

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

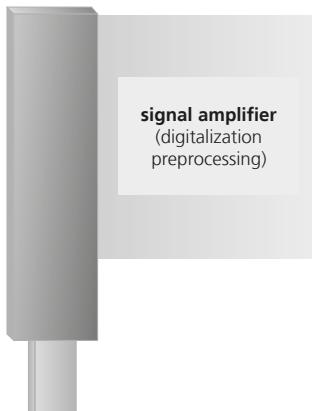
SCHMIDT® ServoPress/TorquePress

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 measure-

ment technology and control unit. These requirements have been taken into account in the system architecture of a **SCHMIDT® ServoPress /TorquePress**.

SCHMIDT® ServoPress module



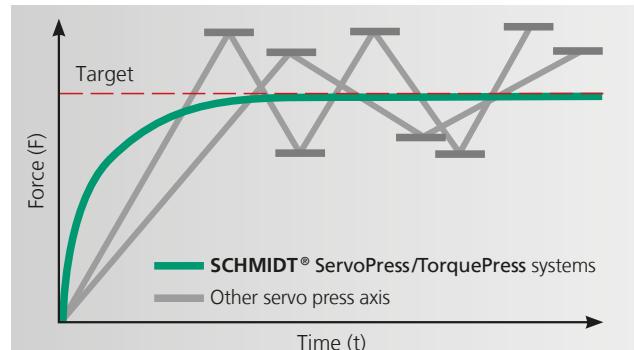
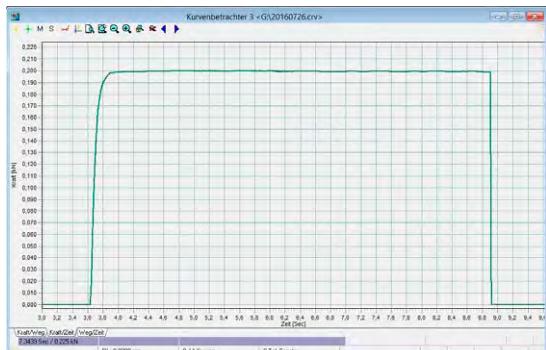
Digitalized force/stroke signals PressControl 5000 RT



PressControl 5000 HMI



SCHMIDT® PressControl 600



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

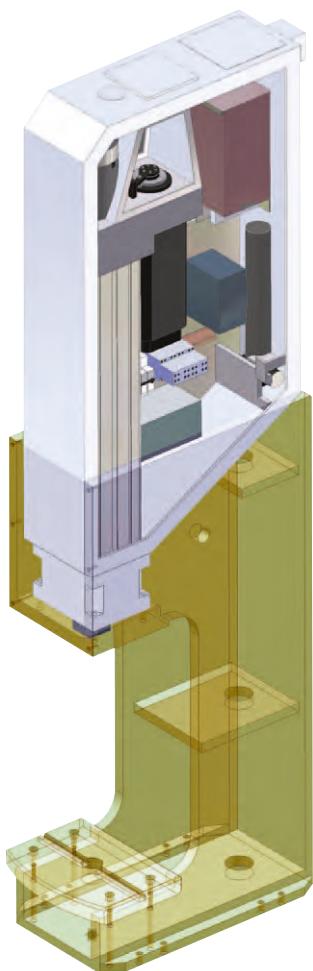
Service-friendly

- 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

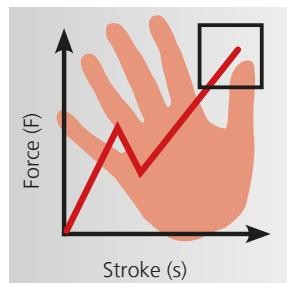


Dynamic bend up compensation

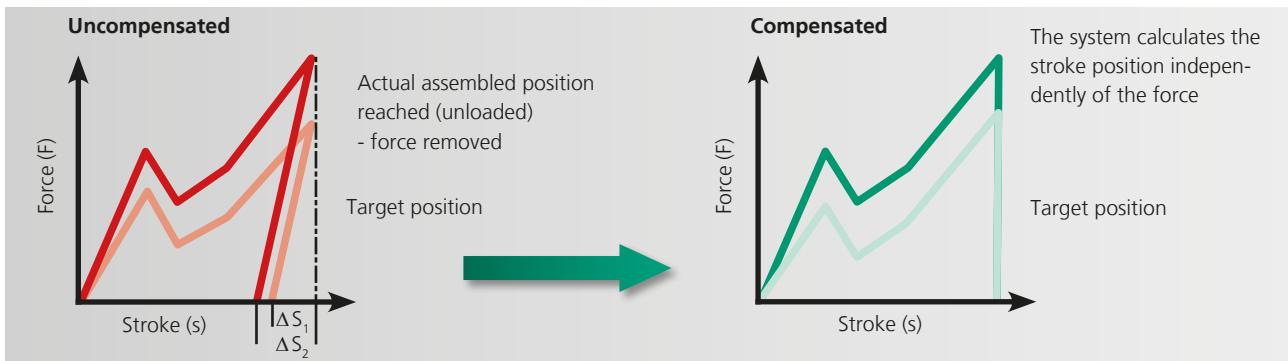
Patented feature

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.



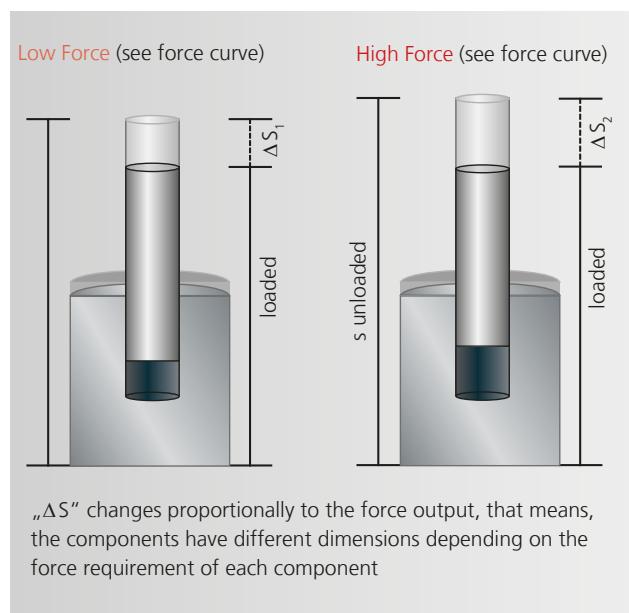
Patented Dynamic Bend up compensation by **SCHMIDT Technology**



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.

- 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 process¹⁾

PS = Pressing start, start of the process data recording¹⁾

PP = Probing position (depending on the component geometry)

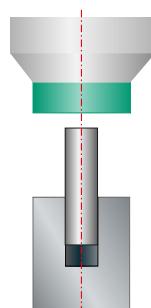
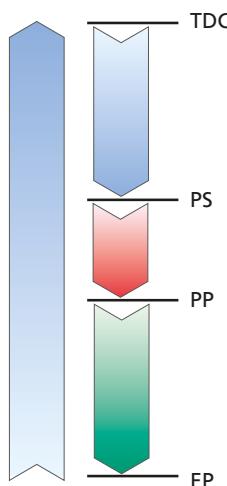
IP = Intermediate position¹⁾ (is required for monitoring purposes)

EP = End position¹⁾

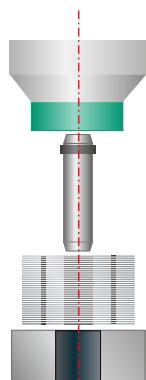
¹⁾ adjustable

Target is "Stroke"

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

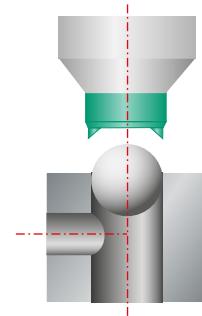
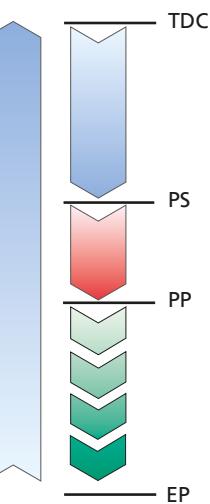


Pressing until reaching a specified position leads to precise results in connection with bend up compensation.

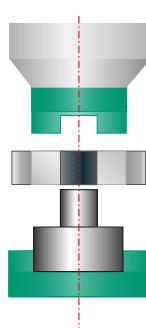


Target is "Force"

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

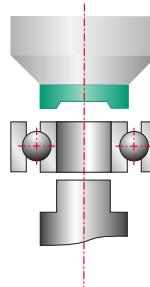
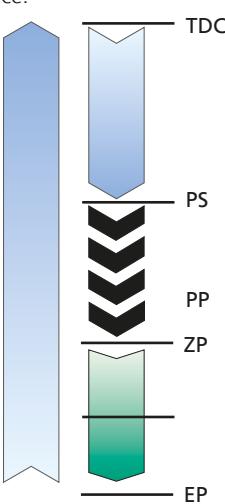


Plugging blind bores – a sphere is pressed in and crimped. Force output correlates to material displacement to determine density and retain force independent of stroke.

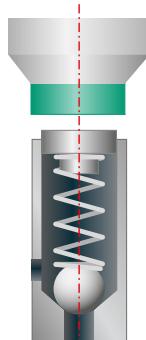


Target is "Delta Stroke" with probing Force

For processes in which component tolerances must be detected. The press detects the surface and presses from this point to a programmed distance.

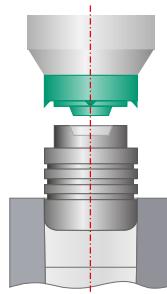
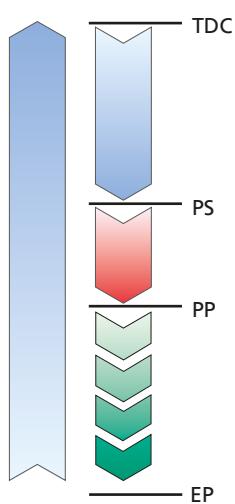


Pressing to a predetermined force which identifies a target feature with which the final pressing distance is measured and pressed.

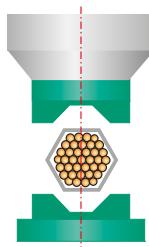


Target is "Force Increase"

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.

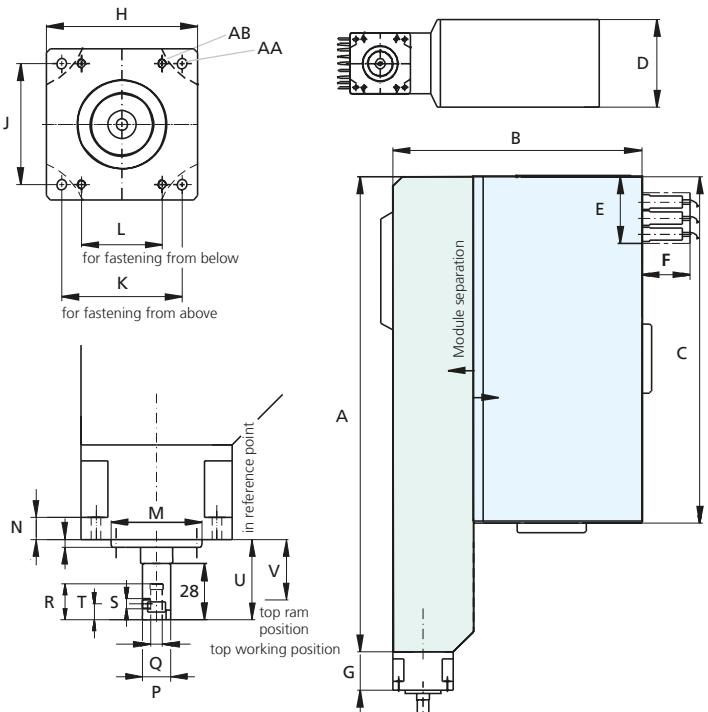


SCHMIDT® ServoPress

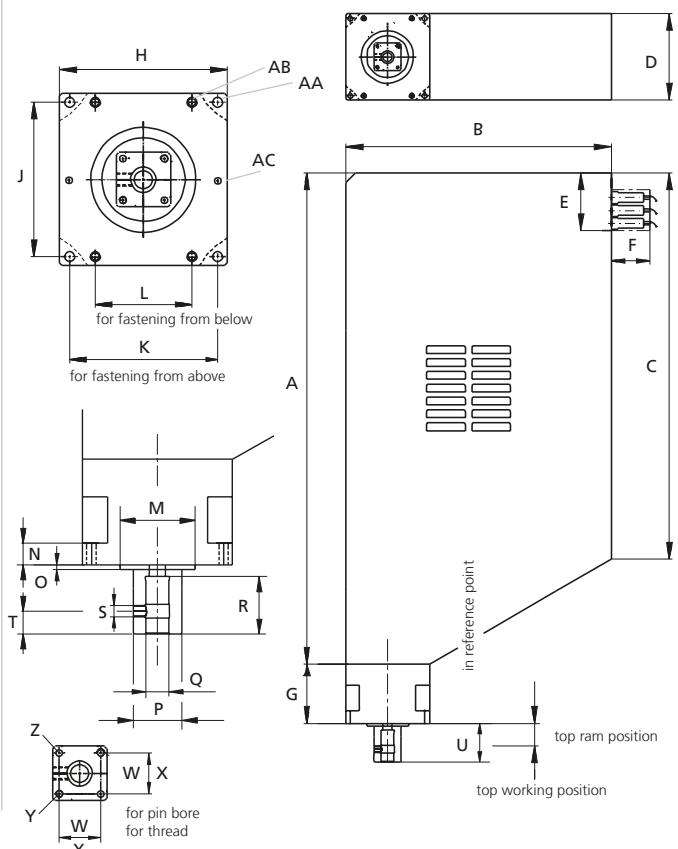
Modules with large application range



ServoPress 405



ServoPress 415 to 460



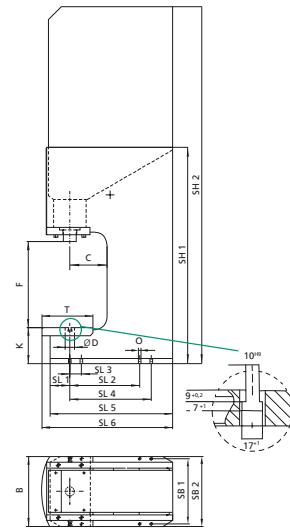
Modules

With force outputs of 15 N to 150 kN

ServoPress Type		405	415	416	417	420	450	460
Force F	F kN	0.8	4.5	5	14	35	75	150
Force F at 100% duty cycle	F kN	0.5	1.5	3	7.5	20	50	100 ¹⁾
Ram stroke	mm	150	200	200	300	400	500	500
Resolution (drive control)	µm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Resolution data acquisition								
Stroke	µm/inc	2.4	4	4	5	6	8	8
Force	N/inc	0.25	1	1	3.75	10	24	48
Ram speed	mm/s	0 - 300	0 - 200	0 - 200	0 - 200	0 - 200	0 - 200	0 - 100
Overload protection		-	Mech. clutch	Mech. clutch	Mech. clutch	Mech. clutch	Mech. clutch	Mech. clutch
Service life of the cycles acc. to standard operating profile		2 x 10 ⁷	2 x 10 ⁷	2 x 10 ⁷	2 x 10 ⁷	2 x 10 ⁷	2 x 10 ⁷	1 x 10 ⁷
Drive		ball screw	ball screw	ball screw	ball screw	roller screw	roller screw	roller screw
Power supply		230 V 1~/6.3 A (208 V 3~/6.3 A)	230 V 1~/6.3 A (208 V 3~/6.3 A)	230 V 1~/6.3 A (208 V 3~/6.3 A)	230 V 1~/16 A	400 V 3~/16 A	400 V 3~/35 A	400 V 3~/35 A
Weight (standard)	approx. kg	20	27	27	70	120	240	240
	A mm	590	560	560	762	978	1166	1166
	B mm	309	330	330	412	535	677	677
	C mm	440	434	434	600	763	992	992
	D mm	109	109	109	134	180	236	236
Cable connection	E mm	~ 75	~ 75	~ 75	~ 90	~ 100	~ 90	~ 90
	F mm	~ 60	~ 60	~ 60	~ 60	~ 60	~ 60	~ 60
Flange	G mm	47	77	77	92	122	120	120
	H mm	75	75	75	130	140	150	150
	J mm ± 0.1	60	88	88	120	160	210	210
	K mm ± 0.1	60	63	63	115	120	130	130
	L mm ± 0.1	40	59.4 x 59.4	59.4 x 59.4	75			
	M Ø mm	45h6	45h6	45h6	65h6	90h6	100h6	100h6
	N mm	11	11	11	19	32	33	33
	O mm	4	4	4	4	5	5	5
	AA Ø mm	5,3	6,3	6,3	8,4	10.1 / M12	12.0 / M14	12.0 / M14
	AB Ø mm	M5	M6	M6	M8			
	AC Ø mm						12.0 / M14	12.0 / M14
Ram								
External ram dimensions	P mm	Ø 14	32 x 32	32 x 32	42 x 42	55 x 55	65 x 65	65 x 65
Ram bore (with bushing)	Q Ø mm	6H7	10H7	10H7	20H7	20H7	20H7	20H7
	R mm	18	30	30	50	40	50	50
	S mm	M5	M8	M8	M10	M10	M10	M10
	T mm	8	10	10	20	20	20	20
Top working position	U mm	40	50	50	60	60	60	60
Top ram position	V mm	30	39	39	33	45	45	45
for pin bore	W mm ± 0.02		22	22	32	40	40	40
for thread	X mm		22	22	32	40	40	40
	Y			M5	M6	M8	M8	M8
	Z Ø mm			5H7	5H7	8H7	8H7	8H7

¹⁾ 100 kN S3 66 % 30 s; 90 kN 100 % ED

Press Type	SP 405	SP 415/416	SP 417	SP 420	SP 450	SP 460
Frame						
Throat depth	C mm	130	130	150	160	160
Table bore	D Ø mm	20H7	20H7	40H7	40H7	40H7
Working height	F mm	246	300	387	518	612
Table height	K mm	93	113	128	155	190
Table size	B x T mm	160 x 140	220 x 175	250 x 200	300 x 220	370 x 230
Mounting surface	BxSL 6 mm	160 x 345	220 x 405	250 x 460	300 x 563	370 x 635
	O Ø mm	9	11	11	13	13
	SL 1 mm	50	80	80	85	95
	SL 2 mm	220	250	250	300	350
	SL 3 mm				50	50
	SL 4 mm				350	400
	SL 5 mm	325	390	430	528	600
	SL 6 mm	345	405	460	563	635
	SH 1 mm	510	630	780	1080	1150
	SH 2 mm	1016	1100	1430	1835	2150
	SB 1 mm	140	200	220	280	350
	SB 2 mm	160	220	250	300	370
						390



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 consistency 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.

Modules

With force outputs of 20 kN to 230 kN

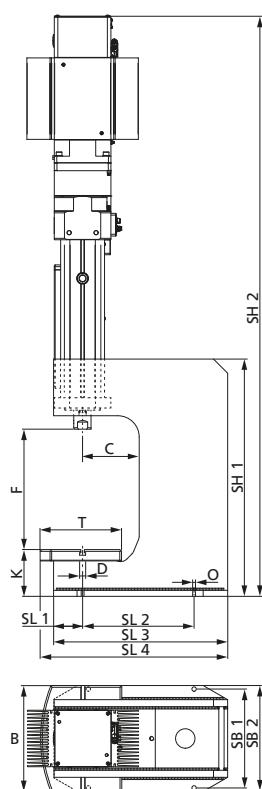
Technical Data	TorquePress 520	TorquePress 200
Force F max. ¹⁾	20 kN	230 kN
Force F at 100 % ED ²⁾	10 kN	200 kN
Ram stroke	250 mm	500 mm
Resolution (drive control)	< 0.1 µm	< 0.1 µm
Process data acquisition		
- Force	4 µm/inc.	8 µm/inc.
- Stroke	6.25 N/inc.	100 N/inc.
Ram speed (max.)	260 mm/s	200 mm/s
Overload protection	electrical	mechanical
Service life of the cycles acc. to standard operating profile	2×10^7	1×10^7
Drive	ball screw	planetary roller screw drive
Power supply	400 V 3~ / 16 A	400 V 3~ / 32 A, 400 V Steckdose CEE
Weight / height resp. length	95 kg / 1100 mm	770 kg / 2300 mm
Control unit	SCHMIDT® PressControl 5000 / 600	SCHMIDT® PressControl 5000 / 600

¹⁾ Temporary peak load

²⁾ Nominal power in continuous operation

Press Frame Type	TP 520	TP 200
Weight	kg	120
Throat depth	C mm	160
Table bore	D Ø mm	40H7
Working height	F mm	340
Table height	K mm	132
Table size	B x T mm	300 x 230
Mounting surface	B x SL6 mm	300 x 530
O	Ø mm	12,5
SL 1	mm	82
SL 2	mm	300
SL 3	mm	492
SL 4	mm	520
SL 5	mm	
SL 6	mm	
SH 1	mm	670
SH 2	mm	1640
SB 1	mm	280
SB 2	mm	300
		850
		2990
		600
		810

³⁾ H-frame version



Detailed dimensional drawings can be downloaded:
www.schmidttechnology.de