

Quality • Safety • Transparency

Product Catalog for Swing Clamps ATEB



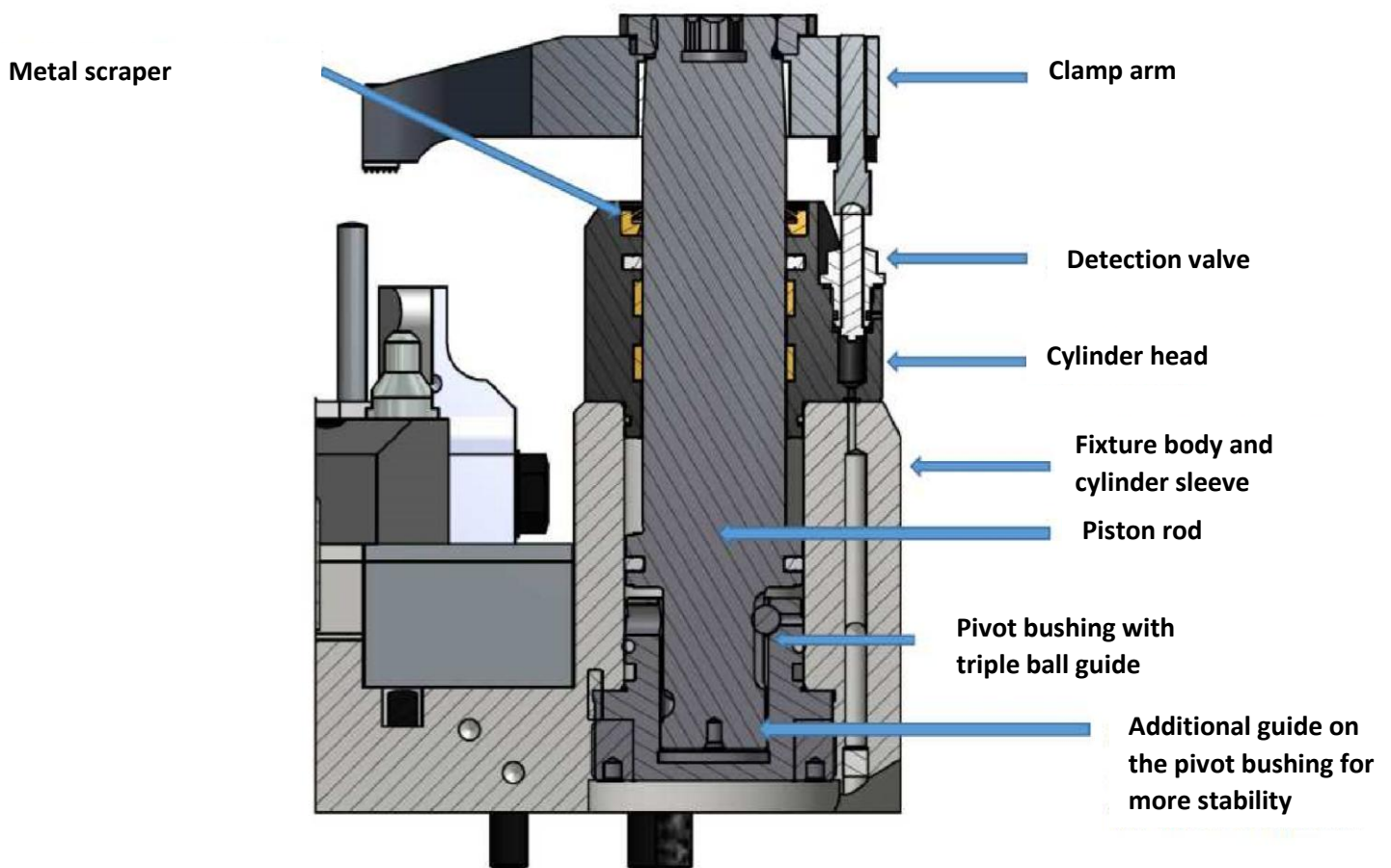
AIR  **tec**[®]
vogel

- ✓ Druckluftmotoren
- ✓ Planetengetrieben
- ✓ Spannhydrauliksysteme
- ✓ Montagetechnik



- ✓ Konstruktion
- ✓ Herstellung
- ✓ Vertrieb
- ✓ Service

Swing Clamp ATEB



Setting the swing speed

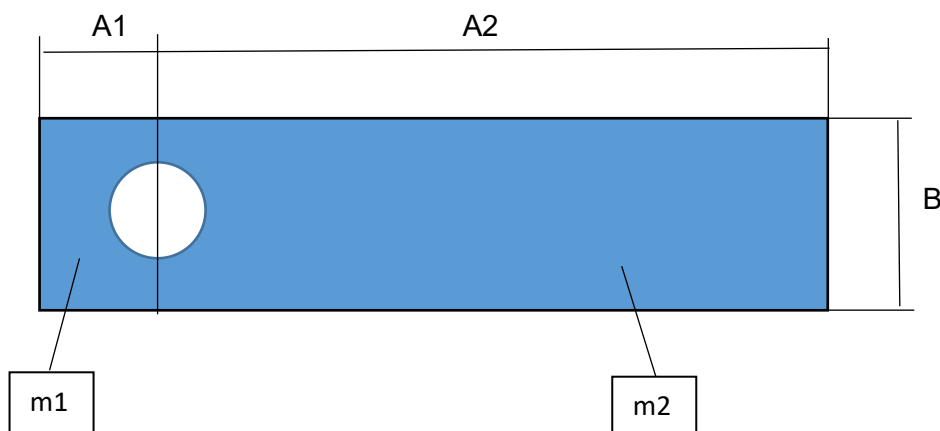
Volume flows that are too high may lead to excessive cylinder and swing speeds that can damage the cylinder. Hydraulic pressure and cylinder designs vary and must be determined based on the clamp arm length and swing speed.

To prevent damage to the cylinder and the swing mechanism at maximum operating pressure, the cylinder speeds for the types listed below must not be exceeded.

Flow control valves must be used to ensure that permissible cylinder and swing speeds are **not** exceeded.

The swing speed and thus the required volume flow are determined by the weight and length of the clamp arm (moment of inertia = I) since the swing stroke affects the swing mechanism.

- 1) Calculate the moment of inertia based on clamp arm length and clamp arm weight.
- 2) Adjust the swing speed (swing time) using a flow control valve in such a way that the ratio of the moment of inertia = I and the swing time of the clamp arm stays above the line shown in the table.
- 3) With a shorter swing time in the **impermissible range**, this may result in damage to the swing mechanism.



Calculation formula for the moment of inertia = I

$$I = \frac{1}{12} m_2 (4 A_2^2 + B^2) + \frac{1}{12} m_1 (4 A_1^2 + B^2)$$

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Swing time diagram

Swing time	Indicates permissible range							
	Moment of inertia = I							
Seconds	0.000	0.002	0.005	0.010	0.015	0.020	0.025	0.030
0.0								
0.2								
0.4								
0.6								
0.8								
1.0								
1.2								
1.4								
1.6								
1.8								

Permissible range

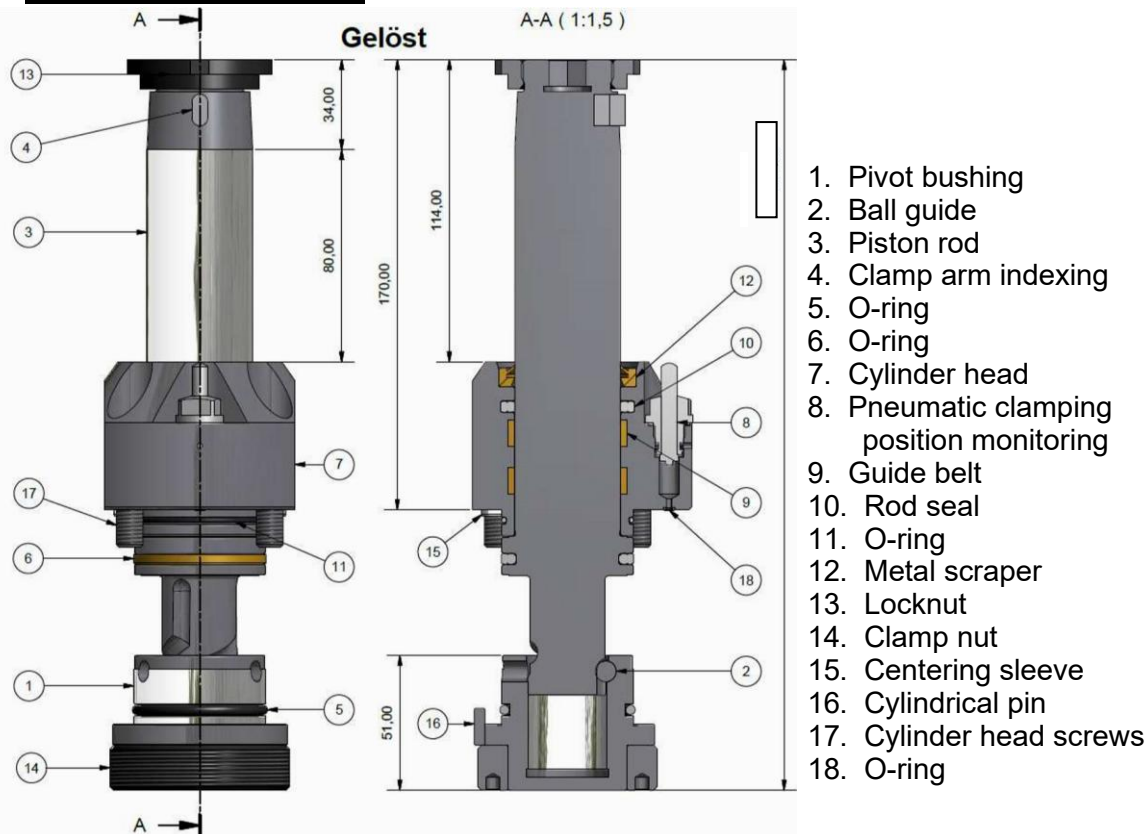
Swing Clamp ATEB

AIR-tec-Vogel[®] GmbH has developed space-saving and adjustable hydraulic swing clamps specifically for fixtures. This patented design with very few components has extremely low wear. The piston does not function as a guide on the cylinder sleeve (fixture body). The actual guidance is carried out by the pivot bushing and the guide pin on the piston rod as well as by the cylinder head. This allows higher clamping forces to be transmitted, such as with longer clamp arms. When servicing, replacing the few components requires very little time. The desired clamping position can be adjusted accurately and with high repeatability by means of the stable triple ball guide.

Benefits:

- Reduced clamp element dimensions allow an increase in the number of components on workpieces
- Greater flexibility and low purchase costs
- High clamp forces of 5.8 to 22.5 kN at low hydraulic pressure of 50bar to 200bar
- Pneumatic clamping position monitoring
- Metal scraper for improved protection against hot chips
- Clamp elements designed as a modular system
- Clamp arm indexing
- Exact adjustment of the required clamp position

Component description:

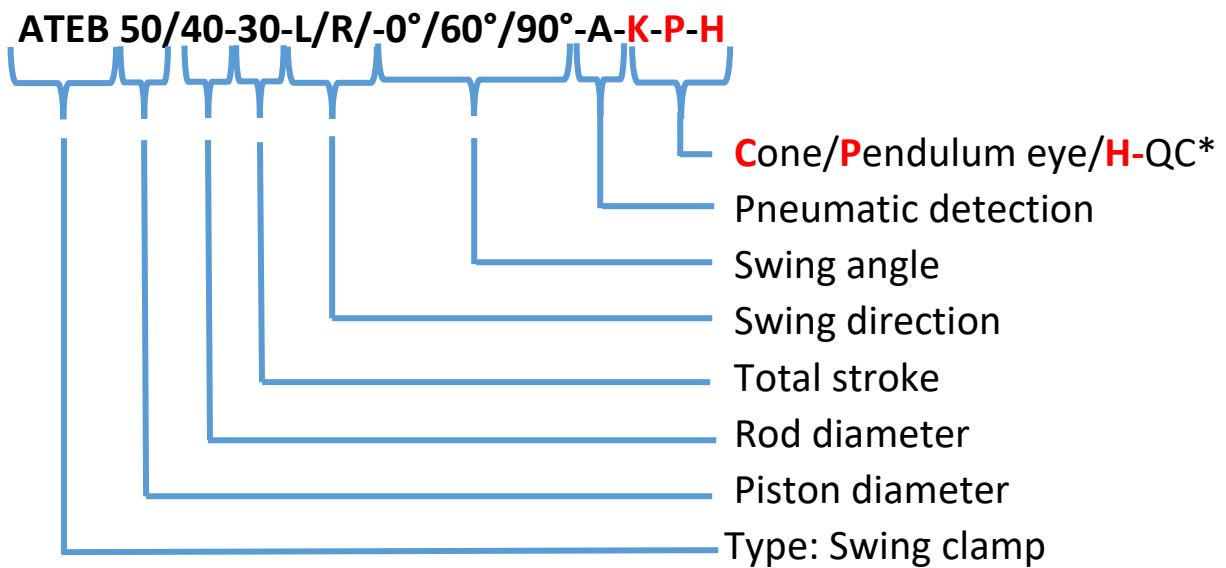


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Product Key



*QC = quick change

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Swing clamp ATEB- 5740, 5040, 4030 & 3222

Intended use



Our hydraulic swing clamps used as a pull cylinder are intended for direct installation in industrial plants for fixtures. They are used to clamp workpieces on production machinery for machining. Commissioning is prohibited until the entire machine conforms to national occupational health and safety regulations, in particular with regard to the implementation of the EU directive on the use of work equipment.

Description of operation



The swing clamps are designed as pull cylinders, with part of the stroke motion being used to rotate the piston. This allows the clamping positions to be mounted and dismantled freely. The stable triple ball guide without swing mechanism overload protection permits the adjustable clamping position to be positioned accurately, with high repeatability and in a way that is suitable for automation.

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Technical Data

Volume flows that are too high may cause excessive cylinder speeds and thus result in cylinder damage. Hydraulic pressure and cylinder design vary and must be determined based on the clamp arm length. To prevent damage to the cylinder at max. V and 200 bar, the cylinder speeds for the types listed below must not be exceeded. Flow control valves must be used to ensure that permissible cylinder speeds are **not** exceeded.

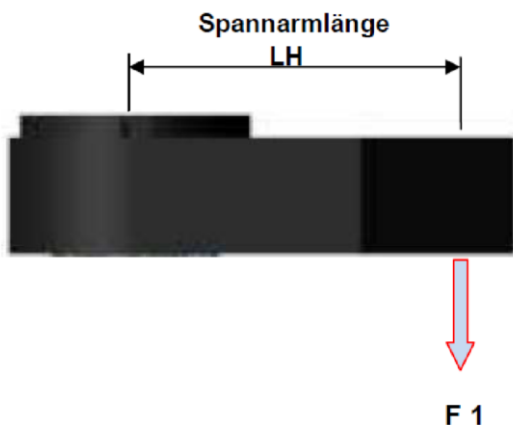
Technical data for cylinders

Type:		ATEB 3222	ATEB 4030	ATEB 5040	ATEB 5740
Piston diameter mm		32mm	40mm	50mm	57mm
Rod diameter mm		22mm	30mm	40mm	40mm
Usable ring surface for (clamping)		4.2 cm ²	5.5 cm ²	7.1 cm ²	12.95 cm ²
Swing angle		0° and 90° +/- 1° 60° +/- 3° 45° +/- 3°			
Repeatability of clamping position		Adjustable in the "minute range" (without adjustment +/- 1°)			
Complete stroke at 90°		22mm	22mm	30mm (other strokes on request)	
Swing stroke at 90°		8mm	8mm	13mm	
Clamping stroke		14mm	14mm	17mm	
Oil required	Clamp	9.2 cm ³	12.1 cm ³	21.4 cm ³	38.9 cm ³
	Release	15.3cm ³	27.2 cm ³	59.8 cm ³	79.9 cm ³
Tightening torque hexagonal nut		35 Nm	100 Nm	190 Nm	190 Nm
Max. permissible oil Volume flow		18.5 cm ³ /s 30.8 cm ³ /s	25cm ³ /s 35cm ³ /s	45.3 cm ³ /s 108 cm ³ /s	71.5 cm ³ /s 135 cm ³ /s
Tightening torque hexagonal nut		M45 X 1.5 130 Nm	M56 X 1.5 170 Nm	M68 X 1.5 230 Nm	M68 X 1.5 230 Nm
Tightening torques for new quick clamping nut screw torque wrench		X	2.0 Nm	2.9 Nm	2.9 Nm

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Technical Data



Ideal operating pressure range 50 ~ 200 bar and operating temperature 20 ~ 70°C

Hydraulic pressure	Cylinder force ATEB 3222	Clamping force in kN						Indicates impermissible range	
		Clamp arm length LH (mm) in kN at F 1							
bar	kN	50 mm	60 mm	70 mm	80 mm	90 mm	100 mm	120 mm	Max. LH
200	7.5	7.1							
150	5.5	5.2	5.2	5.1					
100	3.7	3.5	3.5	3.4	3.4				87mm
50	1.9	1.7	1.7	1.6	1.6	1.6	1.5	1.5	130mm

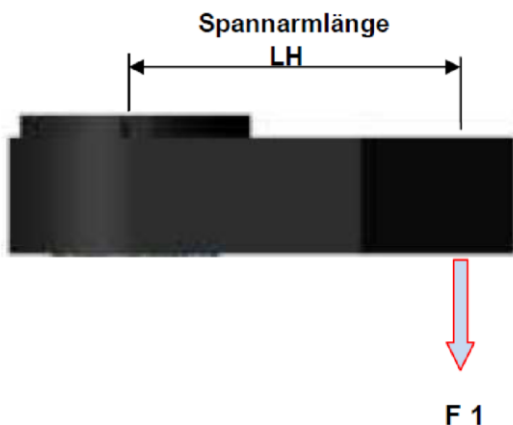
Ideal operating pressure range 50 ~ 200 bar and operating temperature 20 ~ 70°C

Hydraulic pressure	Cylinder force ATEB 4030	Clamping force in kN						Indicates impermissible range			
		Clamp arm length LH (mm) in kN at F 1									
bar	kN	50 mm	60 mm	70 mm	80 mm	90 mm	100 mm	120 mm	140 mm	160 mm	Max. LH
200	9.3	9.0	8.8	8.7	8.5	8.3	8.2				105mm
150	7.0	6.6	6.4	6.2	6.0	5.9	5.7	5.5			125mm
100	4.6	4.4	4.4	4.3	4.2	4.0	3.8	3.6	3.4		150mm
50	2.4	2.2	2.0	2.0	1.8	1.7	1.7	1.6	1.6	1.4	165mm

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Technical Data



Ideal operating pressure range 50 ~ 200 bar and operating temperature 20 ~ 70°C

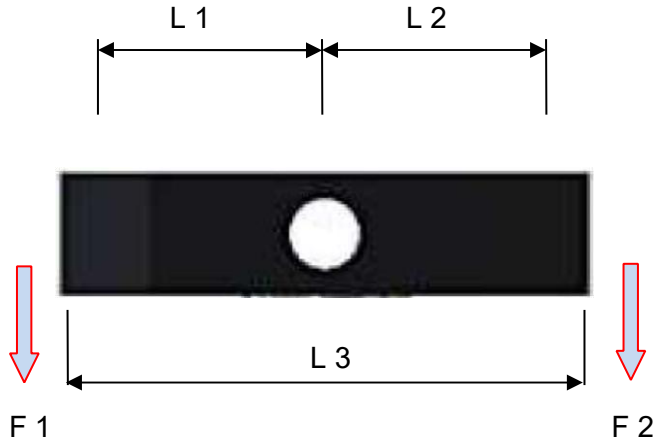
Hydraulic pressure	Cylinder force ATEB 5040	Clamping force in kN					Indicates impermissible range					
		Clamp arm length LH (mm) in kN at F 1										
bar	kN	50 mm	60 mm	70 mm	80 mm	90 mm	100 mm	120 mm	140 mm	155 mm	165 mm	Max. LH
200	13.9	12.4	12.2	11.8	11.6	11.3	10.9	10.5				125
150	10.7	9.3	9.2	8.9	8.7	8.5	8.3	8.1	7.8	7.4		160
100	6.8	6.1	6.0	5.9	5.8	5.7	5.6	5.5	5.4	5.3	5.1	170
50	3.4	3.1	3.0	2.8	2.8	2.7	2.6	2.5	2.4	2.4	2.3	180

Ideal operating pressure range 50 ~ 200 bar and operating temperature 20 ~ 70°C

Hydraulic pressure	Cylinder force ATEB 5740	Clamping force in kN					Indicates impermissible range					
		Clamp arm length LH (mm) in kN at F 1										
bar	kN	30 mm	60 mm	70 mm	80 mm	90 mm	100 mm	120 mm	140 mm	155 mm	165 mm	Max. LH
200	22.5	21.5										35
150	16.8	16.4	15.9	15.6								65
100	11.5	11.2	11.1	10.9	10.7	10.7	10.6	10.5				125
50	5.8	5.6	5.4	5.3	5.3	5.2	5.2	5.2	5.1	5.1	5.0	170

Technical Data

Clamp arm length for pendulum eye



Ideal operating pressure range 50 ~ 200 bar and operating temperature 20 ~ 70°C

Hydraulic pressure	Cylinder force ATEB 5740	Clamping force in kN					
		Clamping arm force L 1 and L 2 (mm) yields force in kN F 1 and F 2					
bar	kN	50 mm	80 Mm	100 mm	120 mm	130 mm	L 3 Max.
200	22.5	10.9	9.8	9.4	9.2	9.0	270mm
150	16.8	7.9	7.6	7.2	7.0	6.8	280mm
100	11.5	5.4	5.2	4.9	4.8	4.7	300mm
50	5.8	2.7	2.7	2.6	2.5	2.5	320mm

Ideal operating pressure range 50 ~ 200 bar and operating temperature 20 ~ 70°C

Hydraulic pressure	Cylinder pressure ATEB 4030	Clamping force in kN			
		Clamping arm force L 1 and L 2 (mm) yields force in kN F 1 and F 2			
bar	kN	50 mm	80 Mm	100 mm	L 3 Max.
200	9.3	4.5	9.8	9.4	205mm
150	7.0	3.3	7.6	7.2	210mm
100	4.6	2.2	5.2	4.9	220mm
50	2.4	1.2	1.2	2.6	230mm

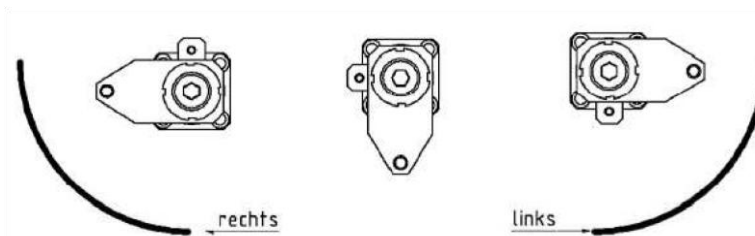
Technical Data

Swing angle and direction of rotation

Our swing clamps are available with swing angles of 0°, 45°, 60° and 90°.

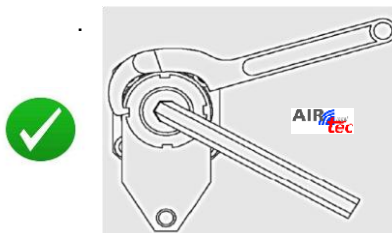
- **Swings right** means that the clamp arm rotates in the clockwise direction if you are looking at the swing clamp from above.
- **Swings left** means that the clamp arm rotates in the counterclockwise direction if you are looking at the swing clamp from above.

• **0° swing clamps** are guided pull cylinders without swing motion **Design =** **R** **0°**
L

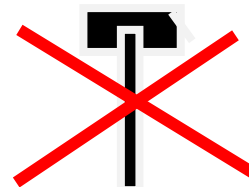


Installing and removing the clamp arm

- Align clamp arm to indexing and intended position and push over the cone 1:10. Ensure that the cone and the clamp arm are grease-free.
 - Preload the clamp arm with the corresponding locknut or hexagonal nut (example: 700-2503515). An open-end wrench, hook wrench or crown wrench is used for tightening.
 - **Please note:** Care must be taken to ensure that a suitable Allen® wrench is used to hold the piston rod in place to prevent torques from being transmitted via the swing mechanism.
- For recommended tightening torques please refer to the technical data table. Caution - Crush hazard: Keep hands and other body parts away from swing and clamping area.**
- Adjusting the thrust screw: After the clamp arm has fully completed the swing motion and the remaining clamping stroke is at least 2mm, adjust the thrust screw so that the screw touches the workpiece. You can then tighten the counter nut. **Please note:** Use a suitable Allen® wrench to hold down the piston rod.
 - **Please note:** If you must release or reposition the clamp arm, you must use a suitable removal tool to release the clamp arm from the clamping cone.

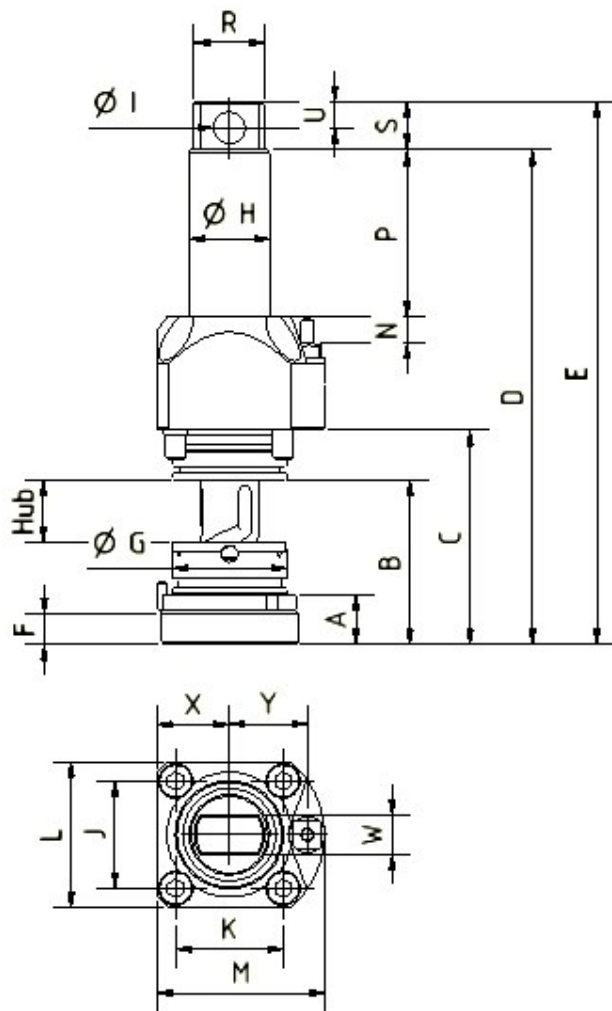
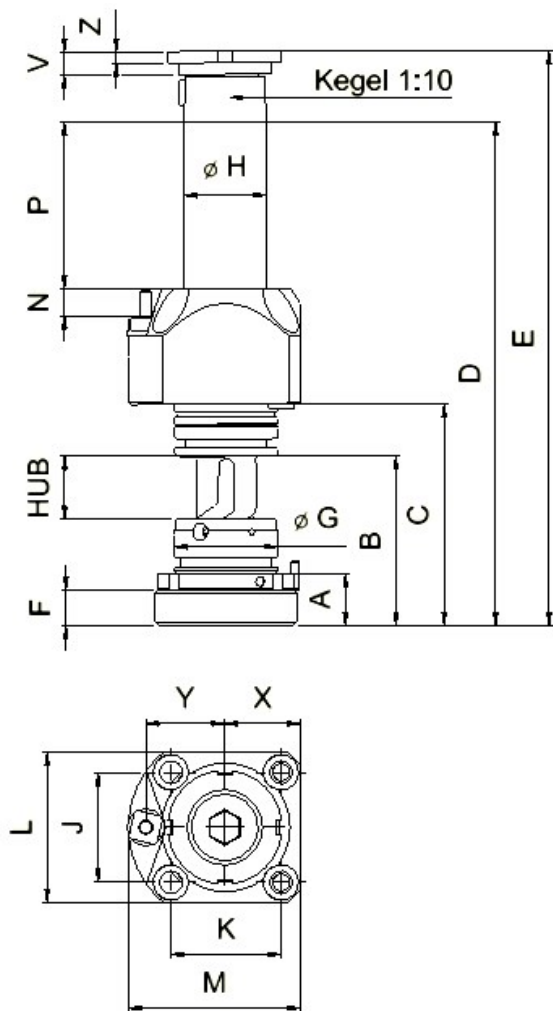


Do not use a hammer



Technical Data

Installation dimensions for ATEB 5740 / 5040 / 4030 / 3222

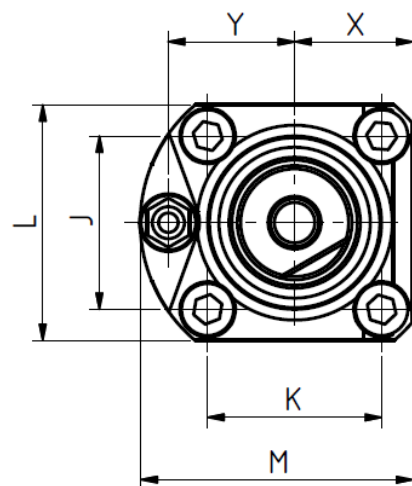
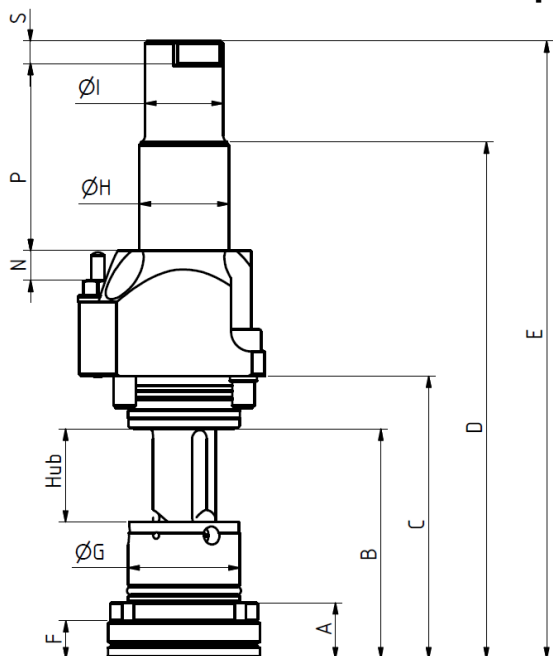


Types	A	B	C	D	E	F	Ø G	H	Ø I	J	K	L	M	N	P	R	S	U	V	W	X	Y	Z
ATEB 3222	19	60.5	83.5	176.5	202.5	12	32	22		35.5	50				43				12		25		6.5
ATEB 4030	22	62	85	182	210	15	40	30		44	60	72	6	48.5				10		30	33.5	4.5	
ATEB 5040	25	81	106	242.5	276	17	50	40		53	72	83	6	80				11		36	38	5.5	
ATEB 5740	25	81	106	244.5	268.5	17	57	40	16	53	72	73	6	82.5	35	24	13		20	36	38		

General tolerances for lengths according to DIN ISO 2768-1 (f) fine

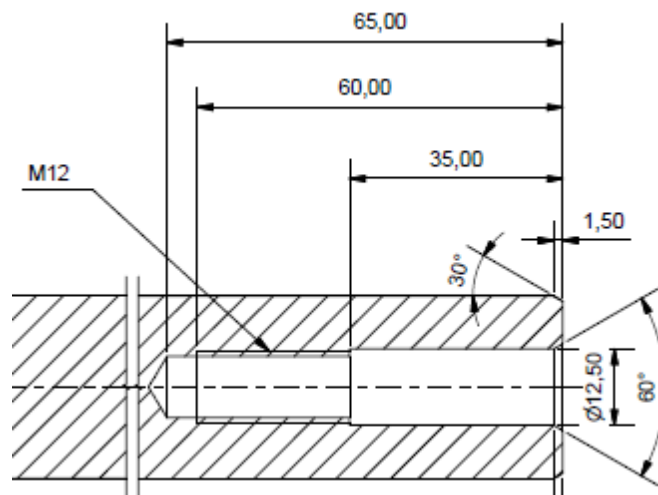
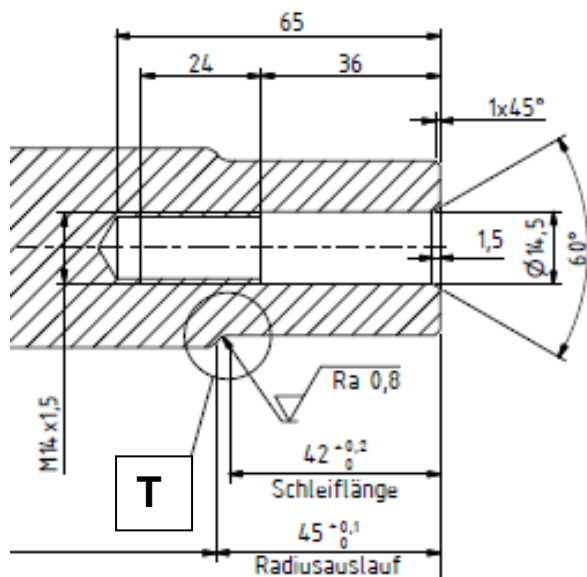
Technical Data

Installation dimensions for quick change system ATEB 5040-30-40- and 41.5 / 4030-22



700-703-ATEB 5040-30 / 40 / 41,5

702-ATEB 4030-22

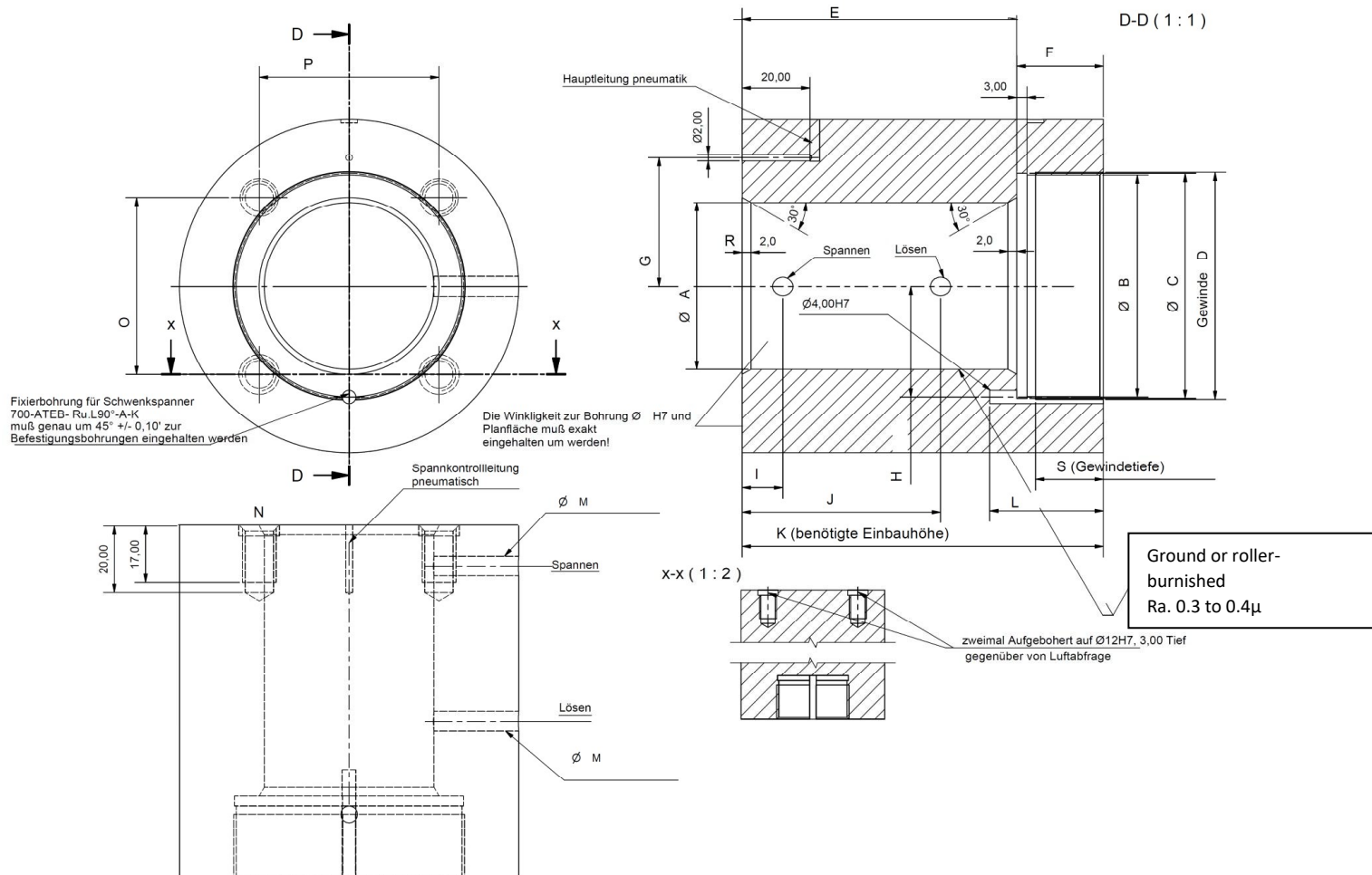


Types	A	B	C	D	E	F	Ø G	Ø H	Ø I	J	K	L	M	N	P	S	T
702-ATEB 4030-22	22	62	85	X	242.5	15	40	30	30g6	44	60	72	83	6	69	10	X
703-ATEB 5040-30 Hub	25	81	106	198.5	241	17	50	40	35g6	53	72	83	83	6	84	10	R3
703-ATEB 5040-40 Hub	25	101	126	233.5	276	17	50	40	35g6	53	72	83	83	6	84	10	R3
700-ATEB 5040-41.5 Hub	25	102.5	126	233	275.5	17	50	40	35g6	53	72	83	83	6	83.5	10	R3

General tolerances for lengths according to DIN ISO 2768-1 (f) fine

Technical Data

Installation dimensions for ATEB 5740 / 5040 / 4030 / 3222



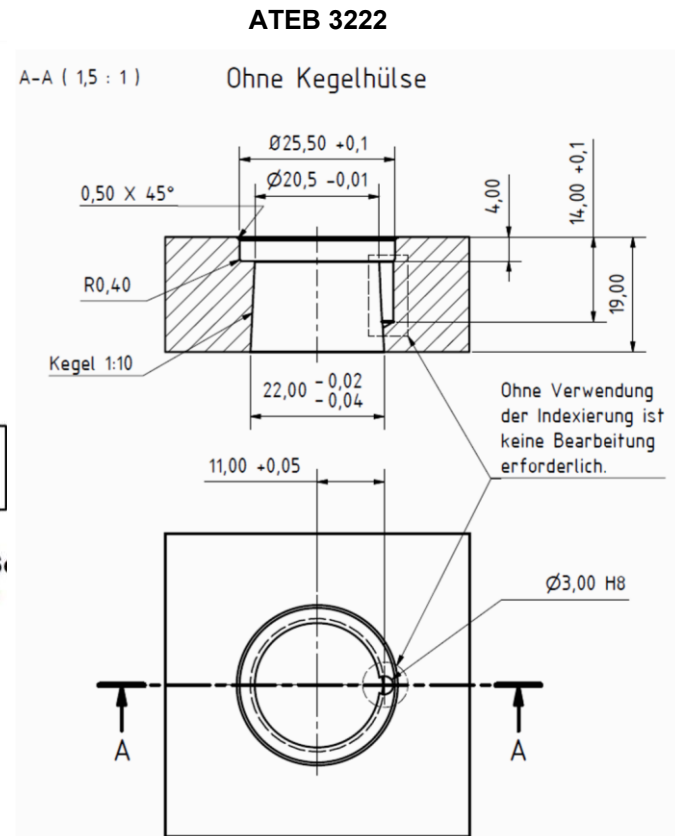
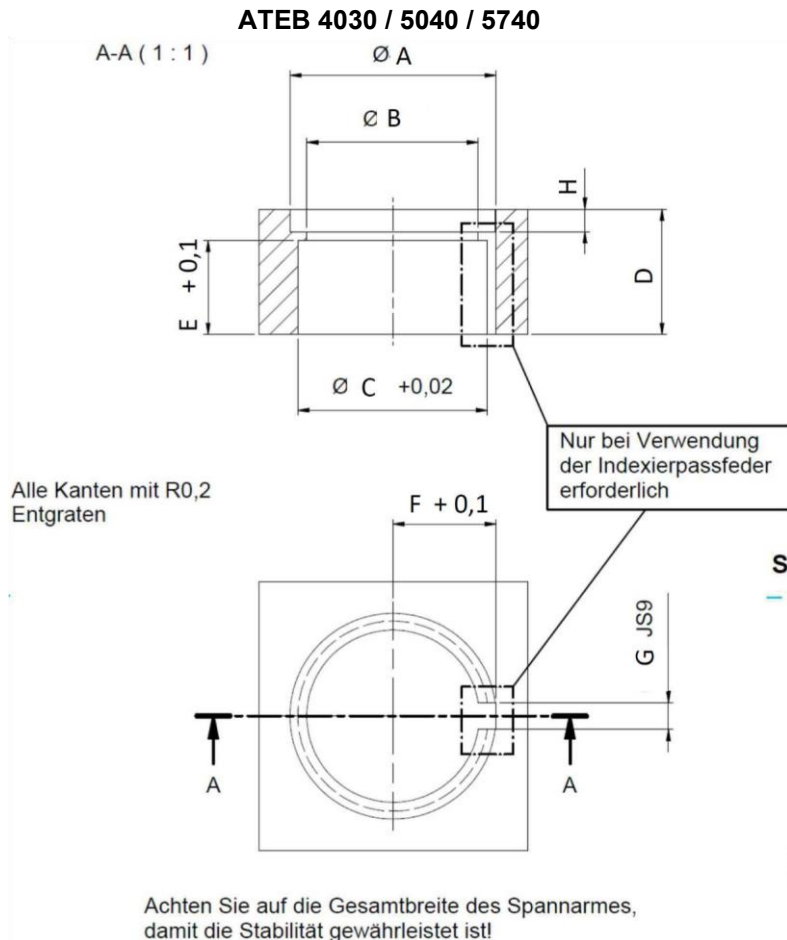
Types	A ØH7	B	C	D	E +0.05	F	G +0.05	H +0.01	I	J	K	L	M Ø	N	O	P	R	S
ATEB 3222	32	43.5	44.5	M45 X 1.5	64.5	19.5		20	10	47	84	29	3	M8	35.5	35.5	2	15
ATEB 4030	40	54.5	55.5	M56 X 1.5	63	22.5	33.5	25	10	47.5	85.5	32	4	M8	44	44	2	18
ATEB 4030 Hub 40	40	54.5	55.5	M56 X 1.5	81	22.5	33.5	25	10	65.5	103.5	32	4	M8	44	44	2	18
ATEB 5040	50	66.5	67.5	M68 X 1.5	81	25.5	38.5	33.28	12	58.5	106.5	34	6	M10	53	53	2	20
ATEB 5040 /40 / 41.5	50	66.5	67.5	M68 X 1.5	101	25.5	38.5	33.28	11	68	126.5	34	4	M10	53	53	2	20
ATEB 5740	57	66.5	67.5	M68 X 1.5	81	25.5	38.5	33.28	12	58.5	106.5	34	6	M10	53	53	2	20

General tolerances for lengths according to DIN ISO 2768-1 (f) fine

J, K and E must be adjusted to the stroke if longer strokes are used. We would be happy to assist you!

Clamp arm bore when cone sleeves are used

AIR-tec-Vogel® GmbH supplies cone sleeves for quick clamp arm changes. Cone sleeves can result in considerably reduced setup times if clamp arms are changed frequently.



Types:	ØA	ØB	ØC +0.02	D	E + 0.1	F + 0.1	G (JS9)	H
ATEB3222	X	X	X	X	X	X	X	X
ATEB4030	37	29	33	24	16	20	5	5
ATEB5040	46	38.5	42.5	28	21	23	6	5
ATEB5740	46	38.5	42.5	28	21	23	6	5

General tolerances for lengths according to DIN ISO 2768-1 (f) fine

Standard clamp arms

AIR-tec-Vogel® GmbH supplies standard clamp arms in various lengths for all swing clamps. The highest possible clamping force, resulting from a maximum operating pressure of 200 bar, can only be achieved if a short clamp arm is used. The permissible maximum pressure and the clamping forces achieved are inversely proportional to the length of the clamp arm used. Please refer to the technical data for more information.

• Please note:

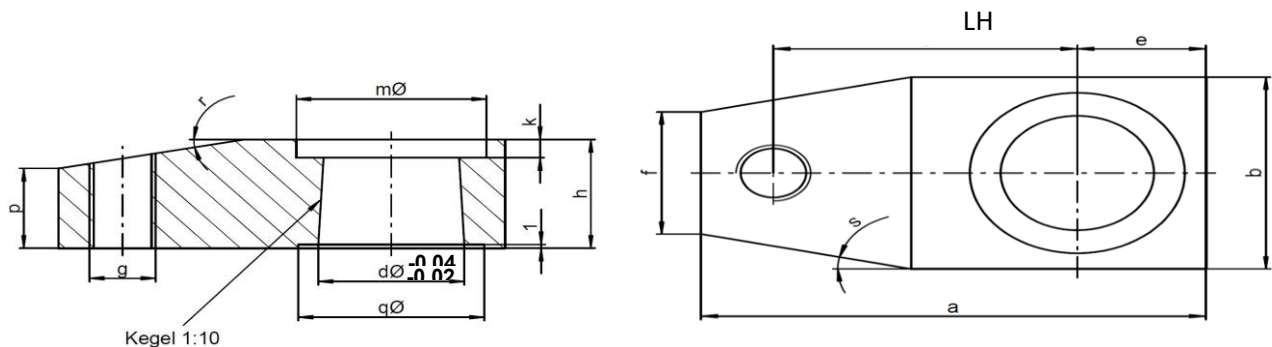
A loosening of the hexagonal nut or locknut can only occur if the clamp arm is not sufficiently dimensioned and if it expands due to external forces such as those from workpieces dropped on it, which can result in the clamp arm pushing on to the cone mount and a **“loosening of the torque”** on the hexagonal nut or locknut.

We would like to point out that for safety reasons the tightening torques of the hexagonal nut or locknut must be checked during the production process at regular intervals to ensure safe production. The use of locking plates is recommended. If you have any questions, just ask us.

Please note: If you must release or reposition the clamp arm, you must use a suitable removal tool to release the clamp arm from the clamping cone.

Safety precautions for changing clamp arms

Torques that are too high on the piston rod may damage the swing mechanism. For this reason, the cylinders should always be moved to the clamping position and held down as an additional safety precaution.



Types:	LH	P	g	r	mØ	dØ -0.02 -0.04	qØ	h	k	f	s	a	b	e
ATEB 3222	42	15	M10	7.3°	25.5	22	25	20	4	22	9.4°	75	35	18
ATEB 4030	75	21	M10	5.0°	37	30	35	25	5	30	9.2°	90	45	22
ATEB 5040	75	25	M12	3.5°	46	40	45	29	5	40	8.7°	125	60	30
ATEB 5740	50	26	M16	2.4°	46	40	45	29	5	50	8.1°	105	70	35

General tolerances for lengths according to DIN ISO 2768-1 (f) fine

Design

- Material 1.7225 (42 CrMo 4 tempered), 1.7231 black-oxide finished
- Medium and long clamp arm with threaded bore for plunger mounting
- Special clamp arms are available based on customer specifications and indexing

Quick change system for clamp arms

AIRtec-Vogel® GmbH supplies a quick change system for clamp arms in various lengths. Very little strength is required to release the clamp arm from the piston rod by removing the clamping screw, making it easy to mount a different arm and repositioning it.

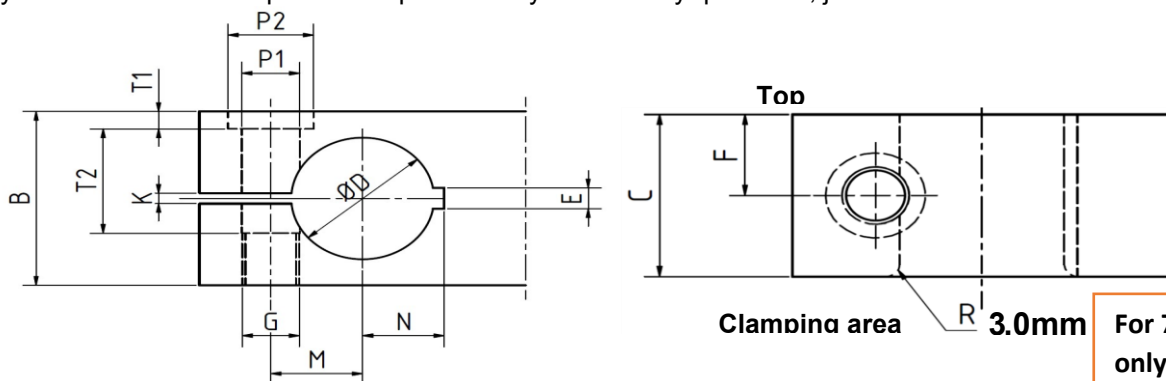
The highest possible clamping force, resulting from the maximum operating pressure of 150 bar, can only be achieved if a short clamping arm is used. The permissible maximum pressure and the clamping forces achieved are inversely proportional to the length LH of the clamp arm used. Please refer to the technical data for more information.

Safety precautions for changing clamp arms

Torques that are too high on the piston rod may damage the swing mechanism. For this reason, the cylinders should always be moved to the clamping position and held down as an additional safety precaution.

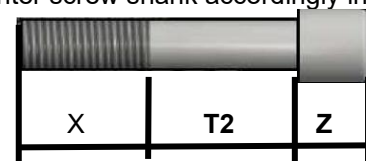
Please note:

We would like to point out that for safety reasons the tightening torques of the clamping screw M12X1.5 and M14 X 1.5 grade 12.9, recommended **tightening torque at M14 X 1.5= 160Nm up to a clamp arm length of 85mm and 100Nm at M12 X 1.5 clamp arm length of 70mm** must be checked during the production process at regular intervals. In addition, we recommend that you replace the clamping screw after certain clamping cycles to ensure a safe production process. If you have any questions, just ask us.



Types:	B	C	K	ØD +0.020 -0.005	E H7	N +0.1	M +0.1	G	T2 +0.5	T1	F +0.01	P1 +0.1	P2 +0.5	X	Z
704- ATEB5040	70	45	3	35	6	21.0	21.7	M14 X 1.5	33	15	24	14.3	22	24	15
701- ATEB3222-25 for max 70mm LH	33	30	2	22	4	12.8	15	M12 X 1.5	17	4.5	16	12.1	19	10	12

- **Please note:** Only use a clamping screw with an unthreaded shank. Allen® head screw M14 X 1.5 X 57mm, grade 12.9, shorten length on threaded side if required and center screw shank accordingly in the clamp arm so that **only the unthreaded shank touches** the piston rod.



Order code: Clamping screw: 704-141570129 only 704 series

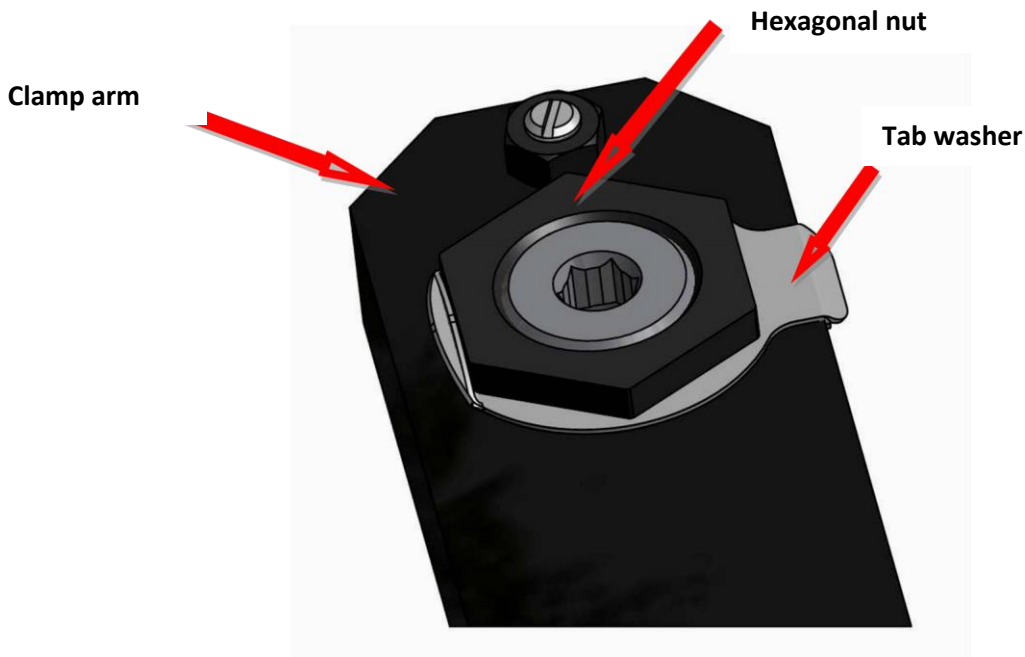
Design

- Material 1.7225 tempered (42 CrMo 4 tempered)
- Medium and long clamp arm with threaded bore for plunger mounting
- Special clamp arms are available based on customer specifications and indexing

Tab washers for tightening nut

AIR-tec-Vogel® GmbH supplies special **tab washers** to help make production processes reliable. These tab washers prevent the hexagonal nut or locknut from loosening due to external forces such as those from workpieces dropped on them, which can result in the clamp arm pushing on to the cone mount 1:10 and the torque on the hexagonal nut or locknut loosening.

Ensure that your design includes sufficient dimensioning of the clamp arms.

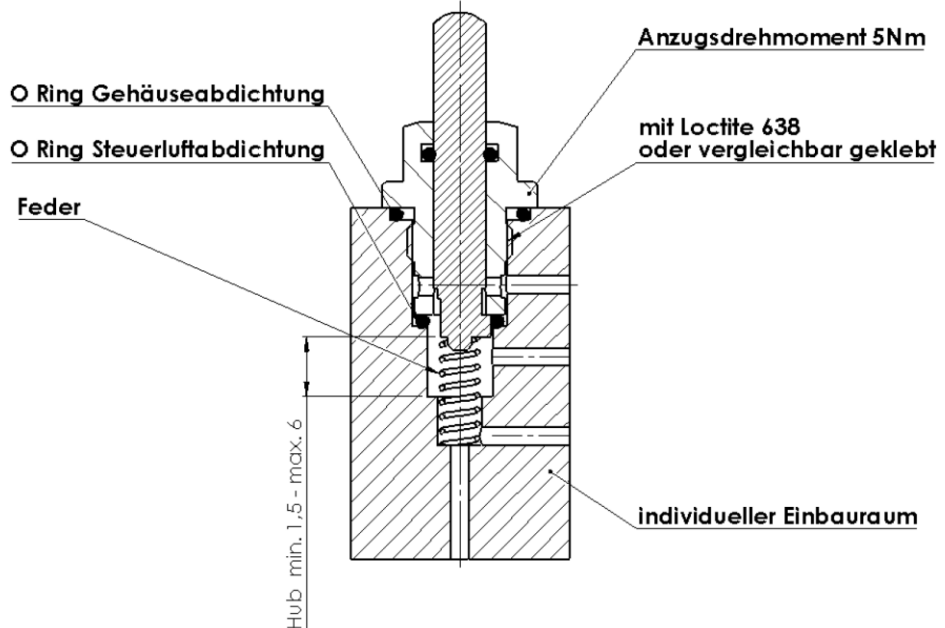
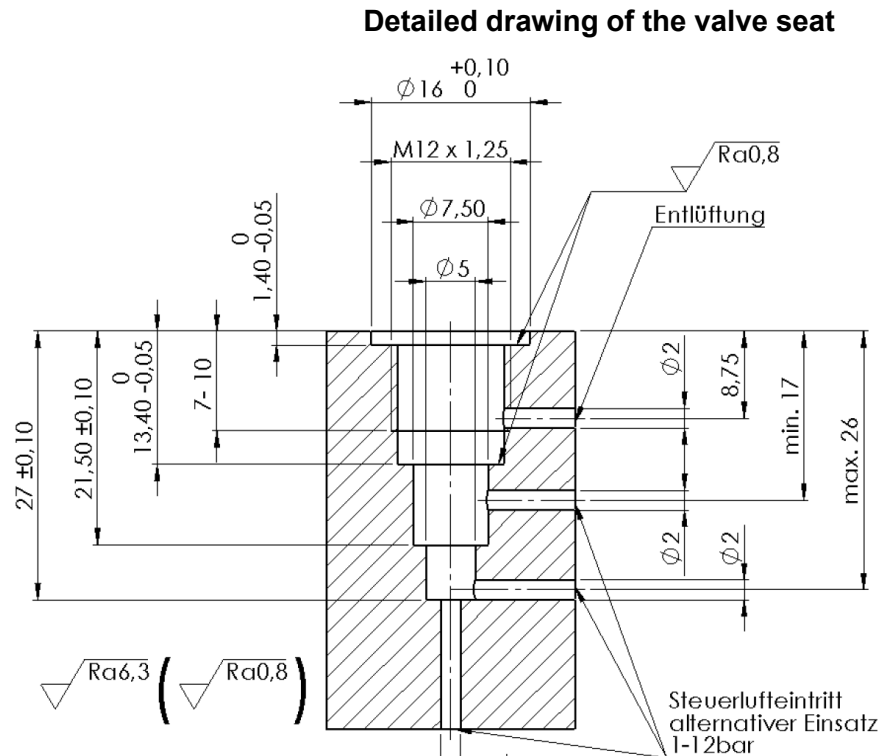
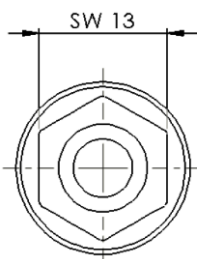
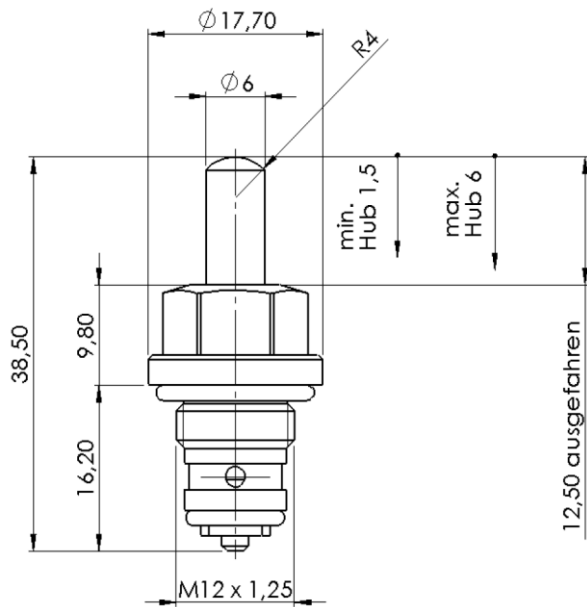


Swing arm types	Order code:
ATEB 3222	700-372508
ATEB 4030	700-503408
ATEB 5740 / 5040	700-604508

Technical Data

Pneumatic clamping detection for robot-assisted production

This simple, compact and reliable valve has been developed specifically for fixtures. In combination with our swing clamps, it checks the position of the swing arm and the presence of a workpiece in the fixture.



Material:

- Valve rod: lapped
- Valve body: honed

Assembly instructions:

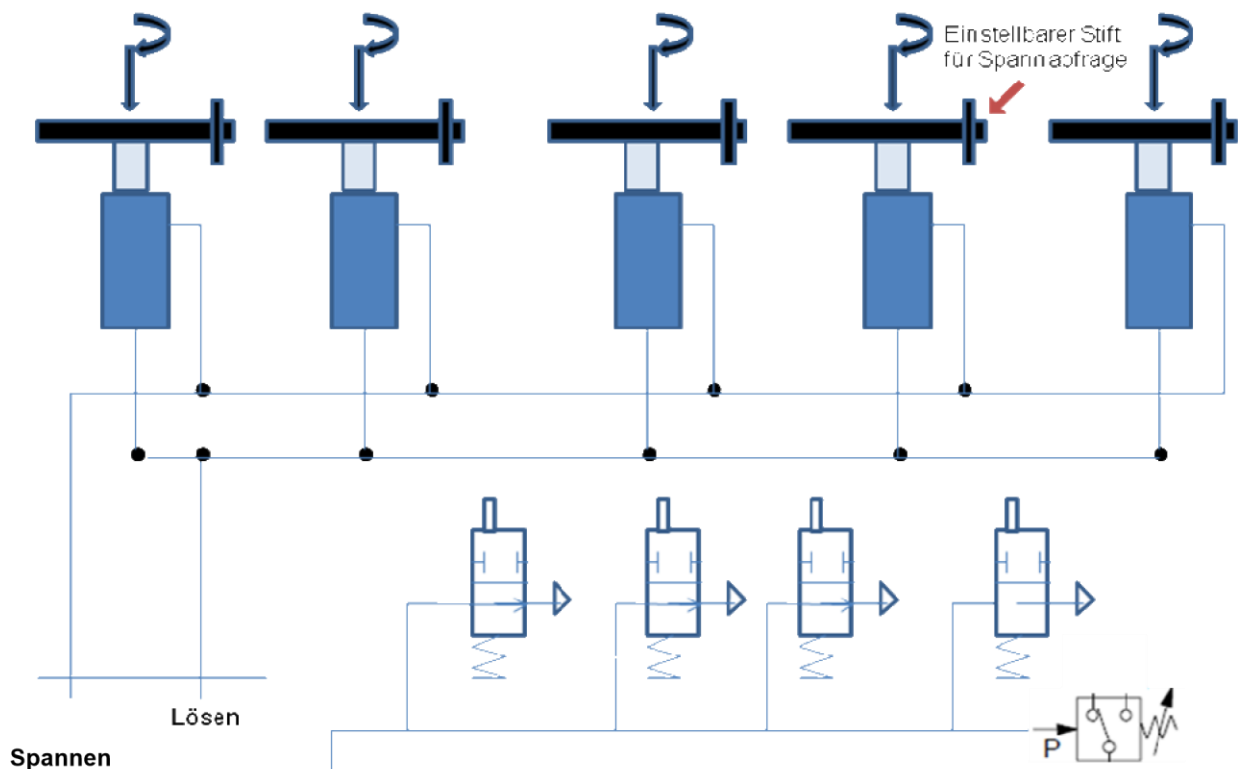
- Tightening torque varies, please tighten gently and check valve for "smooth operation," approx. 3-5Nm (use Loctite 638 retaining compound on threads only)

Adjusting the pneumatic position detection

Please note: The maximum stroke of the valve is 6.0 mm. We recommend a clamping stroke of 1.5 to 3 mm as the valve closes completely after a stroke of 1.0 mm.

Precise air flow intake from the pressure control device regulating the valves is required to ensure proper operation of the clamp arm control valves.

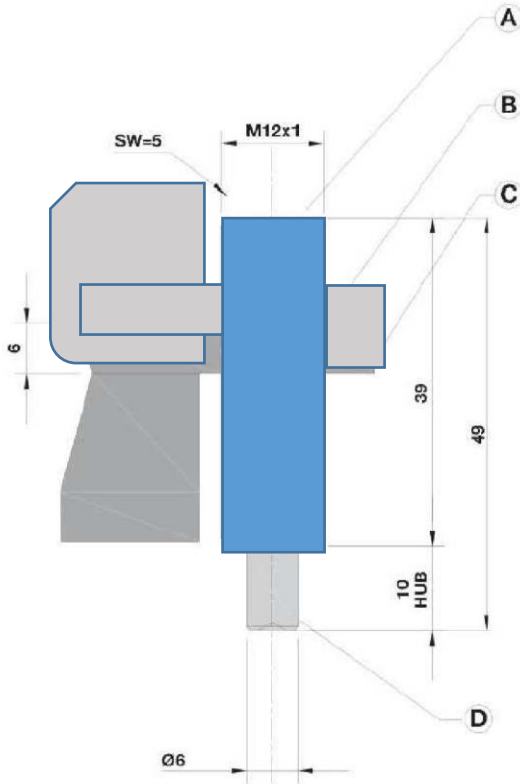
- 1) Close all 700-ATCS01 valves except for one.
- 2) Close the volume flow control valve completely to interrupt air flow.
- 3) Now open the volume flow control valve and slowly increase the pressure to set the release point of the pressure control device for the clamping pressure.
- 4) Slowly close the volume flow control valve until the pressure control device no longer emits any alarm or signal (pressure drop).
- 5) Open and close the ATCS valve to check whether the release pressure you have set has been reached and is now decreasing.



Pneumatic circuit diagram for clamping detection

Control air intake 1 to 12 bar

Adjusting the protection cartridge



The sensor valve protection cartridge is available on request for all built-in cylinders.

The valve protection cartridge allows the operator to perform clamping operations without a workpiece during testing after assembly or when cleaning the fixture while mounted. It also eliminates any risk of damage to the position sensor valve type 700-ATCS01 caused by excessive stroke.

A threaded seat M12 X 1 must be provided in the clamp arm or protection cartridge holder for installing the protection cartridge.

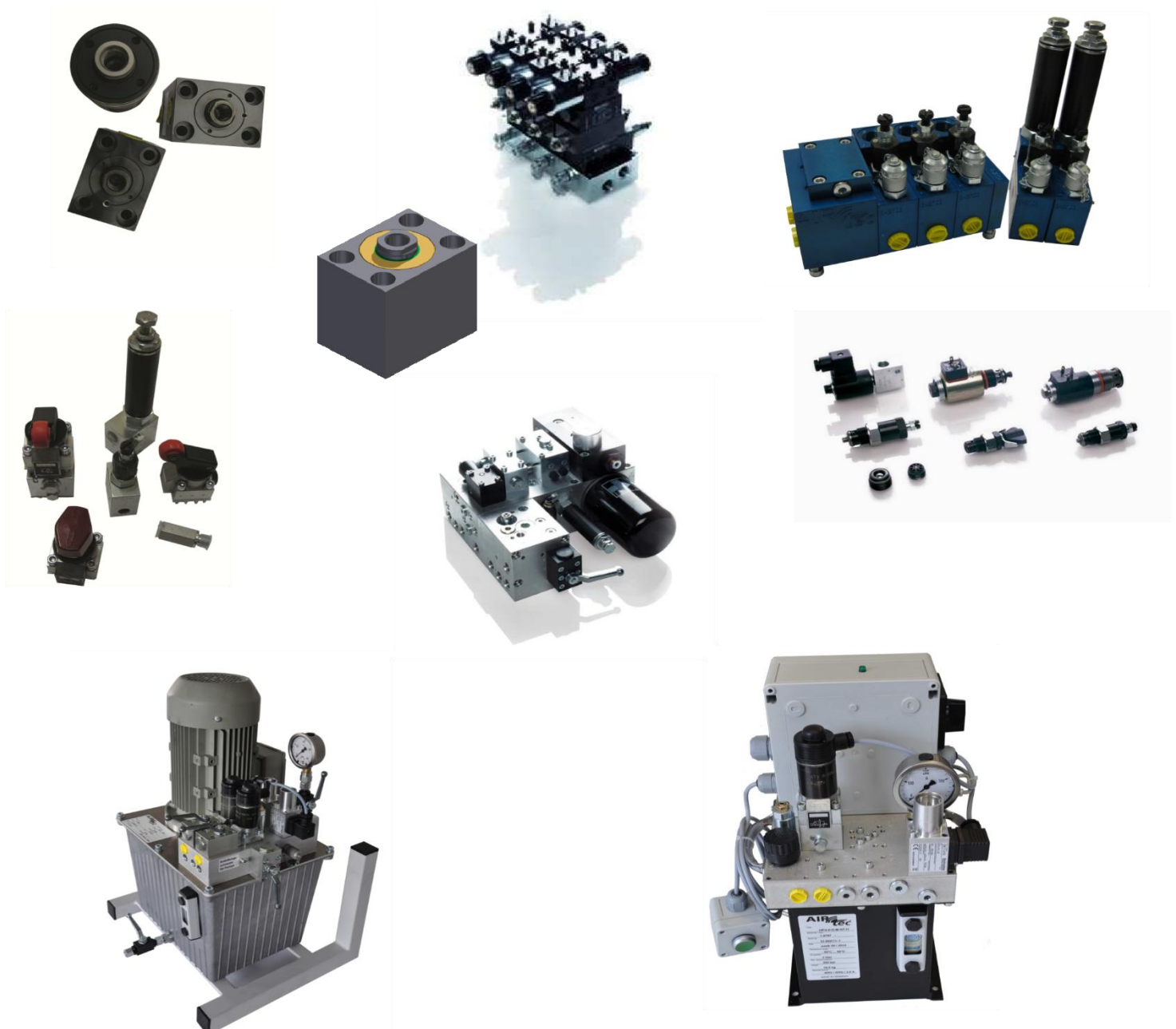
For adjusting the valve protection cartridge, follow the instructions 1 through 4 in the section on pneumatic position monitoring 700- ATCS01. For this purpose, a 5mm Allen® wrench must be used on the threaded body of the cartridge. After the adjustment has been completed, the pressure control device indicates that the pneumatic circuit is closed and instructs the machine to start operating. The piston of the safety valve (D) is able to compensate an additional stroke of the cylinder of up to 10 mm and restores the original calibration as soon as the cylinder has again reached the correct working height. **Check the clamp arm position on the workpiece to ensure that clamping operations without a workpiece do not result in an additional stroke that exceeds the level you have set.** Please note that it is advisable for hydraulic clamping cylinders to be mounted in such a way that the clamp arm is in the clamping position on the workpiece close to the lower cylinder piston limit switch. This achieves stable and durable clamping of the workpiece, thus ensuring proper functioning of the valve protection cartridge.

- ✓ Druckluftmotoren
- ✓ Planetengetrieben
- ✓ Spannhydrauliksysteme
- ✓ Montagetechnik

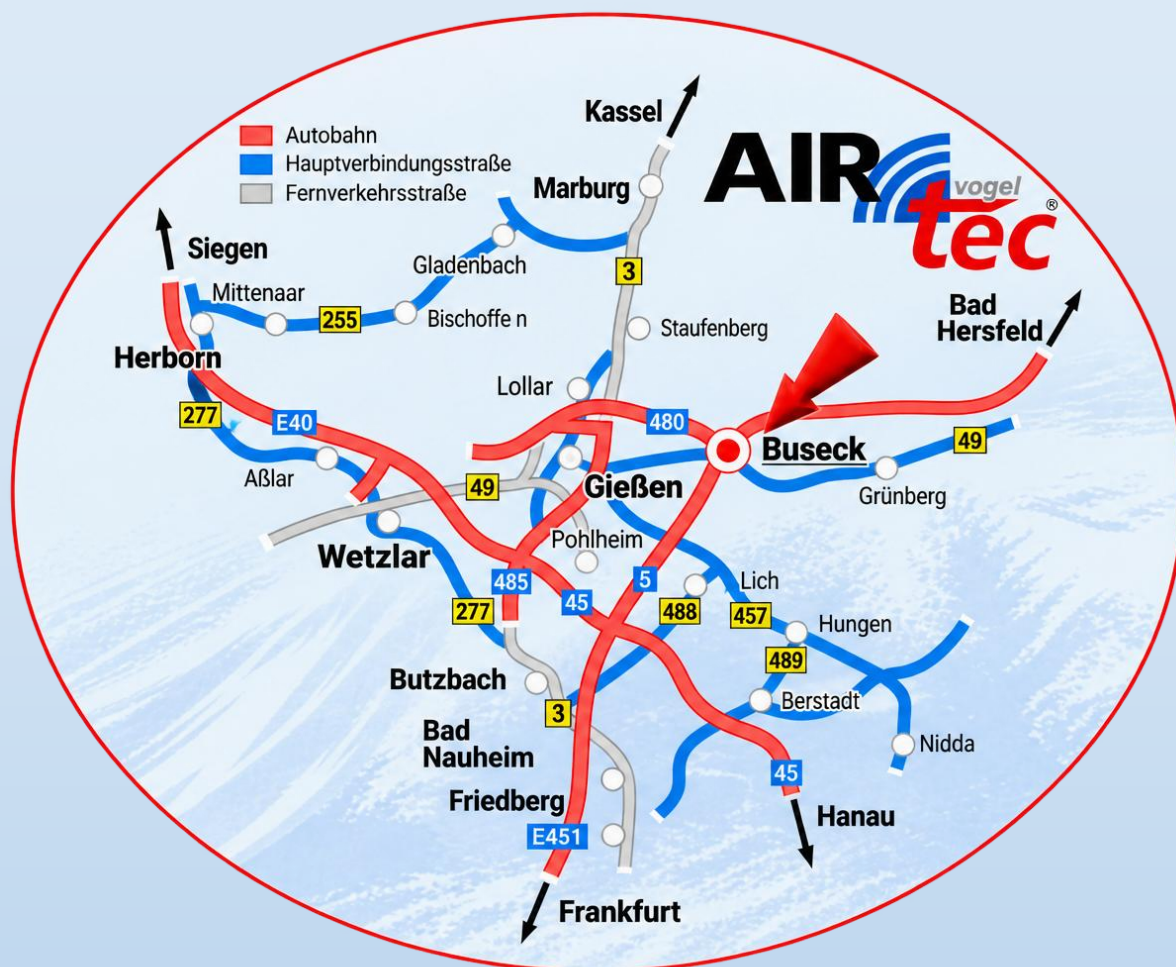


- ✓ Konstruktion
- ✓ Herstellung
- ✓ Vertrieb
- ✓ Service

Check out our catalog if you're looking for valves, standard cylinders, block cylinders, valve blocks, fasteners, pressure generators and accessories.



How to find us



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12/12/2020 Issue

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