Drill Quality Assurance

BQS

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Optional Component for Every Turning and Milling Machine

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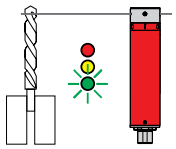
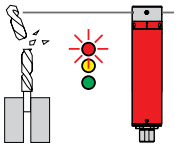
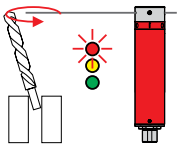
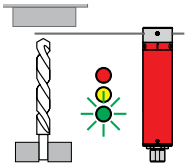
The BQS system will reliably scan your tool or workpiece for presence and scale. It is a sensible addition to any turning and milling machine and/or all machining centres.
When we developed this system, we focused primarily on our customers' requirements. Some of these requirements related to the BQS 224 Sensor, others to the compact BQS Control I/O.
This optimized quality monitoring system offers you a long service life, robustness, impermeability, diversity and reliability right from the beginning.

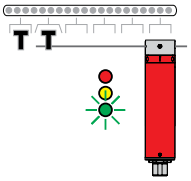
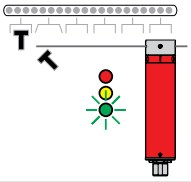
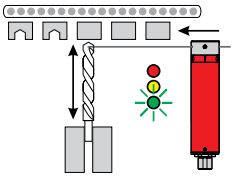
Application

_ Tool presence (Is the tool present?)
_ General breakage monitoring (Is the tool complete?)
_ Position definition/clamping error detection (Is the tool in the right place?)
_ Free space monitoring (Is there an obstacle between the tool and the workpiece?)
_ Object recognition (Is the workpiece present?)
_ Ejection monitoring (Can the next workpiece be inserted?)
_ Process monitoring (Can the next cycle be started?)

Goals

_ Prevent production loss
_ Prevent destruction of tools or parts
_ Shorten downtime
_ Recognize trends early
_ Minimize rejects
_ Support manufacturing process

Tool Presence	
Tool Breakage Monitoring	
Clamping Error Monitoring	
Free Space Monitoring	

	Object Recognition
	Ejection Monitoring
	Process Monitoring

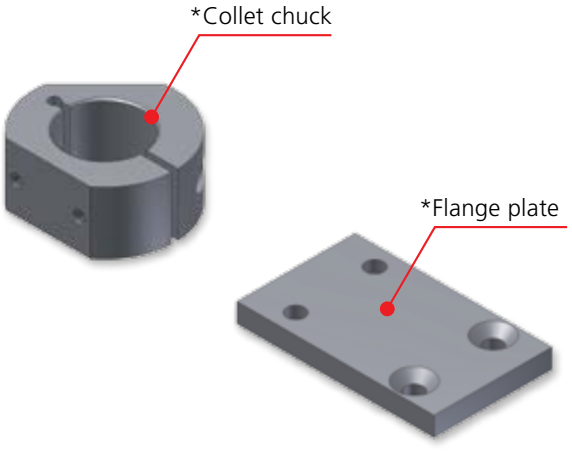
System Case

The system case contains all necessary components for a fully functional BQS system. All components from this case are 100 % harmonized and form one complete unit. You can also order individual components from us at any time by quoting the item number.

Parts List: System Case (792-10006)

Description	Item No.
Connection cable 2 m	620 001 587
Connection cable 5 m (optional)	62 000 1614
ISR. countersunk screw M4×10	27 003 037
Bus connector (optional)	62 005 278
Allen wrench SW 1.5	49 930 050
USB cable 1 m (firmware update)	64 070 427
Flash drive (USB 2.0)	68 000 019

BQS Control E/A	792-10005
BQS 224 Sensor	792-10001
Collet chuck BQS drill breakage control	49 931 006
BQS flange plate	49 931 007
BQS paddle (test needle)	49 931 005



*Recommended manufacturer's retaining system

Quality Assurance

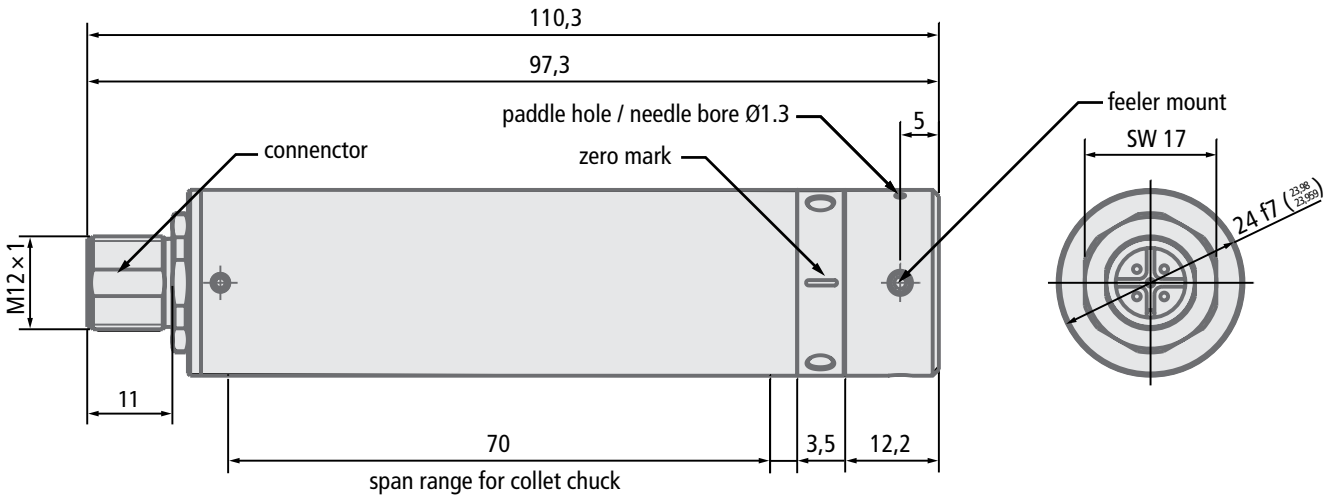
Quality Assurance

Thanks to a multi-stage sealing system, TRsystems' drill quality control is capable of meeting all the requirements of classic metal processing: emulsions, lubricants, aggressive coolants, respirable dust and chips cannot harm the BQS 224 Sensor. With up to 10 million cycles, the BQS 224 Sensor offers a very long service life. The scanning wand's collet features a diameter of 1.2 mm and can be adjusted to a variable length of 165 mm max.

Characteristics

_ Very long service life (up to 10 million cycles)
_ Multi-stage sealing concept
_ Labyrinth seal with integrated cleaning function
_ Sintered bearing for greater radial accuracy
_ Durable materials (anodized)
_ External markings on stopper
_ Fixed starting position
_ Compact design
_ External diameter only 24 mm
_ Protection class IP 68
_ Service-friendly assembly

Dimensional Drawings



Technical Data

Protection class	IP 68
Housing	Aluminium (anodized)
Service life	up to 10 million cycles
Scanning angle	15° … 300° both sides
Immunity to interference	DIN EN 61000-4-4
Ambient temperature	0 … 80 °C

Dimensions

Length	236.5 mm
Diameter	24 mm
Weight (with tactile probe)	128.8 g

Electromagnetic Compatibility (EMC)

Applied Standards for BQS 224 Sensor and BQS Control E/A:

DIN EN 61000-4-2
Electrostatic discharge immunity test.

DIN EN 61000-4-3
Radiated, radio-frequency, electromagnetic field immunity test.

DIN EN 61000-4-4
Electrical fast transient/burst immunity test

DIN EN 61000-4-5
Surge immunity test.

DIN EN 61000-4-6
Immunity to conducted disturbances, induced by radio-frequency fields.

Equipment and function

benefits

_ Integrated dual mode operation
_ Simple handling
_ Compact design
_ DIN rail mounting collet
_ Cable break-detection
_ USB 2.0 – upgradable
_ LED Display Power, OK, KO, Error
_ 4 digital inputs
_ 4 digital I/O (programmable)
_ 12 W switching power
_ Outputs are short-circuit-proof

Equipment

The drive actuation is implemented in a manner that is compatible with the developed control and evaluation unit. The control configuration is intuitive and easy to operate. A clearly arranged front panel shows and describes the individual connections, switches and scanners.
The control unit features a USB 2.0 and an Ethernet interface. The USB 2.0 interface allows for quick firmware upgrading.

The Ethernet interface provides the option to install the update or configurations via a web interface. With machines or control units that are difficult to access, this option makes updating a lot easier.

If neither update nor a configuration via the web browser is required, one can easily get by without a PC.
Rotational direction, scan mode, output signal and scanning force can be adjusted via the DIP switch settings. With the dip switch you can determine the scanning area doing the teach-in phase.

The Firmware Update Function
When keeping the "Teach" button pressed, the control system starts in configuration mode. The update can now easily be installed using the included software. Afterwards, a restart is necessary by disconnection and connecting the operating voltage.

Function

To prevent the BQS 224 Sensor from hitting the test specimen with unbroken force, the sensor can be adjusted to the expected position of the test specimen by using the rotary switch.
Using the start signal of the BQS 224 control I/O, the test needle will be gently accelerated to maximum speed from its 0 position. It will only slow down just before the measuring point. From then on, the sensor needle will scan the taught-in intermediate area as per the previously set mode.

Due to the galvanic isolation, the input signals may also be operated by a more remote control via a separate power supply. The output rating of 12 Watt is dimensioned adequately to control the 24V relay and the vertical gate.
All relevant output signals are simultaneously visualized by LED displays. These displays will remain illuminated while the associated output signals are present. The display duration must not be less than 700 ms. For example, the successful saving of a teach-in position is clearly marked by the OK-LED blinking once.

Technical Data

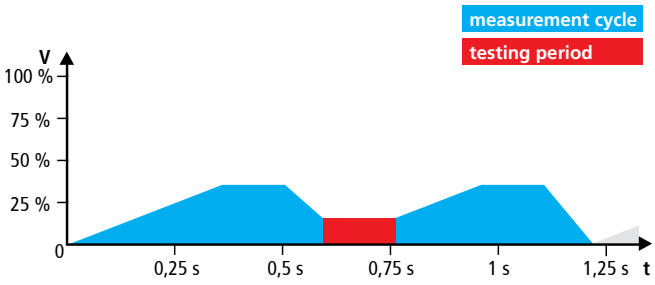
Interfaces	4 inputs and outputs; USB 2.0; RJ45
Mode 1 Mode 2	- For small drills and fine scanning - For quick clock cycles
Scanning Angle	15° … 300°
Immunity to Interference	DIN EN 61000-6-2 DIN EN 61000-6-4
Operating Temperature	0 … 50 °C

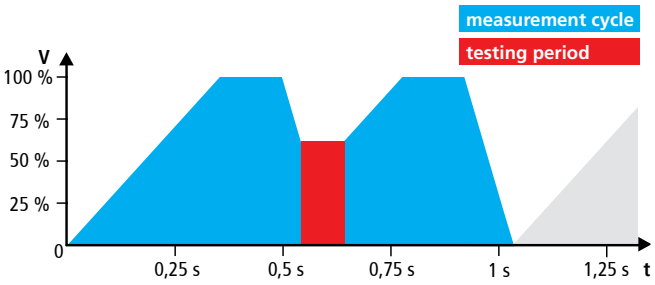
Dimensions

Length	113.6 mm
Width	22.6 mm
Height	99 mm
Weight	133.8 g

Integrated Dual Mode operation

Another advantage of BQS Control I / O is the dual-mode operation. It enables to properly react to different drill bit sizes. During operation, the scanning intensity can be switched by pressing dip switch No. 4.





Examples, showing free-space monitoring (Range of movements 180°)

Mode 1 – small drills and fine scanning
The scanning speed in Mode 1 is lower than in Mode 2. Therefore, we have an increased precision in scanning. This mode is perfectly suitable for drill bit sizes less 3 mm.

Mode 2 – quick clock cycles
In Mode 2, the scanning speed is significantly higher. This results in shorter cycle times and is particularly suitable for drills bit sizes of 3 mm and up.

BQS Control I/O – Initial Operation

Installation

_ Now connect the sensor to X5/1-5:
1 = grey
2 = brown
3 = white
4 = blue
5 = black

_ First of all, the power supply has to be connected to X4/1 GND and X4/2 +24 VDC.
_ PWR-LED on.

The digital inputs and outputs at X6 are galvanically isolated. If you don't want to operate the control inputs via another power source, you'll have to bridge to X6/3 GND_Ext and X4/1.

Test Start

_ Connect your machine signal for the test process to X6/5.
_ Connect the signal for the automatic teach-in process via the machine control to X6/4.
_ Connect the outputs from which you want to read feedback as desired, X7/5 for OK, X7/4 for KO or X7/1 for Error.

This concludes the installation. Now, the control needs to be configured.

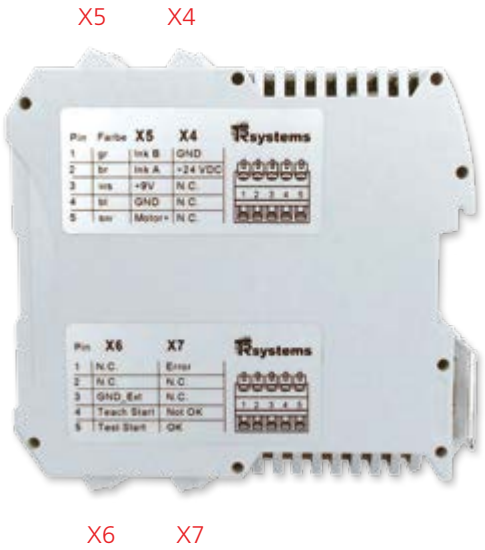
BSQ Control I/O – Terminal Pin Assignment

X5	Sensor Connection
1	Grey
2	Brown
3	White
4	Blue
5	Black

X4	Power Supply
1	GND (0V)
2	US (+24 VDC)
3	n.c
4	n.c.
5	n.c.

X6	I/O (Galvanically Isolated)
1	n.c.
2	n.c.
3	GND_Ext
4	Teach Start
5	Test Start

X7	Switching Outputs
1	Error
2	n.c.
3	n.c.
4	K.O.
5	O.K.



Configuration

First of all, the DIP switches need to be set.

1. Left-hand/right-hand sensor rotation
2. Object/free space monitoring
3. Inverting the output signal
4. Mode 1: for small drills and fine scanning
   Mode 2: for quick clock cycles

Putting into operation

If these steps have been completed, the preparations for the teach-in process can begin.
Using the rotary control switch to choose a sufficiently large range of movement. It is important to select an angle no larger than the observed area so the associated cycle of movement will be carried out properly.
The teach-in process can now be started. To do so, push the "TEACH IN" button (yellow) and observe the OK LED. It will blink twice in rapid succession once the teach-in process has been completed successfully and the position has been saved.

Now, only the PWR-LED is illuminated, and the scanning operation may be started. As soon as the X6/5 input receives a digital high signal (+24V DC), the sensor will gently accelerate to maximum speed from its 0 position. Once the tolerance window has been reached, the BQS 224 Sensor will slow down and start scanning the tolerance window in a precise manner.
The result will be visualized by the control's LEDs and electronically rendered at the outputs X7/5 for OK, X7/4 for KO or X7/1 for Error.

TR-Electronic – your partner in automation

Rotary encoders

Absolute encoder, incremental rotary encoder, wire-actuated encoder

Rotary encoders with optical and magnetic scanning function register the precise position in a wide variety of applications and industries.
In medical engineering, miniature versions ensure correct positioning while SIL3-approved absolute rotary encoders provide the necessary safety. We offer not only high-quality rotary encoders (from Ø 22 to 160 mm) for almost any application but also comprehensive accessories.

Linear encoders

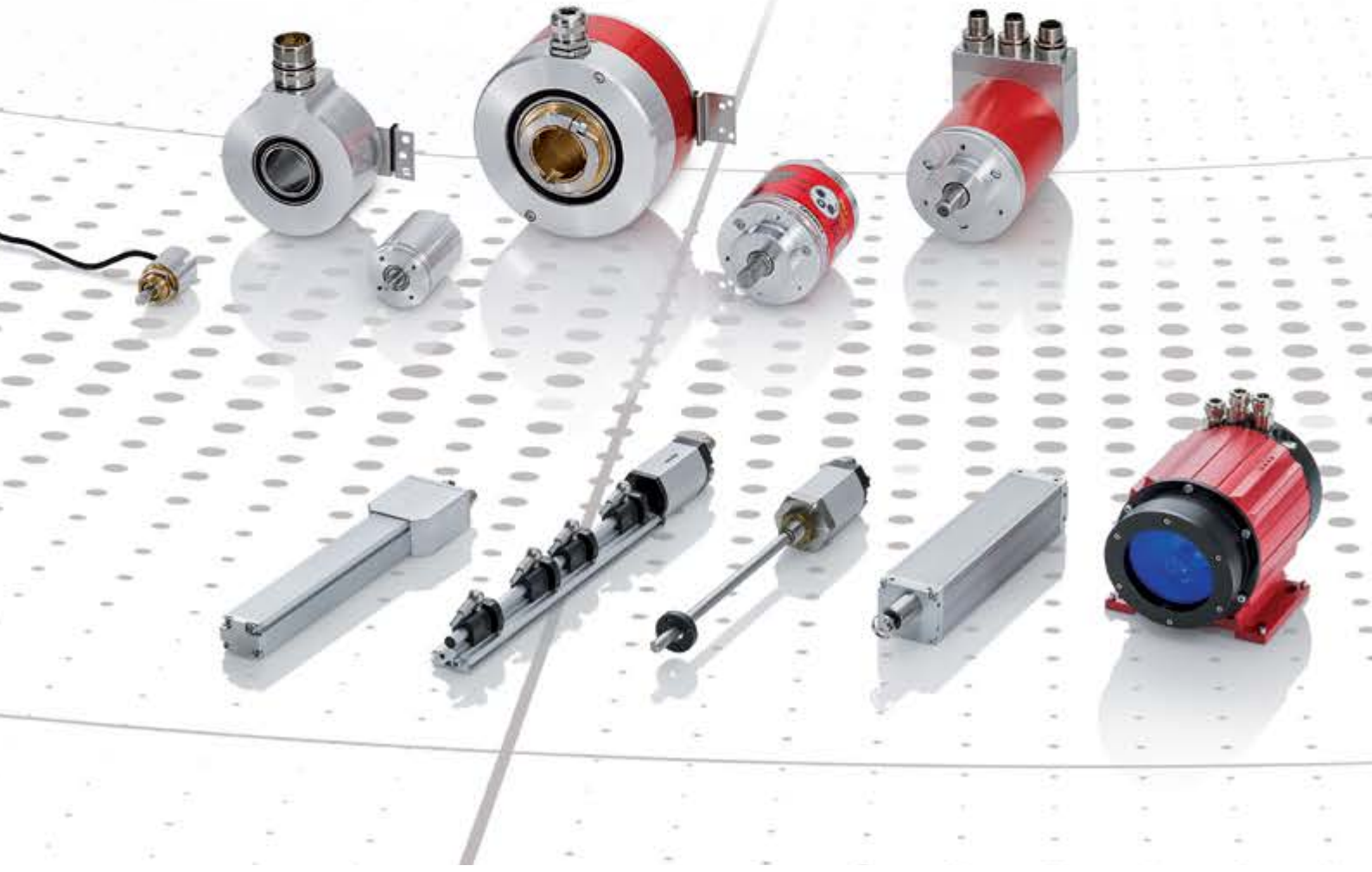
Linear absolute measuring systems, laser displacement measurement

Linear encoders register linear motions in machines, tools and systems according to specific requirements using different technologies.
Linear encoders allow measuring distances of max. 20 m almost without any wear. This value is max. 240 m for laser measuring systems. Machines and systems can be precisely controlled to reach their desired positions.

Motion

Servo drives, compact drives, process drives

Intelligent encoTRive drives are available with the current field bus systems, such as PROFIBUS, PROFINET and CANopen, within a power range of up to 300 watts. The drives are configured to meet customer requirements and can be freely combined with precision gear, holding brake and I/O.
Values of up to 4,350 rpm and powerful 200 Nm are available to cope with demanding applications.



Components

Industrial PC, field bus I/O, PLC, HMI controller

Industrial PCs are available in numerous variants and offer customized calculation power for PC-assisted automation. Programmable logic controllers (PLC) are the traditional means for automation. HMI controllers establish the interface to the user. Field bus nodes, I/O modules and cam controllers complete the range of automation components.

Automation

Consulting and implementation for new machines and retrofit

You want to set up a largely automated new machine or retrofit and modernize your existing machine with automation systems? Then you just need our extensive expert knowledge and the more than 20 years of our experience.

Unidor

Blanking and forming, systems, controls and sensors

Trendsetting blanking and forming technology for more than 30 years. We are your reliable partner in the world of blanking and pressing and can prove this with thousands of machines which we have successfully installed all over the world. Sensors, controls and systems ensure optimal results in machines, tools and retrofit projects.

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