Introduction

Couplings create connections between drive shafts and driven shafts in order to transmit rotary motion and torque. For example, they are used to combine the shafts of motors and transmissions into a single drive unit.

Alongside the primary purpose of transmitting torque, couplings also carry out other important tasks:

- Compensating for shaft offsets and misalignments
- Absorbing runout errors and axial motions
- Damping vibrations and shocks

Couplings are used in a very wide range of applications. The spectrum ranges from simple drives to complex control, regulation and measurement applications.

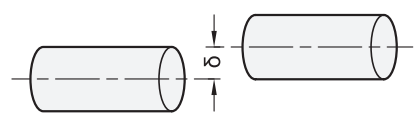
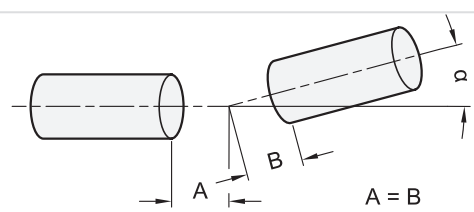
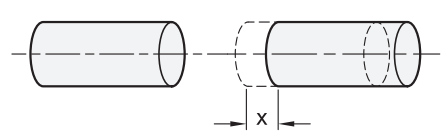
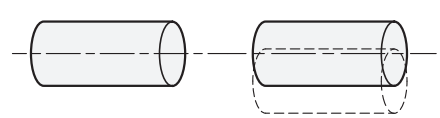
Misalignment and runout tolerances

Like all mechanical parts, shafts are subjected to manufacturing and assembly tolerances that generally cannot be entirely eliminated even with extensive technical measures.

If these deviations are not taken into account in the design, the result can be vibrations, running noises, and wear or damage to the shafts and their bearings.

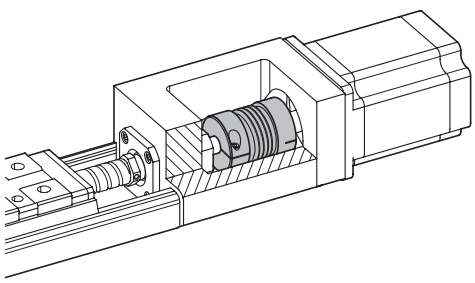
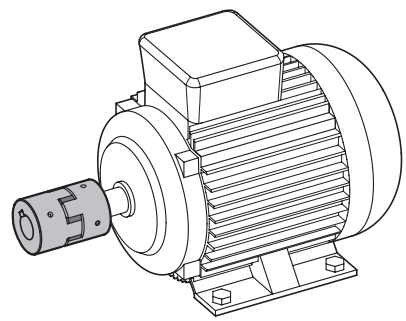
Suitable couplings not only are able to effectively compensate for misalignment and runout errors, they also greatly simplify the assembly process, thereby reducing the overall labor required.

Shaft misalignment and runout errors can vary in nature and should always be taken into consideration when selecting the appropriate coupling.

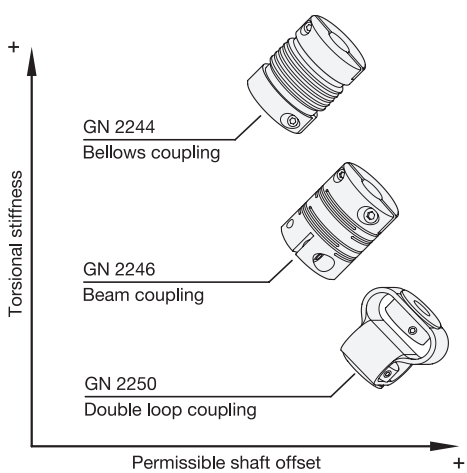
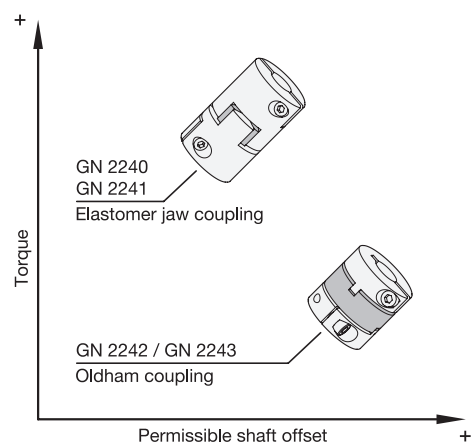
Error type	Misalignment diagram
Lateral The axes of the shafts are in fact parallel, but they are offset laterally and do not line up.	
Angular The axes of the shafts do not lie in the same plane; they meet at a certain angle.	
Axial The shafts move axially along the axis of rotation.	
Runout The shafts move radially out of the center of the axis of rotation.	

Areas of application - Classes - Coupling types

The applications of couplings can generally be divided into two classes.

Motion control	Torque and power transmission
For motion control applications, the rotational movement is transmitted with very high precision and accuracy. This requires a coupling type with a high torsional stiffness and zero backlash in the direction of rotation. Typical applications are: Servo or stepper motors for linear axes, industrial robots, test benches, etc.	For torque and power transmission, the focus lies on pure transmission of force. This requires couplings that can withstand high torques and heavy loads while functioning reliably in harsh conditions. Typical applications are: Conveyor systems, pumps and agitators, packaging machines, etc.
	

Two coupling types are available for each of the application classes described above.

Bellows couplings, beam couplings and double loop couplings	Elastomer jaw couplings and oldham couplings
	
Bellows couplings offer high torsional stiffness. This makes them excellent for precise and controlled movements. Beam couplings have lower torsional stiffness compared with bellows couplings, but they can compensate for higher shaft misalignments.	Elastomer jaw couplings are designed for high torque transmission and can be used in all manner of applications. Oldham couplings transmit less torque but can compensate for higher shaft misalignments.