

SCHMIDT® ServoPress

Unmatched Precision and Flexibility

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, 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 automatic production lines.

Features

- Superior process control behavior compared to conventional NC axis
 - quick
 - repeatable
 - can be optimized for your application
- Intelligent compensation
 - due to calculation of individual tolerances of the parts
 - of system elasticities (dynamic bending compensation)
- Free positioning with changing process forces
 - without fixed tool stop
 - positioning in 1/100 mm range
- Real time evaluation
 - true close-loop control
 - direct reaction to process and quality data
 - no delay caused by low process data transfer
 - immediate availability of SPC data
- Precise and robust mechanical construction
- System is immediately ready for operation
 - standard travel profiles only require the entry of position and speed
 - system automatically parameterizes itself



SCHMIDT® TorquePress

Torque-Power for Servopress

High-dynamic, powerful and low operation costs – these are the advantages by using a torque motor in the **SCHMIDT® TorquePress 200** with 200 kN nominal force and 500 mm stroke.

Torque motors are used for fast and precise move- and positioning tasks and make high torques available. Due to the hollow shaft design mechanical intermediate elements as gear, clutch or belt are not necessary. Especially in this range of performance the mentioned parts – operated under load – are subject to an accordingly high wear. Parts which are not required do not cause any costs and this reduces the service effort. Construction will be more rigid, this is very important in order to realize more dynamic motion-sequences in the assembly technology.



The very high torque of the **SCHMIDT® TorquePress 200** 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 200** 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.

SCHMIDT® TorquePress 200 is permanent load stable due to its active temperature-controlled cooling, like all **ServoPresses** of **SCHMIDT Technology**. A mechanical overload protection becomes active in case allowable top force of 250 kN has been exceeded.

Further highlights are the highly precise, wear-free roller-guide of the ram, the integrated fail-safe force-stroke monitoring and a true closed loop force control integrated in the drive control (continuous force control). The integrated two-channel safety technology according to PLe allows the EC-type approval for complete systems, which is required for manual load work stations.

Technical Data	
Force F max.	250 kN
Force F at 100 % ED	200 kN
Ram stroke	500 mm
Resolution (drive control)	< 0,1 µm
Process data acquisition	
- Force	8 µm/inc.
- Stroke	100 N/inc.
Ram speed (max.)	200 mm/s
Overload protection	Mechanical
Service life of the cycles acc. to standard operating profile	1 x 10 ⁷
Drive	Planetary roller screw drive
Power supply	400 V 3~ / 32 A, 400 V power socket CEE
Weight / height resp. length	
- Modul (approx.)	770 kg / 2300 mm (upright resp. horizontal)
- H-frame (approx.)	980 kg / 850 mm (upright resp. horizontal)
- Press base	approx. 125 kg / height flexible
Control unit	SCHMIDT® PressControl 5000

SCHMIDT® ServoPress/TorquePress

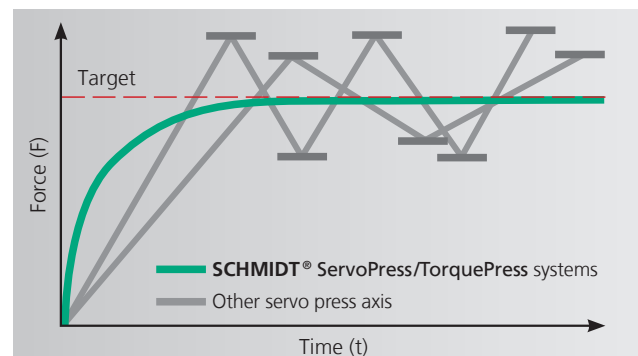
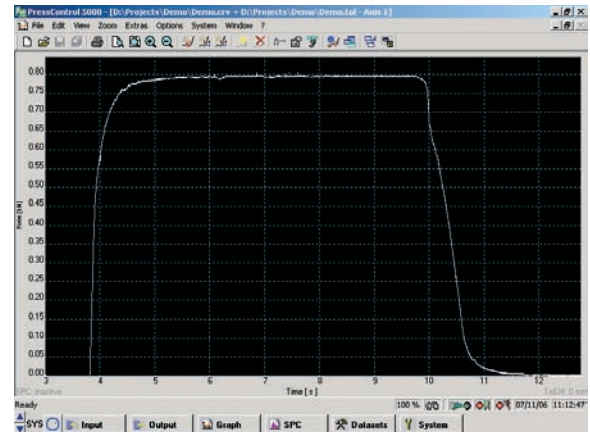
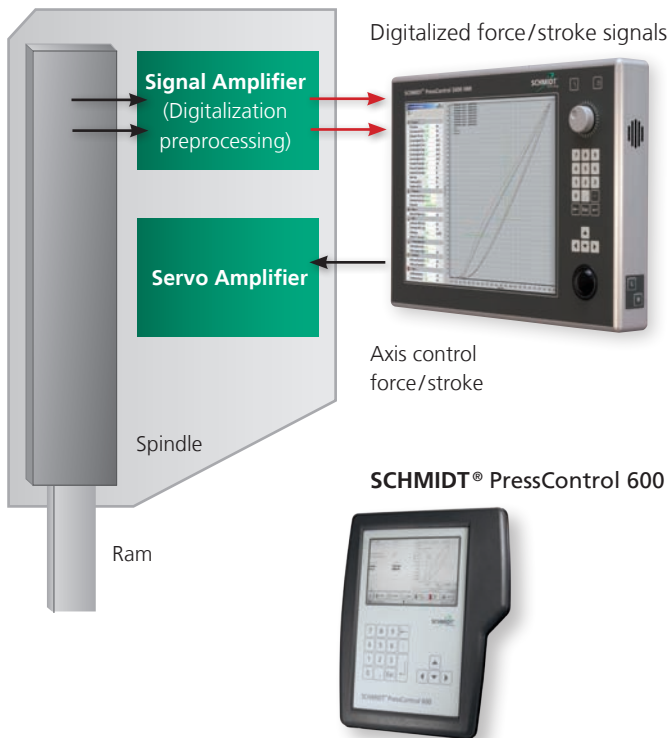
Superior controlled Behavior

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 behavior of the press. This requires an integrated system consisting of drive unit, processmeasure-

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

SCHMIDT® ServoPress Module

SCHMIDT® PressControl 5000



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 overtravelling 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 behavior 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**

* Regulation exclusively by position controller

These characteristics are achieved exclusively by combining the following features:

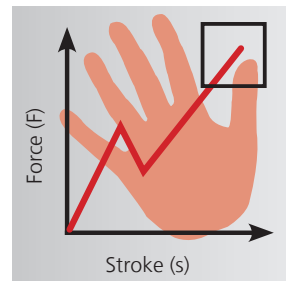
- Integrated measurement technology [scanning rate 2000 Hz]
 - Free-of-play distance measurement, force measurement without lateral forces
- Amplification of the process signals on the **SCHMIDT® ServoPress/TorquePress** module
 - Insensitive against electromagnetic interferences (EMC)
- The system is 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
- CNC with extended command set, in particular for controlling force-regulated positioning tasks

Dynamic Bending Compensation

Patented Feature

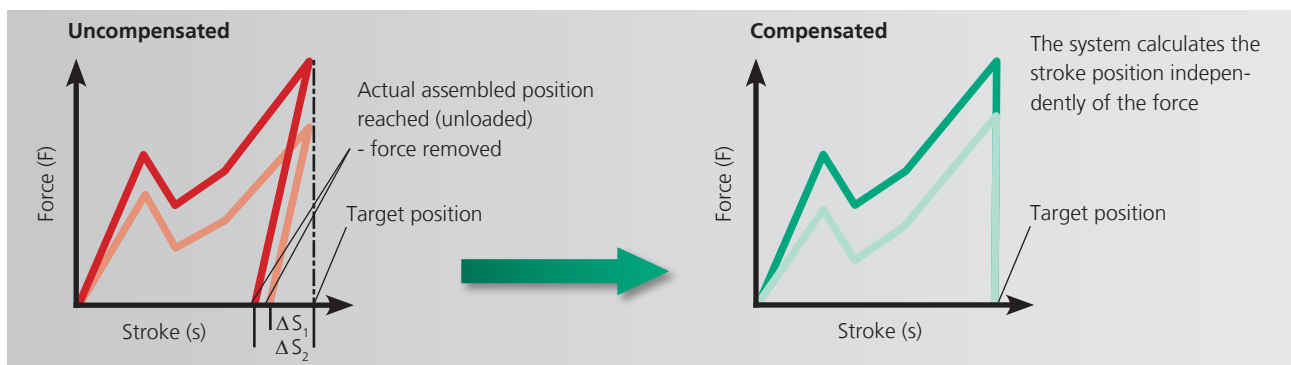
In order to achieve assembly requirements in the 1/100 mm range, compensation of the system yield is required. Workpiece, tooling and machine are elastically deformed by the varying forces induced during the pressing process. Once the operation is complete and the press force is removed, this deformation 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 Bending Compensation by SCHMIDT Technology



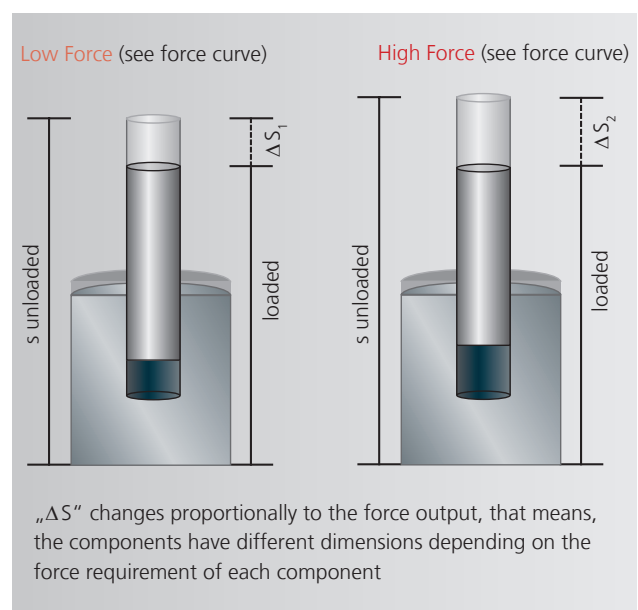
In typical applications, the force required to complete an assembly varies up to 40% from part to part. When freely positioning, such as without a positive stop, the press ram extends to the same target position, regardless of load. But a closer inspection of the completed assembly and the force/distance 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 bending compensation, can the end position 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 bending compensation does not reduce the process speed
- Dynamic bending 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 bending compensation.

Target is "Force"

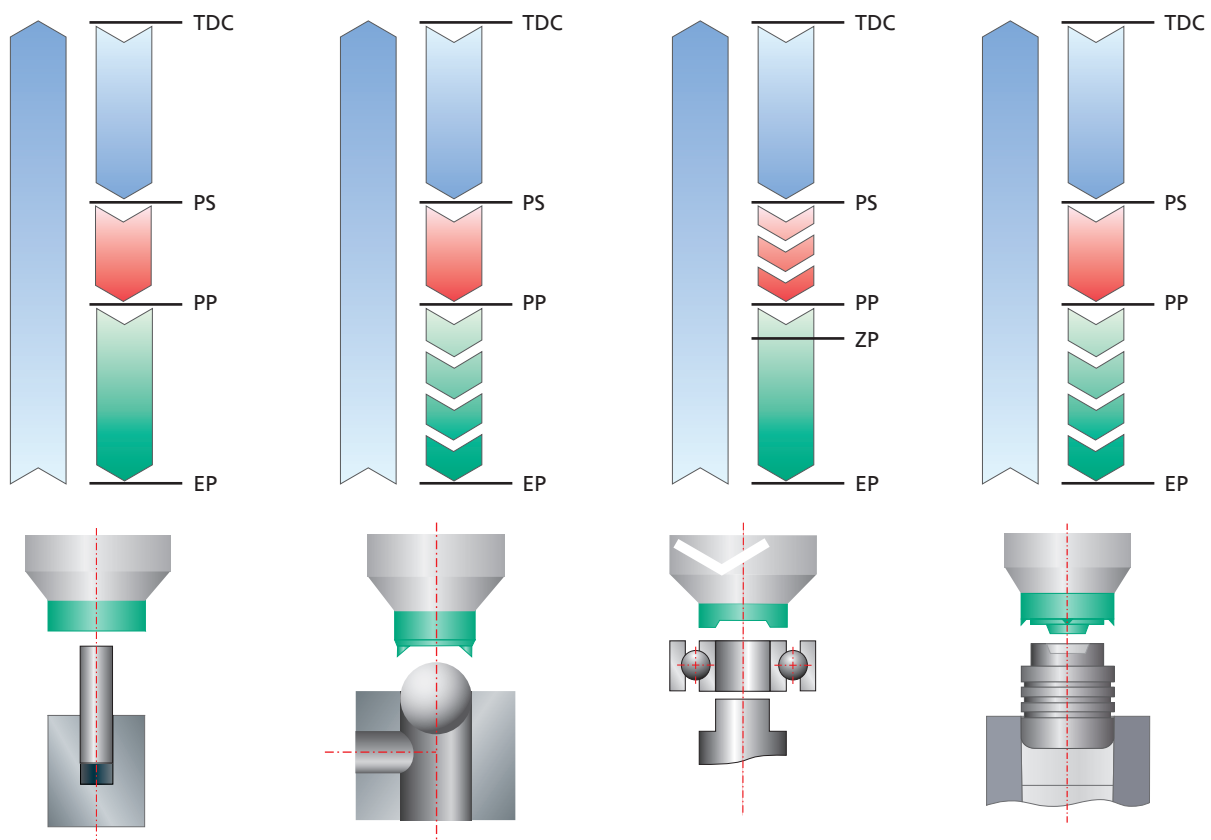
For processes in which the force reached is a measure for the process quality e. g. material compression.

Target is "Delta Stroke" with probing Force

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

Target is "Force Increase"

The return stroke is triggered by detecting a customer defined force slope.

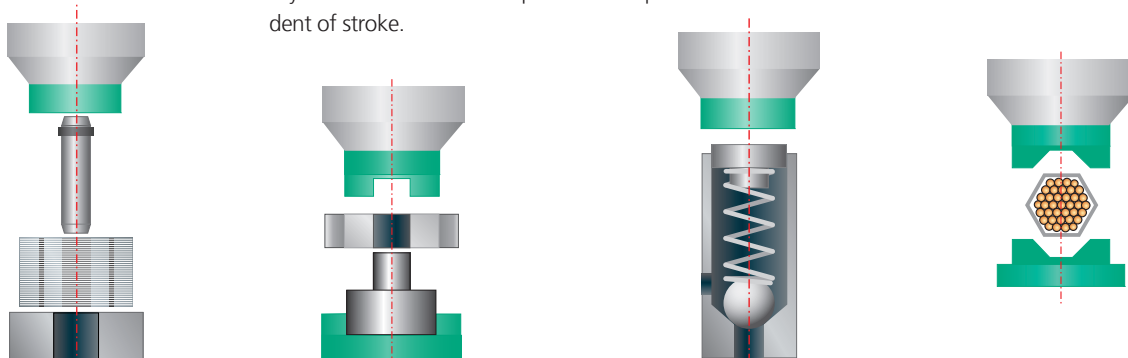


Pressing until reaching a specified position leads to precise results in connection with bending compensation.

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.

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

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/TorquePress

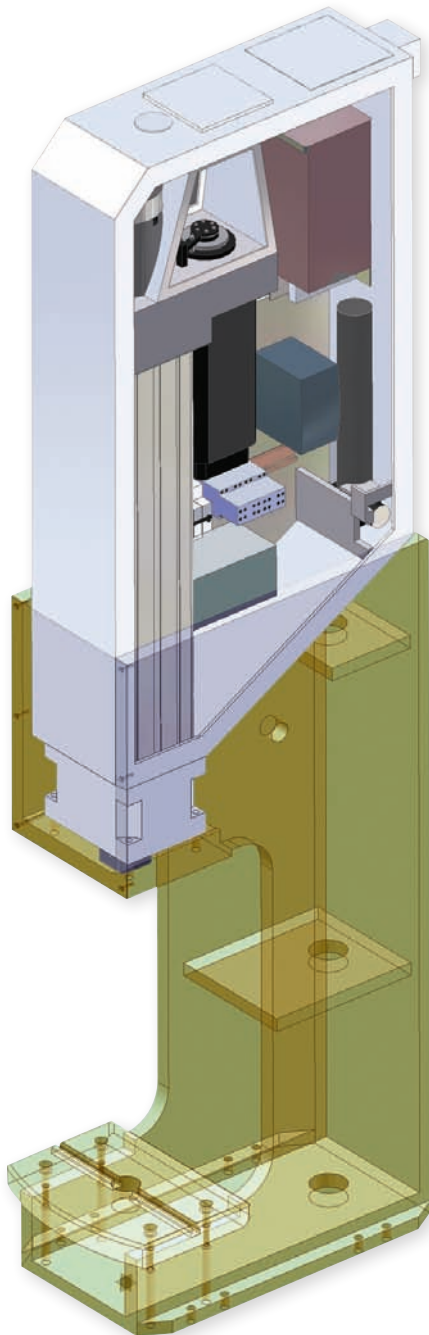
Uncompromising mechanical Quality

The solid, unique mechanics of the **SCHMIDT® ServoPress /TorquePress** is a 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.



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 (without additional friction such as with slot guidance)

Built-in Auto-Protection and Maintenance

- Fully automated spindle lubrication
- Mechanical clutch as overload protection for motor & load cell
- Cooling and thermal monitoring of mechanical and electronic system
- Current limitation if exceeding admissible load
- 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 LV system EC type-approved

- Two-channel safety circuit, PLe

As a Result, this means the following for your Application:

Excellent efficiency
Maximum capacity
High production safety

- 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

SCHMIDT® ServoPress

Modules with large Application Range



Press Typ 405

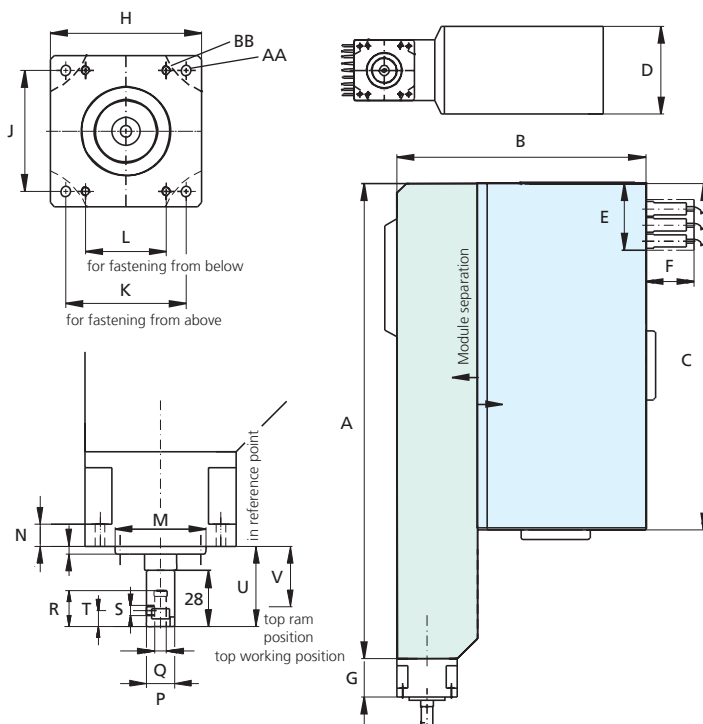
Press Typ 415/416

Press Typ 417

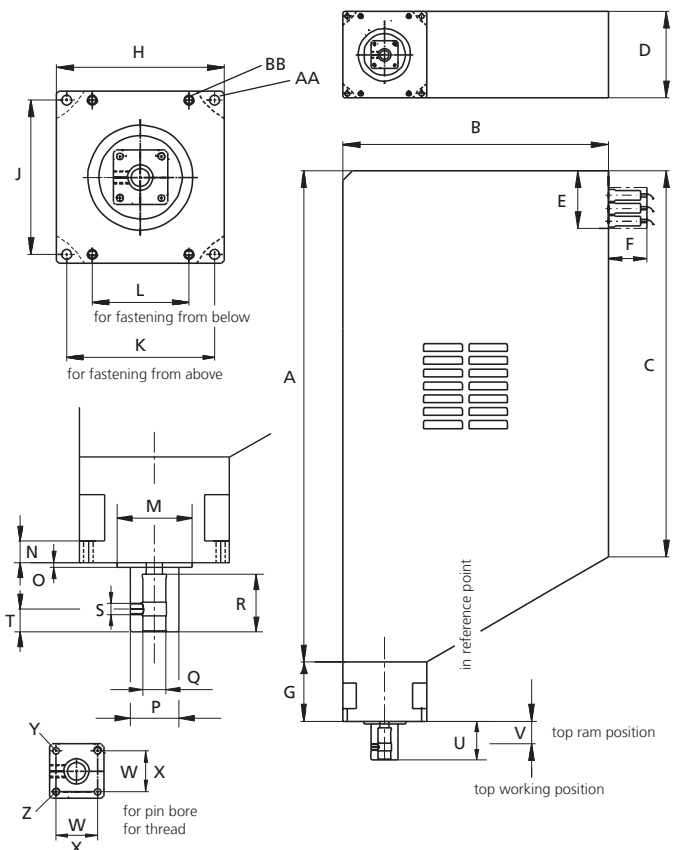
Press Typ 420

Press Typ 450/460

ServoPress 405



ServoPress 415 to 460



Modules

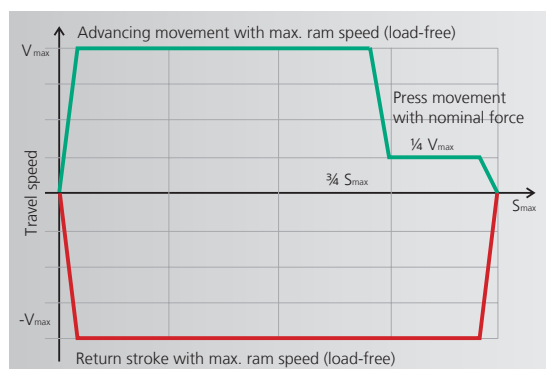
With Force Outputs of 15 kN to 150 kN

Servopress Type		405	415	416	417	420	450	460
Force F	F max. 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
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		2×10^7	2×10^7	2×10^7	2×10^7	2×10^7	2×10^7	1×10^7
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

Module Dimensions

Servopress Type		405	415 / 416	417	420	450 / 460
Housing						
	A mm	590	560	762	978	1166
	B mm	309	330	412	535	677
	C mm	440	434	600	763	992
	D mm	109	109	134	180	236
Cable connection						
	E mm	~ 75	~ 75	~ 90	~ 100	~ 90
	F mm	~ 60	~ 60	~ 60	~ 60	~ 60
Flange						
	G mm	47	77	92	122	120
	H mm	75	75	130	140	150
	J mm ± 0.1	60	88	120	160	210
	K mm ± 0.1	60	63	115	120	130
	L mm ± 0.1	40	59.4 x 59.4	75		
	M Ø mm	45h6	45h6	65h6	90h6	100h6
	N mm	11	11	19	32	33
	O mm	4	4	4	5	5
	AA Ø mm	5.3	6.3	8.4	10.1	12.0
	BB Ø mm	M5	M6	M8	M12	M14
Ram						
External ram dimensions	P mm	Ø 14	32 x 32	42 x 42	55 x 55	65 x 65
Ram bore (with bushing)	Q Ø mm	6H7	10H7	20H7	20H7	20H7
	R mm	18	30	50	40	50
	S mm	M5	M8	M10	M10	M10
	T mm	8	10	20	20	20
Top working position	U mm	40	50	60	60	60
Top ram position	V mm	30	39	33	45	45
for pin bore	W mm ± 0.02		22	32	40	40
for thread	X mm		22	32	40	40
	Y mm		M5	M6	M8	M8
	Z Ø mm		5H7	5H7	8H7	8H7

Standard Operating Profile



SCHMIDT® ServoPress/TorquePress

Manual Workstation with Light Curtain

SCHMIDT® ServoPress/TorquePress manual workstations are delivered ready for operation with press base, transparent protective guarding and light curtain. These systems are single workstations, which can be delivered with all SCHMIDT® ServoPress/TorquePress modules.

Included in the scope of delivery are:

- Module SCHMIDT® ServoPress/TorquePress mounted on a frame
- SCHMIDT® PressControl 600 or PressControl 5000 with pendant arm system
- Press base PU10
- Transparent protective guarding with light curtain
- Distance light curtain adjustable in order to ensure a safe distance to the tool.
- Auxiliary control cabinet

All systems are EC type-approved

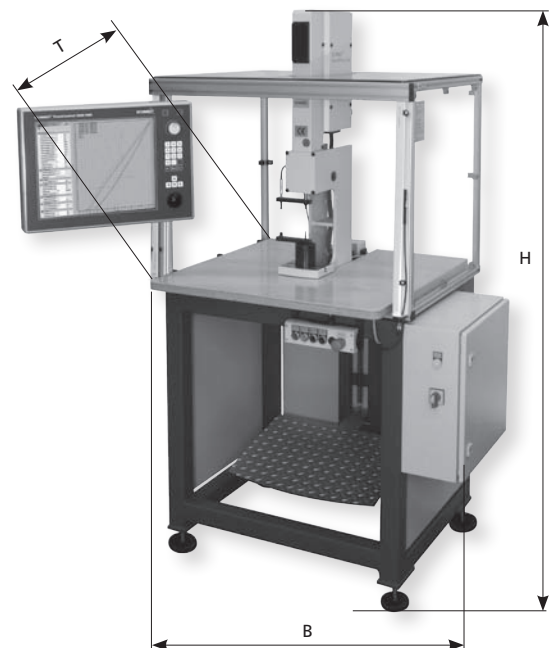
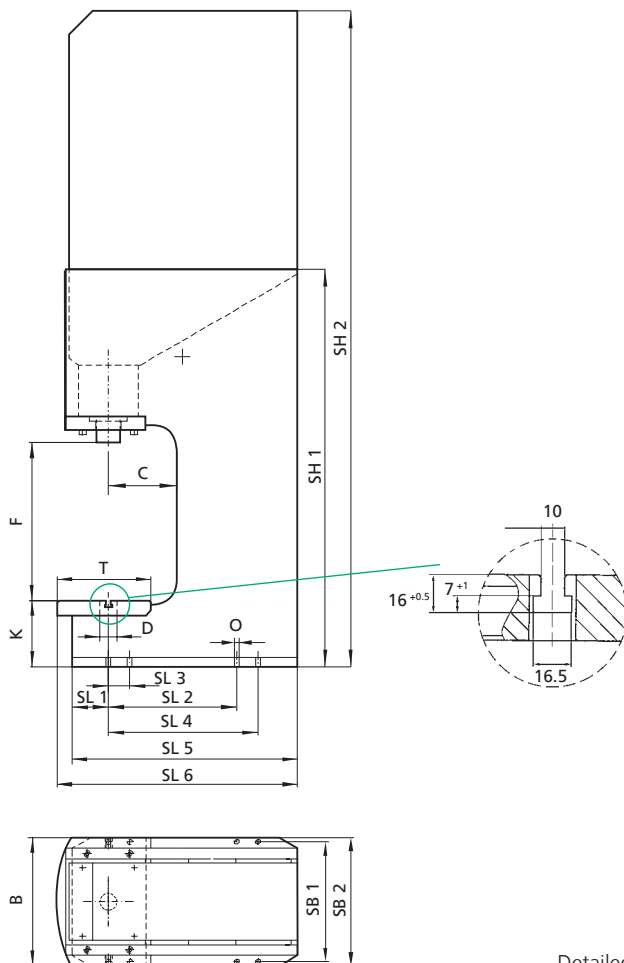


Workstations SCHMIDT® ServoPress

With Force Outputs from 15 kN to 150 kN

ServoPress Type		405	415/416	417	420	450	460
Dimensions - single workstation							
Width	B mm	~ 1120	~ 1120	~ 1120	~ 1120	~ 1120	~ 1120
Depth	T mm	~ 890	~ 890	~ 1140	~ 1140	~ 1140	~ 1140
Hight	H min. mm	1880	min. 1880	min. 2230	min. 2630	min. 2810	min. 2810
Working area	mm	~ 850 x 700 x 650	~ 850 x 700 x 650	~ 850 x 700 x 650	~ 850 x 700 x 650	~ 875 x 980 x 650	~ 875 x 980 x 650
Ram center - light curtain	mm	320	330	278,5 - 378,5	330 - 430	370 - 470	370 - 470
Weight	approx. kg	305	310	390	570	790	790

ServoPress Type		405	415/416	417	420	450	460
Frame							
Throat depth	C mm	130	130	150	160	160	160
Table bore	D Ø mm	20H7	20H7	40H7	40H7	40H7	40H7
Working height	F mm	246	300	387	515	512	512
Table height	K mm	93	113	128	155	190	220
Table size	B x T mm	160 x 140	220 x 175	250 x 200	300 x 220	370 x 230	370 x 230
Mounting surface	mm	160 x 345	220 x 405	250 x 460	300 x 563	370 x 635	370 x 760
	O Ø mm	9	11	11	13	13	13
	SL 1 mm	50	80	80	85	95	95
	SL 2 mm	220	250	250	300	350	350
	SL 3 mm				50	50	50
	SL 4 mm				350	400	400
	SL 5 mm	325	390	430	528	600	725
	SL 6 mm	345	405	460	563	635	760
	SH 1 mm	510	630	780	1080	1050	1092
	SH 2 mm	1016	1100	1430	1835	2050	2070
	SB 1 mm	140	200	220	280	350	350
	SB 2 mm	160	220	250	300	370	370



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

SCHMIDT® ServoPress/TorquePress

Typical Automation System Design

When integrating the **SCHMIDT® ServoPress/TorquePress** into assembly lines, cable lengths need to be specified. The following diagram shows the wiring.

