



MSE 2

High-performance process
module for joining bolted
connections

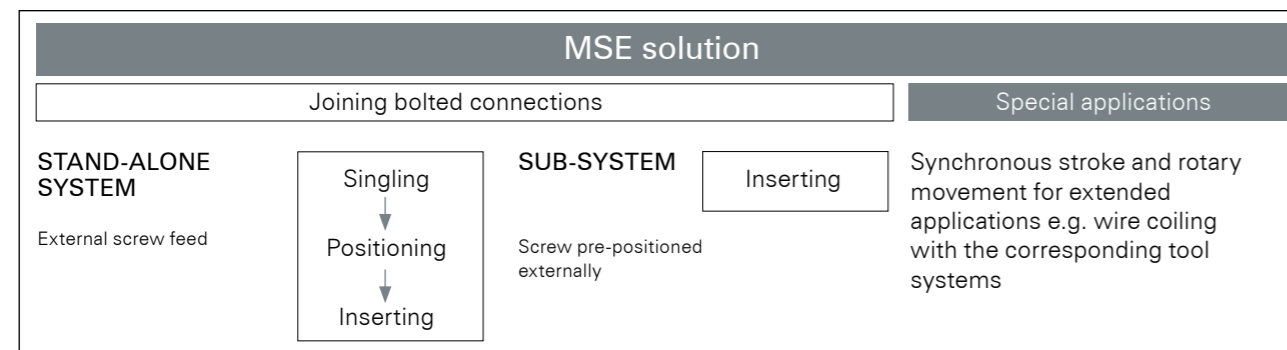
MSE 2

Multiple-use screw insertion unit

High performance, compact, universally applicable

The patented MSE process module for joining bolted connections is perfectly designed for reliable serial production with very high cycle rates up to 180 joining operations/min. The compact module is a stand-alone system for all relevant steps such as singling, positioning and inserting screws.

Since all relevant parameters such as pitch, angle of rotation, screw depth, etc. can be programmed freely, the process module has universal application for various screw and thread types. Exact synchronisation of rotary motion and stroke opens up expanded application possibilities such as wire coiling.



Compact design

The compact design means that the process module can be easily integrated in all production, assembly and transfer lines. It is also possible to install several modules in sequence.



MSE 2 with integrated lifting device as a sub-system (output 120/min).

Intelligent system

The practical design, sensors for monitoring and the control system make individually adaptable processes possible through internal combination of conditions.

- Automatic start of the screw depth only when it is engaged through search movement of the bit (e.g. for slotted screws).
- Independent identification by sensors when the torque clutch is triggered, e.g. if not engaged at a certain point, rotary action continues followed by subsequent check.
- Automatic termination of the screw-in process when the tightening torque is reached.
- Automatic signal transfer of parts declared as defective to the sorter unit.

Wide range of applications

The process module is designed for screw applications up to thread size M8. The patented torque clutch enables screws to be tightened by applying the corresponding torque (0.1 to 2.0 Nm). The rapid changeover system for bits is used when retooling for another screw type.

Lifting unit

The pneumatic lifting unit is used to raise and lower the MSE 2 for rapid tool changes. If a defective screw is loaded (threadless screw) the unit will stop automatically. The production line will continue to run without stopping and the defective piece is removed. The lifting unit can be mounted on presses, punching and bending units and other production lines. The bolting unit can be adjusted along the X-axis by 20mm and along the Y-axis by 80mm via the compound slide rest.

100% process reliability

All MSE process modules have various process monitoring options. Query parameters for sensor signals can be programmed freely according to the process variables. Monitoring processes such as checking screws, torque and angle of rotation, insertion path or disengaging the torque clutch, etc. are available at all times.



Stand-alone system

The MSE 2 as a stand-alone system consists of three parts.

Feed:

Singling and correct positioning of the screw in a transport system.

Positioning:

An interconnected rotary table means high cycle rates can be achieved. Simultaneous check if screw present.

Bolting process:

Synchronous rotary movement and stroke and subsequent tightening to exact torque.

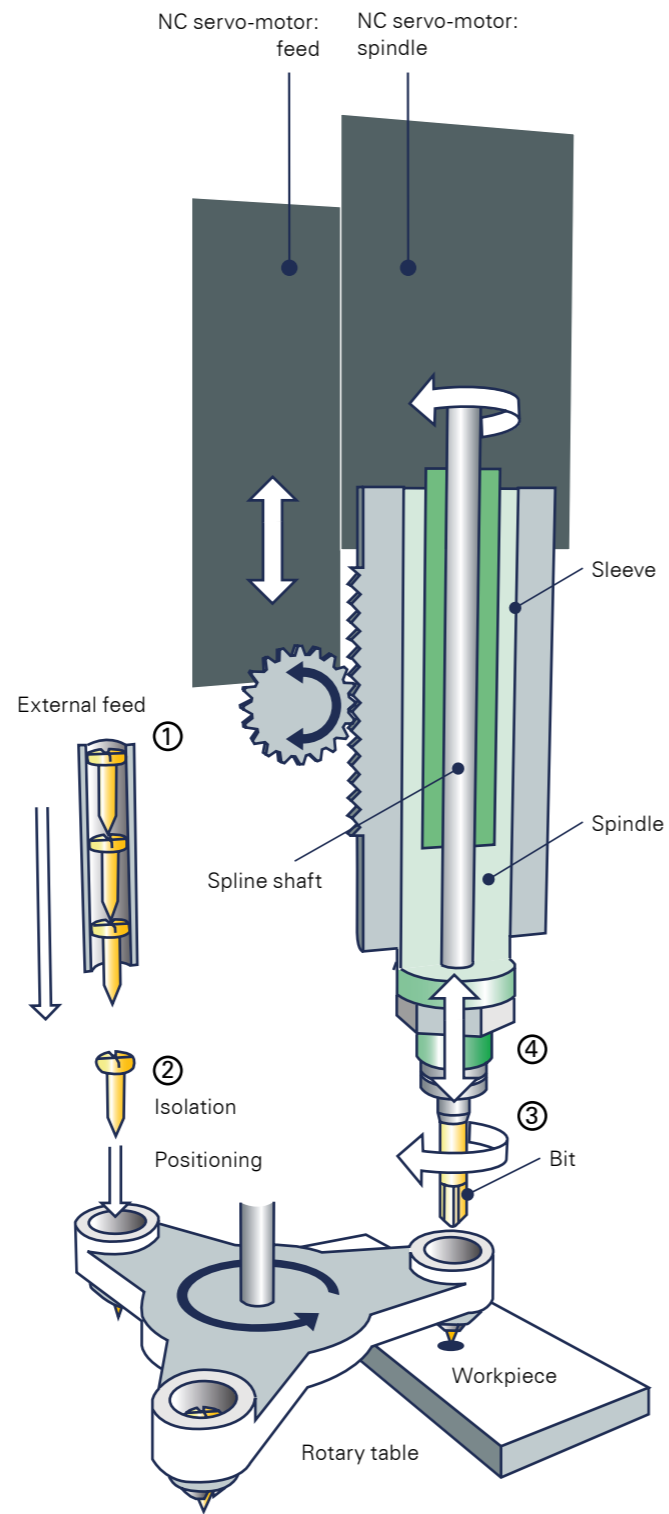
Operating principle

The drive of the MSE 2 is composed of a compact drive unit with two NC servo-motors for synchronous rotary and stroke movement. The drive concept comprises a revolving spindle mounted in a sleeve. The bolting tool is connected directly to the spindle. The stroke movement is actuated by the NC servo-drive with transmission ensured by the sleeve. A spline shaft acts as a coupling unit for simultaneous rotary and stroke movement.

Operation sequence

The operation sequence and the control system for both servos run according to a pre-set program:

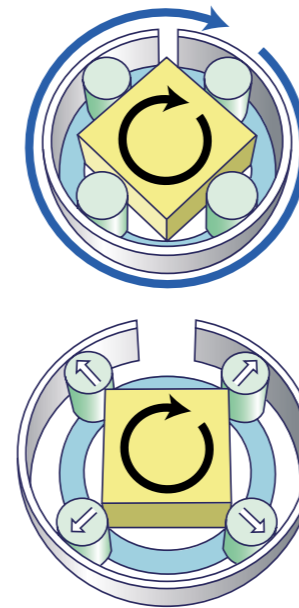
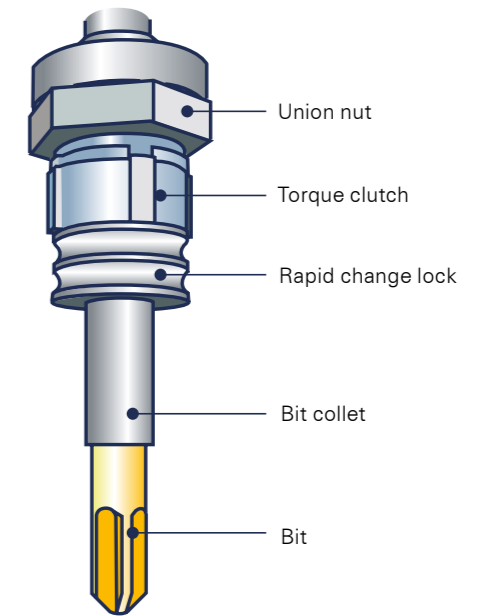
- feed screw into rotary table (already mounted in the correct position);
- turn rotary table to the next position;
- lower bolting tool and insert screw x rotations;
- tighten screw to required torque;
- move bolting tool to home position (reference position).



All operating steps run simultaneously:
 ① screw feed; ② singling, check, positioning of screw;
 ③ insertion of screw; ④ tightening screw to exact torque.

Tool fastener

The tool fastener comprises a bit, bit collet with rapid change lock and torque clutch. As a self-contained unit it is connected directly to the spindle via a union nut. The rapid change lock means tools can be changed in seconds. The bolting tool (bit) is spring-mounted, reducing wear on the bit significantly.



Torque clutch

The patented torque clutch is integrated in the tool fastener and is used to limit the tightening torque on the screw exactly. The operating principle is a „ring“ designed exactly for the torque. When the torque is reached it widens and hence limits the maximum torque.





Control system

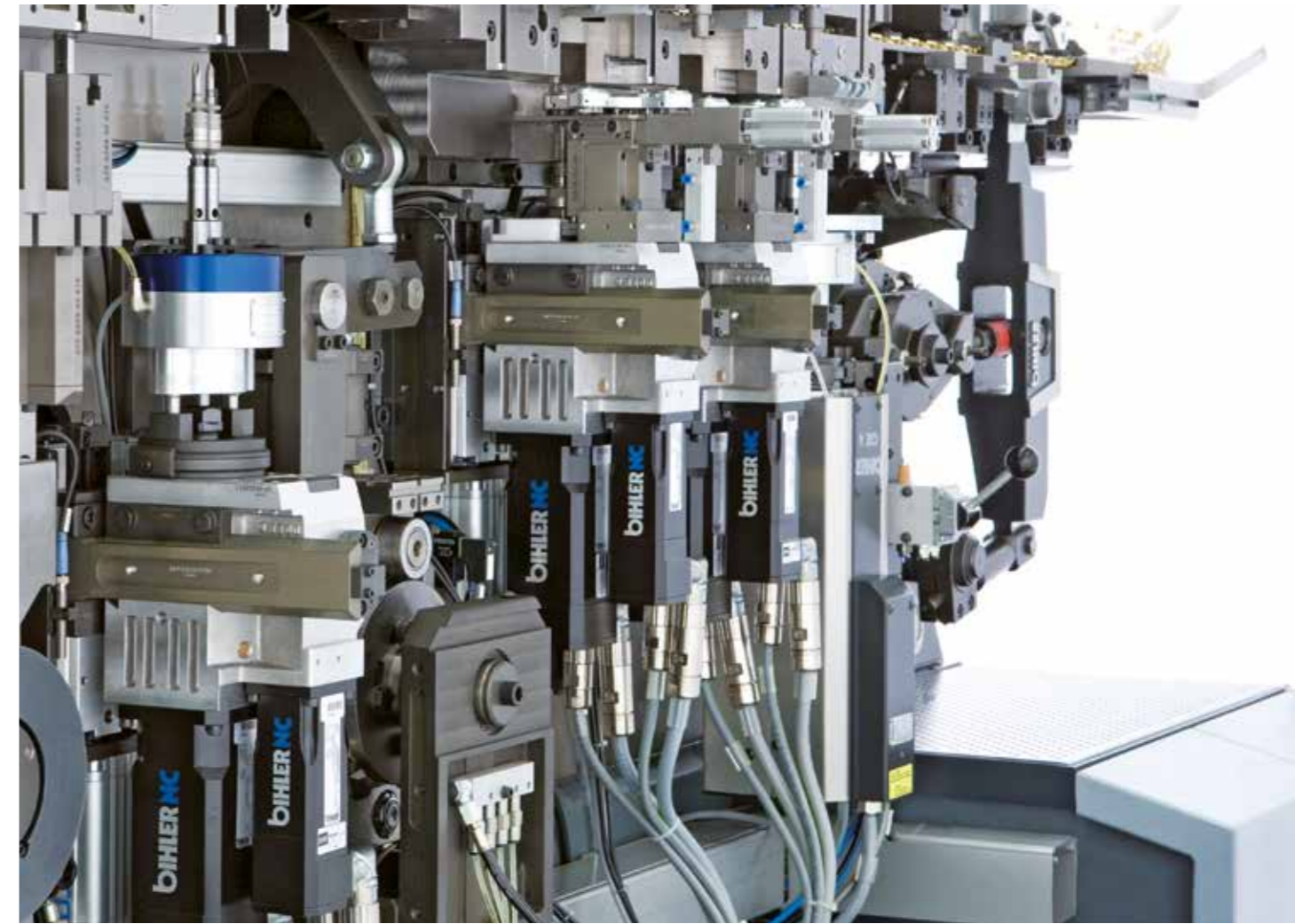
The MSE process module can be fully integrated in the Bihler process control system VC1. The separate FMC process control system is used for stand-alone applications. With this separate control system all production parameters can be programmed freely. Only the starting pulse of a superordinate control system is required.

Customised user menu

All necessary data can be programmed via the control system using an integrated operator menu designed especially for the process. The process is configured by setting the main parameters. A second level offers fine-tuning for detailed optimisation, e.g. fine adaptation of feed and rotary table speed, acceleration and braking ramps, controller parameters, etc.

First-class support at the touch of a button

Remote maintenance.



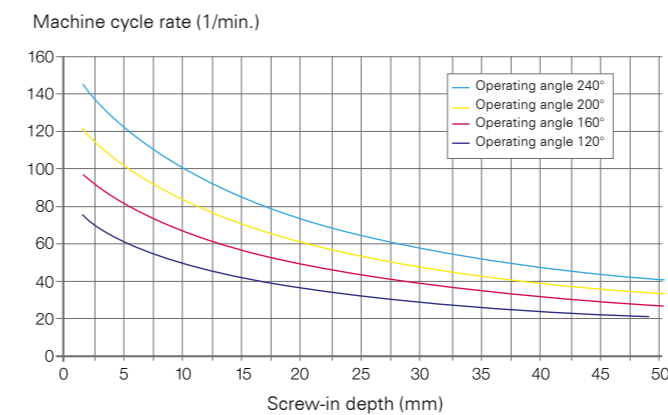
Technical data*

Product	Application as	Screw type (mm)	Screw size (mm)	Max. output** maxi (1/min)	Feed speed (mm/s)	Stroke (mm)
MSE 2	Stand-alone system incl. positioning	Phillips, torx, slotted	- M8	140	424	50
MSE 2	Sub-system: only screw-in process	Phillips, torx, slotted	- M8	180	424	50

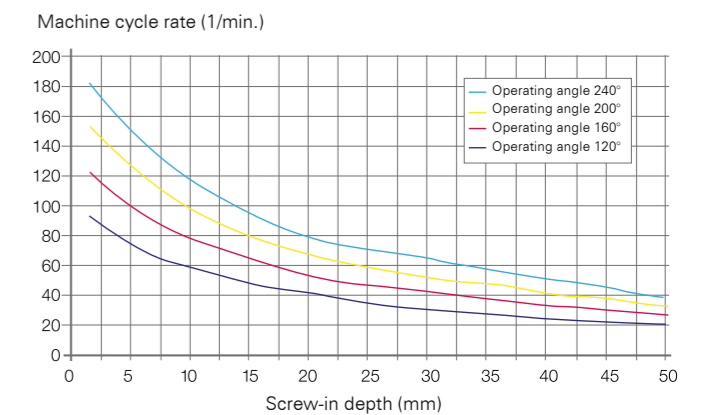
*These technical data are maximum values **Performance data without torque clutch

Performance charts

MSE 2 for M5 Phillips screw with torque clutch, $p=0.8$



MSE for M5 Phillips screw without torque clutch, $p=0.8$



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