SCHMIDT® ServoPress / TorquePress

The reference for precise assembly

An economic and high quality assembly is the key to the success of your product. The aim is to join together precise assemblies from low-cost individual components with different tolerances. Electrically driven spindle presses and servo presses are ideal for such tasks. **SCHMIDT® ServoPress** systems offer an integrated solution of **SCHMIDT® PressControl 600** or **5000** control unit and **SCHMIDT® ServoPress** modules. They meet the most complex requirements, as stand-alone machines or in automated production lines.

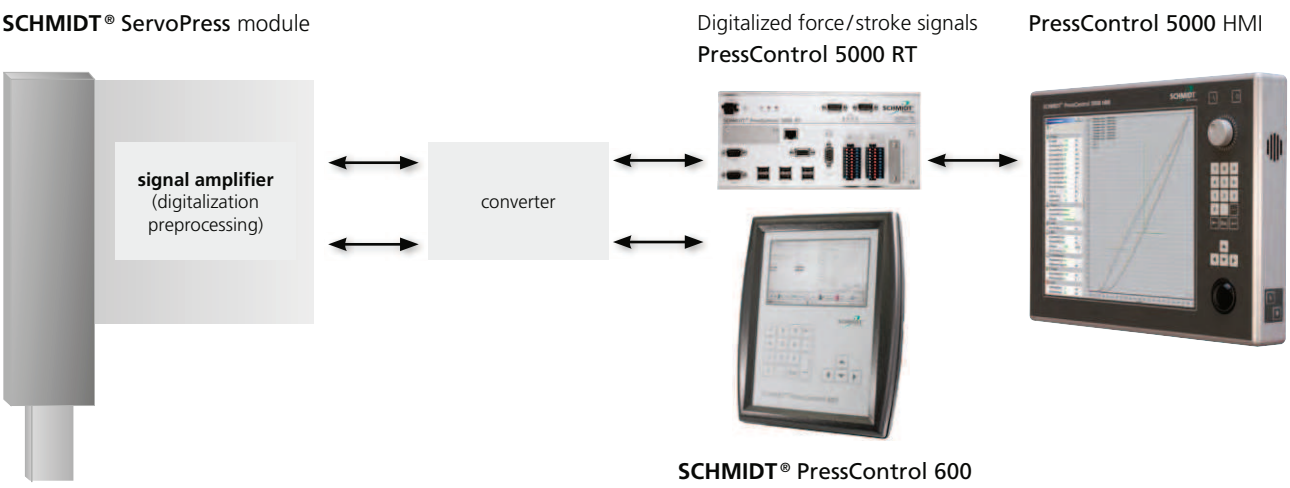
The very high torque of the **SCHMIDT® TorquePress** allows very high forces without additional mechanical transmissions. The considerably higher speed constancy compared to conventional drives entails a higher machine precision.
In comparison to high ratio electric motor driven spindle presses the **SCHMIDT® TorquePress** has an essential lower self moment of inertia and thereby a high dynamic. For this reason the run-up time from zero to working speed is very short. The noise remains remarkably low with all load conditions.

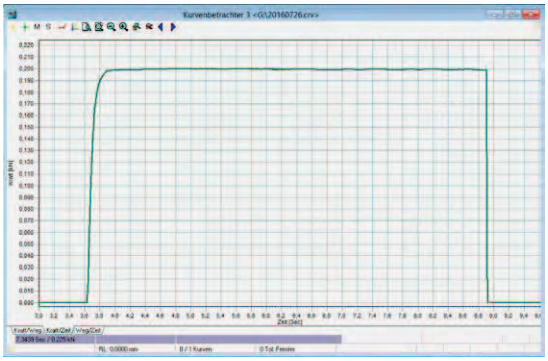
ServoPress

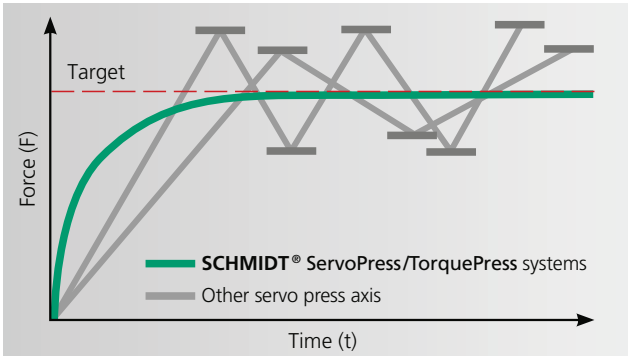
TorquePress 520

SCHMIDT® ServoPress/TorquePress
Superior controlled behaviour

The combination of a spindle with a servo drive is not sufficient to achieve optimum joining results. The key for intelligent assembly is quick and exact controlled behaviour of the press. This requires an integrated system consisting of drive unit, process measurement technology and control unit. These requirements have been taken into account in the system architecture of a **SCHMIDT®** **ServoPress / TorquePress**.







SCHMIDT® **ServoPress/TorquePress** work with real force controllers, unlike the simple switching controllers used by other manufacturers. That means:

- Quickly reaching the nominal values
- No overshooting of the target values
- Precise positioning in the 1/100 mm range, even with dynamically changing force outputs
- High precision force control
- The control parameters can be adjusted.
  - Optimum adaptation to your application
  - No PLC programming necessary
  - The system works with predefined optimum acceleration values (no incorrect entries possible)
- Optimization of the processing times is possible due to an additional graphical display force/time [F/t], stroke/time [s/t] for an analysis of the behaviour of the process. The classic force/stroke [F/s] display of conventional electronic axis cannot be compared to the reliable recording and visualization possibilities of the **SCHMIDT®** ServoPress/TorquePress

Characteristics

- Integrated measurement technology [scanning rate 2000 Hz]
  - Free-of-play distance measurement, force measurement without lateral forces
- Amplification of the process signals on the **SCHMIDT®** **ServoPress/TorquePress** module
  - Insensitive against electromagnetic interferences (EMC)
- The system is completed by using **SCHMIDT®** **PressControl 600** or **5000** (PC-based system), i. e. servo amplifier and motor receive nominal values from the control unit
  - Optimized PLC control algorithm
  - Force [F], stroke [s] or other external control inputs are simultaneously processed
  - The control input can be freely selected
- Quick signal processing on software-based PLC with integrated CNC

SCHMIDT® ServoPress/TorquePress
Uncompromising quality

The solid, unique mechanics of the **SCHMIDT®** ServoPress / **TorquePress** is essential for precise joining results, even in the toughest industry environments.

Test Bench
Before a new model is released, modules are endurance tested under the most severe operating conditions. The rigorous testing helps identify limitations. Improvements are implemented, which ultimately benefit you.

- Test duration is 3 months
- 20 million loading cycles over the entire working stroke with nominal force and lateral forces components at full travel speed
- Cycle time approx. 2 seconds

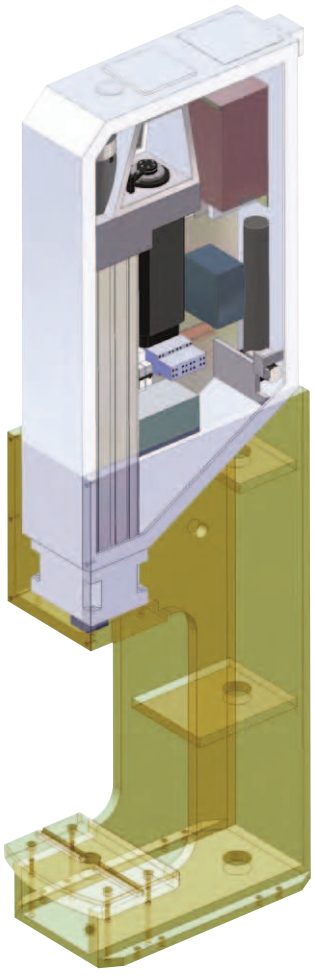
Continuous full load capable modules
- Over the entire ram stroke
- With rapid process times
- Via exact roller guiding of the ram with little play
- Square ram benefits
  - Insensitive to lateral forces
  - Locked against rotation

Built-in auto-protection and maintenance
- Fully automated spindle lubrication
- Mechanical clutch as overload protection for motor and load cell
- Cooling and thermal monitoring of mechanical and electronic system
- Current limitation if admissible load is exceeded
- Machine safeguarded against operator error

Service-friendly
- Low maintenance
- Easy module change possible. The control unit recognizes the new module. No modifications of the data sets are necessary. This is achieved due to a high-precision ram position in the reference point with relation to the supporting surface

Built-in safety in light curtain system or protective housing SmartGuard, of course EC type-approved

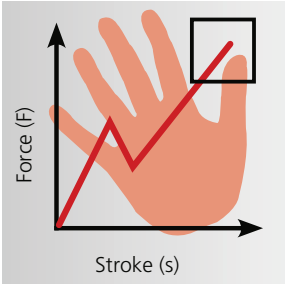
As a result, this means the following for your application:
✓ **Excellent efficiency**
✓ **Maximum capacity**
✓ **High production safety**



Dynamic bend up compensation
Patented feature

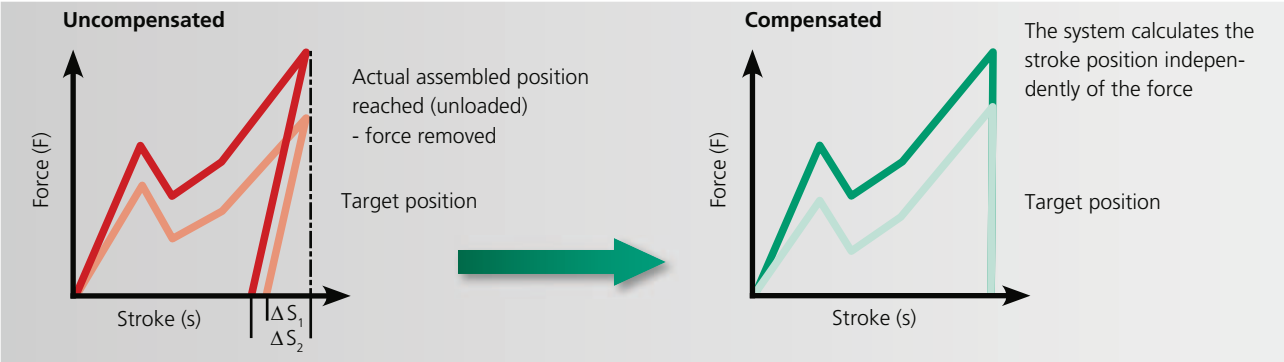
In order to achieve assembly requirements in the 1/100 mm range, compensation of the system yield is required. Work piece, tooling and machine are elastically deformed by the varying forces induced during the pressing process. Once the operation is complete and the press force is removed, this deformation disappears. The result is that the assemblies are not joined to their programmed dimensions. This yielding effect makes it impossible to produce high precision joints regardless of a systems positioning accuracy.

First, a complete process representation of the force characteristic in loaded and unloaded state is necessary so that the system can carry out the required compensation.



Conventional procedures end in the block position – but the process is not finished yet. The system is under force.

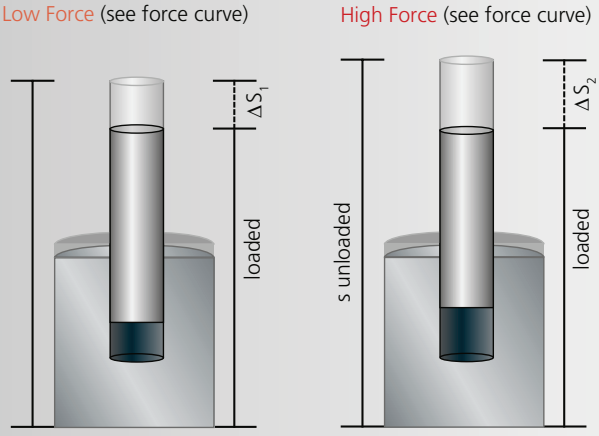
Patented Dynamic Bend up compensation by **SCHMIDT Technology**



In typical applications, the force required to complete an assembly varies up to 40 % from part to part. When freely positioning, such as without a positive stop, the press ram extends to the same target position, regardless of load. But a closer inspection of the completed assembly and the force/distance curve generated, shows that the final pressed position will vary due to the forces in the operation. (figure 1) In order to overcome this effect, **SCHMIDT® ServoPress/TorquePress** systems compensate dynamically to the changing forces. This compensation allows for the assembly to be pressed to the target position, regardless of force (figure 2)

Example: Press in a Pin in a Bushing

The elasticity of an assembly depends on the equipment, process and the component geometries. This effect becomes significant for assemblies with which the assembly forces of the individual components differ strongly from one another. This can particularly be seen in the example shown.



„ΔS" changes proportionally to the force output, that means, the components have different dimensions depending on the force requirement of each component

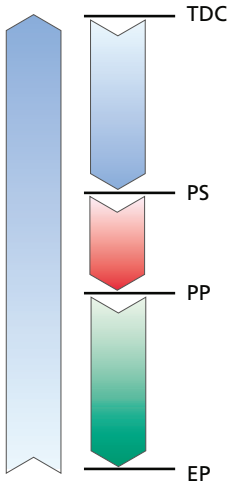
- The **SCHMIDT® ServoPress/TorquePress** system determines easily and precisely the system elasticity and compensates it dynamically in real time
- Only with dynamic bend up compensation, the end position can be reached to an accuracy of the 1/100 mm range
- Free positioning with compensation of the system elasticity is more accurate than pressing on effect tool stop
- Dynamic bend up compensation does not reduce the process speed
- Dynamic bend up compensation in connection with other intelligent functions, such as offset of tolerance data, has been patented

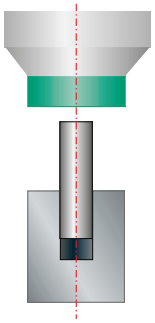
SCHMIDT® ServoPress/TorquePress
Operating profiles and applications

SCHMIDT® ServoPress/TorquePress allow a simple setup of the operating profiles. Different standard operating profiles are provided for a quick set-up. According to experience, these standard operating profiles and the combinations of them cover most applications.

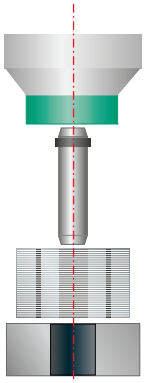
TDC = top dead center of the process [1)]
PS = Pressing start, start of the process data recording [1)]
PP = Probing position (depending on the component geometry)
IP = Intermediate position [1)] (is required for monitoring purposes)
EP = End position [1)]
[1)] adjustable

Target is "Stroke"
Normal operating profile, is typically combined with bend up compensation.

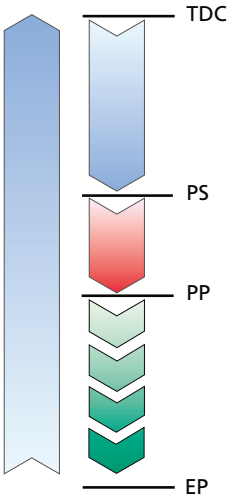


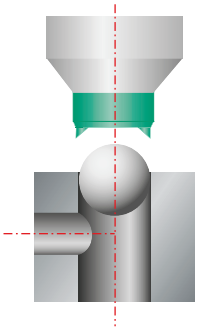


Pressing until reaching a specified position leads to precise results in connection with bend up compensation.

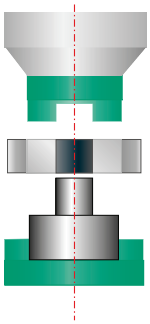


Target is "Force"
For processes in which the force reached is a measure for the process quality e. g. material compression.

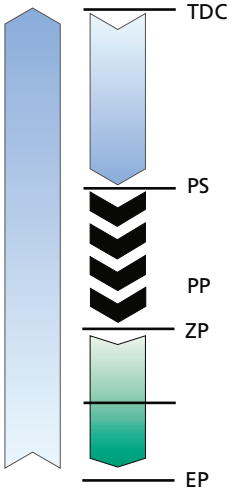


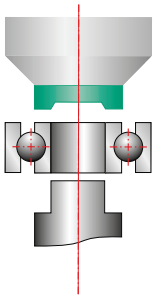


Plugging blind bores – a sphere is pressed in and crimped. Force output correlates to material displacement to determine density and retain force independent of stroke.

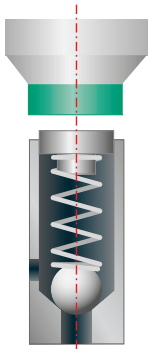


Target is "Delta Stroke" with probing Force
For processes in which component tolerances must be detected. The press detects the surface and presses from this point to a programmed distance.

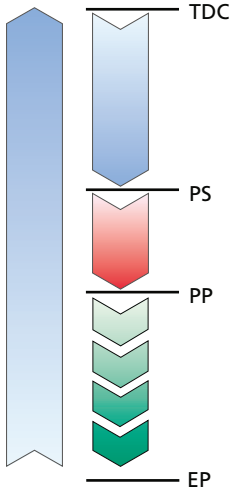


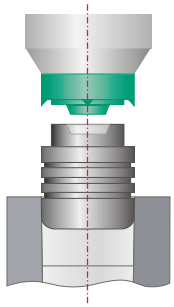


Pressing to a predetermined force which identifies a target feature with which the final pressing distance is measured and pressed.

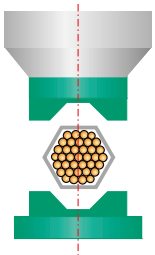


Target is "Force Increase"
The return stroke is triggered by detecting a customer defined force slope.





Pressing of "Beta" plugs or „König" expanders. Sealing and retaining function depend on a force increase that is the return stroke criterion for the press.



SCHMIDT® TorquePress
Precise dynamic

TorquePress 200

TorquePress 520

- high dynamic
- compact design
- maximum force at low rotational speed

The ideal automation component
Driven by an entirely new torque motor development, the **SCHMIDT® TorquePress 520** is the perfect press component for quick and high-precision applications. The new drive technology offers high press force capacity and at the same time low mass moments of inertia that considerably increase the precision of press force and positioning. In automation solutions the quality and the efficiency can thus be considerably improved.

High dynamic, low moment of inertia
In comparison to high ratio servomotors and gear motors the torque motors have a much lower moment of inertia and thus a high dynamic. The start-up time from zero to working speed is only about 100 ms.

Constantly high torque
Due to the high-pole design of the torque motor the maximum torque is already reached at a low speed.

Constant high speed
The speed consistancy is improved by a factor of about 10 compared to conventional drives which results in higher machine precision.

Fully integrated process data acquisition
The force and displacement measurement via an absolute measuring system takes place directly on the ram with a resolution of 0.1 µm. By consequently avoiding gears and other mechanical transmission components a nearly backlash-free construction is possible which in combination with the low inertia, satisfies the highest precision requirements.

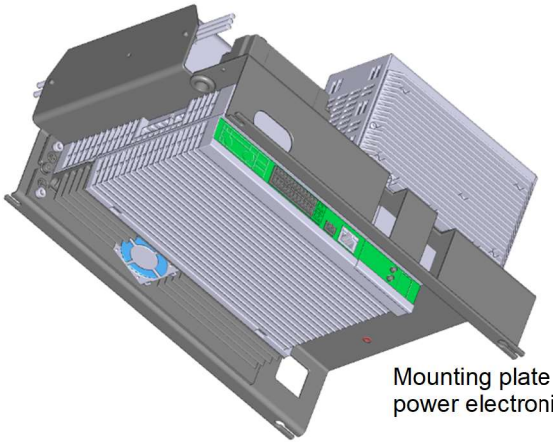
Modular interface
The exchange of data via higher level control becomes more flexible and easier to realize. The user is free to choose: either to select predefined displacement profiles, or to control fully and flexibly the displacement positions, speed and dwell time by higher level control.

SCHMIDT®ServoPress 6xx / TorquePress 560

Smaller, lighter, more rigid and more competitive

SCHMIDT Technology just landed a major coup. The brand-new ServoPress 6xx offers very compact dimensions in conjunction with significantly improved robustness and innovative features, here are the highlights compared to the ServoPress 4xx.

- Power electronics. The physical separation of electronics and the motor leads to a reduced temperature rise of both components thus increased life expectancy. Another benefit is the reduction of vibration load of the electronics.



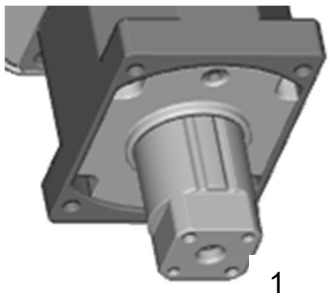
Mounting plate with integrated power electronics (inverter)

- Compactness. Less volume of the press module thanks to the relocation of the power electronics into the switch cabinet. This is certainly more than welcome in any automation environment.

- Position measuring system. The new positioning in the lower end of the ram is improving the system accuracy by compensating mechanical deformation and spindle pitch errors as well as the greatest possible elimination of material changes in length in the event of temperature fluctuations. The improved absolute measuring system allowed us to get rid of the position switches, which again is increasing the reliability of the measuring system. The position resolution of 0.1µm provides a highly accurate target for the control behavior of the inverter.

- Drive. The use of a new motor and improved inverter impresses with improved control characteristics. The higher controller dynamics ensure shorter transmission times on the fieldbus and thus faster response times of the PLC.

- Ram. The new designed ram provides improved robustness and rigidity. The square at the end of the ram is designed for the adaption of existing tools from the ServoPress 4xx modules[1]. The precise anti-rotation of±1 angular minute[2] saves the cost-intensive use of column guides in many cases.



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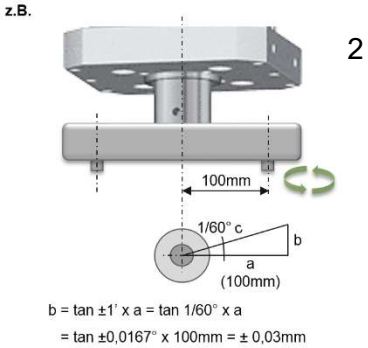
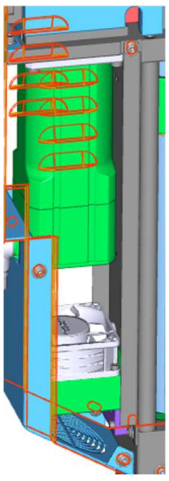
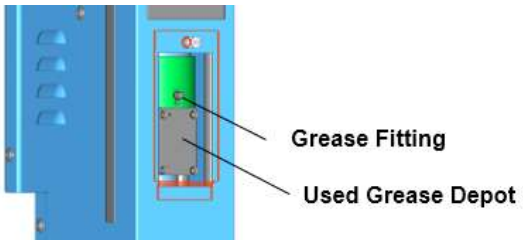


2

- Cooling. Our new ServoPress 6xx got temperature controlled fan speed with monitoring function, which benefits the noise level optimization and at the same time, we have more safety margin in heavy-duty applications. More sophisticated and improved cooling of the motor and the spindle (up to 20 Kelvin less heat development) leads to improved life expectancy, as life is heavily dependent on the temperature.



- Maintenance. The module is easy to maintain due to the automatic lubrication of the spindle and the disposal of the used lubricant into a used grease depot.



- Wear. The newly developed electronic safety device PLe for manual workstations relieves most of the stress from safety components such as the holding brake and contactors, wear will therefore cause significantly less downtime (safe monitoring of the drive axle position in a defined range).

- Future ready. The ServoPress 6xx is of course ready to work with our latest PressControl series 7000 / 700 communicating via EtherCAT. This is enabling us to play within a complex and data intensive industry 4.0 environment.

- Data Transfer. The new Process Data Acquisition with EtherCAT interface increases the data transfer rate with the PressControl by a factor of up to 10, thus shortening the response time to process events in real time.

- Technical data.

Press Type		SP 605	SP 616	SP 617	SP 620	SP 650	SP660	TP 560
Force F max. in S3-mode [1]	kN	0,8	5	14	35	75	160	100
Force F at 100 % continuous run	kN	0,5	3	7,5	20	50	110	50
Stroke	mm	150	200	300	400	500	350	300
Speed max.	mm/s	0 - 300	0 -200	0 -200	0 -200	0 -200	0-100	0-200
Resolution Drive	µm	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Resolution PDA								
Stroke	µm/inc	2,2	3,2	4.6	6,1	7.6	5.4	4.7
Force	N/inc	0.25	1.5	3.75	10	24	48	30
Throat	mm	130	130	150	160	160	160	160
Measurement Module H/W/D	mm	636/89/155	599/124/258	892/144/318	1077/190/384	1250/243/561	1249/249/552	1438/304/255
Weight Module	kg	11,6	25	64	113	225	283	230
Ram Bore	mm	6H7	10H7	20H7	20H7	20H7	20H7	20H7
Ram Dimensions	mm	Ø 25	Ø 40/ ı 32	ı 42	ı 55	ı 65	Ø 90	Ø 60
max. Tool Weight	kg	≤ 5	≤ 15	≤ 25	≤ 50	≤ 100	≤ 100	≤ 100

1 S3-mode (periodic duty)
e.g. Fmax for 25% of the total cycle time
=> Fmax for 5s in 20s total cycle time