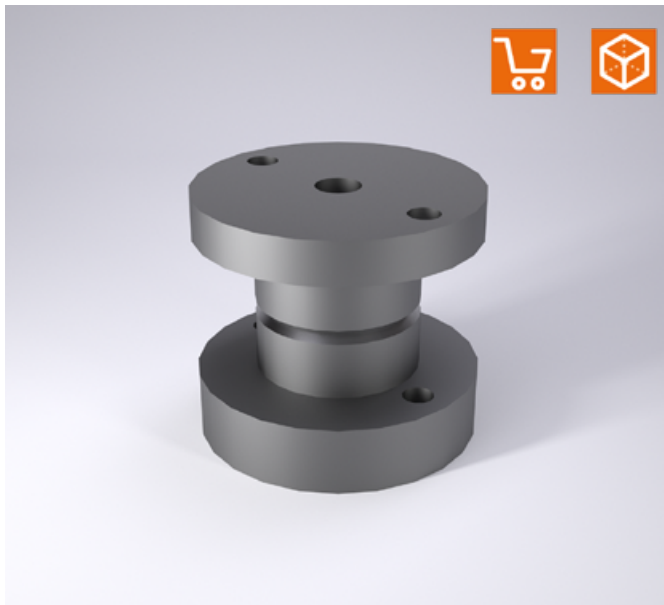
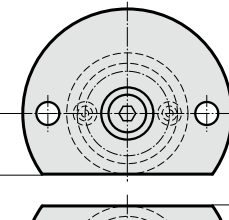
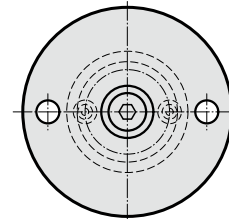
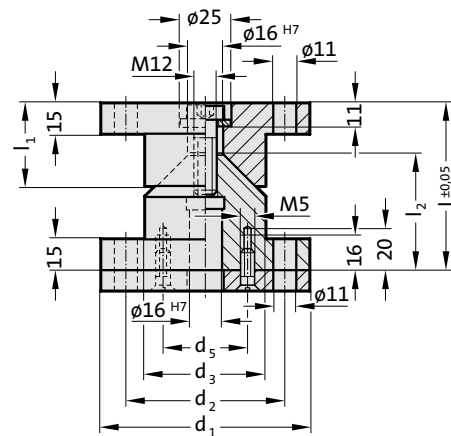


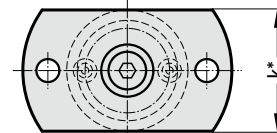
CENTERING UNIT WITH ADJUSTING WASHER



2441.11.0.



$$k^*/2 = d_3/2$$



$$k^* = d_3$$

Material:

Centring Units: 16MnCr5, heat treated
 Conical surfaces induction hardened
 Surface hardness: 60 + 4 HRC, Hardness penetration 1,0 + 0,5 mm
 Adjusting washer: C45 or similar

Note:

Centring unit complete with adjusting washer.
 Screws are included.

2441.11.0.□□□

Centring unit with adjusting washer

2441.11.0.□□□.1

Centring unit with one flat side with adjusting washer

2441.11.0.□□□.2

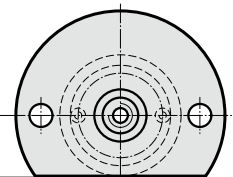
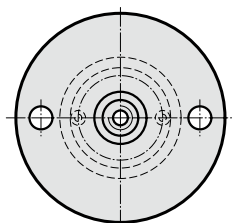
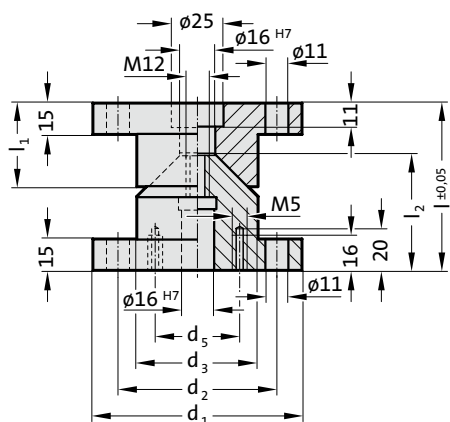
Centring unit with two flat sides with adjusting washer

2441.11.0. Centering unit with adjusting washer

| Order No | d ₁ | d ₂ | d ₃ | d ₅ | l | l ₁ | l ₂ |
|-----------------|----------------|----------------|----------------|----------------|----|----------------|----------------|
| 2441.11.0.100 | 100 | 76 | 58 | 40.5 | 80 | 40 | 55 |
| 2441.11.0.100.1 | 100 | 76 | 58 | 40.5 | 80 | 40 | 55 |
| 2441.11.0.100.2 | 100 | 76 | 58 | 40.5 | 80 | 40 | 55 |
| 2441.11.0.120 | 120 | 96 | 78 | 50.5 | 90 | 50 | 65 |
| 2441.11.0.120.1 | 120 | 96 | 78 | 50.5 | 90 | 50 | 65 |
| 2441.11.0.120.2 | 120 | 96 | 78 | 50.5 | 90 | 50 | 65 |

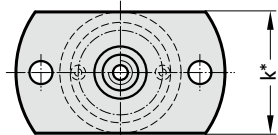
CENTERING UNIT

2441.11.

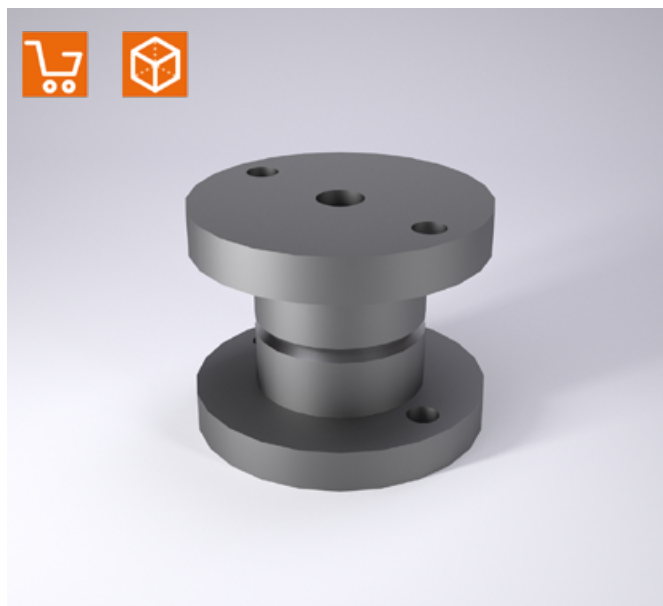


$k^*/2$

$$k^*/2 = d_3/2$$



$$k^* = d_3$$



Material:

16MnCr5, heat treated

Conical surfaces induction hardened

Surface hardness: 60 + 4 HRC, Hardness penetration 1,0 + 0,5 mm

Note:

Adjusting washer 2441.11.3. to be ordered separately.

Screws are not included.

2441.11.□□□

Centering unit

2441.11.□□□.1

Centering unit with one flat side

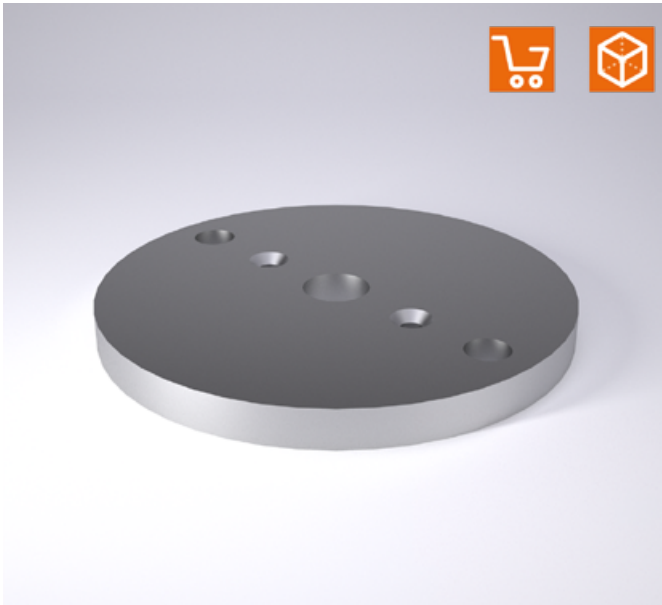
2441.11.□□□.2

Centering unit with two flat sides

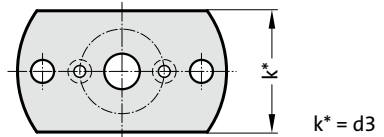
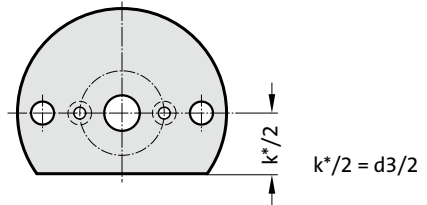
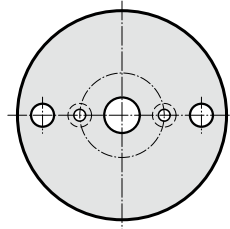
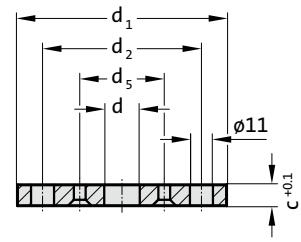
2441.11. Centering unit

| Order No | d ₁ | d ₂ | d ₃ | d ₅ | l | l ₁ | l ₂ |
|---------------|----------------|----------------|----------------|----------------|----|----------------|----------------|
| 2441.11.100 | 100 | 76 | 58 | 40.5 | 80 | 40 | 55 |
| 2441.11.100.1 | 100 | 76 | 58 | 40.5 | 80 | 40 | 55 |
| 2441.11.100.2 | 100 | 76 | 58 | 40.5 | 80 | 40 | 55 |
| 2441.11.120 | 120 | 96 | 78 | 50.5 | 90 | 50 | 65 |
| 2441.11.120.1 | 120 | 96 | 78 | 50.5 | 90 | 50 | 65 |
| 2441.11.120.2 | 120 | 96 | 78 | 50.5 | 90 | 50 | 65 |

ADJUSTING WASHER



2441.11.3.



Material:

C45 or similar

Note:

2441.11.3.□□□
Adjusting washer

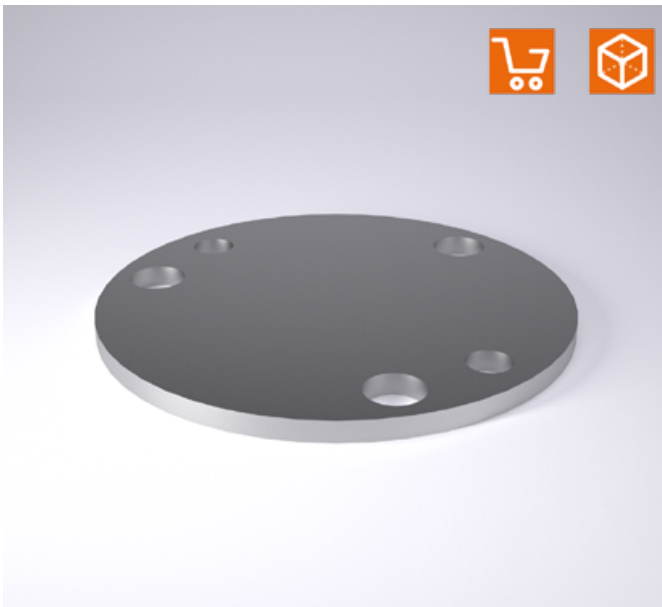
2441.11.3.□□□.1
Adjusting washer with one flat side

2441.11.3.□□□.2
Adjusting washer with two flat sides

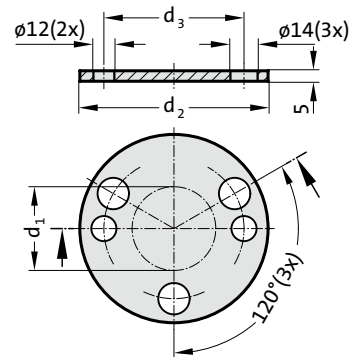
2441.11.3. Adjusting washer

| Order No | d ₁ | d ₂ | d ₄ | d ₅ | c | k |
|-----------------|----------------|----------------|----------------|----------------|-----|----|
| 2441.11.3.100 | 100 | 76 | 17 | 40.5 | 9.8 | - |
| 2441.11.3.100.1 | 100 | 76 | 17 | 40.5 | 9.8 | 58 |
| 2441.11.3.100.2 | 100 | 76 | 17 | 40.5 | 9.8 | 58 |
| 2441.11.3.105 | 105 | 76 | 18 | 40.5 | 5.5 | - |
| 2441.11.3.120 | 120 | 96 | 17 | 50.5 | 9.8 | - |
| 2441.11.3.120.1 | 120 | 96 | 17 | 50.5 | 9.8 | 78 |
| 2441.11.3.120.2 | 120 | 96 | 17 | 50.5 | 9.8 | 78 |
| 2441.11.3.125 | 125 | 96 | 18 | 50.5 | 5.5 | - |

ADJUSTING WASHER, CNOMO



2441.13.3.45.



Material:

Cf 70 (1.1249)

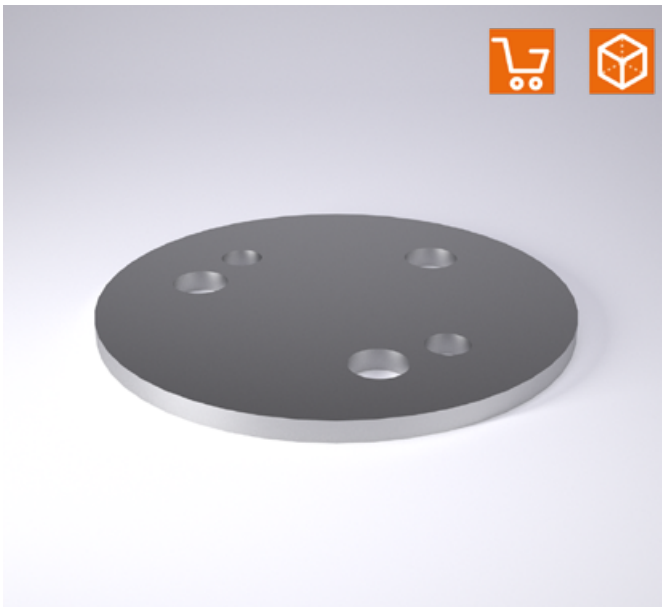
Note:

Adjusting washer for centring unit 2441.13.45.

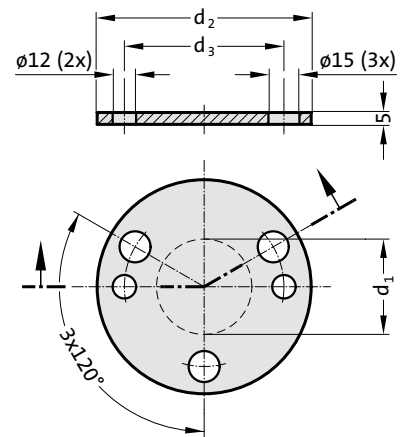
2441.13.3.45. Adjusting washer, CNOMO

| Order No | d ₁ | d ₂ | d ₃ |
|------------------|----------------|----------------|----------------|
| 2441.13.3.45.040 | 40 | 90 | 67 |
| 2441.13.3.45.060 | 60 | 110 | 89 |

ADJUSTING WASHER, CNOMO



2441.13.3.



Material:

100 Cr 6

Note:

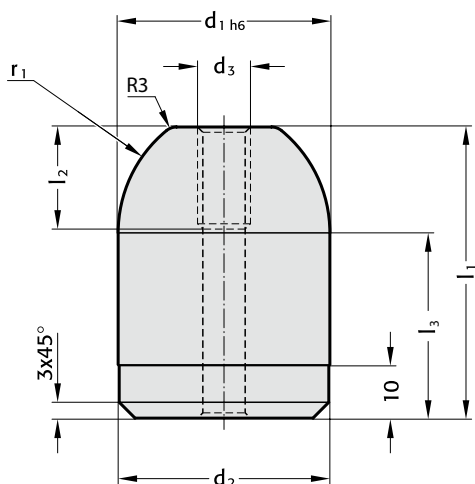
Adjusting washer for centring unit 2441.13.

2441.13.3. Adjusting washer, CNOMO

| Order No | d ₁ | d ₂ | d ₃ |
|---------------|----------------|----------------|----------------|
| 2441.13.3.040 | 40 | 90 | 67 |
| 2441.13.3.060 | 60 | 110 | 89 |

CENTERING PIN

2445.10.



2445.10. Centering pin

| Order No | d ₁ | d ₂ | d ₃ | l ₁ | l ₂ | l ₃ | r ₁ | |
|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----|
| 2445.10.022.045 | 1), 2) | 22 | 21.95 | M8 | 45 | 16 | 35 | 15 |
| 2445.10.022.055 | 2) | 22 | 21.95 | M8 | 55 | 16 | 45 | 15 |
| 2445.10.032.050 | 1) | 32 | 31.95 | M10 | 50 | 20 | 35 | 20 |
| 2445.10.040.055 | 1), 2) | 40 | 39.95 | M10 | 55 | 20 | 35 | 25 |
| 2445.10.040.065 | 2) | 40 | 39.95 | M10 | 65 | 20 | 45 | 25 |
| 2445.10.040.085 | 2) | 40 | 39.95 | M10 | 85 | 20 | 65 | 25 |
| 2445.10.050.055 | 1) | 50 | 49.95 | M10 | 55 | 20 | 35 | 25 |
| 2445.10.056.080 | 1) | 56 | 55.95 | M10 | 80 | 20 | 60 | 30 |

Description:

Using locating holes components, assemblies and tools can be repeatedly centred with high precision on processing machines, measuring equipment and tool components.

Material:

Steel, hardened

Note:

Screws are not included.

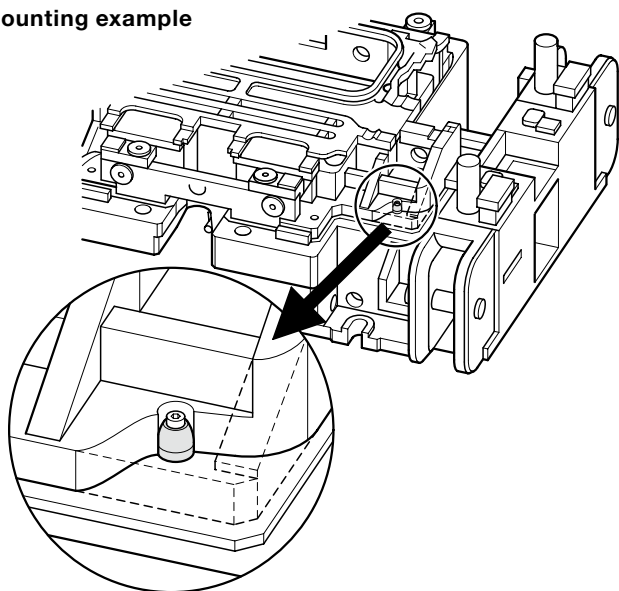
1) to BMW standard

2) to VW standard

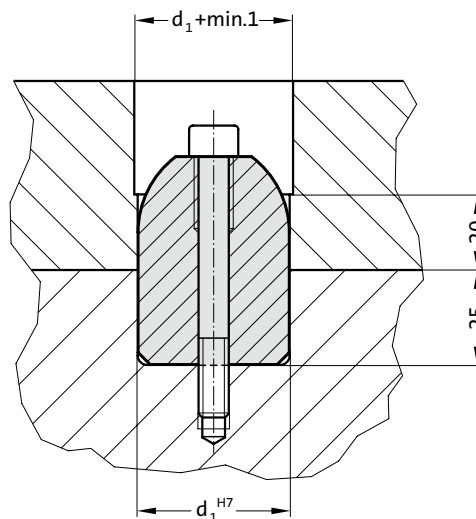
Fixing:

Use socket cap screws DIN EN ISO 4762 M6/M8.

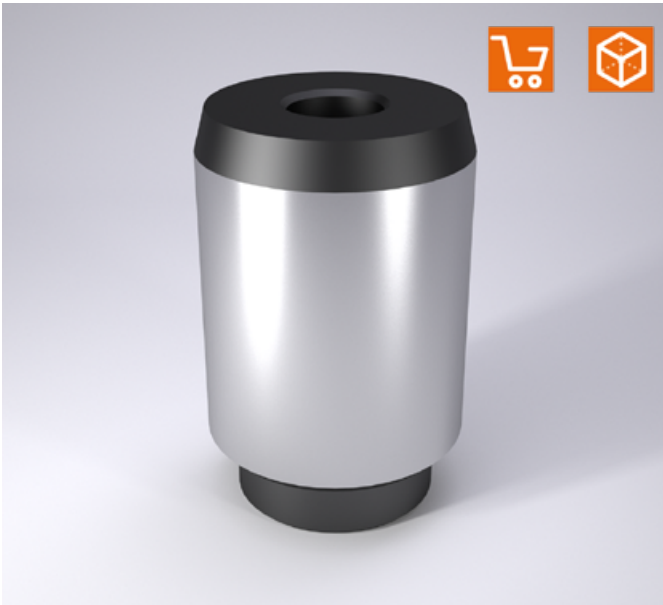
Mounting example



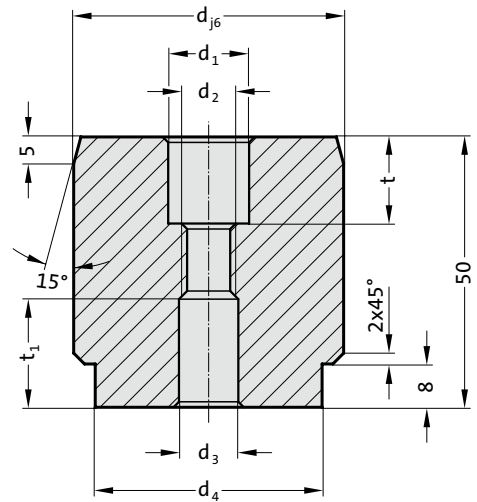
Mounting example



CENTERING PIN TO MERCEDES-BENZ STANDARD



2445.11.



Description:

Using locating holes components, assemblies and tools can be repeatedly centred with high precision on processing machines, measuring equipment and tool components.

Material:

Steel, hardened

Note:

Screws are not included.

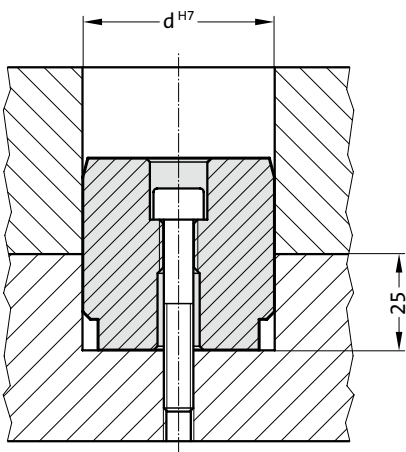
Fixing:

Use socket cap screws DIN EN ISO 4762 M6/M8.

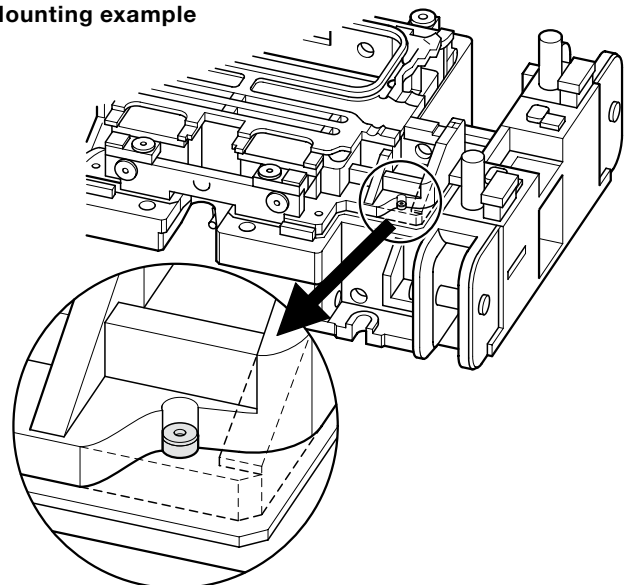
2445.11. Centering pin to Mercedes-Benz Standard

| Order No | d | d ₁ | d ₂ | d ₃ | d ₄ | t | t ₁ |
|-------------|----|----------------|----------------|----------------|----------------|----|----------------|
| 2445.11.022 | 22 | 11 | M8 | 9 | 16 | 13 | 16 |
| 2445.11.025 | 25 | 11 | M8 | 9 | 18 | 13 | 16 |
| 2445.11.032 | 32 | 11 | M8 | 9 | 25 | 13 | 16 |
| 2445.11.040 | 40 | 15 | M10 | 11 | 32 | 16 | 20 |
| 2445.11.050 | 50 | 15 | M10 | 11 | 42 | 16 | 20 |

Mounting example

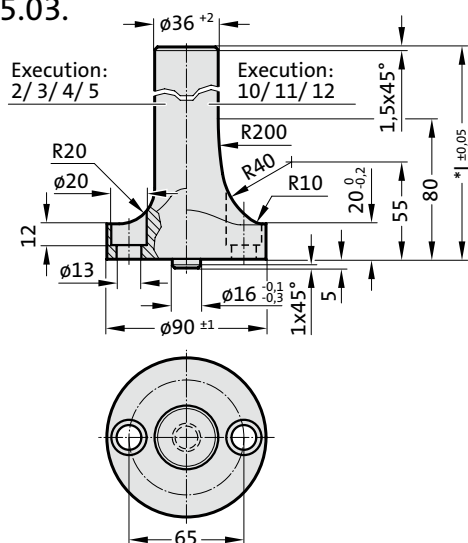


Mounting example

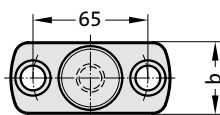


PRESSURE BOLT WITH BASE, ACCORDING TO VW

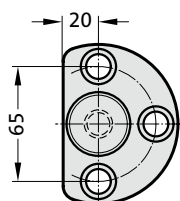
2446.10.55.03.



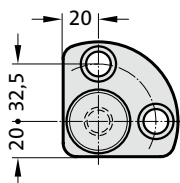
2446.10.55.02. / 2446.10.55.10. / 2446.10.55.11.



2446.10.55.04.



2446.10.55.05. / 2446.10.55.12.



2446.10.55. Pressure bolt with base, according to VW

| Order No | Shape | b | l* | Gradation |
|----------------|-------|----|-----------|-----------|
| 2446.10.55.02. | 2 | 40 | 150 - 360 | 1 |
| 2446.10.55.03. | 3 | 0 | 150 - 360 | 1 |
| 2446.10.55.04. | 4 | 0 | 150 - 360 | 1 |
| 2446.10.55.05. | 5 | 0 | 150 - 360 | 1 |
| 2446.10.55.10. | 10 | 60 | 150 - 360 | 1 |
| 2446.10.55.11. | 11 | 40 | 150 - 360 | 1 |
| 2446.10.55.12. | 12 | 0 | 150 - 360 | 1 |

*to customer's specifications!

Ordering Code (example):

Pressure bolt with base, according to VW = 2446.10.55.
 Execution Shape 4 = 04.
 Length l 150 mm = 150
 Order No = 2446.10.55. 04. 150



Description:

Pressure bolts with base are used to transfer force from the pressure cushion of the press to the tool.

Material:

C45 (1.0503), heat-treated 800 - 1000 N/mm²

Execution:

drop-forged

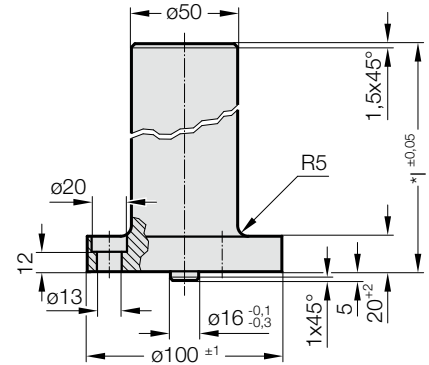
Note:

Screws are not included.

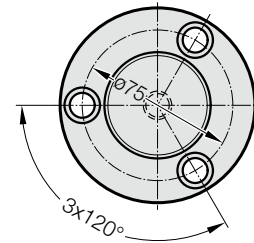
AIR PIN, ACCORDING TO VW STANDARD



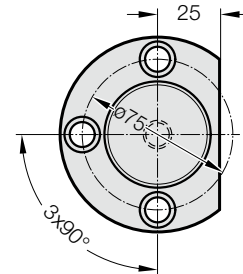
2446.11.55.



2446.11.55.11.



2446.11.55.12.



Description:

Air pins are used to transfer force from the pressure cushion of the press to the tool.

Material:

C45 (1.0503), heat-treated 800 - 1000 N/mm²
Alternatively C60 (1.0601)

Execution:

drop-forged

Note:

Screws are not included.

2446.11.55. Air pin, according to VW standard

| Order No | Execution | l* | Gradation |
|-------------------|-----------|-----------|-----------|
| 2446.11.55.11.150 | 11 | 150 - 440 | 1 |
| 2446.11.55.12.150 | 12 | 150 - 440 | 1 |

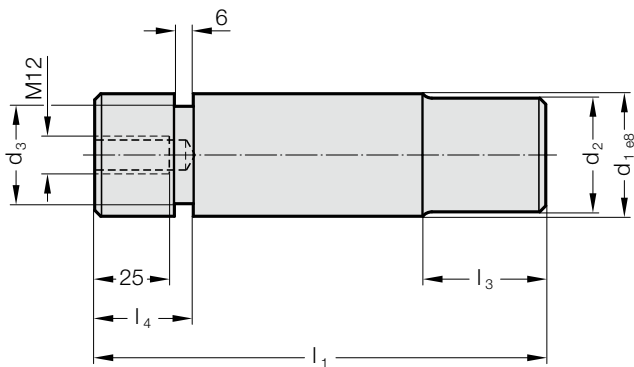
*to customer's specifications!

Ordering Code (example):

| | | |
|-----------------------------------|--------|---------------------|
| Air pin, according to VW standard | = | 2446.11.55. |
| Execution Shape | 12 | = 12. |
| Length l | 150 mm | = 150 |
| Order No | = | 2446.11.55. 12. 150 |

LOCKING PIN, IN ACCORDANCE WITH VW NORM

2446.12.55.



Description:

Locking pins are used to hold and secure the pad in tools

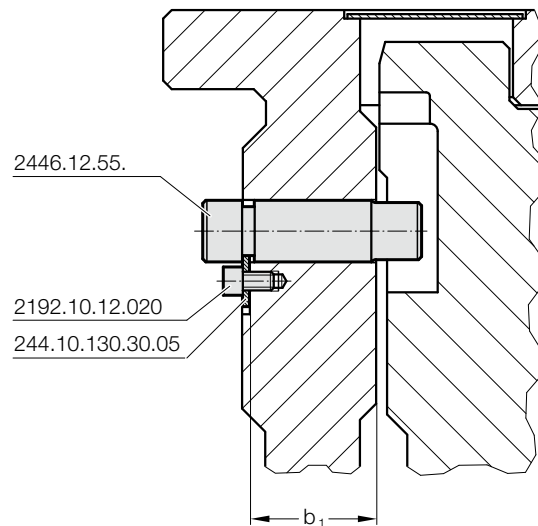
Material:

C45 (1.0503), heat-treated 800 - 1000 N/mm²

Note:

Supplied with sheave and screw

Mounting example



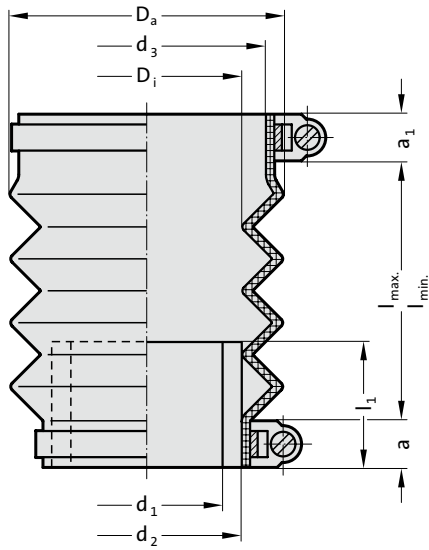
2446.12.55. Locking pin, in accordance with VW norm

| Order No | d_1 | d_2 | d_3 | l_1 | l_3 | l_4 | r | b_1 | max. load capacity per stud dyn. loading [kg] |
|--------------------|-------|-------|-------|-------|-------|-------|-----|-------|---|
| 2446.12.55.032.105 | 32 | 29 | 24 | 105 | 25 | 22 | 4 | 63 | 500 |
| 2446.12.55.032.122 | 32 | 29 | 24 | 122 | 25 | 22 | 4 | 80 | 500 |
| 2446.12.55.040.139 | 40 | 37 | 32 | 139 | 32 | 32 | 5 | 80 | 750 |
| 2446.12.55.040.159 | 40 | 37 | 32 | 159 | 32 | 32 | 5 | 100 | 750 |
| 2446.12.55.050.167 | 50 | 47 | 42 | 167 | 40 | 32 | 6 | 100 | 1250 |
| 2446.12.55.050.192 | 50 | 47 | 42 | 192 | 40 | 32 | 6 | 125 | 1250 |
| 2446.12.55.063.202 | 63 | 60 | 55 | 202 | 50 | 32 | 6 | 125 | 2500 |
| 2446.12.55.063.237 | 63 | 60 | 55 | 237 | 50 | 32 | 6 | 160 | 2500 |



CONCERTINA SHROUD WITH SPACER BUSH

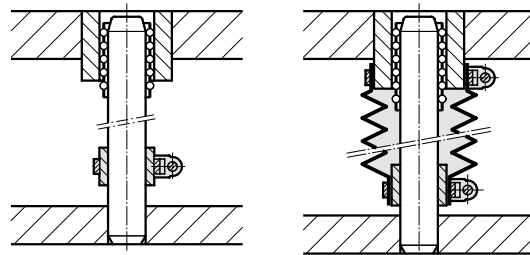
206.91.



Note:

Concertina Shrouds are supplied complete with spacer bush and two hose clamps.
Special sizes on request.

Mounting example



206.91. Concertina shroud with spacer bush

| | | | | | | | | | | | | | | | | | | | | | |
|--|-------|-------|-------|-------|-------|-----|-----|-------|-------|-------|-------|-------|-----|-----|--|--|--|--|--|--|--|
| for guide bushes 2051. 2061. 2051. 2061. 2051. 2061. 2051. 2061. 2051. 2061. 2051. 2061. 2051. 2061. 2081. 2081. 2081. 2081. 2081. 2081. 2081. | | | | | | | | | | | | | | | | | | | | | |
| Pillar- \varnothing d_1 | 19 20 | 24 25 | 30 32 | 38 40 | 48 50 | 60 | 63 | 19 20 | 24 25 | 30 32 | 38 40 | 48 50 | 60 | 63 | | | | | | | |
| d^* | 20 | 25 | 32 | 40 | 50 | 60 | 63 | 20 | 25 | 32 | 40 | 50 | 60 | 63 | | | | | | | |
| d_2 | 25 | 30 | 40 | 50 | 60 | 70 | 70 | 25 | 30 | 40 | 50 | 60 | 70 | 70 | | | | | | | |
| d_3 | 32 | 38 | 46 | 55 | 64 | 76 | 76 | 39 | 45 | 54 | 63 | 74 | 94 | 94 | | | | | | | |
| d_4^{**} | 32 | 38 | 48 | 58 | 68 | 79 | 79 | 40 | 45 | 54 | 66 | 80 | 95 | 95 | | | | | | | |
| D_i | 30 | 30 | 46 | 55 | 62 | 75 | 75 | 32 | 32 | 45 | 52 | 62 | 75 | 75 | | | | | | | |
| D_a | 51 | 56 | 72 | 87 | 86 | 100 | 100 | 54 | 56 | 63 | 96 | 84 | 104 | 104 | | | | | | | |
| a | 13 | 13 | 20 | 12 | 12 | 12 | 12 | 10 | 10 | 10 | 12 | 12 | 10 | 10 | | | | | | | |
| a_1 | 16 | 13 | 20 | 12 | 12 | 10 | 10 | 10 | 10 | 10 | 12 | 12 | 10 | 10 | | | | | | | |
| l_1 | 20 | 30 | 30 | 40 | 40 | 40 | 40 | 20 | 30 | 30 | 40 | 40 | 40 | 40 | | | | | | | |
| l_{min} | 30 | 25 | 20 | 44 | 25 | 30 | 30 | 37 | 35 | 35 | 25 | 45 | 35 | 35 | | | | | | | |
| l_{max} | 170 | 130 | 100 | 119 | 110 | 130 | 130 | 145 | 110 | 110 | 225 | 165 | 185 | 185 | | | | | | | |

* d = Nominal diameter, ** d_4 = Nominal ordering diameter for flange diameter

Ordering Code (example):

| | | |
|---|---------|------------------|
| Concertina shroud with spacer bush | = | 206.91. |
| Nominal diameter d | 20 mm = | 020. |
| Nominal order diameter for flange connection diameter d_4 | 40 mm = | 040 |
| Order No | = | 206.91. 020. 040 |

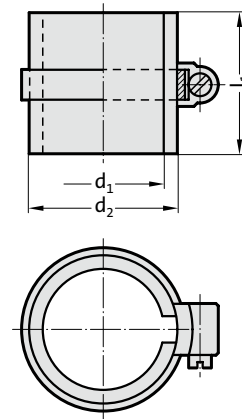
SPACER BUSH SPACER TUBE



Material:

PMMA, PLEXIGLAS®

206.93.



206.93. Spacer bush

| | | | | | | | | | | | | | | |
|-------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Pillar-ø d ₁ | 15 | 16 | 19 | 20 | 24 | 25 | 30 | 32 | 38 | 40 | 48 | 50 | 60 | 63 |
| d* | 16 | 20 | 25 | 30 | 32 | 40 | 50 | 60 | 70 | 70 | 60 | 63 | 60 | 63 |
| d ₂ | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 70 | 40 | 40 | 40 | 40 | 40 | 40 |
| l ₁ | 20 | 20 | 30 | 30 | 30 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |

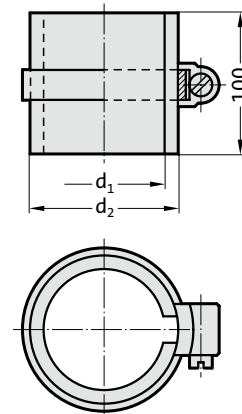
*d = Nominal diameter

Ordering Code (example):

| | |
|--------------------------|--------------|
| Spacer bush | =206.93. |
| Nominal diameter d 40 mm | = 040 |
| Order No | =206.93. 040 |



206.94.



206.94. Spacer tube

| | | | | | | | | | | | | | | |
|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pillar-ø d ₁ | 15 | 16 | 19 | 20 | 24 | 25 | 30 | 32 | 38 | 40 | 48 | 50 | 60 | 63 |
| d* | 16 | 20 | 25 | 30 | 32 | 40 | 50 | 60 | 70 | 70 | 60 | 63 | 60 | 63 |
| d ₂ | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 70 | 40 | 40 | 40 | 40 | 40 | 40 |
| l ₁ | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

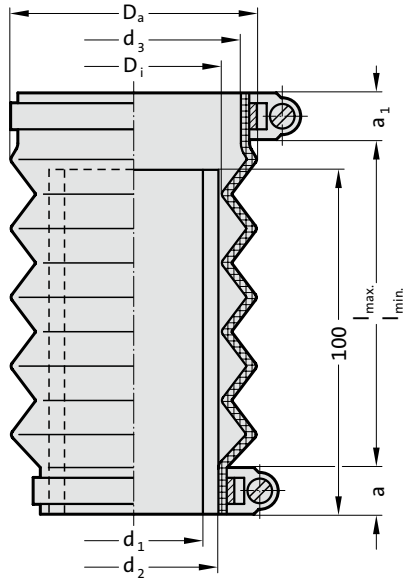
*d = Nominal diameter

Ordering Code (example):

| | |
|--------------------------|---------------|
| Spacer tube | = 206.94. |
| Nominal diameter d 40 mm | = 040 |
| Order No | = 206.94. 040 |

CONCERTINA SHROUD WITH SPACER TUBE

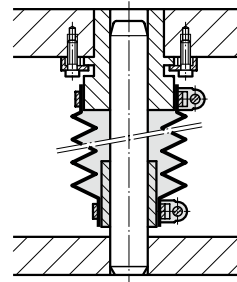
206.92.



Note:

Concertina Shrouds are supplied complete with spacer tube and two hose clamps.
Special sizes on request.

Mounting example



206.92. Concertina shroud with spacer tube

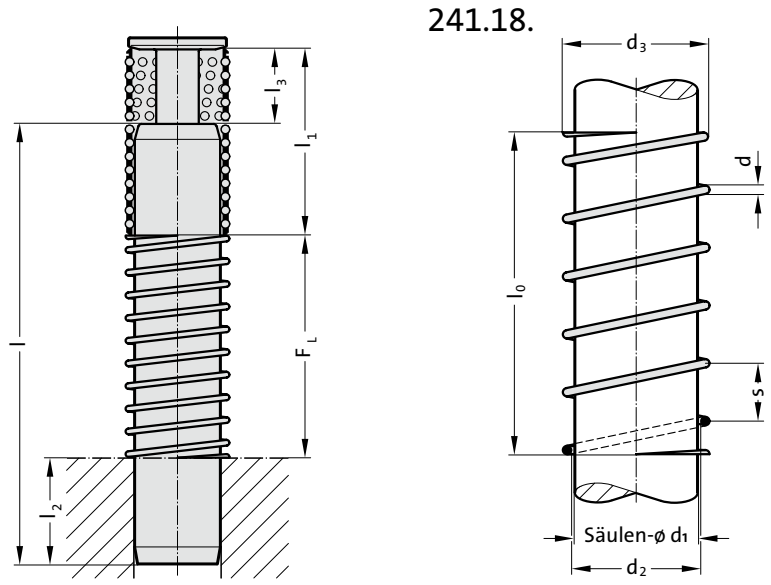
| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|-----|
| for guide bushes | 2051. | 2061. | 2051. | 2061. | 2051. | 2061. | 2051. | 2061. | 2051. | 2061. | 2051. | 2061. | 2051. | 2061. | 2081. | 2081. | 2081. | 2081. | 2081. | 2081. | 2081. | 2081. | | |
| Pillar- \varnothing d ₁ | 19 | 20 | 24 | 25 | 30 | 32 | 38 | 40 | 48 | 50 | 60 | 63 | 19 | 20 | 24 | 25 | 30 | 32 | 38 | 40 | 48 | 50 | 60 | 63 |
| d* | 20 | 25 | 32 | 38 | 40 | 50 | 60 | 63 | 70 | 70 | 76 | 76 | 39 | 45 | 54 | 63 | 74 | 94 | 94 | 94 | 94 | 94 | 94 | 94 |
| d ₂ | 25 | 30 | 40 | 50 | 60 | 70 | 70 | 70 | 70 | 70 | 76 | 76 | 39 | 45 | 54 | 63 | 74 | 94 | 94 | 94 | 94 | 94 | 94 | 94 |
| d ₃ | 32 | 38 | 46 | 55 | 64 | 76 | 76 | 76 | 76 | 76 | 76 | 76 | 39 | 45 | 54 | 63 | 74 | 94 | 94 | 94 | 94 | 94 | 94 | 94 |
| d ₄ ** | 32 | 38 | 48 | 58 | 68 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 40 | 45 | 54 | 66 | 80 | 95 | 95 | 95 | 95 | 95 | 95 | 95 |
| D _i | 30 | 30 | 46 | 55 | 62 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 32 | 32 | 45 | 52 | 62 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| D _a | 51 | 56 | 72 | 87 | 86 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 54 | 56 | 63 | 96 | 84 | 104 | 104 | 104 | 104 | 104 | 104 | 104 |
| a | 13 | 13 | 20 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 10 | 10 | 10 | 12 | 12 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| a ₁ | 16 | 13 | 20 | 12 | 12 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 12 | 12 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| l ₁ | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| l _{min} | 30 | 25 | 20 | 44 | 25 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 37 | 35 | 35 | 25 | 45 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| l _{max} | 170 | 130 | 100 | 119 | 110 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 145 | 110 | 110 | 225 | 165 | 185 | 185 | 185 | 185 | 185 | 185 | 185 |

*d = Nominal diameter, **d₄ = Nominal ordering diameter for flange diameter

Ordering Code (example):

| | | |
|--|---------|------------------|
| Concertina shroud with spacer tube | = | 206.92. |
| Nominal diameter d | 20 mm = | 020. |
| Nominal order diameter for flange connection diameter d ₄ | 40 mm = | 040 |
| Order No | = | 206.92. 020. 040 |

HELICAL SPRING FOR BALL CAGE RETENTION



Calculation:

Formula for selecting spring 241.18.:

$$F_L = [l - (l_2 + (l_1 - l_3))] \times 1,1$$

Formula for calculating the block length L_{BL} of the selected spring:

$$L_{BL} = (l_0 \times d : s) + 2 \times d$$

F_L = Length of compressed spring

l = Length of guide pillar (Customer specified)

l_1 = Cage length (Customer specified)

l_2 = Compression length of guide pillar (Customer specified)

l_3 = Ball cage retainer size (Customer specified)

1.1 = Safety factor

l_0 = Length of uncompressed spring

d = Spring wire diameter

s = Pitch

241.18. Helical spring for ball cage retention

| d_1 | d_2 | d_3 | s | d | l_0 | Gradation l_0 |
|-------|-------|-------|-----|-----|----------|-----------------|
| 19/20 | 20.5 | 22.5 | 14 | 1 | 40 - 140 | 10 |
| 24/25 | 25.5 | 27.9 | 14 | 1.2 | 40 - 160 | 10 |
| 30/32 | 32.5 | 35.7 | 16 | 1.6 | 50 - 230 | 10 |
| 38 | 38.5 | 42.5 | 18 | 2 | 60 - 230 | 10 |
| 40 | 40.5 | 45.1 | 20 | 2.3 | 60 - 230 | 10 |
| 48/50 | 50.5 | 55.7 | 20 | 2.6 | 70 - 280 | 10 |
| 60 | 60.5 | 66.9 | 20 | 3.2 | 80 - 250 | 10 |
| 63 | 63.5 | 69.9 | 20 | 3.2 | 80 - 250 | 10 |

Ordering Code (example):

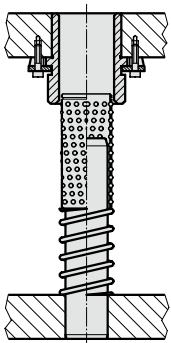
Helical spring for ball cage retention = 241.18.

Inner diameter d_2 40.5 mm = 405.

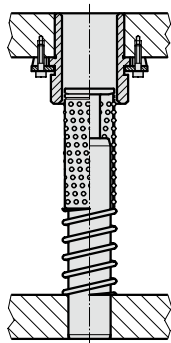
Length l_0 60 mm = 060

Order No = 241.18. 405.060

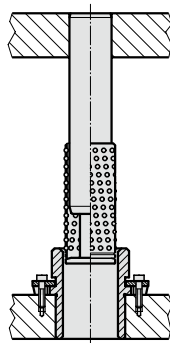
Mounting example



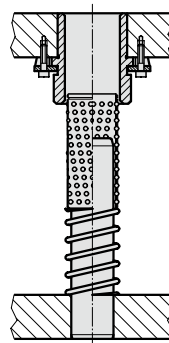
Without ball cage retainer



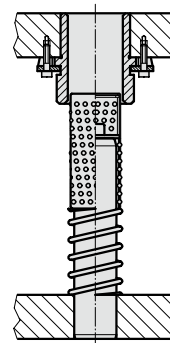
With ball cage retainer 202.91.



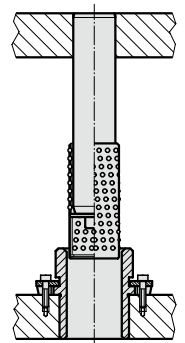
With ball cage retainer 202.91.



Without ball cage retainer



With ball cage retainer 202.92.1.



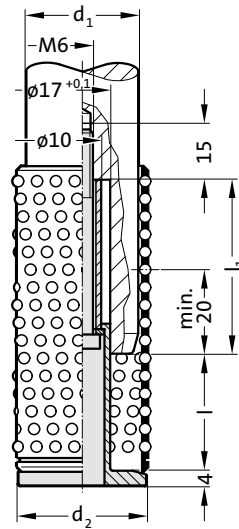
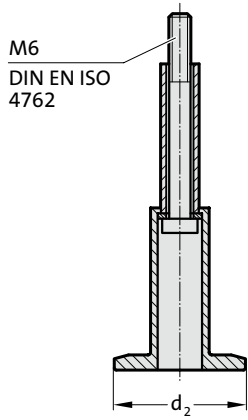
With ball cage retainer 202.92.1.

Mounting example

CAGE RETAINER

202.91.

Mounting example



Note:

The following guide pillars are equipped with this cage retainer:

- 202.17.
- 202.55.
- 2021.44.
- 2021.58.

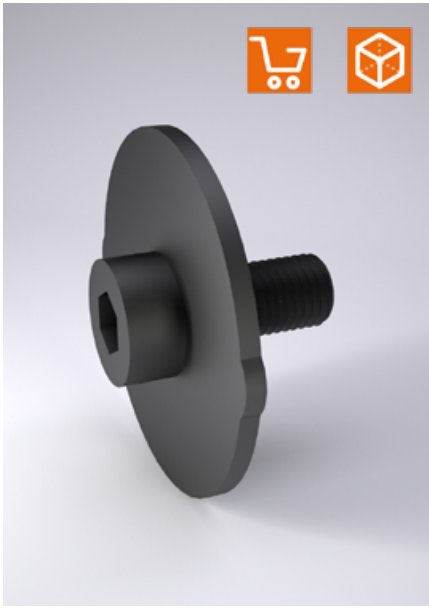
202.91. Cage retainer

| d_1 | 38 | 40 | 48 | 50 | 60 | 63 |
|--------------------------|----|----|----|----|----|----|
| d_2 | 42 | 44 | 52 | 54 | 64 | 67 |
| KG (l / l ₁) | | | | | | |
| 1 (31 / 46) | ● | ● | ● | ● | ● | ● |
| 2 (41 / 56) | ● | ● | ● | ● | ● | ● |
| 3 (51 / 66) | ● | ● | ● | ● | ● | ● |
| 4 (61 / 76) | ● | ● | ● | ● | ● | ● |
| 5 (73 / 89) | ● | ● | ● | ● | ● | ● |

Ordering Code (example):

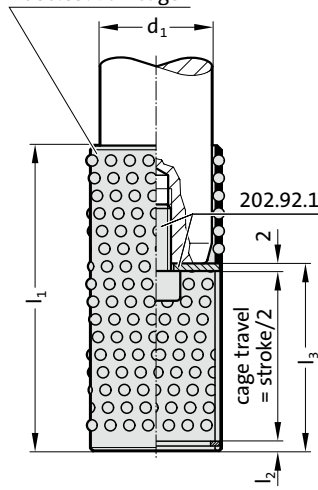
| | | |
|---------------------------|---------|----------------|
| Cage retainer | = | 202.91. |
| Diameter of conduit d_1 | 50 mm = | 050. |
| Cage unit size KG | 1 = | 1 |
| Order No | = | 202.91. 050. 1 |

CAGE RETAINER

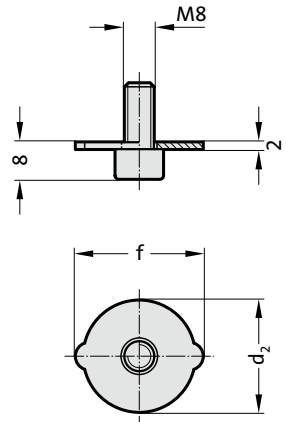


Mounting example

order separately:
206.75. Ball Cage
2060.65. Ball Cage



202.92.1.



Note:

The following guide pillars can be equipped with this cage retainer:

- 202.22.
- 202.24.
- 2021.46.
- 2021.50.

202.92.1. Cage retainer

| | | | | | | | | | | | | |
|-------|----|----|----|----|----|----|----|----|----|----|----|----|
| d_1 | 19 | 20 | 24 | 25 | 30 | 32 | 38 | 40 | 48 | 50 | 60 | 63 |
| d_2 | 18 | 19 | 23 | 24 | 29 | 31 | 37 | 39 | 47 | 49 | 59 | 62 |
| f | 22 | 23 | 27 | 28 | 34 | 36 | 42 | 44 | 52 | 54 | 64 | 67 |

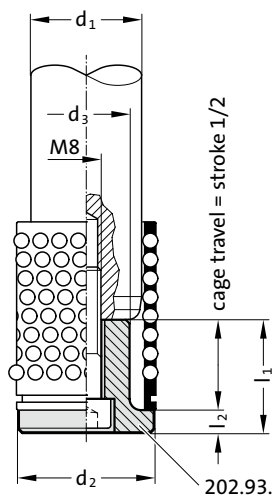
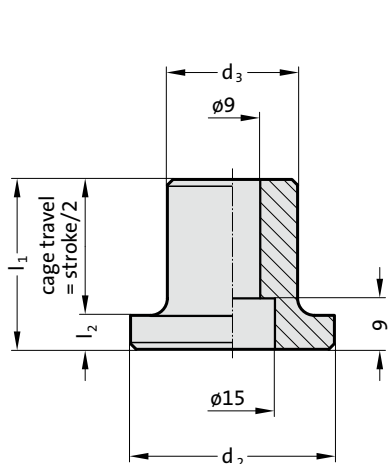
Ordering Code (example):

Cage retainer = 202.92.1.
Diameter of conduit d_1 38 mm = 038
Order No = 202.92.1. 038

CAGE RETAINER

202.93.

Mounting example



Note:

The following guide pillars can be equipped with this cage retainer:

- 202.22.
- 202.24.
- 2021.46.
- 2021.50.

Screws are not included.

Fixing:

Use socket cap screws DIN EN ISO 4762 for ordering size:

- 03. - 2192.12.08.035
- 04. - 2192.12.08.045
- 05. - 2192.12.08.055
- 06. - 2192.12.08.070
- 08. - 2192.12.08.090

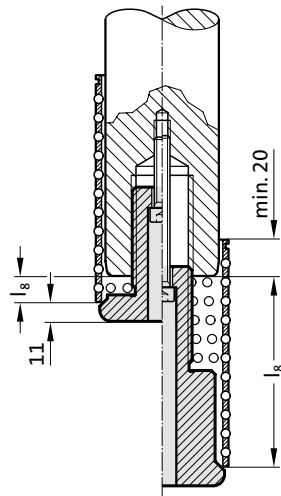
202.93. Cage retainer

| Order No | d ₁ | d ₂ | d ₃ | l ₁ | l ₂ |
|--------------|----------------|----------------|----------------|----------------|----------------|
| 202.93.3.030 | 30 32 | 36 | 23 | 30 | 6 |
| 202.93.4.040 | 38 40 | 44 | 31 | 40 | 6 |
| 202.93.5.050 | 48 50 | 54 | 39 | 50 | 8 |
| 202.93.6.060 | 60 63 | 66 | 51 | 60 | 8 |
| 202.93.8.080 | 80 | 89 | 71 | 80 | 8 |

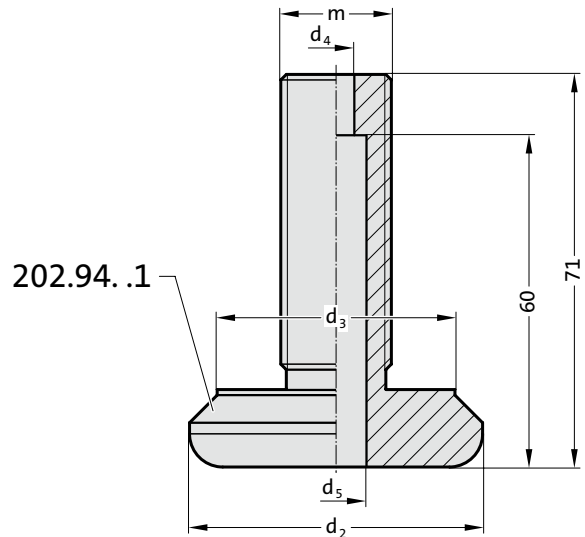
CAGE RETAINER



Mounting example



202.94.



202.94. .1

Description:

Cage unit allows both accurate cage centring as well as a variably adjustable cage feed length (l_g). The cage feed length can be adjusted by turning the thread m in the column. A cheese head screw in accordance with DIN EN ISO 4762 serves as anti-rotation device.

Material:

Steel

Note:

The following guide pillars can be equipped with this cage retainer:

- 202.19. .30.94
- 2021.46. .30.94

Screws are not included.

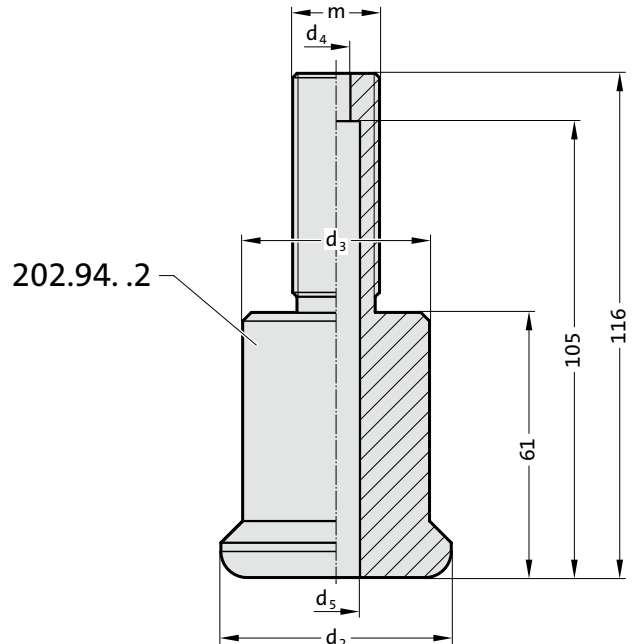
Fixing:

Socket cap screws DIN EN ISO 4762 for nominal diameter ϕd :

- 32 / 40 = 2192.12.05.
- 50 = 2192.12.06.
- 63 / 80 = 2192.12.08.

Length calculation of the safety screw fastening :

Cage retainer 202.94. .1 : Screw length = Cage feed length + 25 mm
 Cage retainer 202.94. .2 : Screw length = Cage feed length - 20 mm



202.94. .2

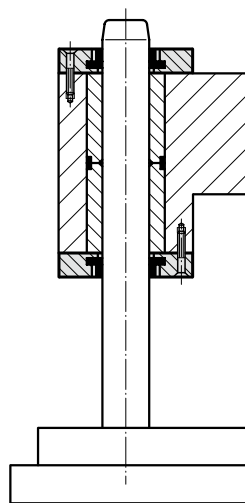
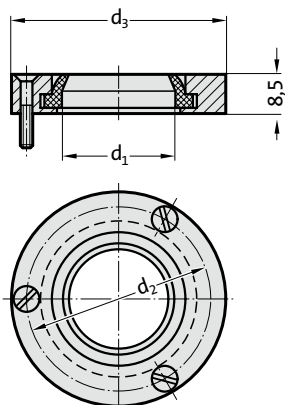
202.94. Cage retainer

| Order No | Nominal- ϕ | Pillar- ϕ | d_2 | d_3 | d_4 | d_5 | m | l_g Cage feed length |
|--------------|-----------------|----------------|-------|-------|-------|-------|---------|---------------------------|
| 202.94.032.1 | 32 | 30/32 | 35 | 25 | 5.5 | 10 | M16x1,5 | 5-50 |
| 202.94.040.1 | 40 | 38/40 | 43 | 33 | 5.5 | 10 | M16x1,5 | 5-50 |
| 202.94.050.1 | 50 | 48/50 | 53 | 43 | 6.6 | 11 | M20x1,5 | 5-50 |
| 202.94.063.1 | 63 | 60/63 | 66 | 56 | 9 | 15 | M30x1,5 | 5-50 |
| 202.94.080.1 | 80 | 80 | 88 | 74 | 9 | 15 | M30x1,5 | 5-50 |
| 202.94.032.2 | 32 | 30/32 | 35 | 25 | 5.5 | 10 | M16x1,5 | 50-100 |
| 202.94.040.2 | 40 | 38/40 | 43 | 33 | 5.5 | 10 | M16x1,5 | 50-100 |
| 202.94.050.2 | 50 | 48/50 | 53 | 43 | 6.6 | 11 | M20x1,5 | 50-100 |
| 202.94.063.2 | 63 | 60/63 | 66 | 56 | 9 | 15 | M30x1,5 | 50-100 |
| 202.94.080.2 | 80 | 80 | 88 | 74 | 9 | 15 | M30x1,5 | 50-100 |

PILLAR WIPER

206.95.
2061.95.

Mounting example



Description:

FIBRO Pillar Wipers protect against premature wear caused by the ingress of dirt into the die set guides. Outside diameters match boss dias. on FIBRO Die Sets (Cast Iron). They can be fitted onto the bolster, or into a counterbore – flush with the bolster surface.

Note:

Pillar Wipers will be delivered with 3 screws M 4 × 16 DIN 963.

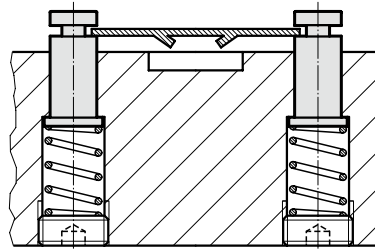
206.95./2061.95. Pillar wiper

| Order No | d ₁ | d ₂ | d ₃ |
|-------------|----------------|----------------|----------------|
| 206.95.024 | 24 | 45 | 55 |
| 206.95.025 | 25 | 45 | 55 |
| 206.95.030 | 30 | 55 | 65 |
| 206.95.032 | 32 | 55 | 65 |
| 206.95.038 | 38 | 65 | 75 |
| 206.95.040 | 40 | 65 | 75 |
| 206.95.042 | 42 | 65 | 75 |
| 206.95.048 | 48 | 78 | 94 |
| 206.95.050 | 50 | 78 | 94 |
| 206.95.052 | 52 | 78 | 94 |
| 206.95.060 | 60 | 92 | 110 |
| 206.95.063 | 63 | 92 | 110 |
| 2061.95.024 | 24 | 50 | 60 |
| 2061.95.025 | 25 | 50 | 60 |

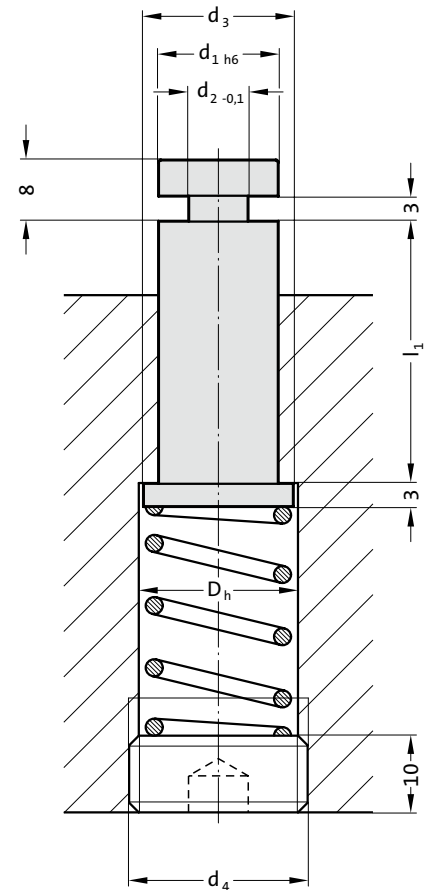
LIFTER PIN FOR PRESS TOOL STRIPS



Mounting example



244.00.2.



Description:

Combination progression dies with certain forming stages can be equipped advantageously with springloaded lifter pins. FIBRO Lifter Pins 244.00.2., available in four sizes, can be used to assume the double function of lifting and guiding the strip. The amount of lift is a function of the counterbore-depth.

Material:

No 1.7131, case-hardened

Execution:

ground

Note:

For ordering code of screw plug 241.00.1. and helical spring see spring range on pages chapter F.

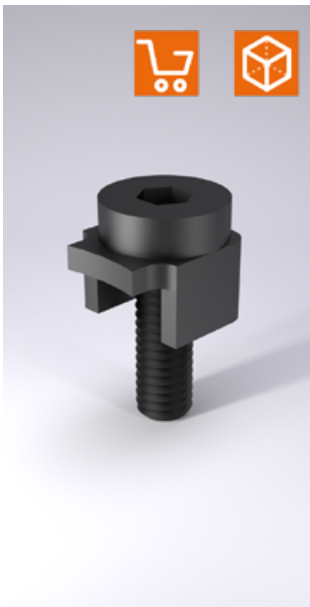
244.00.2. Lifter pin for press tool strips

| | | | | |
|----------------|---------|---------|---------|---------|
| d ₁ | 8 | 10 | 13 | 16 |
| d ₂ | 5 | 6 | 7 | 8 |
| d ₃ | 10 | 12 | 16 | 20 |
| D _h | 10.5 | 12.5 | 16.5 | 20.5 |
| d ₄ | M12x1.5 | M14x1.5 | M18x1.5 | M22x1.5 |
| l ₁ | | | | |
| 20 | ● | | | |
| 25 | ● | | | |
| 32 | ● | ● | ● | ● |
| 40 | ● | ● | ● | ● |
| 50 | | ● | ● | ● |

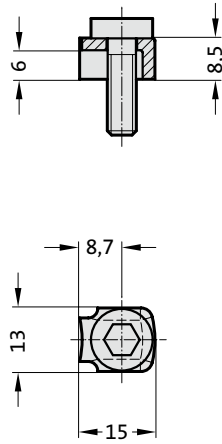
Ordering Code (example):

| | | |
|------------------------------------|---------|------------------|
| Lifter pin for press tool strips | = | 244.00.2. |
| Diameter of conduit d ₁ | 13 mm = | 13. |
| Guide length l ₁ | 25 mm = | 025 |
| Order No | = | 244.00.2. 13.025 |

SCREW CLAMP WITH SCREW

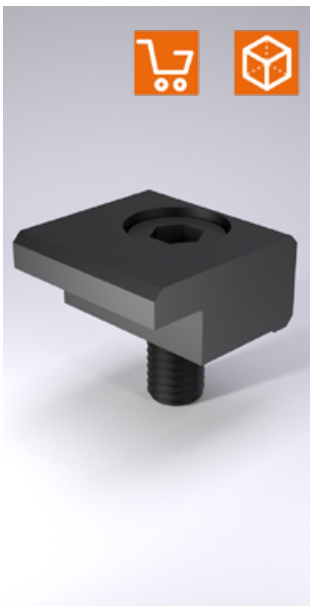


207.45



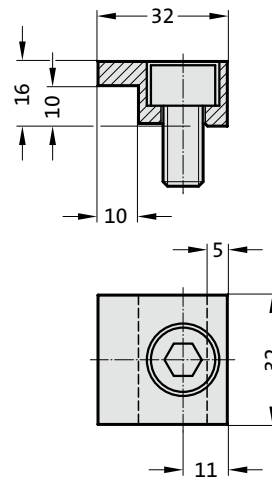
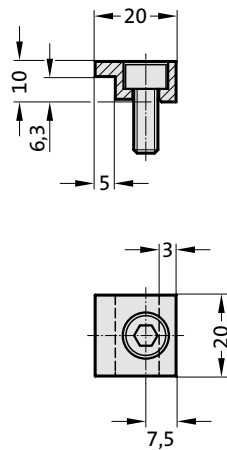
Screw clamp

- incl. screw
- steel punched bent component
- clamping height 6 - 6,3 mm
- M6 screw



2072.45.10

2072.45.16



Screw clamp

- incl. screw
- 2072.45.10
- steel, milled
- clamping height 6 - 6,3 mm
- M6 screw
- 2072.45.16
- steel, milled
- clamping height 10 mm
- M10 screw

SCREW CLAMP WITH SCREW

Screw clamp

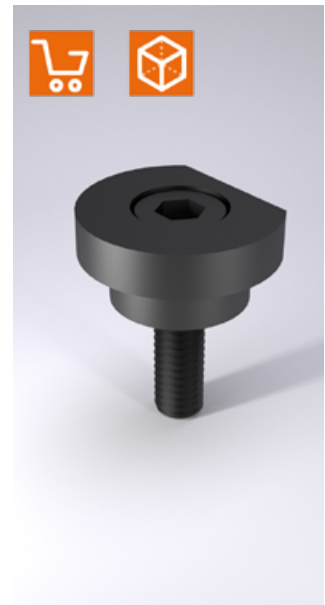
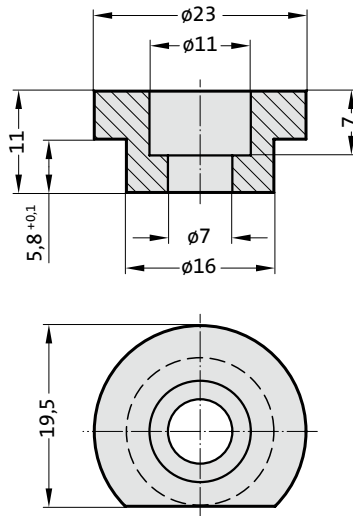
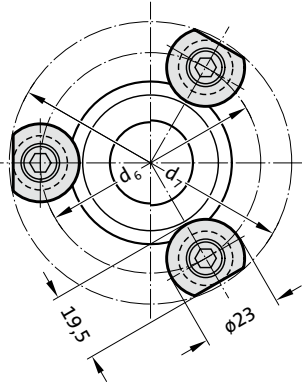
2071.45

incl. screw

– clamping height 6 mm

– Socket cap screw DIN EN ISO

4762 M6x20



Description:

Strengthened holding piece 2071.45 alternative to holding piece 207.45

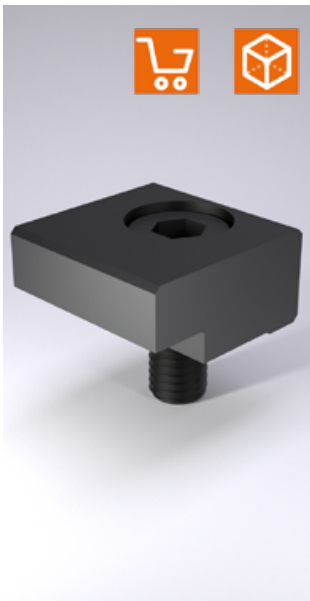
Note:

The fastening of the guide post/guide socket is carried out with 3 holding pieces, from $\varnothing d_1 = 38$ with 4 holding pieces.

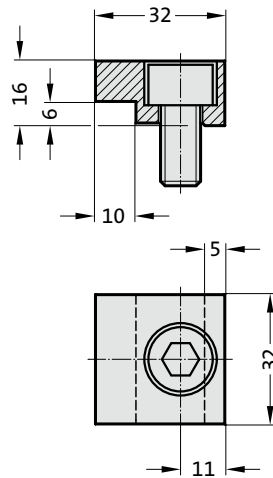
2071.45 Screw clamp with screw

| | | | | | | | | |
|------------------|---|-------|-------|-------|-------|-------|-------|-------|
| Nominal diameter | 15/16 | 19/20 | 24/25 | 30/32 | 38/40 | 48/50 | 60/63 | 80 |
| usable for: | 2021.28./ 29./ 44./ 46. | | | | | | | |
| d ₆ | 38 | 42 | 49 | 57 | 67 | 80 | 97 | 112 |
| d ₇ | 56,5 | 60,3 | 67,1 | 74,9 | 84,6 | 97,4 | 114,2 | 129,1 |
| usable for: | 2021.39. - 2081.31./ 32./ 33./ 34./ 35. - 2081.44./ 45./ 46./ 47./ 49. - 2081.71./ 74./ 75. - 2081.81./ 84./ 85. - 2081.91./ 94./ 95. | | | | | | | |
| d ₆ | -- | 59 | 65 | 73 | 83 | 97 | 112 | 135 |
| d ₇ | -- | 76,8 | 82,7 | 90,5 | 100,4 | 114,2 | 129,1 | 152 |
| usable for: | 210.31./ 34./ 35. - 210.39. - 210.44./ 45./ 46. - 210.85. | | | | | | | |
| d ₆ | 53 | 56 | 64 | 75 | 87 | 107 | 127 | -- |
| d ₇ | 71 | 73,9 | 81,7 | 92,5 | 104,3 | 124,1 | 144 | -- |

SCREW CLAMP WITH SCREW
SCREW CLAMP WITH SCREW, GM STANDARD
SCREW CLAMP WITH SCREW, NAAMS

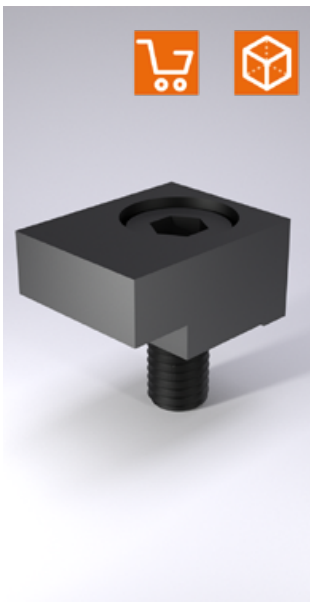


2072.46



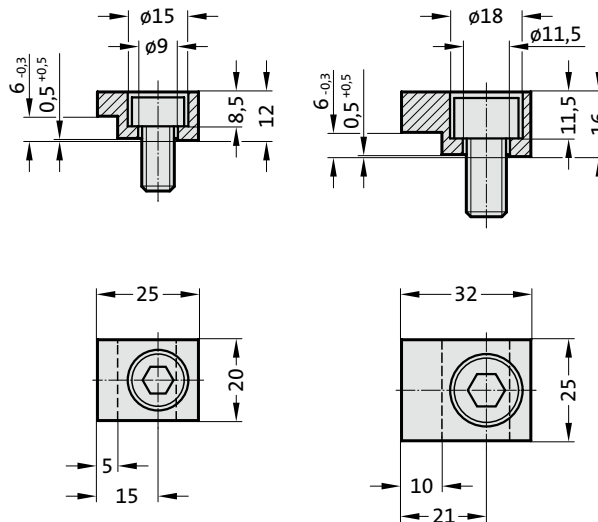
Screw clamp

- incl. screw
- steel, milled
- clamping height 6 - 6,3 mm
- M10 screw



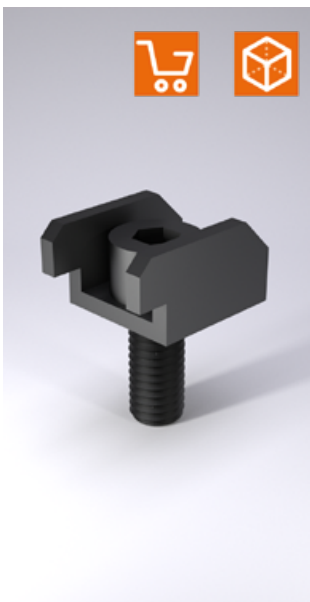
2072.46.30.12

2072.46.30.16

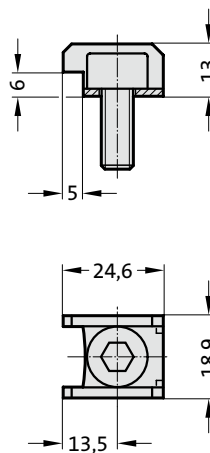


Screw clamp

- according to GM, incl. screw
- 2072.46.30.12
- steel, milled
- clamping height 6 mm
- M8 screw
- 2072.46.30.16
- steel, milled
- clamping height 6 mm
- M10 screw



2072.47

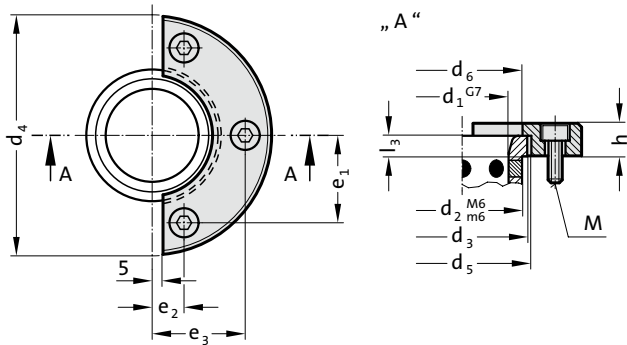


Screw clamp

- according to NAAMS, incl. screw
- steel punched bent component
- clamping height 6 - 6,3 mm
- M8 screw

SECURING FLANGE WITH SCREWS, CNOMO SCREW CLAMP WITH SCREW, CNOMO

2073.45.



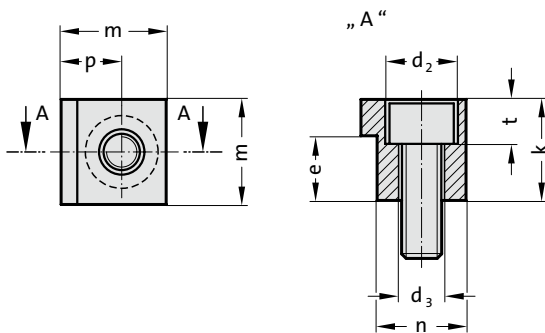
2073.45. Securing flange with screws, CNOMO

| Order No | d ₁ | d ₂ | d ₃ | d ₄ | d ₅ | h | l ₃ | e ₁ | e ₂ | e ₃ | M |
|-------------|----------------|----------------|----------------|----------------|----------------|----|----------------|----------------|----------------|----------------|----|
| 2073.45.020 | 20 | 28 | 32 | 63 | 25 | 10 | 4 | 16 | 18 | 0 | 6 |
| 2073.45.025 | 25 | 35 | 40 | 72 | 32 | 10 | 5 | 20 | 20 | 0 | 6 |
| 2073.45.032 | 32 | 44 | 50 | 80 | 40 | 12 | 6 | 25 | 21 | 0 | 6 |
| 2073.45.040 | 40 | 52 | 60 | 100 | 50 | 12 | 8 | 38.5 | 14 | 41 | 6 |
| 2073.45.050 | 50 | 63 | 71 | 125 | 63 | 16 | 10 | 46 | 17 | 49 | 8 |
| 2073.45.063 | 63 | 80 | 90 | 140 | 80 | 20 | 12 | 55 | 17 | 57.5 | 10 |
| 2073.45.080 | 80 | 100 | 112 | 180 | 100 | 25 | 16 | 70 | 20 | 72 | 12 |
| 2073.45.100 | 100 | 125 | 140 | 200 | 125 | 32 | 20 | 81 | 25 | 85 | 12 |

Securing flange

- according to CNOMO, incl. screws
- steel, turned
 - clamping height 4, 5, 6, 8, 10, 12, 16, 20 mm
 - M6, M8, M10, M12 screws

2072.48.45.



2072.48.45. Screw clamp with screw, CNOMO

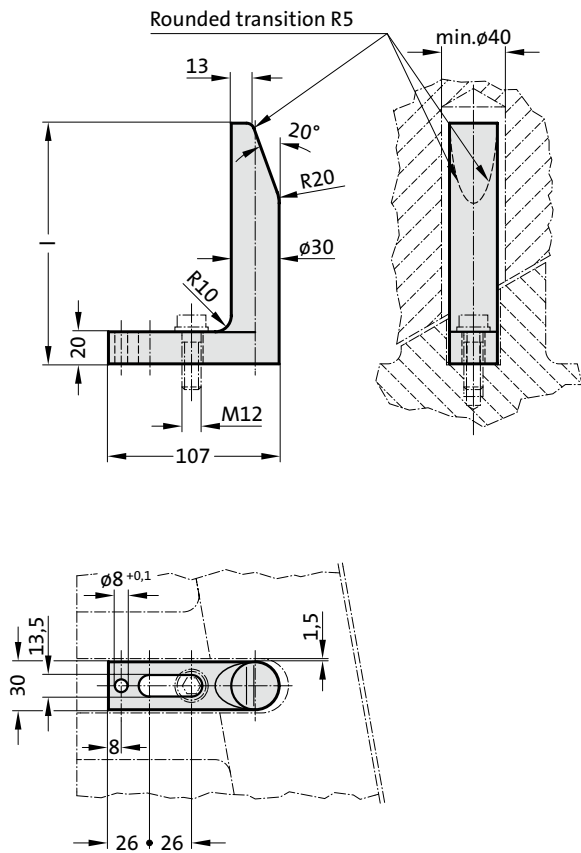
| Order No | k | e | d ₂ | d ₃ | t | m | p | n | d ₁ | M |
|---------------|----|----|----------------|----------------|-----|----|-----|------|----------------|----|
| 2072.48.45.12 | 12 | 8 | 11 | 6.6 | 6.8 | 18 | 9.5 | 15.5 | 40 | 6 |
| 2072.48.45.16 | 16 | 10 | 15 | 9 | 9 | 22 | 12 | 19 | 50 | 8 |
| 2072.48.45.20 | 20 | 12 | 18 | 11 | 11 | 26 | 15 | 21 | 63 | 10 |
| 2072.48.45.25 | 25 | 16 | 18 | 11 | 11 | 26 | 15 | 21 | 80 | 10 |
| 2072.48.45.32 | 32 | 20 | 18 | 11 | 11 | 26 | 15 | 21 | 100 | 10 |

Screw clamp

- according to CNOMO, incl. screw
- steel, milled
 - clamping height 8, 10, 12, 16, 20 mm
 - M6, M8, M10 screw

GUIDE

2443.10.



Material:

Ck 60, area of pilot taper hardened 58 + 2 HRC

Execution:

forged

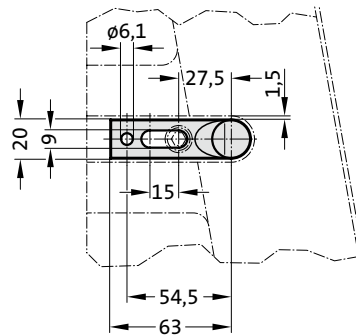
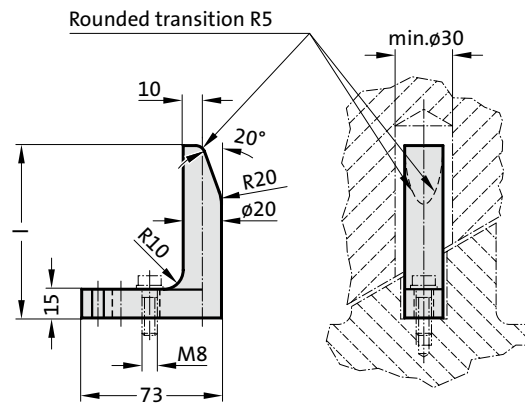
2443.10. Guide

| Order No | l |
|-------------|-----|
| 2443.10.065 | 65 |
| 2443.10.090 | 90 |
| 2443.10.120 | 120 |
| 2443.10.150 | 150 |
| 2443.10.180 | 180 |
| 2443.10.250 | 250 |
| 2443.10.300 | 300 |
| 2443.10.350 | 350 |

GUIDE TO MERCEDES-BENZ STANDARD - UNHARDENED



2443.10.20.



Material:

Ck 60

Execution:

forged

Note:

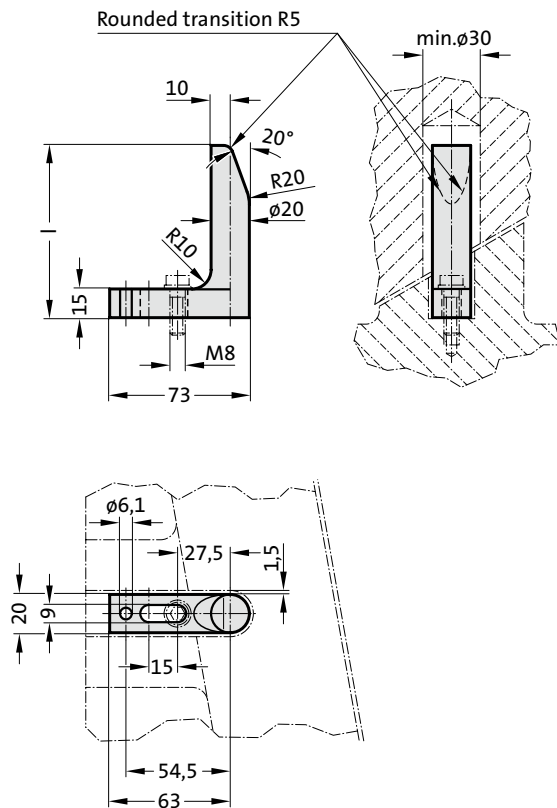
Guides are preferably used in confined spaces in sequential compound dies.

2443.10.20. Guide to Mercedes-Benz Standard - unhardened

| | |
|----------------|----|
| Order No | l |
| 2443.10.20.065 | 65 |
| 2443.10.20.090 | 90 |

GUIDE TO MERCEDES-BENZ STANDARD - HARDENED

2443.10.20. .1



Material:

Ck 60, area of pilot taper hardened 58 + 2 HRC

Execution:

forged

Note:

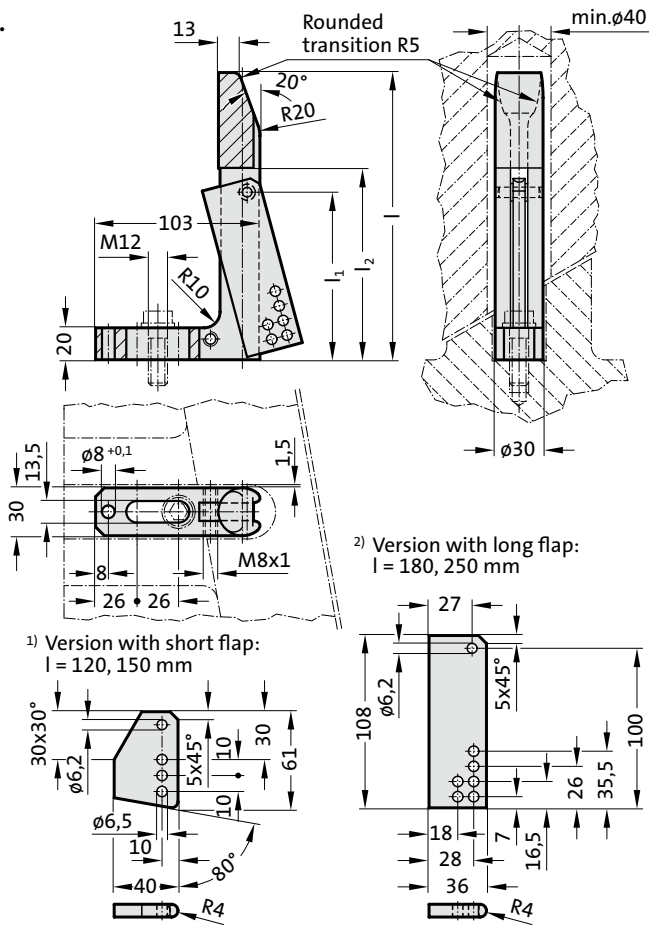
Guides are preferably used in confined spaces in sequential compound dies.

2443.10.20. .1 Guide to Mercedes-Benz Standard - hardened

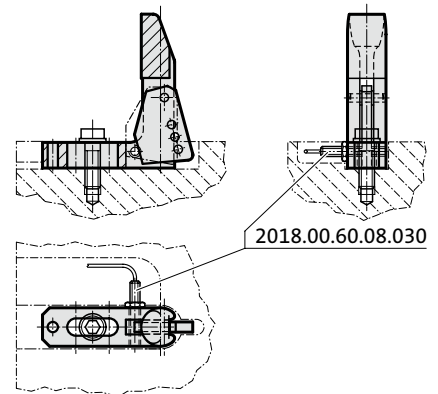
| | |
|------------------|----|
| Order No | l |
| 2443.10.20.065.1 | 65 |
| 2443.10.20.090.1 | 90 |

GUIDE WITH PART POSITION CONTROL, VDI

2443.13.



Mounting example



Material:

Guide: Ck 60, area of pilot taper hardened 50 + 5 HRC

Flap: St 37, hardened 58 + 2 HRC

Execution:

forged

Note:

See following pages for accessories.

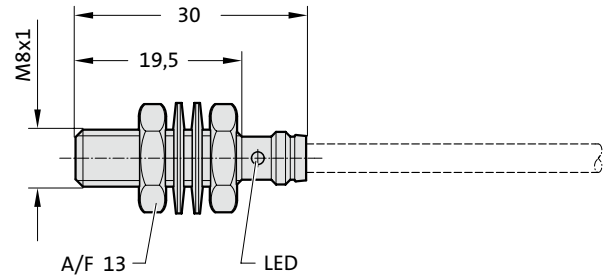
2443.13. Guide with part position control, VDI

| Order No | l | l ₁ | l ₂ |
|-------------|-----|----------------|----------------|
| 2443.13.120 | 120 | 55 | 70 |
| 2443.13.150 | 150 | 55 | 70 |
| 2443.13.180 | 180 | 105 | 120 |
| 2443.13.250 | 250 | 105 | 120 |

INDUCTIVE PROXIMITY SWITCH



2018.00.60.08.030



Technical data:

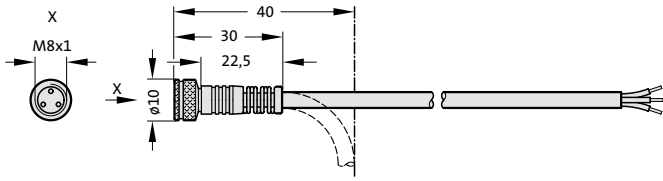
Rated operating voltage U_e : 24 V DC
Operating Voltage U_s : 10 - 30 V DC
No load current I_0 damped/undamped: $\leq 8 \text{ mA}/\leq 1 \text{ mA}$
Repeat accuracy R: $\leq 5\%$
Ambient temperature T_a : -40 to +85 °C
Switching frequency f : 3000 Hz
Degree of protection to IEC 529: IP 67
Casing material: Stainless steel
Connection: plug connector
Approvals: UL

2018.00.60.08.030

**Inductive proximity
switch**

CABLE - STRAIGHT CABLE, 90° CONNECTOR

2018.00.60.23.01.5



2018.00.60.23.01.5

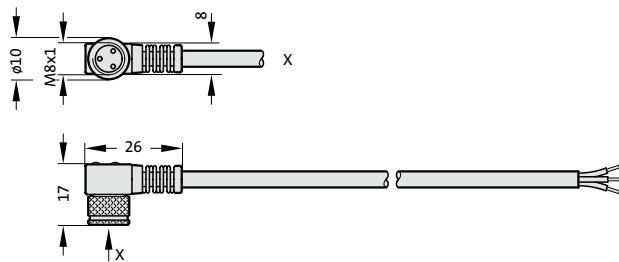
Cable - straight

Technical data:

Cable type: 3 pole, M8, oil resistant
Standard length: 5 m

Other lengths on request

2018.00.60.23.02.5



2018.00.60.23.02.5

Cable, 90° connector

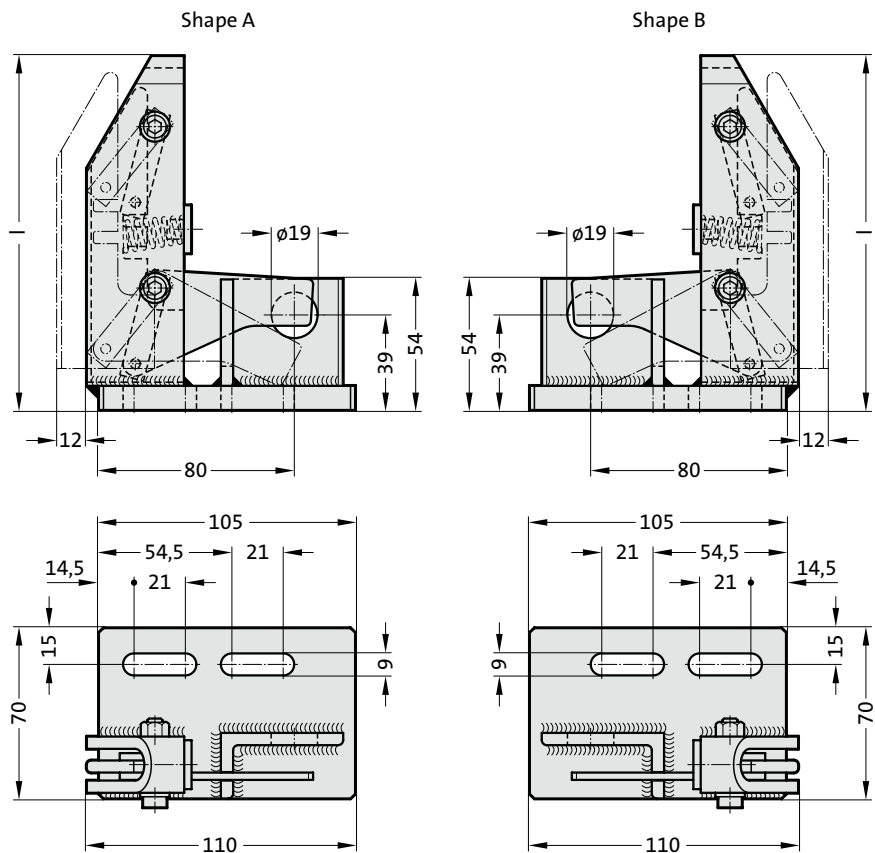
Technical data:

Cable type: 3 pole, M8, oil resistant
Standard length: 5 m

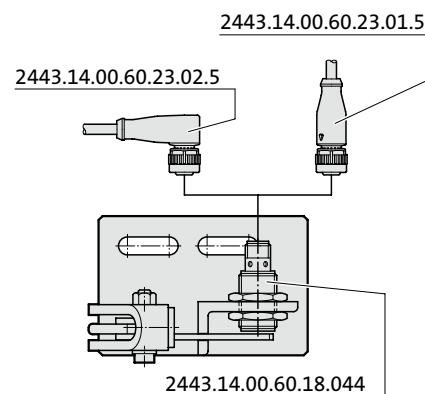
Other lengths on request

POSITION MONITOR FOR BOARDS

2443.14.55.



Mounting example



Material:

Steel

Note:

See following pages for accessories.

Attention:

At least two position monitors must be installed crosswise. In case of large parts, such as the side part, a third position monitor should be placed. The position monitors should be placed in such a way that a perfect querying of the sheet metal part is guaranteed. Position monitors should be arranged a minimum of 5 mm away from the pulling or locking bars and not within the range of strong sheet movement.

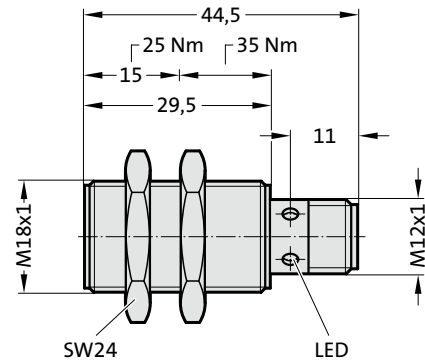
2443.14.55. Position monitor for boards

| Order No | l | Shape |
|---------------|-----|-------|
| 2443.14.55.1 | 145 | A |
| 2443.14.55.2 | 145 | B |
| 2443.14.55.3 | 185 | A |
| 2443.14.55.4 | 185 | B |
| 2443.14.55.25 | 225 | A |
| 2443.14.55.26 | 225 | B |

INDUCTIVE PROXIMITY SWITCH



2443.14.00.60.18.044



Technical data:

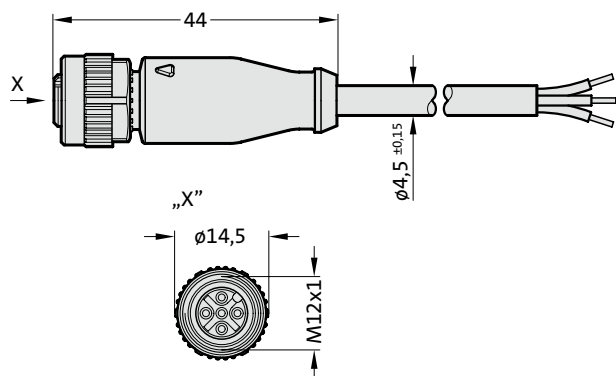
Rated operating voltage U_e : 24 V DC
Operating Voltage U_s : 10 - 30 V DC
No load current I_0 damped/undamped: ≤ 10 mA/ ≤ 3 mA
Repeat accuracy R: max. (% v. Sr) 5%
Ambient temperature T_a : -25 to +70°C
Switching frequency f : max. 1000 Hz
Degree of protection to IEC 60529: IP 67
Casing material: CuZn
Connection: plug connector
Approvals: UL

2443.14.00.60.18.044

Inductive proximity switch

CABLE - STRAIGHT CABLE, 90° CONNECTOR

2443.14.00.60.23.01.5



2443.14.00.60.23.01.5

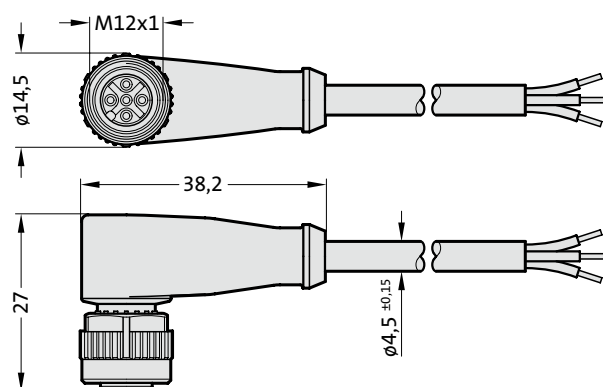
Cable - straight

Technical data:

Cable type: 3 pole, M12x1
Standard length: 5m

Other lengths on request

2443.14.00.60.23.02.5



2443.14.00.60.23.02.5

Cable, 90° connector

Technical data:

Cable type: 3 pole, M12x1
Standard length: 5m

Other lengths on request