

# EXTREME SAP

## EXSAP/MSX TYPE



Facemill type



Modular head type



Shank type

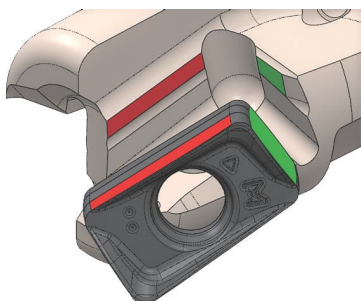
### Various line up

Capable of a variety of applications such as facemilling, slotting and plunging

### Arc-shaped cutting edge trajectory

Due to the arc-geometry on peripheral cutting edge, cusp height can be smaller even in case of large ap.

Achieves high efficient & high precision machining for side walls.



### Strong clamping system

Due to unique clamping system that holds insert in place, it is possible to achieve high efficient machining in roughing application.

### High precision G class periphery ground

capable of semi-finishing



Double sided 4 cutting edge insert

## ■ EXSAP-11 type



High speed machining  
with multi flutes & small insert

Accuracy of tool diameter : 0-0.1mm  
Achieves higher precision on semi-finishing process



Grade: JC8050  
JC8118

PM breaker for general steel (up to 50HRC)



Grade: JC7550  
JC7518  
DS118  
DS150

SL breaker for hard to cut material  
such as Titanium alloy, Heat resistant alloy

## ■ EXSAP-17 type



Max.depth of cut (ap)=15mm  
From roughing to semi-finishing

High rigidity insert  
Achieves high precision machining even when using  
large ap



Grade: JC8050  
JC8118

PM breaker for general steel (up to 50HRC)

## ■ Insert grades

| ISO   | P   |     |        |        |     | M   |     |        |        |     | K   |     |        |     | S   |       |        |     |
|-------|-----|-----|--------|--------|-----|-----|-----|--------|--------|-----|-----|-----|--------|-----|-----|-------|--------|-----|
|       | P01 | P10 | P20    | P30    | P40 | M01 | M10 | M20    | M30    | M40 | K01 | K10 | K20    | K30 | S01 | S10   | S20    | S30 |
| Range |     |     | JC8118 |        |     |     |     | JC8118 |        |     |     |     | JC8118 |     |     | DS118 |        |     |
|       |     |     |        | JC8050 |     |     |     |        | JC8050 |     |     |     |        |     |     |       | DS150  |     |
|       |     |     | JC7518 |        |     |     |     | JC7518 |        |     |     |     |        |     |     |       | JC7518 |     |
|       |     |     |        | JC7550 |     |     |     |        | JC7550 |     |     |     |        |     |     |       | JC7550 |     |

**EXSAP-11**  
TYPE**Bore Type**Through  
coolant  
hole

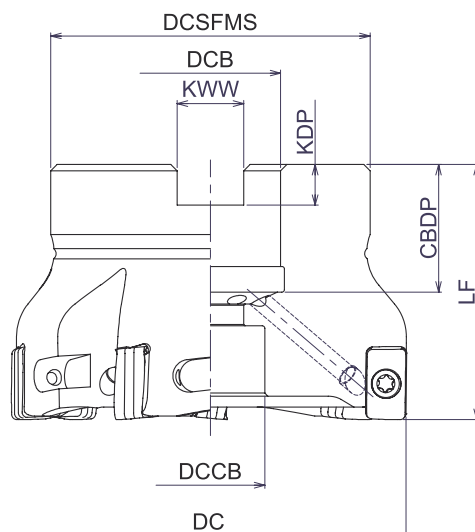
Face Milling

Shoulder Milling

Slotting

Helical Interpolation

Plunge Milling



| Cat.No.           | Stock | No. of inserts | Dimensions (mm) |    |        |     |      |      |     |      | Arbor set bolt | Weight (kg) | Inserts          |
|-------------------|-------|----------------|-----------------|----|--------|-----|------|------|-----|------|----------------|-------------|------------------|
|                   |       |                | DC              | LF | DCSFMS | DCB | DCCB | KWW  | KDP | CBDP |                |             |                  |
| EXSAP-6040R-11-16 | ●     | 6              | 40              | 40 | 35     | 16  | 14   | 8.4  | 5.6 | 18   | M8             | 0.22        | ZNGU1105**ZER-** |
| EXSAP-7050R-11-22 | ●     | 7              | 50              | 40 | 47     | 22  | 16.5 | 10.4 | 6.3 | 20   | M10            | 0.38        |                  |
| EXSAP-7052R-11-22 | ●     | 7              | 52              | 40 | 47     | 22  | 16.5 | 10.4 | 6.3 | 20   | M10            | 0.39        |                  |
| EXSAP-7063R-11-22 | ●     | 7              | 63              | 40 | 50     | 22  | 17   | 10.4 | 6.3 | 20   | M10            | 0.53        |                  |
| EXSAP-7063R-11-27 | ●     | 7              | 63              | 50 | 50     | 27  | 20   | 12.4 | 7   | 22   | M12X1.75X30    | 0.62        |                  |
| EXSAP-8080R-11-27 | ●     | 8              | 80              | 50 | 56     | 27  | 20   | 12.4 | 7   | 22   | M12X1.75X30    | 0.99        |                  |

| Screw    | Torque(N.m) | Wrench |
|----------|-------------|--------|
| TSW-307H | 2.1         | A-10   |

**EXSAP-11**  
TYPE**Shank Type**Through  
coolant  
hole

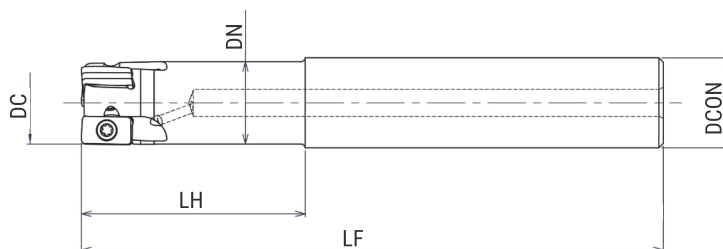
Face Milling

Shoulder Milling

Slotting

Helical Interpolation

Plunge Milling



| Cat.No.               | Stock | No. of inserts | Dimensions (mm) |     |     |      |      | Insert           |
|-----------------------|-------|----------------|-----------------|-----|-----|------|------|------------------|
|                       |       |                | DC              | LH  | LF  | DN   | DCON |                  |
| EXSAP-2016-11-30-S16  | ○     | 2              | 16              | 30  | 90  | 14.6 | 16   | ZNGU1105**ZER-** |
| EXSAP-2016-11-50-S16  | ●     | 2              | 16              | 50  | 110 | 14.6 | 16   |                  |
| EXSAP-3020-11-50-S20  | ●     | 3              | 20              | 50  | 130 | 18.3 | 20   |                  |
| EXSAP-3020-11-80-S20  | ○     | 3              | 20              | 80  | 160 | 18.3 | 20   |                  |
| EXSAP-3025-11-60-S25  | ●     | 3              | 25              | 60  | 140 | 23.4 | 25   |                  |
| EXSAP-3025-11-100-S25 | ○     | 3              | 25              | 100 | 180 | 23.4 | 25   |                  |
| EXSAP-3026-11-60-S25  | ○     | 3              | 26              | 60  | 140 | 23.4 | 25   |                  |
| EXSAP-4030-11-70-S32  | ○     | 4              | 30              | 70  | 150 | 28.4 | 32   |                  |
| EXSAP-4030-11-120-S32 | ○     | 4              | 30              | 120 | 200 | 28.4 | 32   |                  |
| EXSAP-4032-11-70-S32  | ●     | 4              | 32              | 70  | 150 | 29   | 32   |                  |
| EXSAP-4032-11-120-S32 | ○     | 4              | 32              | 120 | 200 | 29   | 32   |                  |
| EXSAP-4033-11-70-S32  | ○     | 4              | 33              | 70  | 150 | 29   | 32   |                  |
| EXSAP-5040-11-50-S32  | ○     | 5              | 40              | 50  | 150 | 37   | 32   |                  |
| EXSAP-5040-11-50L-S32 | ○     | 5              | 40              | 50  | 200 | 37   | 32   |                  |

| Screw    | Torque(N.m) | Wrench |
|----------|-------------|--------|
| TSW-307H | 2.1         | A-10   |

## EXTREME SAP

## EXSAP11/MSX11 Type

**MSX-11**  
TYPE**Modular Type**Through  
coolant  
hole

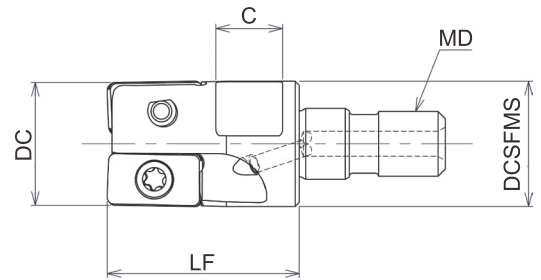
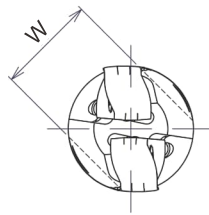
Face Milling

Shoulder Milling

Slotting

Helical Interpolation

Plunge Milling



| Cat.No.         | Stock | No. of inserts | Dimensions (mm) |    |        |     |    |    | Insert          |
|-----------------|-------|----------------|-----------------|----|--------|-----|----|----|-----------------|
|                 |       |                | DC              | LF | DCSFMS | MD  | C  | W  |                 |
| MSX-2016-11-M8  | ●     | 2              | 16              | 23 | 15     | M8  | 8  | 12 | ZNGU1105**ZER** |
| MSX-2017-11-M8  | ○     | 2              | 17              | 23 | 15     | M8  | 8  | 12 |                 |
| MSX-2018-11-M8  | ○     | 2              | 18              | 23 | 15     | M8  | 8  | 12 |                 |
| MSX-3020-11-M10 | ●     | 3              | 20              | 30 | 18     | M10 | 9  | 14 |                 |
| MSX-3021-11-M10 | ○     | 3              | 21              | 30 | 18     | M10 | 9  | 14 |                 |
| MSX-3025-11-M12 | ●     | 3              | 25              | 35 | 22     | M12 | 11 | 19 |                 |
| MSX-3026-11-M12 | ○     | 3              | 26              | 35 | 22     | M12 | 11 | 19 |                 |
| MSX-3028-11-M12 | ○     | 3              | 28              | 35 | 22     | M12 | 11 | 19 |                 |
| MSX-4030-11-M16 | ○     | 4              | 30              | 43 | 29     | M16 | 12 | 22 |                 |
| MSX-4032-11-M16 | ●     | 4              | 32              | 43 | 29     | M16 | 12 | 22 |                 |
| MSX-4033-11-M16 | ○     | 4              | 33              | 43 | 29     | M16 | 12 | 22 |                 |
| MSX-4035-11-M16 | ○     | 4              | 35              | 43 | 29     | M16 | 12 | 22 |                 |
| MSX-5040-11-M16 | ●     | 5              | 40              | 43 | 29     | M16 | 12 | 22 |                 |

| Screw    | Torque(N.m) | Wrench |
|----------|-------------|--------|
| TSW-307H | 2.1         | A-10   |

EXSAP11/MSX11  
TYPE

## Insert



Fig 1

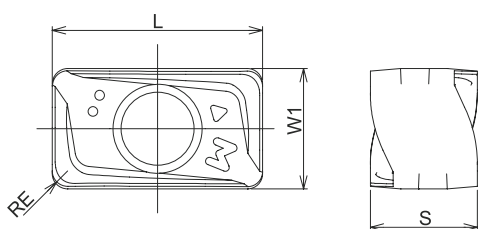
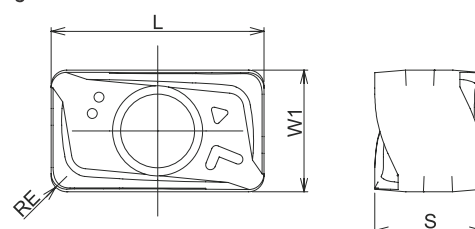
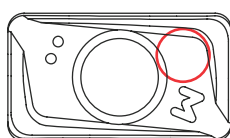


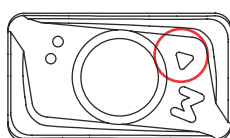
Fig 2



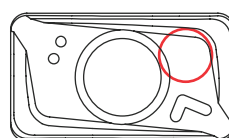
| Cat.No.          | Tolerance | PVD Coating |       |        |        |        |        | Dimensions (mm) |    |     |     | Fig. |
|------------------|-----------|-------------|-------|--------|--------|--------|--------|-----------------|----|-----|-----|------|
|                  |           | DS118       | DS150 | JC7518 | JC7550 | JC8050 | JC8118 | RE              | L  | W1  | S   |      |
| ZNGU110504ZER-PM | G         |             |       |        |        | ●      | ●      | 0.4             | 11 | 6.3 | 5.6 | 1    |
| ZNGU110508ZER-PM | G         |             |       |        |        | ●      | ●      | 0.8             | 11 | 6.3 | 5.6 | 1    |
| ZNGU110512ZER-PM | G         |             |       |        |        | ○      | ○      | 1.2             | 11 | 6.3 | 5.6 | 1    |
| ZNGU110516ZER-PM | G         |             |       |        |        | ●      | ●      | 1.6             | 11 | 6.3 | 5.6 | 1    |
| ZNGU110504ZER-SL | G         | ●           | ●     | ●      | ●      |        |        | 0.4             | 11 | 6.3 | 5.6 | 2    |
| ZNGU110508ZER-SL | G         | ●           | ●     | ●      | ●      |        |        | 0.8             | 11 | 6.3 | 5.6 | 2    |
| ZNGU110516ZER-SL | G         | ●           | ●     | ●      | ●      |        |        | 1.6             | 11 | 6.3 | 5.6 | 2    |

 Grade markings


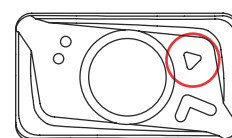
JC8118



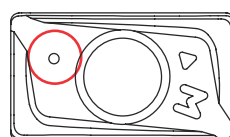
JC8050



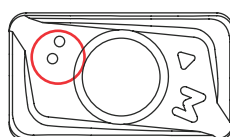
JC7518 / DS118



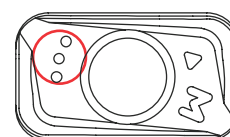
JC7550 / DS150



ZNGU110504ZER



ZNGU110508ZER



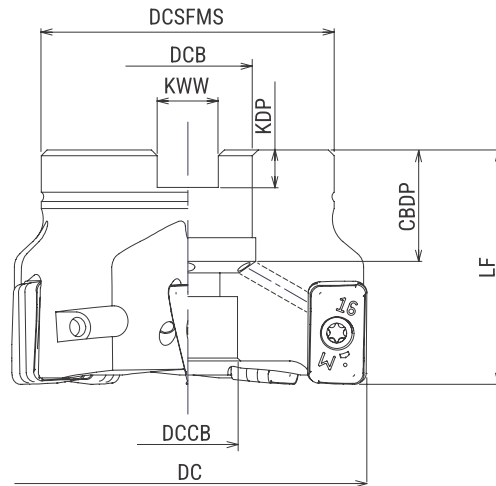
ZNGU110516ZER

## EXTREME SAP

## EXSAP17/MSX17 Type

EXSAP-17  
TYPE

## Bore Type

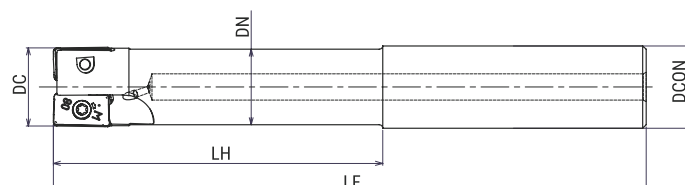


| Cat.No.        | Stock | No. of inserts | Dimensions (mm) |    |        |     |      |      |     |      | Arbor set bolt | Weight (kg) | Insert                               |
|----------------|-------|----------------|-----------------|----|--------|-----|------|------|-----|------|----------------|-------------|--------------------------------------|
|                |       |                | DC              | LF | DCSFMS | DCB | DCCB | KWW  | KDP | CBDP |                |             |                                      |
| EXSAP-4050R-22 | ●     | 4              | 50              | 40 | 47     | 22  | 17   | 10.4 | 6.3 | 20   | M10            | 0.38        | ZNGU1709**ZER-PM<br>ZNGU170908ZER-SM |
| EXSAP-5050R-22 | ●     | 5              | 50              | 40 | 47     | 22  | 17   | 10.4 | 6.3 | 20   | M10            | 0.38        |                                      |
| EXSAP-5052R-22 | ●     | 5              | 52              | 40 | 47     | 22  | 17   | 10.4 | 6.3 | 20   | M10            | 0.41        |                                      |
| EXSAP-5063R-22 | ●     | 5              | 63              | 40 | 50     | 22  | 17   | 10.4 | 6.3 | 20   | M10            | 0.58        |                                      |
| EXSAP-7080R-27 | ●     | 7              | 80              | 50 | 56     | 27  | 20   | 12.4 | 7   | 22   | M12X1.75X30    | 1.09        |                                      |
| EXSAP-7100R-32 | ●     | 7              | 100             | 50 | 85     | 32  | 26   | 14.4 | 8   | 25   | M16X2X25       | 1.93        |                                      |
| EXSAP-8125R-40 | ●     | 8              | 125             | 63 | 100    | 40  | 32   | 16.4 | 9   | 32   | M20X2.5X40     | 3.66        |                                      |

| Screw    | Torque(N.m) | Wrench |
|----------|-------------|--------|
| TSW-410H | 3.5         | A-15T  |

**EXSAP-17**  
TYPE

Shank Type

Through  
coolant  
hole

| Cat.No.            | Stock | No. of inserts | Dimensions (mm) |     |     |    |      | Insert                               |
|--------------------|-------|----------------|-----------------|-----|-----|----|------|--------------------------------------|
|                    |       |                | DC              | LH  | LF  | DN | DCON |                                      |
| EXSAP-2025-60-S25  | ●     | 2              | 25              | 60  | 140 | 23 | 25   | ZNGU1709**ZER-PM<br>ZNGU170908ZER-SM |
| EXSAP-2025-100-S25 | ○     | 2              | 25              | 100 | 180 | 23 | 25   |                                      |
| EXSAP-2032-70-S32  | ○     | 2              | 32              | 70  | 150 | 29 | 32   |                                      |
| EXSAP-2032-120-S32 | ○     | 2              | 32              | 120 | 200 | 29 | 32   |                                      |
| EXSAP-3032-70-S32  | ●     | 3              | 32              | 70  | 150 | 29 | 32   |                                      |
| EXSAP-3032-120-S32 | ○     | 3              | 32              | 120 | 200 | 29 | 32   |                                      |
| EXSAP-3035-40-S32  | ○     | 3              | 35              | 40  | 150 | 32 | 32   |                                      |
| EXSAP-4040-40-S32  | ○     | 4              | 40              | 40  | 150 | 37 | 32   |                                      |

| Screw    | Torque(N.m) | Wrench |
|----------|-------------|--------|
| TSW-410H | 3.5         | A-15   |

# EXTREME SAP

# EXSAP17/MSX17 Type

**MSX-17**  
TYPE

**Modular Type**

Through  
coolant  
hole

**G-  
Body**

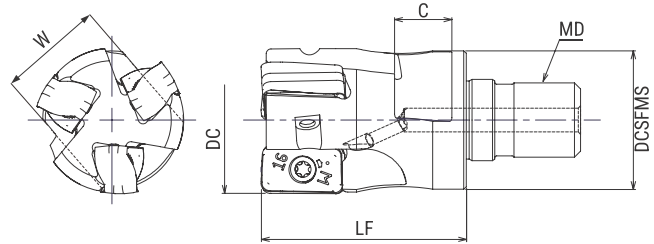
Face Milling

Shoulder Milling

Slotting

Helical Interpolation

Plunge Milling

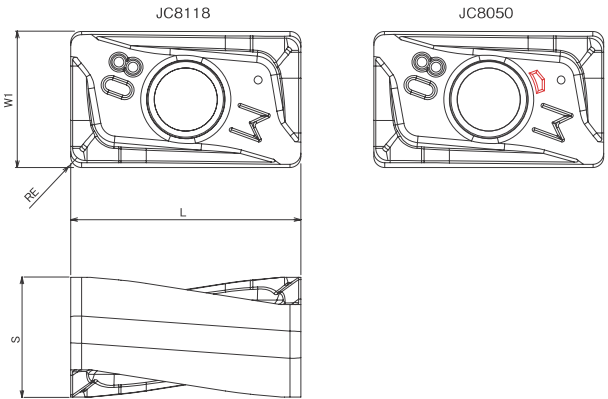


| Cat.No.      | Stock | No. of inserts | Dimensions (mm) |    |        |     |    |    | Insert                               |
|--------------|-------|----------------|-----------------|----|--------|-----|----|----|--------------------------------------|
|              |       |                | DC              | LF | DCSFMS | MD  | C  | W  |                                      |
| MSX-2025-M12 | ●     | 2              | 25              | 35 | 22     | M12 | 11 | 19 | ZNGU1709**ZER-PM<br>ZNGU170908ZER-SM |
| MSX-2026-M12 | ○     | 2              | 26              | 35 | 22     | M12 | 11 | 19 |                                      |
| MSX-2028-M12 | ○     | 2              | 28              | 35 | 22     | M12 | 11 | 19 |                                      |
| MSX-2030-M16 | ○     | 2              | 30              | 43 | 29     | M16 | 12 | 22 |                                      |
| MSX-2032-M16 | ●     | 2              | 32              | 43 | 29     | M16 | 12 | 22 |                                      |
| MSX-3032-M16 | ●     | 3              | 32              | 43 | 29     | M16 | 12 | 22 |                                      |
| MSX-3033-M16 | ○     | 3              | 33              | 43 | 29     | M16 | 12 | 22 |                                      |
| MSX-3035-M16 | ○     | 3              | 35              | 43 | 29     | M16 | 12 | 22 |                                      |
| MSX-4040-M16 | ●     | 4              | 40              | 43 | 29     | M16 | 12 | 22 |                                      |

| Screw    | Torque(N.m) | Wrench |
|----------|-------------|--------|
| TSW-410H | 3.5         | A-15   |

EXSAP17/MSX17  
TYPE

Insert



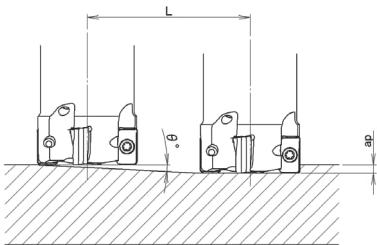
| Cat.No.          | Tolerance | PVD Coating |        | Dimensions (mm) |      |    |     |
|------------------|-----------|-------------|--------|-----------------|------|----|-----|
|                  |           | JC8050      | JC8118 | RE              | L    | W1 | S   |
| ZNGU170904ZER-PM | G         | ●           | ●      | 0.4             | 16.9 | 10 | 8.8 |
| ZNGU170908ZER-PM | G         | ●           | ●      | 0.8             | 16.9 | 10 | 8.8 |
| ZNGU170916ZER-PM | G         | ●           | ●      | 1.6             | 16.9 | 10 | 8.8 |
| ZNGU170920ZER-PM | G         | ●           | ●      | 2               | 16.9 | 10 | 8.8 |
| ZNGU170930ZER-PM | G         | ●           | ●      | 3               | 16.9 | 10 | 8.6 |

| Cat.No.          | Tolerance | PVD Coating | Dimensions (mm) |      |    |     |
|------------------|-----------|-------------|-----------------|------|----|-----|
|                  |           | JC7550      | RE              | L    | W1 | S   |
| ZNGU170908ZER-SM | G         | ●           | 0.8             | 16.9 | 10 | 8.8 |

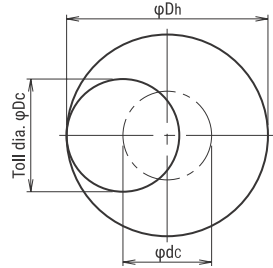
## Recommended Data for Profile Milling

### EXSAP-11 Type

#### Ramping



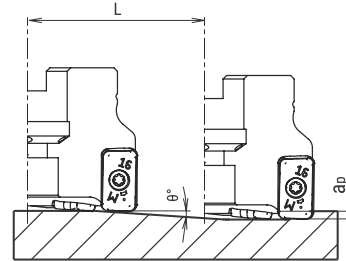
#### Helical interpolation



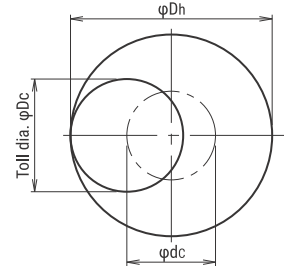
| Cat.No.              | Tool dia. | Effective Cutting dia. | Max. depth of cut : ap | Ramping                     |                                                      | Helical interpolation |                |
|----------------------|-----------|------------------------|------------------------|-----------------------------|------------------------------------------------------|-----------------------|----------------|
|                      |           |                        |                        | Max. ramping angle $\theta$ | Max. depth of cut : ap<br>Total cutting length L(mm) | Min. Bore dia.        | Max. Bore dia. |
| MSX-2016-11-M8       | 16        | 14.1                   | 1.5                    | 1.0°                        | 86                                                   | 18                    | 29.6           |
| MSX-3020-11-M10      | 20        | 18.1                   | 1.5                    | 0.7°                        | 123                                                  | 26                    | 37.6           |
| MSX-3025-11-M12      | 25        | 23.1                   | 1.5                    | 0.4°                        | 215                                                  | 36                    | 47.6           |
| MSX-4030-11-M16      | 30        | 28.1                   | 1.5                    | 0.3°                        | 286                                                  | 46                    | 57.6           |
| MSX-4032-11-M16      | 32        | 30.1                   | 1.5                    | 0.3°                        | 286                                                  | 50                    | 61.6           |
| MSX-5040-11-M16      | 40        | 38.1                   | 1.5                    | 0.2°                        | 430                                                  | 66                    | 77.6           |
| EXSAP-2016-11-**-S16 | 16        | 14.1                   | 1.5                    | 1.0°                        | 86                                                   | 18                    | 29.6           |
| EXSAP-3020-11-**-S20 | 20        | 18.1                   | 1.5                    | 0.7°                        | 123                                                  | 26                    | 37.6           |
| EXSAP-3025-11-**-S25 | 25        | 23.1                   | 1.5                    | 0.4°                        | 215                                                  | 36                    | 47.6           |
| EXSAP-4030-11-**-S32 | 30        | 28.1                   | 1.5                    | 0.3°                        | 286                                                  | 46                    | 57.6           |
| EXSAP-4032-11-**-S32 | 32        | 30.1                   | 1.5                    | 0.3°                        | 286                                                  | 50                    | 61.6           |
| EXSAP-5040-11-**-S32 | 40        | 38.1                   | 1.5                    | 0.2°                        | 430                                                  | 66                    | 77.6           |
| EXSAP-6040R-11-16    | 40        | 38.1                   | 1.5                    | 0.2°                        | 430                                                  | 66                    | 77.6           |
| EXSAP-7050R-11-22    | 50        | 48.1                   | 1.5                    | 0.15°                       | 573                                                  | 86                    | 97.6           |
| EXSAP-7052R-11-22    | 52        | 50.1                   | 1.5                    | 0.15°                       | 573                                                  | 90                    | 101.6          |
| EXSAP-7063R-11-22    | 63        | 61.1                   | 1.5                    | Not recommended             |                                                      |                       |                |
| EXSAP-7063R-11-27    | 63        | 61.1                   | 1.5                    |                             |                                                      |                       |                |
| EXSAP-8080R-11-27    | 80        | 78.1                   | 1.5                    |                             |                                                      |                       |                |

### EXSAP-17 Type

#### Ramping



#### Helical interpolation



| Cat.No.        | Tool dia. | Effective Cutting dia. | Max. depth of cut : ap | Ramping                     |                                                      | Helical interpolation |                |
|----------------|-----------|------------------------|------------------------|-----------------------------|------------------------------------------------------|-----------------------|----------------|
|                |           |                        |                        | Max. ramping angle $\theta$ | Max. depth of cut : ap<br>Total cutting length L(mm) | Min. Bore dia.        | Max. Bore dia. |
| EXSAP/MSX-2025 | 25        | 21.5                   | 1.5                    | 0.7°                        | 123                                                  | 34                    | 46             |
| MSX-2026-M12   | 26        | 22.5                   | 1.5                    | 0.7°                        | 123                                                  | 36                    | 48             |
| MSX-2028-M12   | 28        | 25.5                   | 1.5                    | 0.6°                        | 143                                                  | 40                    | 52             |
| MSX-2030-M16   | 30        | 26.5                   | 1.5                    | 0.6°                        | 143                                                  | 44                    | 56             |
| EXSAP/MSX-032  | 32        | 28.5                   | 1.5                    | 0.5°                        | 172                                                  | 48                    | 60             |
| MSX-3033-M16   | 33        | 29.5                   | 1.5                    | 0.5°                        | 172                                                  | 50                    | 62             |
| MSX-3035-M16   | 35        | 31.5                   | 1.5                    | 0.4°                        | 215                                                  | 54                    | 66             |
| MSX-4040-M16   | 40        | 36.5                   | 1.5                    | 0.4°                        | 215                                                  | 64                    | 76             |
| EXSAP-050R-22  | 50        | 46.5                   | 1.5                    | 0.3°                        | 286                                                  | 84                    | 96             |
| EXSAP-5052R-22 | 52        | 48.5                   | 1.5                    | 0.3°                        | 286                                                  | 88                    | 100            |
| EXSAP-5063R-22 | 63        | 59.5                   | 1.5                    | 0.2°                        | 430                                                  | 110                   | 122            |
| EXSAP-7080R-27 | 80        | 76.5                   | 1.5                    | 0.15°                       | 573                                                  | 144                   | 156            |
| EXSAP-7100R-32 | 100       | 96.5                   | Not recommended        |                             |                                                      |                       |                |
| EXSAP-8125R-40 | 125       | 121.5                  |                        |                             |                                                      |                       |                |

● In case of ramping and helical interpolation, apply 80% or less feed (Vf) from standard cutting condition table

● In case of helical interpolation, recommend wet cutting by coolant through the tool

● Calculation of tool pass dia.

$$\phi_{Dc} = \phi_{Dh} - \phi_{Dc}$$

Tool pass dia.   Bore dia.   Tool Dia.

● Depth of cut per one circuit should not exceed max. depth of cut Ap

● Down cutting is recommended, tool pass rotation should be counterclockwise

## Recommended Cutting Conditions

### EXSAP-11 type / Side Milling

| Material                             | Grade              | Vc        | fz          |         | Tool dia. (mm) |      |      |      |      |     |     |     |
|--------------------------------------|--------------------|-----------|-------------|---------|----------------|------|------|------|------|-----|-----|-----|
|                                      |                    |           |             |         | 16             | 20   | 25   | 32   | 40   | 50  | 63  | 80  |
| Carbon Steel<br>below 250HB          | JC8050<br>(JC8118) | 140 - 180 | 0.14 - 0.20 | ap      | ~5             | ~5   | ~6   | ~6   | ~7   | ~8  | ~9  | ~9  |
|                                      |                    |           |             | ap x ae | ~4             | ~5   | ~7.2 | ~9.8 | ~14  | ~24 | ~30 | ~36 |
| Cast Steel<br>below 285HB            | JC8050<br>(JC8118) | 140 - 180 | 0.14 - 0.20 | ap      | ~5             | ~5   | ~6   | ~6   | ~7   | ~8  | ~9  | ~9  |
|                                      |                    |           |             | ap x ae | ~4             | ~5   | ~7.2 | ~9.8 | ~14  | ~24 | ~30 | ~36 |
| Tool & Die Steel<br>below 255HB      | JC8050<br>(JC8118) | 140 - 180 | 0.14 - 0.20 | ap      | ~5             | ~5   | ~6   | ~6   | ~7   | ~8  | ~9  | ~9  |
|                                      |                    |           |             | ap x ae | ~4             | ~5   | ~7.2 | ~9.8 | ~14  | ~24 | ~30 | ~36 |
| Mold Steel<br>30-36HRC               | JC8118<br>(JC8050) | 110 - 130 | 0.10 - 0.18 | ap      | ~5             | ~5   | ~6   | ~6   | ~7   | ~8  | ~9  | ~9  |
|                                      |                    |           |             | ap x ae | ~4             | ~5   | ~7.2 | ~9.8 | ~14  | ~24 | ~30 | ~36 |
| Mold Steel<br>38-43HRC               | JC8118<br>(JC8050) | 90 - 120  | 0.10 - 0.18 | ap      | ~5             | ~5   | ~6   | ~6   | ~7   | ~8  | ~9  | ~9  |
|                                      |                    |           |             | ap x ae | ~3.4           | ~4   | ~6   | ~8   | ~10  | ~20 | ~24 | ~28 |
| Hardened Die Steel<br>42-52HRC       | JC8118             | 80 - 100  | 0.07 - 0.12 | ap      | ~3             | ~3.5 | ~4   | ~4   | ~4.5 | ~6  | ~9  | ~9  |
|                                      |                    |           |             | ap x ae | ~1.6           | ~2   | ~3.2 | ~3.6 | ~4   | ~8  | ~9  | ~10 |
| Grey Cast Iron<br>below 160-260HB    | JC8118<br>(JC8050) | 160 - 200 | 0.14 - 0.20 | ap      | ~5             | ~5   | ~6   | ~6   | ~7   | ~8  | ~9  | ~9  |
|                                      |                    |           |             | ap x ae | ~5             | ~6   | ~9.8 | ~12  | ~16  | ~28 | ~34 | ~40 |
| Nodular Cast Iron<br>below 170-300HB | JC8118<br>(JC8050) | 140 - 180 | 0.12 - 0.20 | ap      | ~5             | ~5   | ~6   | ~6   | ~7   | ~8  | ~9  | ~9  |
|                                      |                    |           |             | ap x ae | ~5             | ~6   | ~9.8 | ~12  | ~16  | ~28 | ~34 | ~40 |
| Austenitic<br>Stainless Steel        | JC8050<br>(JC7550) | 100 - 120 | 0.10 - 0.18 | ap      | ~5             | ~5   | ~6   | ~6   | ~7   | ~8  | ~9  | ~9  |
|                                      |                    |           |             | ap x ae | ~4             | ~5   | ~7.2 | ~9.8 | ~14  | ~24 | ~30 | ~36 |
| Martensitic<br>Stainless Steel       | JC8050<br>(JC7550) | 100 - 140 | 0.10 - 0.18 | ap      | ~5             | ~5   | ~6   | ~6   | ~7   | ~8  | ~9  | ~9  |
|                                      |                    |           |             | ap x ae | ~3.2           | ~5   | ~7.2 | ~9.8 | ~14  | ~24 | ~30 | ~36 |
| Titanium Alloy                       | DS150<br>(JC7550)  | 50 - 70   | 0.11 - 0.13 | ap      | ~5             | ~5   | ~6   | ~6   | ~7   | ~8  | ~9  | ~9  |
|                                      |                    |           |             | ap x ae | ~3.2           | ~4   | ~6   | ~8   | ~10  | ~20 | ~26 | ~30 |
| Heat Resistant Alloy                 | JC7518<br>(JC8118) | 20 - 30   | 0.08 - 0.10 | ap      | ~5             | ~5   | ~6   | ~6   | ~7   | ~8  | ~9  | ~9  |
|                                      |                    |           |             | ap x ae | ~3.2           | ~4   | ~6   | ~8   | ~10  | ~20 | ~26 | ~30 |

#### Note

1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. In case of chatter occurring, recommended to reduce ap or rpm and keep feed per tooth.
3. ap should be reduced when using on low rigidity machine.
4. Use air blow.

### ■ Recommended Cutting Conditions

#### ● EXSAP-11 type / Face Milling

| Material                             | Grade              | Vc        | fz          |    | Tool dia. (mm) |      |      |      |      |      |      |      |
|--------------------------------------|--------------------|-----------|-------------|----|----------------|------|------|------|------|------|------|------|
|                                      |                    |           |             |    | 16             | 20   | 25   | 32   | 40   | 50   | 63   | 80   |
| Carbon Steel<br>below 250HB          | JC8050<br>(JC8118) | 130 - 180 | 0.11 - 0.2  | ap | ~1             | ~1.2 | ~1.2 | ~1.5 | ~1.8 | ~2   | ~2   | ~2   |
|                                      |                    |           |             | ae | ~10            | ~12  | ~15  | ~18  | ~24  | ~30  | ~30  | ~48  |
| Cast Steel<br>below 285HB            | JC8050<br>(JC8118) | 130 - 180 | 0.11 - 0.2  | ap | ~1             | ~1.2 | ~1.2 | ~1.5 | ~1.8 | ~2   | ~2   | ~2   |
|                                      |                    |           |             | ae | ~10            | ~12  | ~15  | ~18  | ~24  | ~30  | ~30  | ~48  |
| Tool & Die Steel<br>below 255HB      | JC8050<br>(JC8118) | 130 - 180 | 0.11 - 0.2  | ap | ~1             | ~1.2 | ~1.2 | ~1.5 | ~1.8 | ~2   | ~2   | ~2   |
|                                      |                    |           |             | ae | ~10            | ~12  | ~15  | ~18  | ~24  | ~30  | ~30  | ~48  |
| Mold Steel<br>30-36HRC               | JC8118<br>(JC8050) | 110 - 130 | 0.1 - 0.18  | ap | ~1             | ~1.2 | ~1.2 | ~1.5 | ~1.8 | ~2   | ~2   | ~2   |
|                                      |                    |           |             | ae | ~10            | ~12  | ~15  | ~18  | ~24  | ~30  | ~30  | ~48  |
| Mold Steel<br>38-43HRC               | JC8118<br>(JC8050) | 90 - 120  | 0.1 - 0.16  | ap | ~0.8           | ~1   | ~1   | ~1.2 | ~1.4 | ~1.8 | ~1.8 | ~1.8 |
|                                      |                    |           |             | ae | ~10            | ~12  | ~15  | ~18  | ~24  | ~30  | ~30  | ~48  |
| Hardened Die Steel<br>42-52HRC       | JC8118             | 80 - 100  | 0.08 - 0.12 | ap | ~0.4           | ~0.5 | ~0.5 | ~0.6 | ~0.8 | ~1   | ~1   | ~1   |
|                                      |                    |           |             | ae | ~8             | ~8   | ~10  | ~12  | ~16  | ~20  | ~25  | ~32  |
| Grey Cast Iron<br>below 160-260HB    | JC8118<br>(JC8050) | 160 - 200 | 0.11 - 0.2  | ap | ~1             | ~1.2 | ~1.2 | ~1.5 | ~1.8 | ~2   | ~2   | ~2   |
|                                      |                    |           |             | ae | ~10            | ~12  | ~15  | ~18  | ~24  | ~30  | ~30  | ~48  |
| Nodular Cast Iron<br>below 170-300HB | JC8118<br>(JC8050) | 130 - 180 | 0.11 - 0.2  | ap | ~1             | ~1.2 | ~1.2 | ~1.5 | ~1.8 | ~2   | ~2   | ~2   |
|                                      |                    |           |             | ae | ~10            | ~12  | ~15  | ~18  | ~24  | ~30  | ~30  | ~48  |
| Austenitic<br>Stainless Steel        | JC8050<br>(JC7550) | 100 - 120 | 0.11 - 0.18 | ap | ~1             | ~1.2 | ~1.2 | ~1.5 | ~1.8 | ~2   | ~2   | ~2   |
|                                      |                    |           |             | ae | ~6             | ~8   | ~10  | ~12  | ~16  | ~20  | ~25  | ~32  |
| Martensitic<br>Stainless Steel       | JC8050<br>(JC7550) | 100 - 150 | 0.11 - 0.18 | ap | ~1             | ~1.2 | ~1.2 | ~1.5 | ~1.8 | ~2   | ~2   | ~2   |
|                                      |                    |           |             | ae | ~10            | ~12  | ~15  | ~18  | ~24  | ~30  | ~30  | ~48  |
| Titanium Alloy                       | DS150<br>(JC7550)  | 50 - 70   | 0.08 - 0.12 | ap | ~0.8           | ~1   | ~1   | ~0.8 | ~1.4 | ~1.8 | ~1.8 | ~1.8 |
|                                      |                    |           |             | ae | ~6             | ~8   | ~10  | ~12  | ~16  | ~20  | ~25  | ~32  |
| Heat Resistant Alloy                 | JC7518<br>(JC8118) | 20 - 30   | 0.06 - 0.11 | ap | ~0.8           | ~1   | ~1   | ~0.8 | ~1.4 | ~1.8 | ~1.8 | ~1.8 |
|                                      |                    |           |             | ae | ~6             | ~8   | ~10  | ~12  | ~16  | ~20  | ~25  | ~32  |

#### Note

1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. In case of chatter occurring, recommended to reduce ap or rpm and keep feed per tooth.
3. ap should be reduced when using on low rigidity machine.
4. Use air blow.
5. When using for slot milling, apply 50% or less feed (Vf) from standard cutting condition.

## Recommended Cutting Conditions

### EXSAP-17 type / Side Milling

| Material                             | Grade              | Vc        | fz          |         | Tool dia. (mm) |     |     |     |     |     |     |     |
|--------------------------------------|--------------------|-----------|-------------|---------|----------------|-----|-----|-----|-----|-----|-----|-----|
|                                      |                    |           |             |         | 25             | 32  | 40  | 50  | 63  | 80  | 100 | 125 |
| Carbon Steel<br>below 250HB          | JC8050             | 150 - 200 | 0.2 - 0.35  | ap      | ~10            | ~12 | ~15 | ~15 | ~15 | ~15 | ~15 | ~15 |
|                                      |                    |           |             | ap x ae | ~15            | ~24 | ~30 | ~40 | ~45 | ~45 | ~45 | ~45 |
| Cast Steel<br>below 285HB            | JC8050             | 130 - 180 | 0.2 - 0.35  | ap      | ~10            | ~12 | ~15 | ~15 | ~15 | ~15 | ~15 | ~15 |
|                                      |                    |           |             | ap x ae | ~15            | ~24 | ~30 | ~40 | ~45 | ~45 | ~45 | ~45 |
| Tool & Die Steel<br>below 255HB      | JC8050             | 150 - 200 | 0.2 - 0.35  | ap      | ~10            | ~12 | ~15 | ~15 | ~15 | ~15 | ~15 | ~15 |
|                                      |                    |           |             | ap x ae | ~15            | ~24 | ~30 | ~40 | ~45 | ~45 | ~45 | ~45 |
| Mold Steel<br>30-36HRC               | JC8118             | 110 - 150 | 0.2 - 0.35  | ap      | ~10            | ~12 | ~15 | ~15 | ~15 | ~15 | ~15 | ~15 |
|                                      |                    |           |             | ap x ae | ~15            | ~24 | ~30 | ~40 | ~45 | ~45 | ~45 | ~45 |
| Mold Steel<br>38-43HRC               | JC8118             | 90 - 120  | 0.15 - 0.25 | ap      | ~10            | ~12 | ~15 | ~15 | ~15 | ~15 | ~15 | ~15 |
|                                      |                    |           |             | ap x ae | ~12            | ~18 | ~20 | ~30 | ~30 | ~30 | ~30 | ~30 |
| Hardened Die Steel<br>42-52HRC       | JC8118             | 80 - 100  | 0.1 - 0.2   | ap      | ~10            | ~12 | ~12 | ~15 | ~15 | ~15 | ~15 | ~15 |
|                                      |                    |           |             | ap x ae | ~7             | ~8  | ~12 | ~18 | ~25 | ~25 | ~25 | ~25 |
| Grey Cast Iron<br>below 160-260HB    | JC8118             | 200 - 250 | 0.2 - 0.35  | ap      | ~10            | ~12 | ~15 | ~15 | ~15 | ~15 | ~15 | ~15 |
|                                      |                    |           |             | ap x ae | ~15            | ~24 | ~30 | ~40 | ~45 | ~45 | ~45 | ~45 |
| Nodular Cast Iron<br>below 170-300HB | JC8118             | 110 - 150 | 0.15 - 0.3  | ap      | ~10            | ~12 | ~15 | ~15 | ~15 | ~15 | ~15 | ~15 |
|                                      |                    |           |             | ap x ae | ~15            | ~24 | ~30 | ~40 | ~45 | ~45 | ~45 | ~45 |
| Austenitic<br>Stainless Steel        | JC8050<br>(JC7550) | 100 - 120 | 0.1 - 0.2   | ap      | ~10            | ~12 | ~15 | ~15 | ~15 | ~15 | ~15 | ~15 |
|                                      |                    |           |             | ap x ae | ~15            | ~24 | ~30 | ~40 | ~45 | ~45 | ~45 | ~45 |
| Martensitic<br>Stainless Steel       | JC8118             | 130 - 180 | 0.15 - 0.3  | ap      | ~10            | ~12 | ~15 | ~15 | ~15 | ~15 | ~15 | ~15 |
|                                      |                    |           |             | ap x ae | ~15            | ~24 | ~30 | ~40 | ~45 | ~45 | ~45 | ~45 |

#### Note

1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. In case of chatter occurring, recommended to reduce ap or rpm and keep feed per tooth.
3. ap should be reduced when using on low rigidity machine.
4. Use air blow.

### ■ Recommended Cutting Conditions

#### ● EXSAP-17 type / Face Milling

| Material                             | Grade              | Vc        | fz          |    | Tool dia. (mm) |      |      |      |      |      |      |      |
|--------------------------------------|--------------------|-----------|-------------|----|----------------|------|------|------|------|------|------|------|
|                                      |                    |           |             |    | 25             | 32   | 40   | 50   | 63   | 80   | 100  | 125  |
| Carbon Steel<br>below 250HB          | JC8050             | 110 - 150 | 0.20 - 0.30 | ap | ~3             | ~3.5 | ~3.5 | ~4   | ~4   | ~4   | ~4   | ~4   |
|                                      |                    |           |             | ae | ~25            | ~32  | ~40  | ~50  | ~63  | ~80  | ~100 | ~125 |
| Cast Steel<br>below 285HB            | JC8050             | 110 - 150 | 0.20 - 0.30 | ap | ~3             | ~3.5 | ~3.5 | ~4   | ~4   | ~4   | ~4   | ~4   |
|                                      |                    |           |             | ae | ~25            | ~32  | ~40  | ~50  | ~63  | ~80  | ~100 | ~125 |
| Tool & Die Steel<br>below 255HB      | JC8050             | 110 - 150 | 0.15 - 0.25 | ap | ~3             | ~3.5 | ~3.5 | ~4   | ~4   | ~4   | ~4   | ~4   |
|                                      |                    |           |             | ae | ~25            | ~32  | ~40  | ~50  | ~63  | ~80  | ~100 | ~125 |
| Mold Steel<br>30-36HRC               | JC8118             | 110 - 130 | 0.15 - 0.25 | ap | ~3             | ~3.5 | ~3.5 | ~4   | ~4   | ~4   | ~4   | ~4   |
|                                      |                    |           |             | ae | ~25            | ~32  | ~40  | ~50  | ~63  | ~80  | ~100 | ~125 |
| Mold Steel<br>38-43HRC               | JC8118             | 90 - 110  | 0.15 - 0.25 | ap | ~2             | ~2.5 | ~2.5 | ~3   | ~3   | ~3   | ~4   | ~4   |
|                                      |                    |           |             | ae | ~25            | ~32  | ~40  | ~50  | ~63  | ~80  | ~100 | ~125 |
| Hardened Die Steel<br>42-52HRC       | JC8118             | 70 - 90   | 0.10 - 0.20 | ap | ~1             | ~2   | ~2   | ~2.5 | ~2.5 | ~2.5 | ~4   | ~4   |
|                                      |                    |           |             | ae | ~20            | ~25  | ~32  | ~40  | ~55  | ~65  | ~80  | ~100 |
| Grey Cast Iron<br>below 160-260HB    | JC8118             | 130 - 180 | 0.20 - 0.30 | ap | ~5             | ~5.5 | ~5.5 | ~6   | ~6   | ~6   | ~4   | ~4   |
|                                      |                    |           |             | ae | ~25            | ~32  | ~40  | ~50  | ~63  | ~80  | ~100 | ~125 |
| Nodular Cast Iron<br>below 170-300HB | JC8118             | 110 - 130 | 0.15 - 0.25 | ap | ~3             | ~3.5 | ~3.5 | ~4   | ~4   | ~4   | ~4   | ~4   |
|                                      |                    |           |             | ae | ~25            | ~32  | ~40  | ~50  | ~63  | ~80  | ~100 | ~125 |
| Austenitic<br>Stainless Steel        | JC8050<br>(JC7550) | 90 - 110  | 0.10 - 0.20 | ap | ~3             | ~3.5 | ~3.5 | ~4   | ~4   | ~4   | ~4   | ~4   |
|                                      |                    |           |             | ae | ~20            | ~25  | ~32  | ~40  | ~55  | ~65  | ~80  | ~100 |
| Martensitic<br>Stainless Steel       | JC8118             | 110 - 150 | 0.15 - 0.25 | ap | ~3             | ~3.5 | ~3.5 | ~4   | ~4   | ~4   | ~4   | ~4   |
|                                      |                    |           |             | ae | ~25            | ~32  | ~40  | ~50  | ~63  | ~80  | ~100 | ~125 |

#### Note

1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. In case of chatter occurring, recommended to reduce ap or rpm and keep feed per tooth.
3. ap should be reduced when using on low rigidity machine.
4. Use air blow.
5. When using for slot milling, apply 50% or less feed (Vf) from standard cutting condition.