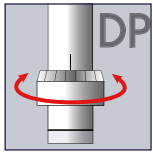


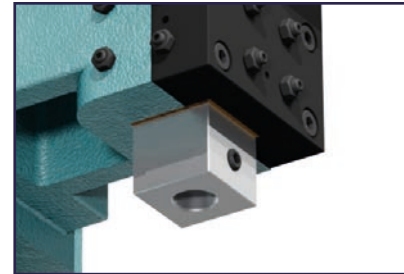
## The accessories



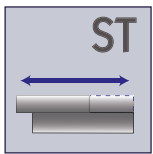
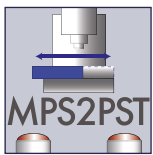
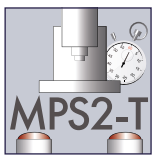
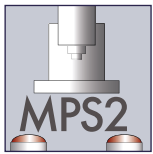
## Pneumatic toggle presses APK\*L and VKL range

The optimum transmission ratio of the toggle lever produces large forces at the end of the stroke and ensures low air consumption. The resulting low energy consumption means that **mäder** pneumatic toggle presses are a cost-effective production tool, not only at the procurement stage but also in the long term.

All pneumatic toggle presses can be provided with the standard **mäder** MPS-2 controller or with customer-specified controllers.

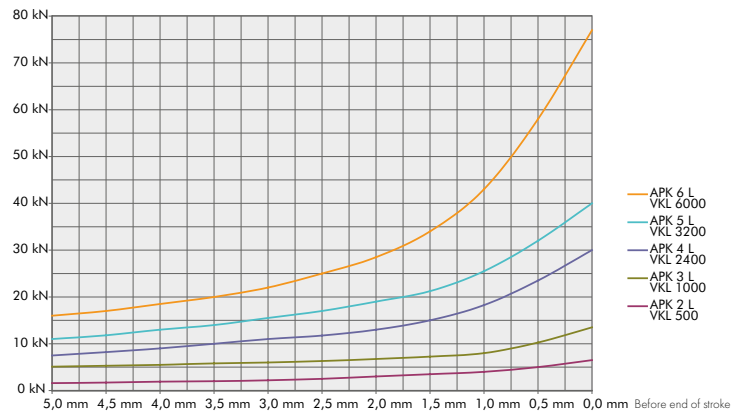


Square Ram



## Other quality features:

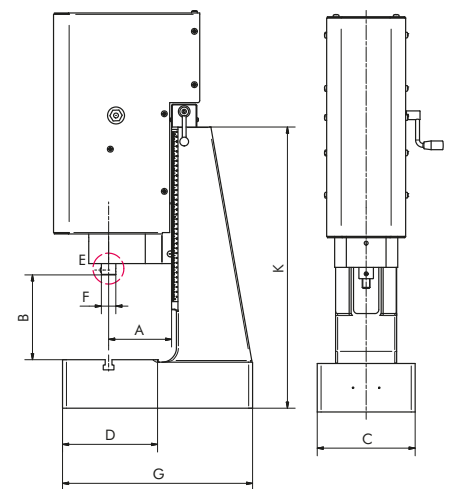
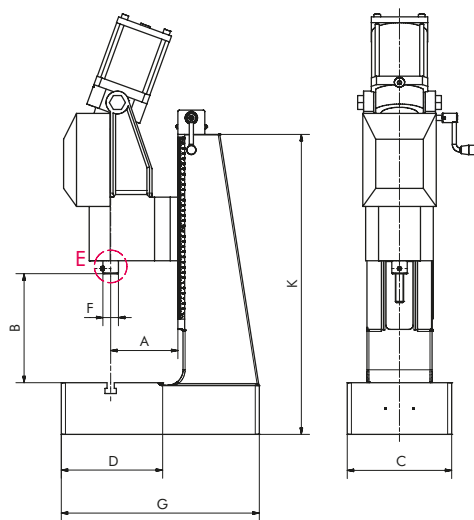
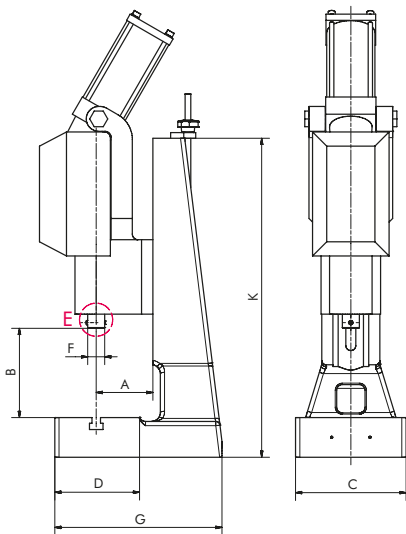
- ▶ Factory pre-set pressure point
- ▶ Right-angled gearbox for simple height adjustment of the press head
- ▶ Side-mounted measuring strip for fast reproduction of settings when changing the tool
- ▶ Practically maintenance-free double-acting cylinder
- ▶ Low noise: less than 75 dB



APK 2L  
VKL 0500-35-80

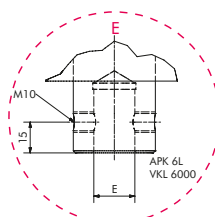
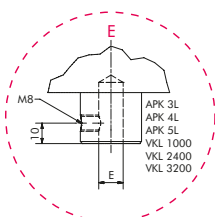
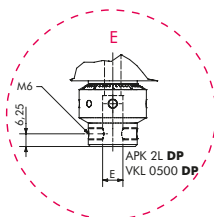
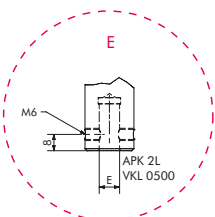
APK 3L  
VKL 1000-40-100

APK 4L  
APK 5L  
APK 6L  
VKL 2400  
VKL 3200  
VKL 6000



Standard

With DP

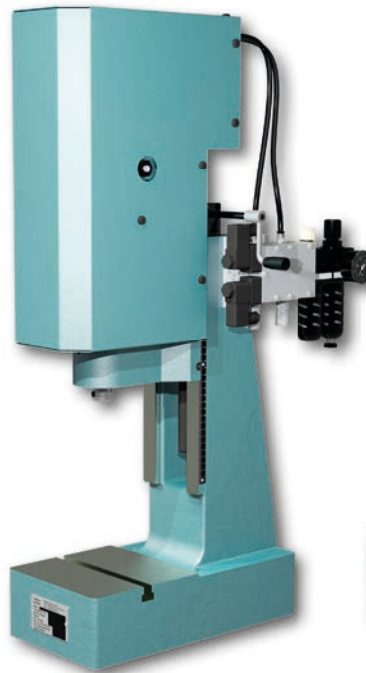




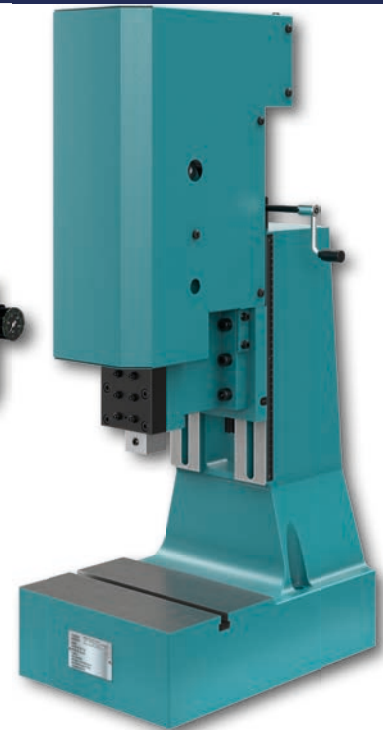
APK 2 L



APK 3 L



APK 4 L / APK 5 L



VKL 6000-40-150

Type			APK 2 L	APK 3 L	with round ram APK 4 L	APK 5 L	APK 6 L
Capacity at 6 bar		kN	5	10	24	32	60
Working stroke		mm	35	40	40	40	40
Throat	A	mm	80	100	130	130	150
Daylight	B	mm	80 - 265	110 - 280	175 - 330	175 - 330	87 - 310
Daylight with DP	B	mm	65 - 250	95 - 265	-	-	-
Table size	CxD	mm	157 - 115	185 - 145	200 x 190	200 x 190	300 x 210
T-slot width similar to DIN 650		mm	10	12	14	14	14
Ram bore Ø x Depth	E	mm	10H7 x 25	12H7 x 30	12H7 x 30	12H7 x 30	20H7 x 34
Ram Ø	F	mm	24	30	30	30	40
Air connection			G 1/4"	G 1/4"	G 3/8"	G 3/8"	G 3/8"
Air consumption/cm cyl. stroke		l	0.26	0.41	1.05	1.05	1.65
Space requirement	CxG	mm	157 x 237	185 x 320	200 x 385	200 x 385	300 x 455
Stand height	K	mm	450	520	580	580	630
Weight		kg	ca. 22	ca. 55	ca. 95	ca. 96	ca. 140

Accessories (see Page 8)			Please specify when ordering.				
Precision ram adjustment			DP	DP	-	-	-

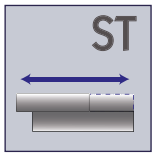
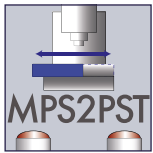
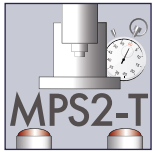
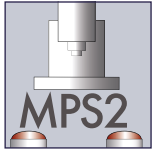
Type			VKL 0500-35-80	VKL 1000-40-100	with square ram VKL 2400-40-130	VKL 3200-40-130	VKL 6000-40-150
Capacity at 6 bar		kN	5	10	24	32	60
Working stroke		mm	35	40	40	40	40
Throat	A	mm	80	100	130	130	150
Daylight	B	mm	80 - 265	110 - 280	175 - 330	175 - 330	90 - 320
Daylight with DP	B	mm	65 - 250	80 - 265	-	-	-
Table size	CxD	mm	157 x 115	185 x 145	200 x 190	200 x 190	300 x 210
T-slot width similar to DIN 650		mm	10	12	14	14	14
Ram bore Ø x Depth	E	mm	10H7 x 25	12H7 x 30	12H7 x 30	12H7 x 30	20H7 x 34
Ram Ø	F	mm	25 x 25	31 x 31	31 x 31	31 x 31	41 x 41
Air connection			G 1/4"	G 1/4"	G 3/8"	G 3/8"	G 3/8"
Air consumption/cm cyl. stroke		l	0.26	0.41	1.05	1.05	1.65
Space requirement	CxG	mm	157 x 237	185 x 320	200 x 385	200 x 385	300 x 455
Stand height	K	mm	450	520	580	580	630
Weight		kg	ca. 22	ca. 55	ca. 95	ca. 96	ca. 140

Accessories (see Page 8)			Please specify when ordering.				
Precision ram adjustment			DP	DP	-	-	-

Valve and service unit only included with controller. Design may vary.

Pneumatic toggle presses

## The accessories

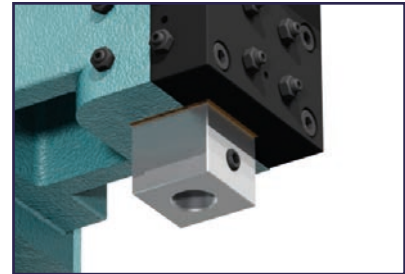


## Pneumatic toggle presses XL-APK\*L and XL-VKL range

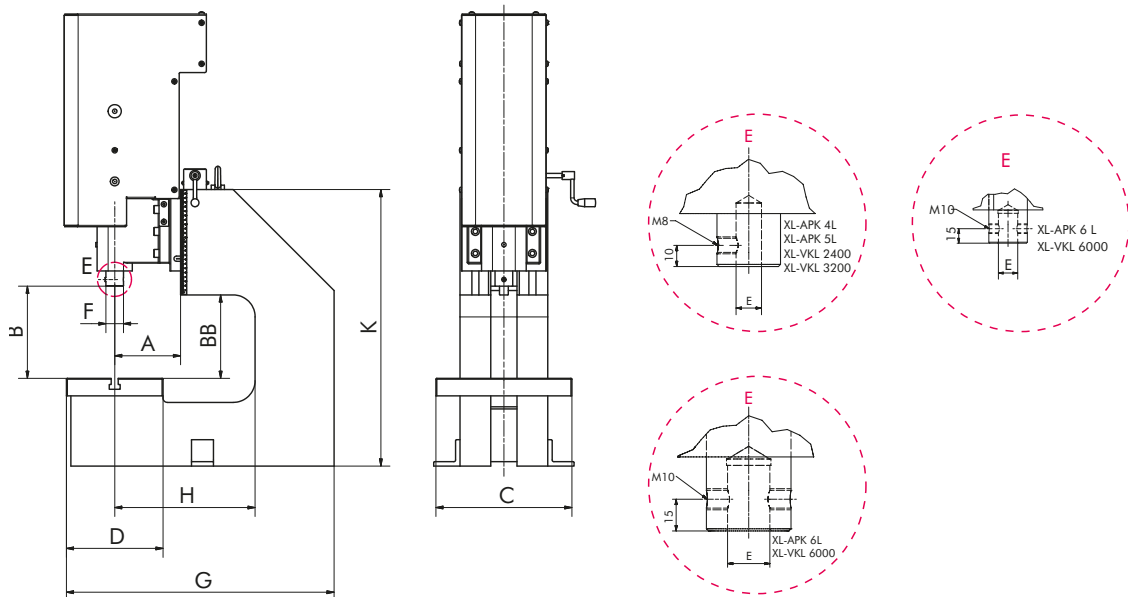
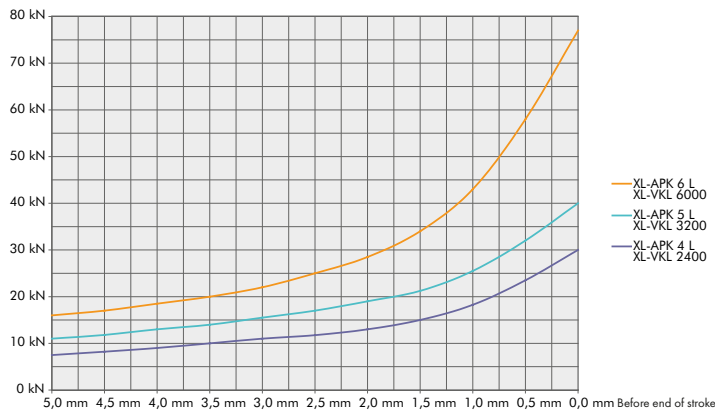
Presses with XL throat are designed for processing large and bulky parts. The press stand consists of a stable welded structure which can be modified to suit customers' requirements. XL pneumatic toggle presses can be provided with the standard **mäder** MPS-2 controller or with customer-specified controllers.

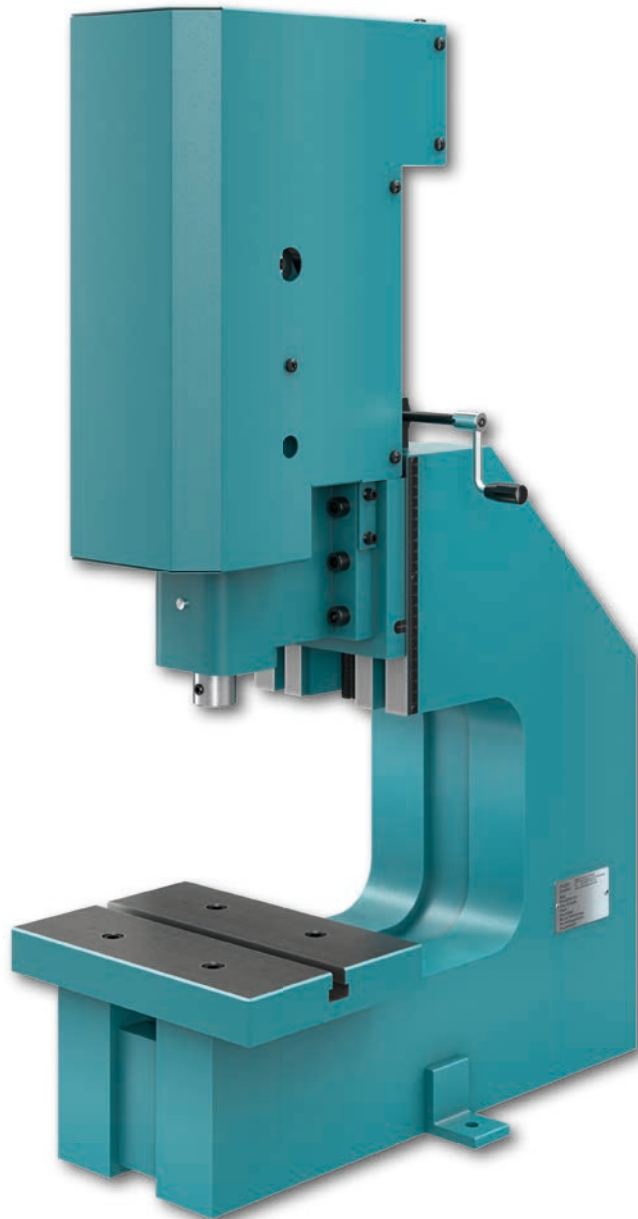
### Other quality features:

- ▶ Factory pre-set pressure point
- ▶ Right-angled gearbox for simple height adjustment of the press head
- ▶ Side-mounted measuring strip for fast reproduction of settings when changing the tool
- ▶ Practically maintenance-free double-acting cylinder
- ▶ Low noise: less than 75 dB



Square ram





XL-APK 6 L

Pneumatic toggle presses

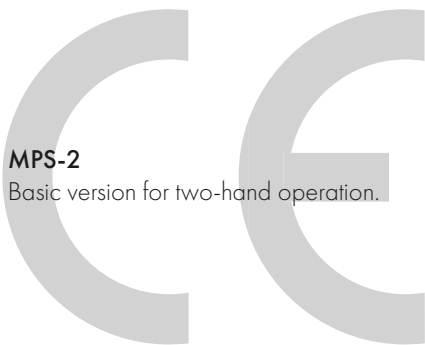
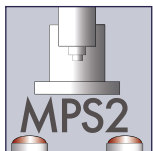
Type	with round ram					with square ram		
			XL-APK 4 L	XL-APK 5 L	XL-APK 6 L	XL-VKL 2400-40-300	XL-VKL 3200-40-300	XL-VKL 6000-40-300
Capacity at 6 bar		kN	24	32	60	24	32	60
Working stroke		mm	40	40	40	40	40	40
Throat	A	mm	130	130	150	130	130	150
Throat C-frame	H	mm	300	300	300	300	300	300
Daylight	B	mm	130 - 280	130 - 280	130 - 230	130 - 280	130 - 280	130 - 230
Daylight C-frame	BB	mm	158	158	190	158	158	190
Table size	CxD	mm	200 x 220	200 x 220	310 x 220	200 x 220	200 x 220	310 x 220
T-slot width similar to DIN 650		mm	14	14	16	14	14	16
Ram bore Ø x Depth	E	mm	12H7 x 30	12H7 x 30	20H7 x 34	12H7 x 30	12H7 x 30	20H7 x 34
Ram Ø / Ram area	F	mm	30	30	40	31 x 31	31 x 31	41 x 41
Air connection			G 3/8"	G 3/8"	G 3/8"	G 3/8"	G 3/8"	G 3/8"
Air consumption/cm cyl. stroke		l	1.05	1.05	1.65	1.05	1.05	1.65
Space requirement	CxG	mm	200 x 560	200 x 560	320 x 610	200 x 560	200 x 560	320 x 610
Stand height	K	mm	630	630	630	630	630	630
Weight		kg	ca. 149	ca. 150	ca. 250	ca. 149	ca. 150	ca. 250

Valve and service unit only included with controller. Design may vary.

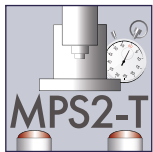
The controller model MPS-2 conforms to the safety requirements which must be applied according to the EC Machinery Directive 2006/42/EC and to the standards for the safety of pneumatic presses. MPS-2 two-hand controls fulfil all requirements of type III C according to DIN EN ISO 13851. mäder presses can therefore be used at workstations with manual loading and open tools. Safety is provided here by the controller, which is designed to be both electrically and pneumatically redundant.

MPS-2 controls include a press safety valve, maintenance unit, push button with protective collar, PLC with free interfaces, Ethernet interface and an integrated web server for remote maintenance, as well as an insert for standard micro SD cards and an electronic piece counter.

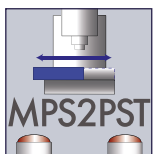
A key switch can be used to select between 2-hand operation or external control.



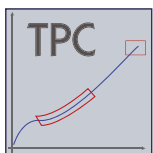
**MPS-2**  
Basic version for two-hand operation.



**MPS-2 T**  
MPS-2 controller with additional stop time function. When the press has reached its end position, a timer can be used to determine when the return stroke should take place.



**MPS-2 PST**  
This type of MPS-2 controller is used to control a pneumatic slide table in addition to the press. The scope of supply also includes the stop time function (see MPS-2 T)



**MPS-2 TPC**  
MPS-2 controller with an additional module TPC-MIDI for force/ displacement monitoring.



## Applications:

Joining and assembly processes using presses must today be carried out safely and if possible without retrospective checking. Specified parameters which define the press process must be maintained during production. Only in this way can the quality and safety of the manufactured product be guaranteed. For this reason, TPC-MIDI is used wherever consistent joining processes are required, the progress of which has to be checked and if applicable documented by means of software.

TPC-MIDI monitors the press operation, compares the actual progress with the requirements and subsequently evaluates it. In this way, reject parts can be reliably detected and separated out.

TPC-MIDI can be used both with hand-operated presses and with pneumatic presses. However, the TPC-MIDI is also available as a pure system component if a PLC environment already exists, e.g. in an automation system.

## The advantages:

- ▶ TPC-MIDI can be programmed via the membrane keyboard or conveniently using the PC software.
- ▶ TPC-MIDI stores 16 different measuring programs
- ▶ Modern curve evaluation via freely parameterisable windows
- ▶ Evaluation options: Window, trapezoid window, block window, envelop curve, thresholds on the x or y axis.
- ▶ Interfaces: Ethernet and USB. Optional fieldbus integration with PROFIBUS, PROFINET or EtherNet/IP.
- ▶ Force measurement directly in the force characteristic with DMS sensor developed especially for presses.
- ▶ Software for programming and saving monitoring programmes, as well as for documentation of the individual press-fit processes

## Clear OK / NOK message

With OK parts, the indicator light is green and the press is ready for the next working stroke.

NOK parts are reliably reported by the TPC-MIDI as an audible signal and by a red indicator light.

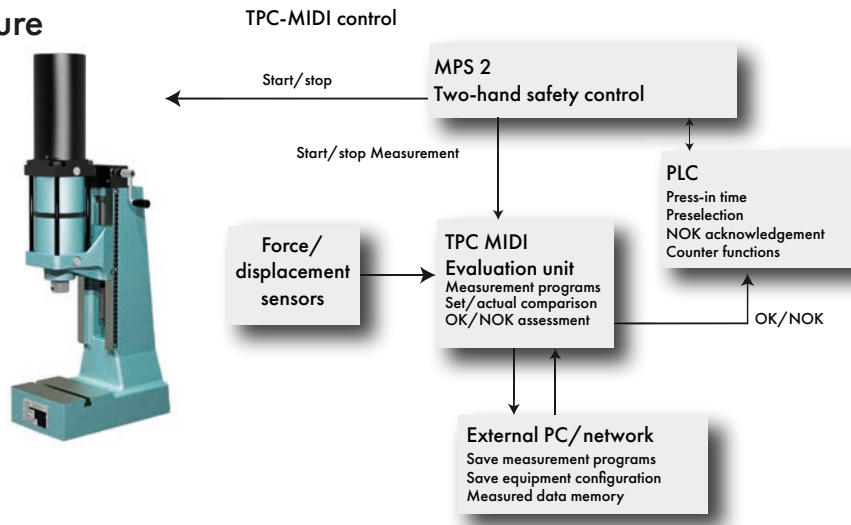
The next press stroke cannot be initiated until the error has been acknowledged.



DA 2800-40-130 with MPS-2 TPC



### System structure



### Load cell force sensors for TPC-MIDI

The load cell force sensor is fixed inside the ram bore. The tool holder can be fixed in the hole at the other end of the sensor. The force sensor is therefore always directly in the force flow between the press ram and the tool.

Measurement range	Measured value divergence	Tool holder
0 – 500 N	≤ ± 0.5% of EV	10H7 x 24 mm
0 – 1 kN	≤ ± 0.5% of EV	10H7 x 24 mm
0 – 2 kN	≤ ± 0.5% of EV	10H7 x 24 mm
0 – 5 kN	≤ ± 2.0% of EV	10H7 x 24 mm
0 – 10 kN	≤ ± 2.0% of EV	10H7 x 24 mm
0 – 20 kN	≤ ± 1.0% of EV	10H7 x 24 mm
0 – 50 kN	≤ ± 1.0% of EV	20H7 x 24 mm
0 – 100 kN	≤ ± 1.0% of EV	20H7 x 24 mm

Unless expressly required to the contrary, the load cell force sensor is selected to match the maximum capacity of the press used



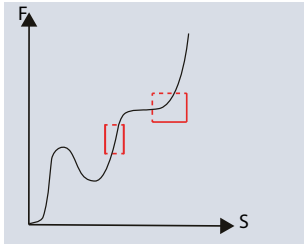
### Potentiometric travel meter

Travel is measured potentiometrically. The service life of the sensors is 10<sup>8</sup> movements

Press stroke	Resolution	Linearity error
40 mm	0.025 mm	0.42%
60/80 mm	0.038 mm	0.41%
100 mm	0.050 mm	0.40%
120 mm	0.075 mm	0.40%

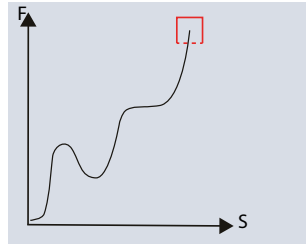
## Monitoring windows

Pass-through window



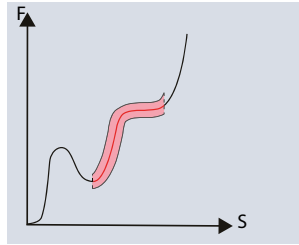
The force/displacement curve must pass through the window from the entry to the exit side as defined without one of the other window boundaries being infringed. The entry and exit sides can be freely selected.

Block window



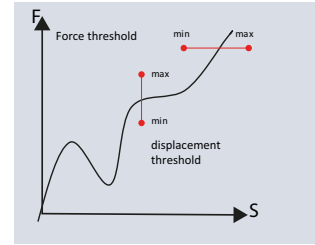
The block window monitors the final values of the press operation. With this type of window, the force/displacement curve must enter the specified entry side and must not leave the window again.

Envelope curve



The measuring curve must pass continuously through the envelope curve and must not infringe it. The envelope curve is taught by means of a teach-in process. Its X-axis parameters and the delta-Y, i.e. the force tolerance range, are then defined.

Monitoring window

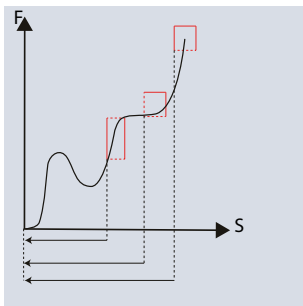


Thresholds define minimum values that must be reached within a certain range and may no longer be undershot. A force threshold (Y-axis) and alternatively a displacement threshold (X-axis) are available.

## The reference points of the monitoring windows

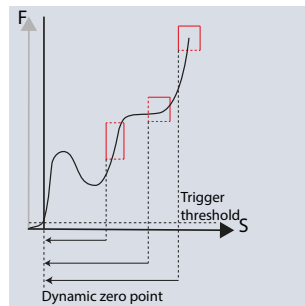
The reference points of the monitoring windows on the X-axis can be defined both rigidly and dynamically.

Absolute



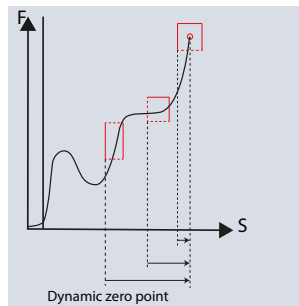
In the case of assembled parts with high repeat accuracy, the calibrated zero point of the displacement sensor on the X-axis is used as the reference point.

Trigger



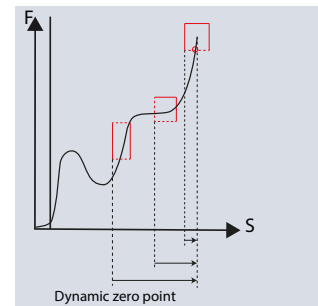
If the assembly sequence is identical as such, but the start of assembly has a major deviation on the X-axis, the beginning of the measurement can be defined by setting a trigger threshold on the Y-axis.

End force



If a measurement with an absolute or a trigger reference point is not useful, the position of the end force (Fmax) on the x-axis can be selected as the reference point. The position of the evaluation window on the X-axis then relates in reverse to this dynamic zero point.

Block window



If the end force shows a wide spread, the reference point of the evaluation windows can also be defined using the entry of the curve into the block window. Any values after the block window has been reached are no longer taken into account. The position of the evaluation windows on the X-axis then relates in reverse to this dynamic zero point.



## PC Software

TPC-MIDI is supplied as standard with the basic version of the software, with which the configuration of TPC-Midi and measurement programs can be set up and saved.

### Equipment configuration

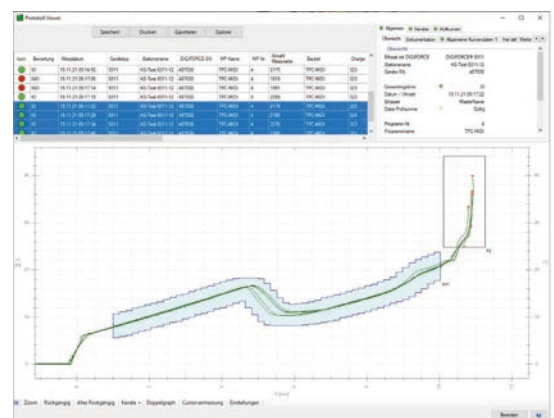
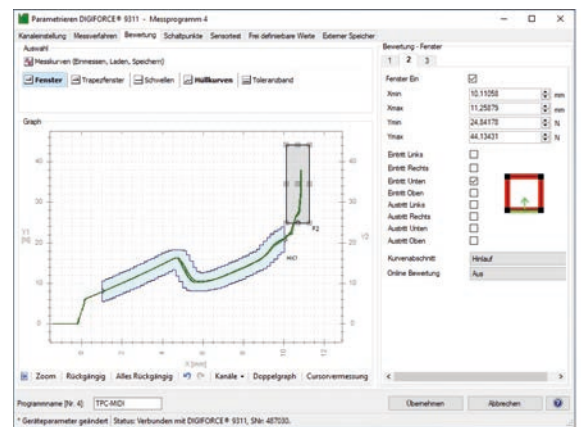
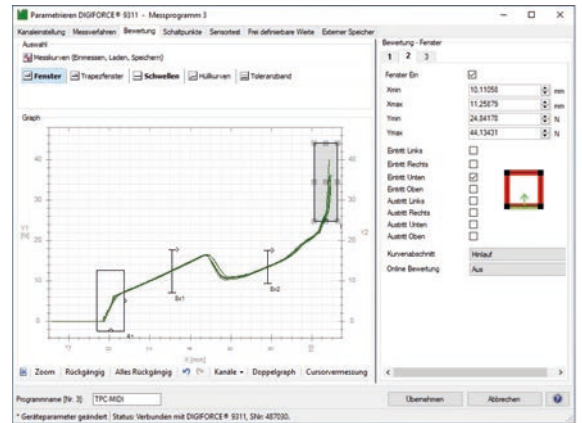
- ▶ Settings or teach-in of the force and displacement sensors (X/Y axes)
- ▶ Stipulation of measurement method and reference points
- ▶ Backup of complete unit configurations (up/download)

### Measurement programs

- ▶ Creation and internal saving of 16 measuring programs. Further measurement programs can be created, saved and reloaded when required.
- ▶ Input of sets of curves
- ▶ Creation of monitoring windows and envelope curve
- ▶ Test runs with OK or NOK assessment

With the licensed full version, the production data per press-in operation can be recorded in addition.

- ▶ Production mode
- ▶ Measured data recording
- ▶ Clear-cut part reference
- ▶ Besides the programme's own format automatic print and export to ACII and Excel



grihtoinom 22e017 ibiM-09TTPC-Midi Process monitoring