

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 4000** or **5000** control unit and **SCHMIDT® ServoPress** modules. They meet the most complex requirements, as stand-alone machines or in automatic production lines.

Features:

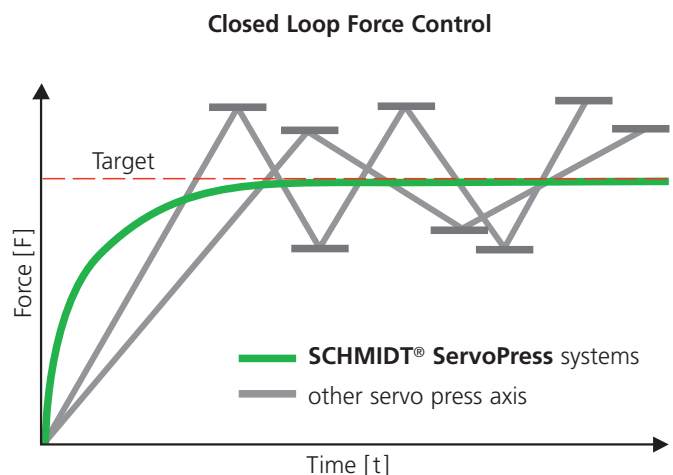
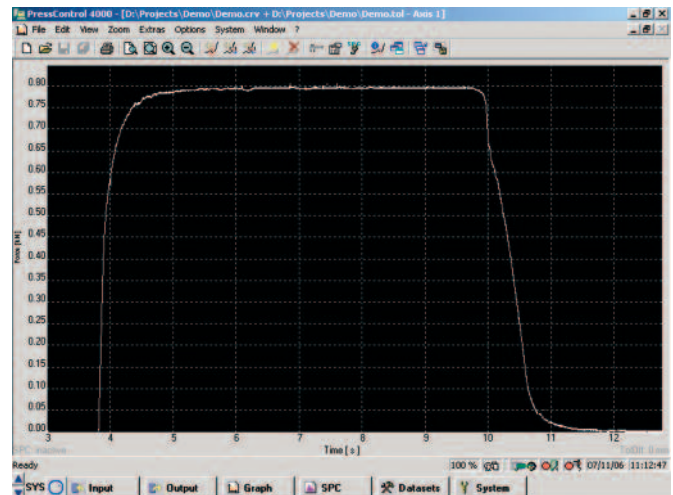
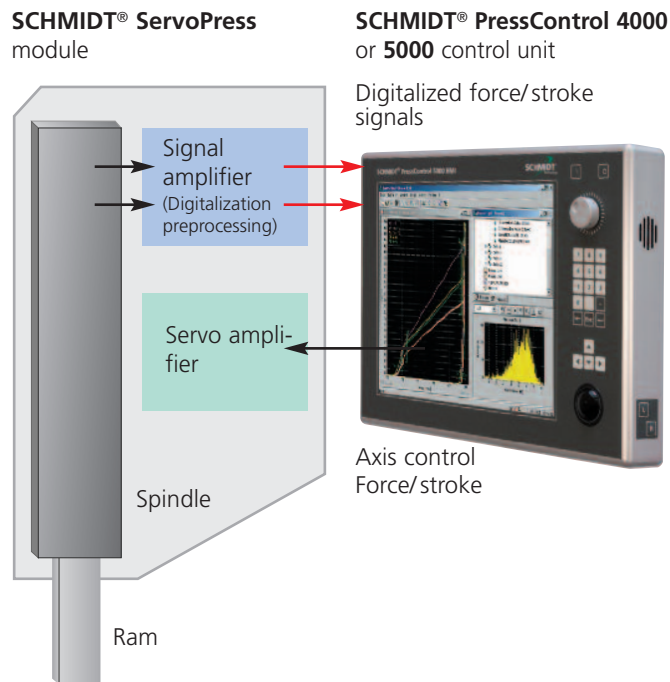
- Superior process control behavior compared to conventional NC axis
 - quick
 - repeatable
 - can be optimized for your application
- Intelligent compensation
 - due to calculation of individual tolerances of the parts
 - of system elasticities (dynamic bending compensation)
- Free positioning with 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® ServoPress

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, process measurement technology and control unit. These requirements have been taken into account in the system architecture of a **SCHMIDT® ServoPress**.



SCHMIDT® ServoPresses work with real force controllers, unlike the simple switching controllers used by other manufacturers.

That means:

- Quickly reaching the nominal values
- No overtraveling 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**.

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** module
 - Insensitive against electromagnetic interferences (EMC)
- The system is completed by using **SCHMIDT® PressControl 4000 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

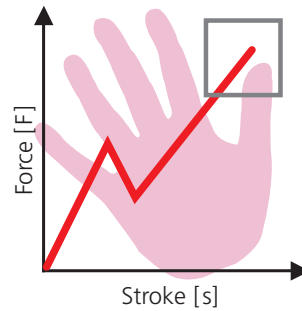
Dynamic Bending Compensation

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.

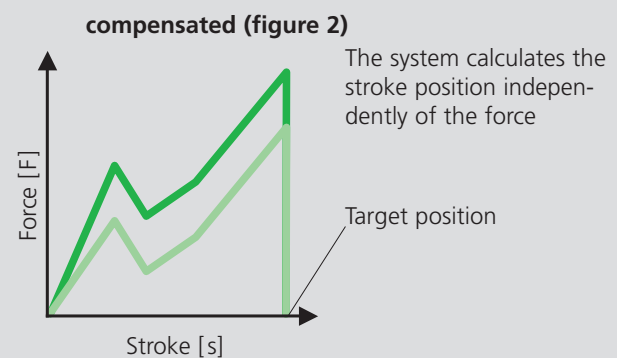
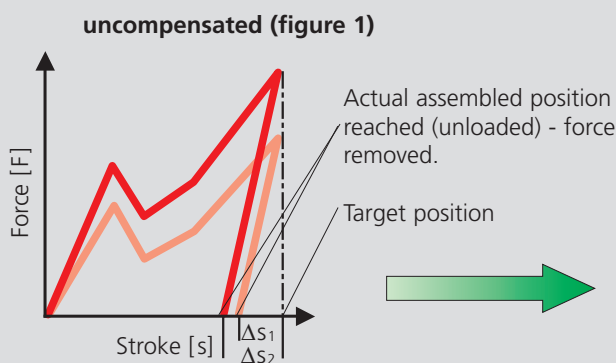
How It Works:

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



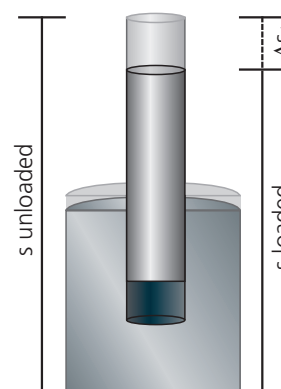
In typical applications, the force required to complete an assembly varies up to 40 % from part to part. When freely positioning, such as without a positive stop, the press ram extends to the same target position, regardless of load. But a closer inspection of the completed assembly and the force/distance 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** 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)

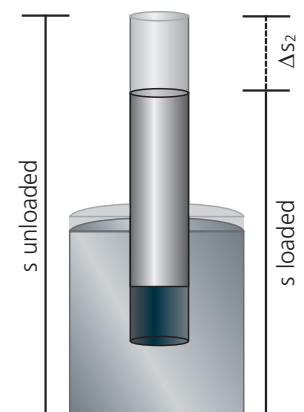
Pressing a pin in a bushing

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.

low force (see force curve)



high force (see force curve)



„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** 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.

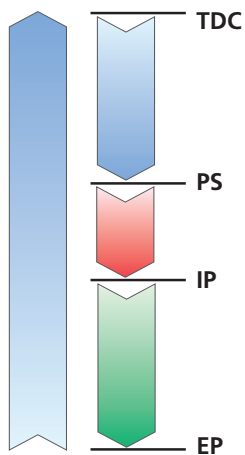
SCHMIDT® ServoPress

Operating profiles and applications

SCHMIDT® ServoPresses 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.

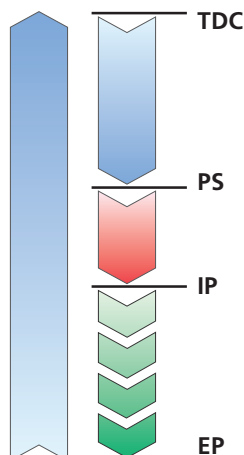
TDC = top dead center of the process¹⁾
PS = Pressing start, start of the process data recording¹⁾
PP = Probing position (depending on the component geometry)
IP = Intermediate position¹⁾ (is required for monitoring purposes)
EP = End position¹⁾
¹⁾adjustable

Target is "Stroke"



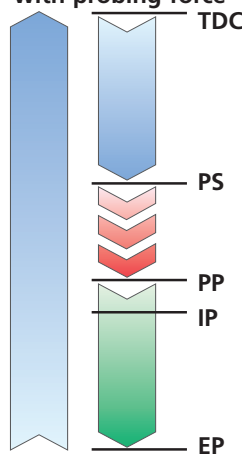
Normal operating profile, is typically combined with bending compensation.

Target is "Force"



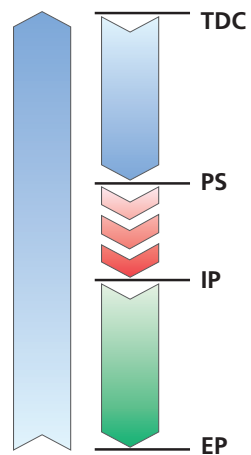
For processes in which the force reached is a measure for the process quality e. g. material compression.

Target is "delta stroke" with probing force

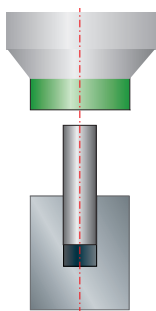


For processes in which component tolerances must be detected. The press detects the surface and presses to a programmed distance from.

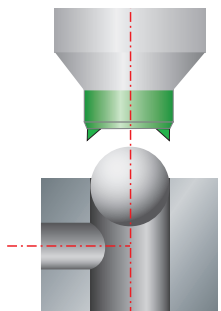
Target is "Force increase"



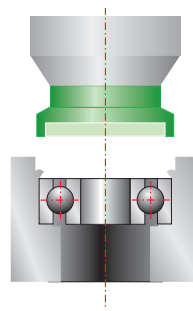
The return stroke is triggered by detecting a customer-defined force slope.



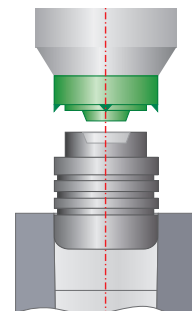
Pressing until reaching a specified position leads to precise results in connection with bending compensation.



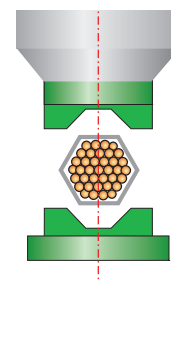
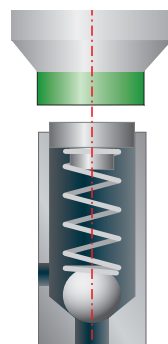
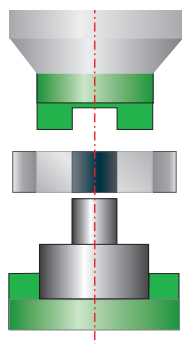
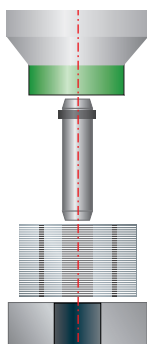
Plugging blind bores – a sphere is pressed in and crimped. Force output correlates to material displacement to determine density and retain force independent of stroke.



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.



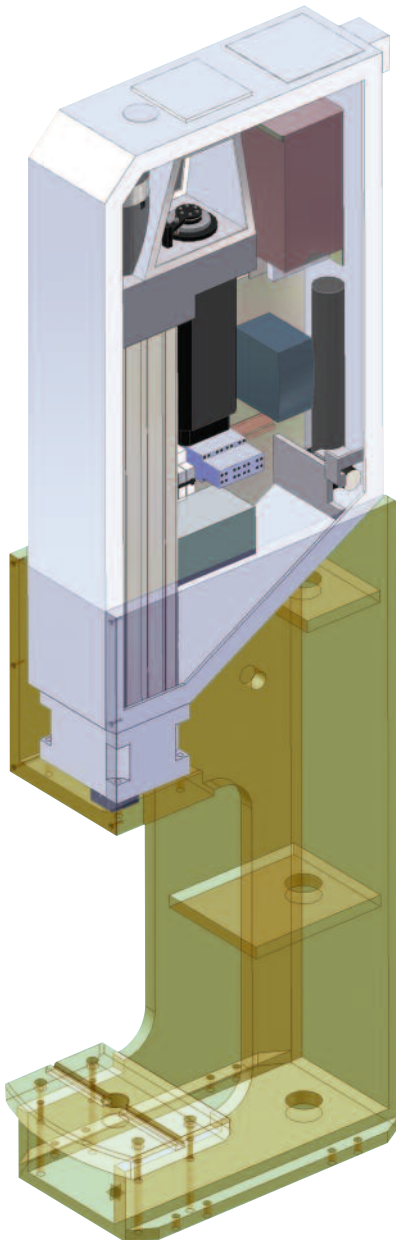
SCHMIDT® ServoPress

Uncompromising mechanical quality

The solid, unique mechanics of the **SCHMIDT® ServoPress** is an 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, category 4

As a result, this means the following for your application:

- Excellent efficiency
- Maximum capacity
- High production safety

Endurance testing criteria

- 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

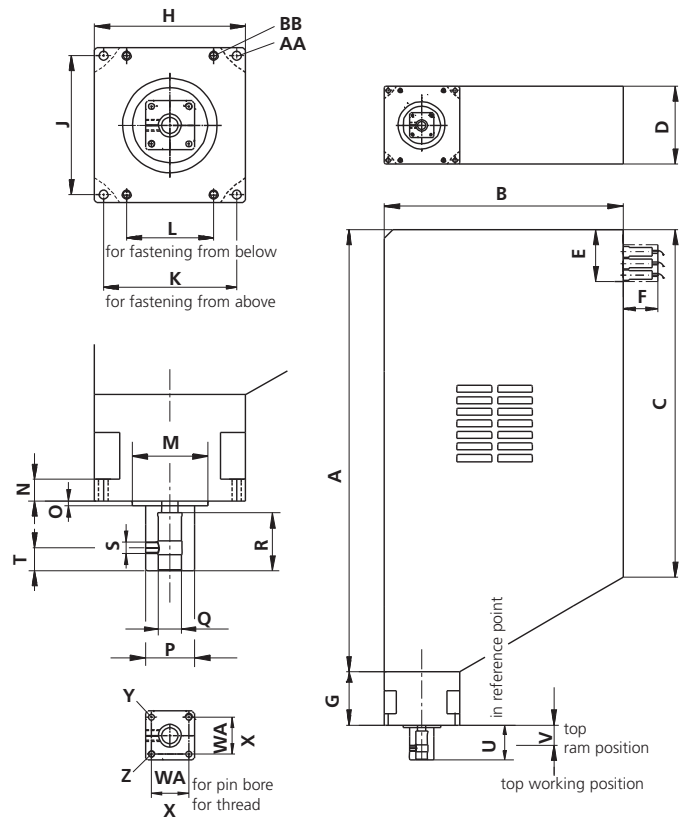
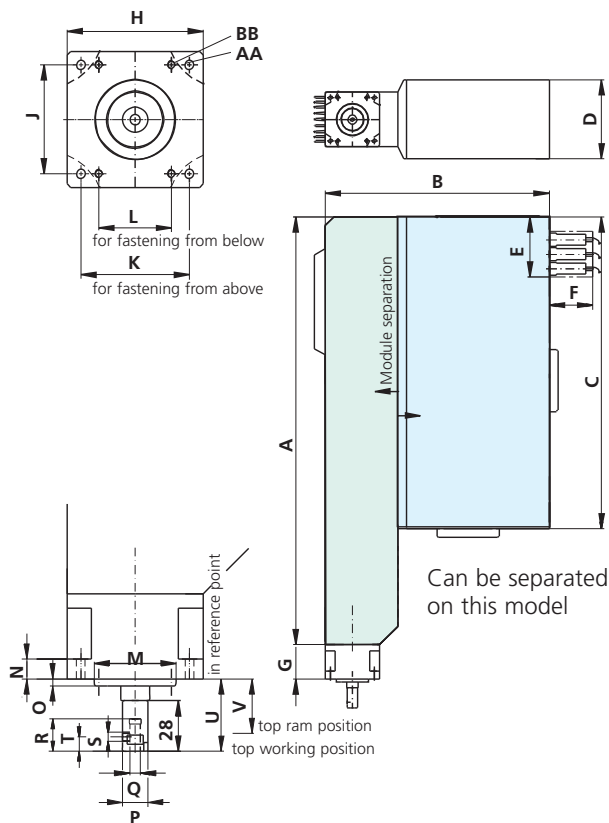
SCHMIDT® ServoPress

Modules with large application range



ServoPress 405

ServoPress 415 to 460



Modules

With force outputs of 15 N to 150 kN

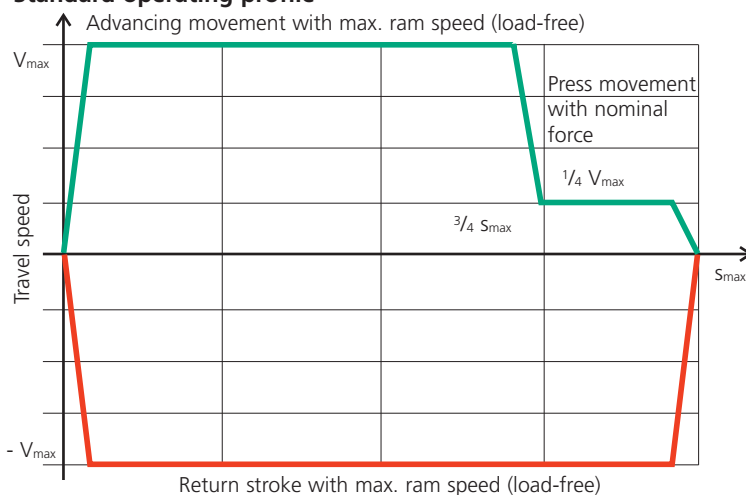
Technical data

ServoPress type		405	415	416	417	420	450	460
Force F	max kN	0.8	4.5	5	14	35	75	150
Force F at 100 % duty cycle	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, process data acquisition								
- stroke	µm/inc	2.4	4	4	5	6	8	8
- force	N/inc	0.25	1	1	4	10	24	48
Ram speed	mm/s	0 to 300	0 to 200	0 to 200	0 to 200	0 to 200	0 to 200	0 to 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		Threaded drive	Threaded drive	Threaded drive	Threaded drive	Threaded drive	Threaded drive	Threaded drive
Power supply		230 V 1~/6.3 A (3x208 V 3~/6.3 A)	230 V 1~/16 A (3x208 V 3~/16 A)	230 V 1~/16 A (3x208 V 3~/16 A)	230 V 3~/16 A	400 V 3~/16 A	400 V 3~/35 A	400 V 3~/35 A
Weight	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	45h7	45h7	65h7	90h7	100h7
	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/M12	12.0/M14
	BB	Ø mm	M5	M6	M8		
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		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	37.5	35	50	45
For pin bore	W	mm ±0.02		22	32	40	40
for thread	X	mm		22	32	40	40
	Y			M5	M6	M8	M8
	Z	Ø mm		5H7	5H7	8H7	8H7

Standard operating profile



SCHMIDT® ServoPress Manual Workstation with light curtain (LV)

SCHMIDT® ServoPress 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 modules.

Included in the scope of delivery are:

- Module SCHMIDT® ServoPress mounted on a frame
- SCHMIDT® PressControl 4000 and 5000 with pendant arm system
- Press base PU 10
- 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.



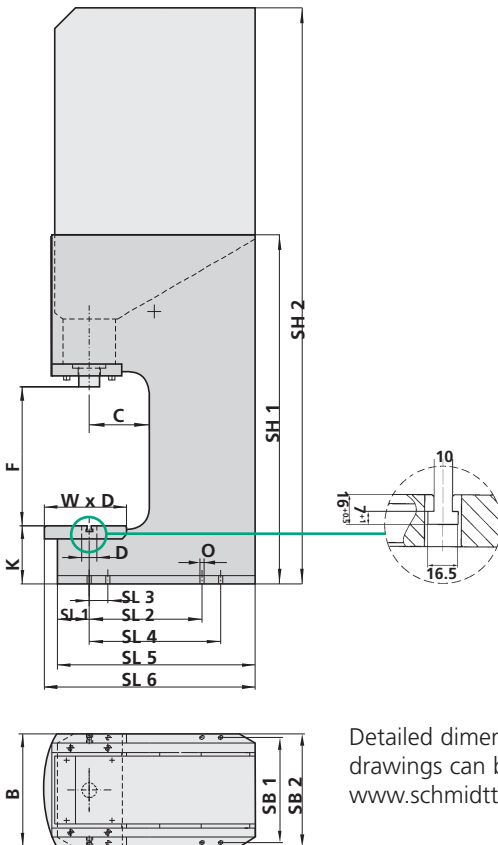
Workstations

With Force outputs from 15 N to 150 kN

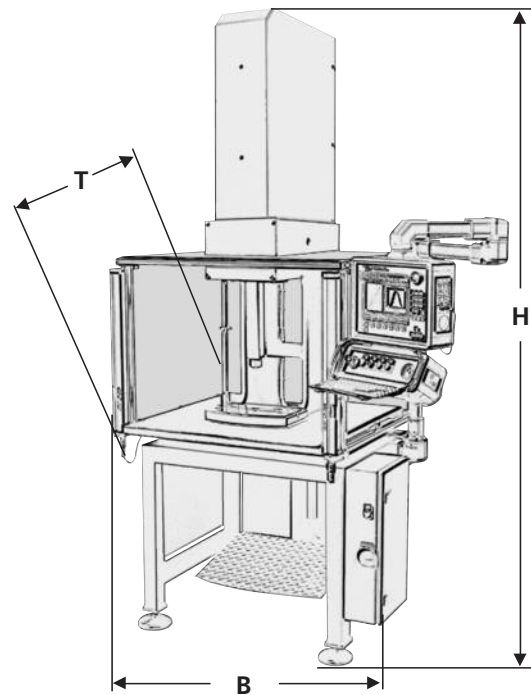
Complete system with light curtain (LV)

Dimensions - single workstation		405	415 / 416	417	420	450 / 460
Width	B mm	~ 1120	~ 1120	~ 1120	~ 1120	~ 1120
Depth	T mm	~ 890	~ 890	~ 1140	~ 1140	~ 1100
Height	H min. mm	1880	min. 1880	min. 2570	min. 2630	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
Ram center - light curtain	mm	320	330	278,5 - 378,5	330 - 430	370 - 470
Weight	approx. kg	305	310	390	570	790

ServoPress typ		405	415/416	417	420	450/460
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	515	512
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	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	1050
	SH 2 mm	1016	1100	1430	1835	2050
	SB 1 mm	140	200	220	280	350
	SB 2 mm	160	220	250	300	370

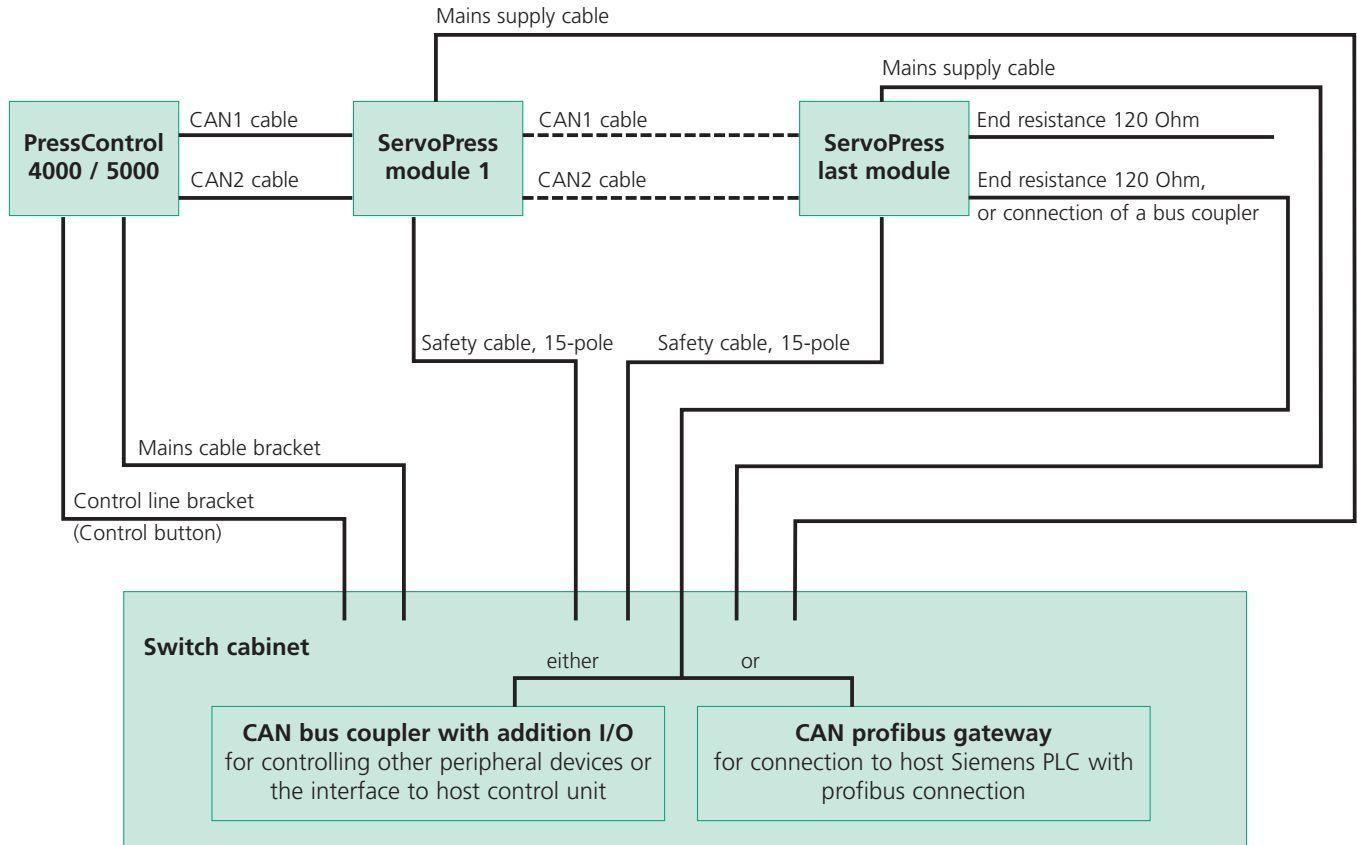


Detailed dimensional drawings can be downloaded:
www.schmidttechnology.de



Typical system design of a SCHMIDT® ServoPress

When integrating the **SCHMIDT® ServoPress** into assembly lines, cable lengths need to be specified. Please indicate the cable lengths according to the table shown when making inquiries or orders. The following diagram shows the wiring.



Cable designation	Standard length	Maximum length	Desired length
PressControl 4000 / 5000 -> ServoPress module 1 CAN 1 / 2	3 m	max. 25 m all together	
ServoPress module 1 -> ServoPress module "N" CAN 1 / 2	3 m	max. 25 m all together	
Switch cabinet -> PressControl 4000 / 5000			
- Main cable	4 m		
- Control line	4 m		
Switch cabinet -> ServoPress module 1 ... "N"			
- Safety cable	5 m		
Switch cabinet -> module 1 ... "N"			
- Bus or interface cable	3 m	max. 25 m all together	