

# UrmaCircoTec

made in Swi<sup>+</sup>zerland

[www.urma.ch](http://www.urma.ch)

# **Ihre Vorteile mit CircoTec RX    $\varnothing$ 11.90 - 140.60 mm** **Advantages of using CircoTec RX** **Vos avantages avec CircoTec RX**



## **Einfaches Handling**

Noch nie haben Sie Reibschneiden so schnell und unkompliziert gewechselt!

## **Prozesssicherheit**

Hohe Wiederholgenauigkeit beim Schneidenwechsel und Hochleistungsschneidstoffe geben Ihnen mehr Sicherheit in der Anwendung.

## **Flexibilität**

Sowohl im Schneidenträger- und Schaftsystem, als auch in der Vielfältigkeit der verfügbaren Schneidstoffe und Durchmesserbereiche.

## **Vorteilhafter Preis**

Deutlich tiefere Schneidenkosten und höhere Leistungsfähigkeit. Ihr Gewinn: tiefere Kosten pro Bohrung!

## **Simple Handling**

Never before, have you been able to change your reamers this fast and straight forward!

## **Reliability**

Accurate repeatability teamed with the high performance RX inserts makes your applications safer.

## **Flexibility**

With our patented insert holders and shank systems, we are able to offer a variety of insert grades along with a wide diameter range that starts at 11.9 mm and goes thru 140.6 mm.

## **Competitive Pricing**

Remarkably, with higher performance and lower prices for the inserts, you will lower your cost per bore while increasing your profits!

## **Manipulation simple**

Il n'a encore jamais été aussi facile d'échanger l'outil de coupe d'un alésoir!

## **Procédé infallible**

La haute précision de répétitivité au changement et les matériaux de hautes performances, sécurisent l'application.

## **Flexibilité**

Grande diversité et choix dans les corps, matériaux et diamètres, ainsi qu'une grande possibilité d'adaptation personnelle.

## **Prix avantageux**

Prix de coupe nettement plus avantageux pour une production plus élevée. Votre gain, un prix par alésage plus avantageux!

**CircoTec RX<sup>®</sup> stellt das Reiben auf den Kopf!**  
**The CircoTec RX<sup>®</sup> system is turning the reaming world upside down!**  
**CircoTec RX<sup>®</sup> met l'alésage sens dessus-dessous!**

**original and patented**

# Inhalt

## Content

## Contenu

Seite  
Page  
Page

### CircoTec RX

3 - 14



#### Schneiden

Inserts  
Plaquettes

4 - 5



#### Schneidenträger

Insert holders  
Porte-plaquettes

6 - 7



#### Schäfte (mit integriertem Ausrichtmechanismus)

Shanks (with integrated compensation device)  
Porte-outils (avec mécanisme de compensation intégré du mal rond)

8



#### Aufnahmen (mit integriertem Ausrichtmechanismus)

Adaptors (with integrated compensation device)  
Adaptateurs (avec mécanisme de compensation intégré du mal rond)

9



#### DEK-Adapter

DEK-Adaptor  
DEK-Adaptateur

10



#### System-Aufnahmen Beta-Modul

System adaptors Beta-Modul  
Adaptateurs Beta-Modul

11 - 12



#### Reduktionen Beta-Modul

Reducers Beta-Modul  
Réductions Beta-Modul

13



#### Verlängerungen Beta-Modul

Extensions Beta-Modul  
Rallonges Beta-Modul

14

### CircoTec Variopoint

15 - 27

### Zubehör | Accessories | Accessoires

29 - 33

### Technologie | Technology | Technologie

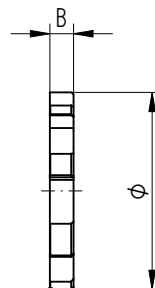
34 - 49

# Schneiden

## Inserts

## Plaquettes

ø 11.9 - 35.6 mm



### Gerade Schneiden

#### Straight fluted inserts

#### Outils avec coupe droite



| RX Systemgröße       | Ø-Bereich mm    | B   | z | VE | Bestell-Nr.                                                                                 |
|----------------------|-----------------|-----|---|----|---------------------------------------------------------------------------------------------|
| RX parameter         | Ø-range mm      |     |   |    | Order No.                                                                                   |
| RX taille de système | Ø-plage mm      |     |   |    | No de commande                                                                              |
| RX 016               | 11.900 - 15.600 | 4.3 | 6 | 4  | <b>RXG...</b><br>Bestellbeispiel unten<br>Order example below<br>Exemple de commande en bas |
| RX 019               | 15.601 - 18.600 | 4.3 | 6 | 4  |                                                                                             |
| RX 024               | 18.601 - 23.600 | 4.3 | 6 | 4  |                                                                                             |
| RX 029               | 23.601 - 28.600 | 4.3 | 8 | 2  |                                                                                             |
| RX 036               | 28.601 - 35.600 | 4.3 | 8 | 1  |                                                                                             |

Mindestbestellmenge 3 Stk. | Minimum order quantity 3 pcs. | Commande minimale 3 pcs.

VE = Verpackungseinheit | Packaging qty. | Unité d'emballage  
 z = Schneidenzahl | Number of cutters | Nombre d'outils



### Linksschräg verzahnte Schneiden

#### Left helical fluted inserts

#### Outils avec coupe diagonale gauche



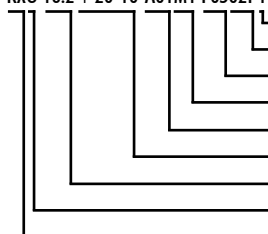
| RX Systemgröße       | Ø-Bereich mm    | B   | z | VE | Bestell-Nr.                                                                                 |
|----------------------|-----------------|-----|---|----|---------------------------------------------------------------------------------------------|
| RX parameter         | Ø-range mm      |     |   |    | Order No.                                                                                   |
| RX taille de système | Ø-plage mm      |     |   |    | No de commande                                                                              |
| RX 016               | 11.900 - 15.600 | 4.3 | 6 | 4  | <b>RXL...</b><br>Bestellbeispiel unten<br>Order example below<br>Exemple de commande en bas |
| RX 019               | 15.601 - 18.600 | 4.3 | 6 | 4  |                                                                                             |
| RX 024               | 18.601 - 23.600 | 4.3 | 6 | 4  |                                                                                             |
| RX 029               | 23.601 - 28.600 | 4.3 | 8 | 2  |                                                                                             |
| RX 036               | 28.601 - 35.600 | 4.3 | 8 | 1  |                                                                                             |

Mindestbestellmenge 3 Stk. | Minimum order quantity 3 pcs. | Commande minimale 3 pcs.

VE = Verpackungseinheit | Packaging qty. | Unité d'emballage  
 z = Schneidenzahl | Number of cutters | Nombre d'outils

### Bestellbeispiel | Order example | Exemple de commande

RXG 18.2+20-10-A01M1 F0502P1



1 = Dünnschicht; 2 = Dickschicht  
 Behandlung/Beschichtungstyp  
 Schneidstoff-Sorte  
 Nano finishing (siehe Seite 38)  
 Anschnittgeometrie  
 Toleranzangabe in µm +/- (oder IT)  
 Durchmesser in mm  
 Schneidenform (G=gerade; L= linksschräg)  
 RX-Systembezeichnung

1 = Thin coating; 2 = Thick coating  
 Coating  
 Cutting material  
 Nano finishing (see page 38)  
 Chamfer angel  
 Tolerance in µm +/- (or Standard)  
 Diameter in mm  
 Flute form (G=straight; L= helical left)  
 RX the system

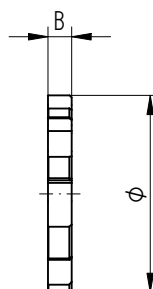
1 = Couche fine; 2 = Couche épaisse  
 Traitement/type de revêtement  
 Matière de coupe  
 Nano finishing (voir page 38)  
 Géométrie d'abordage semblable  
 Tolérances en µm +/- (ou IT)  
 Diamètre en mm  
 Forme de coupe (G=droite; L=gauche)  
 Symbole système RX

# Schneiden

## Inserts

## Plaquettes

ø 35.601 - 140.6 mm



**Gerade Schneiden**  
Straight fluted inserts  
Outils avec coupe droite



| RX Systemgröße<br>RX parameter<br>RX taille de système | Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | B   | z  | VE | Bestell-Nr.<br>Order No.<br>No de commande                                                  |
|--------------------------------------------------------|------------------------------------------|-----|----|----|---------------------------------------------------------------------------------------------|
| RX 044                                                 | 35.601 - 43.600                          | 4.3 | 8  | 1  | <b>RXG...</b><br>Bestellbeispiel unten<br>Order example below<br>Exemple de commande en bas |
| RX 052                                                 | 43.601 - 51.600                          | 4.3 | 10 | 1  |                                                                                             |
| RX 061                                                 | 51.601 - 60.600                          | 4.3 | 10 | 1  |                                                                                             |
| RX 081                                                 | 60.601 - 80.600                          | 4.3 | 12 | 1  |                                                                                             |
| RX 101                                                 | 80.601 - 100.600                         | 4.3 | 12 | 1  |                                                                                             |
| RX 121                                                 | 100.601 - 120.600                        | 5.3 | 12 | 1  |                                                                                             |
| RX 141                                                 | 120.601 - 140.600                        | 5.3 | 12 | 1  |                                                                                             |

Mindestbestellmenge 2 Stk. | Minimum order quantity 2 pcs. | Commande minimale 2 pcs.

VE = Verpackungseinheit | Packaging qty. | Unité d'emballage  
z = Schneidenzahl | Number of cutters | Nombre d'outils



**Linksschräg verzahnte Schneiden**  
Left helical fluted inserts  
Outils avec coupe diagonale gauche



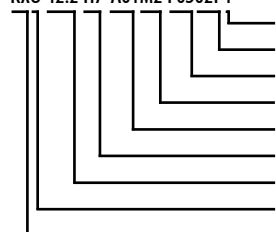
| RX Systemgröße<br>RX parameter<br>RX taille de système | Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | B   | z  | VE | Bestell-Nr.<br>Order No.<br>No de commande                                                  |
|--------------------------------------------------------|------------------------------------------|-----|----|----|---------------------------------------------------------------------------------------------|
| RX 044                                                 | 35.601 - 43.600                          | 4.3 | 8  | 1  | <b>RXL...</b><br>Bestellbeispiel unten<br>Order example below<br>Exemple de commande en bas |
| RX 052                                                 | 43.601 - 51.600                          | 4.3 | 10 | 1  |                                                                                             |
| RX 061                                                 | 51.601 - 60.600                          | 4.3 | 10 | 1  |                                                                                             |
| RX 081                                                 | 60.601 - 80.600                          | 4.3 | 12 | 1  |                                                                                             |
| RX 101                                                 | 80.601 - 100.600                         | 4.3 | 12 | 1  |                                                                                             |
| RX 121                                                 | 100.601 - 120.600                        | 5.3 | 12 | 1  |                                                                                             |
| RX 141                                                 | 120.601 - 140.600                        | 5.3 | 12 | 1  |                                                                                             |

Mindestbestellmenge 2 Stk. | Minimum order quantity 2 pcs. | Commande minimale 2 pcs.

VE = Verpackungseinheit | Packaging qty. | Unité d'emballage  
z = Schneidenzahl | Number of cutters | Nombre d'outils

### Bestellbeispiel | Order example | Exemple de commande

RXG 42.2 H7-A01M2 F0502P1



1 = Dünnschicht; 2 = Dickschicht  
Behandlung/Beschichtungstyp  
Schneidstoff-Sorte  
Nano finishing (siehe Seite 38)  
Anschnittgeometrie  
Toleranzangabe in µm +/- (oder IT)  
Durchmesser in mm  
Schneidenform (G=gerade; L= linksschräg)  
RX-Systembezeichnung

1 = Thin coating; 2 = Thick coating  
Coating  
Cutting material  
Nano finishing (see page 38)  
Chamfer angel  
Tolerance in µm +/- (or Standard)  
Diameter in mm  
Flute form (G= straight; L= helical left)  
RX the system

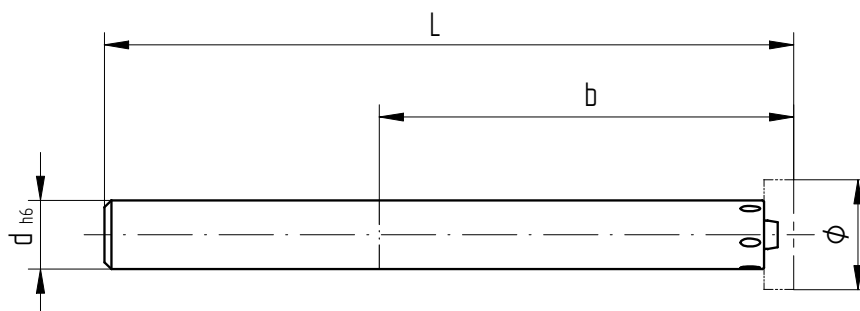
1 = Couche fine; 2 = Couche épaisse  
Traitement/type de revêtement  
Matière de coupe  
Nano finishing (voir page 38)  
Géométrie d'abordage semblable  
Tolérances en µm +/- (ou IT)  
Diamètre en mm  
Forme de coupe (G= droite; L= gauche)  
Symbole système RX

# Schneidenträger

## Insert holders

## Porte-plaquettes

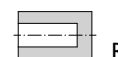
ø 11.9 - 35.6 mm



### Kurze Ausführung

Short version

Version courte

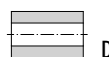


| RX Systemgröße<br>RX parameter<br>RX taille de système | Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | ø d<br>h6 | L   | b   | kg   | Bestell-Nr. «D»<br>Order No. «D»<br>No de commande «D» | Bestell-Nr. «B»<br>Order No. «B»<br>No de commande «B» |
|--------------------------------------------------------|------------------------------------------|-----------|-----|-----|------|--------------------------------------------------------|--------------------------------------------------------|
| RX 016                                                 | 11.900 - 15.600                          | 10        | 100 | 60  | 0.06 | RXD16 10 100                                           | RXB16 10 100                                           |
| RX 019                                                 | 15.601 - 18.600                          | 12        | 115 | 70  | 0.1  | RXD19 12 115                                           | RXB19 12 115                                           |
| RX 024                                                 | 18.601 - 23.600                          | 16        | 128 | 80  | 0.2  | RXD24 16 128                                           | RXB24 16 128                                           |
| RX 029                                                 | 23.601 - 28.600                          | 20        | 145 | 95  | 0.35 | RXD29 20 145                                           | RXB29 20 145                                           |
| RX 036                                                 | 28.601 - 35.600                          | 25        | 170 | 110 | 0.65 | RXD36 25 170                                           | RXB36 25 170                                           |

### Lange Ausführung (Stahl und Hartmetall)

Long version (steel and carbide)

Version longue (en acier et en métal dur)



| RX Systemgröße<br>RX parameter<br>RX taille de système | Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | ø d<br>h6 | L   | b   | kg   | Bestell-Nr. «D»<br>Order No. «D»<br>No de commande «D» | Bestell-Nr. «B»<br>Order No. «B»<br>No de commande «B» |
|--------------------------------------------------------|------------------------------------------|-----------|-----|-----|------|--------------------------------------------------------|--------------------------------------------------------|
| RX 016                                                 | 11.900 - 15.600                          | 10        | 160 | 120 | 0.1  | RXD16 10 160                                           | RXB16 10 160                                           |
| RX 016                                                 | 11.900 - 15.600                          | 10        | 160 | 120 | 0.2  | RXD16 10 160HM                                         | RXB16 10 160HM                                         |
| RX 019                                                 | 15.601 - 18.600                          | 12        | 185 | 140 | 0.15 | RXD19 12 185                                           | RXB19 12 185                                           |
| RX 019                                                 | 15.601 - 18.600                          | 12        | 185 | 140 | 0.3  | RXD19 12 185HM                                         | RXB19 12 185HM                                         |
| RX 024                                                 | 18.601 - 23.600                          | 16        | 208 | 160 | 0.3  | RXD24 16 208                                           | RXB24 16 208                                           |
| RX 024                                                 | 18.601 - 23.600                          | 16        | 208 | 160 | 0.6  | RXD24 16 208HM                                         | RXB24 16 208HM                                         |
| RX 029                                                 | 23.601 - 28.600                          | 20        | 240 | 190 | 0.55 | RXD29 20 240                                           | RXB29 20 240                                           |
| RX 029                                                 | 23.601 - 28.600                          | 20        | 240 | 190 | 1.1  | RXD29 20 240HM                                         | RXB29 20 240HM                                         |
| RX 036                                                 | 28.601 - 35.600                          | 25        | 274 | 214 | 1    | RXD36 25 274                                           | RXB36 25 274                                           |
| RX 036                                                 | 28.601 - 35.600                          | 25        | 274 | 214 | 1.9  | RXD36 25 274HM                                         | RXB36 25 274HM                                         |

Lieferumfang: 1 Satz Ersatzschrauben und 1 Torx-Fahndendreher inbegriffen (Drehmomentdreher empfohlen, Seite 30) | D = Durchgangsbohrung | B = Sacklochbohrung | HM = mit Hartmetallschaft | Ausrichtfutter Seite 32

Scope of delivery: 1 Set of replacement screws and 1 Torx screw driver (Torques screw driver is recommended, page 30) | D = Through bore | B = Blind hole | HM = with carbide shanks | Compensation holder page 32

Volume de livraison: 1 Ensemble de remplacement et 1 Tournevis à drapeau (1 clé dynamométrique est recommandée, page 30) | D = Trou passant | B = Trou borgne | HM = à corps en métal dur | Mandrin de compensation page 32

### Ersatzteile | Spare parts | Pièces de rechange

RX Systemgröße

RX parameter

RX taille de système



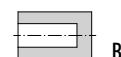
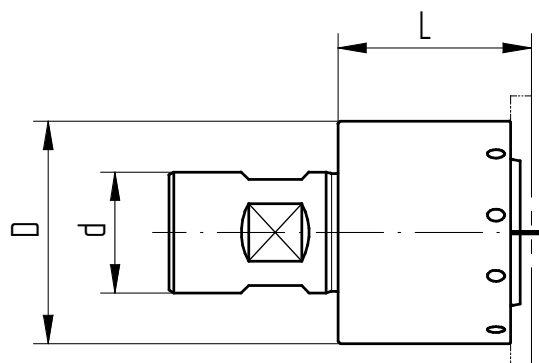
|        |                |           |
|--------|----------------|-----------|
| RX 016 | C00 90 00 (3x) | G00 20 01 |
| RX 019 | C00 90 00 (3x) | G00 20 01 |
| RX 024 | C00 90 01 (3x) | G00 20 02 |
| RX 029 | C00 90 01 (4x) | G00 20 02 |
| RX 036 | C00 90 01 (4x) | G00 20 02 |

# Schneidenträger

## Insert holders

## Porte-plaquettes

ø 35.601 - 140.6 mm



| RX Systemgröße<br>RX parameter<br>RX taille de système | Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | D  | d  | L  | kg   | Bestell-Nr. «G»<br>Order No. «G»<br>No de commande «G» | Bestell-Nr. «B»<br>Order No. «B»<br>No de commande «B» |
|--------------------------------------------------------|------------------------------------------|----|----|----|------|--------------------------------------------------------|--------------------------------------------------------|
| RX 044                                                 | 35.601 - 43.600                          | 32 | 18 | 30 | 0.3  | RXKG44 32 18 030                                       | RXKB44 32 18 030                                       |
| RX 052                                                 | 43.601 - 51.600                          | 39 | 20 | 35 | 0.45 | RXKG52 39 20 035                                       | RXKB52 39 20 035                                       |
| RX 061                                                 | 51.601 - 60.600                          | 46 | 25 | 40 | 0.7  | RXKG61 46 25 040                                       | RXKB61 46 25 040                                       |
| RX 081                                                 | 60.601 - 80.600                          | 56 | 32 | 50 | 1.25 | RXKG81 56 32 050                                       | RXKB81 56 32 050                                       |
| RX 101                                                 | 80.601 - 100.600                         | 76 | 40 | 60 | 2.6  | RXKG101 76 40 060                                      | RXKB101 76 40 060                                      |
| RX 121                                                 | 100.601 - 120.600                        | 76 | 40 | 60 | 3.25 | RXKG121 76 40 060                                      | RXKB121 76 40 060                                      |
| RX 141                                                 | 120.601 - 140.600                        | 76 | 40 | 60 | 3.9  | RXKG141 76 40 060                                      | RXKB141 76 40 060                                      |

Lieferumfang: 1 Satz Ersatzschrauben und 1 Torx-Fahndrehreher inbegriffen (Drehmomentdreher empfohlen, Seite 30)

Scope of delivery: 1 Set of replacement screws and 1 Torx screw driver (Torques screw driver is recommended, page 30)

Volume de livraison: 1 Ensemble de remplacement et 1 tournevis à drapeau (1 clé dynamométrique est recommandée, page 30)

**Achtung:** Schraube Typ «3B» bei B-Version verwenden

**Attention:** Use the screw type «3B» for the version B

**Attention:** Utilisez la vis type «3B» pour la version B

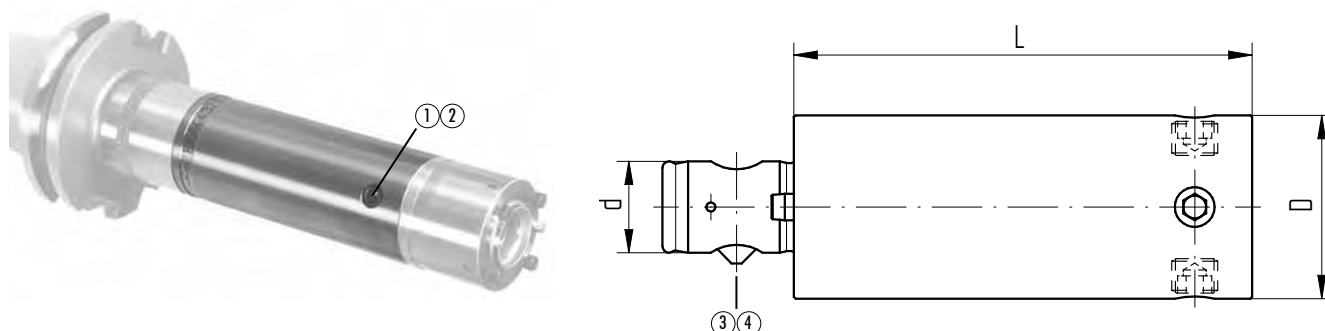
### Ersatzteile | Spare parts | Pièces de rechange

| RX Systemgröße<br>RX parameter<br>RX taille de système | ①                                                                                   | ②                                                                                   | ③G                                                                                  | ③B                                                                                  | ④                                                                                   |
|--------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                        |  |  |  |  |  |
| RX 044                                                 | C00 90 02 (4x)                                                                      | 600 20 02                                                                           | C00 26 23                                                                           | C00 26 23 B                                                                         | 600 02 07                                                                           |
| RX 052                                                 | C00 90 02 (5x)                                                                      | 600 20 02                                                                           | C00 26 38                                                                           | C00 26 38 B                                                                         | 600 02 07                                                                           |
| RX 061                                                 | C00 90 02 (5x)                                                                      | 600 20 02                                                                           | C00 24 26                                                                           | C00 24 26 B                                                                         | 600 02 08                                                                           |
| RX 081                                                 | C00 90 04 (4x)                                                                      | 600 20 03                                                                           | C00 26 37                                                                           | C00 26 37 B                                                                         | 600 02 09                                                                           |
| RX 101                                                 | C00 90 04 (4x)                                                                      | 600 20 03                                                                           | C00 24 31                                                                           | C00 24 31 B                                                                         | 600 02 16                                                                           |
| RX 121                                                 | C00 90 04 (8x)                                                                      | 600 20 03                                                                           | C00 24 31                                                                           | C00 24 31 B                                                                         | 600 02 16                                                                           |
| RX 141                                                 | C00 90 04 (8x)                                                                      | 600 20 03                                                                           | C00 24 31                                                                           | C00 24 31 B                                                                         | 600 02 16                                                                           |

# Schäfte (mit integriertem Ausrichtmechanismus) ø 35.601 - 140.6 mm

## Shanks (with integrated compensation device)

## Porte-outils (avec mécanisme de compensation intégré du mal rond)



| RX Systemgröße<br>RX parameter<br>RX taille de système | Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | D  | d     | L   | kg   | Bestell-Nr.<br>Order No.<br>No de commande |
|--------------------------------------------------------|------------------------------------------|----|-------|-----|------|--------------------------------------------|
| RX 044                                                 | 35.601 - 43.600                          | 32 | BM 32 | 55  | 0.3  | RXA44 32 BM32 055                          |
|                                                        |                                          | 32 | BM 32 | 80  | 0.45 | RXA44 32 BM32 080                          |
|                                                        |                                          | 32 | ZS 20 | 55  | 0.4  | RXA44 32 ZS20 055                          |
|                                                        |                                          | 32 | ZS 20 | 80  | 0.55 | RXA44 32 ZS20 080                          |
| RX 052                                                 | 43.601 - 51.600                          | 39 | BM 40 | 60  | 0.55 | RXA52 39 BM40 060                          |
|                                                        |                                          | 39 | BM 40 | 100 | 0.9  | RXA52 39 BM40 100                          |
|                                                        |                                          | 39 | ZS 25 | 60  | 0.65 | RXA52 39 ZS25 060                          |
|                                                        |                                          | 39 | ZS 25 | 100 | 1    | RXA52 39 ZS25 100                          |
| RX 061                                                 | 51.601 - 60.600                          | 46 | BM 50 | 70  | 0.9  | RXA61 46 BM50 070                          |
|                                                        |                                          | 46 | BM 50 | 120 | 1.6  | RXA61 46 BM50 120                          |
|                                                        |                                          | 46 | ZS 32 | 70  | 1.1  | RXA61 46 ZS32 070                          |
|                                                        |                                          | 46 | ZS 32 | 120 | 1.7  | RXA61 46 ZS32 120                          |
| RX 081                                                 | 60.601 - 80.600                          | 56 | BM 50 | 80  | 1.2  | RXA81 56 BM50 080                          |
|                                                        |                                          | 56 | BM 50 | 140 | 2.1  | RXA81 56 BM50 140                          |
|                                                        |                                          | 56 | ZS 40 | 80  | 1.6  | RXA81 56 ZS40 080                          |
|                                                        |                                          | 56 | ZS 40 | 140 | 2.5  | RXA81 56 ZS40 140                          |
| RX 101   RX 121   RX 141                               | 80.601 - 140.600                         | 76 | BM 63 | 100 | 2.5  | RXA101 76 BM63 100                         |
|                                                        |                                          | 76 | BM 63 | 160 | 3.9  | RXA101 76 BM63 160                         |
|                                                        |                                          | 76 | ZS 40 | 100 | 2.8  | RXA101 76 ZS40 100                         |
|                                                        |                                          | 76 | ZS 40 | 160 | 4.2  | RXA101 76 ZS40 160                         |

1 Inbusschlüssel inbegriffen | 1 Hex key included | 1 clé imbus incluse

### Spannschaftbezeichnung | Definition of clamping holder | Définition

BM = Urma Beta-Modul (modular)  
ZS = Zylinderschaft DIN 1835-A  
WD = Weldonschaft DIN 1835-B\*  
WN = Whistle-Notch DIN 1835-E\*  
\*auf Anfrage

BM = Beta-Modul Urma (modular)  
ZS = Cylindrical shaft DIN 1835-A  
WD = Weldon DIN 1835-B\*  
WN = Whistle-Notch DIN 1835-E\*  
\*on request

BM = Beta-Modul Urma (modulaire)  
ZS = Corps cylindrique Din 1835-A  
WD = Corps Weldon DIN 1835-B\*  
WN = Whistle-Notch DIN 1835-E\*  
\*sur demande

### Ersatzteile | Spare parts | Pièces de rechange

| RX Systemgröße<br>RX parameter<br>RX taille de système | ①              | ②         | ③         | ④         |
|--------------------------------------------------------|----------------|-----------|-----------|-----------|
| RX 044                                                 | C00 90 08 (4x) | G00 02 05 | Z00 32 21 | Z00 32 23 |
| RX 052                                                 | C00 90 10 (4x) | G00 02 06 | Z00 40 21 | Z00 40 23 |
| RX 061                                                 | C00 90 10 (4x) | G00 02 06 | Z00 50 21 | Z00 50 23 |
| RX 081                                                 | C00 90 12 (4x) | G00 02 07 | Z00 50 21 | Z00 50 23 |
| RX 101                                                 | C00 90 16 (4x) | G00 02 08 | Z00 63 21 | Z00 63 23 |
| RX 121                                                 | C00 90 16 (4x) | G00 02 08 | Z00 63 21 | Z00 63 23 |
| RX 141                                                 | C00 90 16 (4x) | G00 02 08 | Z00 63 21 | Z00 63 23 |



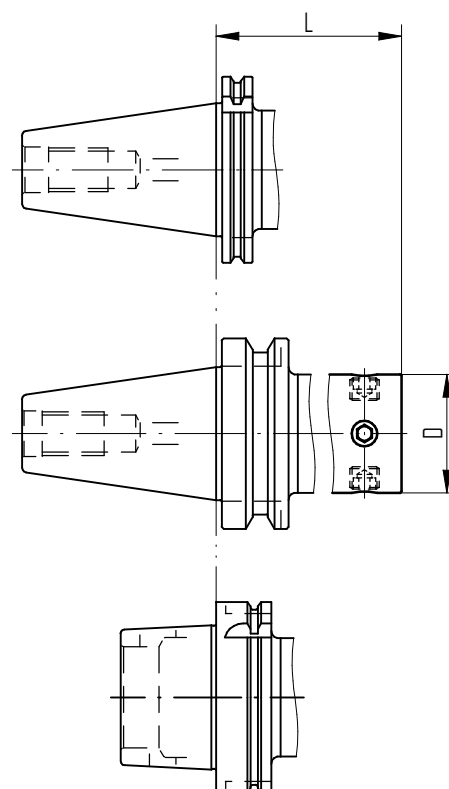
# Aufnahmen (mit integriertem Ausrichtmechanismus) ø 35.601 - 140.6 mm

Adaptors (with integrated compensation device)

Adaptateurs (avec mécanisme de compensation intégré du mal rond)



| Aufnahmen<br>Adaptors<br>Adaptateurs | RX Systemgrösse<br>RX parameter<br>RX taille de système |  | D  | L   | kg  | Bestell-Nr.<br>Order No.<br>No de commande |
|--------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------|----|-----|-----|--------------------------------------------|
| DIN 69871-A/D                        | RX 044                                                  | 40                                                                                | 32 | 65  | 1.1 | RXAD10 40A 44 065                          |
|                                      | RX 052                                                  | 40                                                                                | 39 | 65  | 1.2 | RXAD10 40A 52 065                          |
|                                      | RX 061                                                  | 40                                                                                | 46 | 75  | 1.4 | RXAD10 40A 61 075                          |
|                                      | RX 081                                                  | 40                                                                                | 56 | 85  | 1.6 | RXAD10 40A 81 085                          |
|                                      | RX 101 - RX 141                                         | 40                                                                                | 76 | 95  | 2.2 | RXAD10 40A 101 095                         |
|                                      | RX 044                                                  | 50                                                                                | 32 | 65  | 2.9 | RXAD10 50A 44 065                          |
|                                      | RX 052                                                  | 50                                                                                | 39 | 65  | 3   | RXAD10 50A 52 065                          |
|                                      | RX 061                                                  | 50                                                                                | 46 | 75  | 3.2 | RXAD10 50A 61 075                          |
|                                      | RX 081                                                  | 50                                                                                | 56 | 85  | 3.6 | RXAD10 50A 81 085                          |
|                                      | RX 101 - RX 141                                         | 50                                                                                | 76 | 95  | 4.6 | RXAD10 50A 101 095                         |
| DIN 69871-B                          | RX 044                                                  | 40                                                                                | 32 | 65  | 1.1 | RXAD10 40B 44 065                          |
|                                      | RX 052                                                  | 40                                                                                | 39 | 65  | 1.2 | RXAD10 40B 52 065                          |
|                                      | RX 061                                                  | 40                                                                                | 46 | 75  | 1.4 | RXAD10 40B 61 075                          |
|                                      | RX 081                                                  | 40                                                                                | 56 | 85  | 1.6 | RXAD10 40B 81 085                          |
|                                      | RX 101 - RX 141                                         | 40                                                                                | 76 | 95  | 2.2 | RXAD10 40B 101 095                         |
|                                      | RX 044                                                  | 50                                                                                | 32 | 65  | 2.9 | RXAD10 50B 44 065                          |
|                                      | RX 052                                                  | 50                                                                                | 39 | 65  | 3   | RXAD10 50B 52 065                          |
|                                      | RX 061                                                  | 50                                                                                | 46 | 75  | 3.2 | RXAD10 50B 61 075                          |
|                                      | RX 081                                                  | 50                                                                                | 56 | 85  | 3.6 | RXAD10 50B 81 085                          |
|                                      | RX 101 - RX 141                                         | 50                                                                                | 76 | 95  | 4.6 | RXAD10 50B 101 095                         |
| MAS-BT/A                             | RX 044                                                  | 40                                                                                | 32 | 60  | 1.1 | RXAT10 40A 44 060                          |
|                                      | RX 052                                                  | 40                                                                                | 39 | 65  | 1.3 | RXAT10 40A 52 065                          |
|                                      | RX 061                                                  | 40                                                                                | 46 | 70  | 1.4 | RXAT10 40A 61 070                          |
|                                      | RX 081                                                  | 40                                                                                | 56 | 80  | 1.7 | RXAT10 40A 81 080                          |
|                                      | RX 101 - RX 141                                         | 40                                                                                | 76 | 95  | 2.5 | RXAT10 40A 101 095                         |
|                                      | RX 044                                                  | 50                                                                                | 32 | 65  | 3.7 | RXAT10 50A 44 065                          |
|                                      | RX 052                                                  | 50                                                                                | 39 | 65  | 3.8 | RXAT10 50A 52 065                          |
|                                      | RX 061                                                  | 50                                                                                | 46 | 75  | 4   | RXAT10 50A 61 075                          |
|                                      | RX 081                                                  | 50                                                                                | 56 | 85  | 4.3 | RXAT10 50A 81 085                          |
|                                      | RX 101 - RX 141                                         | 50                                                                                | 76 | 95  | 5.1 | RXAT10 50A 101 095                         |
| DIN 69893-HSK-A                      | RX 044                                                  | 63                                                                                | 32 | 85  | 1   | RXAH10 63A 44 085                          |
|                                      | RX 052                                                  | 63                                                                                | 39 | 90  | 1.2 | RXAH10 63A 52 090                          |
|                                      | RX 061                                                  | 63                                                                                | 46 | 100 | 1.5 | RXAH10 63A 61 100                          |
|                                      | RX 081                                                  | 63                                                                                | 56 | 105 | 1.8 | RXAH10 63A 81 105                          |
|                                      | RX 101 - RX 141                                         | 63                                                                                | 76 | 120 | 2.4 | RXAH10 63A 101 120                         |
|                                      | RX 044                                                  | 100                                                                               | 32 | 90  | 2.3 | RXAH10 100A 44 090                         |
|                                      | RX 052                                                  | 100                                                                               | 39 | 95  | 2.6 | RXAH10 100A 52 095                         |
|                                      | RX 061                                                  | 100                                                                               | 46 | 100 | 2.8 | RXAH10 100A 61 100                         |
|                                      | RX 081                                                  | 100                                                                               | 56 | 120 | 3.5 | RXAH10 100A 81 120                         |
|                                      | RX 101 - RX 141                                         | 100                                                                               | 76 | 130 | 5   | RXAH10 100A 101 130                        |



Verfügbarkeit, weitere Schnittstellen und Grössen auf Anfrage | Availability, additional spindle adaptors and sizes on request | Disponibilité, autres adaptateurs et dimensions sur demandes  
 1 Inbusschlüssel inbegriffen | 1 Hex key included | 1 clé imbus incluse

## Ersatzteile | Spare parts | Pièces de rechange

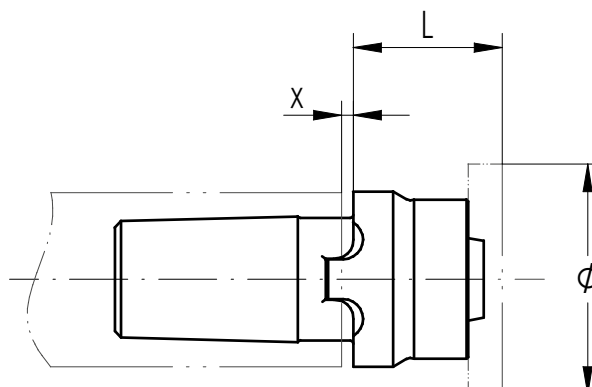
| RX Systemgrösse<br>RX parameter<br>RX taille de système |  |  |
|---------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| RX 044                                                  | C00 90 08 (4x)                                                                      | G00 02 05                                                                           |
| RX 052                                                  | C00 90 10 (4x)                                                                      | G00 02 06                                                                           |
| RX 061                                                  | C00 90 10 (4x)                                                                      | G00 02 06                                                                           |
| RX 081                                                  | C00 90 12 (4x)                                                                      | G00 02 07                                                                           |
| RX 101 - RX 141                                         | C00 90 16 (4x)                                                                      | G00 02 08                                                                           |

# DEK-Adapter

## DEK-Adaptor

## DEK-Adaptateur

ø 12.6 - 60.6 mm



| RX Systemgröße       | Ø-Bereich mm    |     | L    | x   | z  | Bestell-Nr.    |
|----------------------|-----------------|-----|------|-----|----|----------------|
| RX parameter         | Ø-range mm      |     |      |     |    | Order No.      |
| RX taille de système | Ø-plage mm      |     |      |     |    | No de commande |
| RX 016               | 12.600 - 15.600 | 001 | 13.5 | 1.5 | 6  | RXKG16 340 01  |
| RX 019               | 15.601 - 18.600 | 002 | 14.0 | 1.5 | 6  | RXKG19 340 02  |
| RX 024               | 18.601 - 23.600 | 003 | 16.2 | 1.5 | 6  | RXKG24 340 03  |
| RX 029               | 23.601 - 28.600 | 004 | 18.7 | 1.5 | 8  | RXKG29 340 04  |
| RX 036               | 28.601 - 35.600 | 005 | 19.0 | 1.5 | 8  | RXKG36 340 05  |
| RX 044               | 35.601 - 43.600 | 006 | 19.0 | 2.0 | 8  | RXKG44 340 06  |
| RX 052               | 43.601 - 51.600 | 006 | 18.5 | 2.0 | 10 | RXKG52 340 06  |
| RX 061               | 51.601 - 60.600 | 007 | 18.5 | 2.0 | 10 | RXKG61 340 07  |

Lieferumfang: 1 Satz Ersatzschrauben und 1 Torx-Fahrendreher inbegriffen (Drehmomentdreher empfohlen, Seite 30)

Scope of delivery: 1 set of replacement screws and 1 Torx screw driver (torques screw driver is recommended, page 30)

Volume de livraison: 1 ensemble de remplacement et 1 tournevis à drapeau (1 clé dynamométrique est recommandée, page 30)

## Ersatzteile | Spare parts | Pièces de rechange

| RX Systemgröße       |                |           |
|----------------------|----------------|-----------|
| RX parameter         |                |           |
| RX taille de système |                |           |
| RX 016               | C00 90 00 (3x) | G00 20 01 |
| RX 019               | C00 90 00 (3x) | G00 20 01 |
| RX 024               | C00 90 01 (3x) | G00 20 02 |
| RX 029               | C00 90 01 (4x) | G00 20 02 |
| RX 036               | C00 90 01 (4x) | G00 20 02 |
| RX 044               | C00 90 02 (4x) | G00 20 02 |
| RX 052               | C00 90 02 (5x) | G00 20 02 |
| RX 061               | C00 90 02 (5x) | G00 20 02 |

## System-Aufnahmen Beta-Modul

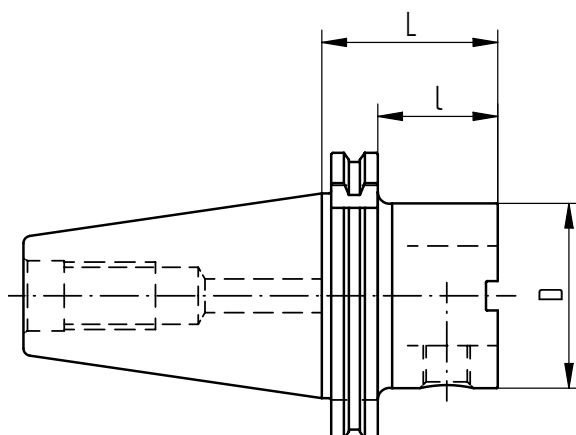
### System adaptors Beta-Modul

### Adaptateurs Beta-Modul



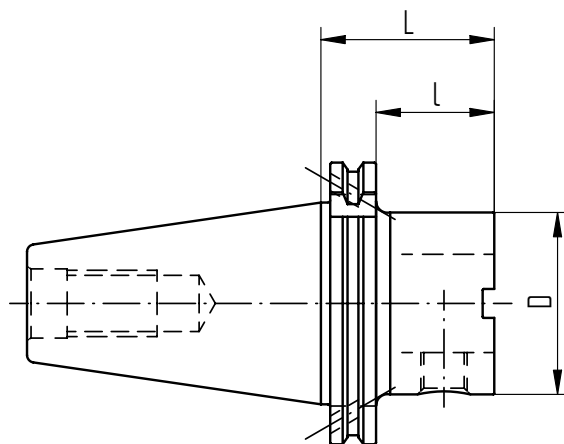
#### DIN 69871-A/D

| Beta |  | L   | I  | D   | kg  | MCC <sup>(1)</sup> | Bestell-Nr.<br>Order No.<br>No de commande |
|------|-----------------------------------------------------------------------------------|-----|----|-----|-----|--------------------|--------------------------------------------|
| 32   | 40                                                                                | 50  | 31 | 32  | 0.9 | B32                | BD10 40A 32 050                            |
| 40   | 40                                                                                | 35  | 16 | 42  | 0.9 | B40                | BD10 40A 40 035                            |
| 40   | 40                                                                                | 50  | 31 | 42  | 1.1 | B40                | BD10 40A 40 050                            |
| 50   | 40                                                                                | 50  | 31 | 50  | 1.2 | B50                | BD10 40A 50 050                            |
| 63   | 40                                                                                | 65  | 46 | 63  | 1.5 | B63                | BD10 40A 63 065                            |
| 25   | 50                                                                                | 60  | 41 | 25  | 2.8 | B25                | BD10 50A 25 060                            |
| 32   | 50                                                                                | 60  | 41 | 32  | 2.9 | B32                | BD10 50A 32 060                            |
| 40   | 50                                                                                | 60  | 41 | 42  | 3.0 | B40                | BD10 50A 40 060                            |
| 50   | 50                                                                                | 60  | 41 | 50  | 3.2 | B50                | BD10 50A 50 060                            |
| 63   | 50                                                                                | 60  | 41 | 63  | 3.3 | B63                | BD10 50A 63 060                            |
| 80   | 50                                                                                | 70  | 51 | 80  | 4.0 | B80                | BD10 50A 80 070                            |
| 100  | 50                                                                                | 115 | 96 | 100 | 6.9 | B100               | BD10 50A 100 115                           |



#### DIN 69871-B

| Beta |  | L   | I  | D   | kg  | MCC <sup>(1)</sup> | Bestell-Nr.<br>Order No.<br>No de commande |
|------|-------------------------------------------------------------------------------------|-----|----|-----|-----|--------------------|--------------------------------------------|
| 40   | 40                                                                                  | 35  | 16 | 42  | 0.9 | B40                | BD10 40B 40 035                            |
| 63   | 40                                                                                  | 65  | 46 | 63  | 1.5 | B63                | BD10 40B 63 065                            |
| 40   | 50                                                                                  | 60  | 41 | 42  | 3.0 | B40                | BD10 50B 40 060                            |
| 50   | 50                                                                                  | 60  | 41 | 50  | 3.2 | B50                | BD10 50B 50 060                            |
| 63   | 50                                                                                  | 60  | 41 | 63  | 3.3 | B63                | BD10 50B 63 060                            |
| 100  | 50                                                                                  | 115 | 96 | 100 | 6.9 | B100               | BD10 50B 100 115                           |



MCC<sup>(1)</sup> = «Match code» Erklärung siehe UrmaSystem Katalog

MCC<sup>(1)</sup> = «Match code» Description see UrmaSystem Catalog

MCC<sup>(1)</sup> = «Match code» Description voir catalogue UrmaSystem

# System-Aufnahmen Beta-Modul

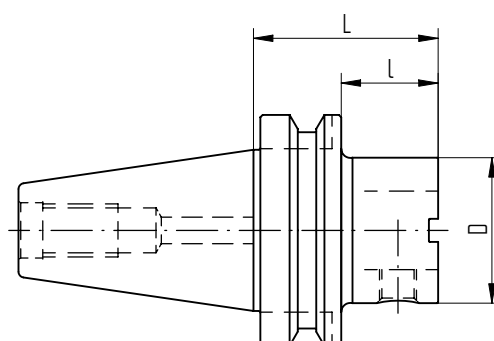
## System adaptors Beta-Modul

### Adaptateurs Beta-Modul



#### MAS-BT/A

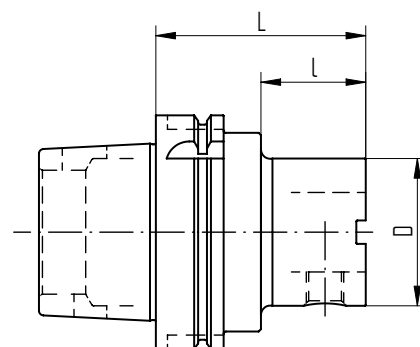
| Beta |  | L   | I  | D   | kg  | MCC  | Bestell-Nr.<br>Order No.<br>No de commande |
|------|-----------------------------------------------------------------------------------|-----|----|-----|-----|------|--------------------------------------------|
| 32   | 40                                                                                | 60  | 33 | 32  | 0.9 | B32  | BT10 40A 32 060                            |
| 40   | 40                                                                                | 28  | 1  | 42  | 0.9 | B40  | BT10 40A 40 028                            |
| 40   | 40                                                                                | 60  | 33 | 42  | 1.2 | B40  | BT10 40A 40 060                            |
| 50   | 40                                                                                | 60  | 33 | 50  | 1.3 | B50  | BT10 40A 50 060                            |
| 63   | 40                                                                                | 55  | 28 | 63  | 1.4 | B63  | BT10 40A 63 055                            |
| 32   | 50                                                                                | 70  | 32 | 32  | 3.7 | B32  | BT10 50A 32 070                            |
| 40   | 50                                                                                | 70  | 32 | 42  | 3.9 | B40  | BT10 50A 40 070                            |
| 50   | 50                                                                                | 70  | 32 | 50  | 4.1 | B50  | BT10 50A 50 070                            |
| 63   | 50                                                                                | 80  | 42 | 63  | 4.3 | B63  | BT10 50A 63 080                            |
| 80   | 50                                                                                | 100 | 62 | 80  | 5.5 | B80  | BT10 50A 80 100                            |
| 100  | 50                                                                                | 110 | 72 | 100 | 7.0 | B100 | BT10 50A 100 110                           |



#### DIN 69893-HSK-A

| Beta |  | L   | I  | D   | kg  | MCC  | Bestell-Nr.<br>Order No.<br>No de commande |
|------|-------------------------------------------------------------------------------------|-----|----|-----|-----|------|--------------------------------------------|
| 40   | 50                                                                                  | 65  | 39 | 42  | 0.7 | B40  | BH10 50A 40 065*                           |
| 32   | 63                                                                                  | 60  | 34 | 32  | 1.0 | B32  | BH10 63A 32 060*                           |
| 40   | 63                                                                                  | 65  | 23 | 42  | 1.1 | B40  | BH10 63A 40 065*                           |
| 50   | 63                                                                                  | 70  | 44 | 50  | 1.5 | B50  | BH10 63A 50 070*                           |
| 63   | 63                                                                                  | 80  | 38 | 63  | 1.5 | B63  | BH10 63A 63 080*                           |
| 40   | 100                                                                                 | 80  | 35 | 42  | 2.3 | B40  | BH10 100A 40 080*                          |
| 50   | 100                                                                                 | 80  | 35 | 50  | 2.5 | B50  | BH10 100A 50 080*                          |
| 63   | 100                                                                                 | 80  | 35 | 63  | 2.8 | B63  | BH10 100A 63 080*                          |
| 80   | 100                                                                                 | 90  | 45 | 80  | 3.8 | B80  | BH10 100A 80 090*                          |
| 100  | 100                                                                                 | 100 | 55 | 100 | 4.0 | B100 | BH10 100A 100 100*                         |

\* Kühlmittelrohr ist nicht inbegriffen | \* Coolant tube is not included | \* Canal lubrifiant n'est pas inclus



#### Ersatzteile | Spare parts | Pièces de rechange

| Beta |  |
|------|-------------------------------------------------------------------------------------|
| 25   | Z00 25 24                                                                           |
| 32   | Z00 32 24                                                                           |
| 40   | Z00 40 24                                                                           |
| 50   | Z00 50 24                                                                           |
| 63   | Z00 63 24                                                                           |
| 80   | Z00 80 24                                                                           |
| 100  | Z00 100 24                                                                          |

#### Kühlmittelrohr | Coolant tube | Canal lubrifiant

|  |  |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 50                                                                                  | H00 50 01                                                                           |
| 63                                                                                  | H00 63 01                                                                           |
| 100                                                                                 | H00 100 01                                                                          |

# Reduktionen Beta-Modul

## Reducers Beta-Modul

## Réductions Beta-Modul

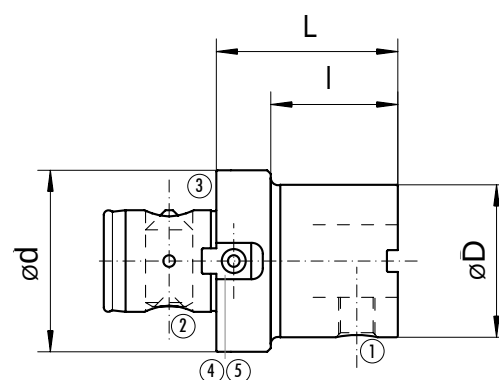


### Reduktionen Beta-Beta

#### Reducers Beta-Beta

#### Réductions Beta-Beta

| Beta | Beta I | L  | I  | D  | d   | kg  | MCM  | MCC | Bestell-Nr.<br>Order No.<br>No de cde |
|------|--------|----|----|----|-----|-----|------|-----|---------------------------------------|
| 40   | 32     | 45 | 30 | 32 | 42  | 0.3 | B40  | B32 | B12 40 32 045                         |
| 50   | 40     | 50 | 35 | 42 | 50  | 0.5 | B50  | B40 | B12 50 40 050                         |
| 63   | 32     | 50 | 30 | 32 | 63  | 0.9 | B63  | B32 | B12 63 32 050                         |
| 63   | 40     | 55 | 35 | 42 | 63  | 1.1 | B63  | B40 | B12 63 40 055                         |
| 63   | 50     | 60 | 40 | 50 | 63  | 1.1 | B63  | B50 | B12 63 50 060                         |
| 80   | 40     | 60 | 35 | 42 | 80  | 2.2 | B80  | B40 | B12 80 40 060                         |
| 80   | 63     | 60 | 35 | 63 | 80  | 2.4 | B80  | B63 | B12 80 63 060                         |
| 100  | 63     | 60 | 35 | 63 | 100 | 3.3 | B100 | B63 | B12 100 63 060                        |
| 100  | 80     | 75 | 50 | 80 | 100 | 3.5 | B100 | B80 | B12 100 80 075                        |



### Ersatzteile | Spare parts | Pièces de rechange

| Beta | ①          | ②          | ③          | ④          | ⑤         |
|------|------------|------------|------------|------------|-----------|
| 25   | Z00 25 24  | Z00 25 21  | Z00 25 23  |            |           |
| 32   | Z00 32 24  | Z00 32 21  | Z00 32 23  |            |           |
| 40   | Z00 40 24  | Z00 40 21  | Z00 40 23  | Z00 40 25  | C00 22 58 |
| 50   | Z00 50 24  | Z00 50 21  | Z00 50 23  | Z00 50 25  | C00 22 60 |
| 63   | Z00 63 24  | Z00 63 21  | Z00 63 23  | Z00 63 25  | C00 22 05 |
| 80   | Z00 80 24  | Z00 80 21  | Z00 80 23  | Z00 80 25  | C00 22 07 |
| 100  | Z00 100 24 | Z00 100 21 | Z00 100 23 | Z00 100 25 | C00 22 71 |

## Verlängerungen Beta-Modul

### Extensions Beta-Modul

### Rallonges Beta-Modul

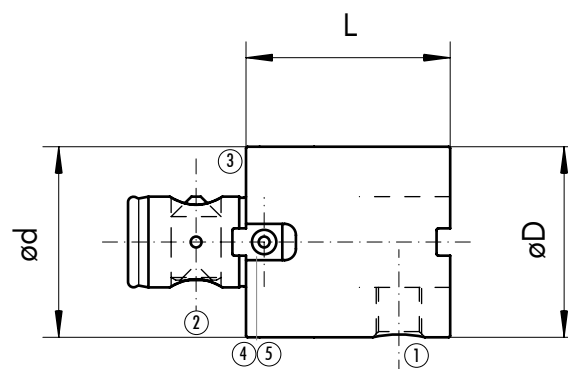


## Verlängerungen Beta-Beta

### Extensions Beta-Beta

### Rallonges Beta-Beta

| Beta | L   | D   | d   | kg   | MCM  | MCC  | Bestell-Nr.<br>Order No.<br>No de cde |
|------|-----|-----|-----|------|------|------|---------------------------------------|
| 32   | 35  | 32  | 32  | 0.2  | B32  | B32  | <b>B13 32 32 035</b>                  |
| 32   | 70  | 32  | 32  | 0.4  | B32  | B32  | <b>B13 32 32 070</b>                  |
| 40   | 45  | 42  | 42  | 0.4  | B42  | B42  | <b>B13 40 40 045</b>                  |
| 40   | 70  | 42  | 42  | 0.7  | B42  | B42  | <b>B13 40 40 070</b>                  |
| 50   | 65  | 50  | 50  | 1.0  | B50  | B50  | <b>B13 50 50 065</b>                  |
| 50   | 100 | 50  | 50  | 1.5  | B50  | B50  | <b>B13 50 50 100</b>                  |
| 63   | 60  | 63  | 63  | 1.3  | B63  | B63  | <b>B13 63 63 060</b>                  |
| 63   | 125 | 63  | 63  | 2.9  | B63  | B63  | <b>B13 63 63 125</b>                  |
| 80   | 80  | 80  | 80  | 2.9  | B80  | B80  | <b>B13 80 80 080</b>                  |
| 80   | 160 | 80  | 80  | 6    | B80  | B80  | <b>B13 80 80 160</b>                  |
| 100  | 80  | 100 | 100 | 4.9  | B100 | B100 | <b>B13 100 100 080</b>                |
| 100  | 180 | 100 | 100 | 10.9 | B100 | B100 | <b>B13 100 100 180</b>                |



## Ersatzteile | Spare parts | Pièces de rechange

| Beta | ①          | ②          | ③          | ④          | ⑤         |
|------|------------|------------|------------|------------|-----------|
| 25   | Z00 25 24  | Z00 25 21  | Z00 25 23  |            |           |
| 32   | Z00 32 24  | Z00 32 21  | Z00 32 23  |            |           |
| 40   | Z00 40 24  | Z00 40 21  | Z00 40 23  | Z00 40 25  | C00 22 58 |
| 50   | Z00 50 24  | Z00 50 21  | Z00 50 23  | Z00 50 25  | C00 22 60 |
| 63   | Z00 63 24  | Z00 63 21  | Z00 63 23  | Z00 63 25  | C00 22 05 |
| 80   | Z00 80 24  | Z00 80 21  | Z00 80 23  | Z00 80 25  | C00 22 07 |
| 100  | Z00 100 24 | Z00 100 21 | Z00 100 23 | Z00 100 25 | C00 22 71 |

# Inhalt

## Content

## Contenu

Seite  
Page  
Page

### CircoTec RX

3 - 14

### CircoTec Variopoint

15 - 27



**Fest-Reibahlen, Zyl.**  
Solid reamers, cyl.  
Alésoirs fixes, cyl.

**ohne Kühlung**  
without coolant through  
sans arrosage

A25N / A45N

16

A27N / A47N

17



**mit Kühlung**  
with coolant through  
avec arrosage

C25N / B25N

18

B27N

19

C45N / B45N

20

B47N

21



**Nachstell-Reibahlen, Zyl.**  
Expandable reamers, cyl.  
Alésoirs expansibles, cyl.

**ohne Kühlung**  
without coolant through  
sans arrosage

D25N / D45N

22

D27N / D47N

23



**mit Kühlung**  
with coolant through  
avec arrosage

G25N / F25N

24

F27N

25

G45N / F45N

26

F47N

27

### Zubehör | Accessories | Accessoires

29 - 33

### Technologie | Technology | Technologie

34 - 49

# Fest-Reibahlen, Zyl. Solid reamers, cyl. Alésoirs fixes, cyl.

Ohne Kühlung  
Without coolant through  
Sans arrosage

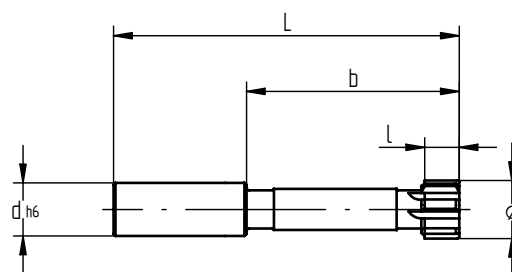
## A25N / A45N



### A25N

**Gerade Schneiden**  
Straight fluted inserts  
Outils avec coupe droite

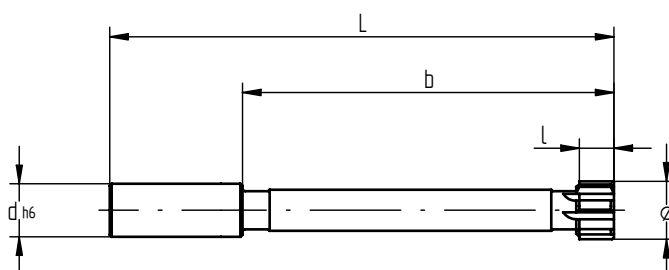
| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b  | d <sub>h6</sub> | Z |
|------------------------------------------|-----|----|----|-----------------|---|
| 5.80 - 7.60                              | 80  | 8  | 40 | 12              | 4 |
| 7.61 - 8.60                              | 80  | 10 | 40 | 12              | 4 |
| 8.61 - 9.60                              | 90  | 10 | 50 | 12              | 4 |
| 9.61 - 10.60                             | 90  | 12 | 50 | 12              | 4 |
| 10.61 - 14.60                            | 100 | 12 | 50 | 12              | 6 |
| 14.61 - 15.60                            | 100 | 14 | 50 | 12              | 6 |
| 15.61 - 18.60                            | 110 | 14 | 50 | 16              | 6 |
| 18.61 - 21.10                            | 130 | 14 | 60 | 20              | 6 |
| 21.11 - 25.10                            | 130 | 16 | 60 | 20              | 6 |
| 25.11 - 28.10                            | 145 | 16 | 75 | 25              | 6 |
| 28.11 - 33.10                            | 145 | 18 | 75 | 25              | 6 |



### A45N

**Gerade Schneiden**  
Straight fluted inserts  
Outils avec coupe droite

| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b   | d <sub>h6</sub> | Z |
|------------------------------------------|-----|----|-----|-----------------|---|
| 5.80 - 7.60                              | 120 | 8  | 80  | 12              | 4 |
| 7.61 - 8.60                              | 120 | 10 | 80  | 12              | 4 |
| 8.61 - 9.60                              | 130 | 10 | 90  | 12              | 4 |
| 9.61 - 10.60                             | 130 | 12 | 90  | 12              | 4 |
| 10.61 - 14.60                            | 150 | 12 | 100 | 12              | 6 |
| 14.61 - 15.60                            | 150 | 14 | 100 | 12              | 6 |
| 15.61 - 18.60                            | 160 | 14 | 100 | 16              | 6 |
| 18.61 - 21.10                            | 190 | 14 | 120 | 20              | 6 |
| 21.11 - 25.10                            | 190 | 16 | 120 | 20              | 6 |
| 25.11 - 28.10                            | 220 | 16 | 150 | 25              | 6 |
| 28.11 - 33.10                            | 220 | 18 | 150 | 25              | 6 |





# Fest-Reibahlen, Zyl. Solid reamers, cyl. Alésoirs fixes, cyl.

## A27N / A47N

Ohne Kühlung  
Without coolant through  
Sans arrosage



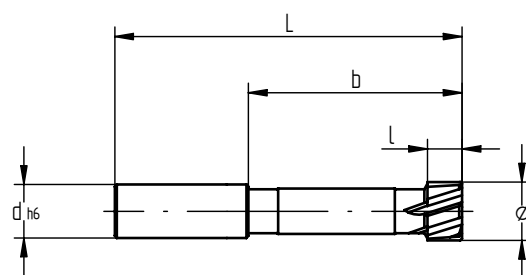
### A27N

#### Linksschräg verzahnte Schneiden

Left helical fluted inserts

Outils avec coupe diagonale gauche

| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b  | dh6 | Z |
|------------------------------------------|-----|----|----|-----|---|
| 5.80 - 7.60                              | 80  | 8  | 40 | 12  | 4 |
| 7.61 - 8.60                              | 80  | 10 | 40 | 12  | 4 |
| 8.61 - 9.60                              | 90  | 10 | 50 | 12  | 4 |
| 9.61 - 10.60                             | 90  | 12 | 50 | 12  | 4 |
| 10.61 - 14.60                            | 100 | 12 | 50 | 12  | 6 |
| 14.61 - 15.60                            | 100 | 14 | 50 | 12  | 6 |
| 15.61 - 18.60                            | 110 | 14 | 50 | 16  | 6 |
| 18.61 - 21.10                            | 130 | 14 | 60 | 20  | 6 |
| 21.11 - 25.10                            | 130 | 16 | 60 | 20  | 6 |
| 25.11 - 28.10                            | 145 | 16 | 75 | 25  | 6 |
| 28.11 - 33.10                            | 145 | 18 | 75 | 25  | 6 |



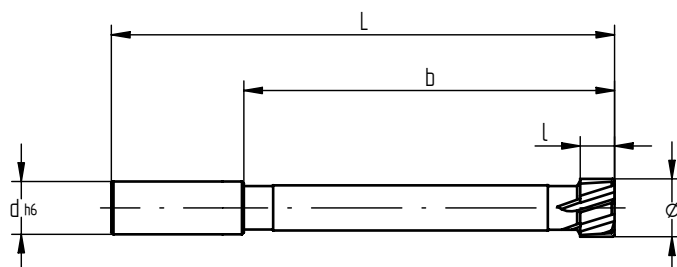
### A47N

#### Linksschräg verzahnte Schneiden

Left helical fluted inserts

Outils avec coupe diagonale gauche

| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b   | dh6 | Z |
|------------------------------------------|-----|----|-----|-----|---|
| 5.80 - 7.60                              | 120 | 8  | 80  | 12  | 4 |
| 7.61 - 8.60                              | 120 | 10 | 80  | 12  | 4 |
| 8.61 - 9.60                              | 130 | 10 | 90  | 12  | 4 |
| 9.61 - 10.60                             | 130 | 12 | 90  | 12  | 4 |
| 10.61 - 14.60                            | 150 | 12 | 100 | 12  | 6 |
| 14.61 - 15.60                            | 150 | 14 | 100 | 12  | 6 |
| 15.61 - 18.60                            | 160 | 14 | 100 | 16  | 6 |
| 18.61 - 21.10                            | 190 | 14 | 120 | 20  | 6 |
| 21.11 - 25.10                            | 190 | 16 | 120 | 20  | 6 |
| 25.11 - 28.10                            | 220 | 16 | 150 | 25  | 6 |
| 28.11 - 33.10                            | 220 | 18 | 150 | 25  | 6 |



# Fest-Reibahlen, Zyl. Solid reamers, cyl. Alésoirs fixes, cyl.

## C25N / B25N

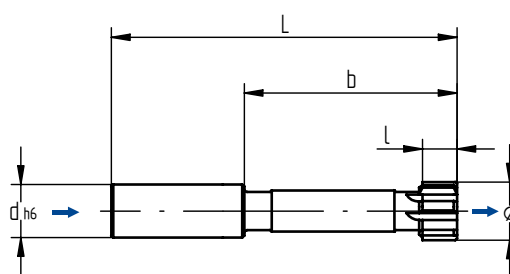
Mit Kühlung  
With coolant through  
Avec arrosage

Gerade Schneiden  
Straight fluted inserts  
Outils avec coupe droite

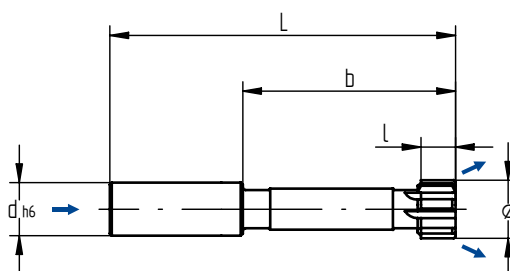


| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b  | dh6 | Z |
|------------------------------------------|-----|----|----|-----|---|
| 5.80 - 7.60                              | 80  | 8  | 40 | 12  | 4 |
| 7.61 - 8.60                              | 80  | 10 | 40 | 12  | 4 |
| 8.61 - 9.60                              | 90  | 10 | 50 | 12  | 4 |
| 9.61 - 10.60                             | 90  | 12 | 60 | 12  | 4 |
| 10.61 - 14.60                            | 100 | 12 | 60 | 12  | 6 |
| 14.61 - 15.60                            | 100 | 14 | 60 | 12  | 6 |
| 15.61 - 18.60                            | 110 | 14 | 60 | 16  | 6 |
| 18.61 - 21.10                            | 130 | 14 | 70 | 20  | 6 |
| 21.11 - 25.10                            | 130 | 16 | 70 | 20  | 6 |
| 25.11 - 28.10                            | 145 | 16 | 85 | 25  | 6 |
| 28.11 - 33.10                            | 145 | 18 | 85 | 25  | 6 |

### C25N



### B25N



# Fest-Reibahlen, Zyl. Solid reamers, cyl. Alésoirs fixes, cyl.

**B27N**

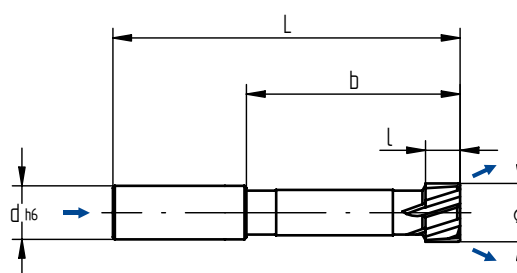
Mit Kühlung  
With coolant through  
Avec arrosage



**Linksschräg verzahnte Schneiden**  
Left helical fluted inserts  
Outils avec coupe diagonale gauche

| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b  | dh6 | Z |
|------------------------------------------|-----|----|----|-----|---|
| 5.80 - 7.60                              | 80  | 8  | 40 | 12  | 4 |
| 7.61 - 8.60                              | 80  | 10 | 40 | 12  | 4 |
| 8.61 - 9.60                              | 90  | 10 | 50 | 12  | 4 |
| 9.61 - 10.60                             | 90  | 12 | 60 | 12  | 4 |
| 10.61 - 14.60                            | 100 | 12 | 60 | 12  | 6 |
| 14.61 - 15.60                            | 100 | 14 | 60 | 12  | 6 |
| 15.61 - 18.60                            | 110 | 14 | 60 | 16  | 6 |
| 18.61 - 21.10                            | 130 | 14 | 70 | 20  | 6 |
| 21.11 - 25.10                            | 130 | 16 | 70 | 20  | 6 |
| 25.11 - 28.10                            | 145 | 16 | 85 | 25  | 6 |
| 28.11 - 33.10                            | 145 | 18 | 85 | 25  | 6 |

**B27N**



# Fest-Reibahlen, Zyl. Solid reamers, cyl. Alésoirs fixes, cyl.

## C45N / B45N

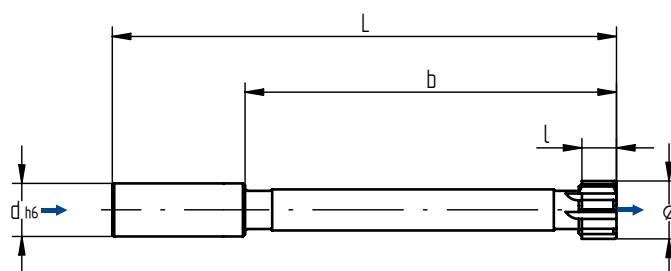
Mit Kühlung  
With coolant through  
Avec arrosage



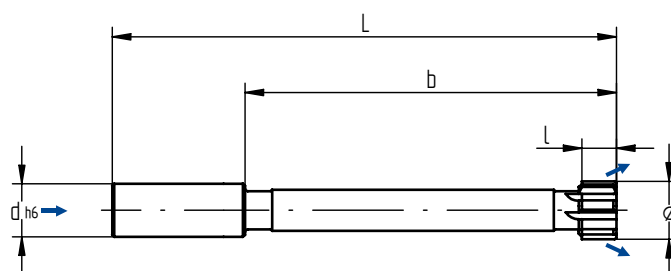
Gerade Schneiden  
Straight fluted inserts  
Outils avec coupe droite

| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b   | d <sub>h6</sub> | Z |
|------------------------------------------|-----|----|-----|-----------------|---|
| 5.80 - 7.60                              | 120 | 8  | 80  | 12              | 4 |
| 7.61 - 8.60                              | 120 | 10 | 80  | 12              | 4 |
| 8.61 - 9.60                              | 130 | 10 | 90  | 12              | 4 |
| 9.61 - 10.60                             | 130 | 12 | 90  | 12              | 4 |
| 10.61 - 14.60                            | 150 | 12 | 110 | 12              | 6 |
| 14.61 - 15.60                            | 150 | 14 | 110 | 12              | 6 |
| 15.61 - 18.60                            | 160 | 14 | 110 | 16              | 6 |
| 18.61 - 21.10                            | 190 | 14 | 130 | 20              | 6 |
| 21.11 - 25.10                            | 190 | 16 | 130 | 20              | 6 |
| 25.11 - 28.10                            | 220 | 16 | 160 | 25              | 6 |
| 28.11 - 33.10                            | 220 | 18 | 160 | 25              | 6 |

### C45N



### B45N



# Fest-Reibahlen, Zyl. Solid reamers, cyl. Alésoirs fixes, cyl.

**B47N**

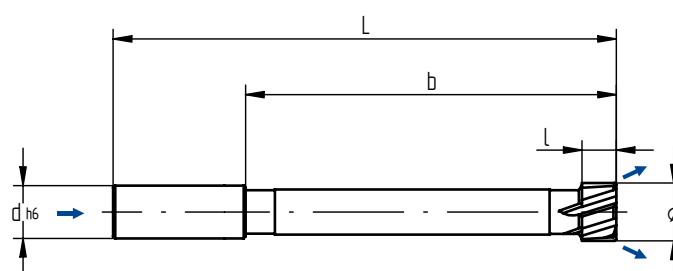
Mit Kühlung  
With coolant through  
Avec arrosage



**Linksschräg verzahnte Schneiden**  
Left helical fluted inserts  
Outils avec coupe diagonale gauche

| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b   | dh6 | Z |
|------------------------------------------|-----|----|-----|-----|---|
| 5.80 - 7.60                              | 120 | 8  | 80  | 12  | 4 |
| 7.61 - 8.60                              | 120 | 10 | 80  | 12  | 4 |
| 8.61 - 9.60                              | 130 | 10 | 90  | 12  | 4 |
| 9.61 - 10.60                             | 130 | 12 | 90  | 12  | 4 |
| 10.61 - 14.60                            | 150 | 12 | 110 | 12  | 6 |
| 14.61 - 15.60                            | 150 | 14 | 110 | 12  | 6 |
| 15.61 - 18.60                            | 160 | 14 | 110 | 16  | 6 |
| 18.61 - 21.10                            | 190 | 14 | 130 | 20  | 6 |
| 21.11 - 25.10                            | 190 | 16 | 130 | 20  | 6 |
| 25.11 - 28.10                            | 220 | 16 | 160 | 25  | 6 |
| 28.11 - 33.10                            | 220 | 18 | 160 | 25  | 6 |

**B47N**



# **Nachstell-Reibahlen, Zyl.** **Expandable reamers, cyl.** **Alésoirs expansibles, cyl.**

**D25N / D45N**

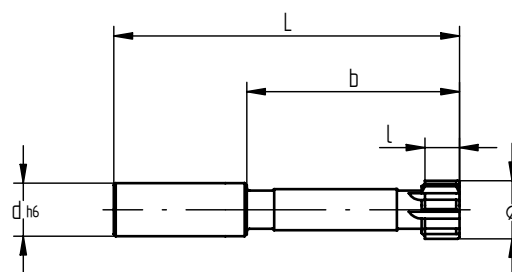
Ohne Kühlung  
 Without coolant through  
 Sans arrosage



## **D25N**

**Gerade Schneiden**  
 Straight fluted inserts  
 Outils avec coupe droite

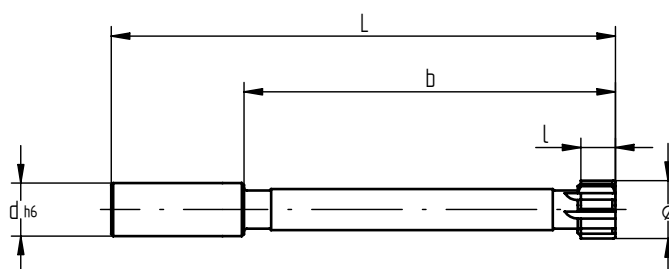
| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b  | d <sub>h6</sub> | Z |
|------------------------------------------|-----|----|----|-----------------|---|
| 5.80 - 7.60                              | 80  | 8  | 40 | 12              | 4 |
| 7.61 - 8.60                              | 80  | 10 | 40 | 12              | 4 |
| 8.61 - 9.60                              | 90  | 10 | 50 | 12              | 4 |
| 9.61 - 10.60                             | 90  | 12 | 50 | 12              | 4 |
| 10.61 - 14.60                            | 100 | 12 | 50 | 12              | 6 |
| 14.61 - 15.60                            | 100 | 14 | 50 | 12              | 6 |
| 15.61 - 18.60                            | 110 | 14 | 50 | 16              | 6 |
| 18.61 - 21.10                            | 130 | 14 | 60 | 20              | 6 |
| 21.11 - 25.10                            | 130 | 16 | 60 | 20              | 6 |
| 25.11 - 28.10                            | 145 | 16 | 75 | 25              | 6 |
| 28.11 - 33.10                            | 145 | 18 | 75 | 25              | 6 |



## **D45N**

**Gerade Schneiden**  
 Straight fluted inserts  
 Outils avec coupe droite

| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b   | d <sub>h6</sub> | Z |
|------------------------------------------|-----|----|-----|-----------------|---|
| 5.80 - 7.60                              | 120 | 8  | 80  | 12              | 4 |
| 7.61 - 8.60                              | 120 | 10 | 80  | 12              | 4 |
| 8.61 - 9.60                              | 130 | 10 | 90  | 12              | 4 |
| 9.61 - 10.60                             | 130 | 12 | 90  | 12              | 4 |
| 10.61 - 14.60                            | 150 | 12 | 100 | 12              | 6 |
| 14.61 - 15.60                            | 150 | 14 | 100 | 12              | 6 |
| 15.61 - 18.60                            | 160 | 14 | 100 | 16              | 6 |
| 18.61 - 21.10                            | 190 | 14 | 120 | 20              | 6 |
| 21.11 - 25.10                            | 190 | 16 | 120 | 20              | 6 |
| 25.11 - 28.10                            | 220 | 16 | 150 | 25              | 6 |
| 28.11 - 33.10                            | 220 | 18 | 150 | 25              | 6 |



# **Nachstell-Reibahlen, Zyl.** **Expandable reamers, cyl.** **Alésoirs expansibles, cyl.**

## **D27N / D47N**

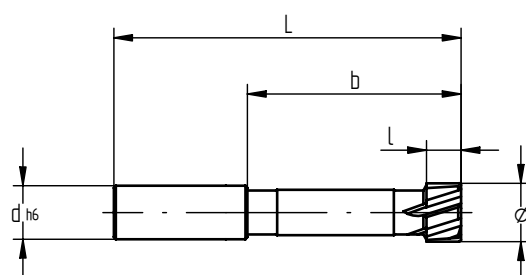
Ohne Kühlung  
 Without coolant through  
 Sans arrosage



### **D27N**

**Linksschräg verzahnte Schneiden**  
 Left helical fluted inserts  
 Outils avec coupe diagonale gauche

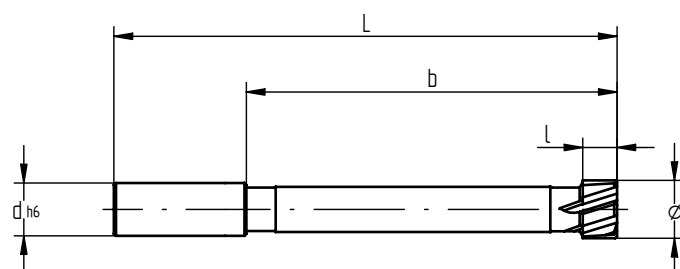
| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b  | dh6 | Z |
|------------------------------------------|-----|----|----|-----|---|
| 5.80 - 7.60                              | 80  | 8  | 40 | 12  | 4 |
| 7.61 - 8.60                              | 80  | 10 | 40 | 12  | 4 |
| 8.61 - 9.60                              | 90  | 10 | 50 | 12  | 4 |
| 9.61 - 10.60                             | 90  | 12 | 50 | 12  | 4 |
| 10.61 - 14.60                            | 100 | 12 | 50 | 12  | 6 |
| 14.61 - 15.60                            | 100 | 14 | 50 | 12  | 6 |
| 15.61 - 18.60                            | 110 | 14 | 50 | 16  | 6 |
| 18.61 - 21.10                            | 130 | 14 | 60 | 20  | 6 |
| 21.11 - 25.10                            | 130 | 16 | 60 | 20  | 6 |
| 25.11 - 28.10                            | 145 | 16 | 75 | 25  | 6 |
| 28.11 - 33.10                            | 145 | 18 | 75 | 25  | 6 |



### **D47N**

**Linksschräg verzahnte Schneiden**  
 Left helical fluted inserts  
 Outils avec coupe diagonale gauche

| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b   | dh6 | Z |
|------------------------------------------|-----|----|-----|-----|---|
| 5.80 - 7.60                              | 120 | 8  | 80  | 12  | 4 |
| 7.61 - 8.60                              | 120 | 10 | 80  | 12  | 4 |
| 8.61 - 9.60                              | 130 | 10 | 90  | 12  | 4 |
| 9.61 - 10.60                             | 130 | 12 | 90  | 12  | 4 |
| 10.61 - 14.60                            | 150 | 12 | 100 | 12  | 6 |
| 14.61 - 15.60                            | 150 | 14 | 100 | 12  | 6 |
| 15.61 - 18.60                            | 160 | 14 | 100 | 16  | 6 |
| 18.61 - 21.10                            | 190 | 14 | 120 | 20  | 6 |
| 21.11 - 25.10                            | 190 | 16 | 120 | 20  | 6 |
| 25.11 - 28.10                            | 220 | 16 | 150 | 25  | 6 |
| 28.11 - 33.10                            | 220 | 18 | 150 | 25  | 6 |



# **Nachstell-Reibahlen, Zyl.** **Expandable reamers, cyl.** **Alésoirs expansibles, cyl.**

## **G25N / F25N**

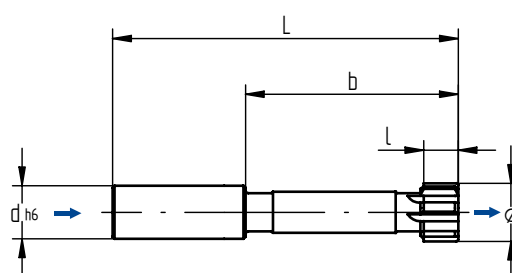
Mit Kühlung  
 With coolant through  
 Avec arrosage

**Gerade Schneiden**  
 Straight fluted inserts  
 Outils avec coupe droite

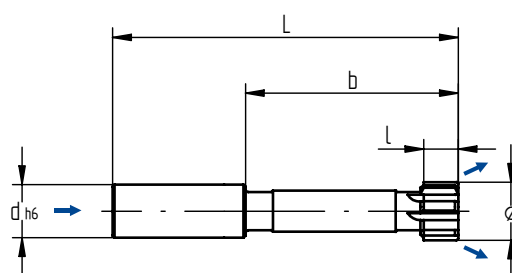


| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b  | d <sub>h6</sub> | Z |
|------------------------------------------|-----|----|----|-----------------|---|
| 5.80 - 7.60                              | 80  | 8  | 40 | 12              | 4 |
| 7.61 - 8.60                              | 80  | 10 | 40 | 12              | 4 |
| 8.61 - 9.60                              | 90  | 10 | 50 | 12              | 4 |
| 9.61 - 10.60                             | 90  | 12 | 60 | 12              | 4 |
| 10.61 - 14.60                            | 100 | 12 | 60 | 12              | 6 |
| 14.61 - 15.60                            | 100 | 14 | 60 | 12              | 6 |
| 15.61 - 18.60                            | 110 | 14 | 60 | 16              | 6 |
| 18.61 - 21.10                            | 130 | 14 | 70 | 20              | 6 |
| 21.11 - 25.10                            | 130 | 16 | 70 | 20              | 6 |
| 25.11 - 28.10                            | 145 | 16 | 85 | 25              | 6 |
| 28.11 - 33.10                            | 145 | 18 | 85 | 25              | 6 |

### **G25N**



### **F25N**





# **Nachstell-Reibahlen, Zyl.** **Expandable reamers, cyl.** **Alésoirs expansibles, cyl.**

**F27N**

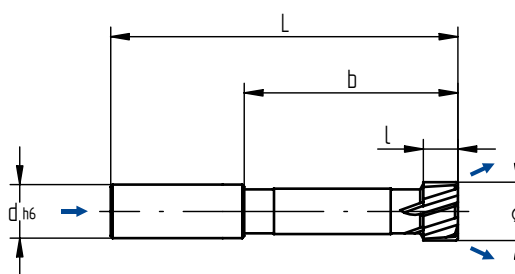
Mit Kühlung  
 With coolant through  
 Avec arrosage

**Linksschräg verzahnte Schneiden**  
 Left helical fluted inserts  
 Outils avec coupe diagonale gauche



| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b  | dh6 | Z |
|------------------------------------------|-----|----|----|-----|---|
| 5.80 - 7.60                              | 80  | 8  | 40 | 12  | 4 |
| 7.61 - 8.60                              | 80  | 10 | 40 | 12  | 4 |
| 8.61 - 9.60                              | 90  | 10 | 50 | 12  | 4 |
| 9.61 - 10.60                             | 90  | 12 | 60 | 12  | 4 |
| 10.61 - 14.60                            | 100 | 12 | 60 | 12  | 6 |
| 14.61 - 15.60                            | 100 | 14 | 60 | 12  | 6 |
| 15.61 - 18.60                            | 110 | 14 | 60 | 16  | 6 |
| 18.61 - 21.10                            | 130 | 14 | 70 | 20  | 6 |
| 21.11 - 25.10                            | 130 | 16 | 70 | 20  | 6 |
| 25.11 - 28.10                            | 145 | 16 | 85 | 25  | 6 |
| 28.11 - 33.10                            | 145 | 18 | 85 | 25  | 6 |

**F27N**



# **Nachstell-Reibahlen, Zyl.** **Expandable reamers, cyl.** **Alésoirs expansibles, cyl.**

**G45N / F45N**

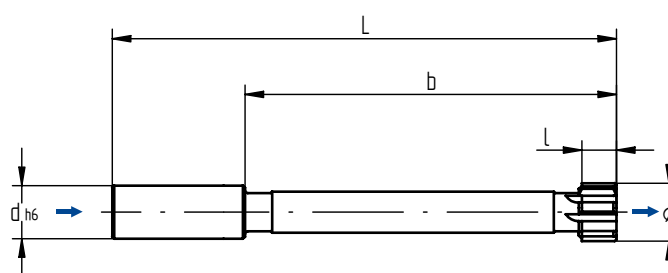
Mit Kühlung  
 With coolant through  
 Avec arrosage



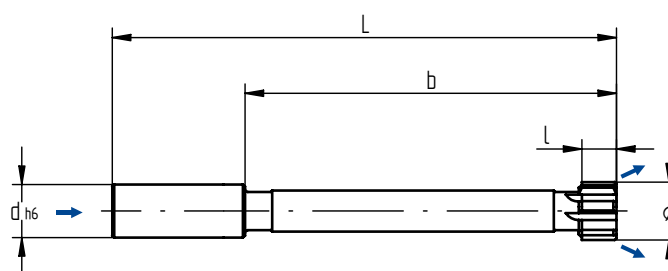
**Gerade Schneiden**  
 Straight fluted inserts  
 Outils avec coupe droite

| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b   | dh6 | Z |
|------------------------------------------|-----|----|-----|-----|---|
| 5.80 - 7.60                              | 120 | 8  | 80  | 12  | 4 |
| 7.61 - 8.60                              | 120 | 10 | 80  | 12  | 4 |
| 8.61 - 9.60                              | 130 | 10 | 90  | 12  | 4 |
| 9.61 - 10.60                             | 130 | 12 | 90  | 12  | 4 |
| 10.61 - 14.60                            | 150 | 12 | 110 | 12  | 6 |
| 14.61 - 15.60                            | 150 | 14 | 110 | 12  | 6 |
| 15.61 - 18.60                            | 160 | 14 | 110 | 16  | 6 |
| 18.61 - 21.10                            | 190 | 14 | 130 | 20  | 6 |
| 21.11 - 25.10                            | 190 | 16 | 130 | 20  | 6 |
| 25.11 - 28.10                            | 220 | 16 | 160 | 25  | 6 |
| 28.11 - 33.10                            | 220 | 18 | 160 | 25  | 6 |

## **G45N**



## **F45N**



# **Nachstell-Reibahlen, Zyl.** **Expandable reamers, cyl.** **Alésoirs expansibles, cyl.**

**F47N**

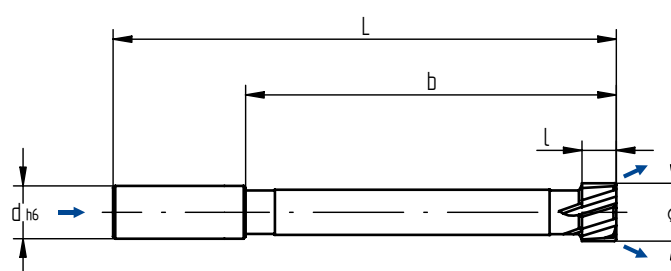
Mit Kühlung  
 With coolant through  
 Avec arrosage

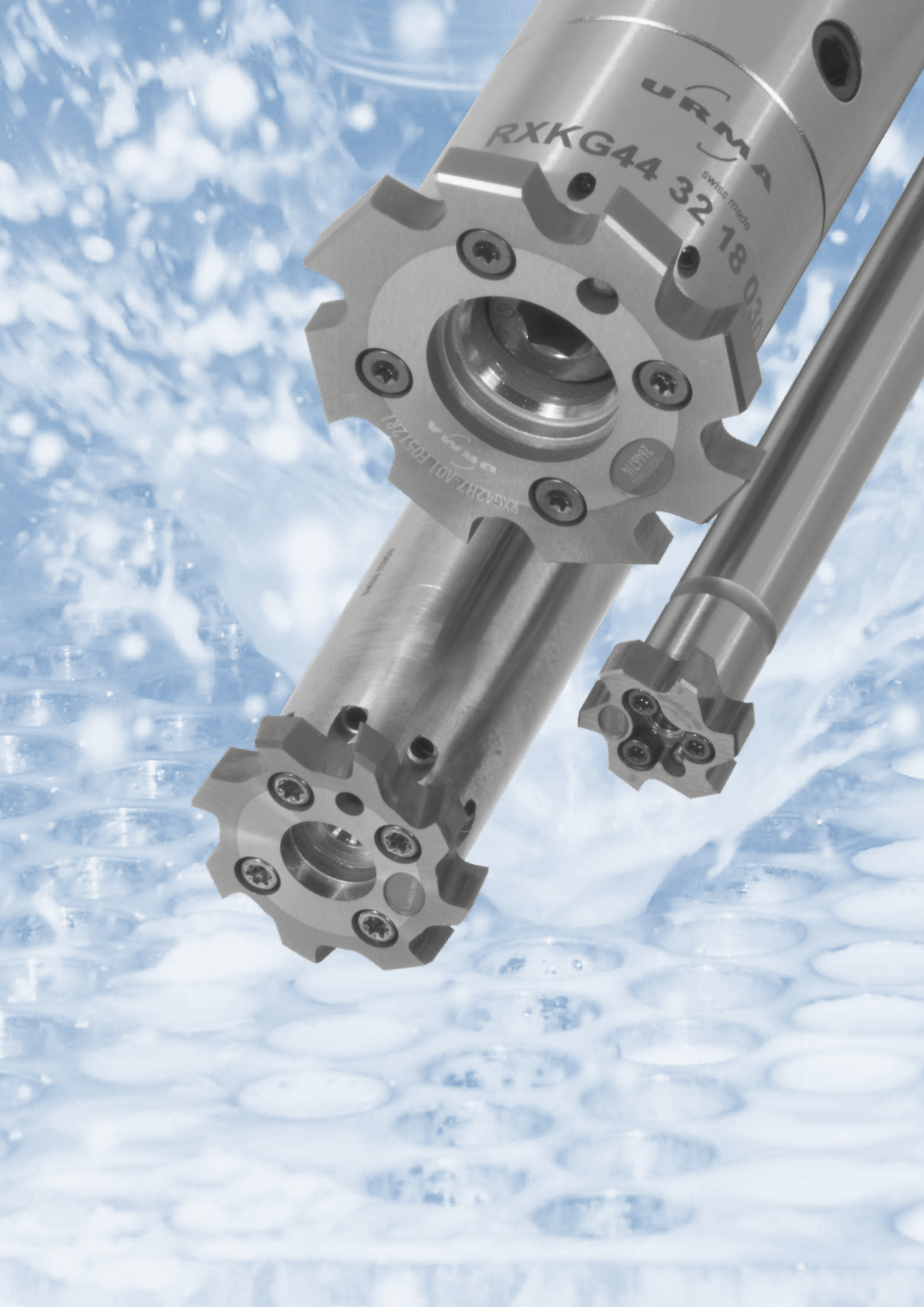


**Linksschräg verzahnte Schneiden**  
 Left helical fluted inserts  
 Outils avec coupe diagonale gauche

| Ø-Bereich mm<br>Ø-range mm<br>Ø-plage mm | L   | l  | b   | dh6 | Z |
|------------------------------------------|-----|----|-----|-----|---|
| 5.80 - 7.60                              | 120 | 8  | 80  | 12  | 4 |
| 7.61 - 8.60                              | 120 | 10 | 80  | 12  | 4 |
| 8.61 - 9.60                              | 130 | 10 | 90  | 12  | 4 |
| 9.61 - 10.60                             | 130 | 12 | 90  | 12  | 4 |
| 10.61 - 14.60                            | 150 | 12 | 110 | 12  | 6 |
| 14.61 - 15.60                            | 150 | 14 | 110 | 12  | 6 |
| 15.61 - 18.60                            | 160 | 14 | 110 | 16  | 6 |
| 18.61 - 21.10                            | 190 | 14 | 130 | 20  | 6 |
| 21.11 - 25.10                            | 190 | 16 | 130 | 20  | 6 |
| 25.11 - 28.10                            | 220 | 16 | 160 | 25  | 6 |
| 28.11 - 33.10                            | 220 | 18 | 160 | 25  | 6 |

**F47N**





# Inhalt

## Content

## Contenu

|                                                                                                                                                                                                                                                                     | Seite<br>Page<br>Page |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <b>CircoTec RX</b>                                                                                                                                                                                                                                                  | <b>3 - 14</b>         |
| <b>CircoTec Variopoint</b>                                                                                                                                                                                                                                          | <b>15 - 27</b>        |
| <b>Zubehör   Accessories   Accessoires</b>                                                                                                                                                                                                                          | <b>29 - 33</b>        |
|  <b>Zubehör</b><br>Accessories<br>Accessoires                                                                                                                                      | 30                    |
|  <b>Schunk «Tendo Zero» Hydrodehn Ausrichtfutter</b><br>Schunk «Tendo Zero» Hydro-Compensation Chuck<br>Mandrins expansibles hydrauliques Schunk «Tendo Zero»                      | 31                    |
|  <b>Ausrichtfutter (inkl. Zubehör und Ersatzteile)</b><br>Compensation holder (incl. accessories and spare parts)<br>Mandrin de compensation (incl. option et pièces de rechange) | 32-33                 |
| <b>Technologie   Technology   Technologie</b>                                                                                                                                                                                                                       | <b>34 - 49</b>        |
| <b>Anwendungsbeispiel</b><br>Example of application<br>Exemple d'application                                                                                                                                                                                        | 34                    |
| <b>Handhabungs-Anleitung RX</b><br>Handling manual RX<br>Manuel d'opération RX                                                                                                                                                                                      | 35 - 37               |
| <b>Schneidstoffe und Anwendungsbereiche für Urma Schneiden Geometrien</b><br>Cutting materials and application range for Urma cutting geometries<br>Matières de coupe et plage d'application des géométries Urma                                                    | 38 - 39               |
| <b>Schnittdaten Richtwerte RX</b><br>Recommended cutting data RX<br>Données de coupe indicatives RX                                                                                                                                                                 | 40 - 41               |
| <b>Schnittdaten Richtwerte Variopoint</b><br>Recommended cutting data Variopoint<br>Données de coupe indicatives Variopoint                                                                                                                                         | 42 - 43               |
| <b>Begriffe und Grundformeln</b><br>Definitions and basic formulas<br>Terminologie et formules de base                                                                                                                                                              | 44                    |
| <b>Bearbeitungsstudie</b><br>Machining study<br>Etude d'usinage                                                                                                                                                                                                     | 45                    |
| <b>Problembehebung</b><br>Practical solutions for reaming problems<br>Solutions pratiques pour les problèmes                                                                                                                                                        | 46 - 47               |
| <b>Werkstoff-Tabelle</b><br>Material comparison table<br>Tableau des matières                                                                                                                                                                                       | 48                    |
| <b>Nummernschlüssel Variopoint</b><br>Numerical code Variopoint<br>Code numérique Variopoint                                                                                                                                                                        | 49                    |

# Zubehör

## Accessories

## Accessoires



### Drehmomentdreher

Torque screw driver

Outil de serrage avec dynamométrie

| RX Systemgrösse      | Bestell-Nr.    | Dimension | Drehmoment |
|----------------------|----------------|-----------|------------|
| RX size of system    | Order No.      | Dimension | Torque     |
| RX taille de système | No de commande | Dimension | Couple     |
| RX 016               | G00 40 11      | T6        | 0.9 Nm     |
| RX 019               | G00 40 11      | T6        | 0.9 Nm     |
| RX 024               | G00 40 12      | T8        | 1.5 Nm     |
| RX 029               | G00 40 12      | T8        | 1.5 Nm     |
| RX 036               | G00 40 12      | T8        | 1.5 Nm     |
| RX 044               | G00 40 12      | T8        | 1.5 Nm     |
| RX 052               | G00 40 12      | T8        | 1.5 Nm     |
| RX 061               | G00 40 12      | T8        | 1.5 Nm     |
| RX 081               | G00 40 13      | T15       | 3.5 Nm     |
| RX 101               | G00 40 13      | T15       | 3.5 Nm     |
| RX 121               | G00 40 13      | T15       | 3.5 Nm     |
| RX 141               | G00 40 13      | T15       | 3.5 Nm     |

### Messmittel

Measuring device

Système de mesure

| Bestell-Nr.    | Typ       | Beschreibung                                                                                                                             |
|----------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------|
| Order No.      | Type      | Description                                                                                                                              |
| No de commande | Type      | Description                                                                                                                              |
| 04430008       | TT 10     | Elektronisches Messgerät, inkl. Batterien<br>Electronic measuring instrument, batteries incl.<br>Instrument électronique, avec batteries |
| 04768002       | LRC 6, AA | Batterien (3 Stk)<br>Batteries (3 pcs)<br>Piles (3 pce)                                                                                  |
| 03210802       | GT 31     | Hebelmesstaster<br>Lever probe<br>Palpeur à levier                                                                                       |
| 01639022       | MGA       | Magnetischer Gelenkarm<br>Support with articulated arm<br>Support à bras articulé                                                        |
| 01930101       | Digico 10 | Elektronische Messuhr, inkl. Batterie<br>Electronic indicator, battery incl.<br>Comparteur électronique, pile comprise                   |



TT10 + GT 31 + MGA



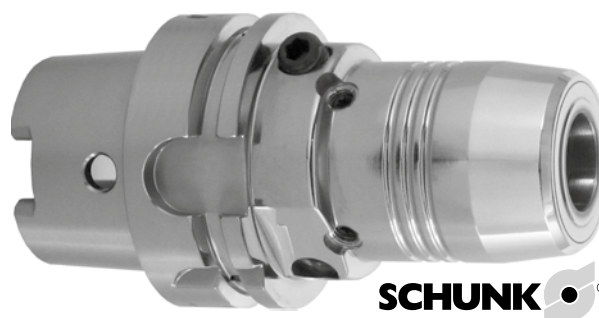
Digico 10 + MGA



# Schunk «Tendo Zero» Hydrodehn Ausrichtfutter

## Schunk «Tendo Zero» Hydro-Compensation Chuck

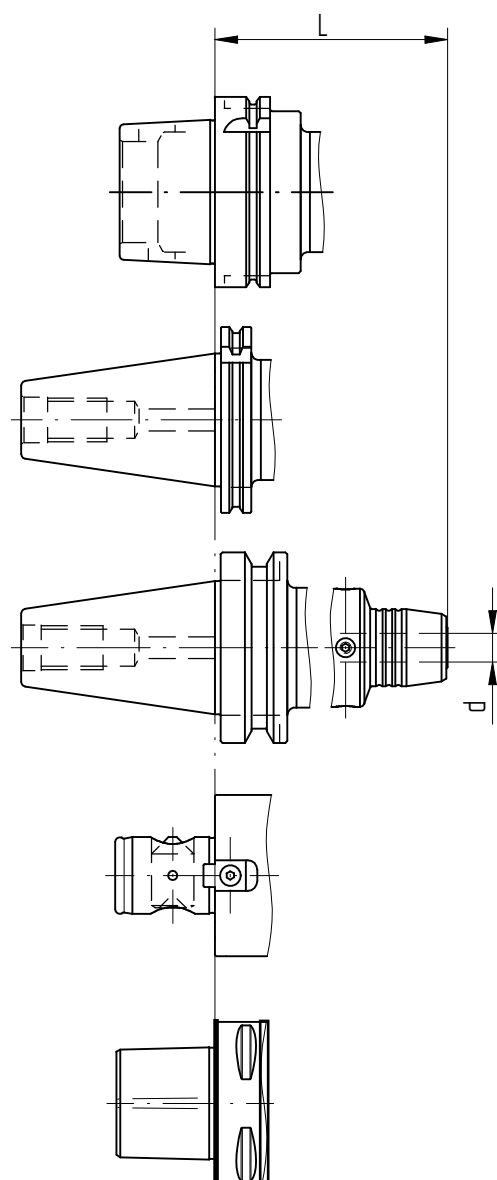
### Mandrins expansibles hydrauliques Schunk «Tendo Zero»



**SCHUNK**®

| Schnittstelle<br>Cutting site<br>Point d'intersection | d   | L   | kg   | Schunk Bestell-Nr.<br>Schunk Order No.<br>Schunk No de commande |
|-------------------------------------------------------|-----|-----|------|-----------------------------------------------------------------|
| HSK A63                                               | Ø12 | 85  | 1.1  | 204054 Z                                                        |
| HSK A63                                               | Ø20 | 90  | 1.3  | 204056 Z                                                        |
| HSK A63                                               | Ø32 | 125 | 2.7  | 204058 Z                                                        |
| HSK A100                                              | Ø12 | 95  | 2.6  | 204064 Z                                                        |
| HSK A100                                              | Ø20 | 105 | 2.8  | 204066 Z                                                        |
| HSK A100                                              | Ø32 | 110 | 3.8  | 204068 Z                                                        |
| SK 40                                                 | Ø12 | 81  | 1.4  | 204264 Z                                                        |
| SK 40                                                 | Ø20 | 81  | 1.4  | 204266 Z                                                        |
| SK 40                                                 | Ø32 | 81  | 2    | 204267 Z                                                        |
| SK 50                                                 | Ø12 | -   | -    | *                                                               |
| SK 50                                                 | Ø20 | 81  | 3.3  | 204246 Z                                                        |
| SK 50                                                 | Ø32 | -   | -    | *                                                               |
| MAS-BT40                                              | Ø12 | 90  | 1.4  | 204443 Z                                                        |
| MAS-BT40                                              | Ø20 | 90  | 1.5  | 204445 Z                                                        |
| MAS-BT50                                              | Ø12 | 90  | 4    | 204455 Z                                                        |
| MAS-BT50                                              | Ø20 | 90  | 4    | 204457 Z                                                        |
| MAS-BT50                                              | Ø32 | -   | -    | *                                                               |
| ABS-H 50                                              | Ø12 | 65  | 0.7  | 204574 Z                                                        |
| ABS-H 50                                              | Ø20 | 75  | 0.9  | 204576 Z                                                        |
| ABS-H 50                                              | Ø32 | -   | -    | *                                                               |
| CAPTO C4                                              | Ø12 | 81  | 0.7  | 201834 Z                                                        |
| CAPTO C4                                              | Ø20 | -   | -    | *                                                               |
| CAPTO C4                                              | Ø32 | -   | -    | *                                                               |
| CAPTO C5                                              | Ø12 | 85  | 0.9  | 201844 Z                                                        |
| CAPTO C5                                              | Ø20 | 90  | 1.05 | 201846 Z                                                        |
| CAPTO C5                                              | Ø32 | -   | -    | *                                                               |
| CAPTO C6                                              | Ø12 | 87  | 1.3  | 201854 Z                                                        |
| CAPTO C6                                              | Ø20 | 97  | 1.6  | 201856 Z                                                        |
| CAPTO C6                                              | Ø32 | 110 | 2.8  | 201858 Z                                                        |

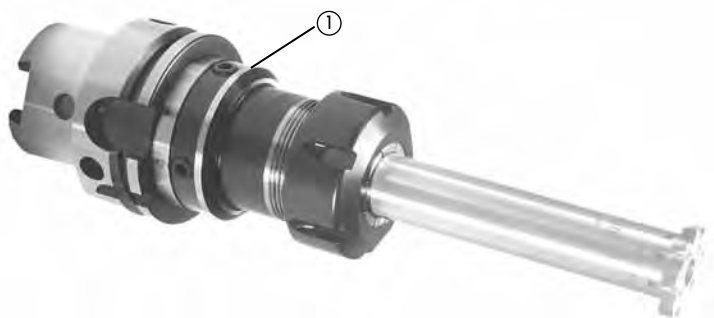
\* auf Anfrage | on request | sur demande



# Ausrichtfutter

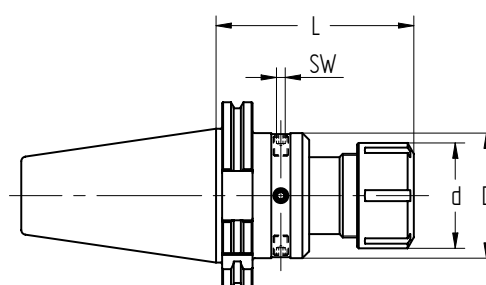
## Compensation holder

## Mandrin de compensation



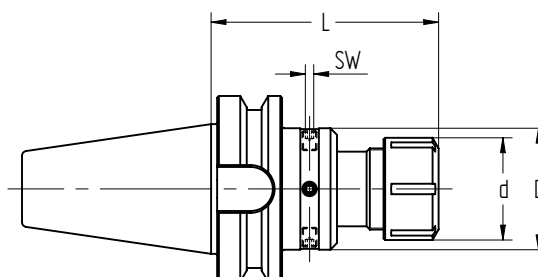
### DIN 69871 A/D-B

| Bestell-Nr.<br>Order No.<br>No de commande | Größe<br>Size<br>Grandeur | Spannbereich<br>Range<br>Plage de serrage | d  | D  | L   | SW |
|--------------------------------------------|---------------------------|-------------------------------------------|----|----|-----|----|
| AAD60 40A 25 085                           | 40 ER25                   | 2.0 - 16.0                                | 42 | 50 | 85  | 4  |
| AAD60 40A 32 090                           | 40 ER32                   | 2.0 - 20.0                                | 50 | 50 | 90  | 4  |
| AAD60 40A 40 115                           | 40 ER40                   | 3.0 - 26.0                                | 63 | 60 | 115 | 4  |
| AAD60 50A 32 090                           | 50 ER32                   | 2.0 - 20.0                                | 50 | 50 | 90  | 4  |
| AAD60 50A 40 100                           | 50 ER40                   | 3.0 - 26.0                                | 63 | 60 | 100 | 4  |



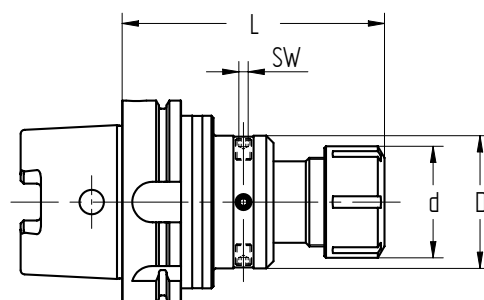
### MAS-BT/A

| Bestell-Nr.<br>Order No.<br>No de commande | Größe<br>Size<br>Grandeur | Spannbereich<br>Range<br>Plage de serrage | d  | D  | L   | SW |
|--------------------------------------------|---------------------------|-------------------------------------------|----|----|-----|----|
| AAT60 40A 25 090                           | 40 ER25                   | 2.0 - 16.0                                | 42 | 50 | 90  | 4  |
| AAT60 40A 32 100                           | 40 ER32                   | 2.0 - 20.0                                | 50 | 50 | 100 | 4  |
| AAT60 40A 40 105                           | 40 ER40                   | 3.0 - 26.0                                | 63 | 60 | 105 | 4  |
| AAT60 50A 32 110                           | 50 ER32                   | 2.0 - 20.0                                | 50 | 50 | 110 | 4  |
| AAT60 50A 40 115                           | 50 ER40                   | 3.0 - 26.0                                | 63 | 60 | 115 | 4  |



### DIN 69893-HSK-A

| Bestell-Nr.<br>Order No.<br>No de commande | Größe<br>Size<br>Grandeur | Spannbereich<br>Range<br>Plage de serrage | d  | D  | L   | SW |
|--------------------------------------------|---------------------------|-------------------------------------------|----|----|-----|----|
| AAH60 63A 25 090                           | 63 ER25                   | 2.0 - 16.0                                | 42 | 50 | 90  | 4  |
| AAH60 63A 32 095                           | 63 ER32                   | 2.0 - 20.0                                | 50 | 50 | 95  | 4  |
| AAH60 63A 40 125                           | 63 ER40                   | 3.0 - 26.0                                | 63 | 60 | 125 | 4  |
| AAH60 100A 40 110                          | 100 ER40                  | 3.0 - 26.0                                | 63 | 60 | 110 | 4  |



Kühlmittelrohr ist nicht inbegriffen / Lieferumfang: inkl. Spannmutter für Dichtscheiben

Coolant tube is not included / Scope of delivery: Collet nosepiece for seal disk included

Canal lubrifiant n'est pas inclus / Volume de livraison: Ecrouteur pour plaquettes étanches inclus

### Kühlmittelrohr | Coolant tube | Canal lubrifiant



|     |            |
|-----|------------|
| 63  | H00 63 01  |
| 100 | H00 100 01 |

### Ersatzteile | Spare parts | Pièces de rechange



|           |
|-----------|
| C00 96 19 |
|-----------|



# Zubehör und Ersatzteile Ausrichtfutter

## Accessories and spare parts to compensation holder

## Option et pièces de rechange pour le mandrin de compensation

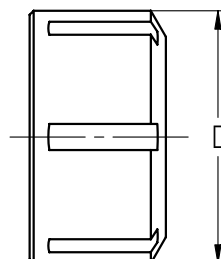
### Spannmutter für Dichtscheiben

Collet nosepiece for seal disk

Ecran tendeur pour plaquettes étanches

| Bestell-Nr.<br>Order No.<br>No de commande | Grösse<br>Size no.<br>Grandeur | D  | d         |
|--------------------------------------------|--------------------------------|----|-----------|
| 20.107.410                                 | ER25                           | 42 | M32 x 1.5 |
| 20.107.510                                 | ER32                           | 50 | M40 x 1.5 |
| 20.107.610                                 | ER40                           | 63 | M50 x 1.5 |

Im Lieferumfang inbegriffen | Included in delivery | Dans le volume de livraison inclus



### Dichtscheiben zu Spannmutter

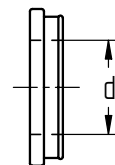
Seal disk to nosepiece

Plaquette étanche pour l'écran tendeur

| Bestell-Nr.<br>Order No.<br>No de commande | Grösse<br>Size<br>Grandeur | d          |
|--------------------------------------------|----------------------------|------------|
| 20.107.41 XXX                              | ER25                       | 3.0 - 16.0 |
| 20.107.51 XXX                              | ER32                       | 3.0 - 20.0 |
| 20.107.61 XXX                              | ER40                       | 3.0 - 26.0 |

XXX = ø d Durchmesser Schneidenträger | Diameter insert holders | Diamètre porte-plaquettes

Beispiel | Example | Exemple: d = 12 = 20.107.41 120



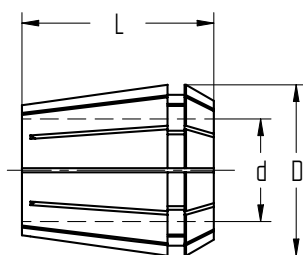
### Spannzangen

Collets

Pincettes de serrage

| Bestell-Nr.<br>Order No.<br>No de commande | Grösse<br>Size<br>Grandeur | D  | L  |
|--------------------------------------------|----------------------------|----|----|
| 62 25 XX                                   | ER25                       | 26 | 35 |
| 62 32 XX                                   | ER32                       | 33 | 40 |
| 62 40 XX                                   | ER40                       | 41 | 46 |

XX = ø d Beispiel | Example | Exemple: d = 12 = 62 25 12

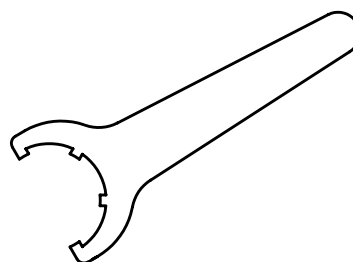


### Schlüssel

Key

Clé

| Bestell-Nr.<br>Order No.<br>No de commande | Grösse<br>Size<br>Grandeur |
|--------------------------------------------|----------------------------|
| 00 05 05                                   | ER25                       |
| 00 05 02                                   | ER32                       |
| 00 05 03                                   | ER40                       |



# Anwendungsbeispiel

## Example of application

## Exemple d'application

|                                                              |                                                                                                                                               |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Werkstoff</b><br>Workpiece material<br>Matières premières | <b>Kugelgraphitguss EN / GJS 500-7</b><br>Nodular Cast Iron EN / GJS 500-7<br>Fonte de graphite nodulaire EN / GJS 500-7                      |
| <b>Maschine</b><br>Machine tool<br>Machine outil             | <b>Vertikales Bearbeitungszentrum</b><br>Vertical Machining Center<br>Centre d'usinage vertical                                               |
|                                                              | <b>Ø 18H7 x 22mm</b>                                                                                                                          |
| <b><math>v_c</math> (m/min)</b>                              | <b>110</b>                                                                                                                                    |
| <b><math>n</math> (min<sup>-1</sup>)</b>                     | <b>1946</b>                                                                                                                                   |
| <b><math>f_z</math> (mm)</b>                                 | <b>0.19</b>                                                                                                                                   |
| <b><math>z</math></b>                                        | <b>6</b>                                                                                                                                      |
| <b><math>v_f</math> (mm/min)</b>                             | <b>2218</b>                                                                                                                                   |
| <b><math>a_p</math> (mm)</b>                                 | <b>0.1</b>                                                                                                                                    |
| <b>Rz (µm)</b><br>Max. 25                                    | <b>Standzeitende aufgrund der Oberflächengüte</b><br>End of tool life caused by surface quality<br>Durée de vie en vertu de l'état de surface |
| <b>Standweg</b>   Tool life   Durée de vie                   | <b>180m</b>                                                                                                                                   |
| <b>Anzahl Teile</b>   No of parts   Nombre de pièces         | <b>8180</b>                                                                                                                                   |
| <b>Schneidentyp</b>   Insert   Type de plaquette             | <b>RXG18H7-A01 F0512R1</b>                                                                                                                    |



### Ziele

- Steigerung der Produktivität
- Tiefere Werkzeugkosten/Bauteil
- Reduktion der Nebenzeiten und Logistikaufwand (Einrichtzeiten, Nachschleifservice)

### Targets

- Increased productivity
- Lower tool cost per part
- Reduction of nonproductive time (setup time, regrinding service)

### Buts

- Hausse de la productivité
- Coûts réduits de l'outillage par pièce
- Réduction du temps secondaire et de la logistique (service reaffûtage et temps de réglage)

### Resultate

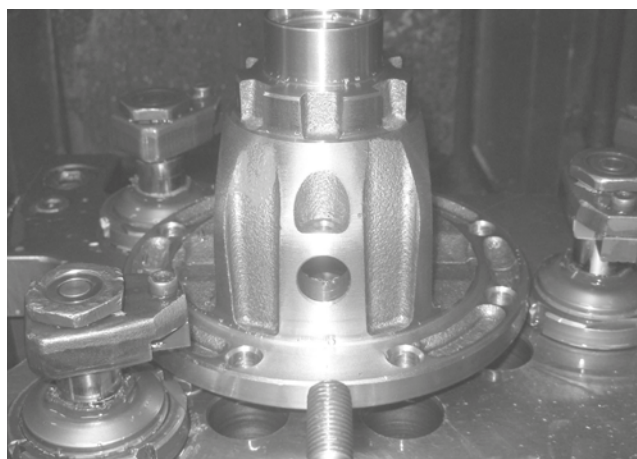
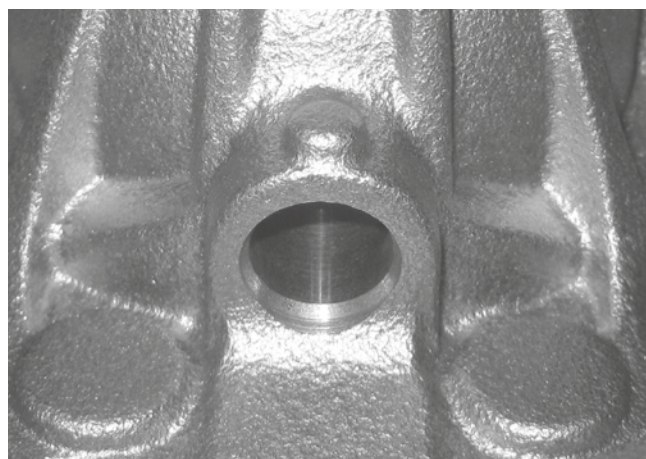
- Produktivitätssteigerung 25%
- Werkzeugkostenreduktion 40%
- Wegfall der Logistikkosten
- Erhöhung der Bedienerfreundlichkeit

### Results

- Productivity increased by 25%
- Tool cost per part reduced by 40%
- Elimination of logistic cost
- Increase user friendliness

### Résultats

- Hausse de la productivité de 25%
- Coûts de l'outillage réduits d'environ 40%
- Elimination des frais de logistique
- Manutention améliorée



# Handhabungs-Anleitung RX

## Handling manual RX

## Manuel d'opération RX

### Ausrichten

Um optimale Reibergebnisse zu erzielen, ist ein perfekter Rundlauf des Werkzeuges unumgänglich. Um Rundlauffehler von Aufnahme und Maschinenspindel auszugleichen, werden Ausricht-, Dehnspann- oder Schrumpffutter eingesetzt. CircoTec RX Reibwerkzeuge können mit verschiedenen Methoden gemessen werden:

### Adjusting

To achieve the best reaming results a tool with zero run-out is desirable. In order to compensate for any errors due to run-out from the tool holders or the machine spindle, the following holders are recommend: compensation holders, hydraulic chucks, or shrink fit holders. CircoTec RX reamers can be measured with different methods:

### Compensation

Pour obtenir un résultat optimal, il est indispensable d'avoir le moins de mal rond possible. Pour rattraper d'éventuelles différences du mandrin et de la broche, des systèmes de compensation sont indispensables. Les outils d'alésage CircoTec RX peuvent être mesurés de différentes manières:

1



2



3



### 1 Über Rundschliffase

Messen unmittelbar hinter dem Anschnitt auf dem Aussendurchmesser der Schneide. Es werden sämtliche Trennstellenfehler eliminiert. Genaueste Messmethode.

### 1 Through circular land

Measuring directly behind chamfer angle on external insert diameter. All interface errors are eliminated. This is the most accurate measuring method.

### 1 Par le diamètre rectifié

Mesurez juste derrière la prise de coupe sur le diamètre extérieur. Toutes les fautes de mesures de la séparation sont éliminées.

### 2 Über Schneidenträger Kurzkegel

Bei demontierter Schneide direkt auf dem Kurzkegel des Schneidenträgers messen. Hohe Präzision, einfache Handhabung.

### 2 Through insert holder short taper

With the reamer disassembled, measure directly on the insert holders short taper. High accuracy, simple handling.

### 2 Sur le cône du porte-plaquette

Sans outil, mesurez directement sur le cône de réception. Haute précision, manipulation facile.

### 3 Über Schneidenträger-Aussendurchmesser

CircoTec RX-Werkzeuge werden in hoher Toleranz gefertigt. Diese Methode liefert akzeptable Präzision und ist einfach zu handhaben.

### 3 On the external diameter of the insert holder

CircoTec RX tool holders are manufactured very accurately on all diameters. An easy handling method that offers reasonable measuring results.

### 3 Sur le diamètre extérieur du porte-plaquette

CircoTec RX sont usinés avec une grande précision. Cette méthode livre des précisions acceptables et une manipulation facile.

### Ausrichtfutter

Siehe Bedienungsanleitung auf [www.urma.ch](http://www.urma.ch)

### Compensation holder

See manual on [www.urma.ch](http://www.urma.ch)

### Mandrin de compensation

Voir manuel d'utilisation sur [www.urma.ch](http://www.urma.ch)



### Schäfte mit integriertem Ausrichtmechanismus

Standard für Reib- $\phi$  über 35 mm

### Shanks with integrated compensation device

These shanks with integrated comp. must be used for reaming diameters bigger than 35 mm

### Porte-outils avec mécanisme de compensation intégrée

Standard pour alésage au dessus de  $\phi$  35 mm



### Handhabung

Zentrale Befestigungsschraube anziehen gemäss Tabellenwert «1». Rundlauf messen und Schneide auf höchsten Punkt drehen. Mit den Justierschrauben den halben Wert des Rundlaufes korrigieren. Kontrollieren und Justierung allenfalls wiederholen. Zentrale Befestigungsschraube anziehen gemäss Tabellenwert «2». Siehe Bedienungsanleitung auf [www.urma.ch](http://www.urma.ch)

### Handling

Secure central locking screw (see value no «1»). Measure run-out and set the cutting edge of the insert to the highest point. Compensate half of the total run-out by using the adjustment screws. Check run-out and repeat the adjustment if necessary. Secure central locking screw according to value «2» in chart below. See manual on [www.urma.ch](http://www.urma.ch)

### Manutention

Serrez la vis de fixation centrale selon les valeurs de la table «1». Mesurez le mal rond et tournez la coupe sur le point le plus haut. Corrigez la moitié de la valeur avec les vis d'ajustages. Contrôlez et ajustez si nécessaire. Serrer la vis de fixation centrale selon les valeurs de la table «2». Voir manuel d'utilisation sur [www.urma.ch](http://www.urma.ch)



| RX Systemgrösse      | 1  | 2   |
|----------------------|----|-----|
| RX parameter         |    |     |
| RX taille de système | Nm | Nm  |
| RX 044               | 25 | 32  |
| RX 052               | 25 | 32  |
| RX 061               | 40 | 55  |
| RX 081               | 65 | 85  |
| RX 101               | 95 | 120 |
| RX 121               | 95 | 120 |
| RX 141               | 95 | 120 |

## Schneidenwechsel

1. Schaft nicht aus der Grundaufnahme nehmen. Spannschrauben und verbrauchte Schneide entfernen.

2. Kurzkegel sorgfältig reinigen und auf mögliche Beschädigungen prüfen.

3. Neue Schneide aufsetzen (Positionierstift beachten) und Spannschrauben leicht anziehen.

4. Vorzugsweise mit Torx-Drehmomentdreher (S. 30) Schrauben übers Kreuz anziehen. (Drehmomente siehe Tabelle)

## Changing inserts

1. Don't take the shank out of the taper holder. Remove clamping screws and used insert.

2. Clean short taper of the shank carefully and check for possible damages.

3. Set new insert in position (pay attention to the positioning pin) and slightly tighten the clamping screws.

4. If available, use the torx-torque screw driver (p. 30) to tighten the screws crosswise. (see torque chart)

## Changement de plaquette

1. Ne pas sortir l'outil d'alésage de son corps de serrage. Enlevez la vis de serrage et l'outil usé.

2. Nettoyez avec précaution le porte-outil et contrôlez d'éventuels dommages.

3. Positionnez le nouvel outil (tenir compte de la goupille de positionnement) et serrez doucement la vis.

4. Si disponible, serrez la vis de façon croisée avec l'outil dynamométrique (p. 30). (Moment de serrage selon la liste suivante)



| RX Systemgröße       | Drehmoment |
|----------------------|------------|
| RX parameter         | Torque     |
| RX taille de système | Couple     |
| RX 016               | 0.9 Nm     |
| RX 019               | 0.9 Nm     |
| RX 024               | 1.5 Nm     |
| RX 029               | 1.5 Nm     |
| RX 036               | 1.5 Nm     |
| RX 044               | 1.5 Nm     |
| RX 052               | 1.5 Nm     |
| RX 061               | 1.5 Nm     |
| RX 081               | 3.5 Nm     |
| RX 101               | 3.5 Nm     |
| RX 121               | 3.5 Nm     |
| RX 141               | 3.5 Nm     |

## Messen des Schneidendurchmessers

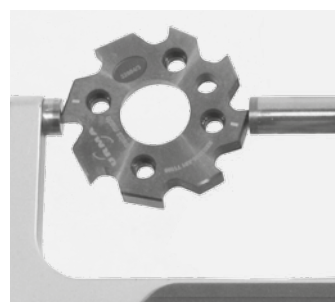
CircoTec RX Schneiden sind ungleich geteilt. Der Durchmesser kann nur über die beiden bezeichneten Schneiden, direkt beim Anschnitt gemessen werden. Die Schneiden sind konisch geschliffen.

## Measuring of insert diameter

CircoTec RX inserts have an unequal spaced pitch. To measure the diameter line up the two marked cutting edges. Measure directly on the chamfered angle because the inserts are ground with taper.

## Mesurer l'outil de coupe

Les coupes de l'outil CircoTec RX, sont positionnées inégalement. Le diamètre ne peut être mesuré que sur les deux dents avec marquage.



# Schneidstoffe

## Cutting materials

## Matières de coupe

|                     |               | Werkstoff   Workpiece material   Matières |   |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | relative v <sub>c</sub> rel |     |   | MMS |   |   |   |  |
|---------------------|---------------|-------------------------------------------|---|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------------------|-----|---|-----|---|---|---|--|
|                     |               | P                                         |   |   |     |     |     | H   | M   |     |     |     | K   |     |     | N   |     |     |     |                             |     | S |     |   |   |   |  |
|                     |               | 1                                         | 2 | 3 | 3.1 | 3.2 | 3.3 | 4.0 | 5.0 | 5.1 | 5.2 | 6.0 | 6.1 | 6.2 | 7.0 | 7.1 | 7.2 | 7.3 | 7.4 | 8.0                         | 8.1 |   |     |   |   |   |  |
| Bezeichnung         | ISO           |                                           |   |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                             |     |   |     |   |   |   |  |
| Designation         |               |                                           |   |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                             |     |   |     |   |   |   |  |
| Désignation         |               |                                           |   |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                             |     |   |     |   |   |   |  |
| F0500               | HW-K05        | □                                         | □ | □ | □   |     |     |     | □   | □   | □   | □   | □   | □   | □   |     | □   | □   | □   | □                           | ■   |   | ▲   |   |   |   |  |
| UMW10 <sup>1)</sup> | HW-K10        | □                                         | □ | □ | □   |     |     |     | □   | □   | □   | □   | □   | □   | □   |     | □   | □   | □   | □                           | ■   |   | ▲   |   |   |   |  |
| T1500               | HT-P15        | ▲                                         | ▲ | ▲ | □   |     |     |     | ■   |     |     | ■   | ■   | □   |     |     | ▲   |     |     |                             | ■   |   |     | ■ | ▲ | ■ |  |
| UMT15 <sup>1)</sup> | HT-P15        | ▲                                         | ▲ | ▲ | □   |     |     |     | ■   |     |     | ■   | ■   | □   |     |     | ▲   |     |     |                             | ■   |   |     | ■ | ▲ | ■ |  |
| BS10 <sup>2)</sup>  | BH-S10        |                                           |   |   |     |     |     |     |     |     |     | ▲   | ▲   | ▲   |     |     |     |     |     |                             |     |   |     | ▲ |   |   |  |
| DP30 <sup>2)</sup>  | DP            |                                           |   |   |     |     |     |     |     |     |     |     |     |     | ▲   | ▲   | ▲   |     |     |                             | ▲   |   |     | ▲ |   |   |  |
|                     |               |                                           |   |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                             |     |   |     |   |   |   |  |
| Bezeichnung         | Beschichtung  |                                           |   |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                             |     |   |     |   |   |   |  |
| Designation         | Coating       |                                           |   |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                             |     |   |     |   |   |   |  |
| Désignation         | Revêtement    |                                           |   |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                             |     |   |     |   |   |   |  |
| 02P                 | TiAlN         | ■                                         | ■ | ■ | ■   | ■   | ■   |     |     |     |     |     | ■   | ■   | ■   |     |     |     |     | □                           |     |   | ▲   |   |   | ■ |  |
| 07R                 | TiAlN + AlCrN |                                           |   |   |     |     |     | □   |     |     |     |     |     |     |     |     |     |     |     |                             |     | ■ | □   |   |   | ■ |  |
| 08P                 | AlCrN         | □                                         | □ | ■ | ■   | ■   | □   |     |     |     |     |     | ■   | ■   | ■   |     |     |     |     | □                           | □   |   | ▲   | ■ |   | ■ |  |
| 10C                 | DLC           |                                           |   |   |     |     |     |     |     |     |     |     |     |     |     | ▲   | ■   | ▲   |     |                             |     |   | ■   | ▲ |   | □ |  |
| 12R                 | AlCrN         | ▲                                         | ▲ | ▲ | ▲   | ▲   | ■   |     | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   |     |     | ▲   | ▲   | ▲   |                             |     | ▲ | ■   |   | ▲ | ▲ |  |
| 14R                 | AlCrN         | ■                                         | ■ | ■ | ■   | ■   | ■   |     | ■   | ■   | ■   | ▲   | ▲   | ▲   |     |     | ■   | ■   | ■   |                             |     | ▲ | ■   |   | ■ | ■ |  |

<sup>1)</sup> Nur Variopoint | Only Variopoint | Seulement Variopoint

<sup>2)</sup> Bestückt | Brazed tips | Plaquette à braser

MMS = Mindermengenschmierung | Mist coolant | Arrosage minimal

▲ = Empfohlen | Recommended | Recommandé

■ = Geeignet | Applicable | Approprié

□ = Möglich | Possible | Possible

Die Tabelle zeigt die Einsatzgebiete der Urma Schneidstoffe. Nebst den Werkstoffgruppen nach ISO ist auch die relative Schnittgeschwindigkeit  $v_{c,rel}$  mitentscheidend über die Wahl der Sorte.

The chart shows the application range for Urma cutting grades. Besides the ISO workpiece material group, the relative cutting speed  $v_{c,rel}$  is important to choose the right grade.

Le tableau montre les applications des matériaux de coupe. En plus des groupes de matériaux selon les normes ISO, la vitesse relative de coupe  $v_{c,rel}$  décisive sur le choix de la variété.

### Beschichtungen | Coatings | Revêtements

Als Basis für Hochleistungs-Beschichtungen dienen sowohl HM als auch Cermet-Schneiden.

Either carbide or Cermet inserts are used as substrates for a variety of high performance coatings.

Les revêtement haute-performance sont basé sur des plaquettes en carbure ou Cermet.

### Sonder-Schneidstoffe | Special Cutting material | Nuances spéciales

BS10 (CBN) und DP30 (PCD) sind auf die Basis von CircoTec RX aufgelötete Schneidplatten.

BS10 (CBN) and DP30 (PCD) are cutting tips brazed on CircoTec RX inserts.

Plaquettes BS10 (CBN) ou DP30 (PCD) sur plaquettes CircoTec RX.

### Nano finish

Diese zusätzliche Schneidkantenbehandlung kann, je nach Anwendungsfall, Schneidverhalten und Standzeit massiv beeinflussen.

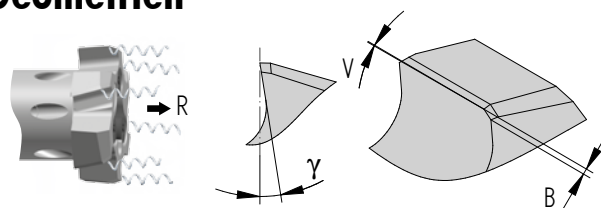
Depending on the application, this additional cutting edge treatment may have an important influence to cutting process and tool life.

Les traitements additionnels des coupes, peuvent, selon l'application, influencer massivement la performance et la durée de vie de l'outil.

# Anwendungsbereiche für Urma Schneiden Geometrien

Application range for Urma cutting geometries

Plage d'application des géométries Urma



## Hauptmerkmale im Vergleich zur Referenz (A01)

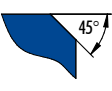
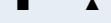
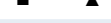
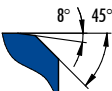
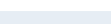
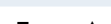
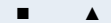
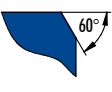
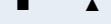
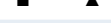
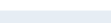
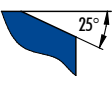
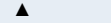
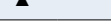
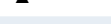
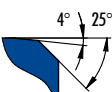
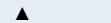
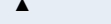
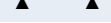
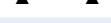
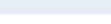
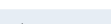
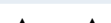
Main features compared to the reference (A01)

Principales caractéristiques par rapport à la référence (A01)

## Auswirkungen im Vergleich zur Referenz (A01)

Effects compared to the reference (A01)

Effets par rapport à la référence (A01)

|                                                                                                                | USG | R | γ | B | V | RXG | RXL | Bohrung                                                                             | $a_p$ | $f_z$ | Ra <sup>1)</sup> | Zyl.   | Pos. <sup>2)</sup>                                                                  | DM                                                                                  | F <sub>c</sub> | M <sub>D</sub> |
|----------------------------------------------------------------------------------------------------------------|-----|---|---|---|---|-----|-----|-------------------------------------------------------------------------------------|-------|-------|------------------|--------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------|----------------|
|                                                                                                                |     |   |   |   |   |     |     |    | mm    | mm    | μm               | <0.010 |  |  |                |                |
|                               | A01 |   |   |   |   |     |     |    |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | A03 |   |   |   |   |     |     |    |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | A06 |   |   |   |   |     |     |    |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | A07 |   |   |   |   |     |     |    |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | A08 |   |   |   |   |     |     |    |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                               | C01 |   |   |   |   |     |     |    |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | C03 |   |   |   |   |     |     |    |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | C06 |   |   |   |   |     |     |    |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | C07 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | C08 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                             | G01 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | G03 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | G06 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | G07 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | G08 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                             | B01 | R |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | B06 | R |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | B07 | R |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | B08 | R |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                             | D01 | R |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | D06 | R |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | D07 | R |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | D08 | R |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
| <b>Sondergeometrien (Aufpreis)   Special cutting geometries (surcharge)   Géométries spéciales (surcharge)</b> |     |   |   |   |   |     |     |                                                                                     |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | S02 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | S04 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | S05 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | S10 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | S12 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | S14 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |
|                                                                                                                | S16 |   |   |   |   |     |     |  |       |       |                  |        |                                                                                     |                                                                                     |                |                |

Begriffe und Grundformeln siehe Seite 44 | Definitions and basic formulas see page 44 | Terminologie et formules voir page 44

R = Spanfluss | Chip flow | Direction du copeau

B = Anschnittbreite | Chamfer length | Largeur du chanfrein

V = Verjüngung | Back taper | Cônicité

F<sub>c</sub> = Schnittkraft | Cutting force | Force de coupe

M<sub>D</sub> = Drehmoment | Torque | Couple

γ = Radialer Spanwinkel | Radial rake angle | Angle de coupe radiale

▲ = Empfohlen | Recommended | Recommandé

■ = Geeignet | Applicable | Approprié

□ = Möglich | Possible | Possible

↗ = Höherer Wert | Higher value | Valeur plus élevée

↘ = Tieferer Wert | Lower value | Valeur inférieure

<sup>1)</sup> relativer Rauheitswert

Relative surface roughness

État de surface relative

<sup>2)</sup> relative Positionierabweichung

Relative positional tolerance

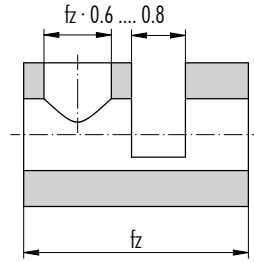
Tolérance de positionnement relative



# Schnittdaten Richtwerte RX

## Recommended cutting data RX

### Données de coupe indicatives RX



|     |     | 1. Wahl   1st choice   Premier choix<br>2. Wahl   2nd choice   2ème choix<br>Alternative   Alternative   Alternative |     |         |                |             | 1. Wahl   1st choice   Premier choix<br>2. Wahl   2nd choice   2ème choix<br>Alternative   Alternative   Alternative |     |         |                |             |
|-----|-----|----------------------------------------------------------------------------------------------------------------------|-----|---------|----------------|-------------|----------------------------------------------------------------------------------------------------------------------|-----|---------|----------------|-------------|
| ISO | UC  | Typ                                                                                                                  | USG | Sorte   | $v_c$<br>m/min | $f_z$<br>mm | Typ                                                                                                                  | USG | Sorte   | $v_c$<br>m/min | $f_z$<br>mm |
| P   | 1   | RXL                                                                                                                  | B07 | T1500   | 120-250        | 0.12-0.35   | RXL                                                                                                                  | B07 | F0512R1 | 120-250        | 0.12-0.35   |
|     |     | RXL                                                                                                                  | B07 | F0512R1 | 100-220        | 0.12-0.35   | RXL                                                                                                                  | B01 | T1500   | 100-220        | 0.12-0.35   |
|     | 2   | RXL                                                                                                                  | B07 | T1500   | 120-250        | 0.12-0.35   | RXL                                                                                                                  | B07 | F0512R1 | 120-250        | 0.12-0.35   |
|     |     | RXL                                                                                                                  | B07 | F0512R1 | 100-220        | 0.12-0.35   | RXL                                                                                                                  | B01 | T1500   | 100-220        | 0.12-0.35   |
|     | 3   | RXL                                                                                                                  | B07 | T1500   | 70-200         | 0.10-0.25   | RXL                                                                                                                  | B01 | F0512R1 | 70-200         | 0.10-0.25   |
|     |     | RXL                                                                                                                  | B07 | F0512R1 | 60-180         | 0.10-0.25   | RXL                                                                                                                  | B01 | T1500   | 60-180         | 0.10-0.25   |
|     | 3.1 | RXL                                                                                                                  | B07 | F0512R1 | 60-150         | 0.10-0.25   | RXL                                                                                                                  | B01 | F0512R1 | 60-150         | 0.10-0.25   |
|     |     | RXL                                                                                                                  | B07 | F0514R1 | 60-150         | 0.10-0.25   | RXL                                                                                                                  | B01 | F0514R1 | 60-150         | 0.10-0.25   |
|     | 3.2 | RXL                                                                                                                  | B07 | F0512R1 | 15-60          | 0.06-0.18   | RXL                                                                                                                  | B01 | F0512R1 | 15-60          | 0.06-0.18   |
|     |     | RXL                                                                                                                  | B07 | F0514R1 | 15-60          | 0.06-0.18   | RXL                                                                                                                  | B01 | F0514R1 | 15-60          | 0.06-0.18   |
|     | 3.3 | RXL                                                                                                                  | B07 | F0512R1 | 10-30          | 0.04-0.15   | RXL                                                                                                                  | B01 | F0512R1 | 10-30          | 0.04-0.15   |
|     |     | RXL                                                                                                                  | B07 | F0514R1 | 10-30          | 0.04-0.15   | RXL                                                                                                                  | B01 | F0514R1 | 10-30          | 0.04-0.15   |
|     | 4   | auf Anfrage   on request   sur demande                                                                               |     |         |                |             |                                                                                                                      |     |         |                |             |
|     |     | auf Anfrage   on request   sur demande                                                                               |     |         |                |             |                                                                                                                      |     |         |                |             |
| M   | 5   | RXL                                                                                                                  | B07 | F0512R1 | 20-80          | 0.08-0.22   | RXL                                                                                                                  | B07 | F0512R1 | 20-80          | 0.08-0.22   |
|     |     | RXL                                                                                                                  | B07 | T1500   | 30-100         | 0.08-0.22   | RXL                                                                                                                  | B01 | T1500   | 30-100         | 0.08-0.22   |
|     | 5.1 | RXL                                                                                                                  | B07 | F0512R1 | 15-60          | 0.06-0.15   | RXL                                                                                                                  | B01 | F0512R1 | 15-60          | 0.06-0.15   |
|     |     | RXL                                                                                                                  | B07 | F0514R1 | 15-60          | 0.06-0.15   | RXL                                                                                                                  | B01 | F0514R1 | 15-60          | 0.06-0.15   |
|     | 5.2 | RXL                                                                                                                  | B07 | F0512R1 | 15-60          | 0.06-0.15   | RXL                                                                                                                  | B01 | F0512R1 | 15-60          | 0.06-0.15   |
|     |     | RXL                                                                                                                  | B07 | F0514R1 | 15-60          | 0.06-0.15   | RXL                                                                                                                  | B01 | F0514R1 | 15-60          | 0.06-0.15   |
| K   | 6   | RXG                                                                                                                  | A01 | F0514R2 | 70-200         | 0.12-0.30   | RXG                                                                                                                  | A01 | F0514R1 | 70-200         | 0.12-0.30   |
|     |     | RXL                                                                                                                  | B01 | F0512R1 | 70-200         | 0.15-0.35   | RXL                                                                                                                  | B01 | F0512R1 | 70-200         | 0.15-0.35   |
|     |     | RXG                                                                                                                  | A01 | BS10    | 200-700        | 0.12-0.25   | RXG                                                                                                                  | A01 | BS10    | 200-700        | 0.12-0.25   |
|     | 6.1 | RXG                                                                                                                  | A01 | F0514R1 | 70-220         | 0.12-0.30   | RXG                                                                                                                  | A01 | F0514R1 | 70-220         | 0.12-0.30   |
|     |     | RXL                                                                                                                  | B01 | F0512R1 | 70-220         | 0.15-0.35   | RXL                                                                                                                  | B01 | F0512R1 | 70-220         | 0.15-0.35   |
|     |     | RXG                                                                                                                  | A01 | BS10    | 200-350        | 0.12-0.25   | RXG                                                                                                                  | A01 | BS10    | 200-350        | 0.12-0.25   |
|     | 6.2 | RXG                                                                                                                  | A01 | F0514R1 | 60-200         | 0.10-0.25   | RXG                                                                                                                  | A01 | F0514R1 | 60-200         | 0.10-0.25   |
|     |     | RXL                                                                                                                  | B01 | F0512R1 | 60-200         | 0.12-0.30   | RXL                                                                                                                  | B01 | F0512R1 | 60-200         | 0.12-0.30   |
|     |     | RXG                                                                                                                  | A01 | BS10    | 180-300        | 0.10-0.22   | RXG                                                                                                                  | A01 | BS10    | 180-300        | 0.10-0.22   |
|     | 7   | RXL                                                                                                                  | B07 | F0510C  | 100-350        | 0.12-0.35   | RXL                                                                                                                  | B07 | F0510C  | 100-350        | 0.12-0.35   |
|     |     | RXL                                                                                                                  | B07 | F0500   | 10-50          | 0.12-0.35   | RXL                                                                                                                  | B07 | F0500   | 10-50          | 0.12-0.35   |
|     |     | RXG                                                                                                                  | A01 | DP30    | 300-800        | 0.10-0.25   | RXG                                                                                                                  | A01 | DP30    | 300-800        | 0.10-0.25   |
| N   | 7.1 | RXL                                                                                                                  | B07 | F0510C  | 100-250        | 0.12-0.35   | RXL                                                                                                                  | B07 | F0510C  | 100-250        | 0.12-0.35   |
|     |     | RXL                                                                                                                  | B07 | F0500   | 10-40          | 0.12-0.35   | RXL                                                                                                                  | B07 | F0500   | 10-40          | 0.12-0.35   |
|     |     | RXG                                                                                                                  | A01 | DP30    | 300-800        | 0.10-0.25   | RXG                                                                                                                  | A01 | DP30    | 300-800        | 0.10-0.25   |
|     | 7.2 | RXL                                                                                                                  | B07 | T1500   | 100-250        | 0.12-0.35   | RXL                                                                                                                  | B07 | T1500   | 100-250        | 0.12-0.35   |
|     |     | RXL                                                                                                                  | B07 | F0512R1 | 100-250        | 0.12-0.35   | RXL                                                                                                                  | B07 | F0512R1 | 100-250        | 0.12-0.35   |
|     |     | RXG                                                                                                                  | A01 | DP30    | 300-800        | 0.10-0.25   | RXG                                                                                                                  | A01 | DP30    | 300-800        | 0.10-0.25   |
|     | 7.3 | RXL                                                                                                                  | B07 | F0512R1 | 10-25          | 0.06-0.18   | RXL                                                                                                                  | B01 | F0512R1 | 10-25          | 0.06-0.18   |
|     |     | RXL                                                                                                                  | B07 | F0514R1 | 10-25          | 0.06-0.18   | RXL                                                                                                                  | B07 | F0514R1 | 10-25          | 0.06-0.18   |
|     | 7.4 | RXL                                                                                                                  | B07 | F0512R1 | 10-25          | 0.06-0.18   | RXL                                                                                                                  | B01 | F0512R1 | 10-25          | 0.06-0.18   |
|     |     | RXL                                                                                                                  | B07 | F0514R1 | 10-25          | 0.06-0.18   | RXL                                                                                                                  | B07 | F0514R1 | 10-25          | 0.06-0.18   |
| S   | 8   | RXL                                                                                                                  | B07 | F0500   | 6-30           | 0.06-0.20   | RXL                                                                                                                  | B07 | F0500   | 6-30           | 0.06-0.20   |
|     |     | RXL                                                                                                                  | B07 | T1500   | 6-30           | 0.06-0.20   | RXL                                                                                                                  | B07 | T1500   | 6-30           | 0.06-0.20   |
|     | 8.1 | RXG                                                                                                                  | A01 | DP30    | 300-800        | 0.08-0.25   | RXG                                                                                                                  | A01 | DP30    | 300-800        | 0.08-0.25   |

ISO = Standard

UC = Urma Material-Code (Seite 48) | Urma material code (page 48) | Désignation de la matière (page 48)

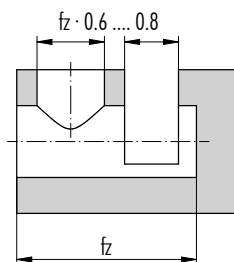
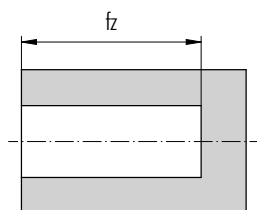
USG = Urma Schneiden Geometrie (Seite 39) | Urma cutting geometry (page 39) | Géométrie coupant Urma (page 39)

$v_c$  = Schnittgeschwindigkeit | Cutting speed | Vitesse de coupe

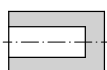
$f_z$  = Vorschub pro Zahn | Feed rate per tooth | Avance par dent

$a_p$  = Empfohlene, radiale Spantiefe | Recommended radial cutting depth | Profondeur de coupe radiale recommandée

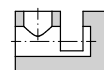




1. Wahl | 1st choice | Premier choix  
2. Wahl | 2nd choice | 2ème choix  
Alternative | Alternative | Alternative



1. Wahl | 1st choice | Premier choix  
2. Wahl | 2nd choice | 2ème choix  
Alternative | Alternative | Alternative



| Typ | USG | Sorte   | $v_c$<br>m/min | $f_z$<br>mm | Typ | USG | Sorte   | $v_c$<br>m/min | $f_z$<br>mm | $a_p$ (mm) |           |           |
|-----|-----|---------|----------------|-------------|-----|-----|---------|----------------|-------------|------------|-----------|-----------|
|     |     |         |                |             |     |     |         |                |             | < ø 20     | ø 20-35   | > ø 35    |
| RXG | A07 | T1500   | 120-250        | 0.10-0.25   | RXG | A07 | F0512R1 | 80-220         | 0.10-0.25   | 0.05-0.12  | 0.08-0.15 | 0.10-0.25 |
| RXG | A07 | F0512R1 | 80-220         | 0.10-0.25   | RXG | A01 | T1500   | 120-250        | 0.10-0.25   | 0.05-0.12  | 0.08-0.15 | 0.10-0.25 |
| RXG | A07 | T1500   | 120-250        | 0.10-0.25   | RXG | A07 | F0512R1 | 80-220         | 0.10-0.25   | 0.05-0.12  | 0.08-0.15 | 0.10-0.25 |
| RXG | A07 | F0512R1 | 80-220         | 0.10-0.25   | RXG | A01 | T1500   | 120-250        | 0.10-0.25   | 0.05-0.12  | 0.08-0.15 | 0.10-0.25 |
| RXG | A07 | T1500   | 70-200         | 0.08-0.20   | RXG | A01 | F0512R1 | 70-200         | 0.08-0.20   | 0.05-0.10  | 0.08-0.15 | 0.10-0.25 |
| RXG | A07 | F0512R1 | 60-180         | 0.08-0.20   | RXG | A01 | T1500   | 60-180         | 0.08-0.20   | 0.05-0.10  | 0.08-0.15 | 0.10-0.25 |
| RXG | A07 | F0512R1 | 60-150         | 0.08-0.20   | RXG | A01 | F0512R1 | 60-150         | 0.08-0.20   | 0.05-0.10  | 0.08-0.15 | 0.08-0.20 |
| RXG | A07 | F0514R1 | 60-150         | 0.08-0.20   | RXG | A01 | F0514R1 | 60-150         | 0.08-0.20   | 0.05-0.10  | 0.08-0.15 | 0.08-0.20 |
| RXG | A07 | F0512R1 | 15-60          | 0.04-0.15   | RXG | A01 | F0512R1 | 15-60          | 0.04-0.15   | 0.05-0.10  | 0.08-0.15 | 0.08-0.20 |
| RXG | A07 | F0514R1 | 15-60          | 0.04-0.15   | RXG | A01 | F0514R1 | 15-60          | 0.04-0.15   | 0.05-0.10  | 0.08-0.15 | 0.08-0.20 |
| RXG | A07 | F0512R1 | 10-30          | 0.04-0.12   | RXG | A01 | F0512R1 | 10-30          | 0.04-0.12   | 0.05-0.10  | 0.06-0.12 | 0.06-0.15 |
| RXG | A07 | F0514R1 | 10-30          | 0.04-0.12   | RXG | A01 | F0514R1 | 10-30          | 0.04-0.12   | 0.05-0.10  | 0.06-0.12 | 0.06-0.15 |
|     |     |         |                |             |     |     |         |                |             |            |           |           |
| RXG | A07 | F0512R1 | 20-80          | 0.06-0.20   | RXG | A07 | F0512R1 | 20-80          | 0.06-0.20   | 0.05-0.10  | 0.08-0.15 | 0.08-0.20 |
| RXG | A07 | T1500   | 30-100         | 0.06-0.20   | RXG | A07 | T1500   | 30-100         | 0.06-0.20   | 0.05-0.10  | 0.08-0.15 | 0.08-0.20 |
| RXG | A07 | F0512R1 | 15-60          | 0.04-0.13   | RXG | A01 | F0512R1 | 15-60          | 0.04-0.13   | 0.05-0.10  | 0.08-0.15 | 0.08-0.20 |
| RXG | A07 | F0514R1 | 15-60          | 0.04-0.13   | RXG | A01 | F0514R1 | 15-60          | 0.04-0.13   | 0.05-0.10  | 0.08-0.15 | 0.08-0.20 |
| RXG | A07 | F0512R1 | 15-60          | 0.04-0.13   | RXG | A01 | F0512R1 | 15-60          | 0.04-0.13   | 0.05-0.10  | 0.08-0.15 | 0.08-0.20 |
| RXG | A07 | F0514R1 | 15-60          | 0.04-0.13   | RXG | A01 | F0514R1 | 15-60          | 0.04-0.13   | 0.05-0.10  | 0.08-0.15 | 0.08-0.20 |
| RXG | A01 | F0514R2 | 70-200         | 0.12-0.30   | RXG | A01 | F0514R1 | 70-200         | 0.12-0.30   | 0.08-0.15  | 0.08-0.18 | 0.10-0.25 |
| RXG | A01 | F0512R1 | 70-200         | 0.12-0.30   | RXG | A01 | F0512R1 | 70-200         | 0.12-0.30   | 0.08-0.15  | 0.08-0.18 | 0.10-0.25 |
| RXG | A01 | BS10    | 200-700        | 0.12-0.25   | RXG | A01 | BS10    | 200-700        | 0.12-0.25   | 0.08-0.13  | 0.08-0.15 | 0.10-0.22 |
| RXG | A01 | F0514R1 | 70-220         | 0.12-0.30   | RXG | A01 | F0514R1 | 70-220         | 0.12-0.30   | 0.08-0.15  | 0.08-0.18 | 0.10-0.25 |
| RXG | A01 | F0512R1 | 70-220         | 0.12-0.30   | RXG | A01 | F0512R1 | 70-220         | 0.12-0.30   | 0.08-0.15  | 0.08-0.18 | 0.10-0.25 |
| RXG | A01 | BS10    | 200-350        | 0.12-0.25   | RXG | A01 | BS10    | 200-350        | 0.12-0.25   | 0.08-0.13  | 0.08-0.15 | 0.10-0.22 |
| RXG | A01 | F0514R1 | 60-200         | 0.10-0.25   | RXG | A01 | F0514R1 | 60-200         | 0.10-0.25   | 0.08-0.15  | 0.08-0.18 | 0.10-0.25 |
| RXG | A01 | F0512R1 | 60-200         | 0.10-0.25   | RXG | A01 | F0512R1 | 60-200         | 0.10-0.25   | 0.08-0.15  | 0.08-0.18 | 0.10-0.25 |
| RXG | A01 | BS10    | 180-300        | 0.10-0.22   | RXG | A01 | BS10    | 180-300        | 0.10-0.22   | 0.08-0.13  | 0.08-0.15 | 0.10-0.22 |
| RXG | A07 | F0510C  | 100-350        | 0.10-0.30   | RXG | A07 | F0510C  | 100-350        | 0.10-0.30   | 0.05-0.12  | 0.08-0.15 | 0.10-0.30 |
| RXG | A07 | F0500   | 10-50          | 0.10-0.30   | RXG | A07 | F0500   | 10-50          | 0.10-0.30   | 0.05-0.12  | 0.08-0.15 | 0.12-0.35 |
| RXG | A01 | DP30    | 300-800        | 0.10-0.25   | RXG | A01 | DP30    | 300-800        | 0.10-0.25   | 0.05-0.12  | 0.08-0.15 | 0.06-0.20 |
| RXG | A07 | F0510C  | 100-250        | 0.10-0.30   | RXG | A07 | F0510C  | 100-250        | 0.10-0.30   | 0.05-0.12  | 0.08-0.15 | 0.10-0.30 |
| RXG | A07 | F0500   | 10-40          | 0.10-0.30   | RXG | A07 | F0500   | 10-40          | 0.10-0.30   | 0.05-0.12  | 0.08-0.15 | 0.12-0.35 |
| RXG | A01 | DP30    | 300-800        | 0.10-0.25   | RXG | A01 | DP30    | 300-800        | 0.10-0.25   | 0.05-0.12  | 0.08-0.15 | 0.06-0.20 |
| RXG | A07 | T1500   | 100-250        | 0.10-0.30   | RXG | A07 | T1500   | 100-250        | 0.10-0.30   | 0.05-0.12  | 0.08-0.15 | 0.12-0.35 |
| RXG | A07 | F0512R1 | 100-250        | 0.10-0.30   | RXG | A07 | F0512R1 | 100-250        | 0.10-0.30   | 0.05-0.12  | 0.08-0.15 | 0.12-0.35 |
| RXG | A01 | DP30    | 300-800        | 0.10-0.25   | RXG | A01 | DP30    | 300-800        | 0.10-0.25   | 0.05-0.12  | 0.08-0.15 | 0.06-0.20 |
| RXG | A07 | F0512R1 | 10-25          | 0.04-0.15   | RXG | A01 | F0512R1 | 10-25          | 0.04-0.15   | 0.05-0.10  | 0.05-0.12 | 0.04-0.15 |
| RXG | A07 | F0514R1 | 10-25          | 0.04-0.15   | RXG | A07 | F0514R1 | 10-25          | 0.04-0.15   | 0.05-0.10  | 0.05-0.12 | 0.04-0.15 |
| RXG | A07 | F0512R1 | 10-25          | 0.04-0.15   | RXG | A01 | F0512R1 | 10-25          | 0.04-0.15   | 0.05-0.10  | 0.05-0.12 | 0.04-0.15 |
| RXG | A07 | F0514R1 | 10-25          | 0.04-0.15   | RXG | A07 | F0514R1 | 10-25          | 0.04-0.15   | 0.05-0.10  | 0.05-0.12 | 0.04-0.15 |
| RXG | A07 | F0500   | 6-30           | 0.06-0.20   | RXG | A07 | F0500   | 6-30           | 0.06-0.20   | 0.05-0.12  | 0.08-0.15 | 0.10-0.25 |
| RXG | A07 | T1500   | 6-30           | 0.06-0.20   | RXG | A07 | T1500   | 6-30           | 0.06-0.20   | 0.05-0.12  | 0.08-0.15 | 0.10-0.25 |
| RXG | A01 | DP30    | 300-800        | 0.08-0.25   | RXG | A01 | DP30    | 300-800        | 0.08-0.25   | 0.05-0.12  | 0.08-0.15 | 0.10-0.25 |

Sortenbeschreibung siehe Seite 38 | Description of cutting materials see page 38 | Description de matières de coupe voir page 38

# Schnittdaten Richtwerte Variopoint

## Recommended cutting data Variopoint

## Données de coupe indicatives Variopoint

| ISO | UC  | VR |   |   | linksschräg verzahnt<br>left helical fluted<br>coupe diagonale gauche   |   | gerade straight fluted<br>coupe droite   |   |   |   | $a_p$ (mm) |           |           |
|-----|-----|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|------------|-----------|-----------|
|     |     |    |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
| P   | 1   | L  | ■                                                                                                                                                                   | ■ | ■                                                                                                                                                                                                                                         |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   | 0.08-0.13  | 0.10-0.18 | 0.10-0.20 |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.08-0.13  | 0.10-0.18 | 0.10-0.20 |
|     | 2   | L  | ■                                                                                                                                                                   | ■ | ■                                                                                                                                                                                                                                         | □ |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   | 0.08-0.13  | 0.10-0.18 | 0.10-0.20 |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.08-0.13  | 0.10-0.18 | 0.10-0.20 |
|     | 3   | L  | ■                                                                                                                                                                   | ■ | ■                                                                                                                                                                                                                                         | □ |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   | 0.08-0.13  | 0.10-0.18 | 0.10-0.20 |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.08-0.13  | 0.10-0.18 | 0.10-0.20 |
|     | 3.1 | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.08-0.15  | 0.10-0.20 | 0.10-0.20 |
|     | 3.2 | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.08-0.15  | 0.10-0.20 | 0.10-0.20 |
|     | 3.3 | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.08-0.15  | 0.10-0.20 | 0.10-0.20 |
|     | 4   | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | □                                                                                                                                                                                                          |   |                                                                                                                                                                       | ■ |            |           |           |
| M   | 5   | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.08-0.13  | 0.08-0.18 | 0.08-0.20 |
|     | 5.1 | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.08-0.13  | 0.08-0.18 | 0.08-0.20 |
|     | 5.2 | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.08-0.13  | 0.08-0.18 | 0.08-0.20 |
| K   | 6   | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.10-0.18  | 0.10-0.25 | 0.10-0.25 |
|     | 6.1 | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.10-0.18  | 0.10-0.25 | 0.10-0.25 |
|     | 6.2 | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.10-0.18  | 0.10-0.25 | 0.10-0.25 |
| N   | 7   | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.08-0.13  | 0.08-0.20 | 0.10-0.25 |
|     | 7.1 | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.08-0.13  | 0.08-0.20 | 0.10-0.25 |
|     | 7.2 | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ |                                                                                                                                                                       | □ | 0.10-0.18  | 0.10-0.25 | 0.10-0.25 |
|     | 7.3 | L  | □                                                                                                                                                                   | □ | ■                                                                                                                                                                                                                                         | □ |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   | 0.06-0.10  | 0.06-0.15 | 0.08-0.18 |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ | □                                                                                                                                                                     | ■ | 0.06-0.10  | 0.06-0.15 | 0.08-0.18 |
|     | 7.4 | L  | □                                                                                                                                                                   | □ | ■                                                                                                                                                                                                                                         | □ |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   | 0.06-0.12  | 0.06-0.18 | 0.08-0.18 |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | ■                                                                                                                                                                                                          | □ | □                                                                                                                                                                     | ■ | 0.06-0.12  | 0.06-0.18 | 0.08-0.18 |
| S   | 8   | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | □                                                                                                                                                                                                          |   |                                                                                                                                                                       | ■ | 0.10-0.18  | 0.10-0.20 | 0.10-0.25 |
|     | 8.1 | L  |                                                                                                                                                                     |   |                                                                                                                                                                                                                                           |   |                                                                                                                                                                                                            |   |                                                                                                                                                                       |   |            |           |           |
|     |     | G  | ■                                                                                                                                                                   | ■ |                                                                                                                                                                                                                                           |   | □                                                                                                                                                                                                          |   |                                                                                                                                                                       | ■ | 0.10-0.18  | 0.10-0.20 | 0.10-0.25 |

ISO = Standard

UC = Urma Material code (Seite 48) | Urma material code (page 48) | Désignation de la matière (page 48)

VR = Verzahnungsrichtung | Direction of flutes | Direction de l'hélice

$a_p$  = Empfohlene, radiale Spantiefe | Recommended radial cutting depth | Profondeur de coupe radiale recommandée

G = Gerade genutet | Straight fluted | Coupe droite

L = Linksschräg | Left helical fluted | Coupe diagonale gauche

E = Schälanschnitt | Curling cut | Coupe gun

F = Stirnschnitt | Face cutting | Coupe frontale

■ = Standard

□ = Optional

| Unbeschichtet   Uncoated   Sans revêtement       |               |                                                      |               | Beschichtet   Coated   Revêtu                         |               |                                                           |               |                                                   |               |                                                   |               |
|--------------------------------------------------|---------------|------------------------------------------------------|---------------|-------------------------------------------------------|---------------|-----------------------------------------------------------|---------------|---------------------------------------------------|---------------|---------------------------------------------------|---------------|
| <b>HM</b><br><b>W1</b> <sup>2)</sup><br>(HW-K10) |               | <b>Cermet</b><br><b>T1</b> <sup>2)</sup><br>(HT-P15) |               | <b>HM</b><br><b>W2 – W3</b> <sup>2)</sup><br>(HC-K10) |               | <b>Cermet</b><br><b>T2 – T3</b> <sup>2)</sup><br>(HT-P15) |               | <b>PKD</b><br><b>D1</b> <sup>2)</sup><br>(DP-N05) |               | <b>CBN</b><br><b>B1</b> <sup>2)</sup><br>(BN-H05) |               |
| $v_c$<br>m/min                                   | $f_z$<br>mm/z | $v_c$<br>m/min                                       | $f_z$<br>mm/z | $v_c$<br>m/min                                        | $f_z$<br>mm/z | $v_c$<br>m/min                                            | $f_z$<br>mm/z | $v_c$<br>m/min                                    | $f_z$<br>mm/z | $v_c$<br>m/min                                    | $f_z$<br>mm/z |
| 6-10                                             | 0.04-0.20     | 75-200                                               | 0.06-0.23     | 60-150                                                | 0.06-0.23     | 75-200                                                    | 0.06-0.23     |                                                   |               |                                                   |               |
| 6-10                                             | 0.03-0.15     | 75-200                                               | 0.04-0.15     | 60-150                                                | 0.04-0.15     | 75-200                                                    | 0.04-0.15     |                                                   |               |                                                   |               |
| 6-10                                             | 0.04-0.20     | 75-200                                               | 0.06-0.23     | 60-150                                                | 0.06-0.23     | 75-200                                                    | 0.06-0.23     |                                                   |               |                                                   |               |
| 6-10                                             | 0.03-0.15     | 75-200                                               | 0.04-0.15     | 60-150                                                | 0.04-0.15     | 75-200                                                    | 0.04-0.15     |                                                   |               |                                                   |               |
| 6-10                                             | 0.04-0.20     | 60-150                                               | 0.04-0.20     | 40-100                                                | 0.04-0.20     | 60-150                                                    | 0.04-0.20     |                                                   |               |                                                   |               |
| 6-10                                             | 0.03-0.15     | 60-150                                               | 0.03-0.15     | 40-100                                                | 0.03-0.15     | 60-150                                                    | 0.03-0.15     |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 6-10                                             | 0.03-0.12     |                                                      |               | 15-40                                                 | 0.03-0.15     |                                                           |               |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 4-7                                              | 0.03-0.10     |                                                      |               | 15-40                                                 | 0.03-0.15     |                                                           |               |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 4-7                                              | 0.03-0.10     |                                                      |               | 10-25                                                 | 0.03-0.15     |                                                           |               |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   | 1)            |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 5-8                                              | 0.03-0.12     |                                                      |               | 15-40                                                 | 0.03-0.15     |                                                           |               |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 4-7                                              | 0.03-0.12     |                                                      |               | 10-30                                                 | 0.03-0.15     |                                                           |               |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 4-7                                              | 0.03-0.12     |                                                      |               | 10-30                                                 | 0.03-0.15     |                                                           |               |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 10-25                                            | 0.03-0.18     |                                                      |               | 30-120                                                | 0.04-0.23     |                                                           |               |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 6-12                                             | 0.03-0.18     |                                                      |               | 20-80                                                 | 0.04-0.23     |                                                           |               |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 10-20                                            | 0.03-0.18     | 100-250                                              | 0.04-0.23     | 60-220                                                | 0.04-0.23     | 100-250                                                   | 0.04-0.23     |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 10-25                                            | 0.03-0.15     | 100-300                                              | 0.04-0.23     | 60-180                                                | 0.04-0.23     | 100-300                                                   | 0.04-0.23     | 100-300                                           | 0.02-0.05     |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 8-20                                             | 0.03-0.15     |                                                      |               | 30-90                                                 | 0.04-0.23     |                                                           |               | 100-300                                           | 0.02-0.05     |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 10-25                                            | 0.03-0.10     |                                                      |               | 15-40                                                 | 0.03-0.15     |                                                           |               |                                                   |               |                                                   |               |
| 6-14                                             | 0.06-0.22     |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 6-14                                             | 0.04-0.15     |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 4-7                                              | 0.06-0.22     |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 4-7                                              | 0.04-0.23     |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 10-30                                            | 0.04-0.23     |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
|                                                  |               |                                                      |               |                                                       |               |                                                           |               |                                                   |               |                                                   |               |
| 4-12                                             | 0.04-0.15     |                                                      |               |                                                       |               |                                                           |               | 80-160                                            | 0.02-0.07     |                                                   |               |

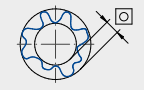
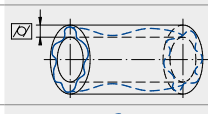
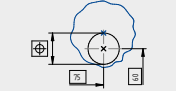
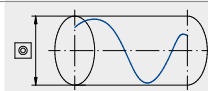
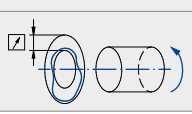
<sup>1)</sup> Auf Anfrage | On request | Sur demande

<sup>2)</sup> Nummernschlüssel Seite 49 | Numerical code page 49 | Code numérique page 49

# Begriffe und Grundformeln

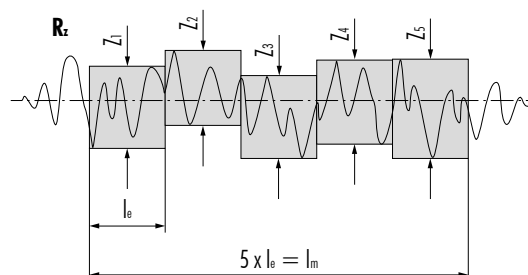
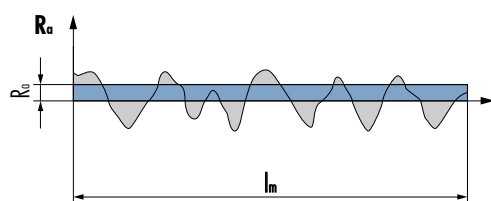
## Definitions and basic formulas

## Terminologie et formules de base

|                                                                                     | Bezeichnung                       | Désignation                          | Désignation                         |                                                                                       |
|-------------------------------------------------------------------------------------|-----------------------------------|--------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|
| $a_p$                                                                               | Spantiefe                         | Depth of cut                         | Profondeur de passe                 | mm                                                                                    |
| $n$                                                                                 | Drehzahl                          | Speed                                | Vitesse de rotation                 | $\text{min}^{-1}$                                                                     |
| $d$                                                                                 | Bohrungs-Durchmesser              | Bore diameter                        | Diamètre d'alésage                  | mm                                                                                    |
| $v_c$                                                                               | Schnittgeschwindigkeit            | Cutting speed                        | Vitesse de coupe                    | m/min                                                                                 |
| $v_f$                                                                               | Vorschubgeschwindigkeit           | Feed rate                            | Vitesse d'avance                    | mm/min                                                                                |
| $f$                                                                                 | Vorschub pro Umdrehung            | Feed per revolution                  | Avance par tour                     | mm                                                                                    |
| $f_z$                                                                               | Vorschub pro Schneide             | Feed per cutter                      | Avance par coupe                    | mm                                                                                    |
| $z$                                                                                 | Schneidenzahl                     | Number of cutters                    | Nombre d'outils                     |                                                                                       |
| $l_f$                                                                               | Vorschubweg                       | Feed distance                        | Course d'avance                     | mm                                                                                    |
| $R_a$                                                                               | Arithmetischer Mittenrauheitswert | Arithmetic centre line average value | Moyenne arithmétique de rugosité    | $\mu\text{m}$                                                                         |
| $R_t$                                                                               | Maximale Rauhtiefe                | Peak-to-valley height                | Profondeur max. de rugosité         | $\mu\text{m}$                                                                         |
| $R_z$                                                                               | Gemittelte maximale Rauhtiefe     | Average peak-to-valley height        | Profondeur moyenne max. de rugosité | $\mu\text{m}$                                                                         |
| $R_m$                                                                               | Zugfestigkeit                     | Tensile strength                     | Résistance à la traction            | $\text{N/mm}^2$                                                                       |
| $t_c$                                                                               | Schnittzeit pro Werkstück         | Cutting time per workpiece           | Durée de coupe par outil            | min                                                                                   |
| $\gamma$                                                                            | Radialer Spanwinkel               | Radial rake angle                    | Angle de coupe radiale              | Grad / degrees / degrés                                                               |
| $\varepsilon$                                                                       | Eckenwinkel                       | Apex angle                           | Angle d'arête                       | Grad / degrees / degrés                                                               |
|  | Rundheit                          | Circularity                          | Rotondité                           |  |
|  | Zylindrizität                     | Cylindricity                         | Cylindricité                        |  |
|  | Position                          | Position                             | Positionnement                      |  |
|  | Koaxialität                       | Concentricity                        | Concentricité                       |  |
|  | Rundlauf                          | Circular runout                      | Circularité                         |  |

|                                                             |                                          |       |                                          |                                          |                   |                                        |                                                  |        |                                                       |                               |     |
|-------------------------------------------------------------|------------------------------------------|-------|------------------------------------------|------------------------------------------|-------------------|----------------------------------------|--------------------------------------------------|--------|-------------------------------------------------------|-------------------------------|-----|
| Schnittgeschwindigkeit<br>Cutting speed<br>Vitesse de coupe | $v_c = \frac{\pi \cdot d \cdot n}{1000}$ | m/min | Drehzahl<br>Speed<br>Vitesse de rotation | $n = \frac{v_c \cdot 1000}{\pi \cdot d}$ | $\text{min}^{-1}$ | Vorschub/min<br>Feed/min<br>Avance/min | $v_f = f \cdot n$<br>$v_f = f_z \cdot z \cdot n$ | mm/min | Bearbeitungszeit<br>Machining time<br>Durée d'usinage | $t_c = \frac{l_f}{f \cdot n}$ | min |
|-------------------------------------------------------------|------------------------------------------|-------|------------------------------------------|------------------------------------------|-------------------|----------------------------------------|--------------------------------------------------|--------|-------------------------------------------------------|-------------------------------|-----|

|    | $R_a$      | $R_z$     |
|----|------------|-----------|
| N8 | 1.6 - 3.2  | 8.4 - 15  |
| N7 | 0.8 - 1.6  | 4.0 - 8.4 |
| N6 | 0.4 - 0.8  | 2.2 - 4.0 |
| N5 | 0.2 - 0.4  | 1.6 - 2.8 |
| N4 | 0.1 - 0.2  | 1.0 - 2.8 |
| N3 | 0.05 - 0.1 | 0.8 - 1.1 |



# Bearbeitungsstudie | Machining study | Etude d'usinage

No:

## Absender | Sender | Expéditeur \*

|                                          |                                                               |
|------------------------------------------|---------------------------------------------------------------|
| <b>Firma</b><br>Company<br>Entreprise    | <b>URMA Vertretung</b><br>URMA Distributor<br>Conseiller URMA |
| <b>Adresse</b><br>Address<br>Adresse     | <b>Sachbearbeiter</b><br>Contact<br>Responsable               |
| <b>Telefon</b><br>Telephone<br>Téléphone | <b>Abteilung</b><br>Department<br>Département                 |
| <b>Fax</b><br>Fax<br>Fax                 | <b>E-Mail</b><br>E-Mail<br>E-Mail                             |

## Maschine | Machine-Tool | Machine-Outil

|                                                                                             |                                                                    |
|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| <b>Typ und Hersteller</b><br>Machine type<br>Type et fabricant                              | <b>Leistung (kW)</b><br>Drive power (kW)<br>Puissance d'entr. (kW) |
| <b>Horizontal *</b><br>Horizontal * <input type="checkbox"/><br>Horizontale *               | <b>Stabilität</b><br>Stability<br>Stabilité                        |
| <b>Vertikal *</b><br>Vertical * <input type="checkbox"/><br>Verticale *                     |                                                                    |
| <b>Werkzeug rotierend *</b><br>Tool rotating * <input type="checkbox"/><br>Outil tournant * |                                                                    |
| <b>Spindelaufnahme *</b><br>Spindle holder *<br>Ajustage de la broche *                     |                                                                    |
| <b>Einschränkungen aufgrund</b><br>Restrictions due to<br>Limitations                       |                                                                    |

## Kühlschmierstoff | Lubricant | Lubrifiant

|                                                                                                               |                                                                  |                                                                        |                                                                                                   |
|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>Öl *</b><br>Oil * <input type="checkbox"/><br>Huile *                                                      | <b>MMS * 1)</b><br>MLS * 1) <input type="checkbox"/><br>MMS * 1) | <b>Emulsion *</b><br>Emulsion * <input type="checkbox"/><br>Emulsion * | <b>Mischungsverhältnis</b><br>Ratio of mixture<br>Dosage                                          |
| <b>Innere Kühlmittel-Zufuhr *</b><br>Internal coolant supply * <input type="checkbox"/><br>Arrosage central * |                                                                  |                                                                        | <b>Kühlmitteldruck (bar) *</b><br>Coolant pressure (bar) *<br>Pression liquide d'arrosage (bar) * |

## Werkstück | Workpiece | Pièce

|                                                                                           |                                                                                |                                                          |
|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------|
| <b>Bezeichnung</b><br>Designation<br>Désignation                                          | <b>Zeichnungsnummer</b><br>Drawing no.<br>No dessin                            | <b>Werkstoff-Nr. *</b><br>Material no. *<br>No matière * |
| <b>Normbezeichnung</b><br>Specification<br>Désignation standard                           | <b>Behandlungszustand *</b><br>Treatment condition *<br>Traitement thermique * | <b>Festigkeit *</b><br>Strength *<br>Dureté *            |
| <b>Anzahl Bohrungen pro Jahr *</b><br>Number of bores/year *<br>Nombre d'alésage par an * | <b>Losgrösse</b><br>Batch size<br>Quantité par lot                             |                                                          |

## Bearbeitungsanforderungen | Machining requirements | Exigences d'usinage

|                                                                                                                          |                                                                                                             |                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| <b>Bohrungs-ø *</b><br>Bore diameter *<br>ø d'alésage *                                                                  | <b>Bohrungslänge *</b><br>Bore length *<br>Profondeur d'alésage *                                           | <b>Vorbearbeitungs-ø *</b><br>Pre-machined ø *<br>ø de préalésage *                        |
| <b>Toleranz *</b><br>Tolerance *<br>Tolérance *                                                                          | <b>Werkzeuglänge (xs)</b><br>Gage length (xs)<br>Longueur d'outil (xs)                                      | <b>Vorbearbeitungsart *</b><br>Method of pre-machining *<br>Méthode de préalésage *        |
| <b>Zusätzliche Toleranzanforderungen</b><br>Additional tolerance requirements<br>Exigences additionnelles des tolérances | <b>Sacklochbohrung *</b><br>Blind hole * <input type="checkbox"/><br>Trous borgnes *                        | <b>Vorgabezeit</b><br>Target time<br>Temps de production donné                             |
| <b>Oberflächengüte (µm) *</b><br>Surface quality (µm) *<br>Qualité d'état de surface (µm) *                              | <b>Schnittunterbrechung *</b><br>Cutting interruption * <input type="checkbox"/><br>Interruption de coupe * | <b>Vorgabemenge</b><br>Target quantity<br>Donnée de quantité                               |
| Ra <input type="checkbox"/> Rz <input type="checkbox"/> Rt <input type="checkbox"/>                                      | <b>Taktzeitbindung</b><br>Cycle time <input type="checkbox"/><br>Temps de production fixe                   |                                                                                            |
| <b>Datum *</b><br>Date *<br>Date *                                                                                       | <b>Visum *</b><br>Visa *<br>Visa *                                                                          | <b>Beilage:</b><br>Attachment:<br>Annexe:                                                  |
|                                                                                                                          |                                                                                                             | <b>Ihre Bearbeitungsskizze *</b><br>Your application sketch *<br>Votre croquis d'usinage * |

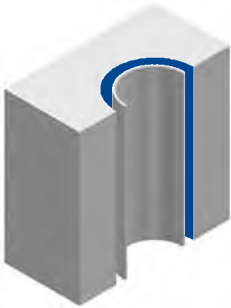
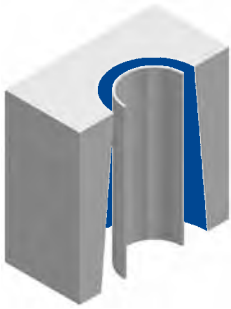
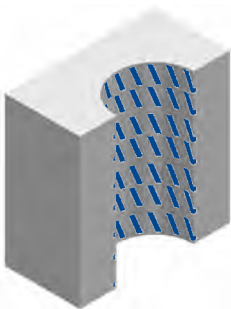
\* = Pflichtfelder | \* = Mandatory fields | \* = Cases obligatoires

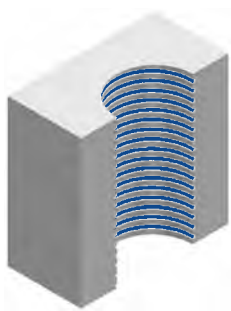
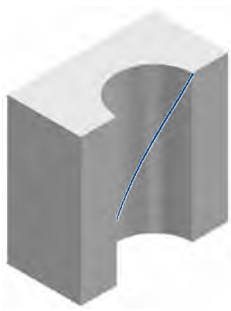
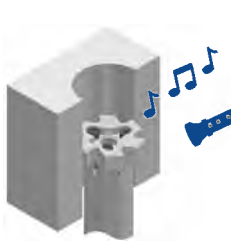
1) **Mindermengen Schmierung** | Minimal lubrication system (mist coolant) | Micro-lubrication

# Problembehebung

## Practical solutions for reaming problems

## Solutions pratiques pour les problèmes

|                                                                                                                  | Behebung                                                                                                                                                                                                                                                                                                                                                                                          | Solutions                                                                                                                                                                                                                                                                                                                                                 | Solutions                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fehler   Fault   Défaits:<br>  | <b>Bohrung ist zu gross</b> <ol style="list-style-type: none"> <li>1. Rundlauffehler reduzieren, evtl. Ausgleichshalter einsetzen</li> <li>2. Schnittgeschwindigkeit reduzieren</li> <li>3. Vorschub erhöhen, Mischverhältnis KSS erhöhen</li> <li>4. Spantiefe reduzieren</li> <li>5. Verschleiss überprüfen (Aufbauschneide)</li> <li>6. Werkzeug-<math>\phi</math> kontrollieren</li> </ol>    | <b>Hole too large</b> <ol style="list-style-type: none"> <li>1. Reduce run-out error and use compensation holder</li> <li>2. Reduce cutting speed</li> <li>3. Increase feed rate, increase coolant mix</li> <li>4. Reduce depth of cut</li> <li>5. Check tool wear (especially on built-up edges)</li> <li>6. Control reamer-<math>\phi</math></li> </ol> | <b>Alésage trop grand</b> <ol style="list-style-type: none"> <li>1. Réduire les défauts de mal rond, evtl. utiliser un mandrin de compensation</li> <li>2. Réduisez la vitesse de coupe</li> <li>3. Augmentez l'avance</li> <li>4. Réduisez la profondeur de coupe</li> <li>5. Contrôlez l'usure</li> <li>6. Contrôlez le <math>\phi</math></li> </ol>                               |
| Fehler   Fault   Défaits:<br> | <b>Bohrung ist konisch</b> <ol style="list-style-type: none"> <li>1. Rundlauffehler reduzieren, evtl. Ausgleichshalter einsetzen</li> <li>2. Schnittgeschwindigkeit und Vorschub reduzieren, KSS überprüfen</li> <li>3. Vorbearbeitung verbessern</li> <li>4. Aufspannung verbessern</li> <li>5. Werkstück messen im gespannten und ungespannten Zustand</li> <li>6. Spänefluss prüfen</li> </ol> | <b>Tapered hole</b> <ol style="list-style-type: none"> <li>1. Reduce run-out error and use compensation holder</li> <li>2. Reduce cutting speed and feed, check coolant mix</li> <li>3. Improve pre-machining</li> <li>4. Improve workpiece clamping</li> <li>5. Measure bore in clamped and unclamped condition</li> <li>6. Check chip flow</li> </ol>   | <b>Alésage cônica</b> <ol style="list-style-type: none"> <li>1. Réduire les défauts de mal rond, evtl. utiliser un mandrin de compensation</li> <li>2. Réduisez la vitesse de coupe et l'avance</li> <li>3. Améliorez les travaux ultérieurs</li> <li>4. Améliorez le serrage</li> <li>5. Mesurez la pièce, serrée et desserrée</li> <li>6. Contrôlez le flux des copeaux</li> </ol> |
| Fehler   Fault   Défaits:<br> | <b>Bohrung zeigt Rattermarken</b> <ol style="list-style-type: none"> <li>1. Rundlauffehler reduzieren, evtl. Ausgleichshalter einsetzen</li> <li>2. Anschnittgeometrie wechseln</li> <li>3. Aufspannung verbessern</li> <li>4. Schnittgeschwindigkeit reduzieren</li> <li>5. Vorschub erhöhen</li> </ol>                                                                                          | <b>Hole shows chatter marks</b> <ol style="list-style-type: none"> <li>1. Reduce run-out error and use compensation holder</li> <li>2. Change chamfer angle</li> <li>3. Improve workpiece clamping</li> <li>4. Reduce cutting speed</li> <li>5. Increase feed rate</li> </ol>                                                                             | <b>Alésage n'est pas rond et présente des tranches de broutage</b> <ol style="list-style-type: none"> <li>1. Réduire les défauts de mal rond, evtl. utiliser un mandrin de compensation</li> <li>2. Changez l'angle du chanfrein</li> <li>3. Améliorez le serrage</li> <li>4. Réduire la vitesse de coupe</li> <li>5. Augmentez l'avance</li> </ol>                                  |

|                                                                                                                  | Behebung                                                                                                                                                                                                                                                     | Solutions                                                                                                                                                                                                                               | Solutions                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fehler   Fault   Défaits:<br>   | <b>Oberflächengüte ungenügend</b><br>1. Verschleiss prüfen<br>2. Rundlauffehler reduzieren, evtl. Ausgleichshalter einsetzen, Schnittdaten überprüfen (Seiten 40/41 und 42/43)<br>3. Werkzeug mit IKZ verwenden<br>4. Mischverhältnis KSS erhöhen            | <b>Surface quality unsatisfactory</b><br>1. Check insert wear<br>2. Reduce run-out error and use compensation holder, check cutting data (pages 40/41 and 42/43)<br>3. Use tool with internal coolant supply<br>4. Increase coolant mix | <b>Qualité de surface insuffisante</b><br>1. Contrôlez l'usure<br>2. Réduire les défauts de mal rond, evtl. utiliser un mandrin de compensation, contrôlez les données de coupe (voir pages 40/41 et 42/43)<br>3. Utilisez des outils avec arrosage par le centre<br>4. Augmentez le mélange de votre lubrification |
| Fehler   Fault   Défaits:<br>  | <b>Rückzugriefen in der Bohrung</b><br>1. Rundlauffehler reduzieren, evtl. Ausgleichshalter einsetzen<br>2. Verschleiss überprüfen (Aufbauschneiden)<br>3. Spantiefe reduzieren<br>4. Schärfere Geometrie einsetzen<br>5. Rückzugsgeschwindigkeit reduzieren | <b>Retention marks in hole</b><br>1. Reduce run-out error and use compensation holder<br>2. Check insert wear (built-up edges)<br>3. Reduce depth of cut<br>4. Use a sharper geometry<br>5. Reduce pull back feed                       | <b>Rayures dans l'alésage tranches d'avance</b><br>1. Réduire les défauts de mal rond, evtl. utiliser un mandrin de compensation<br>2. Contrôlez l'usure<br>3. Réduisez la profondeur de coupe<br>4. Insérez une géométrie plus aiguë<br>5. Réduire la vitesse de retraite                                          |
| Fehler   Fault   Défaits:<br> | <b>Werkzeug klemmt</b><br>1. Mischverhältnis KSS reduzieren<br>2. Spantiefe erhöhen<br>3. Verschleiss prüfen<br>4. Anschnittgeometrie wechseln                                                                                                               | <b>Reamer jams</b><br>1. Reduce coolant mix<br>2. Increase depth of cut<br>3. Check insert wear<br>4. Change chamfer angle                                                                                                              | <b>L'outil coince dans l'alésage</b><br>1. Réduisez le mélange de lubrification<br>2. Augmentez la profondeur de coupe<br>3. Contrôlez l'usure<br>4. Changez la géométrie du chanfrein                                                                                                                              |
| Fehler   Fault   Défaits:<br> | <b>Bohrung zu klein</b><br>1. Schneide ersetzen<br>2. Mischverhältnis KSS reduzieren<br>3. Spantiefe erhöhen<br>4. Schnittgeschwindigkeit erhöhen<br>5. Vorschub reduzieren                                                                                  | <b>Hole too small</b><br>1. Change insert<br>2. Reduce coolant mix<br>3. Increase depth of cut<br>4. Increase cutting speed<br>5. Reduce feed rate                                                                                      | <b>Alésage trop étroit</b><br>1. Échangez l'outil de coupe<br>2. Réduisez le mélange de lubrification<br>3. Augmentez la profondeur de coupe<br>4. Augmentez la vitesse de coupe<br>5. Réduisez l'avance                                                                                                            |

# Werkstoff-Tabelle

## Material comparison table

### Tableau des matières

| ISO | UC  | Werkstoff-Bezeichnung                                                                                   | Material                                                                                           | Désignation de la matière                                                                                                     | Rm<br>N/mm <sup>2</sup> | HB<br>HRC |
|-----|-----|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------|
| P   | 1   | unleg. Kohlenstoffstahl<br>allgemeiner Baustahl                                                         | Unalloyed carbon steel<br>General structural steel                                                 | Acier au carbone non allié<br>Acier de construction ordinaire                                                                 | < 500                   | < 160     |
|     | 2   | Niedrigleg. Kohlenstoffstahl<br>Baustahl<br>Einsatzstahl<br>Vergütungsstahl<br>Stahlguss niedriglegiert | Low-alloy carbon steel<br>Structural steel<br>Cast-hardened steel<br>Tool steel<br>Low-alloy steel | Acier au carbone faiblement allié<br>Acier de construction<br>Acier de traitement<br>Acier à outils<br>Acier faiblement allié | 500-900                 | 140-325   |
|     | 3   | Legierter Werkzeugstahl<br>Nitrierstahl                                                                 | Alloyed tool steel<br>Nitride steel                                                                | Acier à outils allié<br>Acier nituré                                                                                          | 800-1200                | 250-350   |
|     | 3.1 | Werkzeugstahl hochlegiert                                                                               | High alloyed steel                                                                                 | Acier à outils allié                                                                                                          | < 1000                  |           |
|     | 3.2 | Werkzeugstahl hochlegiert                                                                               | High alloyed steel                                                                                 | Acier à outils allié                                                                                                          | < 1600                  |           |
|     | 3.3 | HSS                                                                                                     | High speed steel                                                                                   | Acier rapide                                                                                                                  |                         |           |
|     |     |                                                                                                         |                                                                                                    |                                                                                                                               |                         |           |
| H   | 4   | gehärteter Stahl                                                                                        | Hardened steel                                                                                     | Acier trempé                                                                                                                  | > 1400                  | HRC > 45  |
| M   | 5   | Rostfreier Stahl martensitisch                                                                          | Stainless steel martensitic                                                                        | Acier inoxydable martensitique                                                                                                | 500-1000                |           |
|     | 5.1 | Rostfreier Stahl austenitisch                                                                           | Stainless steel austenitic                                                                         | Acier inoxydable austénitique                                                                                                 |                         |           |
|     | 5.2 | Rostfreier Stahl hitzebeständig                                                                         | Stainless heat resisting steel                                                                     | Acier inoxydable réfractaire                                                                                                  |                         |           |
| K   | 6   | Grauguss GG, Legierter GG                                                                               | Grey cast iron, alloyed grey cast iron                                                             | Fonte grise, Fonte grise allié                                                                                                |                         | < 250     |
|     | 6.1 | GGG ferritisch (GGG40)                                                                                  | Nodular iron ferritic                                                                              | Fonte sphéroïdale ferritique                                                                                                  |                         |           |
|     | 6.2 | GGG ferritisch/perlitisch, Temperguss                                                                   | Nodular iron ferritic/pearlitic, malleable Iron                                                    | Fonte sphéroïdale ferritique/perlitique                                                                                       | > 550                   |           |
| N   | 7   | Aluminium < 10 % Si,<br>Alu-Knetlegierungen                                                             | Aluminium < 10 % Si,<br>Alu-wrough alloys                                                          | Aluminium < 10 % Si,<br>Alliage d'aluminium                                                                                   |                         |           |
|     | 7.1 | Alu-Legierungen > 10 % Si                                                                               | Alu-alloy > 10 % Si                                                                                | Alliages Légers > 10 % Si                                                                                                     |                         |           |
|     | 7.2 | NE-Metalle, Kupferlegierungen,<br>Messing, Bronze                                                       | Nou ferrous alloys, copper alloys, brass,<br>Bronzes                                               | Métaux non-ferreux, alliage de cuivre,<br>laiton, bronze                                                                      |                         |           |
|     | 7.3 | Titan                                                                                                   | Titanium                                                                                           | Titane                                                                                                                        |                         |           |
|     | 7.4 | Nickelbasierte Legierungen                                                                              | Nickelbased alloys                                                                                 | Alliages à base de nickel                                                                                                     |                         |           |
| S   | 8   | Thermo-/Duroplast                                                                                       | Plastics thermo-, duroplast                                                                        | Matières plastiques<br>thermo-, duroplastiques                                                                                |                         |           |
|     | 8.1 | FKV<br>(Faserverstärkte Kunststoffe)                                                                    | Fiber reinforced plastics                                                                          | Matières plastiques<br>renforcées par fibres                                                                                  |                         |           |

UC = Urma Material-Code

UC = Urma material code

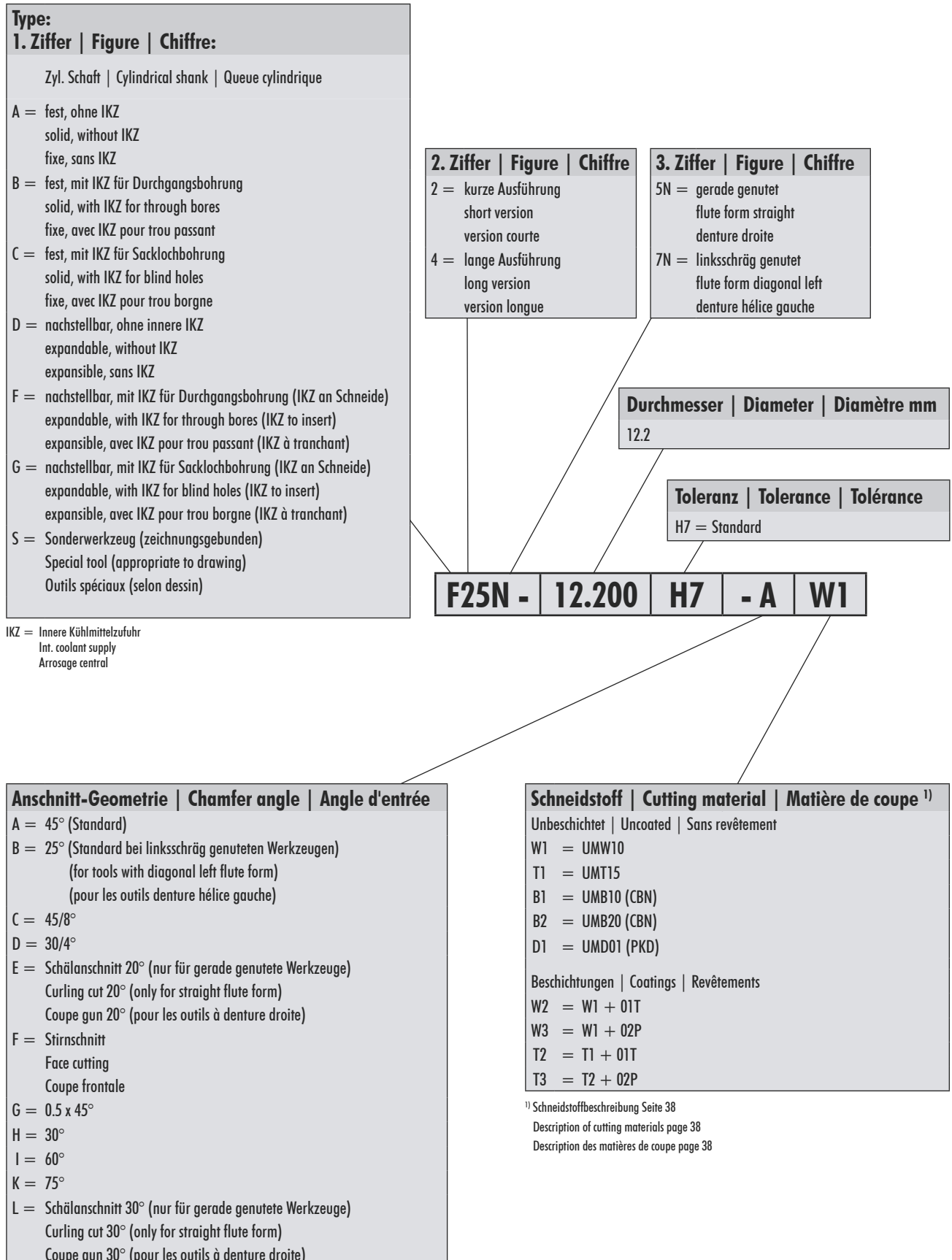
UC = Désignation de la matière Urma



# Nummernschlüssel Variopoint

## Numerical code Variopoint

### Code numérique Variopoint





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DEF-021-1109

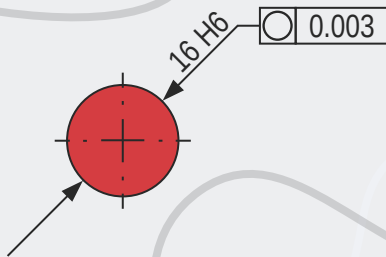
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