

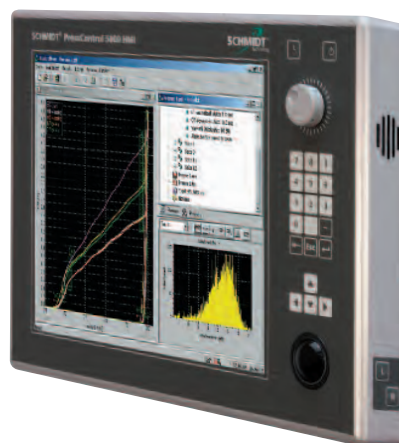
# SCHMIDT® ServoPress

## 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 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® Torque Press 200

## Torque-Power for Servo Press

High-dynamic, powerful and low operation costs – these are the advantages of using a torque motor in the new **SCHMIDT® Torque Press 200** with 200 kN (44,960 lbs) nominal force and 500 mm (19.68”) stroke. Torque motors are used for fast and precise movement and positioning tasks and make high forces possible. Due to the hollow shaft design mechanical elements such as gears, clutches or belts are not necessary. These components, when operated under load, are subject to considerable wear, and since these elements are not present in the torque press there is a substantial savings in maintenance costs. A very rigid construction and the production of high forces with no mechanical force augmentation result in an excellent overall performance dynamic.

Compared to high ratio electric motor driven presses the **SCHMIDT® Torque Press 200** has much lower inertia and therefore a much faster acceleration and deceleration. The noise level remains remarkably low under all load conditions. **SCHMIDT® Torque Press 200**, like all Schmidt Servo Presses, is permanently load stable due to its active temperature-controlled cooling. A mechanical overload protection is automatically activated when the maximum force of 250 kN (56,202 lbs) has been exceeded.

**SCHMIDT® Torque Press 200** features a highly precise, wear-free ram roller-guide, an 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 category 4 safety technology allows the EC-type approval for complete systems, which is required for manual load work stations.



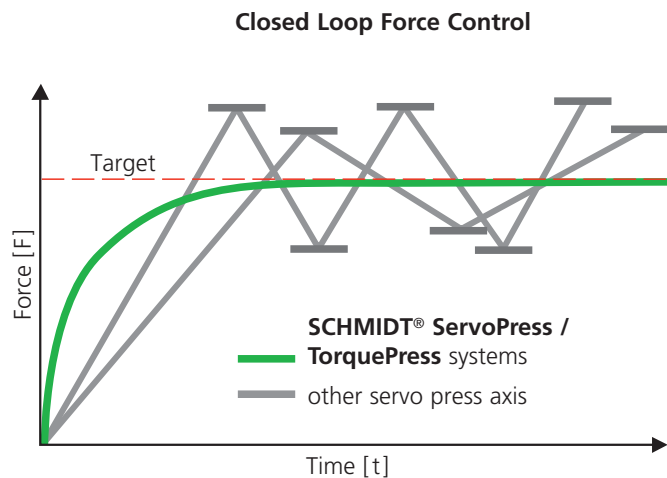
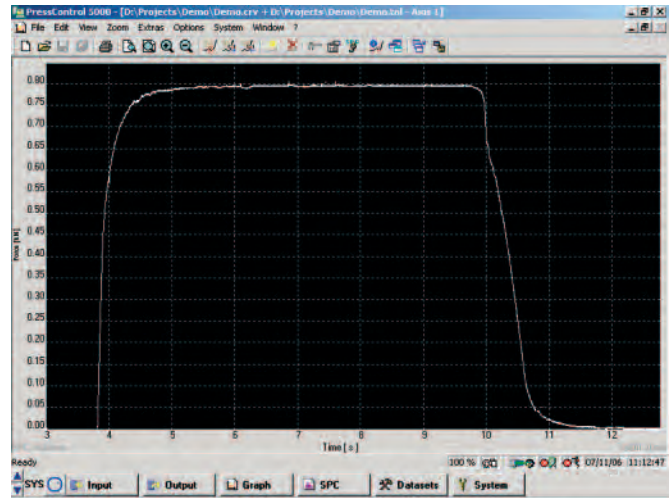
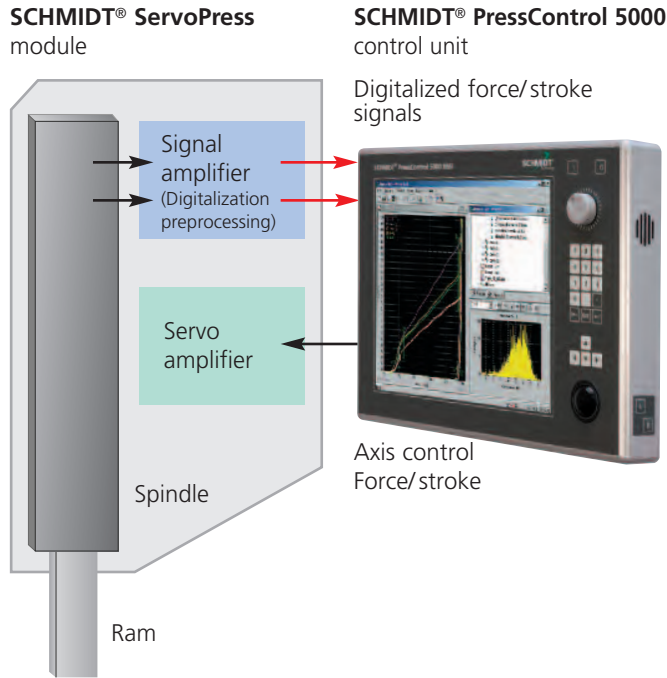
### Technical Data

Force F max.	250 kN/56,202 lbs
Force F at 100 % ED	200 kN/44,960 lbs
Ram stroke	500 mm/19,68 inch
Resolution (drive control)	< 0,1 µm/<0.0004 inch
Resolution, process data acquisition	
- stroke	8 µm/inc./0.0003 inch
- force	100 N/inc./22.48 lbf/inc
Ram speed (max.)	200 mm/s/7.87 inch/sec
Overload protection	mechanical
Service life of the cycles acc. to standard operating profile	2 x 10 <sup>7</sup>
Drive	planetary roller screw drive
Power supply	400 V 3~ / 32 A, 400 V power socket CEE
Weight / height resp. length	
- module	700 kg / 2260 mm -(1543 lbs/7.4”) (upright resp. horizontal)
- H-frame	980 kg / 850 mm -(2161 lbs/89”) (upright resp. horizontal)
- press base	approx. 100 kg (220 lbs) / height flexible

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



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

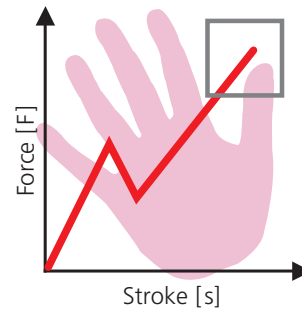
# Dynamic Bending Compensation

## Patented feature

In order to achieve assembly requirements in the 1/100 mm (0.0004") 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:

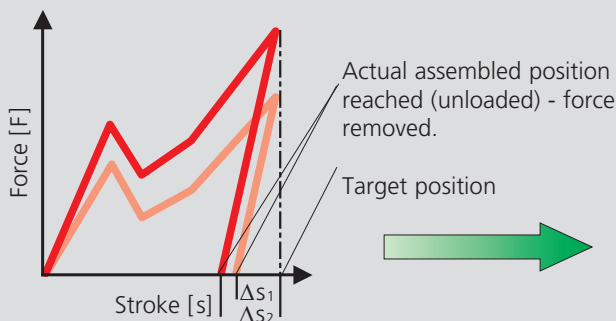
First, a complete process representation of the force characteristic in loaded and unloaded state is necessary so that the system can carry out the required compensation.



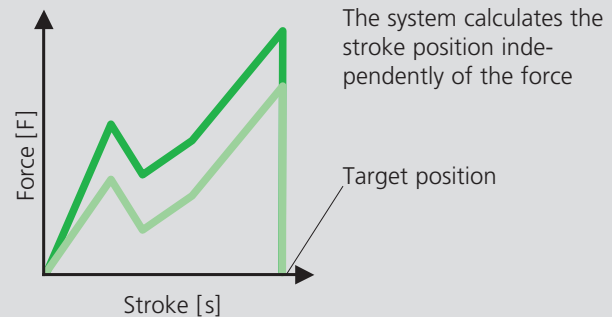
Conventional procedures end in the block position – but the process is not finished yet. The system is under force.

### Patented Dynamic Bending Compensation by SCHMIDT Technology

uncompensated (figure 1)



compensated (figure 2)



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

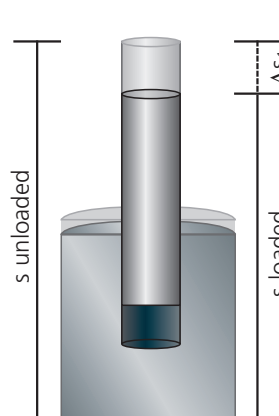
will vary due to the forces in the operation. (figure 1) In order to overcome this effect, **SCHMIDT® ServoPress** systems compensate dynamically to the changing forces. This compensation allows for the assembly to be pressed to the target position, regardless of force (figure 2)

### Pressing a pin in a bushing

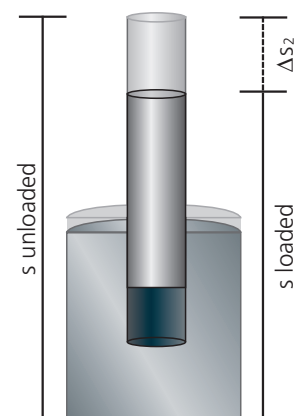
The elasticity of an assembly depends on the equipment, process and the component geometries. This effect becomes significant for assemblies with which the assembly forces of the individual components differ strongly from one another. This can particularly be seen in the example shown.

- 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.

low force (see force curve)



high force (see force curve)



" $\Delta s$ " changes proportionally to the force output, that means, the components have different dimensions depending on the force requirement of each component.

# SCHMIDT® ServoPress / TorquePress

## Operating profiles and applications

SCHMIDT® ServoPresses / 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<sup>1)</sup>

PS = Pressing start, start of the process data recording<sup>1)</sup>

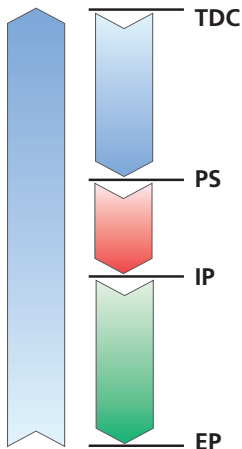
PP = Probing position (depending on the component geometry)

IP = Intermediate position<sup>1)</sup> (is required for monitoring purposes)

EP = End position<sup>1)</sup>

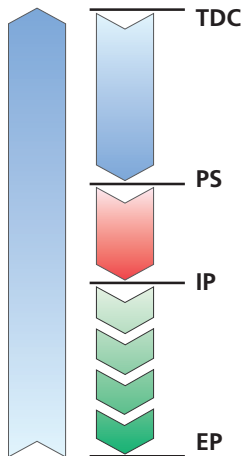
<sup>1)</sup> adjustable

### Target is "Stroke"



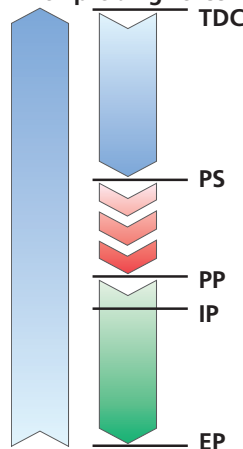
Normal operating profile, is typically combined with bending compensation.

### Target is "Force"



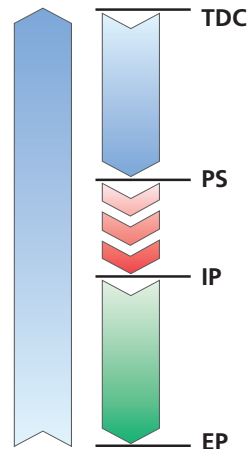
For processes in which the force reached is a measure for the process quality e. g. material compression.

### Target is "delta stroke" with probing force

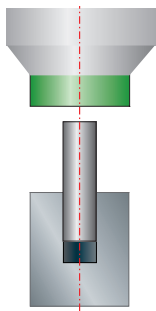


For processes in which component tolerances must be detected. The press detects the surface and presses to a programmed distance from.

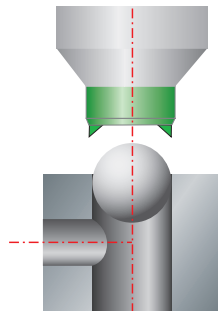
### Target is "Force increase"



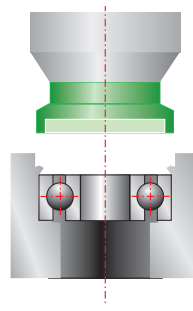
The return stroke is triggered by detecting a customer-defined force slope.



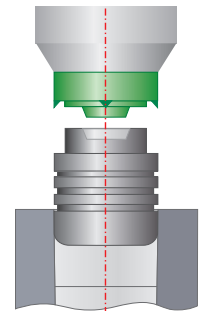
Pressing until reaching a specified position leads to precise results in connection with bending compensation.



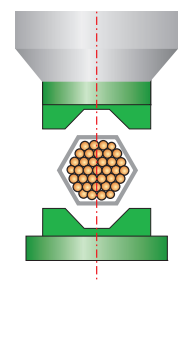
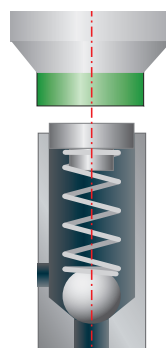
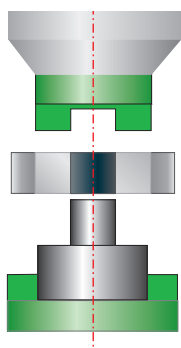
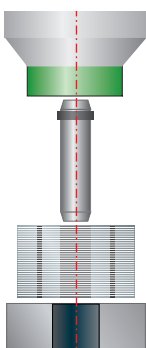
Plugging blind bores – a sphere is pressed in and crimped. Force output correlates to material displacement to determine density and retain force independent of stroke.



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

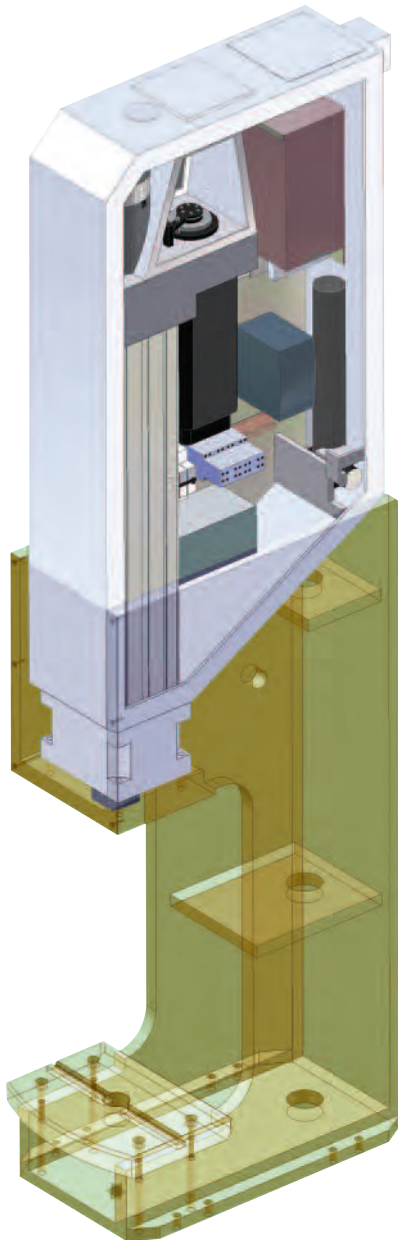
## Uncompromising mechanical quality

The solid, unique mechanics of the **SCHMIDT® ServoPress / TorquePress** is essential for precise joining results, even in the toughest industrial 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
  - anti-rotational (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:**

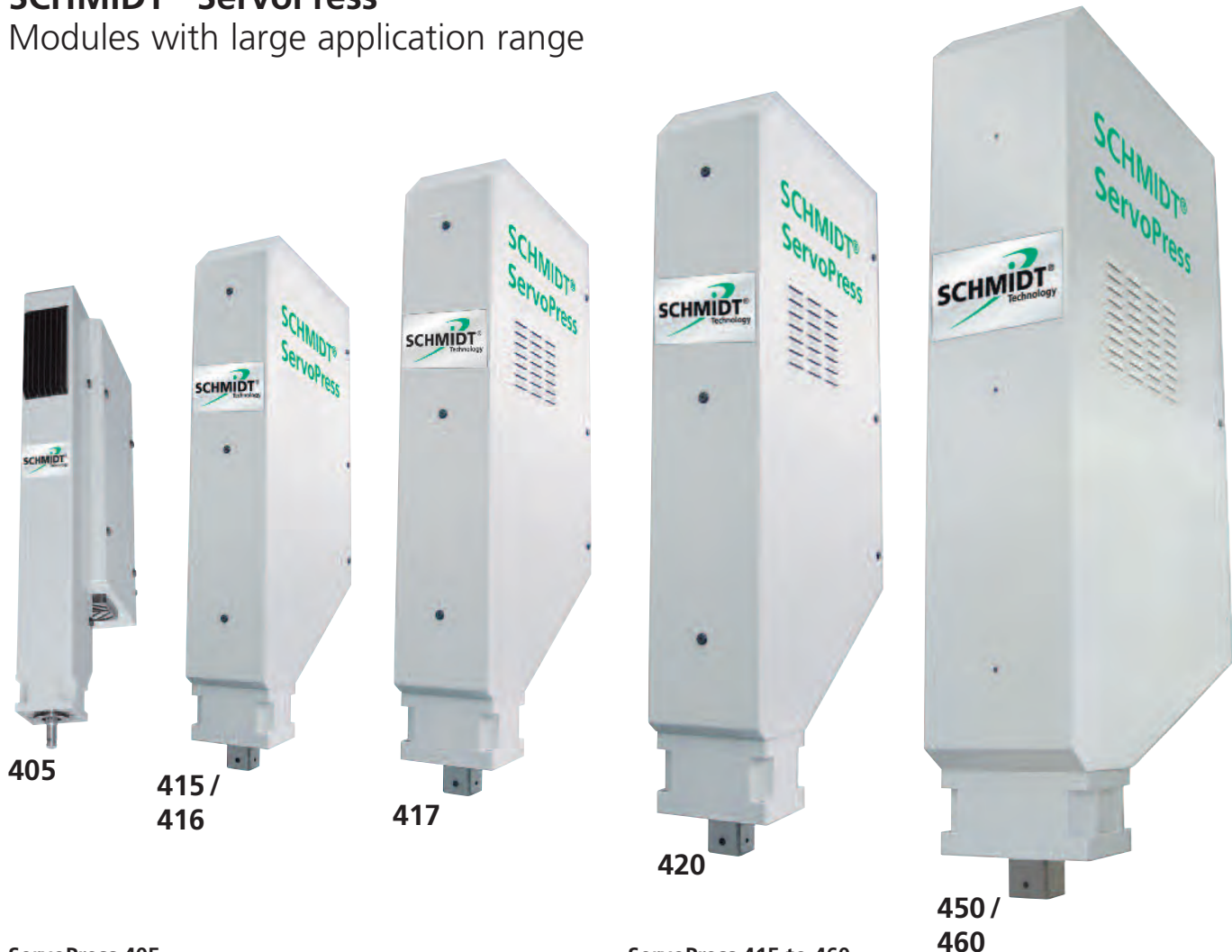
- **Excellent efficiency**
- **Maximum capacity**
- **High production safety**

### Endurance testing criteria

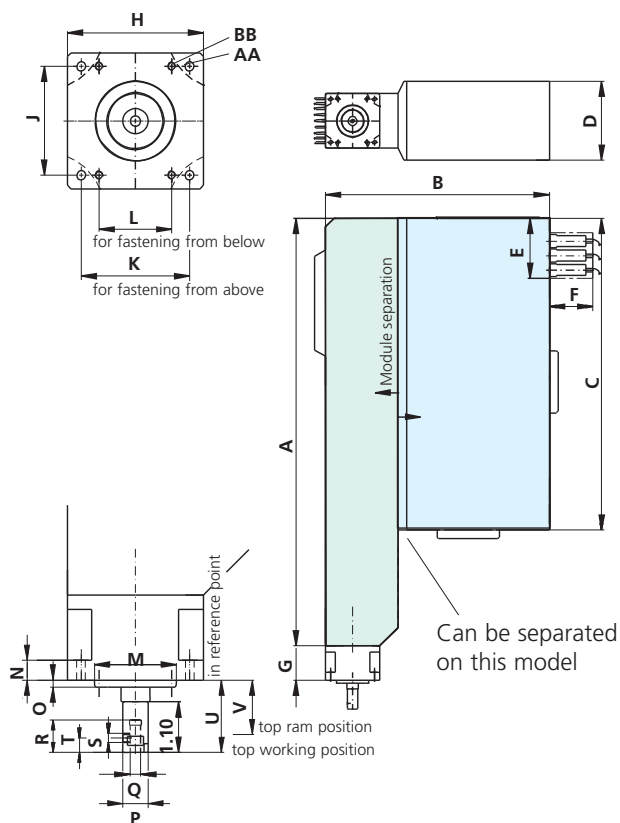
- Test duration is 3 months
- 20 million loading cycles over the entire working stroke with nominal force and lateral forces components at full travel speed
- Cycle time approx. 2 seconds

# SCHMIDT® ServoPress

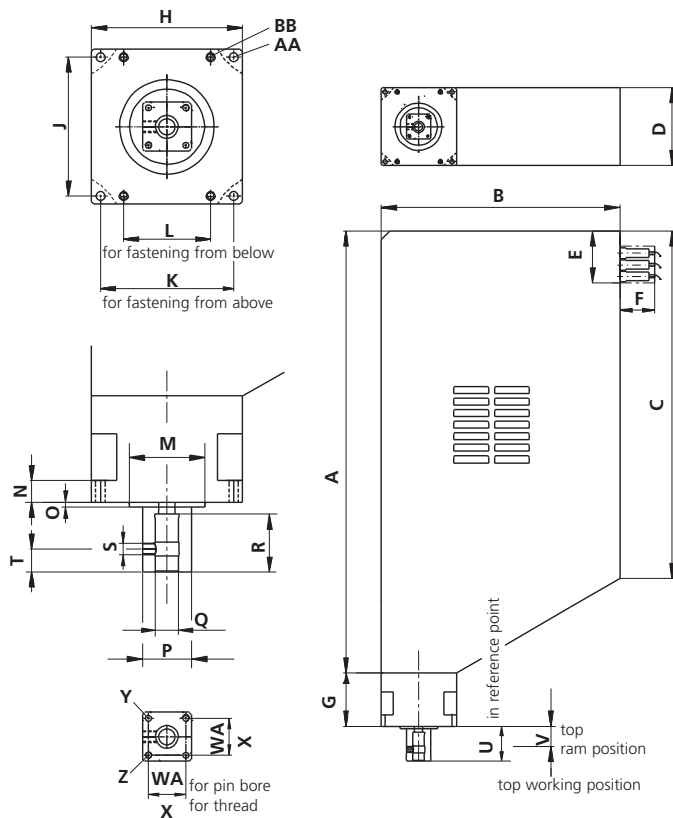
Modules with large application range



ServoPress 405



ServoPress 415 to 460



## Modules

With force outputs from 15 N to 150 kN / ounces up to 33,720 lbs.

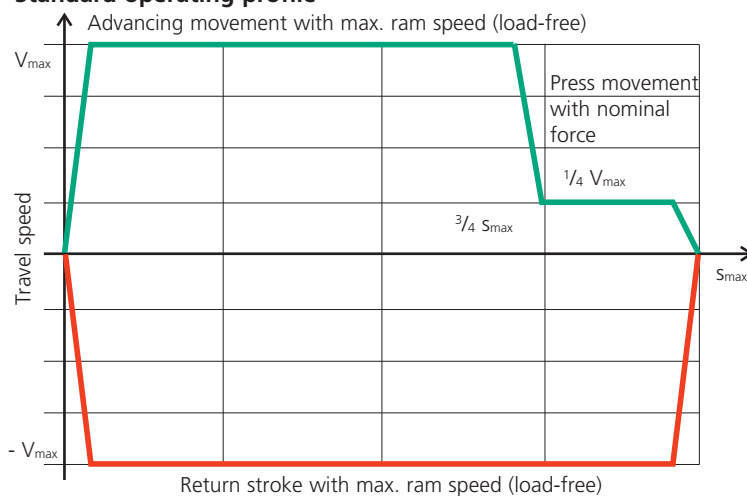
### Technical data

ServoPress type		405	415	416	417	420	450	460
Force F	max lbs	180	1010	1125	3150	7870	16860	33720
Force F at 100% duty cycle	lbs	110	335	675	1685	4495	11240	22480
Ram stroke	mm/inch	150/5.91	200/7.87	200/7.87	300/11.81	400/15.75	500/19.68	500/19.68
Resolution (drive control)	µm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Resolution, process data acquisition								
- stroke	inch/inc	0	0	.0002	.0002	.0002	.0003	.0003
- force	lbs/inc	0.06	.22	.22	.90	2.25	5.39	10.79
Ram speed	inch/s	0 to 11.81	0 to 7.87	0 to 7.87	0 to 7.87	0 to 7.87	0 to 7.87	0 to 3.94
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 <sup>7</sup>	2 x 10 <sup>7</sup>	2 x 10 <sup>7</sup>	2 x 10 <sup>7</sup>	2 x 10 <sup>7</sup>	2 x 10 <sup>7</sup>	1 x 10 <sup>7</sup>
Drive		ball screw	ball screw	ball screw	ball screw	roller screw	roller screw	roller screw
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)	400 V 3~/16 A	400 V 3~/16 A	400 V 3~/35 A	400 V 3~/35 A
Weight	approx. lbs	44	60	60	154	265	529	529

### Module dimensions

ServoPress type		405	415 / 416	417	420	450 / 460
<b>Housing</b>						
<b>A</b>	inch	23.23	22.05	30.00	38.50	45.91
<b>B</b>	inch	12.17	12.99	16.22	21.06	26.65
<b>C</b>	inch	17.32	17.09	23.62	30.04	39.06
<b>D</b>	inch	4.29	4.29	5.28	7.09	9.29
<b>Cable connection</b>						
<b>E</b>	inch	~ 3	~ 3	~ 3	~ 4	~ 3
<b>F</b>	inch	~ 2.5	~ 2.5	~ 2.5	~ 2.5	~ 2.5
<b>Flange</b>						
<b>G</b>	inch	1.85	3.03	3.62	4.80	4.72
<b>H</b>	inch	2.95	2.95	5.12	5.51	5.91
<b>J</b>	inch	2.36	3.46	4.72	6.30	8.27
<b>K</b>	inch	2.36	2.48	4.53	4.72	5.12
<b>L</b>	inch	1.57	2.34	2.95		
<b>M</b>	Ø mm	45h7	45h7	65h7	90h7	100h7
<b>N</b>	inch	0.43	0.43	0.75	1.26	1.30
<b>O</b>	inch	0.16	0.16	0.16	0.20	0.20
<b>AA</b>	Ø inch	0.21	0.25	0.33	0.39/M12	0.47/M14
<b>BB</b>	Ø mm	M5	M6	M8		
<b>Ram</b>						
External ram dimensions	<b>P</b> inch	Ø 0.55	1.26 x 1.26	1.65 x 1.65	2.17 x 2.17	2.56 x 2.56
Ram bore	<b>Q</b> Ø mm	6H7	10H7	20H7	20H7	20H7
	<b>R</b> inch	0.71	1.18	1.97	1.57	1.97
	<b>S</b>	M5	M8	M10	M10	M10
	<b>T</b> inch	0.31	0.39	0.79	0.79	0.79
Top working position	<b>U</b> inch	1.57	1.97	2.36	2.36	60
Top ram position	<b>V</b> inch	1.18	1.48	1.38	1.97	1.77
For pin bore	<b>W</b> inch		0.87 ± 0.0008	1.26 ± 0.008	1.57 ± 0.008	1.57 ± 0.0008
for thread	<b>X</b> inch		0.87	1.26	1.57	1.57
	<b>Y</b>		M5	M6	M8	M8
	<b>Z</b> Ø mm		5H7	5H7	8H7	8H7

### Standard operating profile



### Tolerance conversion of typical sizes of SCHMIDT® Presses

Metric	Nominal Inch	Tolerance Inch
5H7	0.1968	-0 / +0.0005
8H7	0.3149	-0 / +0.0006
10H7	0.3937	-0 / +0.0006
20H7	0.7874	-0 / +0.0008
25H7	0.9842	-0 / +0.0008
32H7	1.2598	-0 / +0.0010
40H7	1.5748	-0 / +0.0010
45H7	1.7716	-0 / +0.0012
65H7	2.5590	-0 / +0.0010
90H7	3.5433	-0 / +0.0014
100H7	3.9370	-0 / +0.0014
<b>Threads</b>		<b>Pitch</b>
M8		1.25 mm
M10		1.50 mm
M5		0.80 mm
M6		1.00 mm

## SCHMIDT® ServoPress / TorquePress Manual Workstation with light curtain (LV)

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 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 SCHMIDT® ServoPress

With force outputs from 15 N to 150 kN / ounces up to 33,720 lbs.

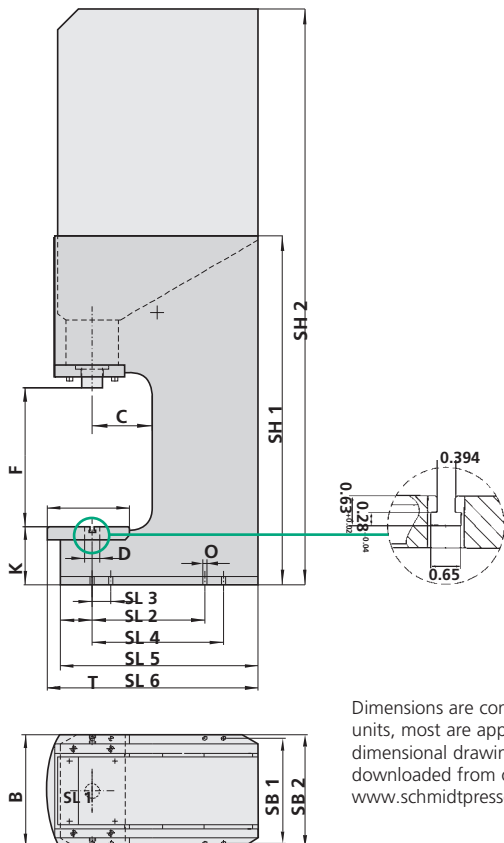
## Complete system with light curtain (LV)

Dimensions – single workstation	405	415 / 416	417	420	450 / 460
B	inch ~ 47.24	~ 47.24	~ 47.24	~ 47.24	~ 47.24
T	inch ~ 35	~ 35	~ 44.88	~ 35	~ 43.31
H	min. inch 74.01	min. 74.01	min. 74.01	min. 103.54	min. 110.63
Working area	inch ~ 33 x 28 x 25	~ 33 x 28 x 25	~ 33 x 28 x 25	~ 33 x 28 x 25	~ 34 x 39 x 26
Ram center – light curtain	inch 12.60	12.99	10.95 – 14.57	12.99 – 16.93	14.57 – 18.50
Weight	approx. lbs 672	683	860	1257	1742

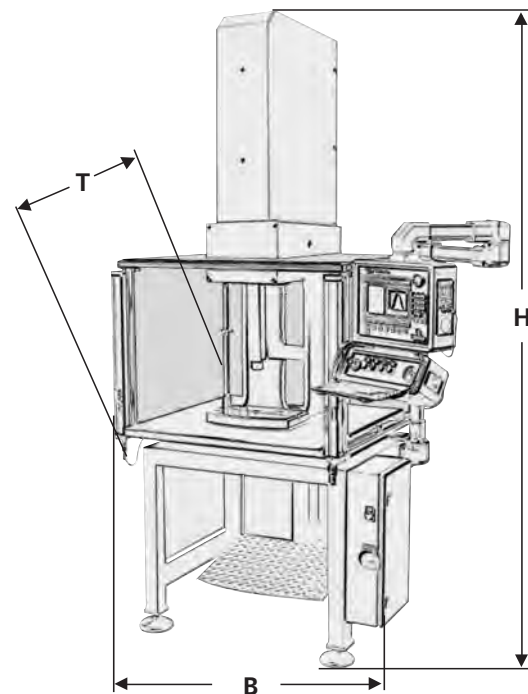
ServoPress No.	405	415/416	417	420	450/460
<b>Frame</b>					
Throat depth <b>C</b>	inch 5.12	5.12	5.91	6.30	6.30
Table bore <b>D</b>	Ø mm 20H7	20H7	40H7	40H7	40H7
Working height <b>F</b>	inch 9.69	11.81	15.24	20.28	20.16
Table height <b>K</b>	inch 3.66	4.45	5.04	6.10	7.48
Table size <b>B x T</b>	inch 6.30 x 5.51	8.66 x 6.89	9.84 x 7.87	11.81 x 8.66	14.57 x 9.06
Mounting surface	inch 6.30 x 13.58	8.66 x 15.94	9.84 x 18.11	11.81 x 22.17	14.57 x 25.00
<b>O</b>	Ø inch 0.35	0.43	0.43	0.51	0.51
<b>SL 1</b>	inch 1.97	3.15	3.15	3.35	3.74
<b>SL 2</b>	inch 8.66	9.84	9.84	11.81	13.78
<b>SL 3</b>	inch			1.97	1.97
<b>SL 4</b>	inch			13.78	15.75
<b>SL 5</b>	inch 12.80	15.35	16.93	20.79	23.62
<b>SL 6</b>	inch 13.58	15.94	18.11	22.17	25.00
<b>SH 1</b>	inch 20.08	24.80	30.71	42.52	41.34
<b>SH 2</b>	inch 40.00	43.31	56.30	72.24	80.71
<b>SB 1</b>	inch 5.51	7.87	8.66	11.02	13.78
<b>SB 2</b>	inch 6.30	8.66	9.84	11.81	14.57

## Tolerance conversion of typical sizes of SCHMIDT® Presses

Metric	Nominal Inch	Tolerance Inch
20H7	0.7874	-0 / +0.0008
40H7	1.5748	-0 / +0.0010

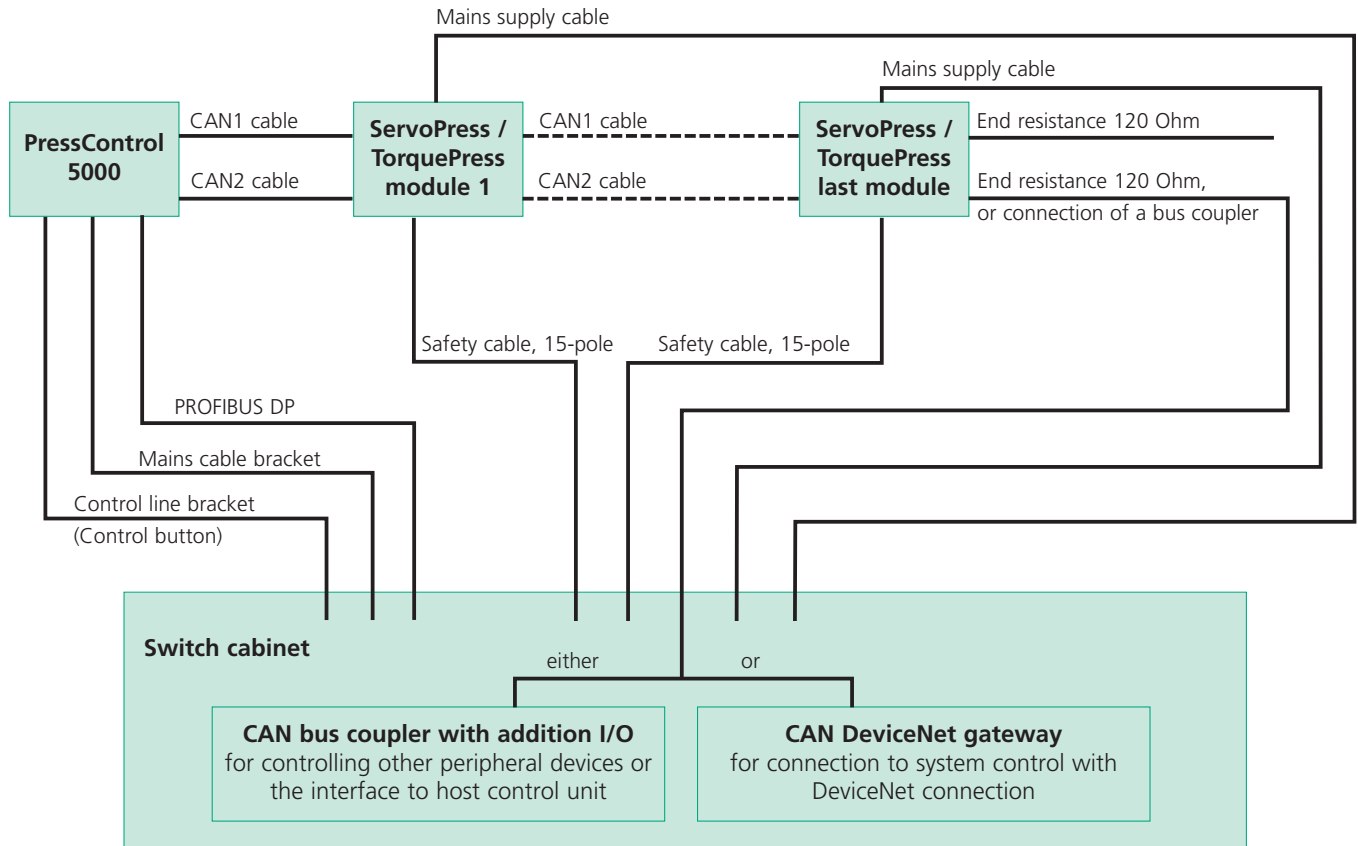


Dimensions are converted from metric units, most are approximate. Detailed dimensional drawings can be downloaded from our website: [www.schmidtpresses.com](http://www.schmidtpresses.com)



# Typical system design of a SCHMIDT® ServoPress / TorquePress

When integrating the SCHMIDT® ServoPress / TorquePress 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 5000 -> ServoPress / TorquePress module 1			
CAN 1 / 2	10 ft	max. 82 ft all together	
ServoPress module 1 -> ServoPress module "N"			
CAN 1 / 2	10 ft	max. 82 ft all together	
Switch cabinet -> PressControl 5000			
- Main cable	13 ft		
- Control line	13 ft		
Switch cabinet -> ServoPress / TorquePress module 1 ... "N"			
- Safety cable	16.5 ft		
Switch cabinet -> module 1 ... "N"			
- Bus or interface cable	10 ft	max. 82 ft all together	