35	0.20 ~ 0.35
~φ30.8	V	80 ~ 130 (60 ~ 90)	80 ~ 130 (60 ~ 90)	60 ~ 90 (50 ~ 70)	60 ~ 90 (50 ~ 70)	60 ~ 90 (50 ~ 80)	70 ~ 100 (60 ~ 90)
	f	0.20 ~ 0.40	0.20 ~ 0.35	0.15 ~ 0.25	0.15 ~ 0.25	0.20 ~ 0.40	0.20 ~ 0.45

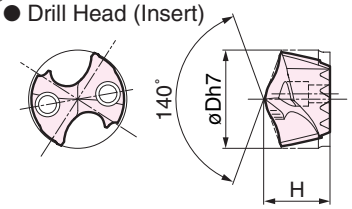
Note: Where machine and work clamp rigidity are good, conditions may be increased up to the maximum.
For 8xD drills, please use feedrates stated within the ( ).
Before drilling 8xD holes, a guide hole of similar diameter must be made.

● Longer tool life with MEL Type for drilling holes in stainless steel



Work: SUS304
Drill: ø16.5×5D
Cond.: V=60m/min, f =0.2mm/rev Hole depth: 40mm (thru)
Coolant: water soluble

● Drill Head (Insert)



Coated Carbide | W/ Oil Hole | Indexable | 3D | 5D | 8D

■ Drill Head

MTL Type Usage: Suitable for high efficiency drilling of general steel
MEL Type Usage: Suitable for exotic metals such as stainless steel, soft steel, gray cast iron, and low rigidity setups.

● Diameter φ12.0～25.0mm

øD	Cat. No.	Stock MTL	Stock MEL	H
12.0	SMDT1200□□□	●	○	9.1
12.1	SMDT1210□□□	●	○	9.1
12.2	SMDT1220□□□	●	○	9.1
12.3	SMDT1230□□□	●	○	9.1
12.5	SMDT1250□□□	●	○	9.4
12.6	SMDT1260□□□	●	○	9.4
12.7	SMDT1270□□□	●	○	9.4
13.0	SMDT1300□□□	●	○	9.7
13.1	SMDT1310□□□	●	○	9.7
13.5	SMDT1350□□□	●	○	10.3
14.0	SMDT1400□□□	●	○	10.3
14.1	SMDT1410□□□	●	○	10.3
14.2	SMDT1420□□□	●	○	10.3
14.5	SMDT1450□□□	●	○	10.3
15.0	SMDT1500□□□	●	○	11.0
15.5	SMDT1550□□□	●	○	11.0
15.6	SMDT1560□□□	●	○	11.6
15.7	SMDT1570□□□	●	○	11.6
16.0	SMDT1600□□□	●	○	11.6
16.3	SMDT1630□□□	●	○	11.6
16.5	SMDT1650□□□	●	○	11.6
17.0	SMDT1700□□□	●	○	12.2
17.5	SMDT1750□□□	●	○	12.2
17.6	SMDT1760□□□	●	○	12.9
17.7	SMDT1770□□□	●	○	12.9
18.0	SMDT1800□□□	●	○	12.9
18.5	SMDT1850□□□	●	○	12.9
19.0	SMDT1900□□□	●	○	13.5
19.5	SMDT1950□□□	●	○	13.5
20.0	SMDT2000□□□	●	○	14.1
20.5	SMDT2050□□□	●	○	14.1
21.0	SMDT2100□□□	●	○	14.8
21.2	SMDT2120□□□	●	○	14.8
21.5	SMDT2150□□□	●	○	14.8
22.0	SMDT2200□□□	●	○	15.0
22.5	SMDT2250□□□	●	○	15.0
23.0	SMDT2300□□□	●	○	15.1
23.5	SMDT2350□□□	●	○	15.1
24.0	SMDT2400□□□	●	○	15.4
24.1	SMDT2410□□□	●	○	15.4
24.5	SMDT2450□□□	●	○	15.4
25.0	SMDT2500□□□	●	○	15.8

Please indicate MTL or MEL in the □□□ when ordering.
(Example: SMDT1200MTL)

● Diameter φ25.5～30.5mm

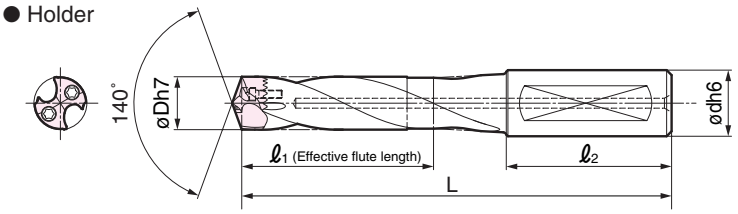
øD	Cat. No.	Stock MTL	Stock MEL	H
25.5	SMDT2550□□□	●	○	15.8
26.0	SMDT2600□□□	●	○	16.4
26.5	SMDT2650□□□	●	○	16.4
27.0	SMDT2700□□□	●	○	17.1
27.5	SMDT2750□□□	●	○	17.1
28.0	SMDT2800□□□	●	○	17.7
28.5	SMDT2850□□□	●	○	17.7
29.0	SMDT2900□□□	●	○	18.3
29.5	SMDT2950□□□	●	○	18.3
30.0	SMDT3000□□□	●	○	19.0
30.5	SMDT3050□□□	●	○	19.0

Grade MTL type ： ACZ70S

■ Recommended Tightening Torque

Drill Head Size	Cap Screw	Recommended Tightening Torque (N · cm)
SMDT1200□□□ ~1550□□□	BXD02208IP	75~100
SMDT1551□□□ ~1850□□□	BXD02509IP	93~124
SMDT1851□□□ ~2150□□□	BXD03011IP	183~244
SMDT2151□□□ ~2480□□□	BXD03512IP	279~372
SMDT2481□□□ ~2780□□□	BXD04014IP	414~552
SMDT2781□□□ ~3050□□□	BXD04515IP	498~664

● Holder



Coated Carbide | W/ Oil Hole | Indexable | 3D | 5D | 8D

■ Holder

■ Parts

Drill Diameter Range	Catalogue No. M (3D) Cat. No.	Stock	L (5D) Cat. No.	Stock	D (8D) Cat. No.	Stock	Applicable Drill Head	Cap Screw	Wrench
From 12.0 to below 12.5	SMDH120M	●	SMDH120L	●	——	—	SMDT1200□□□~SMDT1249□□□	BXD02208IP	TRDR08IP
From 12.5 to below 13.0	SMDH125M	●	SMDH125L	●	——	—	SMDT1250□□□~SMDT1299□□□		
From 13.0 to below 13.5	SMDH130M	●	SMDH130L	●	——	—	SMDT1300□□□~SMDT1349□□□		
From 13.5 to 14.5	SMDH140M	●	SMDH140L	●	SMDH140D	●	SMDT1350□□□~SMDT1450□□□		
Above 14.5 to 15.5	SMDH150M	●	SMDH150L	●	SMDH150D	●	SMDT1451□□□~SMDT1550□□□		
Above 15.5 to 16.5	SMDH160M	●	SMDH160L	●	SMDH160D	●	SMDT1551□□□~SMDT1650□□□	BXD02509IP	TRDR10IP
Above 16.5 to 17.5	SMDH170M	●	SMDH170L	●	SMDH170D	●	SMDT1651□□□~SMDT1750□□□		
Above 17.5 to 18.5	SMDH180M	●	SMDH180L	●	SMDH180D	●	SMDT1751□□□~SMDT1850□□□		
Above 18.5 to 19.5	SMDH190M	●	SMDH190L	●	SMDH190D	●	SMDT1851□□□~SMDT1950□□□	BXD03011IP	TRDR15IP
Above 19.5 to 20.5	SMDH200M	●	SMDH200L	●	SMDH200D	●	SMDT1951□□□~SMDT2050□□□		
Above 20.5 to 21.5	SMDH210M	●	SMDH210L	●	SMDH210D	●	SMDT2051□□□~SMDT2150□□□		
Above 21.5 to 22.8	SMDH220M	●	SMDH220L	●	SMDH220D	●	SMDT2151□□□~SMDT2280□□□	BXD03512IP	TRDR15IP
Above 22.8 to 23.8	SMDH230M	●	SMDH230L	●	SMDH230D	●	SMDT2281□□□~SMDT2380□□□		
Above 23.8 to 24.8	SMDH240M	●	SMDH240L	●	SMDH240D	●	SMDT2381□□□~SMDT2480□□□		
Above 24.8 to 25.8	SMDH250M	●	SMDH250L	●	SMDH250D	●	SMDT2481□□□~SMDT2580□□□	BXD04014IP	TRDR20IP
Above 25.8 to 26.8	SMDH260M	●	SMDH260L	●	SMDH260D	●	SMDT2581□□□~SMDT2680□□□		
Above 26.8 to 27.8	SMDH270M	●	SMDH270L	●	SMDH270D	●	SMDT2681□□□~SMDT2780□□□		
Above 27.8 to 28.8	SMDH280M	●	SMDH280L	●	SMDH280D	●	SMDT2781□□□~SMDT2880□□□	BXD04515IP	TRDR25IP
Above 28.8 to 29.8	SMDH290M	●	SMDH290L	●	SMDH290D	●	SMDT2881□□□~SMDT2980□□□		
Above 29.8 to 30.8	SMDH300M	●	SMDH300L	●	SMDH300D	●	SMDT2981□□□~SMDT3080□□□		

■ Dimensions of assembled drill with MTL Type /MEL Type drill head

Drill Diameter Range	M (3D) Cat. No.	Dimensions L	Dimensions ℓ1	L (5D) Cat. No.	Dimensions L	Dimensions ℓ1	D (8D) Cat. No.	Dimensions L	Dimensions ℓ1	Shank Dimensions ød	Shank Dimensions ℓ2
From 12.0 to below 12.5	SMDH120M	105	44	SMDH120L	130	69	——	—	—	16	48
From 12.5 to below 13.0	SMDH125M			SMDH125L			——	—	—		
From 13.0 to below 13.5	SMDH130M	110	47	SMDH130L	140	74	——	—	—		
From 13.5 to 14.5	SMDH140M	116.5	52.5	SMDH140L	146.5	81.5	SMDH140D	191.5	124.5		
Above 14.5 to 15.5	SMDH150M	126.5	55.5	SMDH150L	156.5	86.5	SMDH150D	201.5	133.5	20	50
Above 15.5 to 16.5	SMDH160M	131.5	59.5	SMDH160L	166.5	92.5	SMDH160D	211.5	141.5		
Above 16.5 to 17.5	SMDH170M	136.5	62.5	SMDH170L	171.5	97.5	SMDH170D	221.5	150.5		
Above 17.5 to 18.5	SMDH180M	141.5	66.5	SMDH180L	176.5	103.5	SMDH180D	226.5	158.5		
Above 18.5 to 19.5	SMDH190M	156.5	69.5	SMDH190L	191.5	108.5	SMDH190D	251.5	167.5	25	56
Above 19.5 to 20.5	SMDH200M		73.5	SMDH200L	196.5	114.5	SMDH200D	261.5	175.5		
Above 20.5 to 21.5	SMDH210M		76.5	SMDH210L		119.5	SMDH210D	266.5	184.5		
Above 21.5 to 22.8	SMDH220M	161.1	80.1	SMDH220L	201.1	125.1	SMDH220D	271.1	192.1		
Above 22.8 to 23.8	SMDH230M	160.6	82.6	SMDH230L	210.6	129.6	SMDH230D	280.6	200.6		
Above 23.8 to 24.8	SMDH240M	170.2	86.2	SMDH240L	220.2	135.2	SMDH240D	295.2	208.2	32	60
Above 24.8 to 25.8	SMDH250M	170	88	SMDH250L	225	140	SMDH250D	300	217		
Above 25.8 to 26.8	SMDH260M	175	92	SMDH260L	230	146	SMDH260D	310	225		
Above 26.8 to 27.8	SMDH270M		94	SMDH270L	235	151	SMDH270D	320	234		
Above 27.8 to 28.8	SMDH280M	180	97	SMDH280L	240	157	SMDH280D	325	242		
Above 28.8 to 29.8	SMDH290M	185	100	SMDH290L	245	162	SMDH290D	335	251		
Above 29.8 to 30.8	SMDH300M		104	SMDH300L	255	167	SMDH300D	345	259		

CHAMFER RING for SEC-MULTIDRILL
DC-SMDH Type

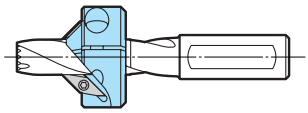
New

■ General Features

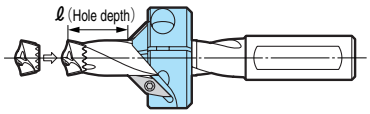
When mounted on the SEC-MULTIDRILL SMD type holder, the CHAMFER RING for SEC-MULTIDRILL “DC-SMDH Type” performs chamfering of the hole entrance in a single process.

■ How to Mount the Chamfer Ring

① Temporarily tighten the chamfer ring to the drill holder before mounting the drill head and the chamfering insert.

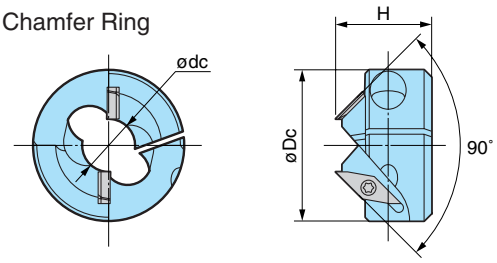


② After mounting the drill head, align the edge of the drill's flute to the tip of the ring's pocket position as shown. Tighten the ring at the desired hole depth position.

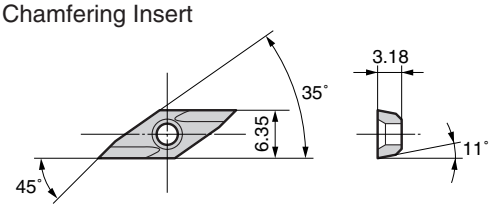


③ The ring should not obstruct the oil hole on the drill holder.

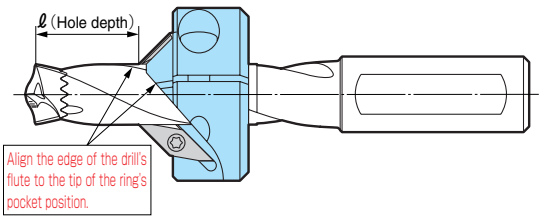
● Chamfer Ring



● Chamfering Insert



● Mounted Figure



■ Troubleshooting

1. In case of chattering at the chamfering portion
   ① Reduce the chamfering speed before use.
   ② Use the shortest possible drill holder.
2. In case the ring is blocked or stuck with chips
   ① Check the position of the drill's flute against the ring's pocket.
   ② Change the chamfering condition.
   ③ Use step feed.

■ Chamfer Ring

Catalogue No. of Chamfer Ring	Stock	Catalogue No. of Applicable Holder	Hole Depth ℓ (min~max)		Max. Chamfering Size	Chamfer Ring Size			Chamfering Insert	Parts			
			M (3D) Holder	L (5D) Holder		φ Dc	φ dc	H		Screw for Ring	Screw for Insert	Wrench for Ring	Wrench for Insert
DC-SMDH140-90	○	**SMDH140M/L**	15~26	15~55	1.5	40	13	25.4	VPGW 1103DCRFX	BX0510	BFTX02506N	LH040	TRX08
DC-SMDH150-90	○	**SMDH150M/L**	15~29	15~60		41	14						
DC-SMDH160-90	○	**SMDH160M/L**	17~33	17~66		42	15						
DC-SMDH170-90	○	**SMDH170M/L**	18~36	18~41		44	16						
DC-SMDH180-90	○	**SMDH180M/L**	18~40	18~77		45	17						
DC-SMDH190-90	○	**SMDH190M/L**	19~43	19~82		46	18						
DC-SMDH200-90	○	**SMDH200M/L**	19~47	19~88		47	19						
DC-SMDH210-90	○	**SMDH210M/L**	17~48	17~91	2.0	50	20	27.0	VPGW 1103DCRFX	BX0615	BFTX02506N	LH050	TRX08
DC-SMDH220-90	○	**SMDH220M/L**	18~52	18~97		51	21						
DC-SMDH230-90	○	**SMDH230M/L**	18~54	18~101		52	22						
DC-SMDH240-90	○	**SMDH240M/L**	18~58	18~107		54	23						
DC-SMDH250-90	○	**SMDH250M/L**	18~60	18~111		55	24						
DC-SMDH260-90	○	**SMDH260M/L**	18~62	18~116		57	25	28.6					
DC-SMDH270-90	○	**SMDH270M/L**	18~64	18~121		59	26						
DC-SMDH280-90	○	**SMDH280M/L**	19~68	19~127		62	27						
DC-SMDH290-90	○	**SMDH290M/L**	19~70	19~132		65	28						
DC-SMDH300-90	○	**SMDH300M/L**	19~74	19~137		68	29						

Achieving double the efficiency with 5 times L/D ratio in deep hole drillling

SEC-W Drill
WDS Type

■ General Features

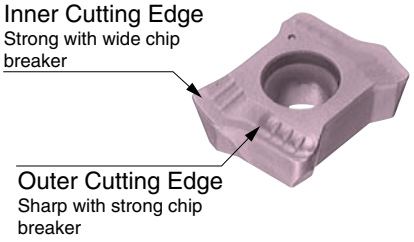
SEC-W Drill WDS type, with an unique cutting edge design for excellent cutting balance, has double the efficiency of previous designs.

■ Advantages / Application

● **High efficiency drilling**
High feed drilling of S50C material can be achieved.
From ø14mm (f=0.2mm/rev) to ø25mm (f=0.3mm/rev).

● **Deep hole drilling**
Deep hole drilling of up to 5 L/D is possible due to excellent chip removal abilities.

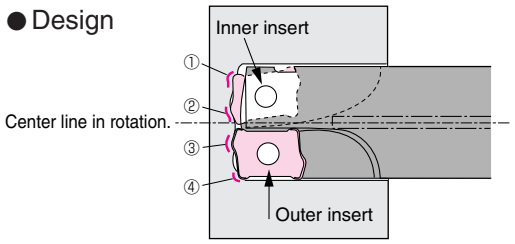
● **High reliability**
A combination of extra tough substrate and high feed conditions promotes a stable and long tool life.



(S04 Type chipbreaker)

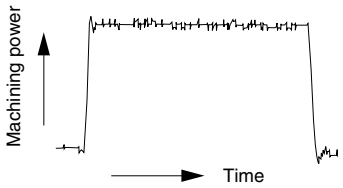
■ Performance

● Design



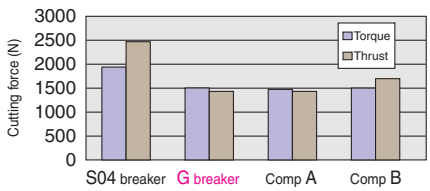
· Small chips produced by 4 effective cutting edges.
· Good cutting balance and low shock penetration due to a smooth and even contact with the work piece.

● Stable drilling even for deep holes (L/D:5)



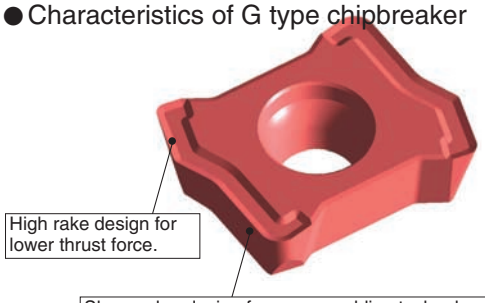
Drill: WDS140M5S20
Work material: S50C(230HB)
V=120m/min, f=0.15mm/rev, d=70mm

● Cuting force of G type chipbreaker



Drill: WDS180M3S25
Work material: S50C(230HB)
V=150m/min, f=0.15mm/rev, d=36mm

● Characteristics of G type chipbreaker



■ Recommended Conditions

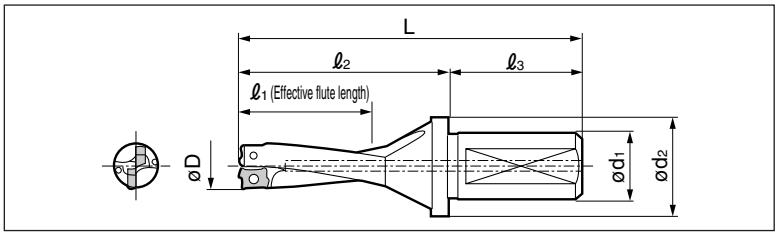
Work material	Grade	Cutting Speed V(m/min)	Feedrate f(mm/rev)				Recommended Chipbreaker
			ø14 ~ ø17.0	ø17.5 ~ ø23.5	ø24 ~ ø32	ø33 ~ ø50	
Low Carbon Steel	AC350, ACZ350	80 ~ 120	0.12 ~ 0.18	0.12 ~ 0.20	0.15 ~ 0.22	0.18 ~ 0.25	G,S04
Carbon Steel	AC350, ACZ350	100 ~ 180	0.12 ~ 0.22	0.12 ~ 0.25	0.15 ~ 0.30	0.18 ~ 0.35	G
Alloy Steel	AC350, ACZ350	100 ~ 150	0.12 ~ 0.20	0.12 ~ 0.22	0.15 ~ 0.25	0.18 ~ 0.30	S04
Stainless Steel	AC350, ACZ350	100 ~ 150	0.12 ~ 0.18	0.12 ~ 0.20	0.15 ~ 0.22	0.18 ~ 0.25	S04
Cast Iron	ACZ310	100 ~ 180	0.12 ~ 0.20	0.12 ~ 0.25	0.15 ~ 0.30	0.18 ~ 0.35	G

Note: When using 5 L/D drills, please reduce the above feedrate to 80% and the feedrate at the entry point should be reduce to 50%.

WDS Type

Max. Depth : 3 L/D

Coated Carbide | W/ Oil Hole | Indexable | 3D



■ Holder (Using LPMX insert)

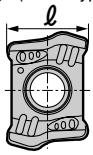
Cat. No.	Stock	Dimensions (mm) D	d1	d2	L	ℓ1	ℓ2	ℓ3	Insert
WDS 140M3S20	●	14.0	20	31	109	42.0	65	44	LPMX 06T206
WDS 145M3S20	●	14.5	20	31	111	43.5	67	44	
WDS 150M3S20	●	15.0	20	31	113	45.0	69	44	
WDS 155M3S20	●	15.5	20	32	115	46.5	71	44	LPMX 07T208
WDS 160M3S20	●	16.0	20	32	117	48.0	73	44	
WDS 165M3S20	●	16.5	20	32	119	49.5	75	44	
WDS 170M3S20	●	17.0	20	32	121	51.0	77	44	
WDS 175M3S25	●	17.5	25	37	135	52.5	79	56	LPMX 080308
WDS 180M3S25	●	18.0	25	37	137	54.0	81	56	
WDS 185M3S25	●	18.5	25	37	139	55.5	83	56	
WDS 190M3S25	●	19.0	25	37	141	57.0	85	56	
WDS 195M3S25	●	19.5	25	37	143	58.5	87	56	
WDS 200M3S25	●	20.0	25	37	145	60.0	89	56	
WDS 205M3S25	●	20.5	25	40	147	61.5	91	56	LPMX 090308
WDS 210M3S25	●	21.0	25	40	149	63.0	93	56	
WDS 215M3S25	●	21.5	25	40	151	64.5	95	56	
WDS 220M3S25	●	22.0	25	40	153	66.0	97	56	
WDS 225M3S25	●	22.5	25	40	155	67.5	99	56	
WDS 230M3S25	●	23.0	25	40	157	69.0	101	56	
WDS 235M3S25	●	23.5	25	40	159	70.5	103	56	

■ Holder (Using XPMX insert)

Cat. No.	Stock	Dimensions (mm) D	d1	d2	L	ℓ1	ℓ2	ℓ3	Insert
WDS 240M3S32	●	24.0	32	47	167	72.0	107	60	XPMX 11T308
WDS 245M3S32	●	24.5	32	47	168	73.5	108.5	60	
WDS 250M3S32	●	25.0	32	47	170	75.0	110	60	
WDS 260M3S32	●	26.0	32	47	173	78.0	113	60	
WDS 270M3S32	●	27.0	32	47	176	81.0	116	60	
WDS 280M3S32	●	28.0	32	47	182	84.0	122	60	XPMX 13T308
WDS 290M3S32	●	29.0	32	47	185	87.0	125	60	
WDS 300M3S32	●	30.0	32	47	188	90.0	128	60	
WDS 310M3S32	●	31.0	32	55	191	93.0	131	60	
WDS 320M3S32	●	32.0	32	55	194	96.0	134	60	
WDS 330M3S40	●	33.0	40	55	210	99.0	140	70	XPMX 150408
WDS 340M3S40	●	34.0	40	55	213	102.0	143	70	
WDS 350M3S40	●	35.0	40	55	216	105.0	146	70	
WDS 360M3S40	●	36.0	40	55	219	108.0	149	70	
WDS 370M3S40	●	37.0	40	65	222	111.0	152	70	
WDS 380M3S40	●	38.0	40	65	225	114.0	155	70	XPMX 170412
WDS 390M3S40	●	39.0	40	65	228	117.0	158	70	
WDS 400M3S40	●	40.0	40	65	231	120.0	161	70	
WDS 410M3S40	●	41.0	40	65	234	123.0	164	70	
WDS 420M3S40	●	42.0	40	65	237	126.0	167	70	
WDS 430M3S40	●	43.0	40	65	240	129.0	170	70	
WDS 440M3S40	●	44.0	40	65	243	132.0	173	70	XPMX 200412
WDS 450M3S40	●	45.0	40	65	246	135.0	176	70	
WDS 460M3S40	●	46.0	40	65	249	138.0	179	70	
WDS 470M3S40	●	47.0	40	65	252	141.0	182	70	
WDS 480M3S40	●	48.0	40	65	255	144.0	185	70	
WDS 490M3S40	●	49.0	40	65	258	147.0	188	70	
WDS 500M3S40	●	50.0	40	65	261	150.0	191	70	

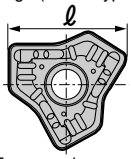
■ Inserts

Fig1 (LPMX type)



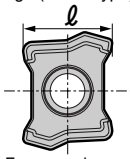
For general use
S04 chipbreaker

Fig2 (XPMX type)



For general use
S04 chipbreaker

Fig3 (LPMX type)



For general use
G chipbreaker

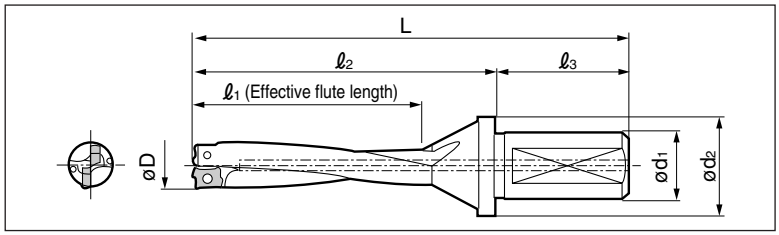
Cat. No.	Coated AC350	ACZ350	ACZ310	Dimensions (mm) ℓ	Thickness	Nose radius	Fig
LPMX 06T206S04	●	–	●	6.0	2.8	0.6	Fig1
LPMX 07T208S04	●	–	●	6.8	2.8	0.8	Fig1
LPMX 07T208-G	–	●	●	6.8	2.8	0.8	Fig3
LPMX 080308S04	●	–	●	7.6	3.2	0.8	Fig1
LPMX 080308-G	–	●	●	7.6	3.2	0.8	Fig3
LPMX 090308S04	●	–	●	8.8	3.2	0.8	Fig1
LPMX 090308-G	–	●	●	8.8	3.2	0.8	Fig3
XPMX 11T308S04	●	–	●	11.1	3.97	0.8	Fig2
XPMX 13T308S04	●	–	●	13.0	3.97	0.8	Fig2
XPMX 150408S04	●	–	●	15.0	4.76	0.8	Fig2
XPMX 170412S04	●	–	●	17.0	4.76	1.2	Fig2
XPMX 200412S04	●	–	●	19.5	4.76	1.2	Fig2

■ Parts

Screw	Wrench	Wrench	Applicable Holder
			
BFTY02205	TRD07	–	WDS140M3S20 ~ WDS150M3S20
BFTY02206	TRD07	–	WDS155M3S20 ~ WDS170M3S20
BFTX02506N	TRD08	–	WDS175M3S25 ~ WDS200M3S25
BFTX02508	TRD08	–	WDS205M3S25 ~ WDS275M3S32
BFTX0309N	–	TRX10	WDS280M3S32 ~ WDS320M3S32
BFTX03584	–	TRX15	WDS330M3S40 ~ WDS370M3S40
BFTX0409N	–	TRX15	WDS380M3S40 ~ WDS430M3S40
BFTX0511N	–	TRX20	WDS440M3S40 ~ WDS500M3S40

Max. Depth : 5 L/D

Coated Carbide | W/ Oil Hole | Indexable | 5D



■ Holde (Using LPMX insert)

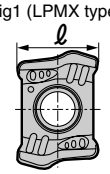
Cat. No.	Stock	Dimensions(mm) D	d1	d2	L	ℓ1	ℓ2	ℓ3	Insert
WDS 140M5S20	●	14.0	20	31	137	70.0	93	44	LPMX 06T206
WDS 145M5S20	●	14.5	20	31	140	72.5	96	44	
WDS 150M5S20	●	15.0	20	31	143	75.0	99	44	
WDS 155M5S20	●	15.5	20	32	146	77.5	102	44	LPMX 07T208
WDS 160M5S20	●	16.0	20	32	149	80.0	105	44	
WDS 165M5S20	●	16.5	20	32	152	82.5	108	44	
WDS 170M5S20	●	17.0	20	32	155	85.0	111	44	
WDS 175M5S25	●	17.5	25	37	170	87.5	114	56	LPMX 080308
WDS 180M5S25	●	18.0	25	37	173	90.0	117	56	
WDS 185M5S25	●	18.5	25	37	176	92.5	120	56	
WDS 190M5S25	●	19.0	25	37	179	95.0	123	56	
WDS 195M5S25	●	19.5	25	37	181	97.5	126	56	
WDS 200M5S25	●	20.0	25	37	185	100.0	129	56	
WDS 205M5S25	●	20.5	25	40	188	102.5	132	56	LPMX 090308
WDS 210M5S25	●	21.0	25	40	191	105.0	135	56	
WDS 215M5S25	●	21.5	25	40	194	107.5	138	56	
WDS 220M5S25	●	22.0	25	40	197	110.0	141	56	
WDS 225M5S25	●	22.5	25	40	200	112.5	144	56	
WDS 230M5S25	●	23.0	25	40	203	115.0	147	56	
WDS 235M5S25	●	23.5	25	40	206	117.5	150	56	

■ Holde (Using XPMX insert)

Cat. No.	Stock	Dimensions(mm) D	d1	d2	L	ℓ1	ℓ2	ℓ3	Insert
WDS 240M5S32	●	24.0	32	47	215	120.0	155	60	XPMX 11T308
WDS 245M5S32	●	24.5	32	47	217.5	122.5	157.5	60	
WDS 250M5S32	●	25.0	32	47	220	125.0	160	60	
WDS 260M5S32	●	26.0	32	47	225	130.0	165	60	
WDS 270M5S32	●	27.0	32	47	230	135.0	170	60	
WDS 280M5S32	●	28.0	32	47	238	140.0	178	60	XPMX 13T308
WDS 290M5S32	●	29.0	32	47	243	145.0	183	60	
WDS 300M5S32	●	30.0	32	47	248	150.0	188	60	
WDS 310M5S32	●	31.0	32	55	253	155.0	193	60	
WDS 320M5S32	●	32.0	32	55	258	160.0	198	60	
WDS 330M5S40	●	33.0	40	55	276	165.0	206	70	XPMX 150408
WDS 340M5S40	●	34.0	40	55	281	170.0	211	70	
WDS 350M5S40	●	35.0	40	55	286	175.0	216	70	
WDS 360M5S40	●	36.0	40	55	291	180.0	221	70	
WDS 370M5S40	●	37.0	40	65	296	185.0	226	70	
WDS 380M5S40	●	38.0	40	65	301	190.0	231	70	XPMX 170412
WDS 390M5S40	●	39.0	40	65	306	195.0	236	70	
WDS 400M5S40	●	40.0	40	65	311	200.0	241	70	
WDS 410M5S40	●	41.0	40	65	316	205.0	246	70	
WDS 420M5S40	●	42.0	40	65	321	210.0	251	70	
WDS 430M5S40	●	43.0	40	65	326	215.0	256	70	
WDS 440M5S40	●	44.0	40	65	331	220.0	261	70	XPMX 200412
WDS 450M5S40	●	45.0	40	65	336	225.0	266	70	
WDS 460M5S40	●	46.0	40	65	341	230.0	271	70	
WDS 470M5S40	●	47.0	40	65	346	235.0	276	70	
WDS 480M5S40	●	48.0	40	65	351	240.0	281	70	
WDS 490M5S40	●	49.0	40	65	356	245.0	286	70	
WDS 500M5S40	●	50.0	40	65	361	250.0	291	70	

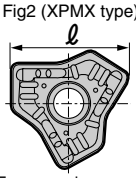
■ Inserts

Fig1 (LPMX type)



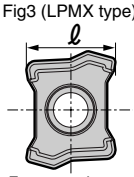
For general use
S04 chipbreaker

Fig2 (XPMX type)



For general use
S04 chipbreaker

Fig3 (LPMX type)



For general use
G chipbreaker

Cat. No.	Coated AC350	ACZ350	ACZ310	Dimensions(mm) ℓ	Thickness	Nose radius	Fig
LPMX 06T206S04	●	–	●	6.0	2.8	0.6	Fig1
LPMX 07T208S04	●	–	●	6.8	2.8	0.8	Fig1
LPMX 07T208-G	–	●	●	6.8	2.8	0.8	Fig3
LPMX 080308S04	●	–	●	7.6	3.2	0.8	Fig1
LPMX 080308-G	–	●	●	7.6	3.2	0.8	Fig3
LPMX 090308S04	●	–	●	8.8	3.2	0.8	Fig1
LPMX 090308-G	–	●	●	8.8	3.2	0.8	Fig3
XPMX 11T308S04	●	–	●	11.1	3.97	0.8	Fig2
XPMX 13T308S04	●	–	●	13.0	3.97	0.8	Fig2
XPMX 150408S04	●	–	●	15.0	4.76	0.8	Fig2
XPMX 170412S04	●	–	●	17.0	4.76	1.2	Fig2
XPMX 200412S04	●	–	●	19.5	4.76	1.2	Fig2

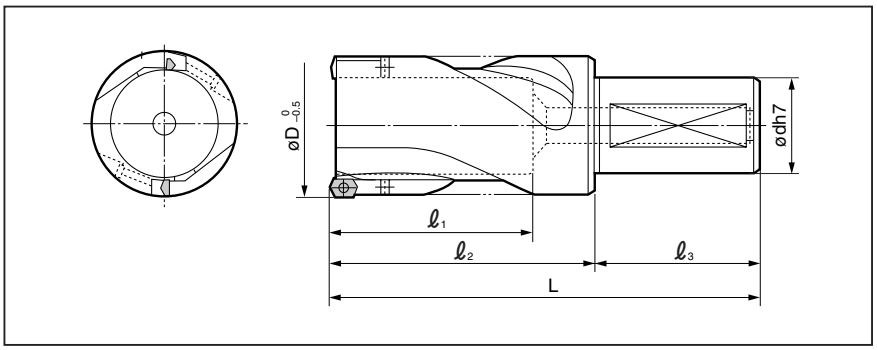
■ Parts

Screw	Wrench	Wrench	Applicable Holder
			
BFTY02205	TRD07	–	WDS140M5S20 ~ WDS150M5S20
BFTY02206	TRD07	–	WDS155M5S20 ~ WDS170M5S20
BFTX02506N	TRD08	–	WDS175M5S25 ~ WDS200M5S25
BFTX02508	TRD08	–	WDS205M5S25 ~ WDS275M5S32
BFTX0309N	–	TRX10	WDS280M5S32 ~ WDS320M5S32
BFTX03584	–	TRX15	WDS330M5S40 ~ WDS370M5S40
BFTX0409N	–	TRX15	WDS380M5S40 ~ WDS430M5S40
BFTX0511N	–	TRX20	WDS440M5S40 ~ WDS500M5S40

SEC-Trepan Drill
TCS Type

Medium To Large Sized Holes

Carbide | Coated Carbide | Indexable | 2D



■ Body

Cat No.	Applicable Drilling range (øDmm)	Dimensions (mm)				
		L	ød	ℓ1	ℓ2	ℓ3
TCS 050~065	50 ~ 65	205 ~ 245	40	115 ~ 145	140 ~ 180	65
TCS 066~080	66 ~ 80	245 ~ 280	40	145 ~ 175	180 ~ 215	65
TCS 081~085	81 ~ 85	290 ~ 305	50	175 ~ 185	215 ~ 230	75
TCS 086~095	86 ~ 95	305 ~ 330	50	185 ~ 205	230 ~ 255	75
TCS 096~105	96 ~ 105	330 ~ 355	50	205 ~ 225	255 ~ 280	75
TCS 106~110	106 ~ 110	355 ~ 365	50	225 ~ 235	280 ~ 290	75

■ Inserts

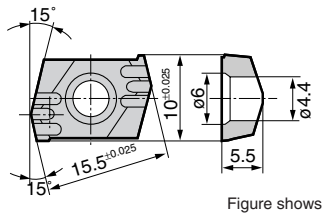


Figure shows WPG10R

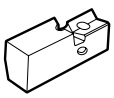
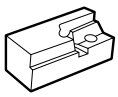
Cat No.	Coated	Uncoated	Application
	AC325	A30N	
WPG 10R			Outer
WPG 10L			Inner

■ Recommended Conditions

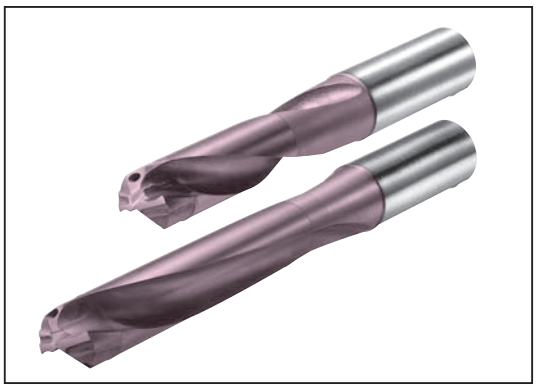
Diameter (mm)		General Steel Alloy Steel (HB320 and below)	Low Carbon Steel General Steel Alloy Steel (HB250 and below)	Die Steel (about HB250)	Ductile Cast Iron	Cast Iron
~ ø165	V	70 – **90** – 110	90 – **110** – 130	50 – **70** – 80	100 – **120** – 140	100 – **120** – 140
	f	0.05 – **0.1** – 0.15	0.05 – **0.1** – 0.15	0.05 – **0.1** – 0.15	0.1 – **0.15** – 0.2	0.15 – **0.2** – 0.25

V : Cutting Speed (m/min), f : Feedrate (mm/rev)
min – **Standard** – max

■ Parts

Applicable body Catalogue No.	Cartridges				Clamp Screw		Radial Adjustment Screw	Axial Adjustment Screw	Insert Screw	Wrench
	Stock	Outer	Stock	Inner	Outer	Inner				
										
TCS 050~055		TU050055K1		TU050055K2	BX 0408	BX 0408	BT 0306	AJM4FT	BFTX 0409	TRX 10
TCS 056~065		TU055065K1		TU055065K2	BX 0410	BX 0410				
TCS 066~075		TU065075K1		TU065075K2	BX 0414	BX 0414				
TCS 076~085		TU075085K1		TU075085K2	BX 0418	BX 0418				
TCS 086~095		TU085095K1		TU085105K2	BX 0418	BX 0425				
TCS 096~105		TU095105K1			BX 0425	BX 0425				
TCS 106~115		TU105135K1		TU105125K2	BX 0430	BX 0425				

Super-MultiDrill AK Type



■ General Features

The SUPER MULTIDRILL AK type, a brazed carbide-tip drill with through-tool oil holes, utilises a tough carbide substrate coupled with the new ZX-coating. With double the conventional regrinding allowance provided, a lower running cost can be achieved.

■ Characteristics and Application

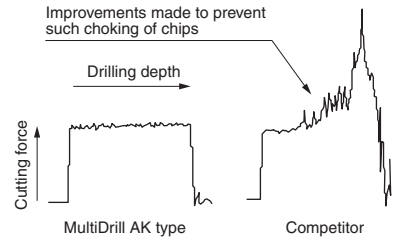
● Stable tool life of up to 1.5 times
Tough substrate with new ZX-coating improves fracture resistance and tool life.

● Double the regrinding possibilities
Longer carbide tip portion provides double the allowance for regrinding.

● Unique flute design for using mist
Both flute shape and flute surface quality is designed for drilling depths of L/D=5 using mist.

■ Efficiency

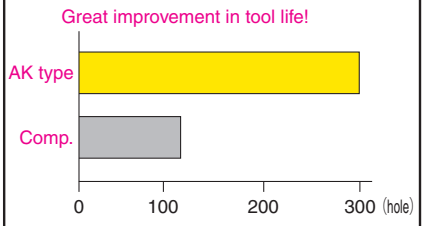
● Chip Removal Comparison
Drilling depth L/D=5 using mist



Drill : φ18 Work : S50C (230HB) Using mist
V=50m/min f=0.3mm/rev d=90mm (L/D=5)

■ Application Examples

● Auto Components SCM440 (HB250)



Drill: KDS250MAK ø25
V=60m/min f=0.25mm/rev d=65mm (through)

■ Series

Type and Series Code	Diameter Range (mm)	Hole Depth (L/D)	Remarks
Standard type (MAK)	φ13.6～φ40.5	～3	Up to 3 times more total tool life expectancy resulting from 1.5 times better tool life and 2 times more regrinding possibility.
Long type (LAK)	φ13.6～φ40.5	～5	
Deep hole type (DAK)	φ13.0～φ30.5	～7	
Standard type (BAK)	φ13.6～φ40.5	～3	Designed for drilling stacked sheets.

■ Recommended Conditions (Brazed Carbide Tip Type)

● General Purpose (L/D : ～5) : MAK Type／LAK Type／BAK Type

(V : Cutting Speed m/min, f : Feederate mm/rev)

Drill Diameter \ Work / Series		Soft Steel (～200HB)	General Steel (～300HB)	Hardended Steel (45HRC)	Structural Steel SM·SS	Stainless Steel (～200HB)	Gray Cast Iron (FC250)	Ductile Cast Iron (FCD450)	Al-alloy –	Ti-alloy (6Al-4V-Ti)	Inconel (Inco718)
		MAK type LAK type	MAK type LAK type	MAK type LAK type	BAK type	MAK type LAK type	MAK type LAK type	MAK type LAK type	MAK type LAK type	MAK type LAK type	MAK type LAK type
~ ø15	V	50 ~ 75	50 ~ 70	30 ~ 45	50 ~ 60	35 ~ 50	60 ~ 100	55 ~ 75	70 ~ 100	20 ~ 35	10 ~ 30
	f	0.15 ~ 0.30	0.15 ~ 0.30	0.10 ~ 0.20	0.20 ~ 0.25	0.10 ~ 0.20	0.20 ~ 0.30	0.15 ~ 0.30	0.25 ~ 0.35	0.10 ~ 0.15	0.08 ~ 0.10
~ ø20	V	50 ~ 75	50 ~ 70	35 ~ 50	50 ~ 65	35 ~ 50	60 ~ 100	60 ~ 80	70 ~ 110	20 ~ 40	10 ~ 30
	f	0.15 ~ 0.35	0.15 ~ 0.35	0.15 ~ 0.25	0.20 ~ 0.25	0.15 ~ 0.25	0.20 ~ 0.35	0.15 ~ 0.35	0.25 ~ 0.40	0.10 ~ 0.15	0.08 ~ 0.10
~ ø30	V	55 ~ 90	55 ~ 90	35 ~ 50	50 ~ 70	35 ~ 50	60 ~ 110	60 ~ 90	75 ~ 120	25 ~ 40	15 ~ 35
	f	0.20 ~ 0.40	0.20 ~ 0.35	0.15 ~ 0.25	0.20 ~ 0.35	0.15 ~ 0.25	0.25 ~ 0.40	0.20 ~ 0.40	0.30 ~ 0.45	0.10 ~ 0.20	0.08 ~ 0.12
~ ø40	V	60 ~ 90	60 ~ 90	35 ~ 50	50 ~ 75	35 ~ 50	60 ~ 110	60 ~ 100	75 ~ 120	25 ~ 40	15 ~ 35
	f	0.20 ~ 0.40	0.20 ~ 0.30	0.15 ~ 0.25	0.25 ~ 0.35	0.15 ~ 0.25	0.25 ~ 0.45	0.20 ~ 0.40	0.30 ~ 0.45	0.10 ~ 0.20	0.08 ~ 0.12

● Deep Hole (L/D : ～7) : DAK Type

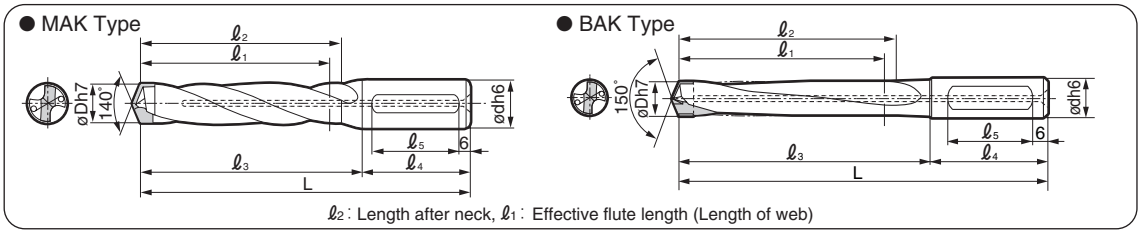
(V : Cutting Speed m/min, f : Feederate mm/rev)

Diameter \ Work		Soft Steel (～200HB)	General Steel (～300HB)	Hardended Steel (45HRC)	Stainless Steel (～200HB)	Gray Cast Iron (FC250)	Ductile Cast Iron (FCD450)	Al-alloy –	Ti-alloy (6Al-4V-Ti)	Inconel (Inco718)
~ ø15	V	50 ~ 65	50 ~ 60	30 ~ 45	35 ~ 50	60 ~ 80	55 ~ 65	70 ~ 90	20 ~ 35	10 ~ 30
	f	0.15 ~ 0.25	0.15 ~ 0.25	0.10 ~ 0.15	0.10 ~ 0.15	0.20 ~ 0.25	0.15 ~ 0.25	0.25 ~ 0.30	0.08 ~ 0.12	0.08 ~ 0.10
~ ø20	V	50 ~ 65	50 ~ 60	35 ~ 45	35 ~ 50	60 ~ 80	60 ~ 70	70 ~ 90	20 ~ 40	10 ~ 30
	f	0.15 ~ 0.25	0.15 ~ 0.25	0.15 ~ 0.20	0.15 ~ 0.20	0.20 ~ 0.25	0.15 ~ 0.25	0.25 ~ 0.35	0.08 ~ 0.12	0.08 ~ 0.10
~ ø30	V	55 ~ 75	55 ~ 70	35 ~ 50	35 ~ 50	60 ~ 90	60 ~ 80	75 ~ 100	25 ~ 40	15 ~ 35
	f	0.20 ~ 0.30	0.20 ~ 0.30	0.15 ~ 0.20	0.15 ~ 0.20	0.25 ~ 0.30	0.20 ~ 0.30	0.30 ~ 0.35	0.08 ~ 0.15	0.08 ~ 0.12
~ ø40	V	60 ~ 70	60 ~ 70	35 ~ 50	35 ~ 50	60 ~ 90	60 ~ 80	75 ~ 100	25 ~ 40	15 ~ 35
	f	0.20 ~ 0.30	0.20 ~ 0.30	0.15 ~ 0.20	0.15 ~ 0.20	0.25 ~ 0.30	0.20 ~ 0.30	0.30 ~ 0.40	0.10 ~ 0.15	0.08 ~ 0.12

Carbide Tipped SUPER MULTIDRILLS

Thru-tool Coolant Supply (MAK Type/BAK Type/LAK Type/DAK Type)

Coated Carbide | W/ Oil Hole | 3D | 5D | 7D



ℓ2 : Length after neck, ℓ1 : Effective flute length (Length of web)

● Diameter φ13.0～23.5mm

Dimension indicated in ( ) is for BAK Type

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Standard Series (3D) Stock MAK	Stock BAK	L	ℓ1	ℓ2	ℓ3	Long Series (5D) Stock LAK	L	ℓ1	ℓ2	ℓ3	Deep Hole Series (7D) Stock DAK	L	ℓ1	ℓ2	ℓ3
13.0	16	KDS130□□□	—	—	110	44	47	62	—	140	74	74	92	●	175	106	106	127
13.5		KDS135□□□	—	—										●				
13.7		KDS137□□□																
14.0		KDS140□□□	●		115	48	51	67	●	145	78	80	97	●	180	113	113	132
14.2		KDS142□□□	●		(118)	(56)	(56)	(70)	●									
14.5		KDS145□□□	●						●					●				
14.7	20	KDS147□□□			125	55	54	75		155	85	85	105		195	122	122	145
14.8		KDS148□□□				(60)	(60)											
15.0		KDS150□□□	●						●					●				
15.5		KDS155□□□	●						●					●				
15.7		KDS157□□□			130	58	58	80		165	91	91	115		205	129	129	155
16.0		KDS160□□□	●			(64)	(64)		●					●				
16.2		KDS162□□□	●						●									
16.3		KDS163□□□	●															
16.5		KDS165□□□	●						●					●				
16.7		KDS167□□□	●		135	61	61	85		170	96	96	120		215	138	138	165
17.0		KDS170□□□	●			(68)	(68)		●					●				
17.5		KDS175□□□	●						●					●				
17.6		KDS176□□□	●		140	65	65	90		175	101	102	125		220	145	145	170
17.7		KDS177□□□	●			(72)	(72)		●									
17.8		KDS178□□□																
18.0		KDS180□□□	●	●					●					●				
18.5		KDS185□□□	●						●					●				
18.7	25	KDS187□□□			155	68	68	99		190	107	107	134		240	154	154	184
18.9		KDS189□□□																
19.0		KDS190□□□	●		(151)	(76)	(76)	(95)	●					●				
19.1		KDS191□□□																
19.2		KDS192□□□																
19.4		KDS194□□□																
19.5		KDS195□□□	●						●					●				
19.7		KDS197□□□			155	72	72	99		195	112	113	139		245	161	161	189
20.0		KDS200□□□	●						●					●				
20.2		KDS202□□□			(156)	(80)	(80)	(100)										
20.3		KDS203□□□																
20.4		KDS204□□□																
20.5		KDS205□□□	●						●					●				
20.6	25	KDS206□□□			155	72	75	99		195	112	118	139		245	166	166	189
20.7		KDS207□□□																
21.0		KDS210□□□	●		(161)	(84)	(84)	(105)	●					●				
21.2		KDS212□□□	●						●									
21.5		KDS215□□□	●						●					●				
21.6		KDS216□□□			160	76	79	104		200	116	124	144		250	174	177	194
22.0		KDS220□□□	●						●					●				
22.1		KDS221□□□			(166)	(88)	(88)	(110)										
22.2		KDS222□□□																
22.4		KDS224□□□																
22.5		KDS225□□□	●						●					●				
23.0		KDS230□□□	●		160	74	82	104	●	210	124	129	154	●	270	186	186	214
23.5		KDS235□□□	●		(171)	(92)	(92)	(115)	●					●				

※ Other than stocked items, sizes of ø0.1 increments can be produce.

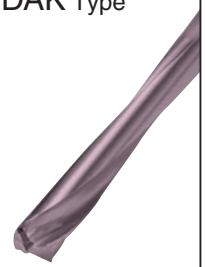
Grade : ACZ70S

Please indicate MAK, BAK, LAK or DAK in the □□□ when ordering.
(Example: KDS130DAK)

MAK Type

LAK Type

DAK Type



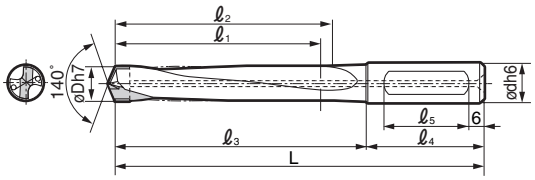
BAK Type

Drills

Thru-tool Coolant Supply (MAK Type/BAK Type/LAK Type/DAK Type)

Coated Carbide | W/ Oil Hole | 3D | 5D | 7D

● LAK/DAK Type



ℓ2 : Length after neck, ℓ1 : Effective flute length (Length of web)

● Diameter φ24.0～40.5mm

Dimension indicated in ( ) is for BAK Type

Diameter øD (mm)	Shank ød (mm)	Cat. No.	Standard Series (3D) Stock MAK	BAK	Standard Series (3D) Dimensions (mm) L	ℓ1	ℓ2	ℓ3	Long Series (5D) Stock LAK	Long Series (5D) Dimensions (mm) L	ℓ1	ℓ2	ℓ3	Deep Hole Series (7D) Stock DAK	Deep Hole Series (7D) Dimensions (mm) L	ℓ1	ℓ2	ℓ3
24.0	32	KDS240□□□	●	●	170 (180)	79 (96)	86 (96)	110 (120)	●	220	129	135	160	●	280	190	190	220
24.1		KDS241□□□	●															
24.5		KDS245□□□	●	●					●					●				
24.6		KDS246□□□	●	●	170 (185)	78 (100)	88 (100)	110 (125)		225	133	140	165		290	200	200	230
24.7		KDS247□□□	●	●														
25.0		KDS250□□□	●						●					●				
25.5		KDS255□□□	●						●					●				
26.0		KDS260□□□	●		175 (190)	82 (104)	92 (104)	115 (130)	●	230	137	146	170	●	300	210	210	240
26.5		KDS265□□□	●	●					●					●				
26.7		KDS267□□□		●	175 (195)	81 (108)	94 (108)	115 (135)		235	141	151	175		305	215	215	245
27.0		KDS270□□□	●						●					●				
27.5		KDS275□□□	●						●									
28.0		KDS280□□□	●		180 (200)	84 (112)	97 (112)	120 (140)	●	240	144	157	180	●	310	220	220	250
28.1		KDS281□□□																
28.3		KDS283□□□																
28.5		KDS285□□□	●						●									
28.6		KDS286□□□			185 (205)	88 (116)	100 (116)	125 (145)		245	148	162	185	●	320	230	230	260
28.7		KDS287□□□																
29.0		KDS290□□□	●						●									
29.4		KDS294□□□																
29.5		KDS295□□□	●						●									
29.8		KDS298□□□			185 (210)	87 (120)	104 (120)	125 (150)		255	157	167	195	●	330	240	240	270
30.0		KDS300□□□	●						●									
30.5		KDS305□□□	●						●									
31.0	40	KDS310□□□		—	205	95	112	135		275	166	187	205		345	245	245	275
31.5		KDS315□□□		—														
32.0		KDS320□□□		—	210	98	115	140		280	172	190	210		355	250	250	285
32.5		KDS325□□□		—														
33.0		KDS330□□□		—	215	101	119	145	●	285	172	194	215		365	260	260	295
33.5		KDS335□□□		—														
34.0		KDS340□□□		—	220	104	122	150		290	177	197	220		375	270	270	305
34.5		KDS345□□□		—														
35.0		KDS350□□□		—	225	107	125	155		295	180	200	225		385	275	275	315
35.5		KDS355□□□		—														
36.0		KDS360□□□		—	225	110	128	155		300	183	203	230		390	280	280	320
36.5		KDS365□□□		—														
37.0		KDS370□□□		—	230	113	132	160		305	188	207	235		400	290	290	330
37.5		KDS375□□□		—														
38.0		KDS380□□□		—	235	116	165	165		315	193	245	245		410	308	340	340
38.5		KDS385□□□		—														
39.0		KDS390□□□		—	240	119	170	170		320	198	250	250		415	312	345	345
39.5		KDS395□□□		—														
40.0		KDS400□□□		—	245	122	175	175		325	203	255	255		420	316	350	350
40.5		KDS405□□□		—														

※ Other than stocked items, sizes of ø0.1 increments can be produce.

Grade : ACZ70S

Please indicate MAK, BAK, LAK or DAK in the □□□ when ordering.
(Example: KDS240MAK)

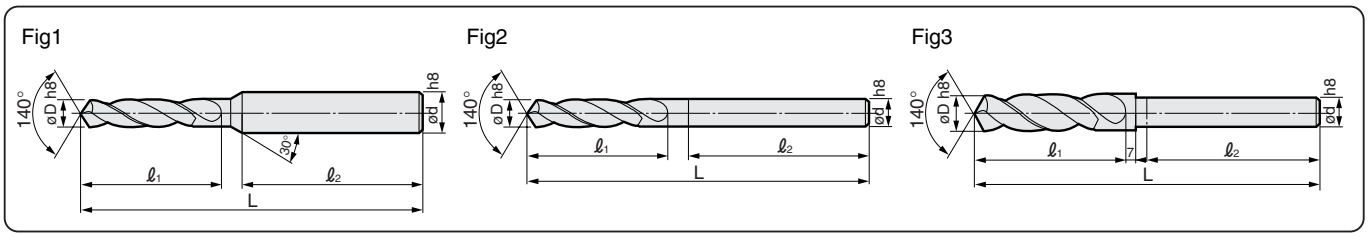
■ Additional Dimensions

Dimensions for Shank length (ℓ4) and side lock flat (ℓ5)		
ød	ℓ4	ℓ5
16.0	48	35
20.0	50	40
25.0	56	45
32.0	60	50
40.0	70	60

HMD-S Type

Short Series

Coated HSS 3D



● Diameter φ1.0～5.3mm

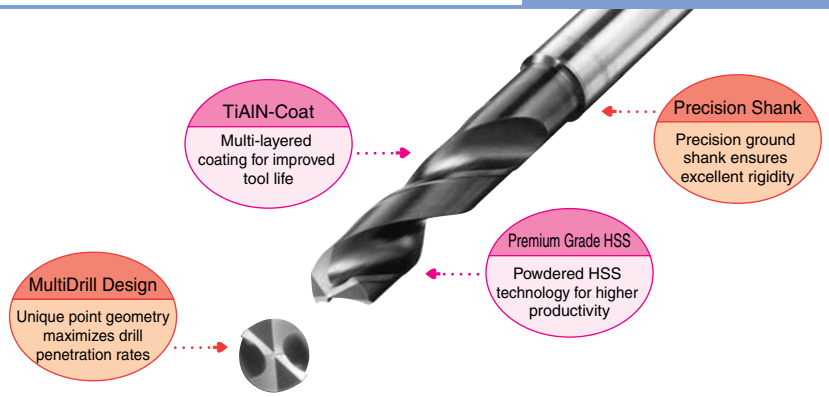
øD (mm)	Shank			Cat. No.	Stock	Dimensions(mm)	
	ød (mm)	ℓ2 (mm)	Shape			L	ℓ1
1.0	3	28	Fig1	HMD010S	●	38	6
1.1				HMD011S	●	39	7
1.2				HMD012S	●	40	8
1.3				HMD013S	●		
1.4				HMD014S	●	41	9
1.5				HMD015S	●		
1.6				HMD016S	●	42	10
1.7				HMD017S	●		
1.8				HMD018S	●	43	11
1.9				HMD019S	●		
2.0				HMD020S	●	44	12
2.1				HMD021S	●		
2.2				HMD022S	●	45	13
2.3				HMD023S	●		
2.4				HMD024S	●	46	14
2.5				HMD025S	●		
2.6				HMD026S	●		
2.7				HMD027S	●	48	16
2.8				HMD028S	●		
2.9				HMD029S	●		
3.0			Fig2	HMD030S	●		
3.1	4	30	Fig1	HMD031S	●	50	18
3.2				HMD032S	●		
3.3				HMD033S	●		
3.4				HMD034S	●	52	20
3.5				HMD035S	●		
3.6				HMD036S	●		
3.7				HMD037S	●		
3.8				HMD038S	●	54	22
3.9				HMD039S	●		
4.0			Fig2	HMD040S	●		
4.1	6	38	Fig1	HMD041S	●	66	22
4.2				HMD042S	●		
4.3				HMD043S	●	68	24
4.4				HMD044S	●		
4.5				HMD045S	●		
4.6				HMD046S	●		
4.7				HMD047S	●		
4.8				HMD048S	●	70	26
4.9				HMD049S	●		
5.0				HMD050S	●		
5.1				HMD051S	●		
5.2				HMD052S	●		
5.3				HMD053S	●		

● Diameter φ5.4～10.0mm

øD (mm)	Shank			Cat. No.	Stock	Dimensions(mm)	
	ød (mm)	ℓ2 (mm)	Shape			L	ℓ1
5.4	6	38	Fig1	HMD054S	●	72	28
5.5				HMD055S	●		
5.6				HMD056S	●		
5.7				HMD057S	●		
5.8				HMD058S	●		
5.9				HMD059S	●		
6.0			Fig2	HMD060S	●		
6.1	8	38	Fig1	HMD061S	●	75	31
6.2				HMD062S	●		
6.3				HMD063S	●		
6.4				HMD064S	●		
6.5				HMD065S	●		
6.6				HMD066S	●		
6.7				HMD067S	●		
6.8				HMD068S	●	78	34
6.9				HMD069S	●		
7.0				HMD070S	●		
7.1				HMD071S	●		
7.2				HMD072S	●		
7.3				HMD073S	●		
7.4				HMD074S	●		
7.5				HMD075S	●		
7.6				HMD076S	●	81	37
7.7				HMD077S	●		
7.8				HMD078S	●		
7.9				HMD079S	●		
8.0			Fig2	HMD080S	●		
8.1	10	43.5	Fig1	HMD081S	●	87	37
8.2				HMD082S	●		
8.3				HMD083S	●		
8.4				HMD084S	●		
8.5				HMD085S	●		
8.6				HMD086S	●	90	40
8.7				HMD087S	●		
8.8				HMD088S	●		
8.9				HMD089S	●		
9.0				HMD090S	●		
9.1				HMD091S	●		
9.2				HMD092S	●		
9.3				HMD093S	●		
9.4				HMD094S	●		
9.5				HMD095S	●		
9.6				HMD096S	●	93	43
9.7				HMD097S	●		
9.8				HMD098S	●		
9.9				HMD099S	●		
10.0			Fig2	HMD100S	●		

Short Series

Coated HSS 3D



● Diameter φ10.1～12.2mm

øD (mm)	Shank			Cat. No.	Stock	Dimensions (mm)	
	ød (mm)	ℓ2 (mm)	Shape			L	ℓ1
10.1	12	46	Fig1	HMD101S	●	100	43
10.2				HMD102S	●		
10.3				HMD103S	●		
10.4				HMD104S	●		
10.5				HMD105S	●		
10.6				HMD106S	●		
10.7				HMD107S	●	104	47
10.8				HMD108S	●		
10.9				HMD109S	●		
11.0				HMD110S	●		
11.1				HMD111S	●		
11.2				HMD112S	●		
11.3				HMD113S	●		
11.4				HMD114S	●		
11.5				HMD115S	●		
11.6				HMD116S	●		
11.7				HMD117S	●		
11.8				HMD118S	●		
11.9				HMD119S	●	108	51
12.0			Fig2	HMD120S	●		
12.1			Fig3	HMD121S	●		
12.2				HMD122S	●		

● Diameter φ12.3～20.0mm

øD (mm)	Shank			Cat. No.	Stock	Dimensions (mm)	
	ød (mm)	ℓ2 (mm)	Shape			L	ℓ1
12.3	12	46	Fig3	HMD123S	●	108	51
12.4				HMD124S	●		
12.5				HMD125S	●		
12.6				HMD126S	●		
12.7				HMD127S	●		
12.8				HMD128S	●		
12.9				HMD129S	●		
13.0				HMD130S	●		
13.5	16	50	Fig1	HMD135S	●	132	72
14.0				HMD140S	●		
14.5				HMD145S	●	136	76
15.0	20	52		HMD150S	●	142	76
15.5				HMD155S	●	146	80
16.0				HMD160S	●		
16.5				HMD165S	●	150	84
17.0				HMD170S	●		
17.5				HMD175S	●	153	87
18.0				HMD180S	●		
18.5				HMD185S	●	156	90
19.0	25	60		HMD190S	●	164	90
19.5				HMD195S	●	168	94
20.0				HMD200S	●		

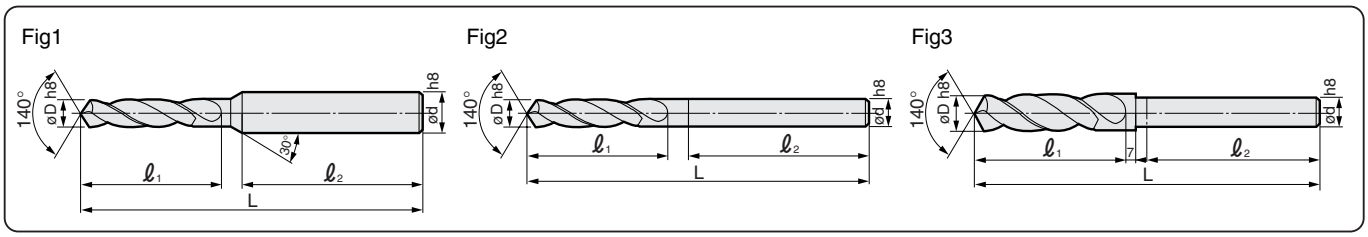
■ Recommended Conditions

Series	Dia. mm	Work / Cond.	Structural Steel SS Carbon Steel SC		Alloy Steel SCM Pre-hardened Steel NAK		Die Steel SKD Stainless Steel Tampered Steel (35～45HRC)		Cast Iron FC		Aluminum Alloy Non-Ferrous metal	
			S/Speed min-1	Feedrate mm/min	S/Speed min-1	Feedrate mm/min	S/Speed min-1	Feedrate mm/min	S/Speed min-1	Feedrate mm/min	S/Speed min-1	Feedrate mm/min
Short	2		5700	360	4600	240	3400	160	6300	490	9700	760
	3		4200	460	3400	320	2500	200	4700	640	7200	980
	5		2500	430	2000	290	1500	200	2800	600	4300	920
	8		1600	370	1300	250	960	170	1800	530	2700	790
	10		1300	340	1000	230	760	150	1400	460	2200	730
	12		1100	310	850	210	640	140	1200	430	1800	670
	16		800	290	640	200	480	130	880	390	1400	610
	20		640	260	510	180	380	120	700	350	1100	550

HMD-M Type

Regular Series

Coated HSS 5D



● Diameter φ2.0～6.0mm

øD (mm)	Shank			Cat. No.	Stock	Dimensions(mm)	
	ød (mm)	ℓ2 (mm)	Shape			L	ℓ1
2.0	3	28	Fig1	**HMD020M**	●	56	24
2.1				**HMD021M**	●		
2.2				**HMD022M**	●	56	25
2.3				**HMD023M**	●		
2.4				**HMD024M**	●	61	30
2.5				**HMD025M**	●		
2.6				**HMD026M**	●		
2.7				**HMD027M**	●	64	33
2.8				**HMD028M**	●		
2.9				**HMD029M**	●		
3.0			Fig2	**HMD030M**	●		
3.1	4	30	Fig1	**HMD031M**	●	68	36
3.2				**HMD032M**	●		
3.3				**HMD033M**	●		
3.4				**HMD034M**	●	71	39
3.5				**HMD035M**	●		
3.6				**HMD036M**	●		
3.7				**HMD037M**	●		
3.8				**HMD038M**	●	75	43
3.9				**HMD039M**	●		
4.0			Fig2	**HMD040M**	●		
4.1	6	38	Fig1	**HMD041M**	●	85	43
4.2				**HMD042M**	●		
4.3				**HMD043M**	●	89	47
4.4				**HMD044M**	●		
4.5				**HMD045M**	●		
4.6				**HMD046M**	●		
4.7				**HMD047M**	●		
4.8				**HMD048M**	●	94	52
4.9				**HMD049M**	●		
5.0				**HMD050M**	●		
5.1				**HMD051M**	●		
5.2				**HMD052M**	●		
5.3				**HMD053M**	●		
5.4				**HMD054M**	●	99	57
5.5				**HMD055M**	●		
5.6				**HMD056M**	●		
5.7				**HMD057M**	●		
5.8				**HMD058M**	●		
5.9				**HMD059M**	●		
6.0			Fig2	**HMD060M**	●		

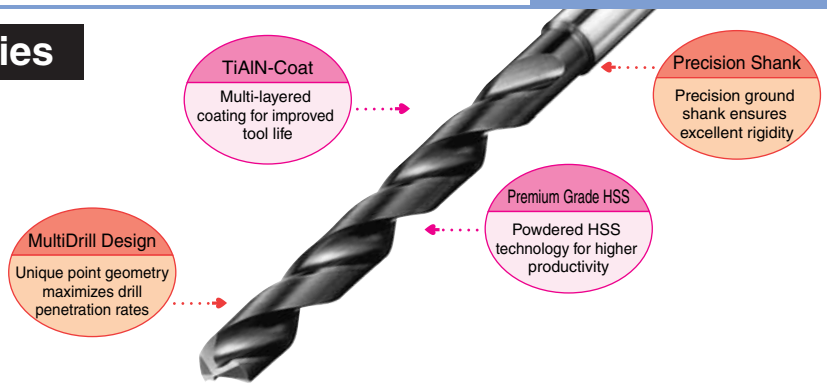
● Diameter φ6.1～10.0mm

øD (mm)	Shank			Cat. No.	Stock	Dimensions(mm)	
	ød (mm)	ℓ2 (mm)	Shape			L	ℓ1
6.1	8	38	Fig1	**HMD061M**	●	107	63
6.2				**HMD062M**	●		
6.3				**HMD063M**	●		
6.4				**HMD064M**	●		
6.5				**HMD065M**	●		
6.6				**HMD066M**	●		
6.7				**HMD067M**	●		
6.8				**HMD068M**	●	113	69
6.9				**HMD069M**	●		
7.0				**HMD070M**	●		
7.1				**HMD071M**	●		
7.2				**HMD072M**	●		
7.3				**HMD073M**	●		
7.4				**HMD074M**	●		
7.5				**HMD075M**	●		
7.6				**HMD076M**	●	119	75
7.7				**HMD077M**	●		
7.8				**HMD078M**	●		
7.9				**HMD079M**	●		
8.0			Fig2	**HMD080M**	●		
8.1	10	43.5	Fig1	**HMD081M**	●	125	75
8.2				**HMD082M**	●		
8.3				**HMD083M**	●		
8.4				**HMD084M**	●		
8.5				**HMD085M**	●		
8.6				**HMD086M**	●	131	81
8.7				**HMD087M**	●		
8.8				**HMD088M**	●		
8.9				**HMD089M**	●		
9.0				**HMD090M**	●		
9.1				**HMD091M**	●		
9.2				**HMD092M**	●		
9.3				**HMD093M**	●		
9.4				**HMD094M**	●		
9.5				**HMD095M**	●		
9.6				**HMD096M**	●	137	87
9.7				**HMD097M**	●		
9.8				**HMD098M**	●		
9.9				**HMD099M**	●		
10.0			Fig2	**HMD100M**	●		

HMD-M Type

Regular Series

Coated HSS 5D



● Diameter φ10.1～12.2mm

øD (mm)	Shank			Cat. No.	Stock	Dimensions(mm)	
	ød (mm)	ℓ2 (mm)	Shape			L	ℓ1
10.1	12	46	Fig1	HMD101M	●	144	87
10.2				HMD102M	●		
10.3				HMD103M	●		
10.4				HMD104M	●		
10.5				HMD105M	●		
10.6				HMD106M	●		
10.7				HMD107M	●	151	94
10.8				HMD108M	●		
10.9				HMD109M	●		
11.0				HMD110M	●		
11.1				HMD111M	●		
11.2				HMD112M	●		
11.3				HMD113M	●		
11.4				HMD114M	●		
11.5				HMD115M	●		
11.6				HMD116M	●		
11.7				HMD117M	●		
11.8				HMD118M	●		
11.9				HMD119M	●	158	101
12.0			Fig2	HMD120M	●		
12.1			Fig3	HMD121M	●		
12.2				HMD122M	●		

● Diameter φ12.3～20.0mm

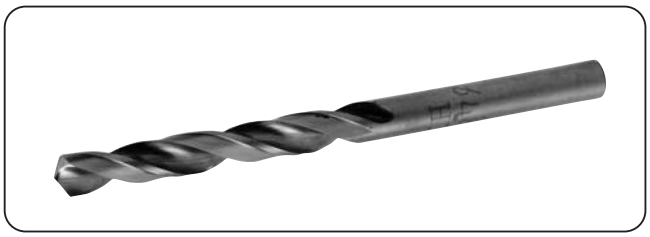
øD (mm)	Shank			Cat. No.	Stock	Dimensions(mm)	
	ød (mm)	ℓ2 (mm)	Shape			L	ℓ1
12.3	12	46	Fig3	HMD123M	●	158	101
12.4				HMD124M	●		
12.5				HMD125M	●		
12.6				HMD126M	●		
12.7				HMD127M	●		
12.8				HMD128M	●		
12.9				HMD129M	●		
13.0				HMD130M	●		
13.5	16	50	Fig1	HMD135M	●	168	108
14.0				HMD140M	●		
14.5				HMD145M	●	173	114
15.0	20	52		HMD150M	●	180	114
15.5				HMD155M	●	185	120
16.0				HMD160M	●		
16.5				HMD165M	●	189	125
17.0				HMD170M	●		
17.5				HMD175M	●	194	130
18.0				HMD180M	●		
18.5				HMD185M	●	198	135
19.0	25	60		HMD190M	●	206	135
19.5				HMD195M	●	210	140
20.0				HMD200M	●		

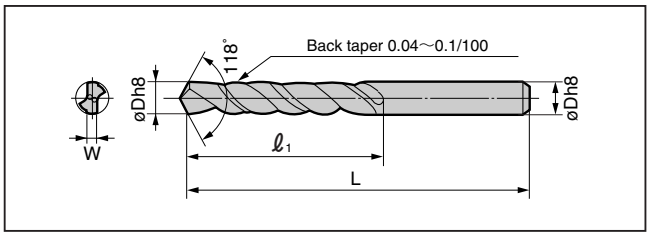
■ Recommended Conditions

Series	Dia. mm \ Work / Cond.	Structural Steel SS Carbon Steel SC		Alloy Steel SCM Pre-hardened Steel NAK		Die Steel SKD Stainless Steel Tampered Steel (35～45HRC)		Cast Iron FC		Aluminum Alloy Non-Ferrous metal	
		S/Speed min^{-1}	Feedrate mm/min	S/Speed min^{-1}	Feedrate mm/min	S/Speed min^{-1}	Feedrate mm/min	S/Speed min^{-1}	Feedrate mm/min	S/Speed min^{-1}	Feedrate mm/min
Regular	2	5700	300	4600	200	3400	130	6300	410	9700	630
	3	4200	380	3400	260	2500	170	4700	530	7200	820
	5	2500	360	2000	240	1500	160	2800	500	4300	770
	8	1600	310	1300	210	960	140	1800	440	2700	660
	10	1300	280	1000	190	760	130	1400	390	2200	610
	12	1100	260	850	180	640	120	1200	360	1800	560
	16	800	240	640	160	480	110	880	330	1400	500
	20	640	220	510	150	380	96	700	300	1100	460

Sollid Carbide Drills
SD Type

Carbide 6~15 D





Cat. No.	Stock Size	Dimensions (mm)			
		øD	L	ℓ1	W
SD 080~090		0.8 ~ 0.9	30	12	0.2
SD 091~140		0.91 ~ 1.4	30	16	0.2~0.3
SD 141~190		1.41 ~ 1.9	35	19	0.4
SD 191~240		1.91 ~ 2.4	40	22	0.5
SD 241~300		2.41 ~ 3.0	45	25	0.6
SD 301~350		3.01 ~ 3.5	50	28	0.7
SD 351~400		3.51 ~ 4.0	55	30	0.8
SD 401~450		4.01~ 4.5	60	34	0.9
SD 451~550		4.51 ~ 5.5	65	38	1.0
SD 551~600		5.51 ~ 6.0	70	40	1.1
SD 601~650		6.01 ~ 6.5	75	43	1.2
SD 651~700		6.51 ~ 7.0	80	46	1.3
SD 701~750		7.01 ~ 7.5	80	46	1.4
SD 751~800		7.51 ~ 8.0	85	50	1.5

Ordering number for (ex.) ø4.6mm drill is SD460
Grade : H1

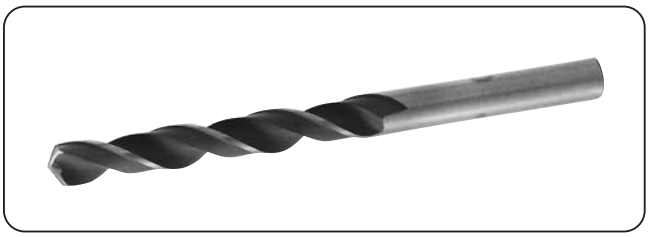
■ Recommended Conditions

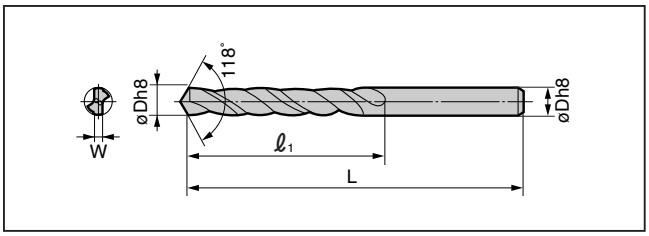
Diameter (mm)	Cond.	Die Steel (About HB250)	Cast Iron	Aluminium Alloy
~ ø5	V	5 – **8** – 10	10 – **30** – 40	20 – **50** – 80
	f	0.03 – **0.04** – 0.05	0.1 – **0.15** –0.2	0.1 – **0.15** –0.2
~ ø13	V	10 – **15** – 20	20 – **40** – 60	30 – **80** – 100
	f	0.05 – **0.06** – 0.07	0.1 – **0.15** – 0.2	0.1 – **0.15** – 0.2

V : Cutting Speed (m/min), f : Feedrate (mm/rev)
(Min – **Standard** – Max)

VA Carbide Drills
VSD Type

Carbide 5~11 D



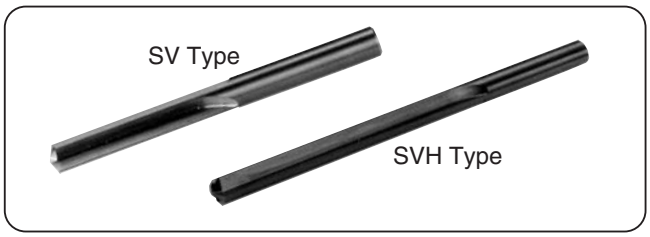


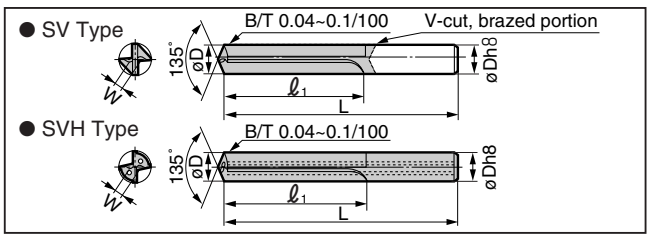
Cat. No.	Stock Size	Dimensions (mm)			
		øD	L	ℓ1	W
VSD 020~024	From Dia. 2.0 To Dia. 10.0, in intervals of 0.1mm is stocked except **VSD 057(5.7) VSD 063(6.3) VSD 072(7.2) VSD 083(8.3) VSD 084(8.4) VSD 089(8.9) VSD 094(9.4) VSD 096(9.6) VSD 099(9.9)**	2.0 ~ 2.4	40	22	0.25XD
VSD 025~030		2.5 ~ 3.0	45	25	0.25XD
VSD 031~035		3.1 ~ 3.5	50	28	0.25XD
VSD 036~040		3.6 ~ 4.0	55	30	0.25XD
VSD 041~045		4.1 ~ 4.5	60	34	0.25XD
VSD 046~050		4.6 ~ 5.0	65	38	0.25XD
VSD 051~055		5.1 ~ 5.5	65	38	0.25XD
VSD 056~060		5.6 ~ 6.0	75	40	0.25XD
VSD 061~065		6.1 ~ 6.5	75	43	0.25XD
VSD 066~070		6.6 ~ 7.0	85	46	0.25XD
VSD 071~075		7.1 ~ 7.5	85	46	0.25XD
VSD 076~080		7.6 ~ 8.0	100	50	0.25XD
VSD 081~085		8.1 ~ 8.5	100	50	0.25XD
VSD 086~090		8.6 ~ 9.0	100	50	0.25XD
VSD 091~095		9.1 ~ 9.5	125	65	0.25XD
VSD 096~100		9.6 ~ 10.0	125	65	0.25XD
VSD 101~105	10.2, 10.3 10.5	10.1 ~ 10.5	125	65	0.25XD
VSD 106~110	11.0	10.6 ~ 11.0	125	65	0.25XD
VSD 111~115	11.5	11.1 ~ 11.5	125	65	0.25XD
VSD 116~120	12.0	11.6 ~ 12.0	150	75	0.25XD
VSD 121~125	12.5	12.1 ~ 12.5	150	75	0.25XD
VSD 126~130	13.0	12.6 ~ 13.0	150	75	0.25XD

Ordering number for (ex.) ø3.2mm drill is VSD032
Grade : H1

Straight Flute Drills
SV/SVH Type

Carbide 5~10 D





■ SV Type

Cat. No.	Stock Size	Dimensions (mm)				Type
		øD	L	ℓ1	W	
SV 200~ 250		2.0 ≤ øD ≤ 2.5	50	20	0.6	Solid
SV 251~ 300		2.5 < øD ≤ 3.0	50	22	0.6	
SV 301~ 350		3.0 < øD ≤ 3.5	55	25	0.8	
SV 351~ 400		3.5 < øD ≤ 4.0	55	28	1.0	
SV 401~ 450		4.0 < øD ≤ 4.5	60	30	1.0	
SV 451~ 500		4.5 < øD ≤ 5.0	65	33	1.2	
SV 501~ 550		5.0 < øD ≤ 5.5	70	35	1.2	
SV 551~ 600		5.5 < øD ≤ 6.0	75	40	1.4	
SV 601~ 650		6.0 < øD ≤ 6.5	80	43	1.4	
SV 651~ 700		6.5 < øD ≤ 7.0	85	46	1.6	
SV 701~ 800		7.0 < øD ≤ 8.0	90	50	1.6	
SV 801~ 900		8.0 < øD ≤ 9.0	95	53	1.6	
SV 901~1000		9.0 < øD ≤ 10.0	100	55	2.0	
SV1001~1100		10.0 < øD ≤ 11.0	115	65	2.0	
SV1101~1200		11.0 < øD ≤ 12.0	115	65	2.3	
SV1201~1400		12.0 < øD ≤ 14.0	120	70	2.5	Brazed
SV1401~1600		14.0 < øD ≤ 16.0	130	75	2.8	
SV1601~1800		16.0 < øD ≤ 18.0	140	80	3.2	
SV1801~2000		18.0 < øD ≤ 20.0	150	90	3.5	

■ SVH Type

SVH 400~ 500		4.0 ≤ øD ≤ 5.0	100	60	1.2	Solid
SVH 501~ 600		5.0 < øD ≤ 6.0	115	72	1.4	
SVH 601~ 700		6.0 < øD ≤ 7.0	130	84	1.6	
SVH 701~ 800		7.0 < øD ≤ 8.0	145	96	1.8	
SVH 801~ 900		8.0 < øD ≤ 9.0	155	108	2.0	
SVH 901~1000		9.0 < øD ≤ 10.0	170	120	2.2	
SVH1001~1100		10.0 < øD ≤ 11.0	182	132	2.4	
SVH1101~1200		11.0 < øD ≤ 12.0	194	144	2.8	
SVH1201~1300		12.0 < øD ≤ 13.0	206	156	3.0	
SVH1301~1400		13.0 < øD ≤ 14.0	218	168	3.2	
SVH1401~1500		14.0 < øD ≤ 15.0	230	180	3.5	
SVH1501~1600		15.0 < øD ≤ 16.0	242	192	3.8	

■ Recommended Conditions

SV Type

V : Cutting Speed (m/min), f : Feedrate (mm/rev)

Diameter (mm)	Cond.	Ductile Cast Iron	Cast Iron	Aluminum Alloy
~ ø10	V	20 – **40** – 60	20 – **35** – 50	50 – **80** – 100
	f	0.05 – 0.08	0.05 – 0.1	0.05 – 0.1
~ ø20	V	30 – **50** – 70	30 – **60** – 80	80 – **100** – 120
	f	0.05 – 0.08	0.05 – 0.1	0.05 – 0.15

SVH Type

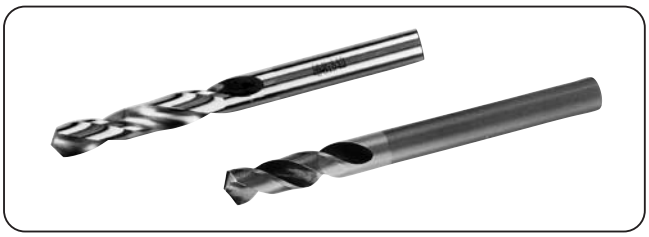
~ ø10	V	40 – **70** – 100	50 – **70** – 100	50 – **100** – 150
	f	0.15 – 0.2	0.2 – 0.3	0.25 – 0.3
~ ø20	V	60 – **90** – 120	100 – **130** – 160	100 – **150** – 200
	f	0.2 – 0.3	0.2 – 0.3	0.3 – 0.35

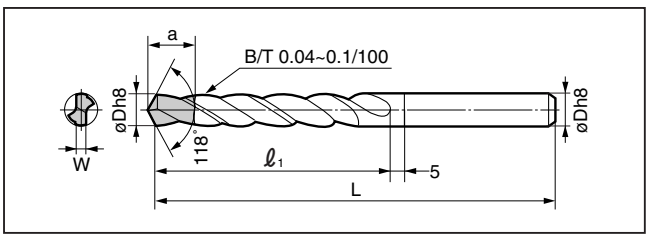
(Min – **Standard** – Max)

Carbide Tipped Twist Drills
DLS Type

For Cast Iron & Al-Alloy

Carbide 5~8 D





■ For Cast Iron

Cat. No.	Stock Size	Dimensions (mm)				
		øD	L	a	ℓ1	W
DLS060~065		6.0 ~ 6.5	95	15	50	1.2
DLS066~070		6.6 ~ 7.0	95	15	50	1.3
DLS071~075		7.1 ~ 7.5	95	20	50	1.4
DLS076~080		7.6 ~ 8.0	95	20	50	1.5
DLS081~085		8.1 ~ 8.5	110	25	60	1.5
DLS086~090		8.6 ~ 9.0	110	25	60	1.6
DLS091~095		9.1 ~ 9.5	110	26	60	1.7
DLS096~100		9.6 ~ 10.0	110	26	60	1.8
DLS101~105		10.1 ~ 10.5	125	26	60	1.8
DLS106~110		10.6 ~ 11.0	125	26	60	1.9
DLS111~115		11.1 ~ 11.5	125	26	60	2.0
DLS116~120		11.6 ~ 12.0	125	26	60	2.0

Note: • Ordering number for (ex.) ø10.5 drill is DLS105. Please also advise work material.
• Tang type drills can be made-to-order. Please advise tang dimensions J and K.
• Helix angle 28°, Web thickness ratio 1.2:1.

■ For Aluminum Alloy

Cat. No.	Stock Size	Dimensions (mm)				
		øD	L	a	ℓ1	W
DLS060A~065A		6.0 ~ 6.5	95	15	50	1.2
DLS066A~070A		6.6 ~ 7.0	95	15	50	1.3
DLS071A~075A		7.1 ~ 7.5	95	20	50	1.4
DLS076A~080A		7.6 ~ 8.0	95	20	50	1.5
DLS081A~085A		8.1 ~ 8.5	110	25	60	1.5
DLS086A~090A		8.6 ~ 9.0	110	25	60	1.6
DLS091A~095A		9.1 ~ 9.5	110	26	60	1.7
DLS096A~100A		9.6 ~ 10.0	110	26	60	1.8
DLS101A~105A		10.1 ~ 10.5	125	26	70	1.8
DLS106A~110A		10.6 ~ 11.0	125	26	70	1.9
DLS111A~115A		11.1 ~ 11.5	125	26	70	2.0
DLS116A~120A		11.6 ~ 12.0	125	26	70	2.0

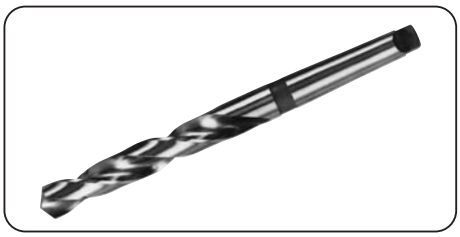
Grade : A1

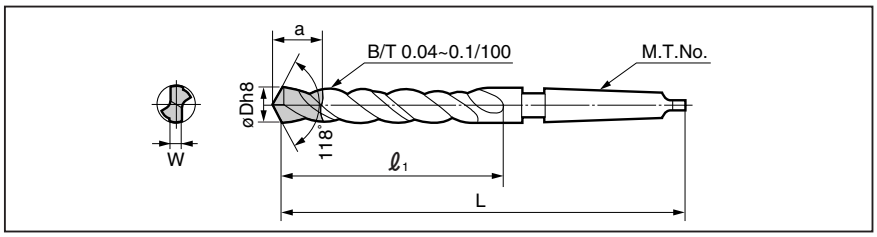
Note: • Ordering number for (ex.) ø7.6 drill is DLS076A. Please advise work material.
• Tang type drills can be made-to-order. Please advise tang dimensions J and K.
• Helix angle 28°, Web thickness ratio 1.2:1.

Carbide Tipped Twist Drills
DLT Type (Morse Taper Shank)

For Cast Iron, Aluminum Alloy

Carbide 6~12 D





Cat. No.	Stock Size	Dimensions (mm) øD	L	a	ℓ1	W	M.T. No.
DLT 060~065	6.0, 6.5	6.0 ~ 6.5	152	15	72	1.2	1
DLT 066~070	6.8, 7.0	6.6 ~ 7.0	155	15	75	1.3	1
DLT 071~075	7.5	7.1 ~ 7.5	158	20	78	1.4	1
DLT 076~080	8.0	7.6 ~ 8.0	162	20	82	1.5	1
DLT 081~085	8.5	8.1 ~ 8.5	168	25	85	1.5	1
DLT 086~090	8.6, 8.7 9.0	8.6 ~ 9.0	172	25	88	1.6	1
DLT 091~095	9.5	9.1 ~ 9.5	175	26	92	1.7	1
DLT 096~100	10.0	9.6 ~ 10.0	178	26	95	1.8	1
DLT 101~105	10.2, 10.3 10.5	10.1 ~ 10.5	182	26	98	1.8	1
DLT 106~110	11.0	10.6 ~ 11.0	185	26	102	1.9	1
DLT 111~115	11.5	11.1 ~ 11.5	188	26	105	2.0	1
DLT 116~120	11.7, 12.0	11.6 ~ 12.0	192	26	108	2.0	1
DLT 121~125	12.5	12.1 ~ 12.5	195	26	112	2.2	1
DLT 126~130	13.0	12.6 ~ 13.0	198	26	115	2.2	1
DLT 131~135	13.5	13.1 ~ 13.5	202	27	118	2.3	1
DLT 136~140	14.0	13.6 ~ 14.0	205	27	122	2.3	1
DLT 141~145	14.5	14.1 ~ 14.5	222	27	122	2.5	2
DLT 146~150	15.0	14.6 ~ 15.0	225	27	125	2.5	2
DLT 151~155	15.5	15.1 ~ 15.5	228	27	125	2.6	2

Grade : A1

Cat. No.	Stock Size	Dimensions (mm) øD	L	a	ℓ1	W	M.T. No.
DLT 156~160	16.0	15.6 ~ 16.0	230	27	130	2.6	2
DLT 161~165	16.5	16.1 ~ 16.5	232	27	132	2.7	2
DLT 166~170	17.0	16.6 ~ 17.0	235	27	135	2.7	2
DLT 171~175	17.5	17.1 ~ 17.5	240	27	140	2.9	2
DLT 176~180	18.0	17.6 ~ 18.0	240	27	140	2.9	2
DLT 181~185	18.5	18.1 ~ 18.5	245	30	145	3.0	2
DLT 186~190	19.0	18.6 ~ 19.0	245	30	145	3.0	2
DLT 191~195		19.1 ~ 19.5	250	30	150	3.1	2
DLT 196~200	20.0	19.6 ~ 20.0	250	30	150	3.1	2
DLT 201~205	20.5	20.1 ~ 20.5	255	30	155	3.3	2
DLT 206~210	21.0	20.6 ~ 21.0	255	30	155	3.3	2
DLT 211~215		21.1 ~ 21.5	260	30	160	3.4	2
DLT 216~220	22.0	21.6 ~ 22.0	260	30	160	3.4	2
DLT 221~225		22.1 ~ 22.5	265	30	165	3.5	2
DLT 226~230	23.0	22.6 ~ 23.0	265	30	165	3.5	2
DLT 231~235	23.5	23.1 ~ 23.5	285	34	165	3.7	3
DLT 236~240	24.0	23.6 ~ 24.0	285	34	165	3.7	3
DLT 241~245	24.5	24.1 ~ 24.5	285	34	165	3.8	3
DLT 246~250		24.6 ~ 25.0	285	34	165	3.8	3

Note: • Ordering number for (ex.) ø8.6 drill is DTL086.
Standard morse-taper shank JIS B4302 is used.
• The Length ℓ dimension of ø8mm drill is the same as that of ø8.1mm~ø8.5mm drill range.
• ø25.1mm~ø50.0mm drills can be made to order.

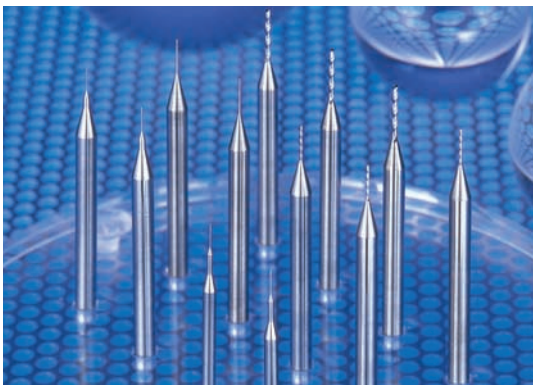
■ Recommended Conditions

Diameter (mm)	Cond.	Ductile Cast Iron	Cast Iron	Aluminum Alloy
~ ø10	V	20 – **35** – 55	20 – **40** – 60	50 – **100** – 150
	f	0.2 – **0.3** – 0.4	0.2 – **0.3** – 0.4	0.1 – **0.15** – 0.2
~ ø15	V	30 – **50** – 70	30 – **60** – 80	70 – **130** – 200
	f	0.3 – **0.35** – 0.4	0.3 – **0.35** – 0.4	0.1 – **0.15** – 0.2
~ ø25	V	50 – **60** – 90	50 – **75** – 100	100 – **150** – 250
	f	0.3 – **0.35** – 0.45	0.3 – **0.4** – 0.5	0.1 – **0.15** – 0.2

V : Cutting Speed (m/min), f : Feedrate (mm/rev)
(Min – **Standard** – Max)

Work	Helix Angle	Web Thickness Ratio
Cast iron	※ 28°~30°	1.2 : 1
Aluminum	40°	1.6 : 1

※ Below ø13mm - 28°, ø13mm and above - 30°



■ General Features

Fulfilling the ever changing demands of the world's electronics market for printed circuit boards, Sumitomo Electric's range of micro drills are developed with a combination of an unique drill design and our AF series of ultra-fine grained carbides.

■ Characteristics

- **Unique Design**
  With a specially developed cutting edge design, problems arising from surface finish can be eliminated.
- **Wide Selection of Grades**
  Catered to the various kinds of board material and process requirements.
- **New ø2.0mm shank type for High Spindle Speeds**
- **High Precision**
  Produced under strict quality controls using special NC machine with high accuracy, drills with consistent precision can be ensured.

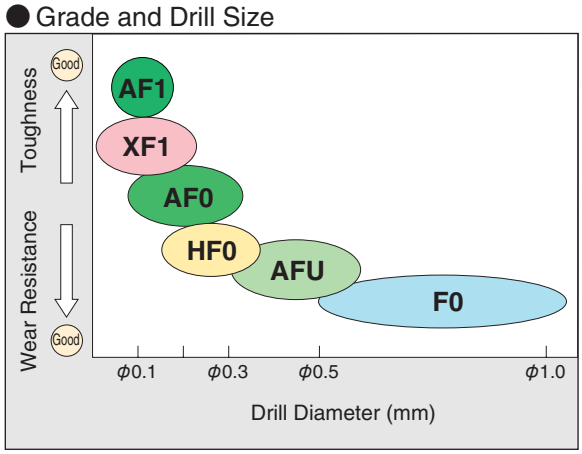
■ Series

Series Code		Diameter Range (φ mm)	Flute Length (mm)	Drill Type	Helix Angle	Special Requirements: Positioning Accuracy	Special Requirements: Hole Quality	Drill Requirement: Breakage Resistance	Drill Requirement: Clip Evacuation
High spindle speed, high feed drilling ø2.0mm shank type (Total length: 31.75mm)	**2-TQ**	0.05 ~ 0.25	0.5 ~ 3.5	Straight	40˚	○		○	
	2-PQ	0.10 ~ 0.40	1.5 ~ 5.0	Undercut	40˚		○		○
	2-PS	0.50 ~ 2.00	5.0 ~ 8.0		35˚		○		○
	2-TR	2.05 ~ 2.95	8.0		35˚		○		○
		3.00 ~ 4.00	8.0	Straight	35˚		○		○
General purpose φ3.175mm shank type (Total length: 38.1mm)	**TQF**	0.10 ~ 0.25	1.2 ~ 3.5	Straight	40˚	○		○	
	PQF	0.15 ~ 0.45	2.8 ~ 5.0	Undercut	40˚		○		○
	PNS	0.30 ~ 0.45	5.0		35˚		○		○
	PWS	0.30 ~ 0.45	5.0		35˚	○		○	
	PS	0.50 ~ 3.175	5.0 ~ 10.0		35˚		○		○

● Drill shape Straight Undercut (○ : Suitable)

■ Grade Characteristics and Application

● Grade and Drill Size



● Grade Characteristics

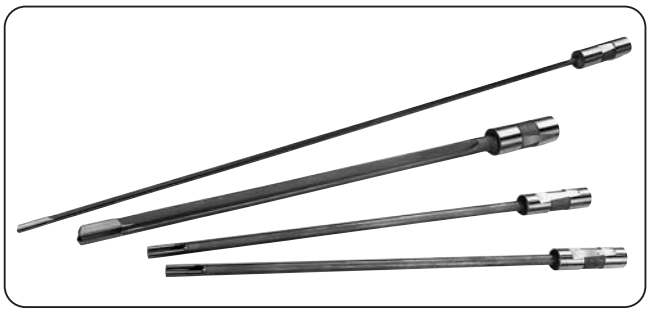
Data for the characteristics below are based on a ø3.175mm rod, this may differ from standard JIS data.

Class	Grade	Characteristics: Hardness (HRA)	Characteristics: Toughness (GPa)	Features
Ultra-fine Grained	**XF1**	93.5	4.5	Worlds smallest grained carbide for excellent breakage resistance.
	AF1	92.5	5.0	World's toughness (4.9GPa), high fracture resistant ultra-fine grained carbide. For small diameter and long fluted drills.
	AF0	93.0	4.5	Reliable performance with a good balance of fracture and wear resistance, best suited for small diameter drills of about ø4.0mm.
	AFU	93.6	4.0	Optimum level of hardness and Young's modulus with superior fracture resistance. For small to general diameter drills.
Standard Carbide	**HF0**	93.0	4.0	For small diameter, high speed drilling with good rigidity, wear and chipping resistance as well as hole positioning accuracy.
Micro Grained	**F0**	93.6	3.4	Small grain structure that enhances the wear resistance and edge sharpness.

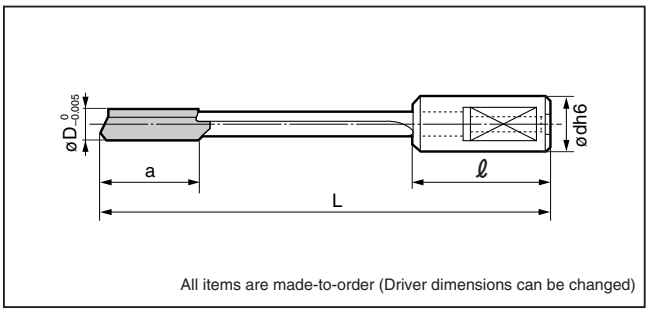
■ For more information, please refer to our brochure "SUMITOMO MICRODRILLS"

Extra Deep Hole Drilling

Carbide | W/ Oil Hole | For M/C 20D | For general 100D



Gun Drill For Machining Center



All items are made-to-order (Driver dimensions can be changed)

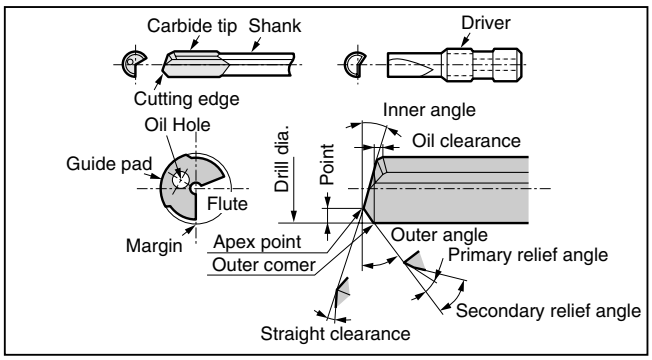
■ Features

- High efficiency drilling
- High precision holes (accuracy H7 class, roughness below 6S)
- Consistent hole quality

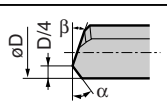
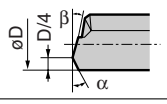
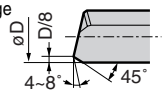
■ Applications

- Gun Drills For M/C Centers
  Able to machine holes with length of 15D~20D.
- Gun Drills For Gun Drilling M/C
  Able to machine holes with lengths of 50D~100D with high accuracy.
- Gun Reamers
  Able to ream a pre-drilled deep hole with high efficiency & accuracy.

■ Nomenclature of Gun Drill



■ Cutting Edge Profile

Cutting Edge Shape	Bevel Edge		Ordinary Shape α : β = 30° : 20° or 42° : 20°
	Notch Edge		Easy To Machine Materials For Example: Carbon α : β = 20° : 35° Pure Aluminium α : β = 5° : 5°
	Stack Point Edge		Multi Layers, Stainless Steel & Difficult-To-Machine Materials
Drilling Point Guide Pad	2 Point Pad Support		Ordinary Type
	3 Point Pad Support		For High Precision
	Special Shape		Special Type

■ Body

(mm)

øD	L 15D	L 20D	d	ℓ	a
3.0 ≤ øD < 3.5	125	140	16	50	The size of the carbide portion is standard (Please refer to the next page)
3.5 ≤ øD < 4.0	130	150	16	50	
4.0 ≤ øD < 4.5	145	165	16	50	
4.5 ≤ øD < 5.0	150	175	16	50	
5.0 ≤ øD < 6.0	175	205	16	50	
6.0 ≤ øD < 7.0	190	225	16	50	
7.0 ≤ øD < 8.0	210	250	16	50	
8.0 ≤ øD < 9.0	225	270	16	50	
9.0 ≤ øD < 10.0	240	290	16	50	
10.0 ≤ øD < 11.0	260	315	20	50	
11.0 ≤ øD < 12.0	280	340	20	50	
12.0 ≤ øD < 13.0	295	360	20	50	
13.0 ≤ øD < 14.0	310	380	20	50	
14.0 ≤ øD < 15.0	330	405	20	50	
15.0 ≤ øD < 17.0	370	455	25	55	
17.0 ≤ øD < 19.0	405	500	25	55	
19.0 ≤ øD < 20.0	425	525	25	55	

Grade : G10E

■ Recommended Conditions

There is no need for a guide bush, however, a 2xD deep guide hole should be made with a MultiDrill to lead the gundrill in.

Material	Hardness	Cutting Speed (m/min)	Feedrate (mm/rev) ø5	ø10	ø20
Aluminium Non Ferrous Alloy	—	~200	0.02 ~0.04	0.04 ~0.06	0.10 ~0.15
General Steel Alloy Steel	~HB250	70~120	0.02 ~0.025	0.04 ~0.05	0.04 ~0.06
General Steel Alloy Steel	HB250~	40~ 70	0.01 ~0.02	0.020~0.025	0.025~0.040
Hardened Steel	~HRC45	20~ 30	0.01 ~0.02	0.020~0.025	0.025~0.035
Cast Iron	—	70~100	0.03 ~0.04	0.05 ~0.06	0.06 ~0.10

1) Please operate within the recommended condition range for good chip control.
2) If the recommended spindle speed cannot be achieved, plese use the maximum speed available.
3) The gun drill should stop rotating after the hole is drilled.

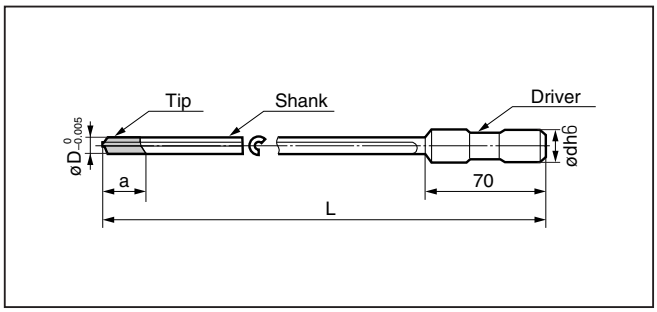
■ Work Tolerance

Materials	Surface Roughness	Over Size (μm)
Steels	About 20S	0 ~ 30
Cast Iron	About 10S	– 5 ~ 20
Aluminium Alloy	About 3S	–10 ~ 5

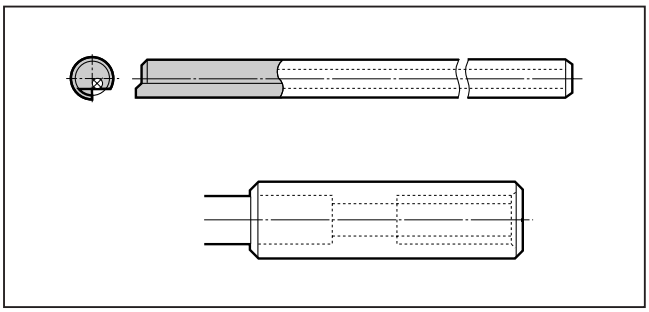
Extra Deep Hole Drilling

Carbide | W/ Oil Hole | 50~100 D

Gun Drill For Gun Drilling Machine



Gun Reamer



- The above illustration shows a single flute gun reamer.
  Other types of gun reamers that can be made to order:
  1) 2 flute type
  2) 2 flute stepped type
  3) 4 flute type
  4) 4 flute stepped type
  5) 6 flute type

- Please provide the following information upon ordering:
  1) Work material
  2) Work dimensions and tolerance
  3) Gun Reamer size (no. of flutes, overall length, driver size)

■ Body

(mm)

øD	L	ød	a
3.0 < øD ≤ 3.59	200~ 500	12.70	16
3.59 < øD ≤ 4.99	200~ 500		22
4.99 < øD ≤ 6.09	200~ 500	19.05	27
6.09 < øD ≤ 9.79	200~ 750		30
9.79 < øD ≤ 11.29	250~1,000		33
11.29 < øD ≤ 13.79	250~1,000		37
13.79 < øD ≤ 16.79	300~1,000	25.40	40
16.79 < øD ≤ 19.29	300~1,500		43
19.29 < øD ≤ 26.29	300~1,500	31.75	45
26.29 < øD ≤ 28.79	350~1,500	38.10	50
28.79 < øD ≤ 30.30	350~1,500		55

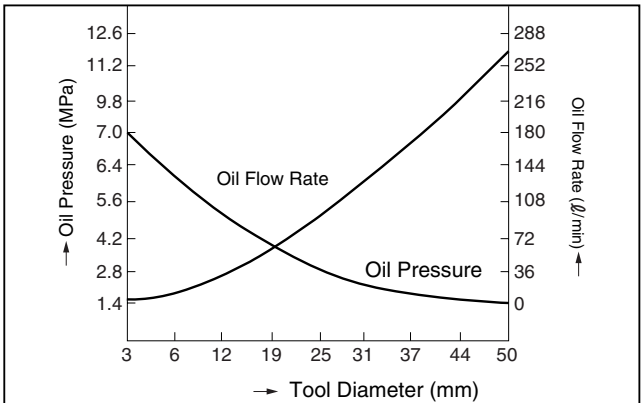
Besides single flute gun drills, 2 flute, stepped and large diameter (more than ø30.3mm) gun drills can be made to order.

Grade : G10E

■ Recommended Conditions

Work Materials	Hardness (HB)	V (m/min)	Feedrate (mm/rev) ~ø4	~ø6	~ø10	~ø14	~ø19	~ø24	ø25 and above
Carbon Steel	below 150	100 ~ 150	0.005 ~ 0.015	0.010 ~ 0.025	0.015 ~ 0.035	0.020 ~ 0.050	0.025 ~ 0.060	0.030 ~ 0.070	0.040 ~ 0.080
	150 ~ 250	80 ~ 120	0.005 ~ 0.010	0.010 ~ 0.020	0.015 ~ 0.030	0.020 ~ 0.040	0.025 ~ 0.050	0.030 ~ 0.060	0.030 ~ 0.060
Alloy Steel	250 ~ 350	50 ~ 100	0.005 ~ 0.010	0.005 ~ 0.010	0.010 ~ 0.020	0.015 ~ 0.030	0.020 ~ 0.035	0.020 ~ 0.040	0.020 ~ 0.040
	above 350	below 30	—	0.005 ~ 0.010	0.005 ~ 0.010	0.010 ~ 0.020	0.015 ~ 0.030	0.020 ~ 0.035	0.020 ~ 0.035
Stainless Steel	below 250	50 ~ 80	0.005 ~ 0.015	0.010 ~ 0.020	0.010 ~ 0.020	0.010 ~ 0.030	0.015 ~ 0.030	0.020 ~ 0.035	0.020 ~ 0.040
	250 ~ 350	40 ~ 50	—	0.005 ~ 0.015	0.010 ~ 0.015	0.010 ~ 0.020	0.010 ~ 0.020	0.010 ~ 0.020	0.010 ~ 0.020
Cast Iron (FC FCD FCMB)	below 220	80 ~ 100	0.010 ~ 0.020	0.020 ~ 0.040	0.030 ~ 0.050	0.040 ~ 0.080	0.060 ~ 0.090	0.080 ~ 0.120	0.100 ~ 0.150
	above 220	40 ~ 80	0.005 ~ 0.010	0.005 ~ 0.015	0.010 ~ 0.020	0.015 ~ 0.030	0.020 ~ 0.040	0.020 ~ 0.050	0.025 ~ 0.070
Aluminium Alloy	—	180 ~ 250	0.010 ~ 0.020	0.020 ~ 0.040	0.030 ~ 0.060	0.040 ~ 0.080	0.060 ~ 0.100	0.100 ~ 0.180	0.150 ~ 0.200
Copper Alloy	—	120 ~ 200	0.005 ~ 0.010	0.010 ~ 0.020	0.020 ~ 0.025	0.020 ~ 0.030	0.025 ~ 0.035	0.030 ~ 0.040	0.040 ~ 0.060

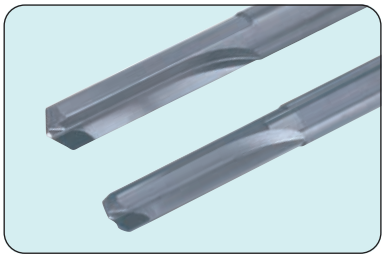
■ Oil Pressure & Oil Flow Rate



- High pressure & big volume of cutting fluid are most important for Gun Drilling machining.
- Use light sticky lubricant oil.
- The above figure shows the recommended oil pressure & oil flow rate for the various Gun Drill diameters.

DAL/DDL Type

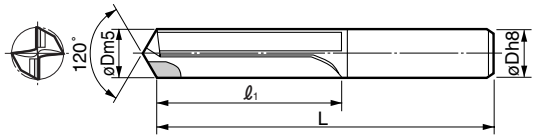
Sintered Diamond | W/ Oil Hole | 3D



From General to High Precision Drilling of Aluminum Alloys !

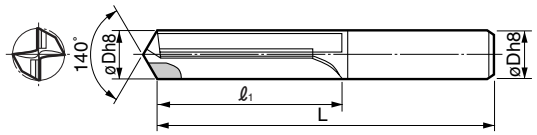
- High precision DAL type is able to produce holes of IT Class of 7～8.
- General DDL type is able to produce holes of IT class of 11～12, mainly for drilling of pre-tap holes.
- DML type is DDL type with a chamfer edge, incorporating 2 processes in one operation.

■ DAL Type



Cat. No.	Stock DA2200	øD	L	ℓ1
DAL 0500H ~ 0600H		φ 5 ≦ D ≦ φ 6	80	30
DAL 0601H ~ 0700H		φ 6 < D ≦ φ 7	90	35
DAL 0701H ~ 0800H		φ 7 < D ≦ φ 8	90	35
DAL 0801H ~ 0900H		φ 8 < D ≦ φ 9	100	40
DAL 0901H ~ 1000H		φ 9 < D ≦ φ 10	100	40
DAL 1001H ~ 1100H		φ 10 < D ≦ φ 11	110	50
DAL 1101H ~ 1200H		φ 11 < D ≦ φ 12	110	50

■ DDL Type



Cat. No.	Stock DA2200	øD	L	ℓ1
DDL 050V ~ 060V		φ 5 ≦ D ≦ φ 6	80	30
DDL 061V ~ 070V		φ 6 < D ≦ φ 7	90	35
DDL 071V ~ 080V		φ 7 < D ≦ φ 8	90	35
DDL 081V ~ 090V		φ 8 < D ≦ φ 9	100	40
DDL 091V ~ 100V		φ 9 < D ≦ φ 10	100	40
DDL 101V ~ 110V		φ 10 < D ≦ φ 11	110	50
DDL 111V ~ 120V		φ 11 < D ≦ φ 12	110	50

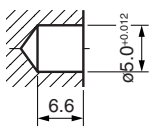
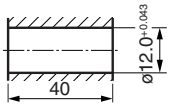
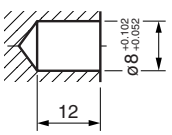
■ Recommended Conditions

	Cutting Speed	Feed	Depth	Oil
φ D < 8	80 ~ 250 m/min	0.05 ~ 0.2 mm/rev.	L/D=Below 3	Water soluble
φ D ≧ 8		0.1 ~ 0.3 mm/rev.		

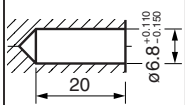
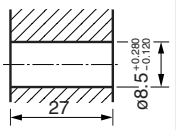
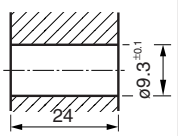
■ Important notes

- Select a high rigidity machine and high precison tool holder.
- Enough coolant to drilled hole.

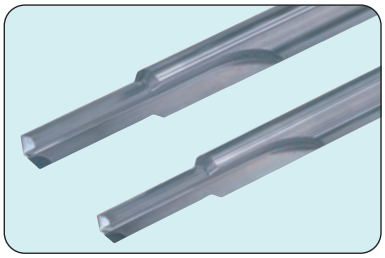
■ Application Examples (DALType)

Work Shape	Work	Conditions	Results
	A390 High silicon Aluminum	V=100m/min f=0.1mm/rev	• Holes by carbide drill was out of specifications after 2,000 holes/reg. • SumiDia drill could drill up to 30,000 holes/reg. • 15 times tool life that of carbide drills.
	A390 High silicon Aluminum (pre-cast hole of φ 10)	V=120m/min f=0.12mm/rev	• Average 40,000 holes/reg (1600m) • Surface roughness Ry = 1μm
	ADC10 Aluminum Die Cast	V=90m/min f=0.08mm/rev	• More than 50,000 holes (600m) and still running

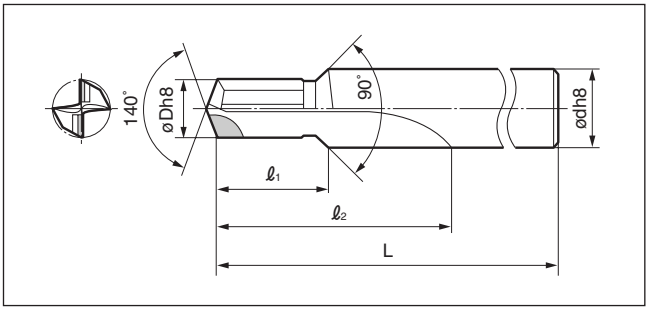
■ Application Examples (DDLType)

Work Shape	Work	Conditions	Results
	ADC12 Aluminum Die Cast M8Pre-tap holes	V=214m/min f=0.14mm/rev	• Regrind after 100,000 holes
	ADC12 Aluminum Die Cast	V=200m/min f=0.17mm/rev	• Regrind after 74,000 holes (2,000m) (Preset tool change)
	AC2A Aluminum Casting	V=234m/min f=0.28mm/rev	• Regrind after 80,000 holes (Preset tool change)

Sintered Diamond | W/ Oil Hole | 3D



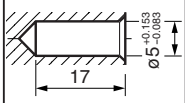
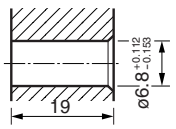
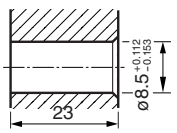
■ DML Type



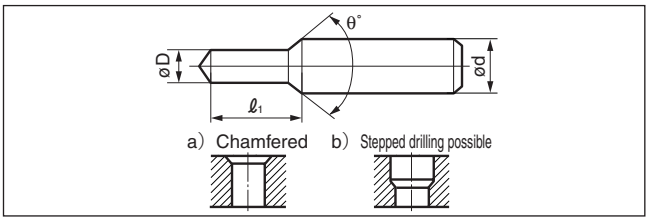
Code	Applicable Tap Size	Cat. No.	Stock DA2200	øD	ød	L	ℓ1	ℓ2
53291	M6	**DML 050V**	▲	5	8	90	18	36
53292	M8	**DML 068V**	▲	6.8	10	104	24	48
53293	M10	**DML 085V**	▲	8.5	12	122	30	60
53294	M12	**DML 103V**	▲	10.3	14	136	36	72

Chamfering position is usually just carbide but PCD edges can be incorporated.

■ Application Examples (DML Type)

Work Shape	Work	Conditions	Results
	AC4C-T6 Aluminum Casting M6 Pre-tap holes	V=100m/min f=0.1mm/rev m/c = 6 spindles	• Regrind after 150,000 holes • Tool life for carbide drill is 500 holes. • 30 times tool life that of carbide drills
	AC2C-T2 Aluminum Casting M8 Pre-tap holes	V=210m/min f=0.15mm/rev	• 100,000 holes/reg (2,000m) and still running. • Drilling and chamfering in the same process
	AC4C-T6 Aluminum Casting M10 Pre-tap holes	V=250m/min f=0.2mm/rev	• 80,000 holes/reg (1,840m) and still running. • Drilling and chamfering in the same process

■ DML Type Possible Profiles



① ℓ1 tolerance for dimension L is more than 0.2mm
② θ° is less than 180°
③ a) Chamfering b) Stepped drilling possible

▲ mark : To be replaced by new item (Please confirm stock availability)