# Technical note for centring unit

## Functional description

1) To join two plates fitted with the centring unit, the cone is simply positioned into the bush.

2) The balls on the cone are now in light contact with the inner surface of the bush, but there is still a small gap between the two plates.

3) When a down force (F) is applied, the precision balls in the rubber jacket are pressed onto the surface of the cone and the surfaces of the two plates align with each other. The metal conical surfaces of the bush and cone both have the same overall hardness and can only deform within their elastic limit where the precision balls make contact. So the balls cannot damage the surfaces. Due to the prevailing balance of forces, the cone always strives to align itself with the centre of the bush. This centre alignment means that the component is always positioned precisely and with high repeat precision in the axis.
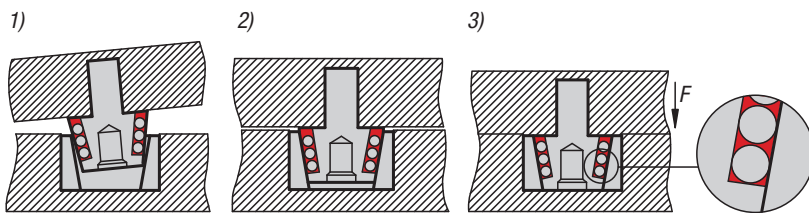
- Temperature differences of up to 30 K can be compensated for

- The rubber does not embrittle and is insensitive to dirt or swarf

- Embedded swarf splinters do not effect the system

- Ester-based or antifreeze coolants should be avoided

- Some form of undercut should be added to the receiving hole so that the bush can be pulled out and replaced
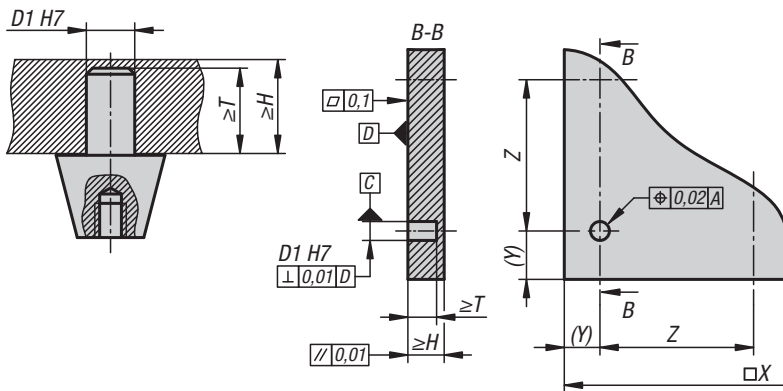
## Centring unit in detail

| Description |
|---|
| 1 Cone |
| 2 Bush |
| 3 Positioning diameter for easy assembly |
| 4 Lead-in chamfer for easy assembly |
| 5 Rubber for holding the precision balls |
| 6 Precision balls as centring element |
| 7 Tapped hole for removing the cone |
| 8 Undercut for flat-parallel installation of the cone |
| 9 Lead-in chamfer for easy assembly |

## Mounting dimensions

bush
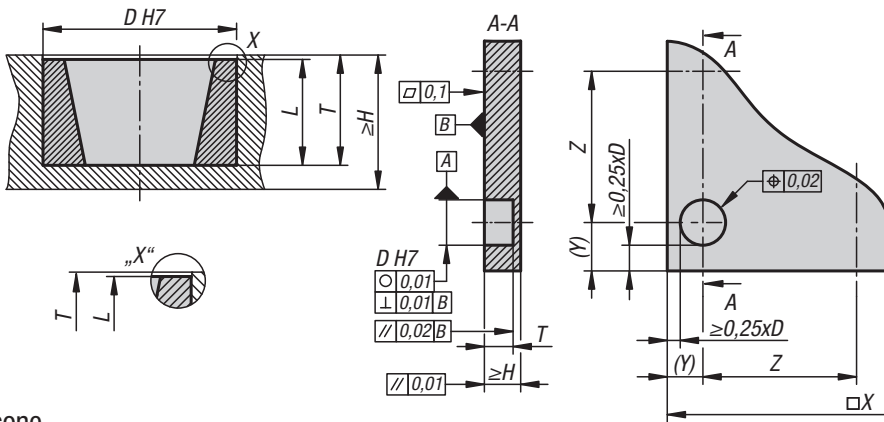


cone



| component | bush | | cone | |
|---|---|---|---|---|
| **Size** | 1 | 3 | 1 | 3 |
| | | | | |
| **D (bore diameter)** | 16$^{H7}$ | 32$^{H7}$ | | |
| **L (bush length)** | 8,5 | 17,5 | | |
| **T (bore depth)** | 9-0,1 | 18-0,1 | | |
| **≥H (plate thickness)** | 12,5 | 25 | | |
| **D1 (bore diameter)** | | | 6$^{H7}$ | 10$^{H7}$ |
| **≥T (bore depth)** | | | 9 | 18 |
| **≥H (plate thickness)** | | | 12 | 21 |

To obtain the best possible alignment of the two workpieces, the centring units should be positioned as far apart as possible.
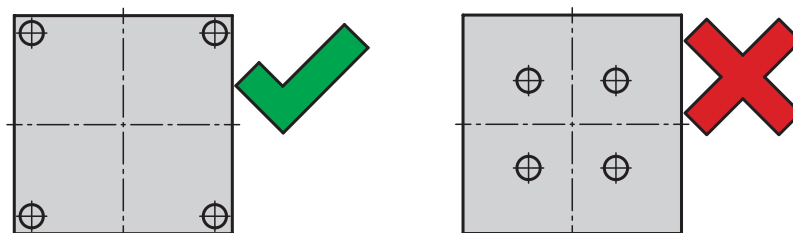
## Minimum down force exerted by a retraction mechanism (e.g. bolts)

| Size | 1 | | 3 | |
|---|---|---|---|---|
| Number of centring units | 1 | 4 | 1 | 4 |
| Minimum down force (kN) | 1,5 | 6 | 1,5 | 10 |

The down force applied by the retraction mechanism must be taken up by the components, as the centring units are only designed for centring, not taking up forces. Application of the minimum down force creates a frictional bond between the two components, leaving the centring units free from lateral forces.

- The maximum working temperature is +80 °C
- Generally, the bush is pressed into the baseplate and the cone is pressed into a pallet or the workpiece
- The maximum centre offset between bush and cone should not exceed 3 mm when mating

*Pallet/Workpiece*

*Base plate*
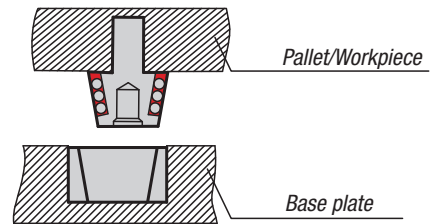
## Special aspects for horizontal mounting

The same mounting dimensions apply as for vertical mounting. Since the workpieces take up the lateral forces when clamped by a down force, the centring units are left free of lateral forces. However, during pallet changes or when mating workpieces the centring units should only be subjected to the following maximum lateral forces:

| Size | 1 | | 3 | |
|---|---|---|---|---|
| Number of centring units | 1 | 4 | 1 | 4 |
| Lateral force Fmax (N) | 35 | | 250 | |

Mating    Clamped position

$F=0\ N$

$\leq F$

*Pallet/Workpiece*

*Base plate*