

IQ chuck and IQ mandrel

with integrated measuring intelligence

- Reduce measurement procedure times
- Reduce scrap
- Increase machine productivity and process capacity
- Ensure necessary maintenance schedule
- Monitor defined clamping forces
- Document the results to replicate repeat projects

Clamping devices with integrated, intelligent measuring technology

Chucks and mandrels with IQ manage the monitoring of production and enable improved work flow. With IQ chucks and mandrels the transformation to Industry 4.0, digitalization, and IoT is quite simple.

Integrated sensor technology enables many different measurements and monitoring possibilities. The measured data is relayed via contactless transmission of data and energy directly to the machine controller where it is analyzed. The controller executes a setpoint comparison. If there are deviations, a message is output or a correction is initiated.

Long-term control is possible with the data obtained through »condition monitoring«. Thus, traceability as stipulated in DIN EN 1550 is ensured.



Variant	TOPlus IQ chuck		SPANNTOP IQ chuck		MAXXOS IQ mandrel	MANDO IQ mandrel	
	Pull-back	Deadlength	Pull-back	Deadlength	T211 pull-back	T211 pull-back	T212 pull-back
Variant	SE [hexagonal]		RD [round]		SE [hexagonal]	RD [round]	
Sizes	52, 65, 100		32, 42, 52, 65, 80, 100, 125, 160		A, B, C, D, E, F	0, 1, 2, 3, 4, 5, 6, 7	XXS, XS, S, 0, 1, 2, 3, 4, 5, 6, 7
Clamping range of all sizes [mm]	3–100		3–160		18–100	20–200	8–190
Actuation	Pull	Push	Pull	Push	Pull	Pull	
Clamping elements	Standard clamping head SE		Standard clamping head RD		Standard segmented clamping bushing SE	Standard segmented clamping bushing RD	
Adaptations	Can be used, however without IQ function				No adaptations available		
Applications	Lathe, vertical lathe, milling machine, machining center, grinding machine, measuring machine, assembly workstation						
Use	Clamping of raw material, clamping of finished material, measuring, final inspection						
Measurement parameters							
Workpiece Ø	✓	✓	✓	✓	✓		✓
Temperature	✓	✓	✓	✓	✓		✓
RPM	✓	✓	✓	✓	✓		✓
Workpiece contact	✓		✓		✓		✓
Workpiece clamping force	✓	✓					

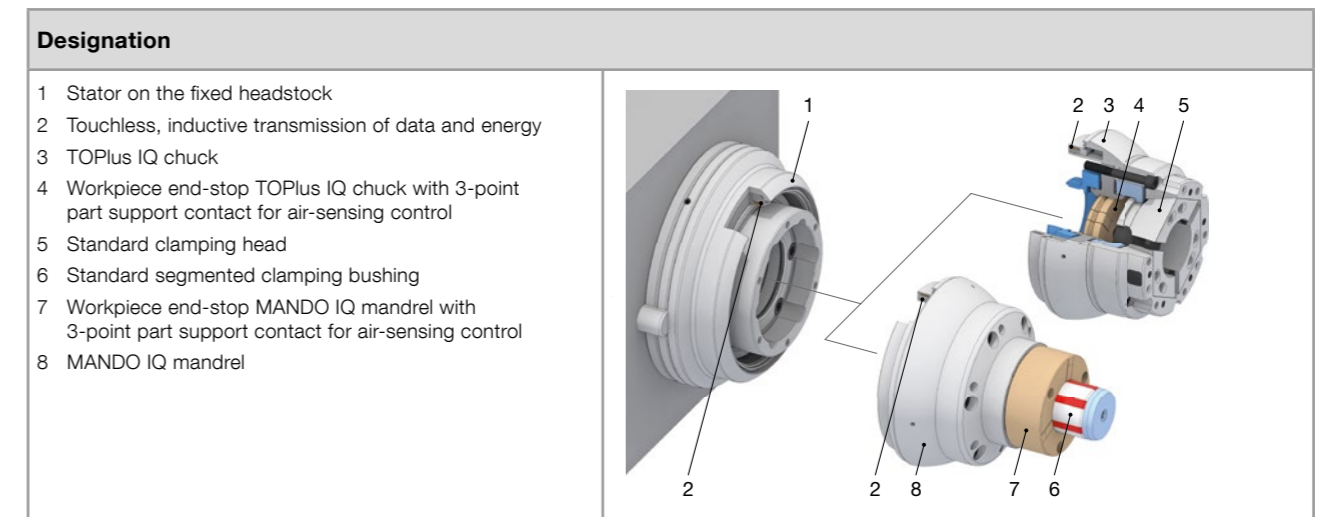
HAINBUCH scope of delivery

- IQ clamping device
- Modulator for the communication between clamping device and machine [machine controller]
- Register description for parameterization of the industrial fieldbus system

Integration tasks of the machine builder

- Adapt software for control of the machine cycle
- Provide the input and output required on the machine side
- Visualize the measured values and interaction buttons on the user interface

IQ clamping devices in detail



Measuring and monitoring possibilities



Workpiece diameter

- Clamping and measuring in one step – without additional measuring machine [»inline measuring«]
- Accuracy: in $\varnothing \pm 0.01 \text{ mm}$

Application example: Detects whether the correct diameter was produced in the upstream machining.



Temperature

- Measuring of the temperature of the clamping device
- Accuracy: $\pm 1 \text{ }^\circ\text{C}$

Application example: Detects a gradual temperature change, triggered by the machining process, which can be taken into account for measuring procedures.



RPM

- Measuring the RPMs of the clamping device
- Accuracy: $\pm 1 \%$

Application example: Ideal for »condition monitoring« for preparation of RPM-based analysis diagrams, detecting inertia losses.



Workpiece contact

- Detects the workpiece contact through sensors in the basic body and through the 3-point part support contact on the workpiece end-stop
- Minimum thickness of foreign objects: $\geq 0.03 \text{ mm}$

Application example: Detects chips on the workpiece end-stop without complex air sensing control with rotary unit and piping.



Workpiece clamping force

- Continuous clamping force monitoring directly on the workpiece
- Deviation from a calibrated clamping force value is determined [not an absolute measurement]

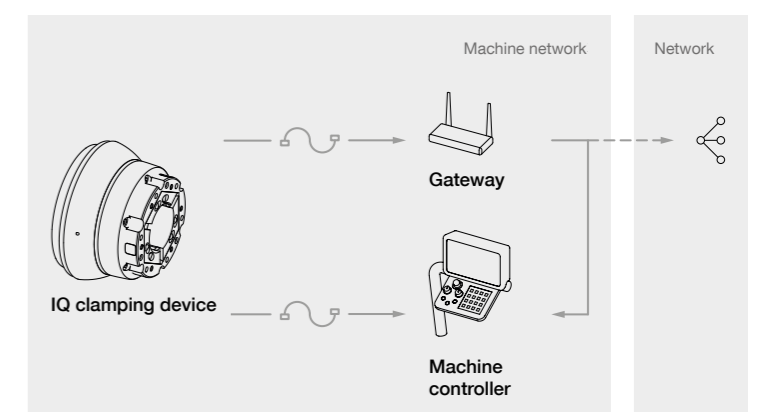
Application example: Detects whether clamping force that is suitable for the workpiece has been set on the hydraulic unit/clamping cylinder – this is the prerequisite for automated manufacturing of different workpieces.

In addition, analysis of the clamping force measurement data enables reliable-process manufacturing and is an important component of maintenance as-needed.

Transmission of data and energy

Touchless transmission of data and energy between the rotating clamping device and the stator fixed on the headstock.

The data can be transmitted with a fieldbus system [e.g. PROFINET] directly to the machine controller or to a gateway.

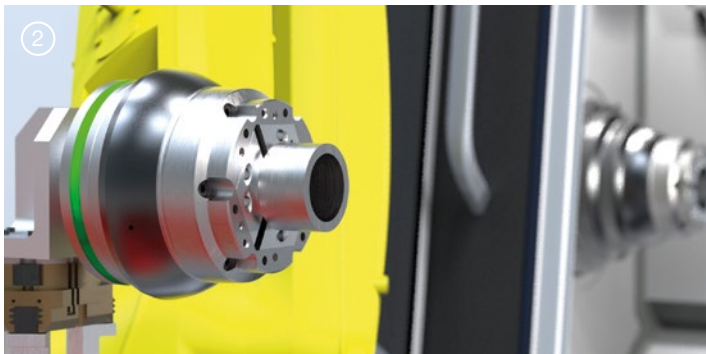


Application example



Measuring on the machine

IQ chuck for measuring workpiece diameter, temperature, RPM, workpiece contact, and workpiece clamping force. Data is processed in the controller or in the master computer and is displayed on the machine panel.



Measuring when handling the workpiece

Use the IQ chuck for measuring the finished workpiece diameter. This data is processed in the controller or in the master computer and is also shown on an LED ring on the chuck.



Measuring station

IQ mandrel for measuring the finished workpiece bore. Data processing occurs in the controller or in the master computer and in addition can be output via a display at the measuring station.

