

STYLI and ACCESSORIES



REFERENZKUGELN

REFERENCE SPHERES

| | |
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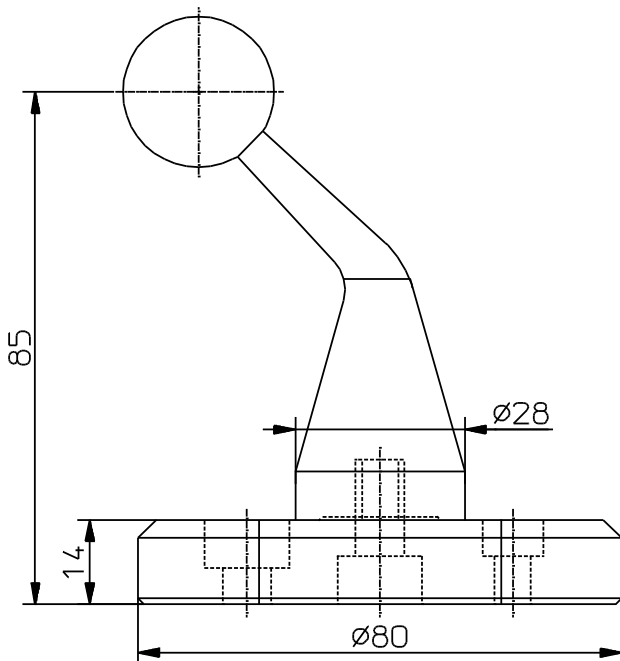
REFERENZKUGELN

REFERENCE SPHERES

| Referenzkugeln / Reference spheres | Bestell-Nr. Order No. | Kugel Material Ball material | Kugel-Ø Ball-Ø |
|---|--------------------------|---------------------------------|-------------------|
| Referenzkugel mit Grundsockel (Typ A) Reference spheres with base plate (Type A) | 15 NRKA | Keramik / Ceramic | 15mm |
| | 20 NRKA | Keramik / Ceramic | 20mm |
| | 25 NRKA | Keramik / Ceramic | 25mm |
| | 30 NRKA | Keramik / Ceramic | 30mm |
| | 25 NRSA | Stahl / Steel | 25mm |

Antasten aus allen 6 Halbachsen

Probing from all 6 semi-axes



Lieferumfang:

- Kugelhalter gebogen 45° mit Referenzkugel L=85mm
- Grundsockel (Seite 89)
- Verlängerung L=70mm (Seite 89)
- Befestigungs-Schrauben: je 1 Stück M6, M8, M10
- Werkzertifikat der Referenzkugel

Supplied equipment:

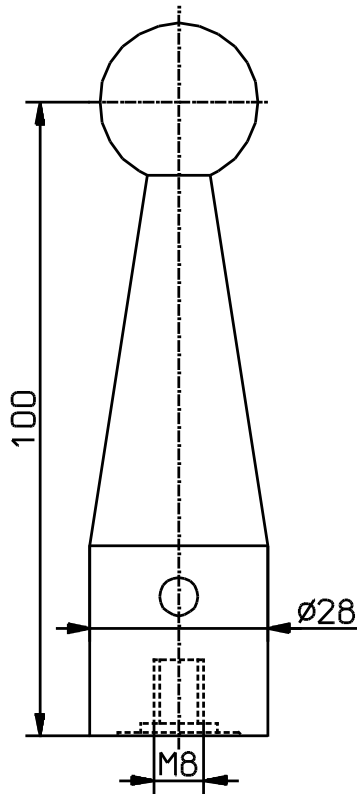
- Ball holder bent 45° with reference sphere L=85mm
- Base plate (Page 89)
- Extension L=70mm (Page 89)
- Fixing screws 1x M6, 1x M8, 1x M10
- Test certificate

| Material Material | Formabweichung Form deviation |
|--|----------------------------------|
| Keramik Al ₂ O ₃ Ceramic Al ₂ O ₃ | < 0.2µm |
| Stahl AISI 440C Steel AISI 440C | < 0.2µm |

REFERENZKUGELN

REFERENCE SPHERES

| Referenzkugeln / Reference spheres | Bestell-Nr. Order No. | Kugel Material Ball material | Kugel-Ø Ball-Ø |
|--|--------------------------|---------------------------------|-------------------|
| Referenzkugel (Typ B) / Reference spheres (Type B) | 15 NRKB | Keramik / Ceramic | 15mm |
| | 20 NRKB | Keramik / Ceramic | 20mm |
| | 25 NRKB | Keramik / Ceramic | 25mm |
| | 30 NRKB | Keramik / Ceramic | 30mm |
| | 25 NRSB | Stahl / Steel | 25mm |



Lieferumfang:

- Kugelhalter mit Referenzkugel L=100mm
- Werkszertifikat der Referenzkugel

Den zu Ihrer Messmaschine passenden **Befestigungsbolzen** bitte bestellen (Seite 89).

Verlängerungen auf Seite 89.

Supplied equipment:

- Ball holder with reference sphere L=100mm
- Test certificate

Please order the appropriate size **Fixing bolt** to your CMM (Page 89).

Extensions see Page 89.

| Material Material | Formabweichung Form deviation |
|--|----------------------------------|
| Keramik Al ₂ O ₃ Ceramic Al ₂ O ₃ | < 0.2µm |
| Stahl AISI 440C Steel AISI 440C | < 0.2µm |

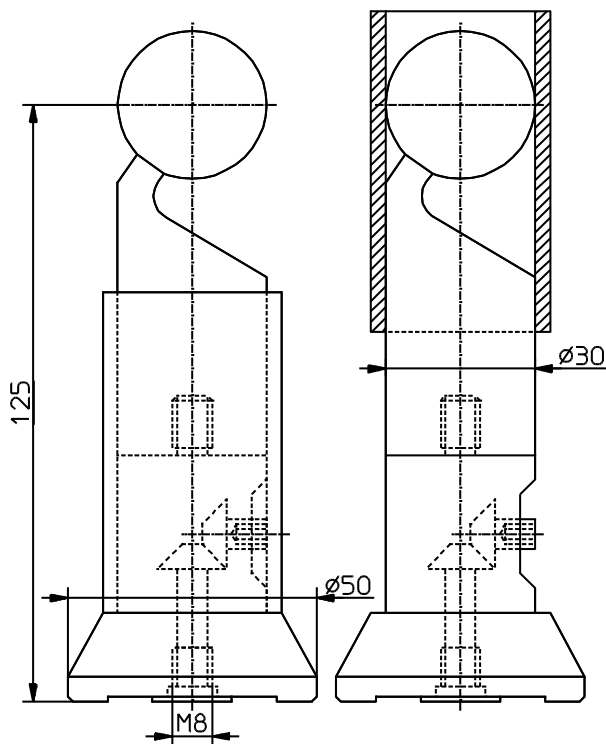
REFERENZKUGELN

REFERENCE SPHERES

| Referenzkugeln / Reference spheres | Bestell-Nr. Order No. | Kugel Material Ball material | Kugel-Ø Ball-Ø |
|--|--------------------------|---------------------------------|-------------------|
| Referenzkugel mit Winkelgetriebe (Typ C) Reference spheres (Type C) | 15 NRKC | Keramik / Ceramic | 15mm |
| | 20 NRKC | Keramik / Ceramic | 20mm |
| | 25 NRKC | Keramik / Ceramic | 25mm |
| | 30 NRKC | Keramik / Ceramic | 30mm |
| | 25 NRSC | Stahl / Steel | 25mm |

Antasten aus allen 6 Halbachsen.
Befestigung auf der Messplatte mittels Winkelgetriebe.

Probing from all 6 semi-axes.
Can be fixed to the surface plate with angle gear.



Lieferumfang:

- 1) Kugelhalter gebogen 30° mit Referenzkugel
L=125mm
- 2) Grundsockel mit Winkelgetriebe
- 3) Schieböhülse zum Schutz der Referenzkugel
- 4) Verlängerung L=50mm (Seite 89)
- 5) Sechskantschlüssel SW 3.0mm
- 6) Stiftschlüssel Ø 2.9mm (Seite 75)
- 7) Befestigungsbolzen: je 1 Stück M6, M8, M10
(Seite 89)

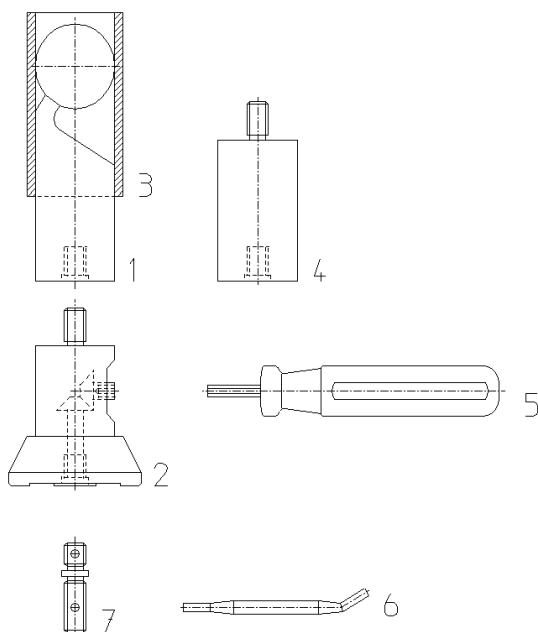
- Werkzertifikat der Referenzkugel

Supplied equipment:

- 1) Ball holder bent 30° with reference sphere
L=125mm
- 2) Base plate with angle gear
- 3) Sliding sleeve to protect the reference sphere
- 4) Extension L=50mm (Page 89)
- 5) Hexagon key 3.0mm
- 6) Pin key Ø 2.9mm (Page 75)
- 7) Fixing bolts 1x M6, 1x M8, 1x M10 (Page 89)

- Test certificate

| Material Material | Formabweichung Form deviation |
|--|----------------------------------|
| Keramik Al ₂ O ₃ Ceramic Al ₂ O ₃ | < 0.2µm |
| Stahl AISI 440C Steel AISI 440C | < 0.2µm |



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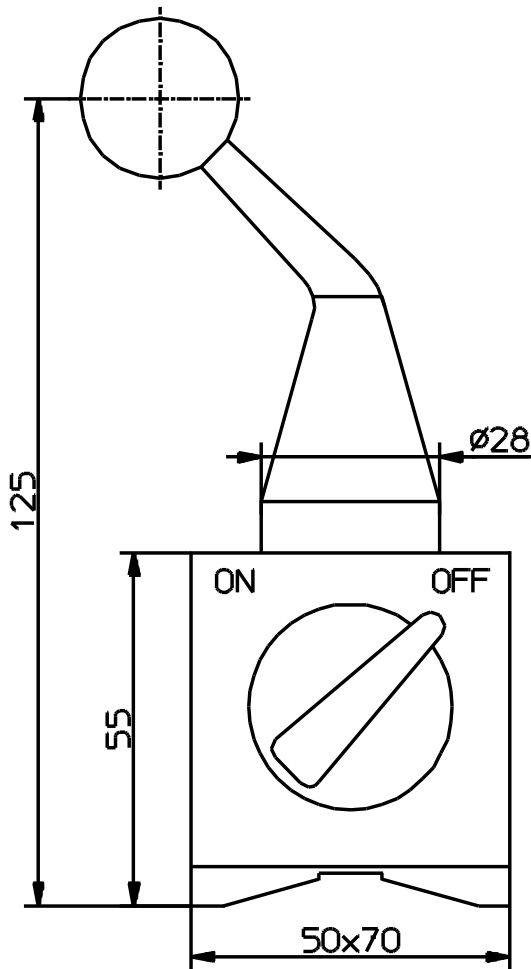
REFERENZKUGELN

REFERENCE SPHERES

| Referenzkugeln / Reference spheres | Bestell-Nr. Order No. | Kugel Material Ball material | Kugel-Ø Ball-Ø |
|---|--------------------------|---------------------------------|-------------------|
| Referenzkugel mit Magnetsockel (Typ D) Reference spheres with magnetic base (Type D) | 15 NRKD | Keramik / Ceramic | 15mm |
| | 20 NRKD | Keramik / Ceramic | 20mm |
| | 25 NRKD | Keramik / Ceramic | 25mm |
| | 30 NRKD | Keramik / Ceramic | 30mm |
| | 25 NRSD | Stahl / Steel | 25mm |

Antasten aus allen 6 Halbachsen

Probing from all 6 semi-axes



Lieferumfang:

- Kugelhalter gebogen 45° mit Referenzkugel L=125mm
- Magnetsockel (Ein/Aus)
- Verlängerung L=70mm (Seite 89)
- Werkzertifikat der Referenzkugel
- Lieferung im Holzetui

Supplied equipment:

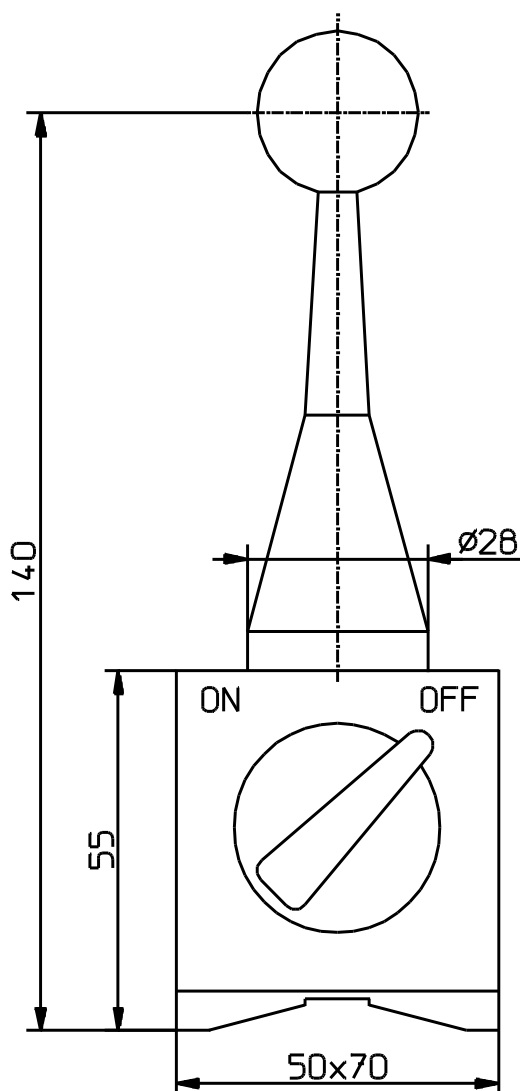
- Ball holder bent 45° with reference sphere L=125mm
- Magnetic base (on/off)
- Extension L=70mm (Page 89)
- Test certificate
- Delivery in a wooden case

| Material Material | Formabweichung Form deviation |
|--|----------------------------------|
| Keramik Al ₂ O ₃ Ceramic Al ₂ O ₃ | < 0.2µm |
| Stahl AISI 440C Steel AISI 440C | < 0.2µm |

REFERENZKUGELN

REFERENCE SPHERES

| Referenzkugeln / Reference spheres | Bestell-Nr. Order No. | Kugel Material Ball material | Kugel-Ø Ball-Ø |
|---|--------------------------|---------------------------------|-------------------|
| Referenzkugel mit Magnetsockel (Typ E) Reference spheres with magnetic base (Type E) | 15 NRKE | Keramik / Ceramic | 15mm |
| | 20 NRKE | Keramik / Ceramic | 20mm |
| | 25 NRKE | Keramik / Ceramic | 25mm |
| | 30 NRKE | Keramik / Ceramic | 30mm |
| | 25 NRSE | Stahl / Steel | 25mm |



Lieferumfang:

- Kugelhalter mit Referenzkugel L=140mm
- Magnetsockel (Ein/Aus)
- Verlängerung L=70mm (Seite 89)
- Werkzertifikat der Referenzkugel
- Lieferung im Holzetui

Supplied equipment:

- Ball holder with reference sphere L=140mm
- Magnetic base (on/off)
- Extension L=70mm (Page 89)
- Test certificate
- Delivery in a wooden case

| Material Material | Formabweichung Form deviation |
|--|----------------------------------|
| Keramik Al ₂ O ₃ Ceramic Al ₂ O ₃ | < 0.2µm |
| Stahl AISI 440C Steel AISI 440C | < 0.2µm |

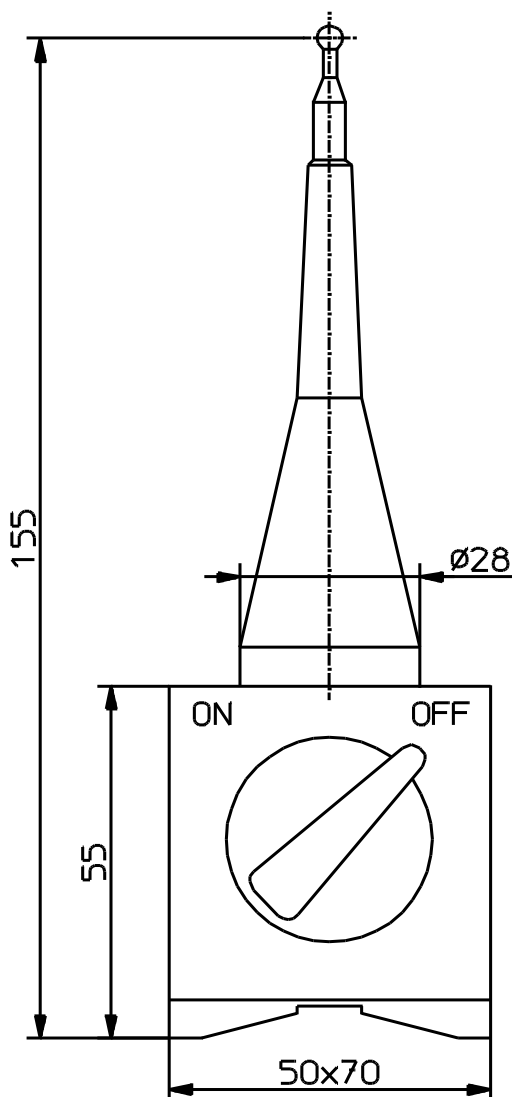
REFERENZKUGELN

REFERENCE SPHERES

| Referenzkugeln / Reference spheres | Bestell-Nr. Order No. | Kugel Material Ball material | Kugel-Ø Ball-Ø |
|--|--------------------------|---------------------------------|-------------------|
| Referenzkugel für Erodiermaschinen (Typ F) Reference spheres for Electrical Discharge Machine EDM (Type F) | 245 NRKF | Hartmetall / TC | 2mm 4mm 5mm |

Elektrisch leitende Referenzkugeln

Electrically conductive reference spheres



Lieferumfang:

- Kugelhalter mit Referenzkugeln L=155mm
- 3 Stück Referenzkugeln: Ø2mm, Ø4mm, Ø5mm (auswechselbar)
- Magnetsockel (Ein/Aus)
- Verlängerung L=70mm (Seite 89)
- Lieferung im Holzetui

Technische Daten der Referenzkugeln:

Durchmesser Toleranz: $\pm 1\mu\text{m}$
Formabweichung: $< 0.25\mu\text{m}$

Supplied equipment:

- Ball holder with reference sphere L=155mm
- 3 pcs reference spheres: Ø2mm, Ø4mm, Ø5mm (exchangeable)
- Magnetic base (on/off)
- Extension L=70mm (Page 89)
- Delivery in a wooden case

Technical data of reference spheres:

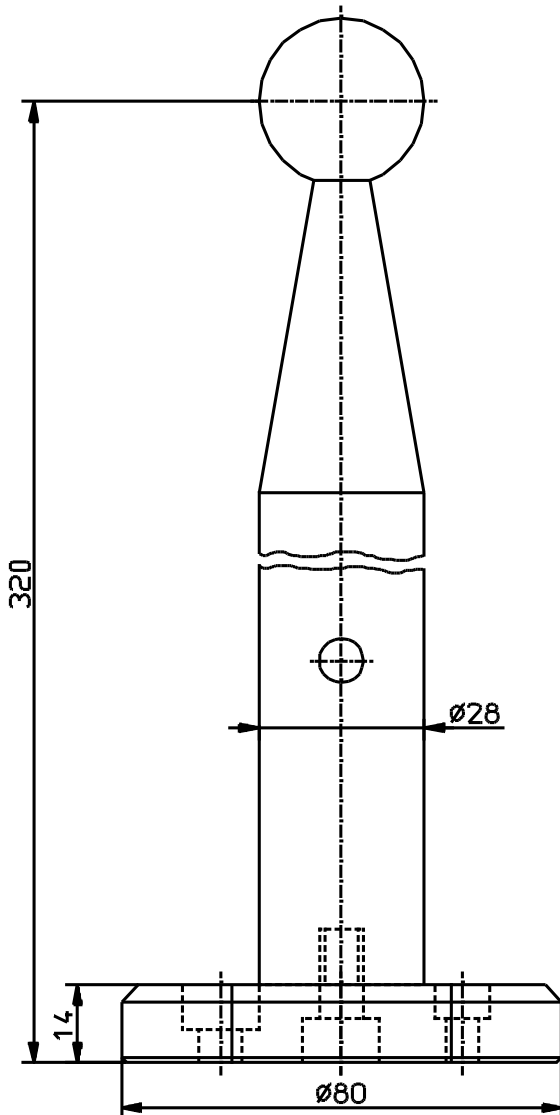
Diameter tolerance: $\pm 1\mu\text{m}$
Form deviation: $< 0.25\mu\text{m}$

REFERENZKUGELN

REFERENCE SPHERES

| Referenzkugeln / Reference spheres | Bestell-Nr. Order No. | Kugel Material Ball material | Kugel-Ø Ball-Ø |
|---|--------------------------|---------------------------------|-------------------|
| Referenzkugel mit Grundsockel (Typ G) Reference spheres with base plate (Type G) | 20 NRKG | Keramik / Ceramic | 20mm |
| | 25 NRKG | Keramik / Ceramic | 25mm |
| | 30 NRKG | Keramik / Ceramic | 30mm |
| | 50 NRKG | Keramik / Ceramic | 50mm |
| | 25 NRSG | Stahl / Steel | 25mm |

Grosse Ausführung / Large design



Lieferumfang:

- Kugelhalter mit Referenzkugel L=320mm
- Grundsockel (Seite 89)
- Verlängerung L=200mm (Seite 89)
- Befestigungs-Schrauben: je 1 Stück M6, M8, M10
- Werkzertifikat der Referenzkugel

Supplied equipment:

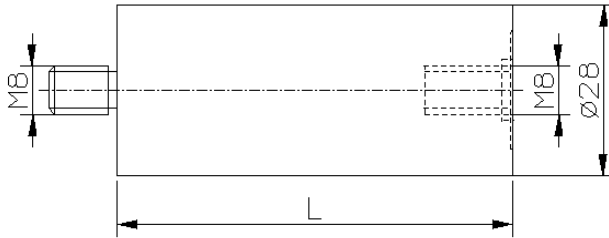
- Ball holder with reference sphere L=320mm
- Base plate (Page 89)
- Extension L=200mm (Page 89)
- Fixing screws 1x M6, 1x M8, 1x M10
- Test certificate

| Material Material | Formabweichung Form deviation |
|--|----------------------------------|
| Keramik Al ₂ O ₃ Ceramic Al ₂ O ₃ | < 0.2µm |
| Stahl AISI 440C Steel AISI 440C | < 0.2µm |

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| Zubehör / Accessories | Bestell-Nr. Order No. | Material Material | L mm |
|---------------------------|--------------------------|----------------------|---------|
| Verlängerung / Extensions | 70 NVRA | Stahl / Steel | 70.0 |
| | 100 NVRA | Stahl / Steel | 100.0 |
| | 200 NVRA | Stahl / Steel | 200.0 |

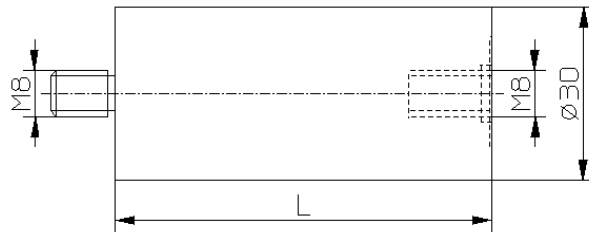


Verlängerung passend zu **Referenzkugel (Typ A, B, D, E, F, G)**.

For use with *Reference spheres (Type A, B, D, E, F, G)*.

| Bestell-Nr. Order No. | Material Material | L mm |
|--------------------------|--|---------|
| 50 NVRC | Aluminium eloxiert Aluminium anodized | 50.0 |
| 100 NVRC | Aluminium eloxiert Aluminium anodized | 100.0 |

| Verlängerung / Extensions | Bestell-Nr. Order No. | Material Material | L mm |
|---------------------------|--------------------------|--|---------|
| Verlängerung / Extensions | 50 NVRC | Aluminium eloxiert Aluminium anodized | 50.0 |
| | 100 NVRC | Aluminium eloxiert Aluminium anodized | 100.0 |

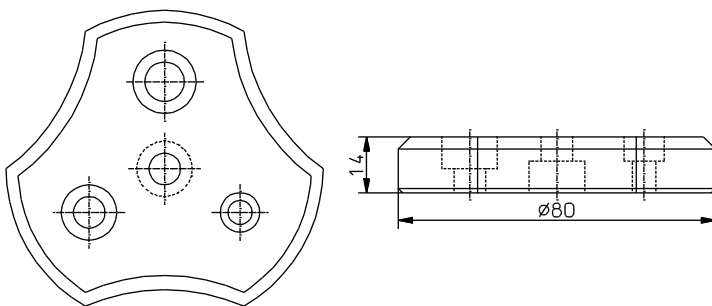


Verlängerung passend zu **Referenzkugel (Typ C)**.

For use with *Reference spheres (Type C)*.

| Bestell-Nr. Order No. | Material Material |
|--------------------------|--|
| 80 NGRA | Aluminium eloxiert Aluminium anodized |

| Grundsockel / Base plate | Bestell-Nr. Order No. | Material Material |
|--------------------------|--------------------------|--|
| Grundsockel / Base plate | 80 NGRA | Aluminium eloxiert Aluminium anodized |



Grundsockel passend zu **Referenzkugel (Typ A, B, G)**.

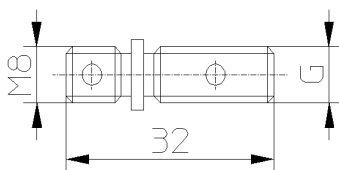
Lieferung mit Befestigungsschrauben M6, M8, M10.

For use with *Reference spheres (Type A, B, G)*.

Delivery with fixing screws M6, M8, M10.

| Bestell-Nr. Order No. | Gewinde G Thread G |
|--------------------------|-----------------------|
| 60-6 NBB | M6 |
| 60-8 NBB | M8 |
| 60-10 NBB | M10 |
| 60-1-4 NBB | 1/4-20 UNC |
| 60-3-8 NBB | 3/8-16 UNC |

| Befestigungsbolzen / Fixing bolts | Bestell-Nr. Order No. | Gewinde G Thread G |
|-----------------------------------|--------------------------|-----------------------|
| Befestigungsbolzen / Fixing bolts | 60-6 NBB | M6 |
| | 60-8 NBB | M8 |
| | 60-10 NBB | M10 |
| | 60-1-4 NBB | 1/4-20 UNC |
| | 60-3-8 NBB | 3/8-16 UNC |



Befestigungsbolzen passend zu **Referenzkugel (Typ B, C)**.

Andere Gewindegrößen sind auf Anfrage erhältlich.

For use with *Reference spheres (Type B, C)*. Other thread sizes are available.

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Dimensional measurement technology : Styli for coordinate measuring machines (CMM), machine tools, height gauges