## Universal Joints, General Information

Universal joints and universal shafts are today, and will be in future, absolutely essential and versatile components for transferring rotary motion and transmitting torque from the driving to the driven unit.

If two shafts set at a certain angle are connected using a single universal joint and one shaft turns with constant velocity, the other shaft will move irregularly. This non-uniformity – also called gimbal error – means that angle of rotation of the second shaft slightly lags behind or leads the movement off the first shaft, with kind of sinus-shaped variations. The greater the operating angle α, the greater the non-uniformity in motion of the second shaft.

Thus single universal joints are only used in applications where non-uniformity of rotation is acceptable. This non-uniformity can be compensated by either using two single universal joints in sequence - thus forming a universal shaft - or by using a double universal joint. When properly installed, the second universal joint can compensate the non-uniform rotation of the first universal joint, that is under the following preconditions, as described in DIN 808:

1. Correct yoke orientation: when two single universal joints are used, please make sure that the yokes of the inbound joints, or brackets for the bracket-version, are properly aligned – as for double universal joints.
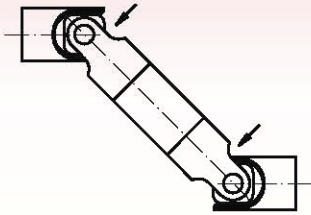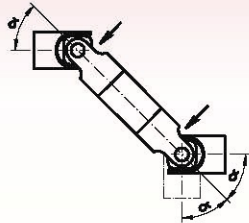

CORRECT: yoke orientation properly aligned
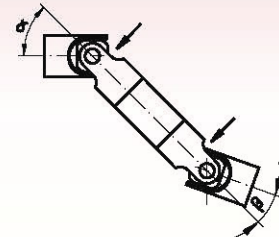

90º offset
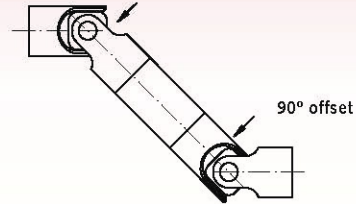
INCORRECT: yoke orientation offset by 90º

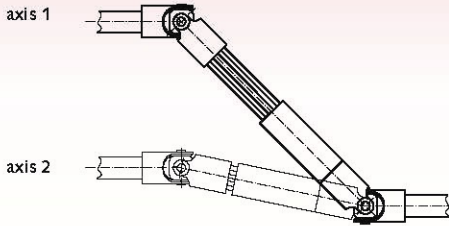**2. The operating angle must be the same at both ends.**

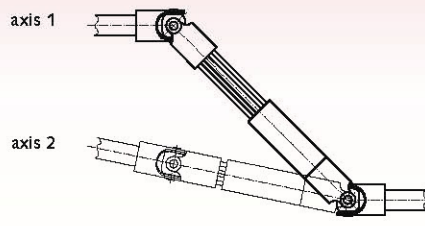CORRECT : angle α is the same everywhere

INCORRECT: angle α and β are different

3. When position of driving and driven shaft is changed, they must always be moved in parallel.
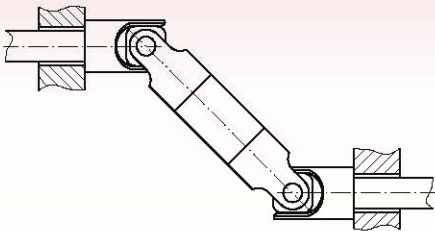

axis 1

axis 2

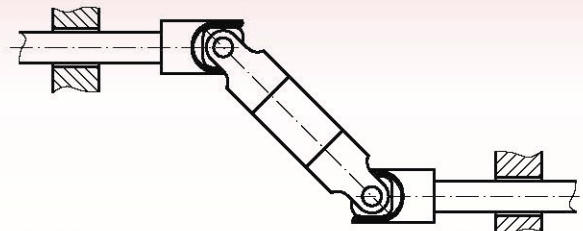CORRECT : axis 1 is parallel to axis 2

axis 1

axis 2

INCORRECT: axis 1 is not parallel to axis 2

4. The universal-joint shaft – or the double universal joint – should be supported as close as possible to the universal joints.

CORRECT : bearing positioned as close as possible

INCORRECT: bearing positioned is too far off the joint

The universal joints are supplied without pinholes and split pins. The length of the split pin is determined by the outer diameter of the universal joint, i.e. the pin must be flush when inserted.

We recommend Split Pins accord. to DIN 1481.

Bore Ø	6	8	10	12	16	20	25	32	40	50
Pin Ø	2	3	4	5	6	8	10	12	14	16

Calculating the Size of the Universal Joint

When selecting the most suitable universal joint, the highest transmittable torque is not the only decisive figure. Other operation conditions such as shock load, angle ratios, speeds etc. also need to be considered. The adjoining diagram therefore helps to determine a first rough sizing for the universal joint, and shows the respective reference values.

The respective reference value for smaller operating angles under 10º, between 0º and 5º, is 25% higher.

For larger operating angles above 40º to 45º (maximum) we can only recommend manual operation.
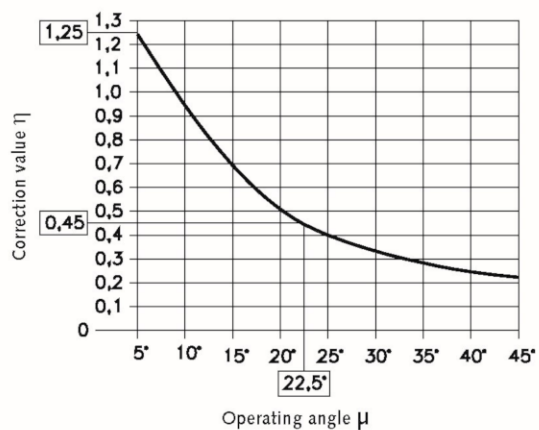
Corrective Values Subject to the Operating Angle.