

## AVENTICS Series MSC Guide cylinders

The AVENTICS Series MSC mini slides have a compact design, require minimal installation space and can be optimally configured for virtually any automated handling task. A wide range of configuration options make the mini slide a truly universal handling component. Precise and reliable operation, coupled with a custom configuration and tailored to the specific application – these attributes allow the mini slides to assume the actuator role in efficient handling. The Series MSC offers high torque absorption and maximum stability. In addition, it provides technical features that guarantee optimally adjusted functions and maintenance-friendly processes. Fast, secure and efficiently connected with the special Easy-2-Combine Interface, the mini slides can be combined with the other components of a handling system without additional mounting plates.

- High torque and load absorption with maximum stability
- Compact design
- Easy-2-Combine Interface



## Technical data

|                                      |                    |
|--------------------------------------|--------------------|
| Industry                             | Industrial         |
| Piston Ø                             | 16 mm              |
| Stroke                               | 40 mm              |
| Functional principle                 | Double-acting      |
| Easy2Combine                         | capable            |
| double piston                        | with double piston |
| Port                                 | M5                 |
| Cushioning                           | elastic            |
| Min. working pressure                | 1 bar              |
| Max. working pressure                | 10 bar             |
| Min. ambient temperature             | 0 °C               |
| Max. ambient temperature             | 60 °C              |
| Medium                               | Compressed air     |
| Retracting piston force, theoretical | 218 N              |
| Extracting piston force, theoretical | 253 N              |
| Max. speed                           | 0.8 m/s            |
| Cushioning length                    | 1 mm               |
| Cushioning energy                    | 0.3 J              |
| Min. oil content of compressed air   | 0 mg/m³            |

|                                                                           |                                                                   |
|---------------------------------------------------------------------------|-------------------------------------------------------------------|
| Max. oil content of compressed air                                        | 1 mg/m <sup>3</sup>                                               |
| Max. particle size                                                        | 5 µm                                                              |
| Pressure for determining piston forces<br>with integrated ball rail guide | 6,3 bar<br>With integrated "High Performance" ball rail<br>system |
| Weight                                                                    | 0.82 kg                                                           |

## Material

|                          |                      |
|--------------------------|----------------------|
| Housing material         | Aluminum             |
| Surface housing          | anodized             |
| Material piston rod      | Stainless Steel      |
| Material front plate     | Aluminum             |
| Surface front plate      | anodized             |
| Seal material            | Polyurethane         |
| Material ball rail table | Aluminum             |
| Surface ball rail table  | anodized             |
| Material guide rail      | Steel, chrome-plated |
| Surface guide rail       | hardened             |
| Material centering rings | Stainless Steel      |
| Part No.                 | R412019171           |

## Technical information

Repetitive precision after 100 consecutive strokes: 0,3 mm

Base with air connections at the back and sides

Intermediate strokes can be configured.

Scope of delivery: incl. centering rings

R1 = stroke setting range for forward stroke

R2 = stroke setting range for return stroke

Ø 8 has a different reference plane.

The pressure dew point must be at least 15 °C less than ambient and medium temperature and may not exceed 3 °C.

The oil content of compressed air must remain constant during the life cycle.

## Dimensions



R\*: base with air connections only at the back  
 S\*: base with air connections at the back and sides  
 \*\*  $\varnothing 8$  has a different reference plane.

## Dimensions

| Piston Ø | Ø D1  | Ø D2    | H1 | H2   | H3   | H4-R | H4-S | H5   | H6-R | H6-S |
|----------|-------|---------|----|------|------|------|------|------|------|------|
| 8        | M5    | M10x1   | 28 | 9.6  | 20.5 | -    | 7.5  | 19.5 | -    | 5.5  |
| 12       | M5    | M12x1   | 34 | 5.7  | 25   | 11.2 | 11.2 | 24.5 | 5.7  | 5.7  |
| 16       | M5    | M12x1   | 40 | 7.2  | 29   | 12.2 | 12.2 | 31   | 7.7  | 7.7  |
| 20       | G 1/8 | M16x1,5 | 50 | 11.2 | 37.5 | 17.3 | 17.3 | 38.2 | 11.7 | 12.2 |
| 25       | G 1/8 | M18x1,5 | 60 | 14.2 | 44   | 15.5 | 22.9 | 46.5 | 13.2 | 21.7 |

| Piston Ø | H7   | H8  | H9  | H10 | L3 max. | L4  | L5 2) | L6  | L7 | R2 max. |
|----------|------|-----|-----|-----|---------|-----|-------|-----|----|---------|
| 8        | 18   | -   | -   | -   | 16      | 9.8 | -     | 1.9 | 6  | 9.1     |
| 12       | 8.3  | -   | -   | -   | 20.2    | 7.2 | 22.5  | 2   | 8  | 14      |
| 16       | 11.2 | -   | -   | -   | 18.4    | 6.5 | 17.7  | 2   | 10 | 12.4    |
| 20       | 11.7 | 5.5 | 4.2 | 1   | 27.9    | 8   | 30    | 2.1 | 10 | 19.9    |
| 25       | 16.2 | 6.9 | 5.2 | 1.5 | 29.2    | 9   | 31    | 2.1 | 12 | 22.2    |

| Piston Ø | W1   | W2-R | W2-S | W3-R | W3-S | W4   | W5   | W6  | W7  |
|----------|------|------|------|------|------|------|------|-----|-----|
| 8        | 50.2 | -    | 19.3 | -    | 30.5 | 18   | W1/2 | -   | -   |
| 12       | 66   | 28.8 | 28.8 | 53   | 53   | 24.5 | W1/2 | -   | -   |
| 16       | 76   | 31   | 31   | 60.5 | 60.5 | 30   | W1/2 | -   | -   |
| 20       | 92   | 10   | 21   | 74   | 74   | 35   | W1/2 | 2   | 4   |
| 25       | 112  | 11   | 14   | 92   | 92   | 44   | W1/2 | 2.5 | 4.8 |

## Stroke-dependent dimensions

| Piston Ø | S=10 EB | S=20 EB | S=30 EB | S=40 EB | S=50 EB | S=80 EB | S=100 EB | S=125 EB | S=150 EB | S=200 EB |
|----------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|
| 8        | 12      | 2       | 2       | 2       | 2       | 2       | –        | –        | –        | –        |
| 12       | 22      | 12      | 2       | 2       | 2       | 2       | 2        | –        | –        | –        |
| 16       | 22      | 12      | 2       | 2       | 2       | 2       | 2        | 2        | 2        | –        |
| 20       | 22      | 12      | 2       | 2       | 2       | 2       | 2        | 2        | 2        | 2        |
| 25       | 22      | 12      | 2       | 2       | 2       | 2       | 2        | 2        | 2        | 2        |

| Piston Ø | S=10 L1-R | S=20 L1-R | S=30 L1-R | S=40 L1-R | S=50 L1-R | S=80 L1-R | S=100 L1-R | S=125 L1-R | S=150 L1-R | S=200 L1-R |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|
| 8        | –         | –         | –         | –         | –         | –         | –          | –          | –          | –          |
| 12       | 101       | 101       | 101       | 111       | 126       | 172       | 192        | –          | –          | –          |
| 16       | 103.5     | 103.5     | 103.5     | 113.5     | 128.5     | 174.5     | 194.5      | 283        | 308        | –          |
| 20       | 115       | 115       | 115       | 125       | 140       | 185       | 205        | 289.5      | 329.5      | 404.5      |
| 25       | 128.5     | 128.5     | 128.5     | 138.5     | 151.5     | 197.5     | 217.5      | 294.5      | 334.5      | 409.5      |

| Piston Ø | S=10 L1-S | S=20 L1-S | S=30 L1-S | S=40 L1-S | S=50 L1-S | S=80 L1-S | S=100 L1-S | S=125 L1-S | S=150 L1-S | S=200 L1-S |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|
| 8        | 81.7      | 81.7      | 91.7      | 101.7     | 121.7     | 171.7     | –          | –          | –          | –          |
| 12       | 117.9     | 117.9     | 117.9     | 127.9     | 142.9     | 188.9     | 208.9      | –          | –          | –          |
| 16       | 114.4     | 114.4     | 114.4     | 124.4     | 139.4     | 185.4     | 205.4      | 293.9      | 318.9      | –          |
| 20       | 139.9     | 139.9     | 139.9     | 149.9     | 164.9     | 209.9     | 229.9      | 314.4      | 354.4      | 429.4      |
| 25       | 152.2     | 152.2     | 152.2     | 162.2     | 175.2     | 221.2     | 241.2      | 318.2      | 358.2      | 433.2      |

| Piston Ø | S=10 L2 | S=20 L2 | S=30 L2 | S=40 L2 | S=50 L2 | S=80 L2 | S=100 L2 | S=125 L2 | S=150 L2 | S=200 L2 |
|----------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|
| 8        | 73.5    | 73.5    | 83.5    | 93.5    | 113.5   | 163.5   | –        | –        | –        | –        |
| 12       | 88.8    | 88.8    | 88.8    | 98.8    | 113.8   | 159.8   | 179.8    | –        | –        | –        |
| 16       | 90.4    | 90.4    | 90.4    | 100.4   | 115.4   | 161.4   | 181.4    | 269.9    | 294.9    | –        |
| 20       | 100.5   | 100.5   | 100.5   | 110.5   | 125.5   | 170.5   | 190.5    | 275      | 315      | 390      |
| 25       | 111.5   | 111.5   | 111.5   | 121.5   | 134.5   | 180.5   | 200.5    | 277.5    | 317.5    | 392.5    |

| Piston Ø | S=10<br>R1 max. | S=20<br>R1 max. | S=30<br>R1 max. | S=40<br>R1 max. | S=50<br>R1 max. | S=80<br>R1 max. | S=100<br>R1 max. | S=125<br>R1 max. | S=150<br>R1 max. | S=200<br>R1 max. |
|----------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|
| 8        | 9.2             | 9.2             | 9.2             | 9.2             | 9.2             | 9.2             | –                | –                | –                | –                |
| 12       | 7.7             | 7.7             | 7.7             | 7.7             | 7.7             | 7.7             | 7.7              | –                | –                | –                |
| 16       | 10.7            | 10.7            | 10.7            | 10.7            | 10.7            | 10.7            | 10.7             | 10.7             | 10.7             | –                |
| 20       | 18.4            | 18.4            | 18.4            | 18.4            | 18.4            | 18.4            | 18.4             | 18.4             | 18.4             | 18.4             |
| 25       | 17.5            | 17.5            | 17.5            | 17.5            | 16.5            | 17.5            | 17.5             | 17.5             | 17.5             | 17.5             |

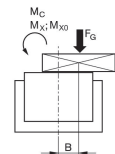
Correction factor (a, d)



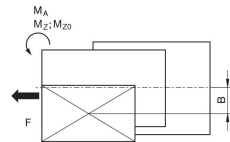
Correction factor (a, d)  
horizontal



|       |                                    |
|-------|------------------------------------|
| stat. | $M_{B0} = F_G \cdot A + F \cdot D$ |
| dyn.  | $M_B = F_G \cdot A$                |



|       |                        |
|-------|------------------------|
| stat. | $M_{C0} = F_G \cdot B$ |
| dyn.  | $M_C = F_G \cdot B$    |



|       |                      |
|-------|----------------------|
| stat. | $M_{A0} = F \cdot B$ |
| dyn.  | $M_A = 0$            |

|       |                                                                                |
|-------|--------------------------------------------------------------------------------|
| dyn.  | $\frac{M_A}{M_1} + \frac{M_B}{M_2} + \frac{M_C}{M_3} \leq 1$                   |
| stat. | $\frac{M_{A0}}{M_{Z0}} + \frac{M_{B0}}{M_{Y0}} + \frac{M_{C0}}{M_{X0}} \leq 1$ |

$F = m \cdot a$   $FG = m \cdot g$   $a = 1250 \cdot V^2 / H$   
 $F$  = deceleration force [N]  $F_G$  = force due to weight [N]  $m$  = load mass [kg]  $a$  = deceleration [ $m/s^2$ ]  $g$  = gravitational acceleration 9,81 [ $m/s^2$ ]  $V$  = velocity [ $m/s$ ]  $H$  = stroke length of shock absorber [mm]

Correction factor (a, d)  
vertical



|       |                              |
|-------|------------------------------|
| stat. | $M_{B0} = (F_G + F) \cdot D$ |
| dyn.  | $M_B = F_G \cdot D$          |



|       |                              |
|-------|------------------------------|
| stat. | $M_{A0} = (F_G + F) \cdot B$ |
| dyn.  | $M_A = F_G \cdot B$          |

|       |                                                        |
|-------|--------------------------------------------------------|
| dyn.  | $\frac{M_A}{M_1} + \frac{M_B}{M_2} \leq 1$             |
| stat. | $\frac{M_{A0}}{M_{Z0}} + \frac{M_{B0}}{M_{Y0}} \leq 1$ |

$F = m \cdot a$   $F_G = m \cdot g$   $a = 1250 \cdot V^2 / H$   
 $F$  = deceleration force [N]  $F_G$  = force due to weight [N]  $m$  = load mass [kg]  $a$   
= deceleration [m/s<sup>2</sup>]  $g$  = gravitational acceleration 9,81 [m/s<sup>2</sup>]  $V$  = velocity  
[m/s]  $H$  = stroke length of shock absorber [mm]

# Mini slide, Series MSC-HG-EE

R412019171

Series MSC

2026-03-26

## Dimensions

### MSC-08



\* = centering rings

\*\* Ø 8 has a different reference plane.

| Part No.   | Piston Ø | Stroke | N1 | N2 | N3 | L5 |
|------------|----------|--------|----|----|----|----|
| R480643788 | 8        | 10     | 4  | 2  | 2  | 11 |
| R480643789 | 8        | 20     | 4  | 2  | 2  | 11 |
| R480643790 | 8        | 30     | 4  | 2  | 2  | 11 |
| R480643791 | 8        | 40     | 6  | 2  | 2  | 11 |
| R480643792 | 8        | 50     | 8  | 3  | 3  | 11 |
| R480643793 | 8        | 80     | 12 | 3  | 5  | 11 |

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| Part No.   | Piston Ø | Stroke | N1 | N2 | N3 | L5 |
|------------|----------|--------|----|----|----|----|
| R412019204 | 8        | 10     | 4  | 2  | 2  | 11 |
| R412019205 | 8        | 20     | 4  | 2  | 2  | 11 |
| R412019206 | 8        | 30     | 4  | 2  | 2  | 11 |
| R412019207 | 8        | 40     | 6  | 2  | 2  | 11 |
| R412019208 | 8        | 50     | 8  | 3  | 3  | 11 |
| R412019209 | 8        | 80     | 12 | 3  | 5  | 11 |

## Dimensions MSC-12



\* = centering rings

| Part No.   | Piston Ø | Stroke | N1 | N2 | N3 |
|------------|----------|--------|----|----|----|
| R412019190 | 12       | 10     | 4  | 2  | 2  |
| R412019191 | 12       | 20     | 4  | 2  | 2  |
| R412019192 | 12       | 30     | 4  | 2  | 2  |
| R412019193 | 12       | 40     | 4  | 2  | 2  |
| R412019194 | 12       | 50     | 6  | 3  | 3  |
| R412019195 | 12       | 80     | 10 | 3  | 5  |
| R412019196 | 12       | 100    | 12 | 3  | 5  |

## Maximum moving mass



V = velocity [m/s]  
m = mass

# Mini slide, Series MSC-HG-EE

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Series MSC

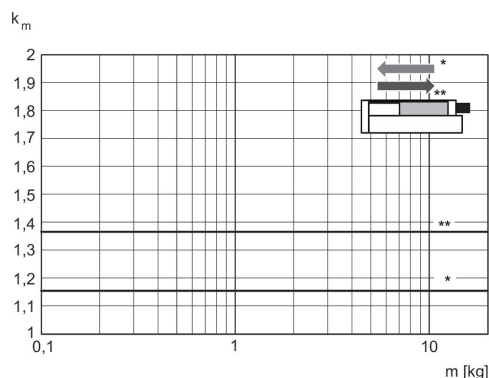
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## Overview drawing



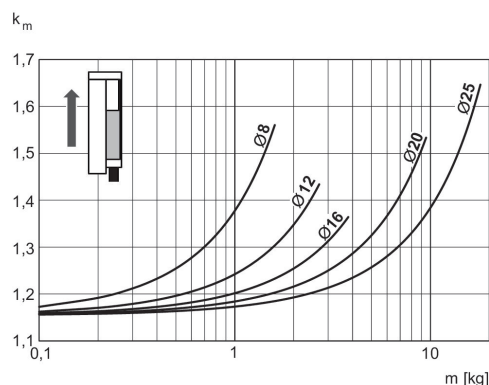
NOTE: This overview drawing is only for orientation to indicate where the various accessory parts can be fastened to the cylinder. The illustration has been simplified for this purpose. It is thus not possible to derive the dimensions from this overview.

Correction factor for required speed:  
retracting and extending, horizontal



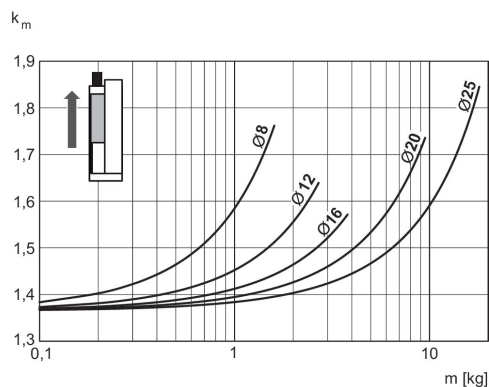
\* retracting  
\*\* extending  
 $V = s/1000 \cdot t \cdot km$   
V = velocity [m/s]  
S = stroke

Correction factor for required speed:  
extending, vertical, upwards



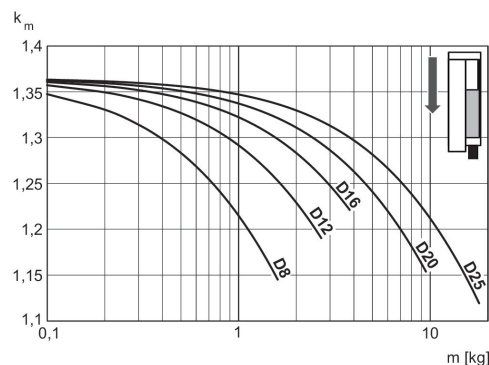
$V = s/1000 \cdot t \cdot km$   
V = velocity [m/s]  
S = stroke [mm]  
t = time [s] for one stroke  
m = mass

Correction factor for required speed:  
retracting, vertical, upwards



$V = s/1000 \cdot t \cdot km$   
V = velocity [m/s]  
S = stroke [mm]  
t = time [s] for one stroke  
m = mass

Correction factor for required speed:  
retracting, vertical, downwards



$V = s/1000 \cdot t \cdot km$   
V = velocity [m/s]  
S = stroke [mm]  
t = time [s] for one stroke  
m = mass

# Mini slide, Series MSC-HG-EE

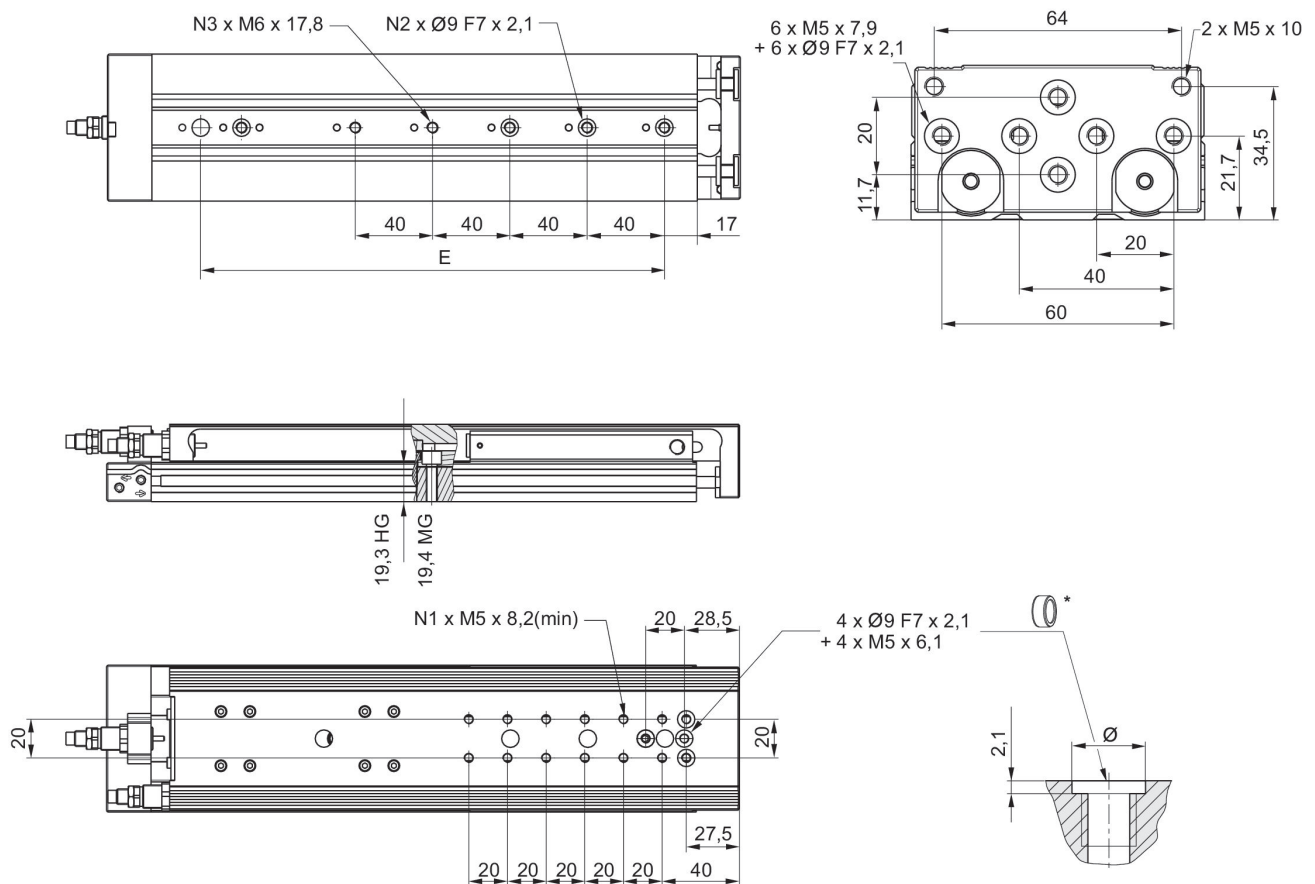
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Series MSC

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## Dimensions

### MSC-16



\* = centering rings

| Part No.   | Piston Ø | Stroke | E   | N1 | N2 | N3 |
|------------|----------|--------|-----|----|----|----|
| R412019175 | 16       | 125    | 200 | 12 | 4  | 5  |
| R480643808 | 16       | 125    | 200 | 12 | 4  | 5  |
| R412019188 | 16       | 125    | 200 | 12 | 4  | 5  |
| R480640200 | 16       | 125    | 200 | 12 | 4  | 5  |
| R412019176 | 16       | 150    | 240 | 12 | 4  | 5  |
| R480643809 | 16       | 150    | 240 | 12 | 4  | 5  |
| R412019189 | 16       | 150    | 240 | 12 | 4  | 5  |
| R480640201 | 16       | 150    | 240 | 12 | 4  | 5  |

| Part No.          | Piston Ø | Stroke | E | N1 | N2 | N3 |
|-------------------|----------|--------|---|----|----|----|
| R412019168        | 16       | 10     | – | 4  | 2  | 2  |
| R412019169        | 16       | 20     | – | 4  | 2  | 2  |
| R412019170        | 16       | 30     | – | 4  | 2  | 2  |
| <b>R412019171</b> | 16       | 40     | – | 4  | 2  | 2  |
| R412019172        | 16       | 50     | – | 6  | 2  | 2  |
| R412019173        | 16       | 80     | – | 6  | 3  | 3  |
| R412019174        | 16       | 100    | – | 8  | 3  | 3  |

Correction factor for required speed:  
extending, vertical, downwards



$V = s/1000 \cdot t \cdot km$   
 $V$  = velocity [m/s]  
 $S$  = stroke [mm]  
 $t$  = time [s] for one stroke  
 $m$  = mass

Max. extracting speed



$V = \sqrt{s \cdot kv}$   
 $V$  = velocity [m/s]  
 $S$  = stroke [mm]  
 $m$  = mass

# Mini slide, Series MSC-HG-EE

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Series MSC

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## Dimensions

### MSC-20



\* = centering rings

| Part No.   | Piston $\varnothing$ | Stroke | E | N1 | N2 | N3 |
|------------|----------------------|--------|---|----|----|----|
| R412018910 | 20                   | 10     | — | 2  | 2  | 2  |
| R412018911 | 20                   | 20     | — | 2  | 2  | 2  |
| R412018912 | 20                   | 30     | — | 2  | 2  | 2  |
| R412018913 | 20                   | 40     | — | 2  | 2  | 2  |
| R412018914 | 20                   | 50     | — | 2  | 2  | 2  |
| R412018915 | 20                   | 80     | — | 4  | 3  | 3  |
| R412018916 | 20                   | 100    | — | 4  | 3  | 3  |

# Mini slide, Series MSC-HG-EE

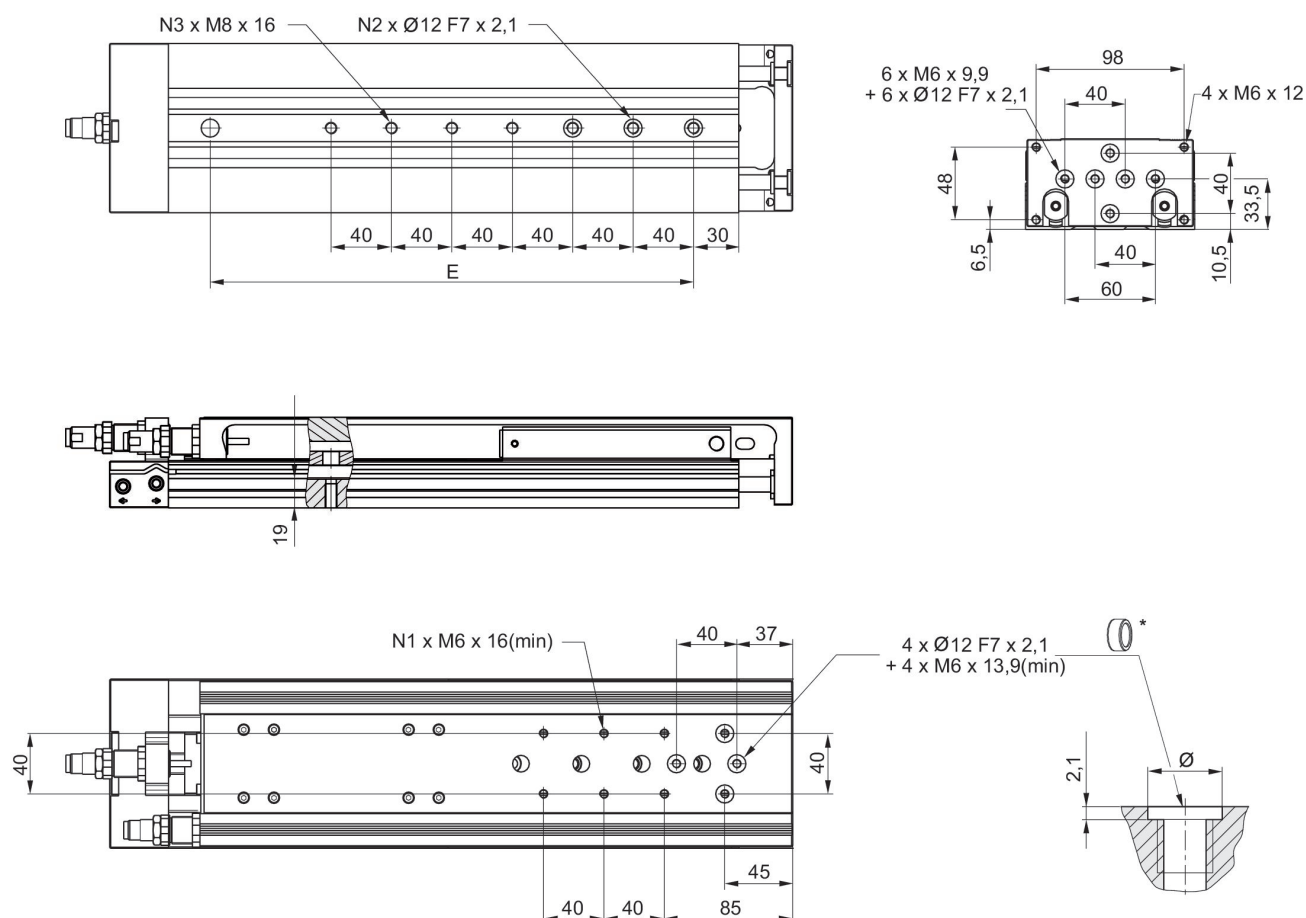
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Series MSC

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| Part No.   | Piston Ø | Stroke | E   | N1 | N2 | N3 |
|------------|----------|--------|-----|----|----|----|
| R412018917 | 20       | 125    | 200 | 6  | 4  | 5  |
| R480643817 | 20       | 125    | 200 | 6  | 4  | 5  |
| R412019005 | 20       | 125    | 200 | 6  | 4  | 5  |
| R480640205 | 20       | 125    | 200 | 6  | 4  | 5  |
| R412018918 | 20       | 150    | 240 | 6  | 4  | 5  |
| R480643818 | 20       | 150    | 240 | 6  | 4  | 5  |
| R412019006 | 20       | 150    | 240 | 6  | 4  | 5  |
| R480640206 | 20       | 150    | 240 | 6  | 4  | 5  |
| R412018919 | 20       | 200    | 320 | 6  | 4  | 7  |
| R480643819 | 20       | 200    | 320 | 6  | 4  | 7  |
| R412019007 | 20       | 200    | 320 | 6  | 4  | 7  |
| R480640207 | 20       | 200    | 320 | 6  | 4  | 7  |

## Dimensions MSC-25



\* = centering rings

# Mini slide, Series MSC-HG-EE

R412019171

Series MSC

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| Part No.   | Piston Ø | Stroke | E | N1 | N2 | N3 |
|------------|----------|--------|---|----|----|----|
| R480643820 | 25       | 10     | – | 2  | 2  | 2  |
| R480643821 | 25       | 20     | – | 2  | 2  | 2  |
| R480643822 | 25       | 30     | – | 2  | 2  | 2  |
| R480643823 | 25       | 40     | – | 2  | 2  | 2  |
| R480643824 | 25       | 50     | – | 4  | 2  | 2  |
| R480643825 | 25       | 80     | – | 4  | 3  | 3  |
| R480643826 | 25       | 100    | – | 4  | 3  | 3  |

| Part No.   | Piston Ø | Stroke | E   | N1 | N2 | N3 |
|------------|----------|--------|-----|----|----|----|
| R412019030 | 25       | 125    | 200 | 4  | 4  | 5  |
| R480643827 | 25       | 125    | 200 | 4  | 4  | 5  |
| R412019041 | 25       | 125    | 200 | 4  | 4  | 5  |
| R480640211 | 25       | 125    | 200 | 4  | 4  | 5  |
| R412019031 | 25       | 150    | 240 | 6  | 4  | 5  |
| R480643828 | 25       | 150    | 240 | 6  | 4  | 5  |
| R412019042 | 25       | 150    | 240 | 6  | 4  | 5  |
| R480640212 | 25       | 150    | 240 | 6  | 4  | 5  |
| R412019032 | 25       | 200    | 320 | 6  | 4  | 7  |
| R480643829 | 25       | 200    | 320 | 6  | 4  | 7  |
| R412019043 | 25       | 200    | 320 | 6  | 4  | 7  |
| R480640213 | 25       | 200    | 320 | 6  | 4  | 7  |

## Load capacity



M = max. permissible torque

## Correction factor (a)

| Part No.          | Piston Ø | Stroke | a [mm] | d [mm] | Mx <sub>max</sub> [Nm] | My <sub>max</sub> [Nm] | Mz <sub>max</sub> [Nm] |
|-------------------|----------|--------|--------|--------|------------------------|------------------------|------------------------|
| R412019204        | 8        | 10     | 45     | 14     | 7                      | 7                      | 7                      |
| R412019205        | 8        | 20     | 50     | 14     | 7                      | 7                      | 7                      |
| R412019206        | 8        | 30     | 60     | 14     | 7                      | 7                      | 7                      |
| R412019207        | 8        | 40     | 70     | 14     | 7                      | 7                      | 7                      |
| R412019208        | 8        | 50     | 80     | 14     | 9                      | 13                     | 13                     |
| R412019209        | 8        | 80     | 125    | 14     | 13                     | 25                     | 25                     |
| R412019190        | 12       | 10     | 54.5   | 16     | 20                     | 14                     | 14                     |
| R412019191        | 12       | 20     | 59.5   | 16     | 20                     | 14                     | 14                     |
| R412019192        | 12       | 30     | 64.5   | 16     | 20                     | 14                     | 14                     |
| R412019193        | 12       | 40     | 74.5   | 16     | 20                     | 14                     | 14                     |
| R412019194        | 12       | 50     | 84.5   | 16     | 23                     | 19                     | 19                     |
| R412019195        | 12       | 80     | 125    | 16     | 33                     | 32                     | 32                     |
| R412019196        | 12       | 100    | 145    | 16     | 33                     | 32                     | 32                     |
| R412019168        | 16       | 10     | 55.5   | 15     | 35                     | 25                     | 25                     |
| R412019169        | 16       | 20     | 60.5   | 15     | 35                     | 25                     | 25                     |
| R412019170        | 16       | 30     | 65.5   | 15     | 35                     | 25                     | 25                     |
| <b>R412019171</b> | 16       | 40     | 75.5   | 15     | 35                     | 25                     | 25                     |
| R412019172        | 16       | 50     | 85.5   | 15     | 38                     | 29                     | 29                     |
| R412019173        | 16       | 80     | 126    | 15     | 74                     | 58                     | 58                     |
| R412019174        | 16       | 100    | 146    | 15     | 74                     | 58                     | 58                     |
| R412019175        | 16       | 125    | 198.5  | 15     | 88                     | 118                    | 118                    |
| R412019176        | 16       | 150    | 223.5  | 15     | 88                     | 119                    | 119                    |
| R412018910        | 20       | 10     | 60.5   | 20     | 87                     | 57                     | 57                     |
| R412018911        | 20       | 20     | 65.5   | 20     | 87                     | 57                     | 57                     |
| R412018912        | 20       | 30     | 70.5   | 20     | 87                     | 57                     | 57                     |
| R412018913        | 20       | 40     | 80.5   | 20     | 87                     | 57                     | 57                     |
| R412018914        | 20       | 50     | 90.5   | 20     | 93                     | 65                     | 65                     |
| R412018915        | 20       | 80     | 130.5  | 20     | 116                    | 99                     | 99                     |
| R412018916        | 20       | 100    | 150.5  | 20     | 116                    | 99                     | 99                     |
| R412018917        | 20       | 125    | 201    | 20     | 126                    | 136                    | 136                    |
| R412018918        | 20       | 150    | 233.5  | 20     | 126                    | 152                    | 152                    |
| R412018919        | 20       | 200    | 296    | 20     | 126                    | 179                    | 179                    |
| R412019023        | 25       | 10     | 67.5   | 24     | 100                    | 90                     | 90                     |
| R412019024        | 25       | 20     | 72.5   | 24     | 100                    | 90                     | 90                     |
| R412019025        | 25       | 30     | 77.5   | 24     | 100                    | 90                     | 90                     |
| R412019026        | 25       | 40     | 87.5   | 24     | 100                    | 90                     | 90                     |
| R412019027        | 25       | 50     | 96.5   | 24     | 100                    | 90                     | 90                     |
| R412019028        | 25       | 80     | 137    | 24     | 110                    | 129                    | 129                    |
| R412019029        | 25       | 100    | 157    | 24     | 110                    | 129                    | 129                    |
| R412019030        | 25       | 125    | 201    | 24     | 145                    | 180                    | 180                    |
| R412019031        | 25       | 150    | 236.5  | 24     | 145                    | 201                    | 201                    |
| R412019032        | 25       | 200    | 299    | 24     | 145                    | 236                    | 236                    |

## Weight of moving parts [kg]

| Piston Ø | S=10  | S=20  | S=30  | S=40  | S=50  | S=80  | S=100 | S=125 | S=150 | S=200 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 8        | 0.14  | 0.14  | 0.155 | 0.165 | 0.195 | 0.265 | –     | –     | –     | –     |
| 12       | 0.255 | 0.255 | 0.26  | 0.28  | 0.315 | 0.403 | 0.46  | –     | –     | –     |
| 16       | 0.375 | 0.375 | 0.375 | 0.4   | 0.45  | 0.615 | 0.65  | 0.725 | 0.765 | –     |
| 20       | 0.655 | 0.655 | 0.655 | 0.69  | 0.765 | 0.985 | 1.035 | 1.2   | 1.29  | 1.54  |
| 25       | 1     | 1     | 1     | 1.1   | 1.225 | 1.45  | 1.625 | 1.885 | 2.085 | 2.445 |