



HARTNER

Precision Cutting Tools

Multiplex

Interchangeable insert drilling system with internal cooling

New: Modular System
up to Ø 210 mm

2011



MULTIPLEX – THE VERSATILE ALTERNATIVE

The interchangeable insert drilling system with internal cooling for especially high performance machining, for hole diameters from 9.7 to 210 mm.

The most important system advantages

- No re-grinding and re-coating costs. Only the insert is replaced.
- Quick insert change: Simply loosen two screws, remove worn insert, insert new blade, tighten screws – finished.
- Variable tool material, variable coating.
- Constant tool length, resulting in reduction of set-up time and therefore set-up costs.
Pre-set-up time and re-setting no longer necessary with CNC machines and automatics.
- High performance machining and optimal tool life thanks to internal cooling and wear resistant inserts.
- Reduced storage costs because one holder can be applied for several insert diameters.

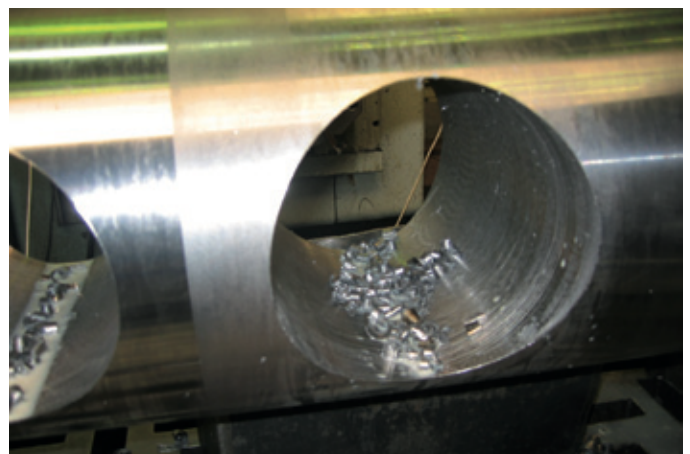
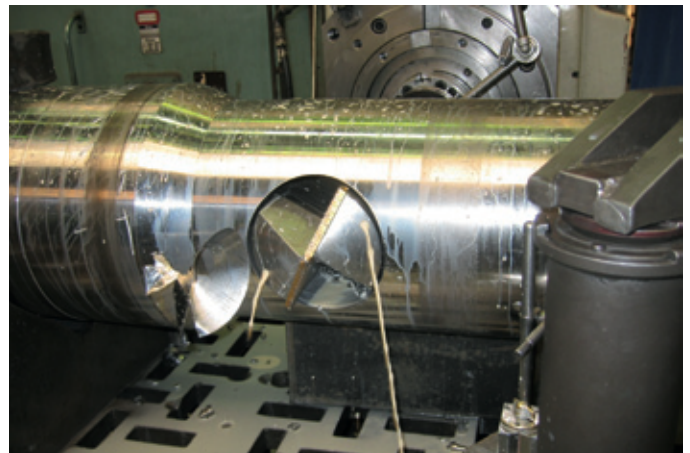
The holder range

All holders offer internal coolant delivery. It ensures the coolant is transported directly to the cutting edges and provides total efficiency. Even high cutting rates are not a problem for the inserts. In addition, the internal cooling ensures optimal chip evacuation by washing the swarf out of the drilled hole thereby making the time consuming peckfeeding unnecessary.

The straight shank holders are available in the following lengths:

- short, for drilling depths 3 x D
- long, for drilling depths 5 x D
- extra long for drilling depths 7 x D
- extra length for drilling depths up to 20 x D
- modular drilling system with variable drilling depths (because of changeable extensions)

Standard taper and straight shank holders are hardened, nickel-plated and possess an optimised flute profile (<35 mm Ø) providing improved quality and chip evacuation.



Application example: Drilling into the solid with Ø 185.00 mm in material 34 CrNiMo with 1000 N/mm²

THE MULTIPLEX HOLDER RANGE

The Multiplex-System offers a choice from different holders:

- Four straight shank holders for the drilling depths 3xD, 5xD and 7xD (Ø-range 9.70 - 65.00 mm) as well as an extra long version (Ø-range 11.71 - 102.00 mm).



Product No. 86612	Page 8
--------------------------	--------



Product No. 86622	Page 9
--------------------------	--------



Product No. 86624	Page 9
--------------------------	--------



Special programme	Page 10
-------------------	---------

- Two straight shank holders for stepped holes with a 90° or 180° step angle.



Product No. 86740	Page 12
--------------------------	---------



Product No. 86730	Page 12
--------------------------	---------

- Two Morse taper shank holders with axial coolant delivery, short or long design for the diameter range 9.70 to 25.40 mm. Design with radial coolant supply on request.



Product No. 86630	Page 14
--------------------------	---------



Product No. 86650	Page 15
--------------------------	---------

- Three Morse taper shank holders with radial coolant delivery via collar in short, long or extra long design for the diameter range 25.00 to 102.00 mm (axial coolant delivery by modification possible).



Product No. 86670	Page 14
--------------------------	---------



Product No. 86680	Page 15
--------------------------	---------



Special programme	Page 16
-------------------	---------

- Modular system: adaptors, extensions, tangs and drill heads can be combined individually. Hole Ø up to 210 mm.



Special programme	Page 17
-------------------	---------

THE MULTIPLEX INTERCHANGEABLE INSERTS

Wide choice

In order to achieve optimal machining results in all materials, Hartner's Multiplex system offers a wide choice of interchangeable inserts.

The following inserts are available:

- Solid carbide interchangeable insert with margin and TiN- and Fire-coating (product no. 86708/86702, up to Ø 35 mm)
- Solid carbide interchangeable insert without margin and TiN- and Fire-coating (product no. 86709/86701, up to Ø 35 mm)
- PM HSS-E interchangeable insert with chip breaker grooves and TiN- and FIRE-coating (product no. 86602/86608, up to Ø 25 mm)
- PM HSS-E interchangeable insert (MP05) with chip breaker grooves and AlTiN-coating (product no. 86609, > Ø 25 mm)

Please take note of our special geometries (page 6), delivery within approximately 3 weeks.

In addition, the following bright finish carbide interchangeable inserts are available as stepped inserts for the stepped holder:

- Carbide step insert, carbide grade P20-P30. Suitable for steel and grey cast iron. (product no. 86850/86851/86852)
- Carbide step insert, carbide grade K10-K20. Suitable for grey cast iron, steel, Al-alloys and Duroplastics. (product no. 86860/86861/86862)

Application range of inserts

The carbide inserts for the major cutting edge offer an extremely favourable ratio of toughness and hardness thanks to the special carbide grade of the insert. They are therefore especially resilient against forces occurring during the drilling operation. Inserts without margins are especially suitable for materials with a tensile strength of up to 600 N/mm², inserts with margins can be applied in materials with a tensile strength over 600 N/mm².

In addition, cobalt-alloyed molybdenum steel inserts are available for the machining of alloyed and un-alloyed steel and cast steel with a tensile strength up to 1100 N/mm², grey cast iron, malleable cast iron, spheroidal cast iron, sintered iron, nickel silver, bronze, brass as well as aluminium.



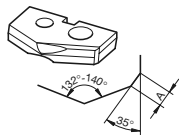
Special solutions to customer specific demands are available. Please take note of our special geometries on page 6.

Insert coatings

In order to achieve the highest possible cutting speeds and tool life, inserts for the major cutting edges are TiN-, AlTiN- or FIRE-coated. TiN is the most cost-efficient solution for standard applications. FIRE increases the efficiency of the insert in comparison with TiN-coated inserts and is suitable for applications under especially demanding conditions. The AlTiN-coating of our MP05 insert offers high hot hardness and is especially suitable for difficult-to-machine materials.

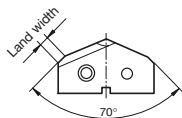
Point angle for insert diameter
$\leq \varnothing 25.4 = 135^\circ$
$> \varnothing 25.4 = 132^\circ$
$> \varnothing 66.0 = 140^\circ$
$> \varnothing 190.0 = 150^\circ$

Margin for carbide inserts $\varnothing 9.7 - 35$ mm
and PM HSS-E inserts $\varnothing 9.7 - 25.4$ mm



Insert diameter	Margin A
$\varnothing 9.7 - 13.4$	0.25 ± 0.05
$\varnothing 13.5 - 18.9$	0.30 ± 0.05
$\varnothing 19.0 - 25.4$	0.35 ± 0.05
$\varnothing 25.5 - 35.0$	0.40 ± 0.05

Grinding instruction for
point grinding for cast iron



Up to $\varnothing$ mm	Land width mm	Tolerance mm	Clearance angle
35.00	1.0	± 0.2	8°
50.00	1.5	± 0.2	8°
80.00	2.0	± 0.2	8°
102.00	2.5	± 0.2	8°
150.00	3.5	± 0.2	8°
210.00	4.5	± 0.2	8°

Insert geometry

The Multiplex system's PM HSS interchangeable inserts are equipped with chip breakers and chip breaker grooves. Subsequently, they produce very short chips, easing chip evacuation.

The Multiplex system's short flute length gives the entire tool extreme rigidity, making it possible to apply high feed rates. In addition, it improves the self-centering characteristics.

Please note:

As Multiplex tools are predominantly guided by the chisel edge, they are not suitable for the drilling of pre-cast or pre-drilled holes!

Further details can be found in the chapter "Important Notes" on page 24.

The MP05 interchangeable insert is made from PM HSS
Product No. 86609

The insert has an optimised geometry and AlTiN-coating for an improved chip formation, longer tool life and reduced wear.

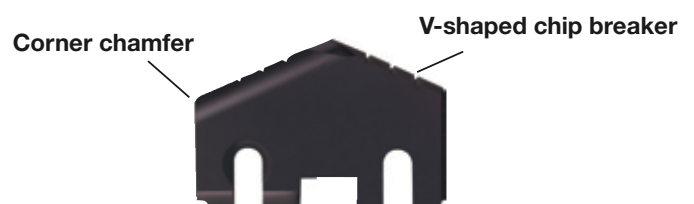
The V-form chip breakers reduce the jamming of chips and therefore increase the tool life of the insert.

Application range:

Steel, stainless steel, cast iron, high heat resistant alloys, aluminium, non-ferrous alloys

Advantages:

- Improved chip formation
- Increased tool life (thanks to corner chamfer) and reduced corner wear and reduced burr formation especially on 'break through'
- Improved heat dissipation and reduced wear thanks to corner chamfer
- Higher cutting speeds and longer tool life achievable thanks to new PM HSS-E ($\leq \varnothing 66.0$ mm; $> \varnothing 66.0$ mm: HSS-E)



SPECIAL GEOMETRIES

Special geometries in combination with different coatings from our programme are available on request. Please contact us. **Delivery period is approximately 3 weeks.**



Form insert* to customer's drawing (HSS-E/PM HSS-E or carbide).



NC insert (HSS-E/PM HSS-E or carbide) with 90° or 120°. (depending on Ø the 90° angle at the point is distorted)



Radius insert (HSS-E/PM HSS-E or carbide).



Stepped insert (HSS-E/PM HSS-E or carbide).



Aluminium geometry (carbide) for the application in non-ferrous metals and plastics.



Blind hole insert* (HSS-E/PM HSS-E) with center point.



Brass geometry (carbide) for the application in brass and similar materials.



Blind hole insert* (HSS-E/PM HSS-E) without center point.



Point grind for fiber plastics (carbide).

* Please note when using blind hole or contour inserts:

- Application only with short holders.
- Pre-machining of bore hole with standard Multiplex insert ($\varnothing$ of standard insert $\leq$ $\varnothing$ of blind hole insert)
- Drilling in solid material is recommended only under special conditions.
- Please forward a drawing of bore hole to our technicians, if possible.

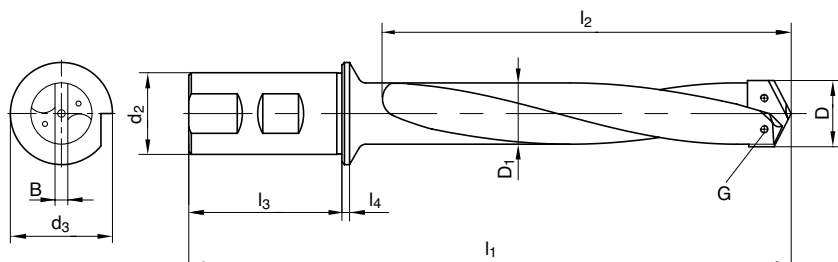
A MULTIPLEX SYSTEM SUMMARY

Which insert and which accessory is suitable for which holder? The following matrix provides an overview of the entire system:

	Straight shank				Stepped holder		Morse taper shank				
for	3xD	5xD	7xD	extra long	90°	180°	short, axial coolant delivery	long, axial coolant delivery	short, radial coolant delivery	short, radial coolant delivery	extra long, radial coolant delivery
accessories	86612	86622	86624		86730	86740	86630	86650	86670	86680	
86602, PM HSS-E, interchangeable insert, TiN	•	•	•	•	•	•	•	•			
86608, PM HSS-E, interchangeable insert, Fire	•	•	•	•	•	•	•	•			
86609 PM HSS-E, interchangeable insert	•	•	•	•					•	•	
86708, carbide interch. insert, TiN, with margin	•	•	•	*	•	•	•	•	•	•	
86702, carbide interch. insert, Fire, with margin	•	•	•	*	•	•	•	•	•	•	
86709, carbide interch. insert, TiN, w/o margin	•	•	•	*	•	•	•	•	•	•	
86701, carbide interch. insert, Fire, w/o margin	•	•	•	*	•	•	•	•	•	•	
86850, indexable insert for stepped holder, bright					•	•					
86851, indexable insert for stepped holder, bright					•	•					
86852, indexable insert for stepped holder, bright					•	•					
86860, indexable insert for stepped holder, bright					•	•					
86861, indexable insert for stepped holder, bright					•	•					
86862, indexable insert for stepped holder, bright					•	•					
86807, Torx screw for stepped holder (index. insert)					•	•					
86807, Torx screw for straight/MT holder	•	•	•	•	•	•	•	•	•	•	•
86842, Torx screwdriver for all holders	•	•	•	•	•	•	•	•	•	•	•
Coolant feed chuck with ISO taper acc. DIN 69871/cyl. mounting hole	•	•	•	•	•	•					
Coolant feed chuck with ISO taper acc. DIN 2080/cyl. mounting hole	•	•	•	•	•	•					
Coolant feed chuck with MT acc. DIN 228 B/cyl. mounting hole	•	•	•	•	•	•					
Coolant feed chuck with BT MAS/cyl. mounting hole	•	•	•	•	•	•					
Bushing for coolant feed chuck with cyl. mounting hole	•	•	•	•	•	•					
86690, coolant del. pipe f. MT holder (with 82571+ 82578)									•	•	•
82571, coolant del. pipe for cool. del. collar 86690									•	•	•
82578, quick release pipe union f. 82571 w. 86690									•	•	•

* limited suitability • suitable

STANDARD RANGE STRAIGHT SHANK MULTIPLEX HOLDER



**only for special range p. 10-11

Shank dimensions to DIN 1835-B (Weldon)

Ø D mm	d ₂ mm	d ₃ mm	l ₃ mm	l ₄ mm
9.70-25.40	20	25	40	5.0
25.41-29.00	32	40	60	3.0
29.01-35.00	32	40	60	4.5
35.01-45.00	32	40	60	6.3
45.01-55.00	40	50	70	5.0
55.01-65.00	40	-	70	-
65.01-78.00**	40	-	70	-
78.01-90.00**	50	-	80	-
90.01-102.00**	50	-	80	-

Two Torx screws are supplied with each holder



For dimensional drawing see "Shank dimensions Weldon", above
Lengths l₁ and l₂ incl. indexable insert.

*Attention: only for insert thickness 4 mm

86612 short, for drilling depths < 3 x D

Hole Ø-range D mm	Total length l ₁ mm	Flute length l ₂ mm	Holder-Ø D ₁ mm	Width of slot B mm	Torx screws 86807		Screw driver size	Code no.
					Size	Code no.		
9.70 - 11.70	107	50.0	9.5	2.5	M 2x4	2.000	T 6	09.500
11.71 - 13.40	109	53.0	11.5	2.5	M 2x4	2.000	T 6	11.500
13.41 - 16.40	116	60.0	13.0	3.5	M 2.5x5	2.500	T 7	13.000
16.41 - 18.90	118	65.0	16.0	3.5	M 2.5x7	2.501	T 7	16.000
18.91 - 22.40	124	73.0	18.5	4.0	M 3x6	3.000	T 9	18.500
22.41 - 25.40*	127	78.0	22.0	4.0	M 3x8	3.001	T 9	22.000
25.41 - 29.00	178	105.0	24.0	5.0	M 3.5x10	3.500	T 15	24.000
29.01 - 35.00	178	108.0	28.0	5.0	M 3.5x10	3.500	T 15	28.000
35.01 - 45.00	223	152.0	34.0	7.0	M 4x15	4.001	T 20	34.000
45.01 - 55.00	233	152.0	44.0	7.0	M 4x15	4.001	T 20	44.000
55.01 - 65.00	233	152.0	54.0	7.0	M 4x15	4.001	T 20	54.000



For dimensional drawing see "Shank dimensions Weldon", page 8
Lengths l_1 and l_2 incl. indexable insert.

*Attention: only for insert thickness 4 mm

86622 long, for drilling depths $< 5 \times D$

Hole Ø-range D mm	Total length l_1 mm	Flute length l_2 mm	Holder-Ø D_1 mm	Width of slot B mm	Torx screws 86807		Screwdriver size	Code no.
					Size	Code no.		
9.70 - 11.70	140	83.0	9.5	2.5	M 2x4	2.000	T 6	09.500
11.71 - 13.40	150	94.0	11.5	2.5	M 2x4	2.000	T 6	11.500
13.41 - 16.40	160	104.0	13.0	3.5	M 2.5x5	2.500	T 7	13.000
16.41 - 18.90	170	117.0	16.0	3.5	M 2.5x7	2.501	T 7	16.000
18.91 - 22.40	180	129.0	18.5	4.0	M 3x6	3.000	T 9	18.500
22.41 - 25.40*	180	131.0	22.0	4.0	M 3x8	3.001	T 9	22.000
25.41 - 29.00	240	166.0	24.0	5.0	M 3.5x10	3.500	T 15	24.000
29.01 - 35.00	240	170.0	28.0	5.0	M 3.5x10	3.500	T 15	28.000
35.01 - 45.00	280	210.0	34.0	7.0	M 4x15	4.001	T 20	34.000
45.01 - 55.00	290	210.0	44.0	7.0	M 4x15	4.001	T 20	44.000
55.01 - 65.00	290	210.0	54.0	7.0	M 4x15	4.001	T 20	54.000



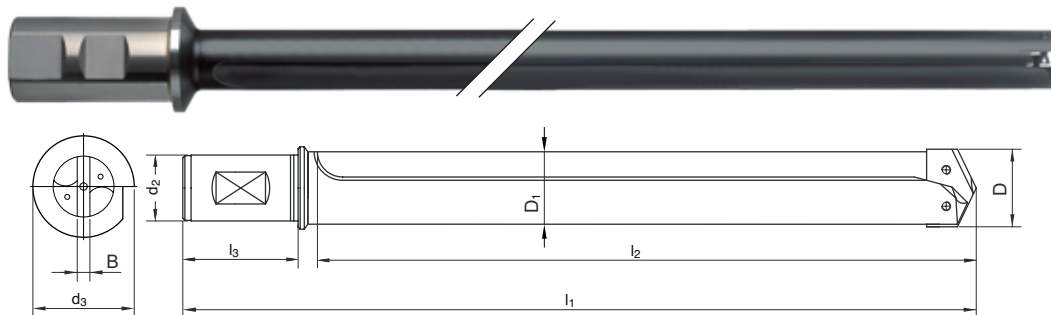
For dimensional drawing see "Shank dimensions Weldon", page 8
Lengths l_1 and l_2 incl. indexable insert.

*Attention: only for insert thickness 4 mm

86624 extra long, for drilling depths $< 7 \times D$

Hole Ø-range D mm	Total length l_1 mm	Flute length l_2 mm	Holder-Ø D_1 mm	Width of slot B mm	Torx screws 86807		Screwdriver size	Code no.
					Size	Code no.		
9.70 - 11.70	180	123.0	9.5	2.5	M 2x4	2.000	T 6	09.500
11.71 - 13.40	190	134.0	11.5	2.5	M 2x4	2.000	T 6	11.500
13.41 - 16.40	210	155.0	13.0	3.5	M 2.5x5	2.500	T 7	13.000
16.41 - 18.90	220	168.0	16.0	3.5	M 2.5x7	2.501	T 7	16.000
18.91 - 22.40	250	199.0	18.5	4.0	M 3x6	3.000	T 9	18.500
22.41 - 25.40*	250	201.0	22.0	4.0	M 3x8	3.001	T 9	22.000
25.41 - 29.00	320	246.0	24.0	5.0	M 3.5x10	3.500	T 15	24.000
29.01 - 35.00	320	250.0	28.0	5.0	M 3.5x10	3.500	T 15	28.000
35.01 - 45.00	380	310.0	34.0	7.0	M 4x15	4.001	T 20	34.000
45.01 - 55.00	390	310.0	44.0	7.0	M 4x15	4.001	T 20	44.000
55.01 - 65.00	390	310.0	54.0	7.0	M 4x15	4.001	T 20	54.000

SPECIAL RANGE STRAIGHT SHANK MULTIPLEX HOLDER, STRAIGHT FLUTED



Shank dimensions see page 8 (sim. to Weldon), lengths l_1 and l_2 incl. indexable insert

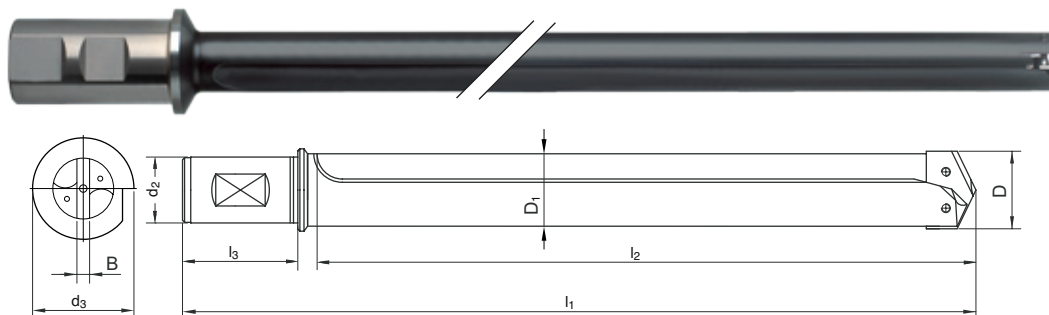
Special dimensions, different from standard range

Hole Ø-range D mm	Total length l_1 mm	Flute length l_2 mm	Holder-Ø D1 mm	Torx-screws 86807		Width of slot B	Order- number
				Size	Code-no.		
13.41 - 16.40	198.5	144	13	M 2.5x5	2.500	3.5	333003953
13.41 - 16.40	238.5	184	13	M 2.5x5	2.500	3.5	333003954
13.41 - 16.40	318.5	264	13	M 2.5x5	2.500	3.5	333010526
15.00 - 16.40	95	40	14.5	M 2.5x5	2.500	3.5	333006111
15.00 - 16.40	125	70	14.5	M 2.5x5	2.500	3.5	333006112
15.00 - 16.40	178.5	124	14.5	M 2.5x5	2.500	3.5	333006114
15.00 - 16.40	198.5	144	14.5	M 2.5x5	2.500	3.5	333006115
15.00 - 16.40	238.5	184	14.5	M 2.5x5	2.500	3.5	333003955
15.00 - 16.40	268.5	214	14.5	M 2.5x5	2.500	3.5	333003956
15.00 - 16.40	398.5	344	14.5	M 2.5x5	2.500	3.5	333010527
16.41 - 18.90	260.5	209	16	M 2.5x7	2.501	3.5	333003957
16.41 - 18.90	295.5	244	16	M 2.5x7	2.501	3.5	333003958
16.41 - 18.90	410.5	359	16	M 2.5x7	2.501	3.5	333010533
18.91 - 22.40	304	255	18.5	M 3x6	3.000	4	333003959
18.91 - 22.40	344	295	18.5	M 3x6	3.000	4	333003960
18.91 - 22.40	464	415	18.5	M 3x6	3.000	4	333010538
22.41 - 25.40*	285	237	22	M 3x8	3.001	4	333008888
22.41 - 25.40*	345	297	22	M 3x8	3.001	4	333003961
22.41 - 25.40*	385	337	22	M 3x8	3.001	4	333003962
22.41 - 25.40*	535	487	22	M 3x8	3.001	4	333010545
25.41 - 29.00	138	66	23	M 3x8	3.001	5	333006710
25.41 - 29.00	173	100	23	M 3x8	3.001	5	333010546
25.41 - 29.00	225	150	23	M 3x8	3.001	5	333015054
25.41 - 29.00	273	200	23	M 3x8	3.001	5	333010547
25.41 - 29.00	343	270	23	M 3x8	3.001	5	333007963
25.41 - 29.00	433	360	23	M 3x8	3.001	5	333003963
25.41 - 29.00	503	430	23	M 3x8	3.001	5	333003964
25.41 - 29.00	683	610	23	M 3x8	3.001	5	333010548
29.01 - 35.00	393	321	28	M 3.5x10	3.500	5	333006118
29.01 - 35.00	473	401	28	M 3.5x10	3.500	5	333003965
29.01 - 35.00	553	481	28	M 3.5x10	3.500	5	333003966
29.01 - 35.00	763	691	28	M 3.5x10	3.500	5	333010551
33.20 - 36.00**	148	77	33	M 3.5x10	3.500	5	333006119
33.20 - 36.00**	173	102	33	M 3.5x10	3.500	5	333006120
33.20 - 36.00**	223	152	33	M 3.5x10	3.500	5	333010552
33.20 - 36.00**	273	202	33	M 3.5x10	3.500	5	333006121
33.20 - 36.00**	393	322	33	M 3.5x10	3.500	5	333006122
33.20 - 36.00**	503	432	33	M 3.5x10	3.500	5	333003967

*Attention: only for insert thickness 4 mm

Delivery on request

SPECIAL RANGE STRAIGHT SHANK MULTIPLEX HOLDER, STRAIGHT FLUTED



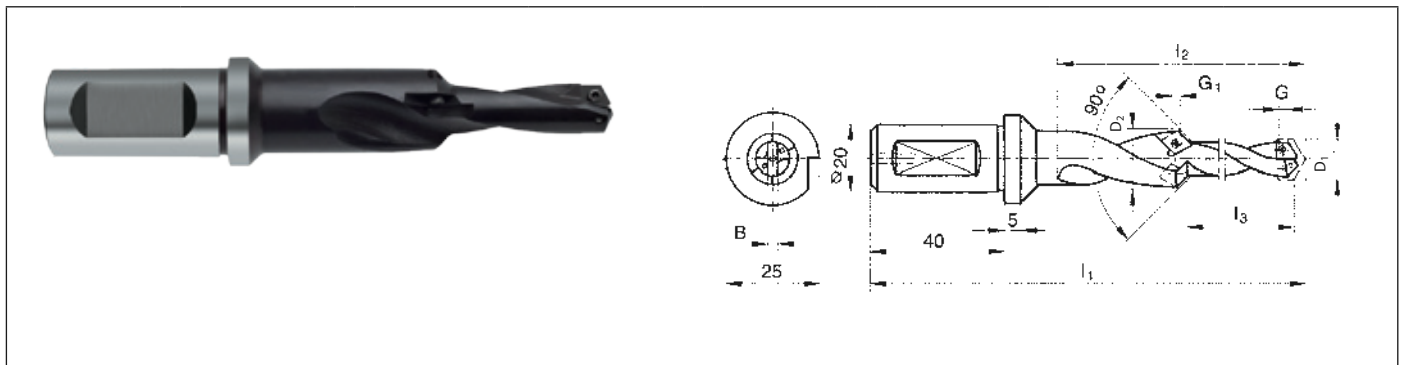
Special dimensions, different from standard range

Hole Ø-range D mm	Total length l1 mm	Flute length l2 mm	Holder-Ø D1 mm	Torx-screws 86807		Width of slot B	Order- number
				Size	Code-no.		
33.20 - 36.00**	603	532	33	M 3.5x10	3.500	5	333003968
33.20 - 36.00**	823	752	33	M 3.5x10	3.500	5	333010553
35.01 - 45.00	457	387	34	M 4x15	4.001	7	333003969
35.01 - 45.00	607	537	34	M 4x15	4.001	7	333003970
35.01 - 45.00	907	837	34	M 4x15	4.001	7	333062971
45.01 - 55.00	467	388	44	M 4x15	4.001	7	333003971
45.01 - 55.00	617	538	44	M 4x15	4.001	7	333003972
45.01 - 55.00	917	838	44	M 4x15	4.001	7	333062972
55.01 - 65.00	467	393	54	M 4x15	4.001	7	333003973
55.01 - 65.00	617	537	54	M 4x15	4.001	7	333003974
55.01 - 65.00	917	837	54	M 4x15	4.001	7	333062973
65.01 - 78.00	230	155	63	M 5x20	5.000	9	333017372
65.01 - 78.00	320	245	63	M 5x20	5.000	9	333026343
65.01 - 78.00	340	265	63	M 5x20	5.000	9	333017374
65.01 - 78.00	620	545	63	M 5x20	5.000	9	333017375
65.01 - 78.00	920	845	63	M 5x20	5.000	9	333062974
78.01 - 90.00	240	155	77	M 5x20	5.000	9	333017376
78.01 - 90.00	350	265	77	M 5x20	5.000	9	333017377
78.01 - 90.00	630	545	77	M 5x20	5.000	9	333017378
78.01 - 90.00	930	845	77	M 5x20	5.000	9	333062975
90.01 - 102.00	240	155	89	M 5x20	5.000	9	333017379
90.01 - 102.00	350	265	89	M 5x20	5.000	9	333017380
90.01 - 102.00	630	545	89	M 5x20	5.000	9	333017381
90.01 - 102.00	930	845	89	M 5x20	5.000	9	333062976



For all holders <7xD support for pilot hole is necessary!

STANDARD RANGE STRAIGHT SHANK MULTIPLEX HOLDER

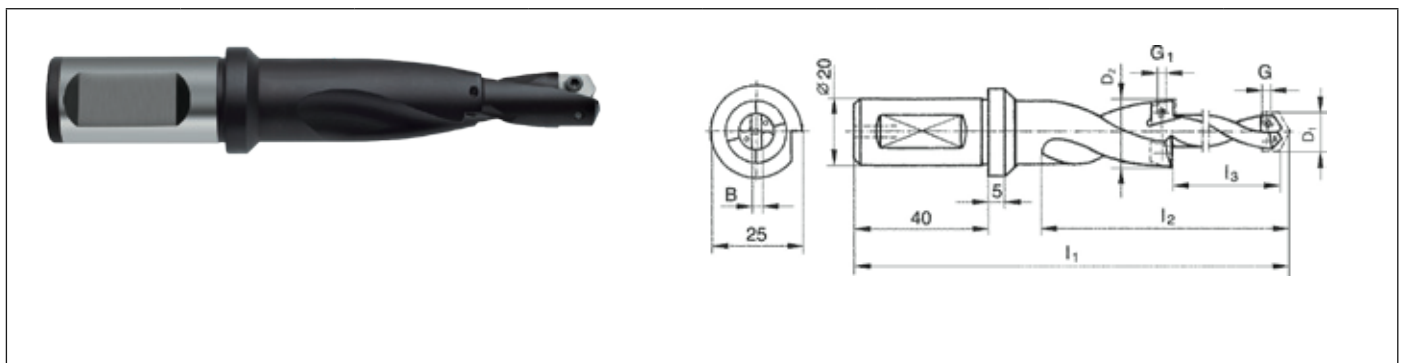


86740 for stepped holes, 90° step angle

For	Body-Ø d2 mm	Step-Ø d1 mm	Total length l1 mm	Flute length l2 mm	Step length l3 mm	Width of slot B mm	Code no.
M 12	16	10.2	118	57	30.0	2.5	16.000
M 14	20	12.0	128	69	34.5	2.5	20.000
M 16	21	14.0	133	74	38.5	3.5	21.000
M 18	21	15.5	133	74	38.5	3.5	21.001
M 20	24	17.5	145	88	47.5	3.5	24.000

Step drill for the efficient production of hole and countersink in one operation. For the production of tapping size holes to DIN 336, sheet 1, and countersinks to DIN-ISO 273, medial tolerance.

Step angle 90°. Each holder is supplied with 4 Torx screws.



86730 for stepped holes, 180° step angle

For	Body-Ø d2 mm	Step-Ø d1 mm	Total length l1 mm	Flute length l2 mm	Step length l3 mm	Width of slot B mm	Code no.
M 10	18.0	11.0	120	59	23	2.5	18.000
M 12	20.0	13.5	128	69	27	3.5	20.000
M 14	24.0	15.5	140	81	31	3.5	24.000
M 16	26.0	17.5	148	91	35	3.5	26.000
M 18	30.0	20.0	157	102	39	4.0	30.000
M 20	33.0	22.0	167	112	43	4.0	33.000

Step drill for the efficient production of hole and countersink in one operation. For the production of clearance holes to DIN-ISO 273 and screw head angles form H, J and K. Medial tolerance to DIN 74, part 2. Step angle 180°. Each holder is supplied with 4 Torx screws.

ACCESSORIES SPECIFICALLY FOR STRAIGHT SHANK MULTIPLEX HOLDERS FOR STEPPED HOLES



86807 Torx screws for stepped holder, step angle 90°

For holder number	Torx screws for boring insert G	Order number	Torx screws for step insert G1	Order number
86740 16.000	M 2 x 4	86807 2.000	M 2 x 4	86807 2.000
86740 20.000	M 2 x 4	86807 2.000	M 2.5 x 5	86807 2.500
86740 21.000	M 2.5 x 5	86807 2.500	M 2.5 x 5	86807 2.500
86740 21.001	M 2.5 x 5	86807 2.500	M 2.5 x 5	86807 2.500
86740 24.000	M 2.5 x 7	86807 2.501	M 2.5 x 5	86807 2.500



86807 Torx screws for stepped holder, step angle 180°

For holder number	Torx screws for boring insert G	Order number	Torx screws for step insert G1	Order number
86730 18.000	M 2 x 4	86807 2.000	M 2 x 4	86807 2.000
86730 20.000	M 2.5 x 5	86807 2.500	M 2 x 4	86807 2.000
86730 24.000	M 2.5 x 5	86807 2.500	M 2.5 x 5	86807 2.500
86730 26.000	M 2.5 x 7	86807 2.501	M 2.5 x 7	86807 2.501
86730 30.000	M 3 x 6	86807 3.000	M 4 x 9	86807 4.000
86730 33.000	M 3 x 6	86807 3.000	M 4 x 9	86807 4.000

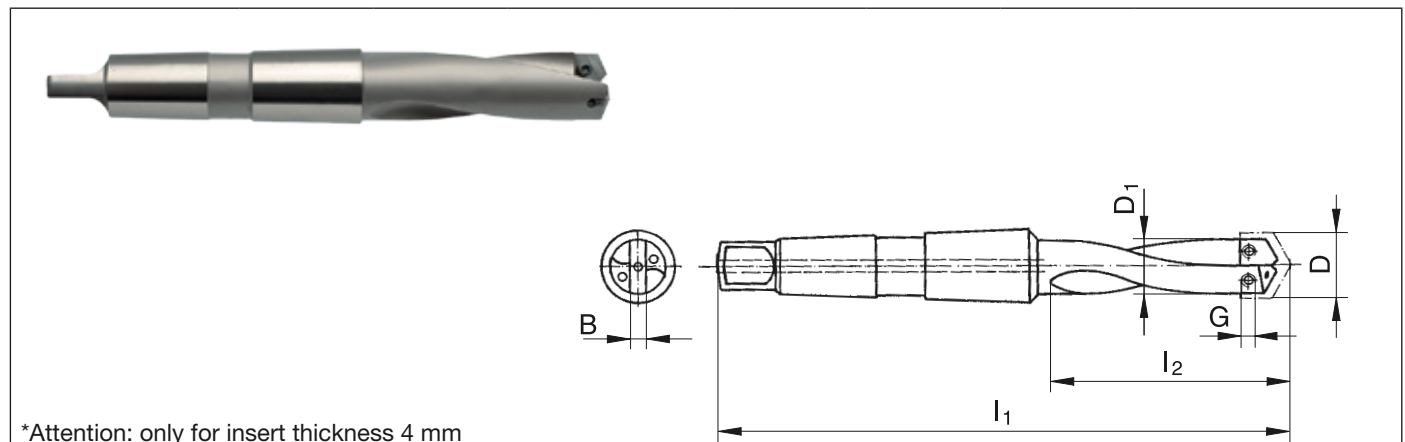


Indexable inserts for stepped holders

Carbide grade P20-P30	Carbide grade K10-K20	For holder order number	Hole and countersink for thread size
86850 42.040 ISO-EPMW 040204	86860 42.040 ISO-EPMW 040204	86730 18.000 86730 20.000 86740 16.000	M 10 M 12 M 12
86851 62.040 ISO-EPMT 060204	86861 62.040 ISO-EPMT 060204	86730 24.000 86730 26.000 86740 20.000	M 14 M 16 M 14
		86740 21.000 86740 21.001 86740 24.000	M 16 M 18 M 20
86852 83.040 ISO-EPMT 08M304	86862 83.040 ISO-EPMT 08M304	86730 30.000 86730 33.000	M 18 M 20

Coatings on request

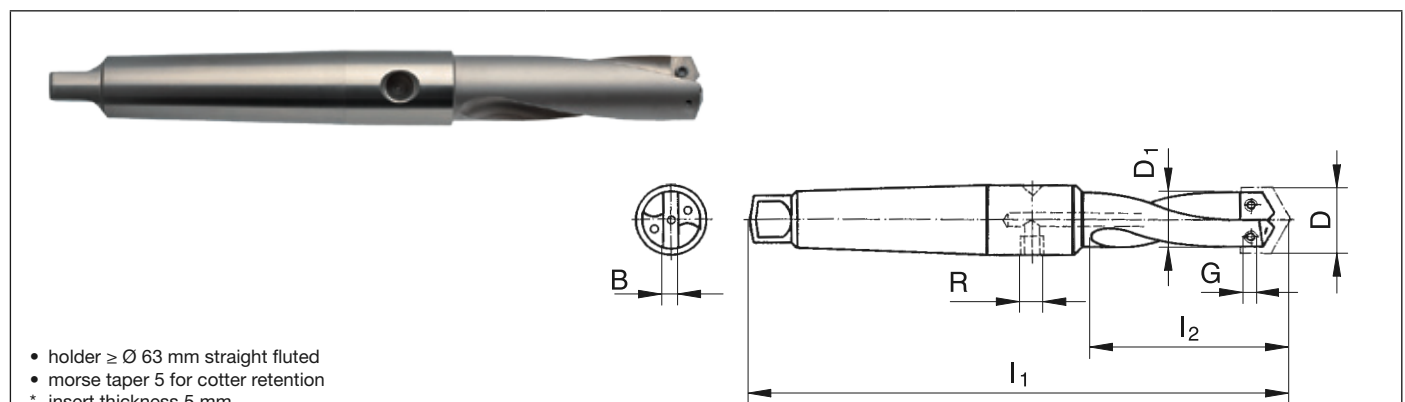
STANDARD RANGE MORSE TAPER SHANK MULTIPLEX HOLDERS



*Attention: only for insert thickness 4 mm

86630 short, axial coolant delivery, radial coolant delivery on request

Hole Ø-range D mm	Total length l ₁ mm	Flute length l ₂ mm	Morse taper	Holder-Ø d ₁ mm	Width of slot B mm	Torx screws 86807		Screwdriver size	Code no.
						Size	Code no.		
9.70 - 11.70	139	56	2	9.5	2.5	M 2x4	2.000	T 6	09.500
11.71 - 13.40	141	58	2	11.5	2.5	M 2x4	2.000	T 6	11.500
13.41 - 16.40	148	63	2	13.0	3.5	M 2.5x5	2.500	T 7	13.000
16.41 - 18.90	150	67	2	16.0	3.5	M 2.5x7	2.501	T 7	16.000
18.91 - 22.40	178	76	3	18.5	4.0	M 3x6	3.000	T 9	18.500
22.41 - 25.40*	181	80	3	22.0	4.0	M 3x8	3.001	T 9	22.000

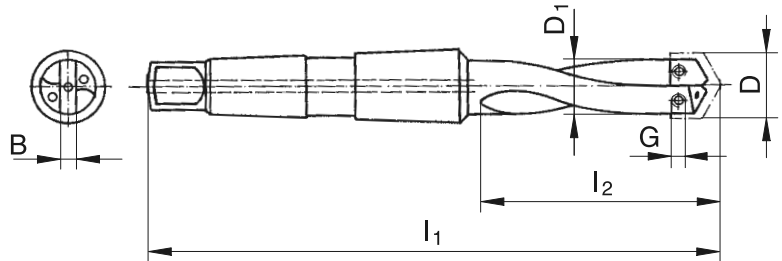


- holder ≥ Ø 63 mm straight fluted
- morse taper 5 for cotter retention
- * insert thickness 5 mm

86670 short, radial coolant delivery, axial coolant delivery on request

Hole Ø-range D mm	Total length l ₁ mm	Flute length l ₂ mm	Morse taper	Holder-Ø d ₁ mm	Width of slot B mm	R	Torx screws 86807		Screwdriver size	Code no.
							Size	Code no.		
25.01 - 29.00*	279	108	4	24	5	G 1/4"	M 3.5x10	3.500	T 15	24.000
29.01 - 35.00	279	108	4	28	5	G 1/4"	M 3.5x10	3.500	T 15	28.000
35.01 - 45.00	324	152	4	34	7	G 1/4"	M 4x15	4.001	T 20	34.000
45.01 - 55.00	324	152	4	44	7	G 1/4"	M 4x15	4.001	T 20	44.000
55.01 - 65.00	324	152	4	54	7	G 1/4"	M 4x15	4.001	T 20	54.000
65.01 - 78.00	436	216	5	63	9	G 1/2"	M 5x20	5.000	T 20	63.000
78.01 - 90.00	436	216	5	77	9	G 1/2"	M 5x20	5.000	T 20	77.000
90.01 - 102.00	436	216	5	89	9	G 1/2"	M 5x20	5.000	T 20	89.000

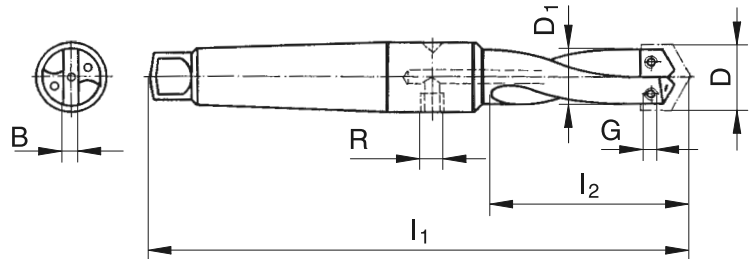
STANDARD RANGE MORSE TAPER SHANK MULTIPLEX HOLDERS



*Attention: only for insert thickness 4 mm

86650 long, axial coolant delivery, radial coolant delivery on request

Hole Ø-range D mm	Total length I ₁ mm	Flute length I ₂ mm	Morse taper	Holder-Ø d ₁ mm	Width of slot B mm	Torx screws 86807		Screwdriver size	Code no.
						Size	Code no.		
9.70 - 11.70	186	103	2	9.5	2.5	M 2x4	2.000	T 6	09.500
11.71 - 13.40	191	108	2	11.5	2.5	M 2x4	2.000	T 6	11.500
13.41 - 16.40	210	125	2	13.0	3.5	M 2.5x5	2.500	T 7	13.000
16.41 - 18.90	218	135	2	16.0	3.5	M 2.5x7	2.501	T 7	16.000
18.91 - 22.40	258	156	3	18.5	4.0	M 3x6	3.000	T 9	18.500
22.41 - 25.40*	266	165	3	22.0	4.0	M 3x8	3.001	T 9	22.000

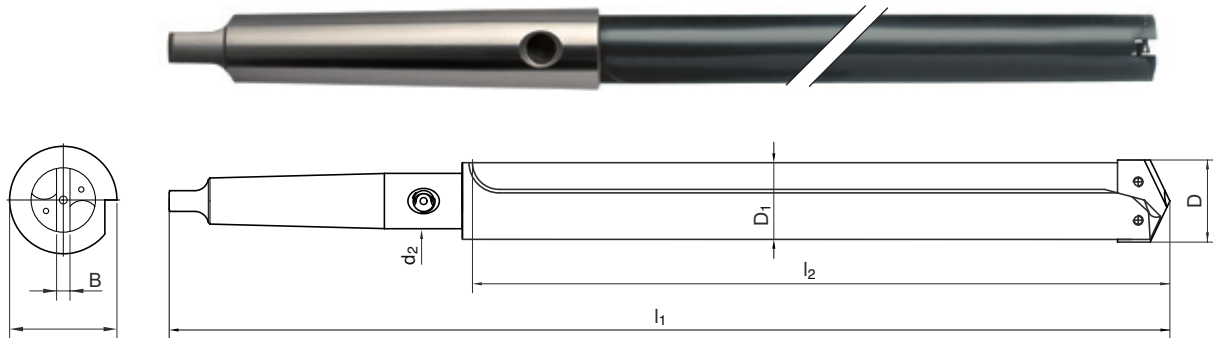


- holder ≥ Ø 63 mm straight fluted
- morse taper 5 for cotter retention
- * insert thickness 5 mm

86680 long, radial coolant delivery, axial coolant delivery on request

Hole Ø-range D mm	Total length I ₁ mm	Flute length I ₂ mm	Morse taper	Holder-Ø d ₁ mm	Width of slot B mm	R	Torx screws 86807		Screwdriver size	Code no.
							Size	Code no.		
25.01 - 29.00*	379	208	4	24	5	G 1/4"	M 3.5x10	3.500	T 15	24.000
29.01 - 35.00	379	208	4	28	5	G 1/4"	M 3.5x10	3.500	T 15	28.000
35.01 - 45.00	429	257	4	34	7	G 1/4"	M 4x15	4.001	T 20	34.000
45.01 - 55.00	429	257	4	44	7	G 1/4"	M 4x15	4.001	T 20	44.000
55.01 - 65.00	429	257	4	54	7	G 1/4"	M 4x15	4.001	T 20	54.000
65.01 - 78.00	536	316	5	63	9	G 1/2"	M 5x20	5.000	T 20	63.000
78.01 - 90.00	536	316	5	77	9	G 1/2"	M 5x20	5.000	T 20	77.000
90.01 - 102.00	536	316	5	89	9	G 1/2"	M 5x20	5.000	T 20	89.000

SPECIAL RANGE MORSE TAPER SHANK MULTIPLEX HOLDERS



Special dimensions, different from standard range

Hole Ø-range D mm	Total length l1 mm	Flute length l2 mm	Morse taper	Holder-Ø D1 mm	Torx screws 86807		Width of slot B mm	Order no.
					Size	Code no.		
35.01 - 45.00	536	365	4	34	M 4x15	4.001	7	333067400
35.01 - 45.00	716	545	4	34	M 4x15	4.001	7	333017389
35.01 - 45.00	1016	845	4	34	M 4x15	4.001	7	333062977
45.01 - 55.00	716	545	4	44	M 4x15	4.001	7	333017392
45.01 - 55.00	1016	845	4	44	M 4x15	4.001	7	333062978
55.01 - 65.00	560	385	4	54	M 4x15	4.001	7	333040762
55.01 - 65.00	716	545	4	54	M 4x15	4.001	7	333017395
55.01 - 65.00	1016	845	4	54	M 4x15	4.001	7	333062979
65.01 - 78.00	766	545	5	63	M 5x20	5.000	9	333017398
65.01 - 78.00	1066	845	5	63	M 5x20	5.000	9	333062980
78.01 - 90.00	766	545	5	77	M 5x20	5.000	9	333017401
78.01 - 90.00	1066	845	5	77	M 5x20	5.000	9	333062981
90.01 - 102.00	766	545	5	89	M 5x20	5.000	9	333017404
90.01 - 102.00	1066	845	5	89	M 5x20	5.000	9	333062982

Delivery on request



For all holders <7xD support for pilot hole is necessary!

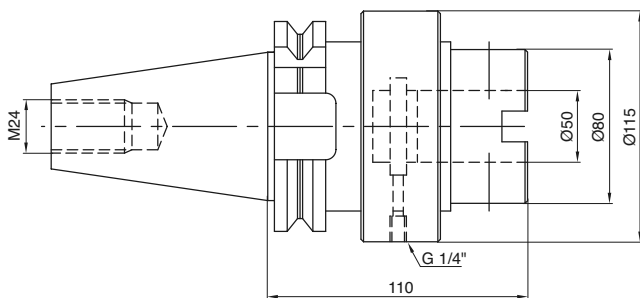
SPECIAL RANGE MULTIPLEX MODULAR SYSTEM



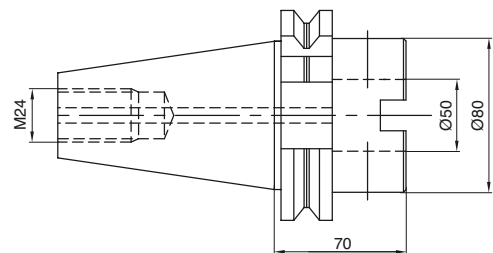
Adaptors

The following versions are available on request:

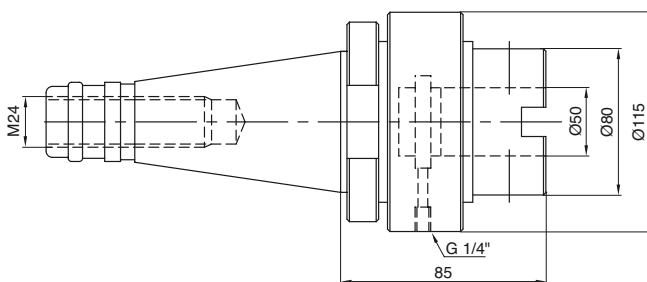
- SK50 DIN 69871 with oil feed adaptors



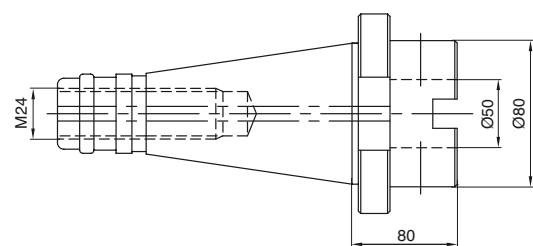
- SK50 DIN 69871 without oil feed adaptors



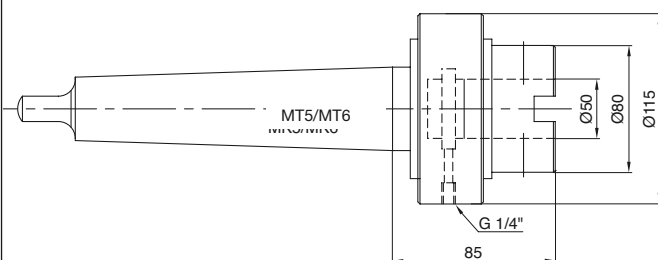
- SK50 DIN 2080 with oil feed adaptors



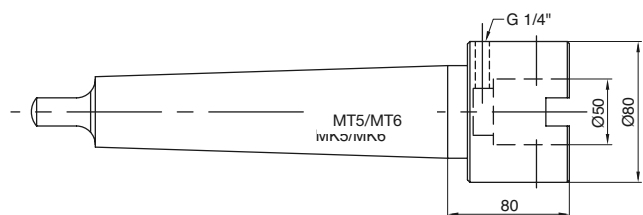
- SK50 DIN 2080 without oil feed adaptors



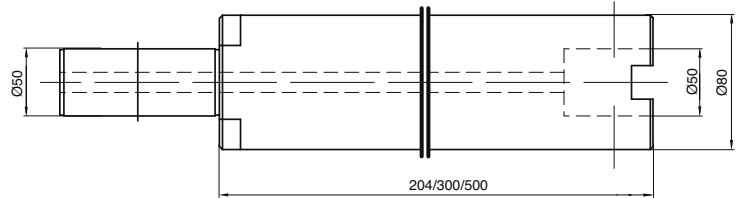
- MT 5/MT 6 with oil feed adaptors



- MT 5/MT 6 without oil feed adaptors



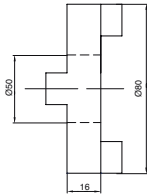
SPECIAL RANGE MULTIPLEX MODULAR SYSTEM



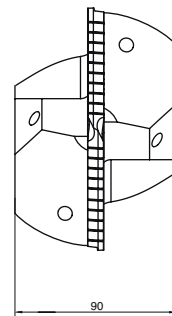
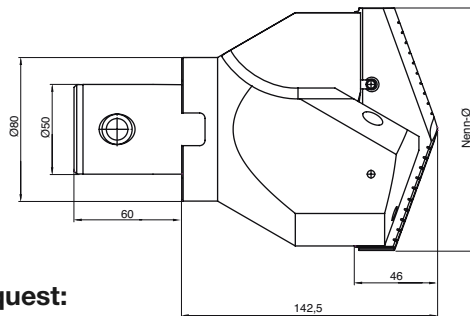
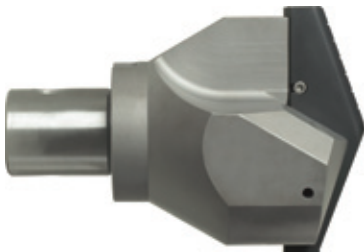
The following lengths are available on request:

- 204 mm
- 300 mm
- 500 mm

Extensions



Tangs

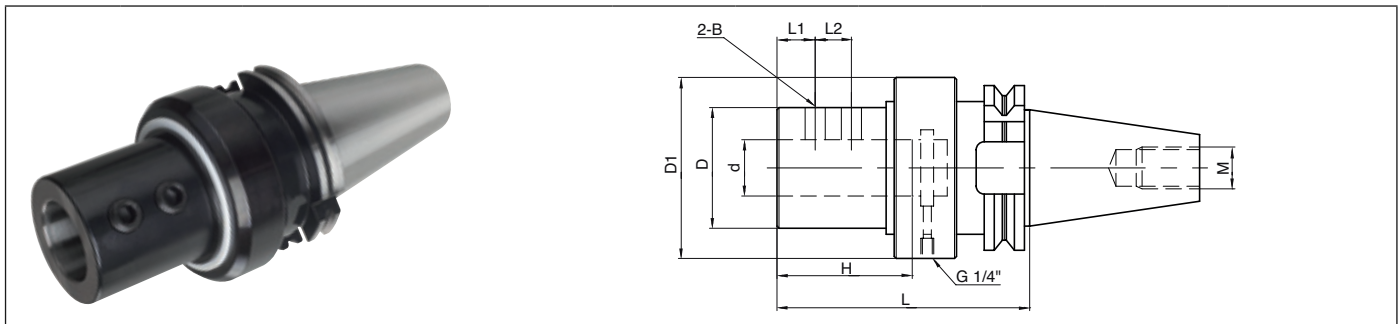


The following versions are available on request:

- Ø 131 mm up to Ø 165 mm, L2 = 142.5 mm
- Ø 164 mm up to Ø 210 mm, L2 = 142.5 mm

Drill heads

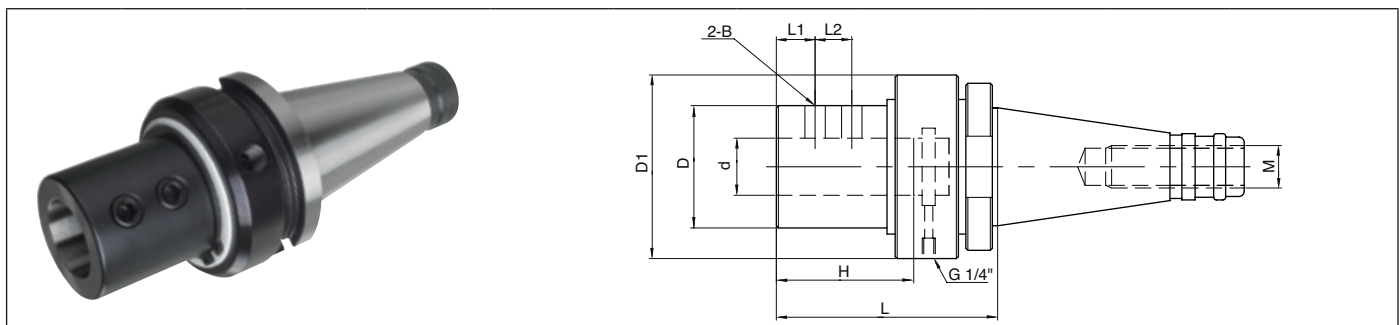
ACCESSORIES



Coolant feed chuck with ISO taper according DIN 69871 and cylindrical mounting hole

Type	d* mm	L mm	D mm	D1 mm	H mm	L1 mm	L2 mm	2 B	M	Order no.
SK40-32	32	130	65	88	70	20	20	M14	M16	333007047
SK50-40	40	135	65	98	80	20	25	M16	M24	333007050
SK50-50	50	165	90	123	90	35	35	M20	M24	333026093

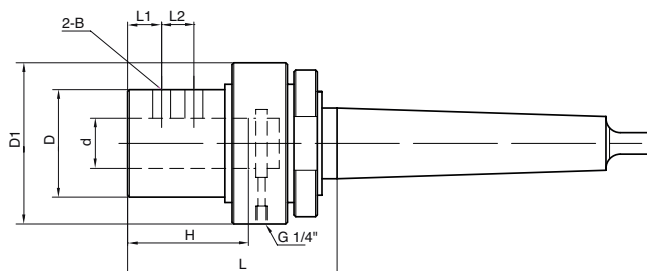
*With smaller shank diameters use bushings (page 21).



Coolant feed chuck with ISO taper according DIN 2080 and cylindrical mounting hole

Type	d* mm	L mm	D mm	D1 mm	H mm	L1 mm	L2 mm	2 B	M	Order no.
SK40-32	32	110	65	88	70	20	20	M14	M16	333007052
SK50-40	40	120	65	98	80	20	25	M16	M24	333007055
SK50-50	50	145	90	123	90	35	35	M20	M24	333026094

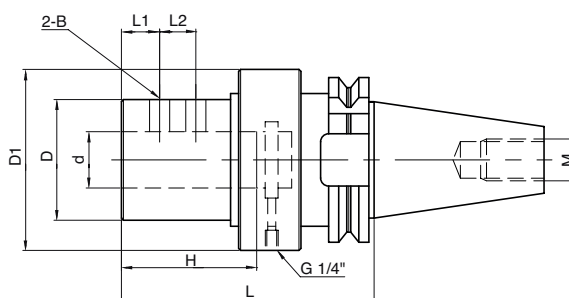
*With smaller shank diameters use bushings (page 21).



Coolant feed chuck with MT according DIN 228B and cylindrical mounting hole

Type	d* mm	L mm	D mm	D1 mm	H mm	L1 mm	L2 mm	2 B	Order no.
MT4-32	32	100	65	88	70	20	20	M14	333007057
MT5-40	40	110	75	98	80	20	25	M16	333007060
MT5-50	50	140	90	123	90	35	35	M20	333026097
MT6-40	40	120	75	98	80	20	25	M16	333007063
MT6-50	50	140	90	123	90	35	35	M20	333026096

*With smaller shank diameters use bushings (page 21).

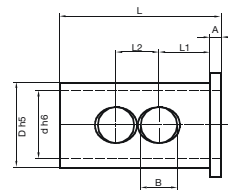
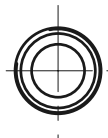


Coolant feed chuck with BT MAS403 and cylindrical mounting hole

Type	d* mm	L mm	D mm	D1 mm	H mm	L1 mm	L2 mm	2 B	M	Order no.
BT40-32	32	125	65	88	70	20	20	M14	M16	333007065
BT50-40	40	145	65	98	80	20	25	M16	M24	333007068
BT50-50	50	170	90	123	90	35	35	M20	M24	333026098

*With smaller shank diameters use bushings (page 21).

ACCESSORIES

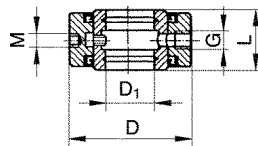


Bushing for coolant feed chuck with cylindrical mounting hole

Outer-Ø Inner-Ø	D	d	L	L1	L2	A	Order no.
Ø 32 / Ø 20	32	20	65	20	*	5	333007078
Ø 32 / Ø 25	32	25	65	20	20	5	333007079
Ø 40 / Ø 20	40	20	75	20	*	5	333007075
Ø 40 / Ø 25	40	25	75	20	25	5	333007076
Ø 40 / Ø 32	40	32	75	20	25	5	333007077
Ø 50 / Ø 32	50	32	95	35	35	5	333026099
Ø 50 / Ø 40	50	40	95	35	35	5	333026100

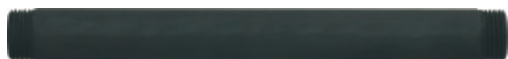


Pic. similar



86690 coolant delivery collar for holder series 86670 and 86680 (without screw fitting)

For Morse taper holder	D mm	D1 mm	L mm	M mm	G	Order no.
MT 4	80	31.75	45	M 10	G 1/4"	86690 31.750
MT 5	127	63.50	60	M 12	G 1/2"	86690 63.500



Pic. similar

82571 coolant delivery pipe for 86690

Nom. tube Ø	Thread Ø mm	Length mm	G		Suitable for order no.	Order no.
1/4"	13.160	200	G 1/4"		86690 31.750	82571 13.160
1/2"	20.960	200	G 1/2"		86690 63.500	82571 20.960



Pic. similar

82578 quick release pipe union

Max. operating pressure P in bar	Material	Hose stem mm	G		Suitable for order no.	Order no.
60	brass	9	G 1/4"		82571 13.160	82578 9.000
40	brass	13	G 1/2"		82571 20.960	82578 13.000

ACCESSORIES



86807 Torx screws for all insert holders except stepped holders

Size	Order no. Packaging unit 5 pcs.	Torx-Size
M 2 x 4	86807 2.000	T6
M 2.5 x 5	86807 2.500	T7
M 2.5 x 7	86807 2.501	T7
M 3 x 6	86807 3.000	T9
M 3 x 8	86807 3.001	T9
M 3.5 x 10	86807 3.500	T15
M 4 x 9	86807 4.000	T15
M 4 x 15	86807 4.001	T20
M 5 x 20	86807 5.000	T20



86842 screwdriver for Torx screws

Screwdriver size	Order no.
T 6	86842 2.000
T 7	86842 2.500
T 9	86842 3.000
T 15	86842 3.500
T 20	86842 4.000

THE COOLANT DELIVERY

Every Multiplex holder is equipped with an internal coolant system guaranteeing an optimal delivery of the coolant or the lubricant respectively to the cutting edges during horizontal as well as vertical drilling operations and subsequently improving tool life. In addition, the coolant ensures an optimised chip evacuation from the hole.

The type of coolant delivery is dependent on the shank design:

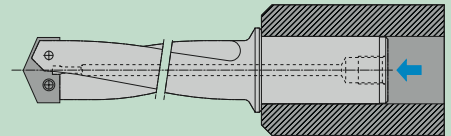
Coolant delivery bore on the end face of the shank

For **static** and **rotary** tools:

Axial coolant delivery through the tool holder.

For straight shank holders and hole-Ø 10 to 102 mm.

Holder product no. 86612/86622/86624/86730/86740/86750
and extra length holders



Coolant delivery bore on the surface of the shank with delivery chuck

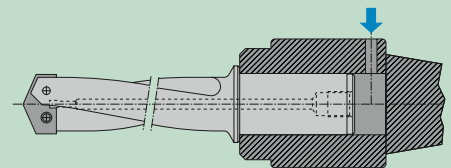
For **rotary** tools:

Radial coolant delivery through the coolant delivery chuck.

For straight shank holders and hole-Ø 10 to 102 mm.

Holder product no. 86612/86622/86624/86730/86740/86750
and extra length holders

Coolant feed chucks SK40/50 and Morsetaper MT4/5/6 to cyl.



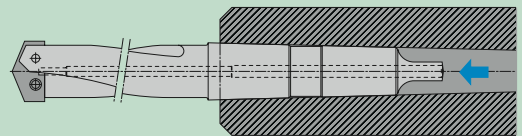
Coolant delivery bore in tang

For **static** and **rotary** tools:

Axial coolant delivery through the tool holder.

For Morse taper holders and hole-Ø 10 to 25 mm.

Holder product no. 86630/86650



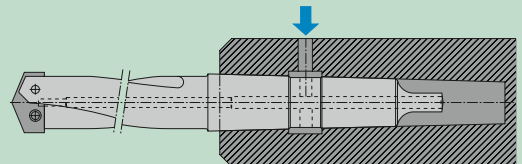
Lateral coolant delivery bore on Morse taper

For **static** tools:

Radial coolant delivery through the tool holder.

For Morse taper holders and hole-Ø 10 to 25 mm.

Holder on request

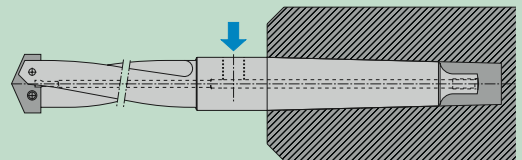


Lateral coolant delivery bore at seat of collar position

For **static** tools:

Coolant delivery via direct hose/pipe connection with thread R1/4" and R1/2". For Morse taper holders with seat for delivery collar for hole-Ø 25 to 102 mm.

Holder product no. 86670/86680 and extra length holders

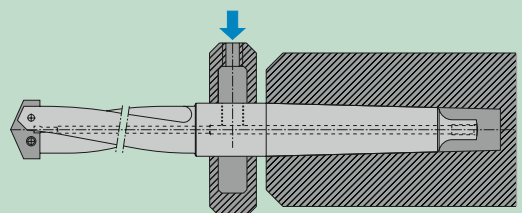


Lateral coolant delivery bore at seat of collar position

For **rotary** tools:

Radial coolant delivery through the delivery collar. For Morse taper holders with collar running face for hole-Ø over 25 mm.

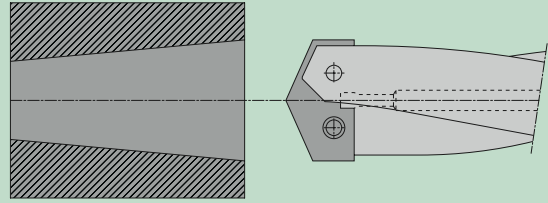
Holder product no. 86670/86680 and extra length holders



TIPS AND TRICKS

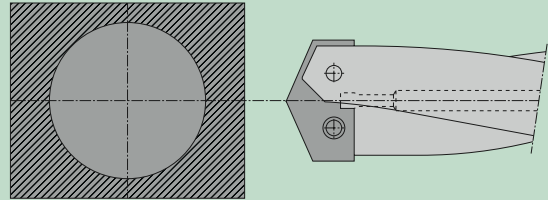
Drilling pre-drilled holes

As Multiplex system is guided predominantly by the chisel edge, it is not suitable for drilling pre-cast or pre-drilled holes. However, if the system is applied under the aforementioned conditions, the cutting parameters should be reduced.



Interrupted cutting

The Multiplex system is not suitable for interrupted cutting (i.e. transverse holes that are larger than the drill diameter).



Centering

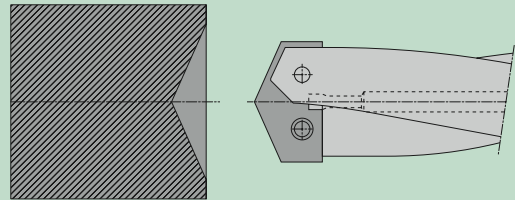
The inserts for the Multiplex system are web thinned. Therefore, centering is only necessary for larger drilling depths. If centering is necessary for technical reasons, the centering point angle must be equal or larger than the point angle of the insert.

The following applies: up to $d = 25.4 \text{ mm} = 135^\circ$

up to $d = 66.0 \text{ mm} = 132^\circ$

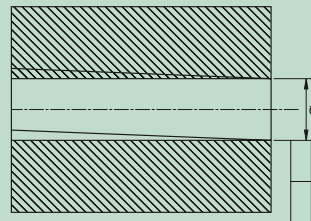
from $d = 66.0 \text{ mm} = 140^\circ$

A short holder (3xD) may also be applied for centering.



Drill running off center

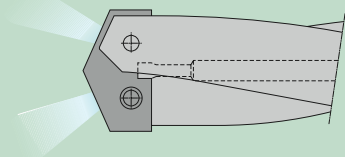
A drill running off center can be due to several factors. An approximate value of 0.1-0.16 mm for drilling depths up to 7xD is accepted as the norm. In this case the shortest possible and therefore the most rigid holder type should be applied.



Coolant pressure

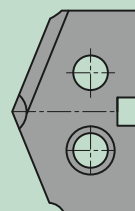
The coolant used with the Multiplex system is extremely important for the chip evacuation. It can be delivered at a pressure from approx. 5 bar. Generally, the following rule applies. The more coolant available, the better.

Through the use of coolant collars or coolant delivery chucks, the Multiplex system can also be applied on older machines with existing external cooling. One of our technical engineers will gladly find a solution to your specific application task.



Heavy cutting edge wear

If heat has eroded the corners, the cutting speed is too high and has to be reduced. Measure the unaffected diameter and re-calculate the cutting speed based on this new diameter. Subtract 10% from resulting speed and enter the value into the machine.



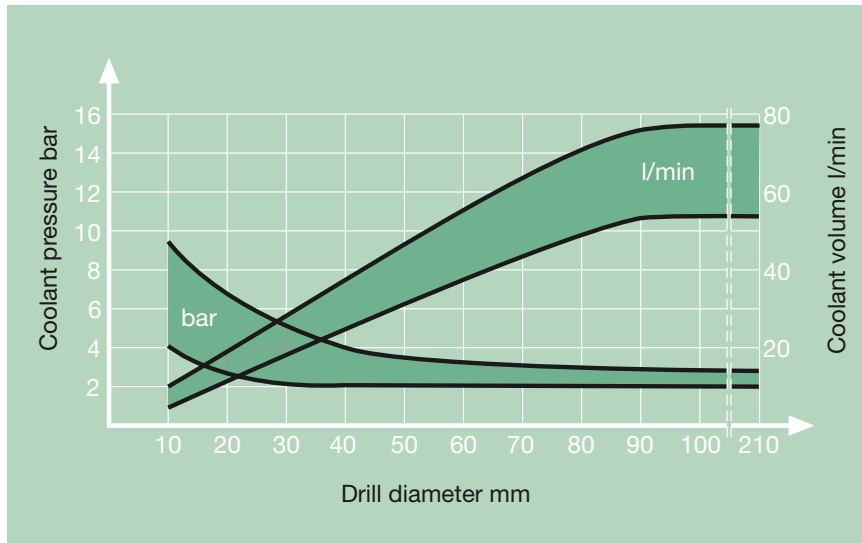
COOLING AGENTS

An efficient cooling agent is of extreme importance. Insufficient coolant pressure and volume can result in an unsatisfactory surface finish or tool breakage.

If possible, the size of solid particles in the coolant should not exceed 50 μm .

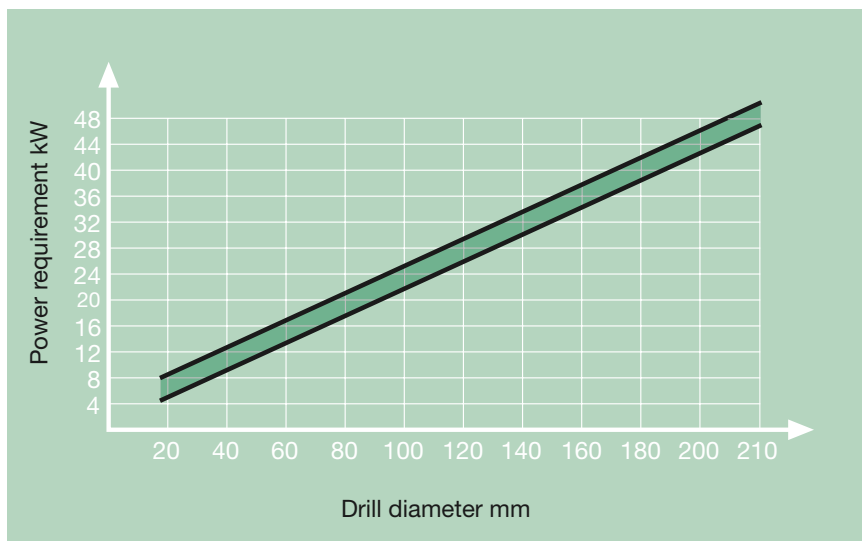
For the application of Multiplex tools with high speed steel or carbide inserts we recommend soluble oil as coolant applying the standard ratio of mixture of 1 : 20.

The coolant pressure and volume are more important than the composition of the soluble oil. An efficient cooling agent is therefore an important pre-requisite for sufficient cooling and lubrication.



MACHINE AND WORKPIECE

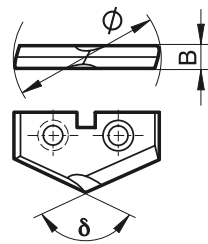
Only a rigid machine, spindle, workpiece and tool clamping make the application of carbide possible. Insufficient rigidity leads to vibrations or rapid corner wear of the drill during the production of through holes when the chisel edge exits the workpiece, resulting in reduced tool life or insert breakage.



STANDARD RANGE SOLID CARBIDE INTERCHANGEABLE INSERTS WITH FACET POINT GRIND

Tool material		Solid carbide	Solid carbide	Solid carbide	Solid carbide
Product no.		86701	86702	86708	86709
		w/o margin	with margin	with margin	w/o margin
Surface finish		F	F	T	T
Dia- meter mm	Width mm				
10.00	2.5	●	●		
10.20	2.5	●	●	○	
10.50	2.5	●	●		○
11.00	2.5	○	●		○
11.11	2.5				○
11.20	2.5				○
11.50	2.5	●	●	●	●
12.00	2.5	●	●		●
12.50	2.5	●	●		●
12.70	2.5				○
12.75	2.5	●	●		○
13.00	2.5	●	●	●	○
13.50	3.5	●	●	○	○
13.75	3.5	○	●		
14.00	3.5	●	●	●	●
14.10	3.5		●		
14.25	3.5	●			
14.50	3.5	●	●	○	●
14.75	3.5	○	○	●	●
15.00	3.5	●	●	●	○
15.50	3.5	●	●		
15.75	3.5	●			
15.88	3.5				○
16.00	3.5	●		●	
16.25	3.5	●	●		○
16.50	3.5	●	●	●	○
16.67	3.5				○
16.75	3.5	○	○	○	
17.00	3.5	●	●	●	●
17.50	3.5	●	●	●	●
17.75	3.5	○	●	●	○
18.00	3.5	●	●	●	●
18.25	3.5	○	●		○
18.50	3.5	●	●	●	●
18.75	3.5		●		
19.00	4.0	●	●	●	●
19.50	4.0	●	●		○
19.75	4.0	●	●	●	○
20.00	4.0	●	●	●	●
20.50	4.0	●	●	●	○
20.64	4.0				○
21.00	4.0	●	●	●	●
21.50	4.0	●	●		○
22.00	4.0	●	●	●	●
22.30	4.0		●		
22.50	4.0			●	
22.75	4.0		●		
23.00	4.0	●	●	●	●
23.25	4.0				○
23.50	4.0			●	
24.00	4.0	●		●	
24.25	4.0		○		
24.50	4.0	●	●		●
24.75	4.0				○
25.00	4.0	●	●	●	●
26.00	5.0	●	●	●	○

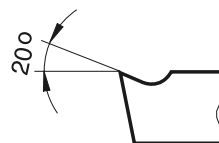
Tool material		Solid carbide	Solid carbide	Solid carbide	Solid carbide
Product no.		86701	86702	86708	86709
		w/o margin	with margin	with margin	w/o margin
Surface finish		F	F	T	T
Dia- meter mm	Width mm				
26.50	5.0		●		
27.00	5.0	●	●	○	○
28.00	5.0	●	●	●	●
29.00	5.0	●	●		
30.00	5.0	●	●	●	○
31.00	5.0	●		○	
32.00	5.0	●	●		
33.00	5.0	●	●		
34.00	5.0	●	●		
35.00	5.0	●	●		



≤ Ø 25.4 = 135°

> Ø 25.4 = 132°

> Ø 66.0 = 140°



without margins
for materials with a tensile
strength up to approximately
600 N/mm²



with margins
for materials with a tensile
strength over approximately
600 N/mm²



Please note:

Not mentioned intermediate diameters are available
on request.

STANDARD RANGE HSS-E-/PM HSS-E-INTERCHANGE- ABLE INSERTS WITH CHIP BREAKER GROOVES

Tool material		PM HSS-E	PM HSS-E
Product no.		86 602	86 608
Surface finish		T	F
Dia-meter mm	Width mm		
10.00	2.5	●	●
10.20	2.5	●	
10.50	2.5		○
11.00	2.5	●	○
11.75	2.5		●
12.00	2.5	●	●
12.25	2.5	○	
12.30	2.5	○	
12.40	2.5	○	
12.50	2.5	●	○
12.75	2.5	●	
13.00	2.5	●	●
13.25	2.5	●	
13.50	3.5	●	●
13.75	3.5	●	
14.00	3.5	●	●
14.25	3.5	●	●
14.50	3.5	●	●
14.75	3.5	●	○
15.00	3.5	●	●
15.25	3.5	○	○
15.30	3.5	●	
15.50	3.5	●	●
15.75	3.5	●	○
16.00	3.5	●	●
16.50	3.5	●	●
16.75	3.5	●	
17.00	3.5	●	●
17.25	3.5	●	
17.50	3.5	●	●
17.75	3.5	●	
18.00	3.5	●	●
18.25	3.5	●	●
18.50	3.5	●	●
18.75	3.5	●	●
19.00	4.0	●	●
19.50	4.0	●	○
19.75	4.0	●	●
20.00	4.0	●	●
20.25	4.0	●	○
20.50	4.0	●	●
21.00	4.0	●	●
21.25	4.0	●	
21.50	4.0	●	○
21.75	4.0	●	○
22.00	4.0	●	●
22.50	4.0	●	●
23.00	4.0	●	●
23.50	4.0	●	●
24.00	4.0	●	●
24.50	4.0	●	●
24.75	4.0	○	○
25.00	4.0	●	●

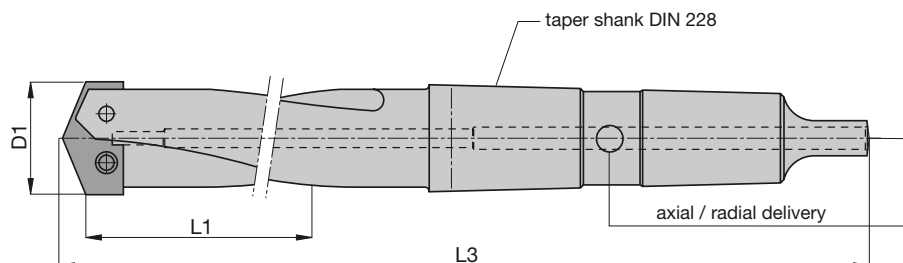
Tool material		PM HSS-E
Product no.		86 609
Surface finish		A
Dia-meter mm	Width mm	
25.00	5.0	●
25.50	5.0	●
26.00	5.0	●
26.50	5.0	●
27.00	5.0	●
28.00	5.0	●
29.00	5.0	●
29.50	5.0	●
30.00	5.0	●
31.00	5.0	●
32.00	5.0	●
33.00	5.0	●
34.00	5.0	●
35.00	5.0	●
36.00	7.0	●
37.00	7.0	●
38.00	7.0	●
39.00	7.0	●
40.00	7.0	●
41.00	7.0	●
42.00	7.0	●
43.00	7.0	●
44.00	7.0	●
45.00	7.0	●
46.00	7.0	●
47.00	7.0	●
48.00	7.0	●
49.00	7.0	●
50.00	7.0	●
51.00	7.0	●
52.00	7.0	●
53.00	7.0	●
54.00	7.0	●
55.00	7.0	●
56.00	7.0	●
57.00	7.0	●
58.00	7.0	●
59.00	7.0	●
60.00	7.0	●
62.00	7.0	●
64.00	7.0	●
65.00	7.0	●
68.00	9.0	●
70.00	9.0	●
74.00	9.0	●
75.00	9.0	●
80.00	9.0	●
82.00	9.0	●
84.00	9.0	●
85.00	9.0	●
88.00	9.0	●
90.00	9.0	●
93.00	9.0	●
95.00	9.0	●
96.00	9.0	●
98.00	9.0	●
100.00	9.0	●

Tool material		PM HSS-E
Product no.		86 609
Surface finish		A
Dia-meter mm	Width mm	
102.00	9.0	○
103.00	9.0	○
105.00	9.0	○
110.00	9.0	○
115.00	9.0	○
120.00	9.0	○
125.00	9.0	○
130.00	9.0	○
135.00	9.0	○
140.00	9.0	○
145.00	9.0	○
150.00	9.0	○
155.00	9.0	○
160.00	9.0	○
165.00	9.0	○
170.00	9.0	○
175.00	9.0	○
180.00	9.0	○
185.00	9.0	○
190.00	9.0	○
195.00	9.0	○
200.00	9.0	○
205.00	9.0	○
210.00	9.0	○

* intermediate sizes on request

WE CAN PROVIDE SPECIAL SOLUTIONS ON REQUEST (PLEASE MARK WITH A CROSS ACCORDING TO YOUR REQUIREMENTS):

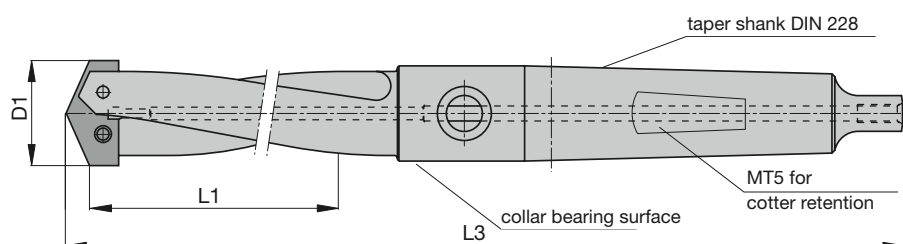
☐ Morse taper shank holder



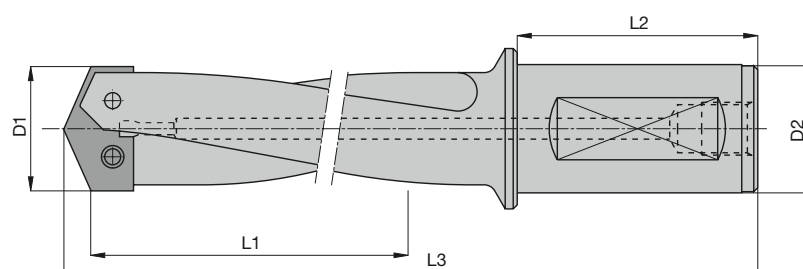
☐ Morse taper shank holder with collar bearing surface for delivery collar product no. 86690

☐ with flat

☐ without flat



☐ Straight shank holder



To supply a quote we also require the following data:

Hole diameter

(max. diameter of insert 210 mm)

Material to be machined

Drilling depth L1

Coolant pressure

Flute length

Quantity
(minimum order 2 units)

Total length
(up to approx. 1000 mm)

Transverse slot
(if Morse taper)

Shank diameter

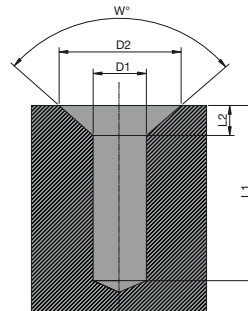
(if Weldon shank)

For further information please contact our technical department. Telephone +49 74 31/125-0

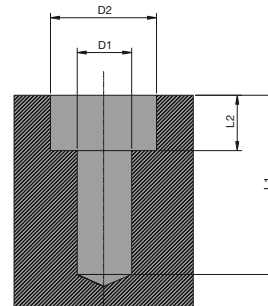
FOR SPECIAL STEPPED HOLES WE REQUIRE THE FOLLOWING DATA:



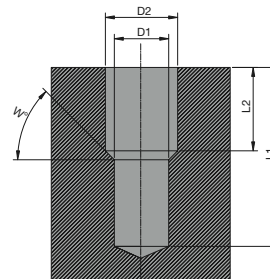
Step drill
for tapping size hole
with 90° step angle



Step drill
with 180° step angle



Stepped hole
with variable step angle



To supply a quote we also require the following data:

Hole form	Please mark with a cross above	Angle W°	
Diameter D1		Material to be machined	
Diameter D2			
Length L1			
Length L2			

or send us a drawing section that includes all the measurements required.

APPLICATION RECOMMENDATIONS FOR THE MULTI- PLEX INTERCHANGEABLE INSERT SYSTEM

Drill-Ø mm	Feed column no.				
	1	2	3	4	5
	f(mm/U)				
10.00	0.08	0.09	0.11	0.14	0.19
12.50	0.09	0.11	0.13	0.17	0.22
16.00	0.11	0.13	0.16	0.21	0.27
20.00	0.13	0.15	0.19	0.25	0.32
25.00	0.16	0.18	0.23	0.29	0.38
31.50	0.19	0.22	0.27	0.35	0.45
40.00	0.23	0.26	0.33	0.42	0.54
50.00	0.27	0.31	0.39	0.50	0.64
63.00	0.32	0.38	0.47	0.60	0.77
102.00	0.40	0.48	0.59	0.74	0.85

Tools with **bold** feed column no. are preferred choice.

- with drilling depth > 7 x D reduce cutting rates by 20%!
- with drilling depth ≥ 7 x D pilot drilling is recommended,
for all holders <7xD support for pilot hole is necessary!
- application recommendations for diameters > 102 mm on request.

Material group	Material examples Bold = material no. to DIN EN	Tensile strength N/mm ²	Hardness	Coolant
Common structural steels	1.0035 S185, 1.0486 StE P275N, 1.0345 P235GH, 1.0425 P265GH 1.0050 E295, 1.0070 E360, 1.8937 P500NH	≤500 >500-850		●
Free-cutting steels	1.0718 11SMnPb30, 1.0736 115Mn37 1.0727 46 S20, 1.0728 60 S20, 1.0757 46SPb20	≤850 850-1000		●
Unalloyed heat-treatable steels	1.0402 C22, 1.1178 C30E 1.0503 C45, 1.1191 C45E 1.0601 C60, 1.1221 C60E	≤ 700 700-850 850-1000		●
Alloyed heat-treatable steels	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	850-1000 1000-1200		●
Unalloyed case hardened steels	1.0301 C10, 1.1121 C10E	≤750		●
Alloyed case hardened steels	1.7043 38Cr4 1.5752 14NiCr14, 1.7131 16MnCr5, 1.7264 20CrMo5	850-1000 1000-1200		●
Nitriding steels	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≥850-1000 1000-1200		●
Tool steels	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 850-1000		●
High speed steels	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 61CrV4	≥650-1000		●
Spring steels	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4		≤330 HB	●
Stainless steels, sulphured	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18 9	≤850		●
austenitic	1.4301 X5CrNi18 10, 1.4541 X6CrNiTi18 10, 1.4571 X6CrNiMoTi 17 12 2	≤850		●
martensitic	1.4057 X17CrNi16-1, 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18 2	≤850		●
Hardened steels	–		≤40-48 HRC >48-60 HRC	●
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		●
Cast iron	EN-GJL-100 ... EN-GJL-200 (previously GG10 ... GG20) EN-GJL-250 ... EN-GJL-350 (previously GG25 ... GG45)		≤240 HB <300 HB	●
Spheroidal graphite and malleable cast iron	EN-GJMW-350-4, EN-GJMB-550-4, EN-GJS-500-7 (previously GTW35, GTS55, GGG50) EN-GJMB-700-2, EN-GJS-700-2 (previously GTS70, GGG70)		≤240 HB <300 HB	●
Chilled cast iron	–		≤350 HB	●
Ti and Ti-alloys	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7164 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 850-1200		●
Al and Al-alloys	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		●
Al wrought alloys	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤450		●
Al cast alloys ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		●
> 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Magnesium alloys	MgMn2, G-MgAl8Zn1, G-MgAl6Zn3	≤450		○
Copper, low-alloyed	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤400		●
Brass, short-chipping	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		●
Brass, long-chipping	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		●
Bronze, short-chipping	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 >600-850		●
Bronze, long-chipping	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 850-1000		●
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren		–	○
Thermoplastics	Plexiglas, Hostalen, Novodur, Makralon		–	○
Kevlar	Kevlar		–	○
Glass, carbon concentr. plastics	GFK/CFK		–	○

Coolant: ● soluble oil ● neat oil ○ air

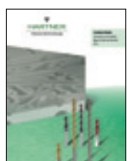
HIGH SPEED STEEL INTER-CHANGEABLE INSERTS

Tool material		PM HSS-E	PM HSS-E	PM HSS-E
Carbide description		–	–	–
Carbide grade		–	–	–
Surface finish				
Product no.		86602	86608	86609
Ø-range		10...25	10...25	25...210
with PM-HSS-E interchangeable inserts				
  				
v _c m/min for all drilling depths		Feed column no. for all drilling depths		
40	48	4		
35	42	4		
50	60	5		
40	50	5		
40	45	4		
35	40	4		
30	35	4		
25	28	3		
22	25	2		
35	40	3		
25	28	3		
22	25	2		
22	25	3		
15	18	2		
26	28	3		
22	25	2		
12	18	2		
10	13	2		
20	23	2		
15	17	2		
15	20	2		
35	40	4		
35	40	4		
35	40	4		
28	33	4		
60	65	5		
80	85	5		
85	85	5		
70	70	5		
45	50	4		
45	50	4		
60	65	5		
45	50	4		
32	35	5		
40	45	3		
36	40	3		
28	32	3		
22	27	3		

CARBIDE INTERCHANGE-ABLE INSERTS

Tool material		Solid carbide	Solid carbide	Solid carbide	Solid carbide
Carbide description		H22	H22	H22	H22
Carbide grade		K20 - K40	K20 - K40	K20 - K40	K20 - K40
Surface finish					
Product no.		86709	86701	86708	86702
Ø-range		10...35	10...35	10...35	10...35
Point grind		... w/o margins for materials with a tensile strength up to app. 600 N/mm² 		... with margins for materials with a tensile strength over 600 N/mm² 	
With solid carbide interch. inserts					
					
v _c m/min for all drilling depths		Feed column no. for all drilling depths			
60	70	5			
55	65	4			
100	115	4			
95	105	4			
80	90	4			
80	90	4			
75	85	3			
70	80	4			
60	70	3			
85	95	4			
70	80	4			
55	65	3			
60	65	3			
50	55	2			
40	45	3			
35	40	2			
40	45	2			
35	40	2			
40	45	2			
25	30	2			
25	30	1			
100	120	5			
90	105	4			
80	90	4			
65	75	3			
25	30	1			
180	200	5			
160	180	5			
140	160	5			
130	150	5			
150	160	5			
70	80	4			
160	180	5			
110	120	4			
80	90	5			
65	75	4			
45	50	4			
35	40	4			
70	85	3			
70	85	3			
70	85	3			
70	85	3			

Our programme:



FU 500/FN500



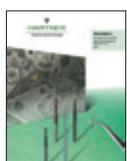
Gun Drills



INOX Drills



Standard Solid Carbide De-burring Tools



Micro Precision Drills



Multiplex



TS-Drills



Multiplex HPC



Highlights



Standard Range



Special Drills



TM Vending Machines

Hartner GmbH

P.O. Box 10 04 27, D-72425 Albstadt

Tel. +49 74 31/1 25-0, Fax +49 74 31/1 25-21 547

www.hartner.de