

A detailed medical illustration of a human hip joint. The femoral head and acetabulum are shown in a realistic, anatomical style. A minimally invasive surgical approach is depicted, with a small incision in the soft tissue. A blue, flexible, articulated surgical instrument is shown inserted into the joint space. The background shows a faint, blue-tinted illustration of the human torso and skeletal structure.

**MINIATURE
BALL BEARINGS**

Q21  **NANO™**

→ PRECISION AT ITS SMALLEST SCALE

GRW expands its portfolio with a new high-precision miniature ball bearing featuring an outer diameter of only **2.3 mm**. It is currently **the smallest deep-groove ball bearing available on the market at this quality level** and has been specifically designed for demanding medical technology applications – particularly for use inside the human body.

→ OUR MOTIVATION FOR THE DEVELOPMENT

The development of this miniature ball bearing is based on a clear market trend:

- Increasing miniaturization in invasive and minimally invasive medicine
- Growing demand for compact, high-performance components
- Reduced strain on the patient's body

Basic principle:

- The smaller the technical components inside the body, the less mechanical stress is placed on tissues and surrounding structures. This allows for less invasive procedures and promotes faster healing.

→ TYPICAL APPLICATION AREAS

- Cardiovascular support systems (e.g. blood pumps)
- Implantable microsystems (e.g. drug delivery systems)
- High-precision drive systems in compact medical devices
- Minimally invasive surgical instruments
- Catheter systems
- Medical robotics



Q21  NANO™

*true to scale



TECHNICAL SPECIFICATIONS

Feature	Specification
Outer Diameter	2.3 mm / 0.0906 inch
Inner Diameter	0.6 mm / 0.0236 inch
Size	25% smaller than bearing type 681
Materials	Biocompatible materials (e.g. XTRAlon)
Corrosion Resistance	Very high
Media Resistance	High resistance to bodily fluids
Hygiene Compliance	Suitable for common sterilization and disinfection procedures
Quality Standard	In accordance with established GRW quality standards
Available from	End of 2026



KEY BENEFITS AT A GLANCE

Advantages in Medical Applications

- Minimized stress on the body
- High corrosion resistance (SV30 steel)
- High resistance to bodily fluids (e.g. blood)
- Suitable for common sterilization and disinfection procedures
- Use of biocompatible materials (e.g. XTRAlon)
- Reduced system size enables smaller instruments

Additional Advantages

- 25% smaller than the previous smallest reference size (Type 681, OD 3 mm)
- Proven GRW quality even in an extremely miniaturized design
- High precision and reliability despite minimal dimensions
- **Made in Germany**



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