

botek[®]

DEEP HOLE DRILLING SYSTEMS
SOLID CARBIDE TOOLS

Deep hole drilling tools

Ejector System



botek



The botek company

Manufacturing deep and precise holes is a technical challenge when processing metal. Accordingly specialising in deep hole drilling technology was the founding idea in 1974 of botek Präzisionsbohrtechnik GmbH in Riederich.

botek grew to be an international supplier of deep hole drilling tools. Over 500 employees in the main company develop and manufacture single and two fluted drills, deep hole drilling tools BTA and Ejector systems as well as special tools.

A complete product program, regarding all deep hole drilling aspects and a team of highly qualified and dedicated cutting specialists make botek a competent partner for the automobile industry and their suppliers, shipbuilding industry, hydraulic industry as well as motor, gear and machine building companies.



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Overview of types

	<p>Type 15 solid drill head</p> <ul style="list-style-type: none"> - High cutting capacity coupled with ease of operation - Stable tool - Suitable for extremely close tolerances - Low up-front costs with small batches
	<p>Type 60 solid drill head</p> <ul style="list-style-type: none"> - Very economical, with optimal cutting capacity - Indexable inserts with various chip breakers available to suit processed material - Tool adjustment range up to 1 mm using suitable replacement parts
	<p>Type 62 solid drill head</p> <ul style="list-style-type: none"> - New chip breakers for high feed rates and high productivity - No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm - Tool adjustment range 0.5 mm - Minimal axis deviation at large drilling depths
	<p>Type 70 E solid drill head</p> <ul style="list-style-type: none"> - Very few wear parts over the whole drilling range - New chip breakers for high feed rates and high productivity - No adjustment after a change of indexable inserts - We keep wear parts in stock
	<p>Type 42 solid drill head</p> <ul style="list-style-type: none"> - New chip breakers for high feed rates and high productivity - No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm - Tool adjustment range up to 5 mm using suitable replacement parts - Minimal axis deviation at large drilling depths
	<p>Type 43 E solid drill head</p> <ul style="list-style-type: none"> - Simplest operation, change of wear parts without readjustment within +/- 0.01 mm - Wear parts can be exchanged on the machine - Tool adjustment range of 10 mm with replacement parts - New cutting geometries for high cutting capacity - Minimal axis deviation at large drilling depths
	<p>Type 13 E counterboring head</p> <ul style="list-style-type: none"> - New chip breakers for high feed rates and high productivity - No adjustment required when changing wear parts - Tool adjustment range 0.5 mm - Maximum shape accuracy and straightness in the drilled hole
	<p>Type 35 E counterboring head</p> <ul style="list-style-type: none"> - Tool adjustment range up to 25 mm - Low requirement for tools over the whole drilling range - Adjustment system for easy change of diameter - New patented adjustment system with a central adjusting disc from Ø 149 mm - Change of wear parts without tool readjustment

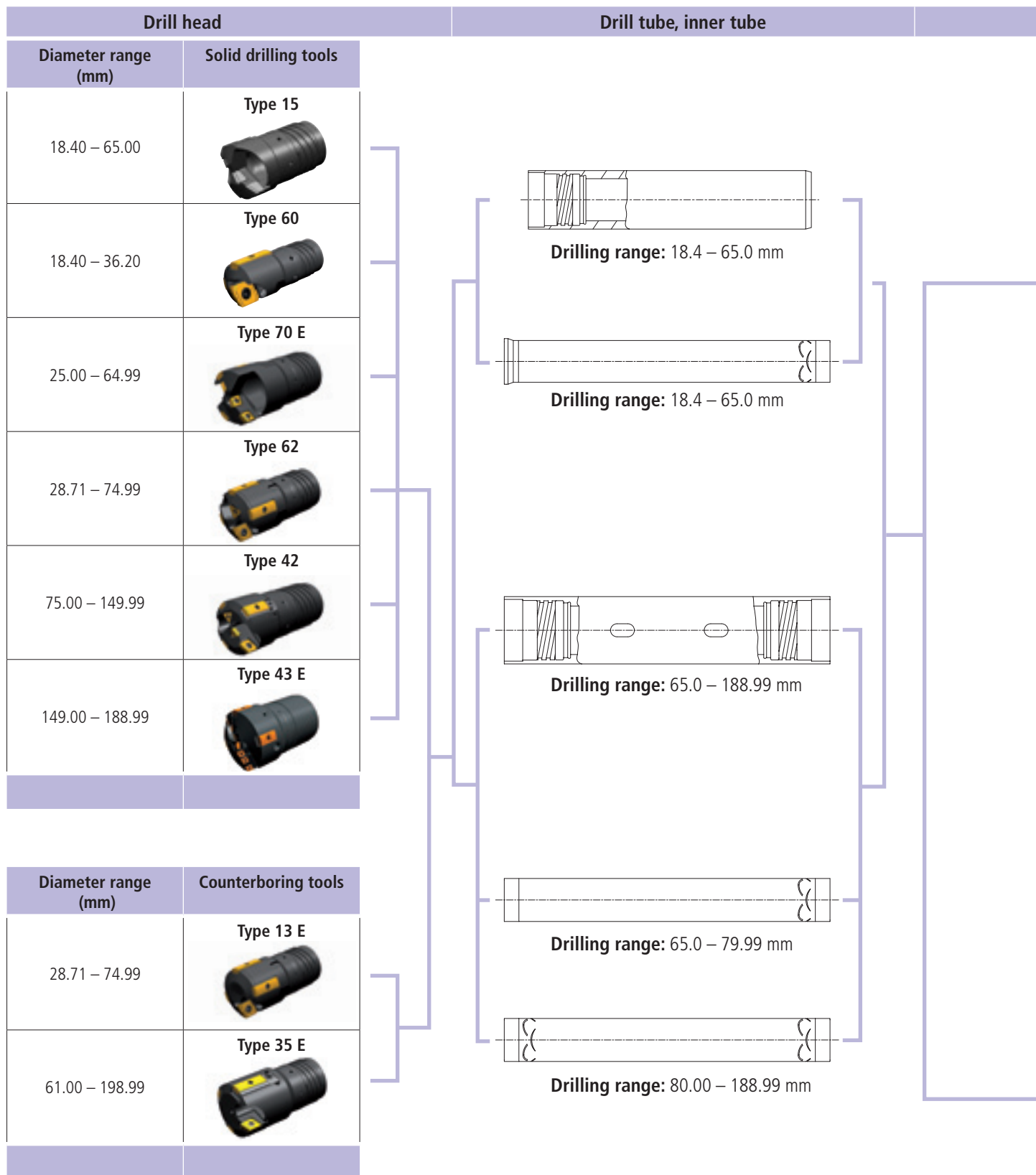
Areas of application

Page	Surface quality Ra	Drilling tolerance	Workpiece material				
			Steel	Stainless steel	Cast iron	Aluminium alloys	Heat resisting alloys
8	2 µm	IT 8	•••	••	•••	••	•
10	1 µm	IT 8 (IT 7)	•••	••	•••	•••	••
12	2 µm	IT 8	•••	•••	•••	•••	•••
14	2 µm	IT 10	•••	•	•••	•••	•
16	2 µm	IT 8	•••	•••	•••	•••	•••
18	2 µm	IT 8	•••	•••	•••	•••	•••
20	1 µm	IT 7	•••	•••	•••	•••	••
22	2 µm	IT 8 (IT 7)	•••	•••	•••	•••	••

••• = good

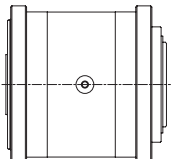
• = on average

Deep-hole drilling Ejector system



Deep-hole drilling Ejector system

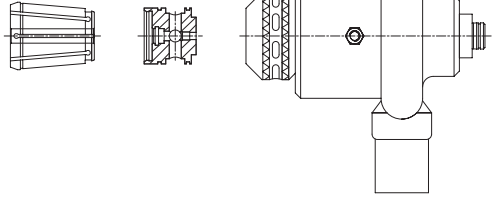
Vibration damper	Collet	Sealing sleeve	Connector	Basic toolholder
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**Vibration damper,
rotating**

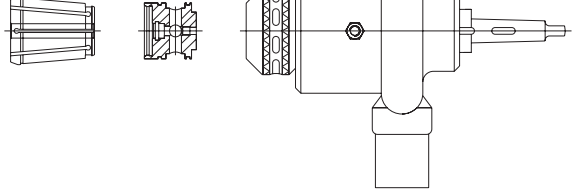
- 91-028100-000 (Size 1)
- 91-028200-000 (Size 2)
- 91-028300-000 (Size 3)

97-2055-400M-V63
(Ø 18.40 - 65.00)



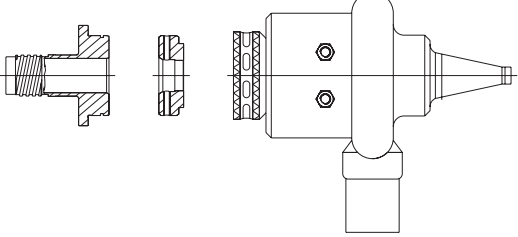
- ISO 50 DIN 69871
- ISO 50 DIN 2080
- HSK 100
- Capto C6

97-2055-400M
(Ø 18.40 - 65.00)

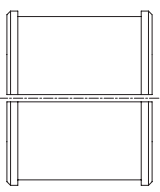


MK5

97-2055-402
(Ø 65.00 - 123.24)



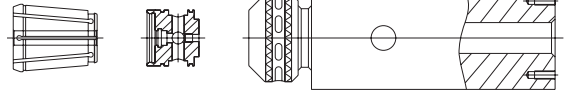
**ISO 50
DIN 2080**



**Vibration damper
non-rotating**

- 91-030000-000 (Size 0)
- 91-030100-000 (Size 1)
- 91-030200-000 (Size 2)
- 91-030300-000 (Size 3)

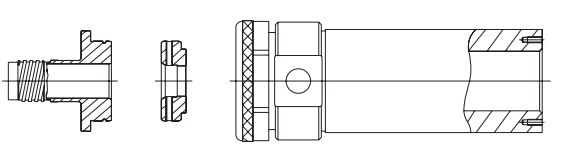
97-2055-410
(Ø 18.40 - 65.00)



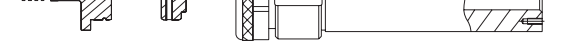
97-2055-411
(Ø 18.40 - 36.20)



97-2055-412
(Ø 65.00 - 123.24)



97-2055-413
(Ø 123.25 - 188.99)



Type 15

Solid drill head, brazed type

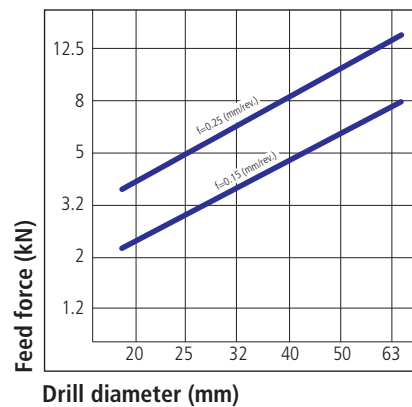
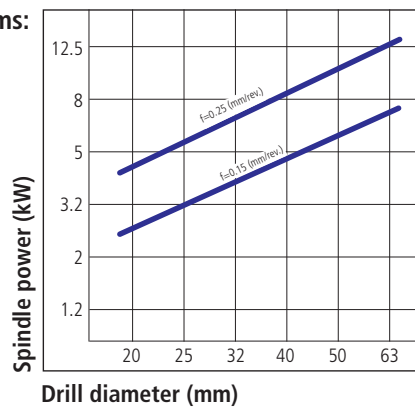
Drilling range: 18.40 - 65.00 mm



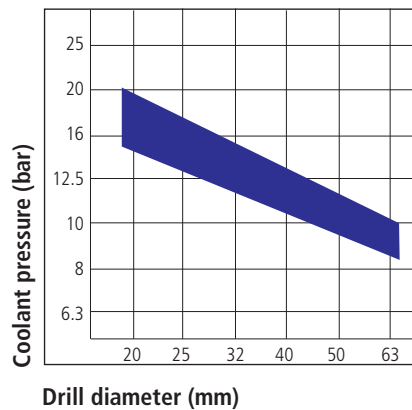
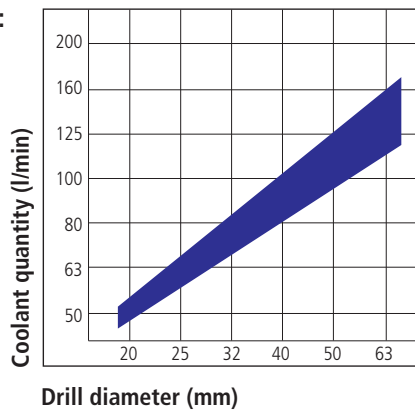
Advantages:

- High cutting capacity coupled with ease of operation
- Stable tool
- Suitable for extremely close tolerances
- Low up-front costs with small batches

Performance diagrams:



Coolant information:



Guide values for deep hole drilling of different materials

Material/ Mechanical strength properties	Cutting speed (m/min)	Feed (mm/rev.) for drill diameter (mm)				Carbide grades
		18.40 - 20.00	20.01 - 31.00	31.01 - 43.00	43.01 - 65.00	
* Construction steel ≤ 700 N/mm ²	70 - 120	0.10 - 0.20	0.15 - 0.25	0.15 - 0.30	0.18 - 0.32	020
Case hardened steel ≤ 750 N/mm ²	70 - 100	0.10 - 0.20	0.17 - 0.25	0.20 - 0.30	0.24 - 0.32	020
Case hardened steel $\leq 1,100$ N/mm ²	55 - 100	0.10 - 0.20	0.17 - 0.25	0.20 - 0.30	0.24 - 0.32	020
Heat treated steel ≤ 700 N/mm ²	70 - 100	0.10 - 0.20	0.17 - 0.25	0.20 - 0.30	0.24 - 0.32	020
Heat treated steel $\leq 1,100$ N/mm ²	55 - 100	0.10 - 0.20	0.17 - 0.25	0.20 - 0.30	0.24 - 0.32	020
Nitriding steel $\leq 1,100$ N/mm ²	55 - 100	0.10 - 0.20	0.17 - 0.25	0.20 - 0.30	0.24 - 0.32	020
Ferritic steel ≤ 900 N/mm ²	40 - 85	0.12 - 0.20	0.18 - 0.25	0.22 - 0.30	0.24 - 0.36	029*/020
* Austenitic steel (stainless)	40 - 85	0.10 - 0.20	0.18 - 0.25	0.22 - 0.30	0.24 - 0.36	029*/020
Heat resisting steel (stainless), Tool steel	50 - 100	0.10 - 0.20	0.17 - 0.25	0.20 - 0.30	0.24 - 0.32	022
Steel castings ≤ 700 N/mm ²	50 - 100	0.12 - 0.20	0.15 - 0.25	0.20 - 0.30	0.24 - 0.36	029*/020
Nodular cast iron $\leq 1,100$ N/mm ²	50 - 100	0.10 - 0.18	0.15 - 0.22	0.20 - 0.28	0.24 - 0.32	022
Cast iron, alloyed and unalloyed	60 - 100	0.10 - 0.18	0.15 - 0.22	0.20 - 0.28	0.24 - 0.32	022
* Aluminium and Aluminium alloys	65 - 130	0.10 - 0.20	0.16 - 0.25	0.18 - 0.30	0.20 - 0.45	022
* Copper Cu-content < 99%	65 - 130	0.05 - 0.20	0.05 - 0.25	0.05 - 0.30	0.05 - 0.45	022

* First recommendation * Material is of limited suitability for ejector drilling

Type 60

Solid drill head with indexable inserts and guide pads,
diameter adjustment with stop plate
Diameter range: 18.40 - 36.20 mm

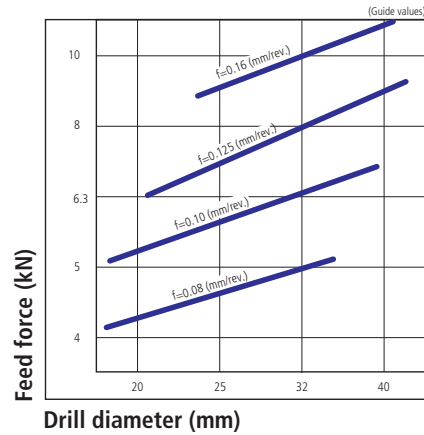
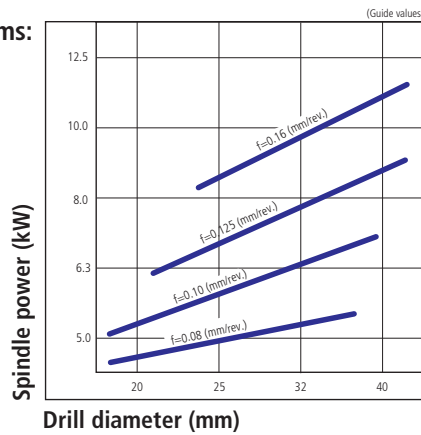


Advantages:

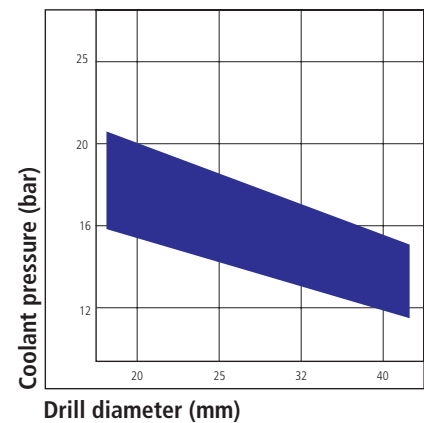
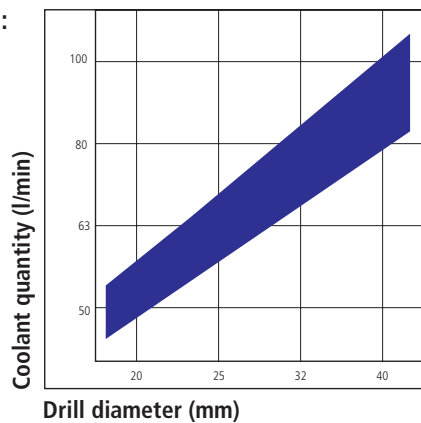
- Very economical, with optimal cutting capacity
- Indexable inserts with various chip breakers available to suit processed material
- Tool adjustment range up to 1 mm using suitable replacement parts



Performance diagrams:



Coolant information:



Guide values for deep hole drilling of different materials

Material/ Mechanical strength properties	Cutting speed (m/min)	Feed (mm/rev.) for drill diameter (mm)			Carbide grades	
		18.40 - 23.99	24.00 - 30.99	31.00 - 36.20	Indexable insert	Guide pad
Construction steel ≤ 700 N/mm ²	80 - 100	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16	P 25 B - 1* P 40 B - 1	P 20
Case hardened steel ≤ 750 N/mm ²						
Case hardened steel ≤ 1,100 N/mm ²	70 - 80	0.08 - 0.11	0.10 - 0.13	0.12 - 0.15		
Heat treated steel ≤ 700 N/mm ²	70 - 90	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16		
Heat treated steel ≤ 1,100 N/mm ²	55 - 75	0.08 - 0.11	0.10 - 0.13	0.12 - 0.15		
Nitriding steel ≤ 1,100 N/mm ²	55 - 75	0.08 - 0.10	0.09 - 0.12	0.11 - 0.14		
Ferritic steel ≤ 900 N/mm ²	60 - 80	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16	P 20 B	
Austenitic steel (stainless)	60 - 80	0.08 - 0.10	0.10 - 0.12	0.12 - 0.14		
Heat resisting steel (stainless), Tool steel	50 - 70	0.08 - 0.10	0.10 - 0.12	0.12 - 0.14	P 25 - 1	P 20
Steel castings ≤ 700 N/mm ²	60 - 80	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16		
Nodular cast iron ≤ 1,100 N/mm ²	65 - 80	0.10 - 0.13	0.12 - 0.15	0.14 - 0.18		
Cast iron, alloyed and unalloyed	70 - 100	0.10 - 0.13	0.12 - 0.15	0.14 - 0.18	K 10 - 1	
Aluminium and Aluminium alloys	100 - 200	0.09 - 0.12	0.10 - 0.14	0.12 - 0.18		
Copper Cu-content < 99%	120 - ...	0.06 - 0.10	0.08 - 0.12	0.10 - 0.14		

* First recommendation

Type 62

Solid drill head with indexable inserts and guide pads,
diameter adjustment with stop plate

Diameter: 28.71 - 74.99 mm

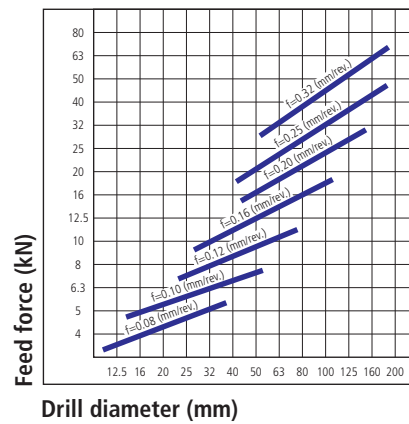
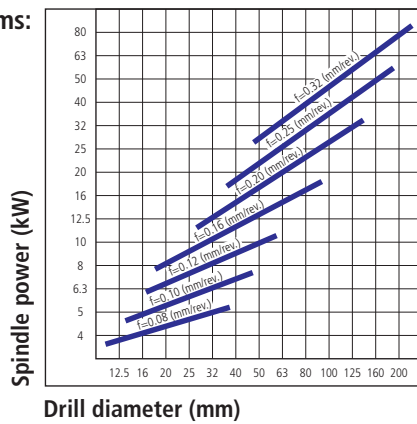


Advantages:

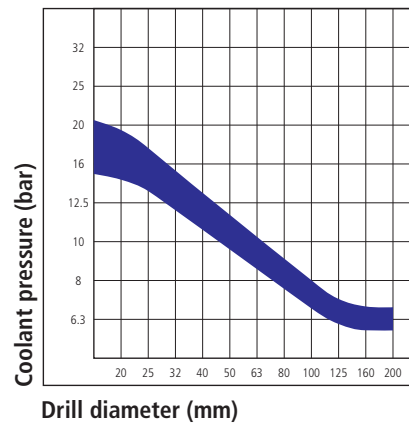
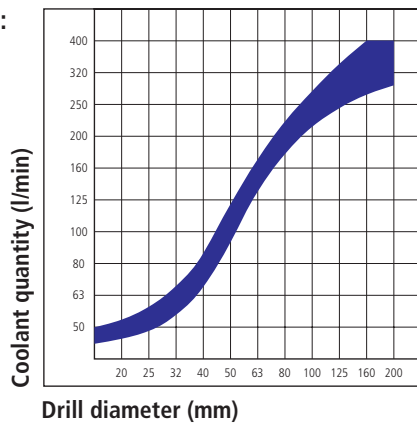
- New chip breakers for high feed rates and high productivity
- No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm
- Tool adjustment range 0.5 mm
- Minimal axis deviation at large drilling depths



Performance diagrams:



Coolant information:



Guide values for deep hole drilling of different materials

Material/ Mechanical strength properties	Cutting speed (m/min)	Feed (mm/rev.) for drill diameter (mm)			Carbide grades			
		28.71 - 39.99	40.00 - 51.99	52.00 - 74.99	Peripheral insert	Intermediate insert	Guide pad	
Construction steel ≤ 700 N/mm ²	80 - 100	0.12 - 0.18	0.15 - 0.20	0.15 - 0.22	P 25 B - 2	P 40 B - 1	P 20	
Case hardened steel ≤ 750 N/mm ²	80 - 100	0.12 - 0.18	0.15 - 0.20	0.15 - 0.22	P 25 B - 1			
Case hardened steel ≤ 1,100 N/mm ²	70 - 80	0.20 - 0.25	0.20 - 0.30	0.20 - 0.35	P 25 B - 5			
Heat treated steel ≤ 700 N/mm ²	70 - 90	0.20 - 0.28	0.20 - 0.35	0.20 - 0.40				
Heat treated steel ≤ 1,100 N/mm ²	55 - 75	0.20 - 0.25	0.20 - 0.30	0.20 - 0.30				
Nitriding steel ≤ 1,100 N/mm ²	55 - 75	0.20 - 0.25	0.20 - 0.30	0.20 - 0.30	P 25 B - 1			P 20 B
Ferritic steel ≤ 900 N/mm ²	60 - 80	0.15 - 0.25	0.15 - 0.30	0.20 - 0.30	P 25 B - 5			
Austenitic steel (stainless)	60 - 80	0.08 - 0.12	0.10 - 0.18	0.10 - 0.22	K 10 BX - 2	K 10 BX - 1	P 20	
Heat resisting steel (stainless), Tool steel	50 - 70	0.15 - 0.25	0.20 - 0.25	0.20 - 0.30	P 25 B - 2	P 40 B - 1		
Steel castings ≤ 700 N/mm ²	60 - 80	0.20 - 0.25	0.20 - 0.35	0.20 - 0.35	P 25 B - 5			
Nodular cast iron ≤ 1,100 N/mm ²	65 - 80	0.20 - 0.35	0.25 - 0.40	0.25 - 0.50				
Cast iron, alloyed and unalloyed	70 - 100	0.20 - 0.35	0.20 - 0.40	0.25 - 0.50				
Aluminium Al content > 99 %	100 - 200	0.05 - 0.15	0.05 - 0.25	0.05 - 0.25	K 10 B - 1	K 10 B - 1	P 20 B	
Aluminium alloys	100 - 200	0.15 - 0.25	0.15 - 0.30	0.15 - 0.45	K 10 B - 5			
Copper Cu content < 99%	120 - ...	0.05 - 0.15	0.05 - 0.25	0.05 - 0.25	K 10 - 1	K 10 - 1	P 20	

Type 70E

Solid drill head with indexable inserts and guide pads,
diameter made to order

Diameter range: 25.00 - 64.99 mm

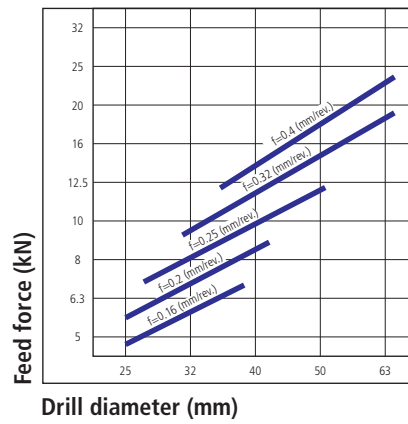
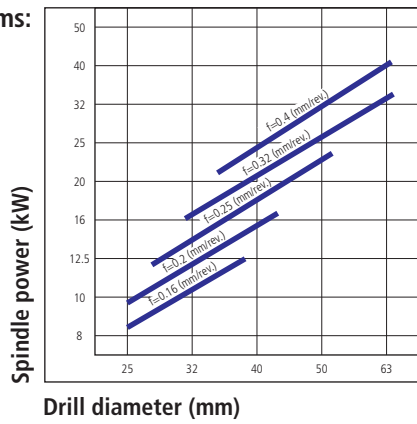


Advantages:

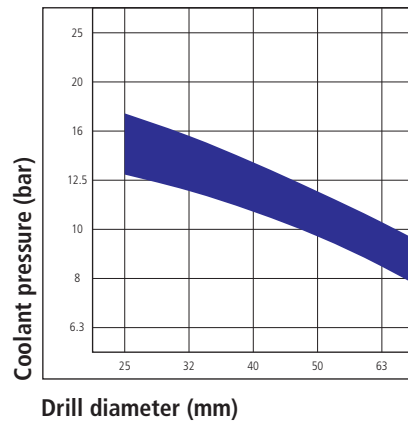
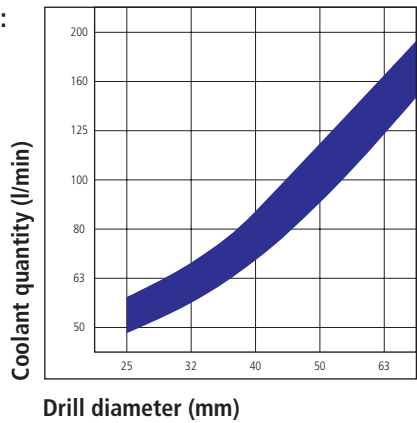
- Very few wear parts over the whole drilling range
- New chip breakers for high feed rates and high productivity
- No adjustment after a change of indexable inserts
- We keep wear parts in stock



Performance diagrams:



Coolant information:



Guide values for deep hole drilling of different materials

Material/ Mechanical strength properties	Cutting speed (m/min)	Feed (mm/rev.) for drill diameter (mm)			Carbide grades	
		25.00 - 29.99	30.00 - 44.99	45.00 - 64.99	Peripheral insert Intermediate insert Centre insert	Guide pad
Construction steel ≤ 700 N/mm ²	80 - 100	0.15 - 0.20	0.18 - 0.30	0.20 - 0.35	U 225 BX - 2	P 20
Case hardened steel ≤ 750 N/mm ²	80 - 100	0.15 - 0.20	0.18 - 0.30	0.20 - 0.35		
Case hardened steel ≤ 1,100 N/mm ²	70 - 80	0.20 - 0.25	0.20 - 0.30	0.20 - 0.35	U 225 BX - 5	
Heat treated steel ≤ 700 N/mm ²	70 - 90	0.20 - 0.25	0.25 - 0.40	0.25 - 0.40		
Heat treated steel ≤ 1,100 N/mm ²	55 - 75	0.20 - 0.25	0.25 - 0.30	0.25 - 0.30		
Nitriding steel ≤ 1,100 N/mm ²	55 - 75	0.15 - 0.20	0.18 - 0.25	0.20 - 0.30	U 225 BX - 2	P 20 B
Ferritic steel ≤ 900 N/mm ²	60 - 80	0.15 - 0.25	0.25 - 0.30	0.25 - 0.30	U 225 BX - 5	P 20
Austenitic steel (stainless)	60 - 80	0.10 - 0.20	0.10 - 0.20	0.10 - 0.20	U 225 BX - 2	
Heat resisting steel (stainless), Tool steel	50 - 70	0.15 - 0.22	0.18 - 0.25	0.20 - 0.30		
Steel castings ≤ 700 N/mm ²	65 - 80	0.20 - 0.25	0.20 - 0.35	0.20 - 0.35	U 225 BX - 5	
Nodular cast iron ≤ 1,100 N/mm ²	65 - 80	0.20 - 0.35	0.25 - 0.40	0.30 - 0.40		
Cast iron, alloyed and unalloyed	70 - 100	0.20 - 0.35	0.25 - 0.40	0.30 - 0.40		
Aluminium Al content > 99 %	100 - 200	0.05 - 0.15	0.05 - 0.25	0.05 - 0.25	U 225 BX - 2	P 20 B
Aluminium alloys	100 - 200	0.15 - 0.25	0.15 - 0.30	0.15 - 0.45	U 225 BX - 5	
Copper Cu content < 99%	120 - ...	0.05 - 0.15	0.05 - 0.25	0.05 - 0.25	U 225 BX - 2	P 20

Type 42

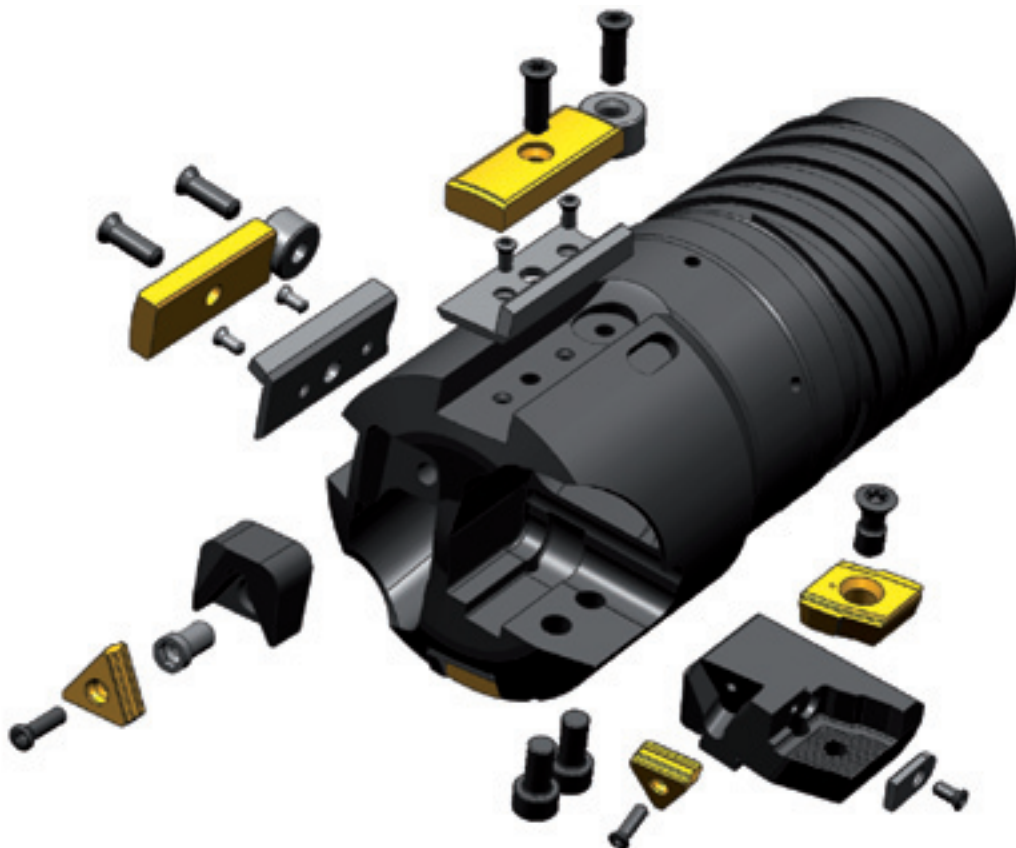
Solid drill head with indexable inserts and guide pads

Diameter range: 75.00 - 149.99 mm

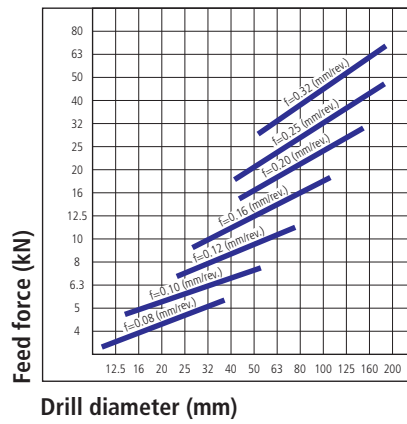
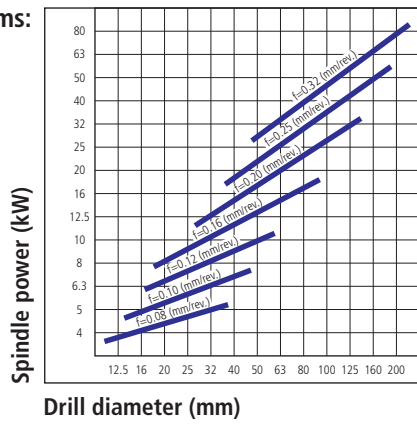


Advantages:

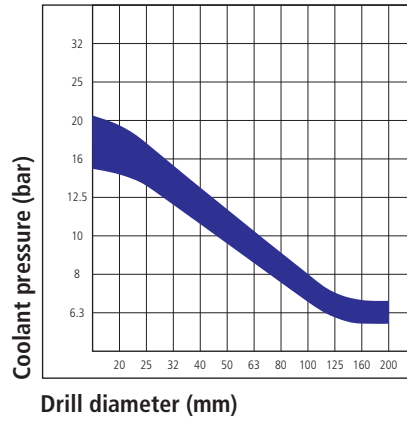
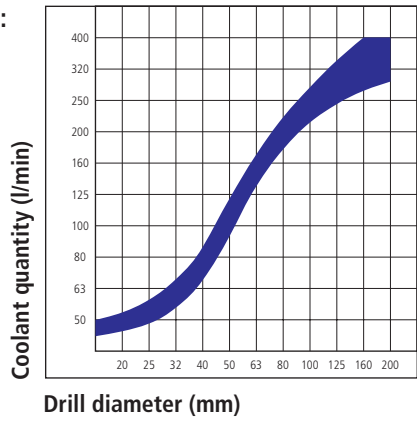
- New chip breakers for high feed rates and high productivity
- No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm
- Tool adjustment range up to 5 mm using suitable replacement parts
- Minimal axis deviation at large drilling depths



Performance diagrams:



Coolant information:



Guide values for deep hole drilling of different materials						
Material/ Mechanical strength properties	Cutting speed (m/min)	Feed (mm/rev.) for drill diameter (mm)		Carbide grades		
		75.00 - 149.99	Peripheral insert	Intermediate insert	Centre insert	Guide pad
Construction steel ≤ 700 N/mm ²	80 - 100	0.20 - 0.35	P 25 B - 1	P 40 B - 1	P 40 B - 1	P 20
Case hardened steel ≤ 750 N/mm ²	80 - 100	0.20 - 0.40				
Case hardened steel ≤ 1,100 N/mm ²	70 - 80	0.20 - 0.35				
Heat treated steel ≤ 700 N/mm ²	70 - 90	0.20 - 0.40	P 25 B - 5			
Heat treated steel ≤ 1,100 N/mm ²	55 - 75	0.20 - 0.30				
Nitriding steel ≤ 1,100 N/mm ²	55 - 75	0.20 - 0.30	P 25 B - 1			P 20 B
Ferritic steel ≤ 900 N/mm ²	60 - 80	0.20 - 0.30	P 25 B - 5			
Austenitic steel (stainless)	60 - 80	0.15 - 0.30	K 10 BX - 2	K 10 BX - 2	K 10 BX - 1	P 20
Heat resisting steel (stainless), Tool steel	50 - 70	0.20 - 0.30	P 25 B - 2	P 40 B - 1	P 40 B - 1	
Steel castings ≤ 700 N/mm ²	60 - 80	0.20 - 0.35	P 25 B - 5			
Nodular cast iron ≤ 1,100 N/mm ²	65 - 80	0.25 - 0.45				
Cast iron, alloyed and unalloyed	70 - 100	0.25 - 0.45	K 10 B - 1	K 10 B - 1	K 10 B - 1	P 20 B
Aluminium Al content > 99 %	100 - 200	0.10 - 0.25				
Aluminium alloys	100 - 200	0.15 - 0.45	K 10 B - 5	K 10 - 1	K 10 - 1	P 20
Copper Cu content < 99%	120 - ...	0.10 - 0.25	K 10 - 2			

Type 43

Solid drill head with indexable inserts and guide pads,
diameter adjustment with stop plate
Diameter range: 149.00 - 188.99 mm

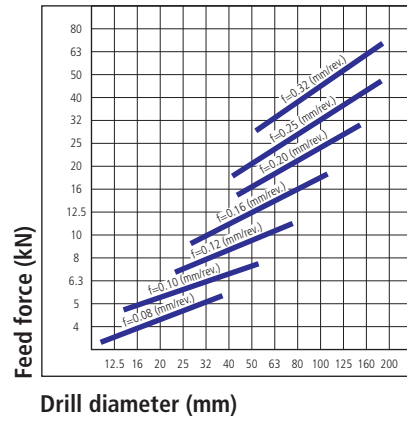
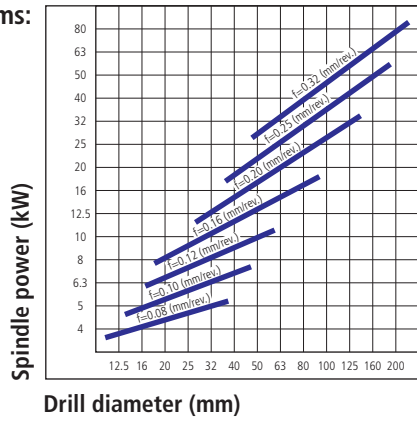


Advantages:

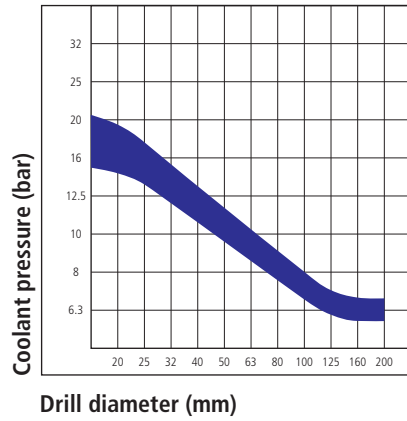
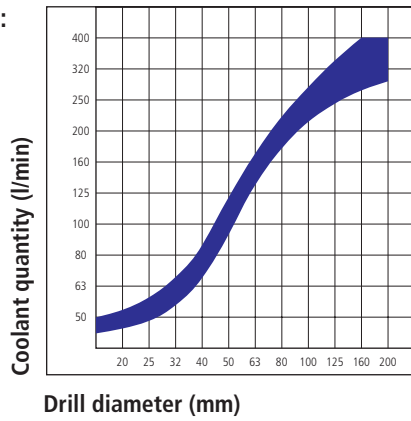
- Simplest operation, change of wear parts without readjustment within +/- 0.01 mm
- Wear parts can be exchanged on the machine
- Tool adjustment range of 10 mm with replacement parts
- New cutting geometries for high cutting capacity
- Minimal axis deviation at large drilling depths



Performance diagrams:



Coolant information:



Guide values for deep hole drilling of different materials

Material/ Mechanical strength properties	Cutting speed (m/min)	Feed (mm/rev.) for drill diameter (mm)		Carbide grades			
		149.00 - 188.99	Peripheral insert	Intermediate insert	Centre insert	Guide pad	
Construction steel ≤ 700 N/mm ²	80 - 100	0.20 - 0.40	P 25 B - 1	P 25 B - 1	P 40 B - 1	P 20	
Case hardened steel ≤ 750 N/mm ²	80 - 100	0.25 - 0.40					
Case hardened steel ≤ 1,100 N/mm ²	70 - 80	0.20 - 0.35					
Heat treated steel ≤ 700 N/mm ²	70 - 90	0.25 - 0.40	P 25 B - 5	P 25 B - 5	P 20 B		
Heat treated steel ≤ 1,100 N/mm ²	55 - 75	0.20 - 0.35					
Nitriding steel ≤ 1,100 N/mm ²	55 - 75	0.20 - 0.35	P 25 B - 1	P 25 B - 1	K 10 BX - 1		
Ferritic steel ≤ 900 N/mm ²	60 - 80	0.18 - 0.30					
Austenitic steel (stainless)	60 - 80	0.15 - 0.25	K 10 BX - 2	K 10 BX - 2	P 20		
Heat resisting steel (stainless), Tool steel	50 - 70	0.18 - 0.30	P 25 B - 1	P 25 B - 5			
Steel castings ≤ 700 N/mm ²	60 - 80	0.20 - 0.30	P 25 B - 5	P 25 B - 5			
Nodular cast iron ≤ 1,100 N/mm ²	65 - 80	0.25 - 0.50					
Cast iron, alloyed and unalloyed	70 - 100	0.25 - 0.50					
Aluminium Al content > 99 %	100 - 200	0.10 - 0.25	K 10 B - 1	K 10 B - 1	K 10 B - 1	P 20 B	
Aluminium alloys	100 - 200	0.15 - 0.50	K 10 B - 5	K 10 B - 5			
Copper Cu content < 99%	120 - ...	0.10 - 0.25	K 10 - 1	K 10 - 1	K 10 - 1	P 20	

Type 13E

Counterboring head, 4-start connection thread external, with indexable inserts and guide pads, diameter adjustment with stop plate

Diameter range: 28.71 - 74.99 mm

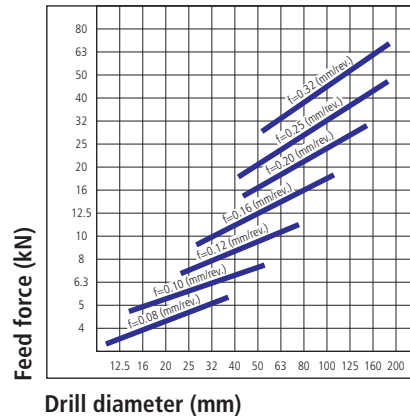
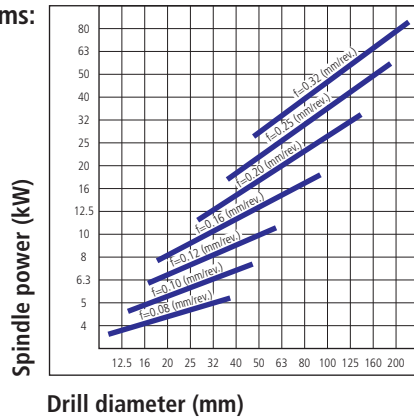


Advantages:

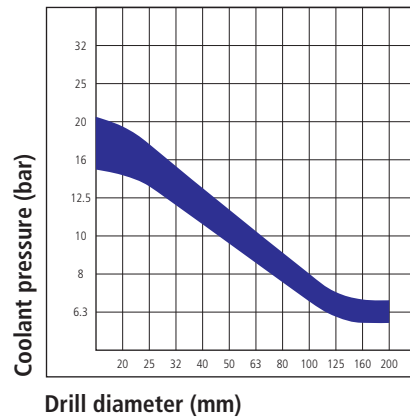
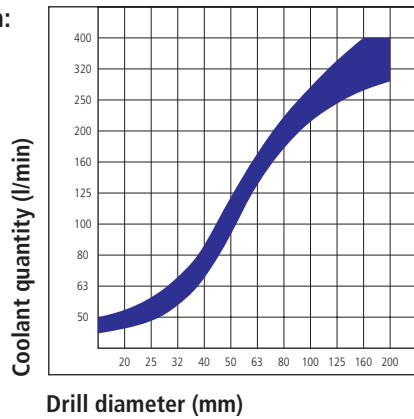
- New chip breakers for high feed rates and high productivity
- No adjustment required when changing wear parts
- Tool adjustment range 0.5 mm
- Maximum shape accuracy and straightness in the drilled hole



Performance diagrams:



Coolant information:



Guide values for deep hole drilling of different materials						
Material/ Mechanical strength properties	Cutting speed (m/min)	Feed (mm/rev.) for drill diameter (mm)			Carbide grades	
		28.71 - 39.99	40.00 - 51.99	52.00 - 74.99	Peripheral insert	Guide pad
Construction steel ≤ 700 N/mm ²	90 - 120	0.20 - 0.30	0.20 - 0.35	0.20 - 0.45	P 25 B - 1	P 20
Case hardened steel ≤ 750 N/mm ²	90 - 120	0.20 - 0.30	0.20 - 0.35	0.20 - 0.40		
Case hardened steel ≤ 1,100 N/mm ²	80 - 100	0.20 - 0.30	0.20 - 0.35	0.20 - 0.35	P 25 B - 5	
Heat treated steel ≤ 700 N/mm ²	80 - 120	0.20 - 0.30	0.20 - 0.35	0.20 - 0.40		
Heat treated steel ≤ 1,100 N/mm ²	80 - 100	0.20 - 0.30	0.20 - 0.30	0.20 - 0.30	P 25 B - 2	P 20 B
Nitriding steel ≤ 1,100 N/mm ²	60 - 90	0.20 - 0.30	0.20 - 0.30	0.20 - 0.30		
Ferritic steel ≤ 900 N/mm ²	50 - 70	0.15 - 0.25	0.15 - 0.30	0.20 - 0.30	P 25 B - 5	P 20
Austenitic steel (stainless)	50 - 70	0.12 - 0.15	0.12 - 0.20	0.12 - 0.20		
Heat resisting steel (stainless), Tool steel	50 - 70	0.15 - 0.25	0.20 - 0.30	0.20 - 0.30	P 25 B - 2	
Steel castings ≤ 700 N/mm ²	60 - 80	0.15 - 0.25	0.20 - 0.35	0.20 - 0.35	P 25 B - 5	
Nodular cast iron ≤ 1,100 N/mm ²	60 - 100	0.25 - 0.35	0.25 - 0.40	0.25 - 0.45		
Cast iron unalloyed and alloyed	70 - 120	0.20 - 0.35	0.25 - 0.40	0.25 - 0.45	K 10 - B 1	P 20 B
Aluminium Al content > 99 %	100 - 200	0.05 - 0.20	0.05 - 0.20	0.05 - 0.25		
Aluminium alloys	100 - 200	0.15 - 0.25	0.15 - 0.35	0.15 - 0.45	K 10 - B 5	
Copper Cu content < 99%	120 - ...	0.05 - 0.20	0.05 - 0.20	0.05 - 0.25	K 10 - 1	P 20

Type 35E

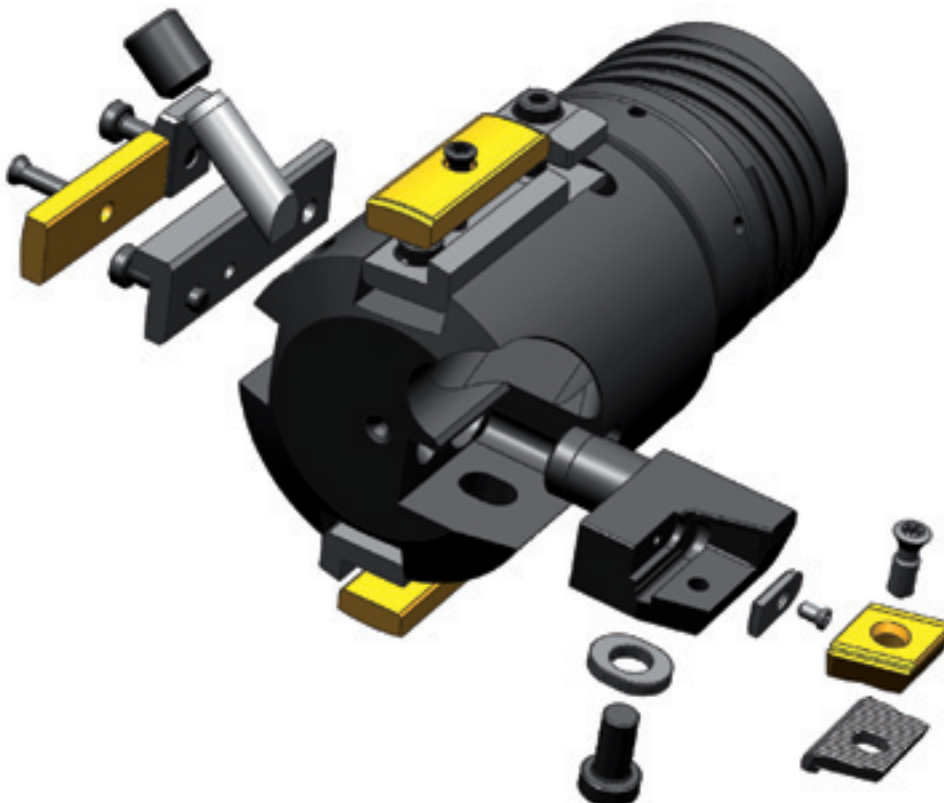
Counterboring head, 4-start connection thread external, large adjustment range

Diameter range: 61.00 - 198.99 mm

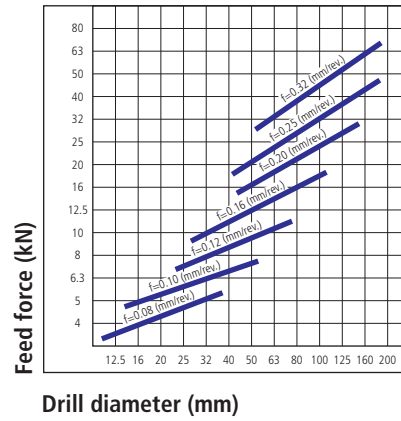
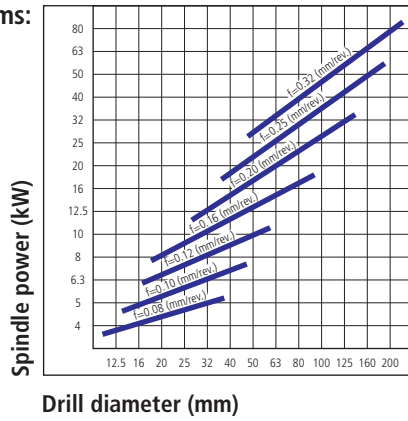


Advantages:

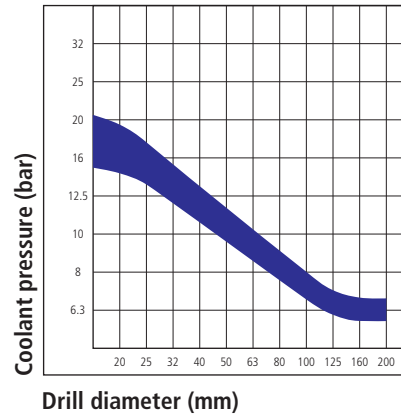
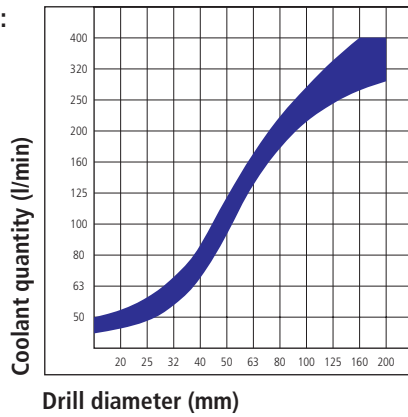
- Tool adjustment range 6 mm rising to 14 mm, in accordance with diameter
- Low requirement for tools over the whole drilling range
- Adjustment system for easy change of diameter
- New patented adjustment system (adjustment range 25 mm) with a central adjusting disc from \varnothing 149 mm
- Change of wear parts without tool readjustment



Performance diagrams:

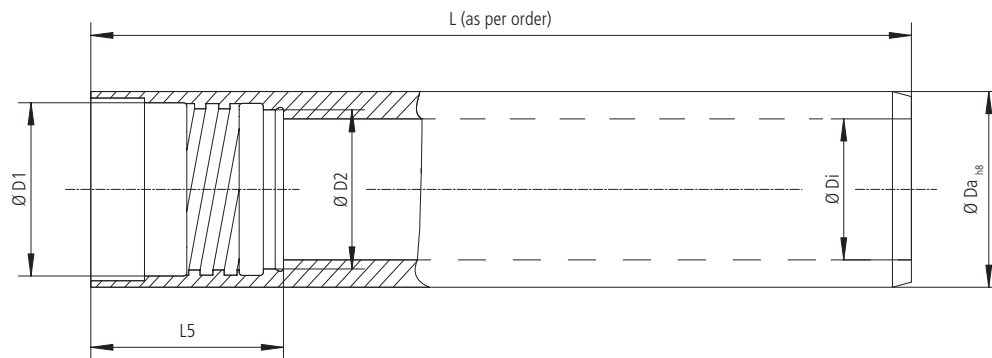


Coolant information:

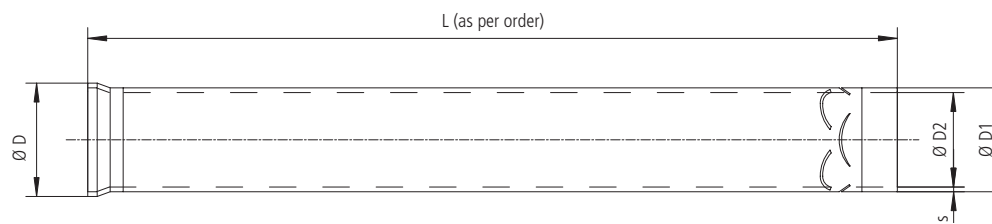


Guide values for deep hole drilling of different materials					
Material/ Mechanical strength properties	Cutting speed (m/min)	Feed (mm/rev.) for drill diameter (mm)		Carbide grades	
		61.00 - 122.99	123.00 - ...	Peripheral insert	Guide pad
Construction steel ≤ 700 N/mm ²	90 - 120	0.20 - 0.45	0.30 - 0.50	P 25 B - 1	P 20
Case hardened steel ≤ 750 N/mm ²	90 - 120	0.20 - 0.40	0.30 - 0.50		
Case hardened steel ≤ 1,100 N/mm ²	80 - 100	0.20 - 0.35	0.30 - 0.40	P 25 B - 5	
Heat treated steel ≤ 700 N/mm ²	80 - 120	0.20 - 0.40	0.30 - 0.50		
Heat treated steel ≤ 1,100 N/mm ²	80 - 100	0.20 - 0.30	0.30 - 0.45	P 25 B - 1	P 20 B
Nitriding steel ≤ 1,100 N/mm ²	60 - 90	0.20 - 0.30	0.30 - 0.40		
Ferritic steel ≤ 900 N/mm ²	50 - 70	0.20 - 0.30	0.20 - 0.30	P 25 B - 5	P 20
Austenitic steel (stainless)	50 - 70	0.15 - 0.30	0.15 - 0.30		
Heat resisting steel (stainless), Tool steel	50 - 70	0.20 - 0.30	0.25 - 0.40	K 10 BX - 2	
Steel castings ≤ 700 N/mm ²	60 - 80	0.20 - 0.35	0.20 - 0.40		
Nodular cast iron ≤ 1,100 N/mm ²	60 - 100	0.25 - 0.50	0.25 - 0.50	P 25 B - 5	
Cast iron unalloyed and alloyed	70 - 120	0.25 - 0.50	0.30 - 0.50		
Aluminium Al content > 99 %	100 - 200	0.05 - 0.25	0.05 - 0.25	K 10 B - 2	P 20 B
Aluminium alloys	100 - 200	0.15 - 0.45	0.15 - 0.45		
Copper Cu content < 99%	120 - ...	0.05 - 0.25	0.05 - 0.25	K 10 - 2	P 20

Type 55 outer and inner tubes



Order no.	Drilling range	Ø Da	Ø Di	Ø D1	Ø D2	L5	Thread pitch
55-0110-L	18.40 - 19.99	18.0	12.0	16.0	14.0	27.5	10
55-0210-L	20.00 - 21.80	19.5	14.0	18.0	16.0	30.0	12
55-0310-L	21.81 - 23.99	21.5	15.0	19.5	17.5		
55-0410-L	24.00 - 26.49	23.5	16.0	21.0	19.0		
55-0510-L	26.50 - 28.70	26.0	18.0	23.5	21.0	33.0	16
55-0610-L	28.71 - 31.00	28.0	20.0	25.5	23.0		
55-0710-L	31.01 - 33.30	30.5	22.0	28.0	25.5		
55-0810-L	33.31 - 36.20	33.0	24.0	30.0	27.0	40.0	20
55-0910-L	36.21 - 39.60	35.5	26.0	33.0	30.0		
55-1010-L	39.61 - 43.00	39.0	29.0	36.0	33.0		
55-1110-L	43.01 - 47.00	42.5	32.0	39.0	36.0	44.0	24
55-1210-L	47.01 - 51.70	46.5	35.0	43.0	39.5		
55-1310-L	51.71 - 56.20	51.0	39.0	47.0	43.5		
55-1410-L	56.21 - 65.00	55.5	43.0	51.0	47.5		

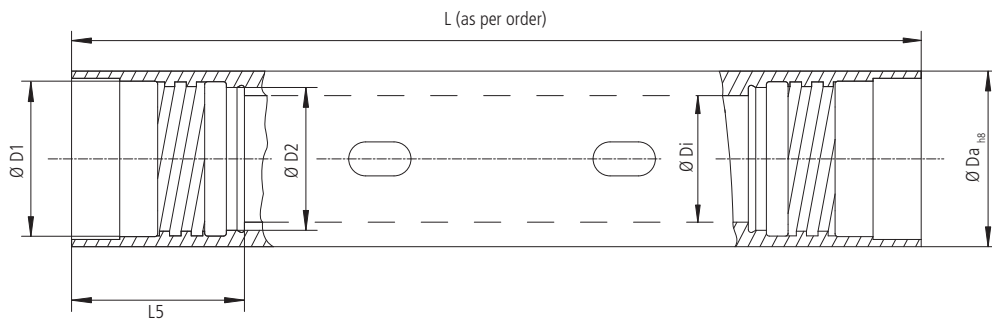


Please note!

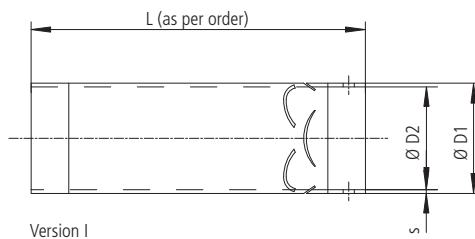
The inner tube must be 30 mm longer than the outer tube.

Order no.	Drilling range	Ø D	Ø D1	Ø D2	s
55-0150-L	18.40 - 19.99	12.0	10.0	9.0	0.5
55-0250-L	20.00 - 21.80	14.0	12.0	11.0	0.5
55-0350-L	21.81 - 23.99	15.0	13.0	12.0	0.5
55-0450-L	24.00 - 26.49	16.0	14.0	13.0	0.5
55-0550-L	26.50 - 28.70	18.0	16.0	14.0	1.0
55-0650-L	28.71 - 31.00	20.0	18.0	16.0	1.0
55-0750-L	31.01 - 33.30	22.0	20.0	18.0	1.0
55-0850-L	33.31 - 36.20	24.0	22.0	20.0	1.0
55-0950-L	36.21 - 39.60	26.0	24.0	22.0	1.0
55-1050-L	39.61 - 43.00	29.0	27.0	25.0	1.0
55-1150-L	43.01 - 47.00	32.0	30.0	28.0	1.0
55-1250-L	47.01 - 51.70	35.0	32.0	30.0	1.0
55-1350-L	51.71 - 56.20	39.0	36.0	34.0	1.0
55-1450-L	56.21 - 65.00	43.0	40.0	38.0	1.0

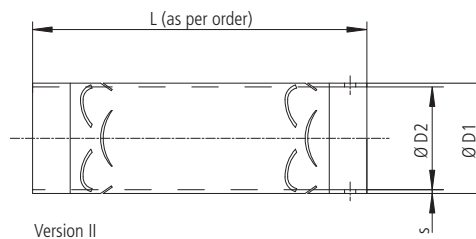
Type 55 outer and inner tubes



Order no.	Drilling range	Ø Da	Ø Di	Ø D1	Ø D2	L5	Thread pitch
55-1620-L	65.00 - 66.99	56.0	43.0	52.0	47.0	75	32
55-1720-L	67.00 - 72.99	62.0	48.0	58.0	53.0		
55-1820-L	73.00 - 79.99	68.0	53.0	63.0	58.0		
55-1920-L	80.00 - 86.99	75.0	59.0	70.0	64.0	97	44
55-2020-L	87.00 - 99.99	82.0	66.0	77.0	71.0		
55-2120-L	100.00 - 111.99	94.0	78.0	89.0	83.0		
55-2220-L	112.00 - 123.24	106.0	88.0	101.0	95.0	118	60
55-2320-L	123.25 - 136.74	118.0	94.0	113.0	107.0		
55-2420-L	136.75 - 147.99	130.0	104.0	125.0	119.0		
55-2520-L	148.00 - 159.24	142.0	116.0	137.0	131.0	139	72
55-2620-L	159.25 - 171.99	154.0	128.0	149.0	143.0		
55-2720-L	172.00 - 183.99	166.0	136.0	161.0	155.0		



Version I



Version II

Please note!

From order no. 55-1620-L to 55-2220-L the inner tube must be 190 mm longer than the outer tube.

Please note!

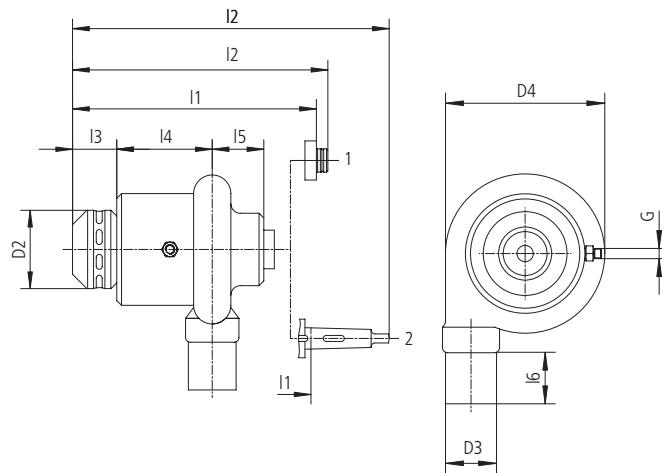
From order no. 55-2320-L to 55-2720-L the inner tube must be 220 mm longer than the outer tube.

Order no.	Drilling range	D1	D2	s	Version
55-1650-L	65.00 - 66.99	40.0	38.0	1.0	I
55-1750-L	67.00 - 72.99	44.0	41.0	1.5	
55-1850-L	73.00 - 79.99	48.0	45.0	1.5	
55-1950-L	80.00 - 86.99	54.0	50.0	2.0	II
55-2050-L	87.00 - 99.99	60.0	56.0	2.0	
55-2150-L	100.00 - 111.99	70.0	60.0	2.0	
55-2250-L	112.00 - 123.24	80.0	76.0	2.0	
55-2350-L	123.25 - 136.74	80.0	76.0	2.0	
55-2450-L	136.75 - 147.99	95.0	91.0	2.0	
55-2550-L	148.00 - 159.24	100.0	96.0	2.0	
55-2650-L	159.25 - 171.99	120.0	116.0	2.0	
55-2750-L	172.00 - 183.99	130.0	126.0	2.0	

Ejector





Rotating connector

Diameter range: Ø 18.40 - 65.00 mm



Pos.	Drill Ø	Order no.	Tool holder	D2	D3	D4	I1	I2	I3	I4	I5	I6	G
1	18.40 - 65.00	97-2055-400M-V63	Varilock V63	115.0	53.0	210.0	305.0	323.0	67.0	135.0	85.0	60.0	G3/4"
2		97-2055-400M	MK5				309.5	465.0					

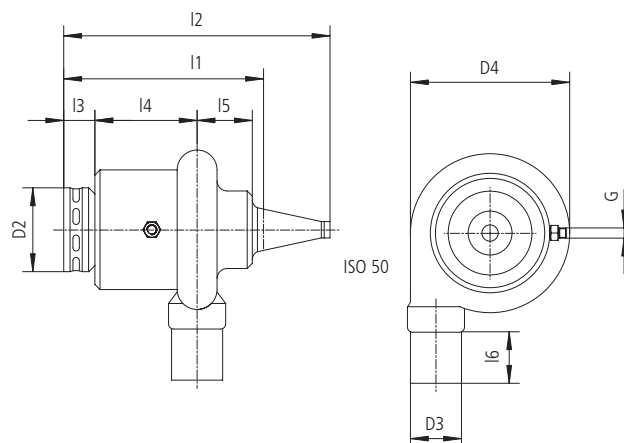
Accessories

Drill Ø	Chuck	Sealing sleeve	Outer O-ring	Inner O-ring
			 2 pieces	 1 piece
18.40 - 20.00	97-2055-420-00	97-2055-430-00	OR 60 x 3	OR 18.0 x 3
20.01 - 21.80	97-2055-420-01	97-2055-430-01	OR 60 x 3	OR 19.2 x 3
21.81 - 24.10	97-2055-420-02	97-2055-430-02	OR 60 x 3	OR 21.2 x 3
24.11 - 26.40	97-2055-420-03	97-2055-430-03	OR 60 x 3	OR 23.0 x 3
26.41 - 28.70	97-2055-420-04	97-2055-430-04	OR 60 x 3	OR 26.0 x 3
28.71 - 31.00	97-2055-420-05	97-2055-430-05	OR 60 x 3	OR 28.0 x 3
31.01 - 33.30	97-2055-420-06	97-2055-430-06	OR 60 x 3	OR 30.2 x 3
33.31 - 36.20	97-2055-420-07	97-2055-430-07	OR 60 x 3	OR 32.2 x 3
36.21 - 39.60	97-2055-420-08	97-2055-430-08	OR 60 x 3	OR 35.2 x 3
39.61 - 43.00	97-2055-420-09	97-2055-430-09	OR 60 x 3	OR 39.0 x 3
43.01 - 47.00	97-2055-420-10	97-2055-430-10	OR 60 x 3	OR 42.5 x 3
47.01 - 51.70	97-2055-420-11	97-2055-430-11	OR 60 x 3	OR 46.5 x 3
51.71 - 56.20	97-2055-420-12	97-2055-430-12	OR 60 x 3	OR 50.2 x 3
56.21 - 65.00	97-2055-420-13	97-2055-430-13	OR 60 x 3	OR 55.2 x 3

Ejector

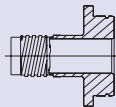


Rotating connector

Diameter range: Ø 65.00 - 123.24 mm



Drill Ø	Order no.	D2	D3	D4	I1	I2	I3	I4	I5	I6	G
65.00 - 123.24	97-2055-402	164.0	100.0	312.0	391.0	521.0	61.0	200.0	108.0	100.0	G1"

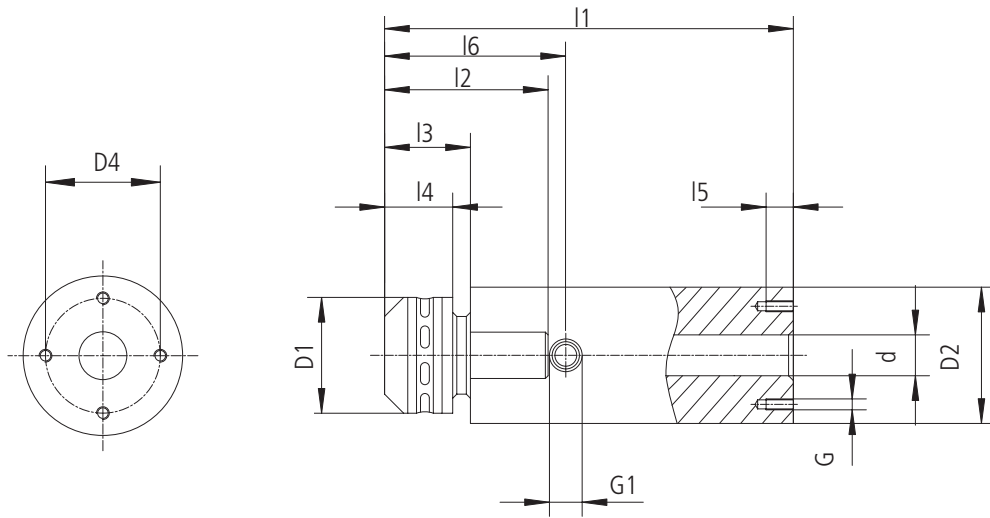
Accessories

Drill Ø	Connecting sleeve	Sealing sleeve	Outer O-ring
			 1 piece
65.00 - 66.90	97-2055-422-14	97-2055-432-14	OR 94.5 x 3
67.00 - 72.90	97-2055-422-15	97-2055-432-15	OR 94.5 x 3
73.00 - 79.90	97-2055-422-16	97-2055-432-16	OR 94.5 x 3
80.00 - 86.90	97-2055-422-17	97-2055-432-17	OR 94.5 x 3
87.00 - 99.90	97-2055-422-18	97-2055-432-18	OR 94.5 x 3
100.00 - 111.90	97-2055-422-19	97-2055-432-19	OR 94.5 x 3
112.00 - 123.24	97-2055-422-20	97-2055-432-20	OR 94.5 x 3

Ejector





Non-rotating connector

Diameter range: Ø 18.40 - 36.20 mm



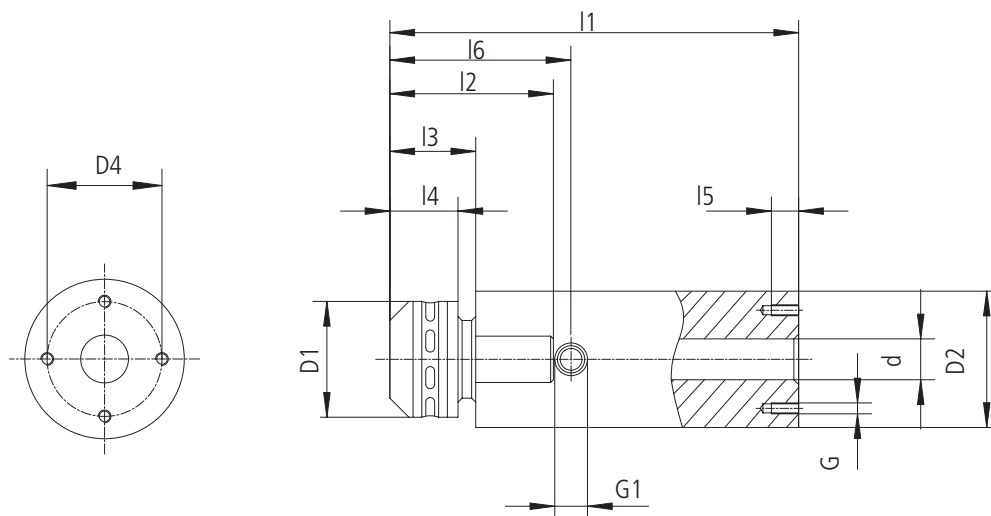
Drill Ø	Shank D2	Order no.	D1	d	l1	l2	l3	l4	l5	l6	G	G1	D4 4x90°
18.40 - 36.20	75 g6	97-2055-411	85.0	30.0	300.0	103.0	63.0	50.0	20.0	~115.0	M8	G1/2"	60.0

Accessories

Drill Ø	Chuck	Sealing sleeve	Outer O-ring	Inner O-ring
			 2 pieces	 1 piece
18.40 - 20.00	97-2055-421-00	97-2055-431-00	OR 39 x 3	OR 18.0 x 3
20.01 - 21.80	97-2055-421-01	97-2055-431-01	OR 39 x 3	OR 19.2 x 3
21.81 - 24.10	97-2055-421-02	97-2055-431-02	OR 39 x 3	OR 21.2 x 3
24.11 - 26.40	97-2055-421-03	97-2055-431-03	OR 39 x 3	OR 23.0 x 3
26.41 - 28.70	97-2055-421-04	97-2055-431-04	OR 39 x 3	OR 26.0 x 3
28.71 - 31.00	97-2055-421-05	97-2055-431-05	OR 39 x 3	OR 28.0 x 3
31.01 - 33.30	97-2055-421-06	97-2055-431-06	OR 39 x 3	OR 30.2 x 3
33.31 - 36.20	97-2055-421-07	97-2055-431-07	OR 39 x 3	OR 32.2 x 3





Ejector

Non-rotating connector
Diameter range: Ø 18.40 - 65.00 mm



Drill Ø	Shank D2	Order no.	D1	d	l1	l2	l3	l4	l5	l6	G	G1	D4 4x90°
18.40 - 65.00	100 g6	97-2055-410	115.0	45.0	330.0	120.0	63.0	50.0	20.0	132.0	M8	G3/4"	80.0

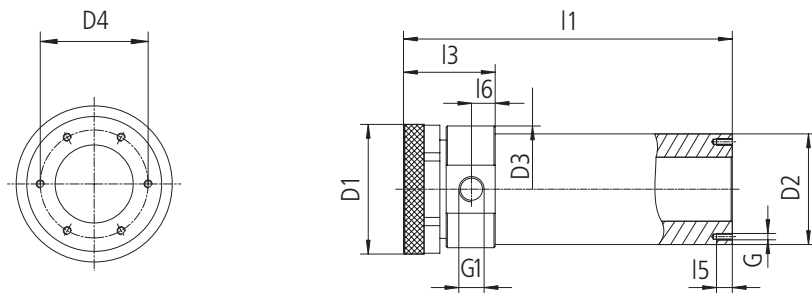
Accessories

Drill Ø	Chuck	Sealing sleeve	Outer O-ring	Inner O-ring
			 2 pieces	 1 piece
18.40 - 20.00	97-2055-420-00	97-2055-430-00	OR 60 x 3	OR 18.0 x 3
20.01 - 21.80	97-2055-420-01	97-2055-430-01	OR 60 x 3	OR 19.2 x 3
21.81 - 24.10	97-2055-420-02	97-2055-430-02	OR 60 x 3	OR 21.2 x 3
24.11 - 26.40	97-2055-420-03	97-2055-430-03	OR 60 x 3	OR 23.0 x 3
26.41 - 28.70	97-2055-420-04	97-2055-430-04	OR 60 x 3	OR 26.0 x 3
28.71 - 31.00	97-2055-420-05	97-2055-430-05	OR 60 x 3	OR 28.0 x 3
31.01 - 33.30	97-2055-420-06	97-2055-430-06	OR 60 x 3	OR 30.2 x 3
33.31 - 36.20	97-2055-420-07	97-2055-430-07	OR 60 x 3	OR 32.2 x 3
36.21 - 39.60	97-2055-420-08	97-2055-430-08	OR 60 x 3	OR 35.2 x 3
39.61 - 43.00	97-2055-420-09	97-2055-430-09	OR 60 x 3	OR 39.0 x 3
43.01 - 47.00	97-2055-420-10	97-2055-430-10	OR 60 x 3	OR 42.5 x 3
47.01 - 51.70	97-2055-420-11	97-2055-430-11	OR 60 x 3	OR 46.5 x 3
51.71 - 56.20	97-2055-420-12	97-2055-430-12	OR 60 x 3	OR 50.2 x 3
56.21 - 65.00	97-2055-420-13	97-2055-430-13	OR 60 x 3	OR 55.2 x 3

Ejector

Non-rotating connector

Diameter range: Ø 65.00 - 123.24 mm



Drill Ø	Shank D2	Order no.	D1	D3	d	l1	l3	l5	l6	G	G1	D4 6x60°
65.00 - 123.24	140 g ⁶	97-2055-412	164.0	160.0	81.0	416.0	116.0	20.0	30.0	M8	G1"	120.0

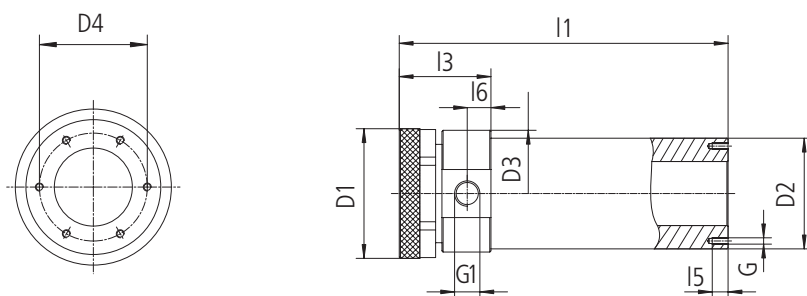
Accessories

Drill Ø	Connecting sleeve	Sealing sleeve	Outer O-ring
			 1 piece
65.00 - 66.90	97-2055-422-14	97-2055-432-14	OR 94.5 x 3
67.00 - 72.90	97-2055-422-15	97-2055-432-15	OR 94.5 x 3
73.00 - 79.90	97-2055-422-16	97-2055-432-16	OR 94.5 x 3
80.00 - 86.90	97-2055-422-17	97-2055-432-17	OR 94.5 x 3
87.00 - 99.90	97-2055-422-18	97-2055-432-18	OR 94.5 x 3
100.00 - 111.90	97-2055-422-19	97-2055-432-19	OR 94.5 x 3
112.00 - 123.24	97-2055-422-20	97-2055-432-20	OR 94.5 x 3

Ejector

Non-rotating connector

Diameter range: Ø 123.25 - 188.99 mm



Drill Ø	Shank D2	Order no.	D1	D3	d	I1	I3	I5	I6	G	G1	D4 6x60°
123.25 - 188.99	230 g ⁶	97-2055-413	244.0	250.0	142.0	456.0	156.0	20.0	40.0	M8	G1¼"	200.0

Accessories

Drill Ø	Connecting sleeve	Sealing sleeve	Outer O-ring
			 1 piece
123.25 - 135.90	97-2055-423-21	97-2055-433-21	OR 149.3 x 5.7
136.00 - 147.90	97-2055-423-22	97-2055-433-22	OR 149.3 x 5.7
148.00 - 159.90	97-2055-423-23	97-2055-433-23	OR 149.3 x 5.7
160.00 - 171.90	97-2055-423-24	97-2055-433-24	OR 149.3 x 5.7
172.00 - 188.99	97-2055-423-25	97-2055-433-25	OR 149.3 x 5.7

Ejector accessories

Basic toolholder versions

ISO 50 DIN 69871-A

Basic toolholder

ISO 7388/1 (DIN 69871-A)

97-2001-5063027



ISO 50 DIN 2080

Basic toolholder

DIN 2080

97-2003-5063027



HSK 100

HSK basic toolholder

HSK-A/C

97-2004-10063090



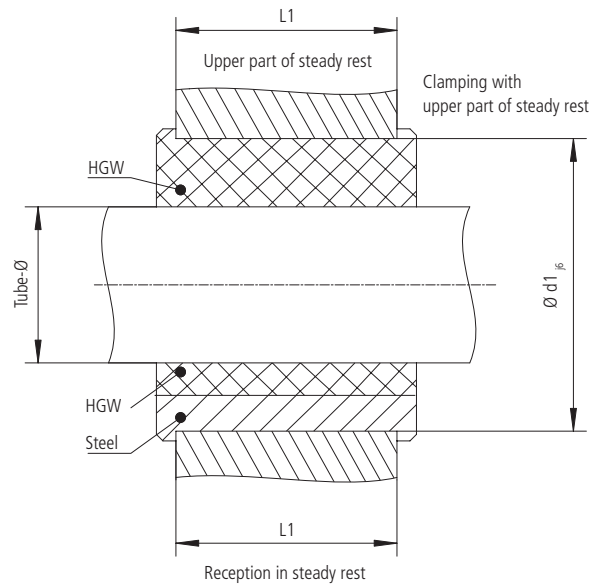
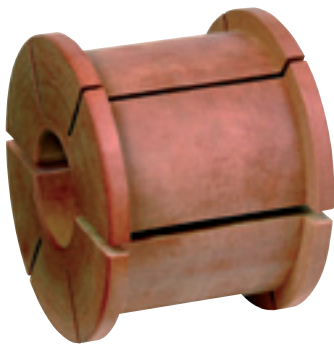
Capto C6

**Coromant Capto holder
for Varilock tools**

97-2005-C6-V63080



Vibration dampers, stationary tools



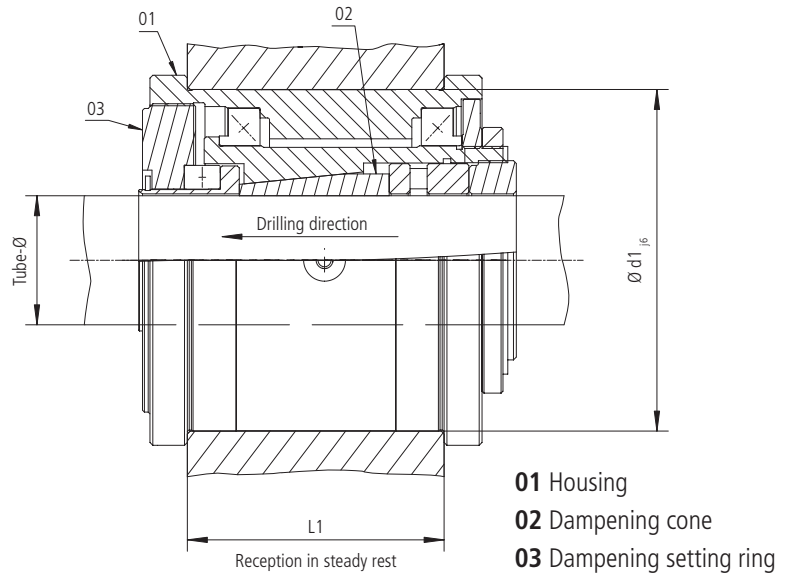
The vibration dampers are built into a steady rest.
The steady rest is clamped in its upper part. The vibration dampers for stationary tools consist of **two-piece damping sleeves**.
These can also be supplied in a combination of steel and plastic.

Drill \varnothing max. (mm)	Size	Damper $\varnothing d1 \times L1$ (mm)	Order no.
130	0	150 x 135	91-030000-000
154	1	180 x 135	91-030100-000
250	2	280 x 165	91-030200-000
310	3	355 x 165	91-030300-000

Ejector accessories

Vibration dampers, (mechanically) rotating tools

Vibration dampers, rotating tools



The vibration dampers are built into a steady rest. The damping pressure can be set using a key on the dampening setting ring **during the drilling process**. A damping cone is required for each size of boring tube.

Drill Ø (mm)	Size	Damper Ø d1 x L1 (mm)	Order no.	max. speed (rpm)
11 - 68	1	180 x 135	91-028100-000	1200
43 - 142	2	280 x 165	91-028200-000	500
118 - 226	3	355 x 165	91-028300-000	250

Guide bush



Guide bush 170-04
Cylindrical in accordance with DIN 179 A
or custom-made on request

Drill head setting gauge

For simple and reliable adjustment of drilling tools \varnothing 1 - 200 mm



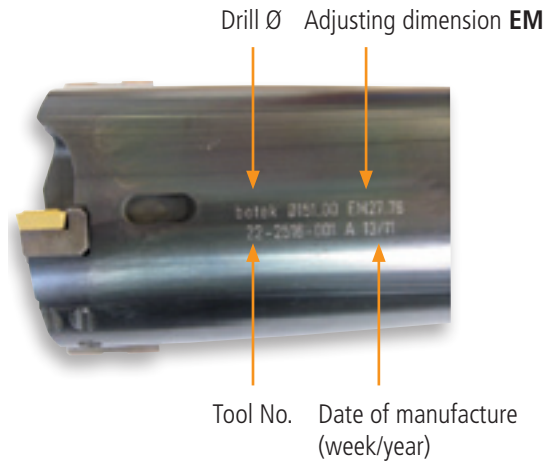
The set diameter of the tool is to be checked before use every time. Correct tool adjustment increases process safety while machining: rejects are prevented, while wear on the drilling head, indexable inserts and guide pads is substantially reduced.

Technical appendix

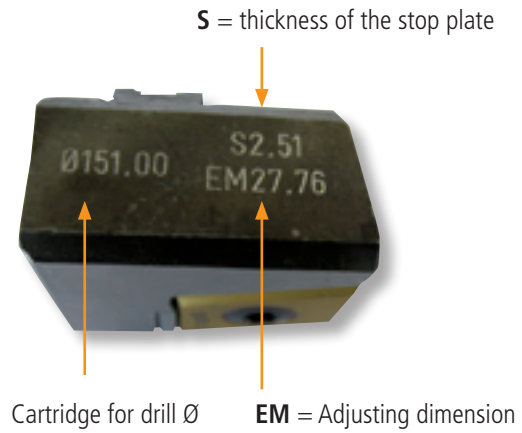
Adjusting tools

When they leave the factory, tools are preset to the diameter stated in the order, and all **important** data (drill diameter, adjusting dimension and thickness of the stop plate) are engraved on the body or on the cartridge.

Example: Labelling – drill head



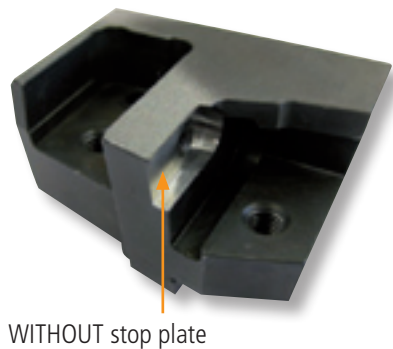
Example: Labelling – cartridge for peripheral insert



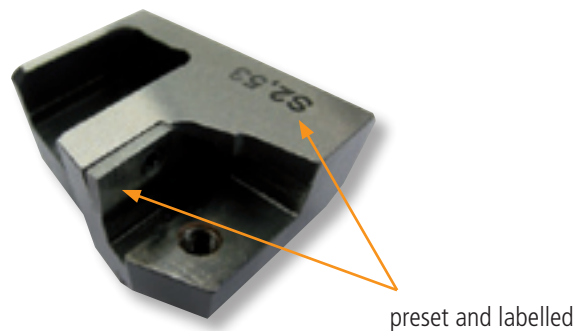
Cartridges - replacement orders

When ordering replacement cartridges, always quote the adjusting dimension („EM“) engraved on the body. Preset cartridges will then be supplied.

Example: If cartridges are ordered **without** stating the „EM“ size, they will be supplied **without** fittings.



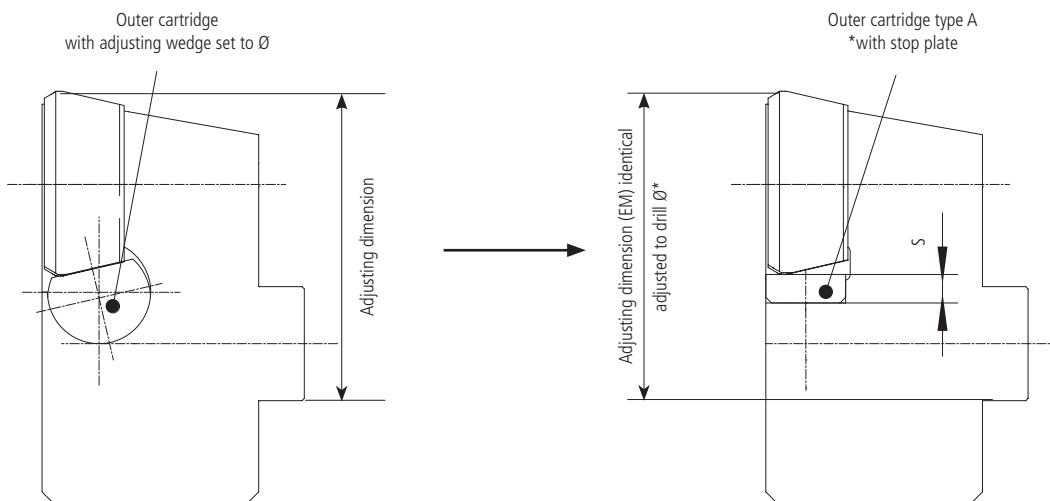
Example: If cartridges are ordered **stating** the „EM“ size, they will be supplied **preset and labelled**.



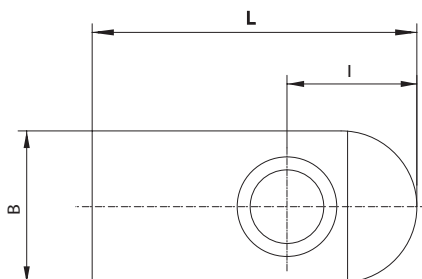
Alternatively the tool can be adjusted with a set of stop plates on site.

Ordering information for type A cartridge

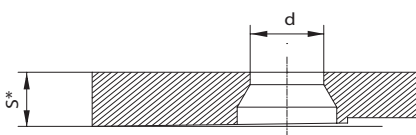
The following must be ensured when changing the outer cartridge from the version with adjusting wedge to the type A version with stop plate (this also applies to exchange/replacement of type A cartridges). To be ensured when changing the outer cartridge from the version with adjusting wedge to the type A version with stop plate, or replacing the latter.



- When changing from cartridge with adjusting wedge to type A cartridge with stop plate, please quote order number and in addition the adjusting dimension (EM) (take size from cartridge with adjusting wedge). The thickness of the stop plates (size S) can thereby be determined and suitably supplied.
- When a drilling head with type A outer cartridge is supplied, the adjusting dimension (EM) for the drilling head diameter supplied is engraved on the drilling head and on the cartridge.
- When reordering a type A cartridge, quote the adjusting dimension (EM).
- Stop plates are available in thickness steps (dimension S) of 0.01 mm. The respective thickness is engraved on the stop plate. For available S dimensions, see VU-01-0056-B.
- It is advisable to store a certain assortment of these stop plates so that any diameter adjustments required can be made without delay.



- * Stop plates are available in thickness steps (dimension S) of 0.01 mm. For range, see table. The respective thickness is engraved on the part. When reordering, quote the order number and in addition the dimension S.



Technical appendix

Changing the diameter of drill head

By replacing the accessories the diameter can be changed.

Depending on the type of tool, stop plate, guide pads and cartridge of peripheral insert must be replaced.

- Stop plate - available in increments of 0.01 mm
- Cartridge - please choose according to information given in our catalogues.
- Guide pads - are manufactured on diameter, alternatively shims in thickness of 0.025, 0.05, 0.1 and 0.25 mm can be supplied.
Other dimensions must be sourced in locally.

When re-ordering accessories please always state technical details.

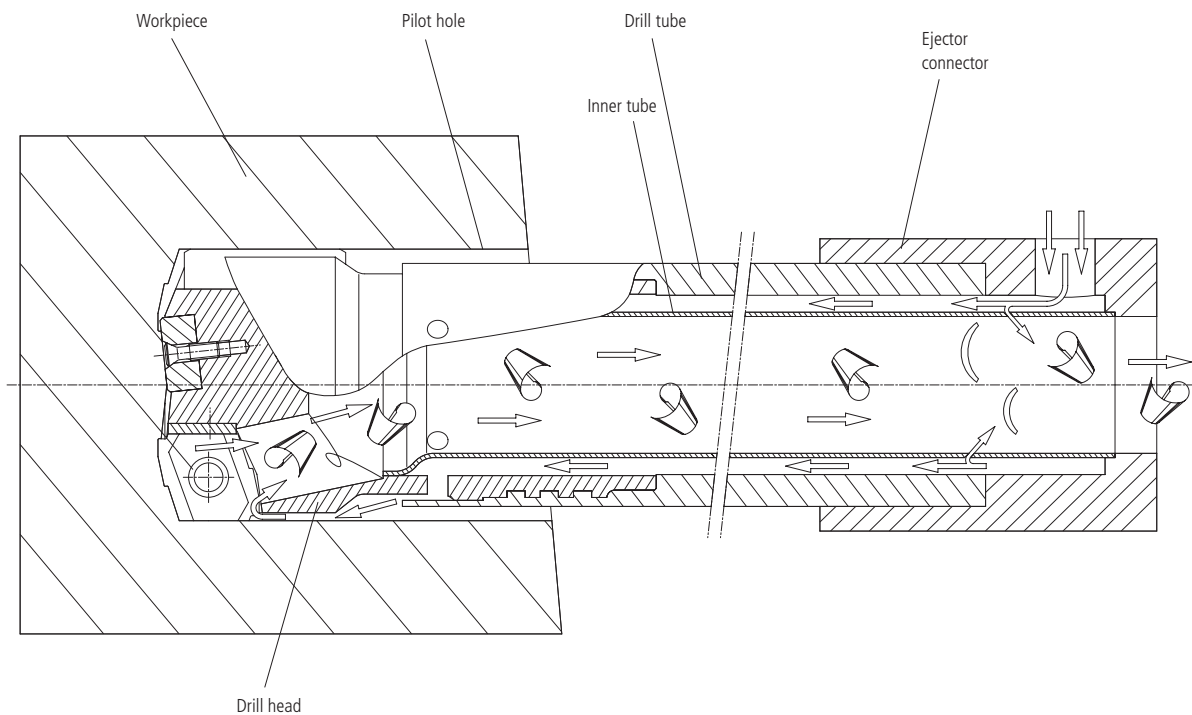
Drill heads without cartridge (e.g. type 60) → dimension „S“ and the drill Ø

Drill heads with cartridge (e.g. type 42) → adjusting dimension „EM“ and the drill Ø

Examination

Please check the correct settings after every diameter change by using the botek head setting gauge.





The ejector drilling system is a variant of the BTA drilling system. Ejector deep-hole drilling is mainly used on conventional machine tools and machining centres, however, since unlike BTA deep-hole drilling there is no sealing to prevent the exit of the cooling lubricant at the workpiece. This drilling system can thus be used if it is not possible to seal the cooling lubricant circuit, e.g. for oblique boring or discontinuous workpieces. Drilling depths of up to $100 \times D$ are possible with this process.

The cooling lubricant is fed through an annular space between the drill tube and an inner tube (double-tube system). The cooling lubricant exits from the side of the drilling head, flows over it and then flows back into the inner tube along with the chips. Some of the cooling lubricant is introduced into the inner tube via a ring nozzle. The resulting underpressure at the chip mouth enables backflow (the ejector effect). An ejector cooling-lubricant feed system is required for generating the ejector effect.

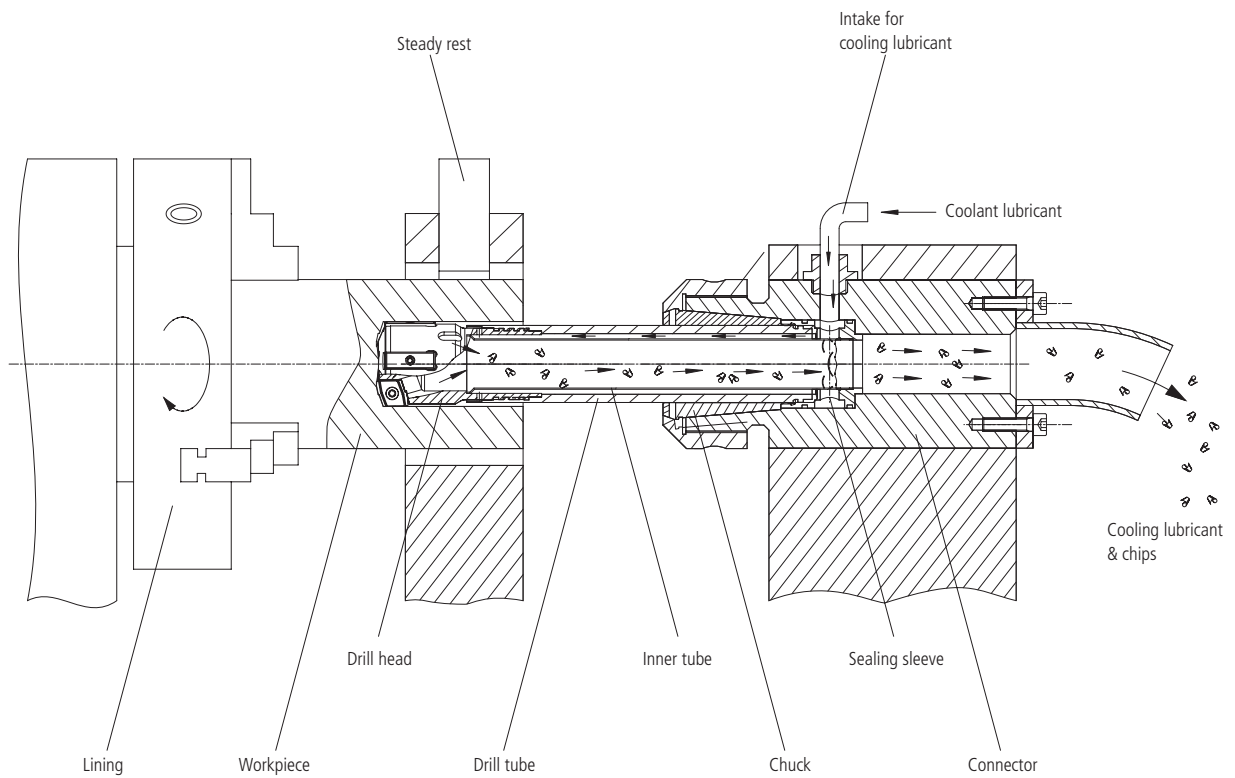
The smooth functioning of the chip return flow depends on the process delivering an optimal chip form.

botek deep drilling tools for the ejector drilling system are available in a range of diameters $D = 18.40$ to approximately 200 mm.

The Figure shows the essential characteristics of the ejector drilling system.

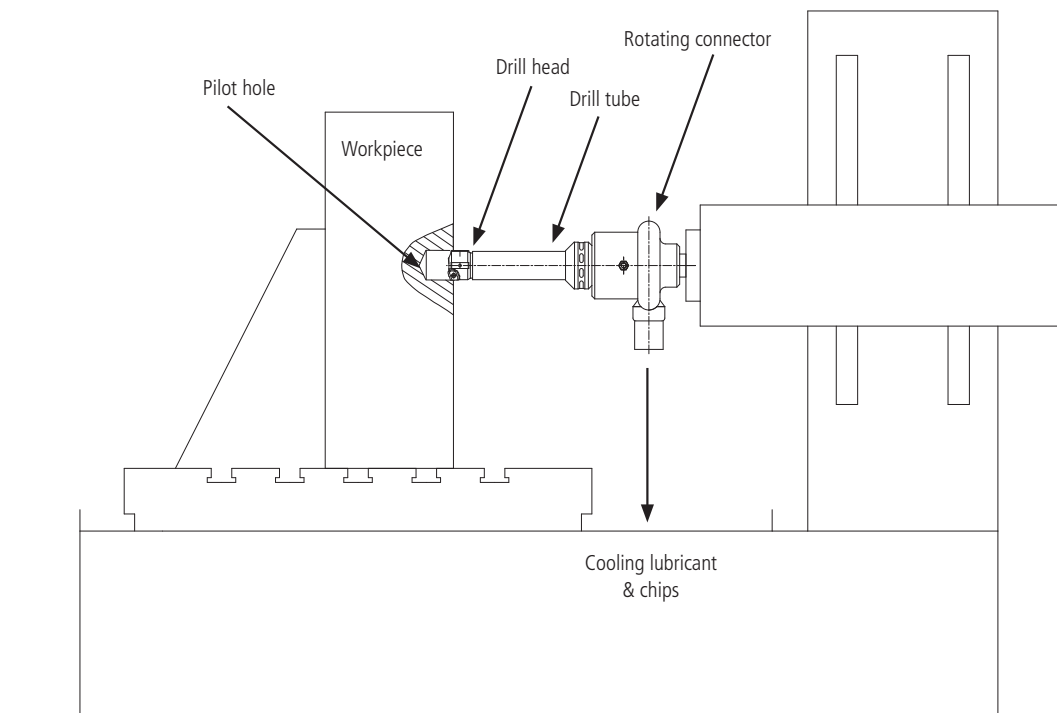
Technical appendix

Application on a lathe



The ejector system on a lathe:

1. The ejector system is easy to set up on a lathe: it can be used on conventional lathes and machining centres.
2. It is a cost-effective alternative to a deep-hole drilling machine.
3. A pilot hole made into the workpiece serves as a guidance for the drill head.
A guide bush can alternatively be used.
4. No sealing is required between the workpiece and the drill tube, for only a little cooling lubricant leaks out throughout the machining process.



The ejector system on a machining centre

1. The ejector system is easy to set up and can be used on conventional machining centres and boring machines.
2. A pilot hole made into the workpiece serves as a guidance for the drill head.
3. Throughout the machining process, no sealing is required between the workpiece and the drill tube.

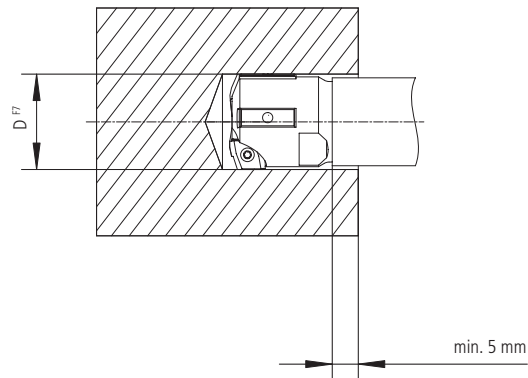
Information

Pilot hole/guide bush

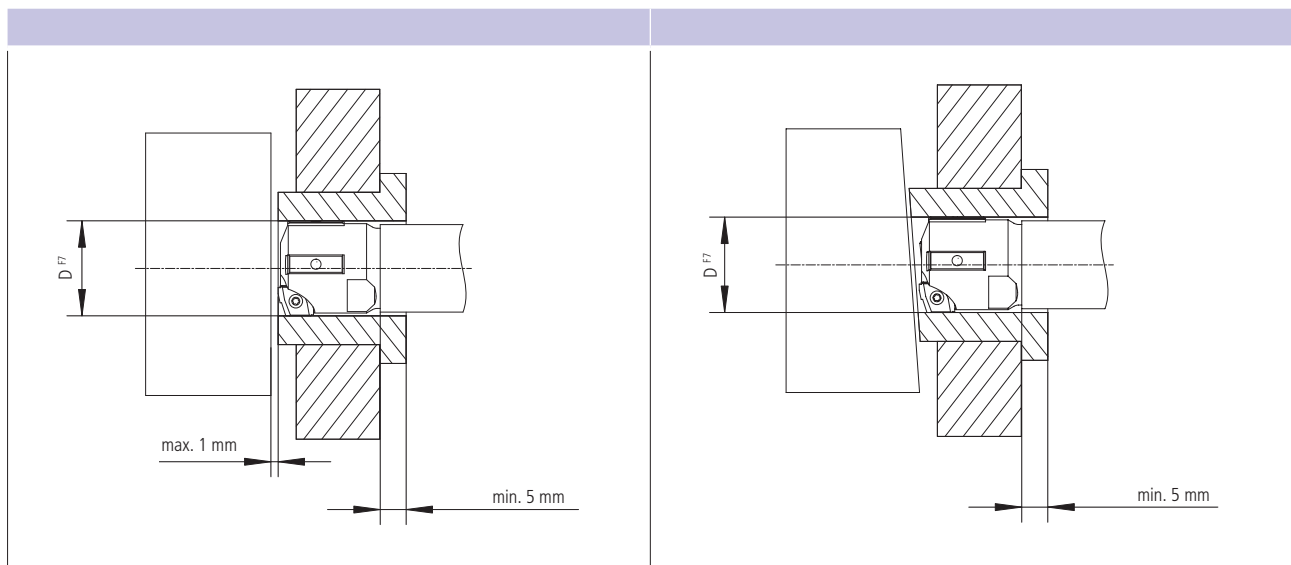
Dimensions for the guide hole

The pilot hole should be slightly larger as the diameter of the drill head (recommended tolerance: F7).

CAUTION: The drill tube must enter into the pilot hole by at least 5 mm.



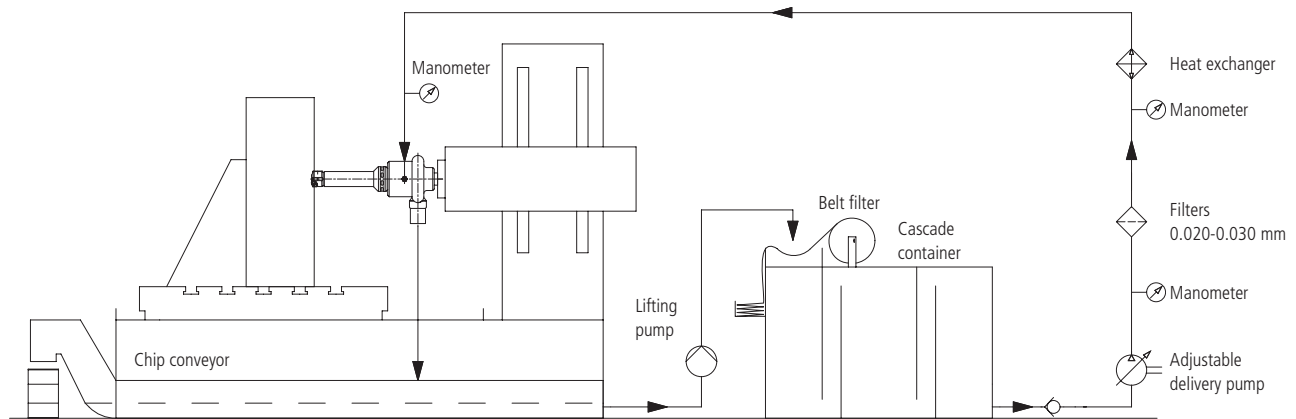
Positioning of the guide bush for ejector drilling



No sealing is required between the workpiece and the guide bush in the ejector system. This guide bush should be as close as possible to the workpiece. To guarantee good boring, the distance should not exceed 1.0 mm.

For efficient coolant supply the drill bush should be at least 5 mm longer than the length to which the drill head extends in front of the drill tube. If necessary, the angle of workpiece and drill bush should correspond.

Schematic diagram of the cooling system



Cooling lubricant systems

The purpose of a cooling lubricant in a drilling system is:

- Extend tool life
- Lubricate the guide pads
- Extract the chips
- Dissipate the heat

The cooling system must ensure an adequate supply to the tool of clean cooling lubricant at the correct pressure and temperature. Many workpieces can be drilled with the ejector process, using an emulsion that contains EP (extreme pressure) additives.

Tank size/tank volume

Tanks must be designed to have a volume approximately equivalent to ten times the maximum pump output per minute. This allows dirt in the tank to settle and heat to be dissipated.

In many cases the tank has a chip container above the chamber holding dirty cooling lubricant. The compartment holding clean cooling lubricant has baffle plates to allow any air present to escape from the cooling lubricant.

The tank is heated by

90% of the driving energy for the drill is converted into heat energy.
95% of the pumping energy of all pressure and circulation pumps is converted into heat energy.
The frictional energy in the lines/fans/filters is converted into heat energy.

All this energy is absorbed by the cooling lubricant.

The tank is cooled by

The tank giving off heat as soon as the temperature of the cutting fluid is higher than that of the surroundings. If the tank is enclosed, heat loss is greatly reduced.

The workpiece is generally at ambient temperature and has a cooling effect.

Information

Cooling system

Heat exchangers

The best results are achieved at a cooling lubricant temperature of 30 - 40°C. A large tank can ensure an adequate cooling effect due to the circulation of air within the plant. For continuous operation, however, the use of an air or water-driven heat exchanger is recommended.

As protective measures against tool breakage:

A cooling lubricant pressure shut-off - if the cooling lubricant pressure collapses, the machine spindle must switch off immediately. Monitoring the machine's spindle power and feed force is a prerequisite.

High-pressure pump

Gear wheel pumps or screw pumps are frequently used. To guarantee an adequate supply, either frequency-controlled pumps can be used or a number of pumps having different powers can be combined. It is important that the pumps are fitted with the correct seals for the respective cooling lubricant. This will prevent excessive wear. When emulsion is used, it is important to ensure that the solution contains enough EP (extreme pressure) additives to achieve the requisite lubrication.

Filtering of the cooling lubricant

There are good reasons for filtering the cooling lubricant well:

1. The surface quality of the drilled hole and the high wear properties of the guide pads
2. Preventing damage or wear to the high-pressure pump and ejector unit

The cooling system must ensure an adequate supply of clean cooling lubricant at the correct pressure and temperature to the tool.

Cooling lubricant

Recommendations:

Deep hole drilling oil:

Is recommended as the first choice, since:

- Lengthy operating life – 30% longer operating life of the guide pads is normally achieved with oil. Less wear, especially with high-alloyed workpiece materials.
- More uniform chip breaking
- Wider chip breaking range
- Substantially easier to care for than emulsion

Emulsion:

Is recommended as the second choice.

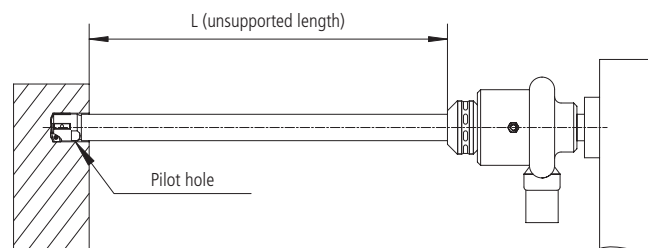
The following arguments are quoted for this:

- Using pure oil can be complicated if the drilling is done within one machine group or manufacturing cell with supply of cooling lubricant.
- If oil is used, it is occasionally necessary to wash the workpiece to remove the oil before storage or the next operation. If emulsion is used, the workpiece is cleaned during the machining process.

The proportion of deep-hole drilling is often smaller than that of other milling tasks with high cutting data in order to complete the workpiece as part of a complete machining process.

Application notes

1. **Before using the drills make sure the machine has the necessary equipment to do proper deep hole drilling. The machine should have suitable safety guarding for protection from cutting chips and coolant for operator.** Check with machine builder!
2. **Improper use or handling of deep hole drilling tools can cause serious injuries**, e.g. skin cuts from the cutting edge.
3. Deep hole drilling tools are not self centering and can be unbalanced. Therefore the drills must be guided **during the start of the drilling cycle** by means of a sufficiently long drill bush or pilot hole.



4. **Tool support: Unsupported drill length** should never exceed the dimensions as shown on table. If the unsupported drill length is exceeded the drill might cause injury.

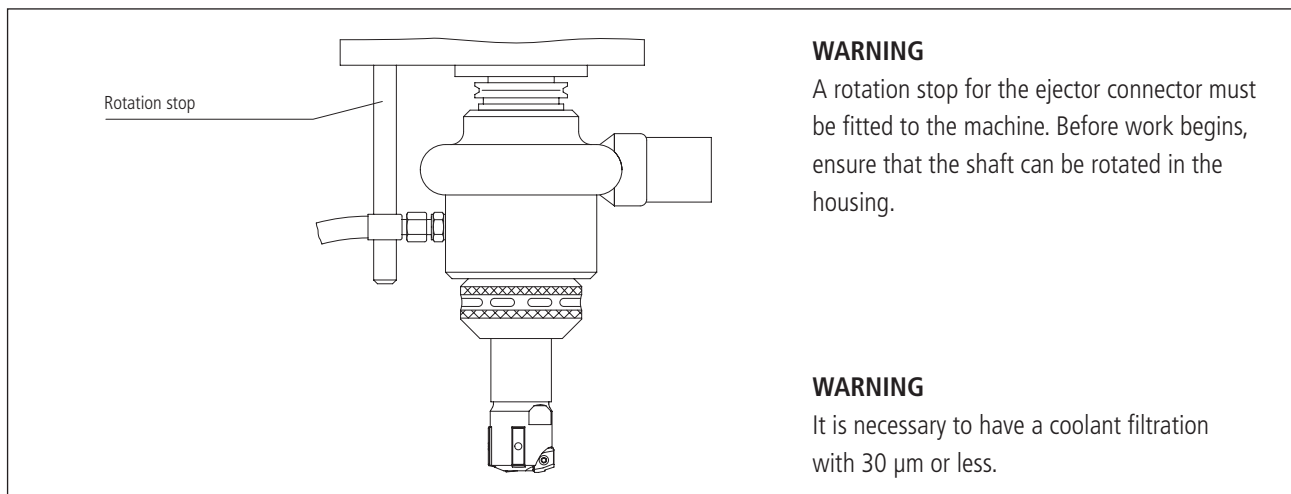
Drill tube Ø	Maximum unsupported tube length
mm	mm
18	1500
19.5	
21.5	
23.5	
26	1900
28	
30.5	
33	
35.5	2300
39	
42.5	
46.5	
51	2700
55.5	
56	
62	
75	3300
82	
94	
106	
118	3900
130	
142	
154	
166	4200

The values shown in the table are guide values for the maximum unsupported tube length. The actual unsupported tube length may vary, depending on the drilling task. Where tube lengths are equal to or more than approximately half of the maximum free length, we recommend in general the use of a vibration damper.

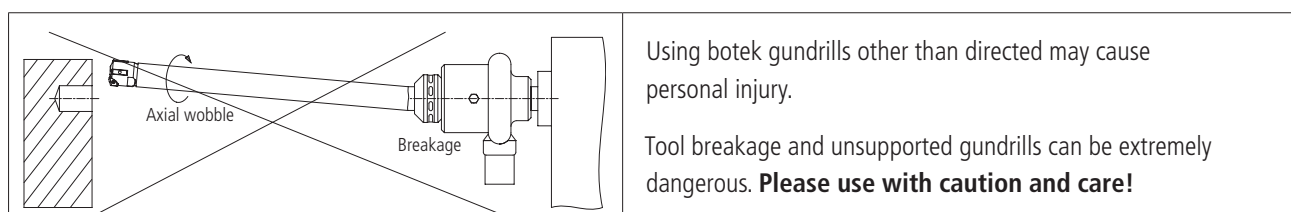
5. The tool is fed into the drill bush or pilot hole **while non rotating**. Then the coolant and the machine spindle should be started.
6. **After reaching the drilling depth** switch off the coolant and retract with the spindle stopped.
7. **Warning when drilling with Ejector tools**

All machines being used with a rotating Ejector coolant connector must have a rotation stop to prevent the housing from rotating. Smallest chips in the coolant liquid can cause the bearings to stop moving. Consequently the housing can be pulled round with the supply tubing to follow this movement. This may cause a serious accident. A rotation stop must therefore always be used.

If the rotating connector has not been used for some time, it is necessary to check by hand if the drive shaft can be moved inside the housing before the machine is started.



8. Grinding of carbide produces dust (cobalt, etc.) that may be potentially hazardous. Use adequate ventilation and safety glasses during grinding.
9. **Consequences of not following** our application notes No. 1-8.



Please note that all application notes and values contained herein are intended as guidelines only. We do not accept any liability for damages caused by improper handling of botek deep hole drilling tools, operating errors, unsuitable machinery or misuse while using our tools!

Do you have any further queries? Please call up at (630) 893-5300. We will be pleased to offer you advice.

botek[®]

DEEP HOLE DRILLING SYSTEMS
SOLID CARBIDE TOOLS

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