

Automatization

*for the
PC-controlled lathe*



***Edition A2003-08
A6Z 640 010***

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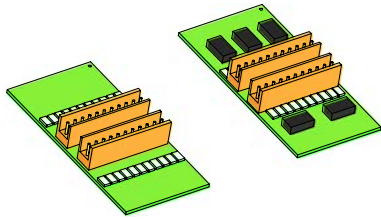
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Automatization-Survey

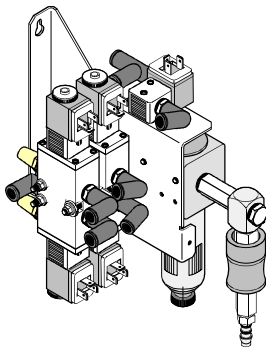


I/O-Extension

Prerequisite for:

- Automatic door mechanism
- Pneumatic chuck
- Electrically actuated tailstock
- Robotics interface

Order-no. A6Z 640

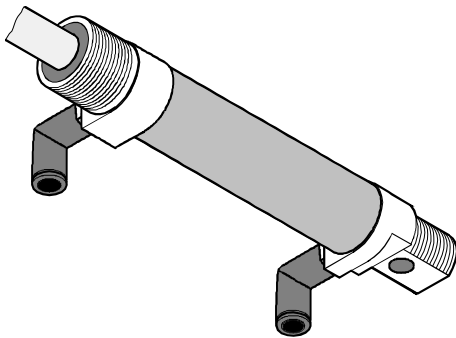


Pneumatic unit for

Order-no. A6Z 550

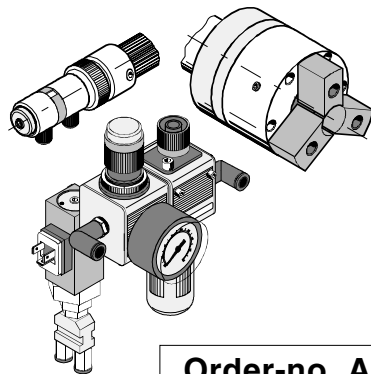
and/or

Automatic door mechanism

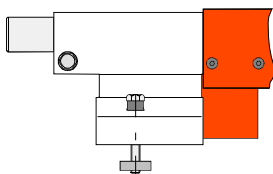


Order-no. A6Z 510

Pneumatic chuck with blow-out device



Order-no. A6Z 530



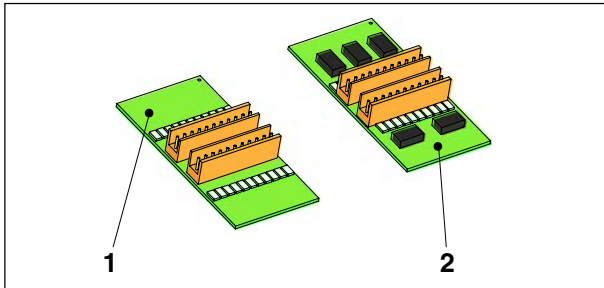
Electrically actuated tailstock

Order-no. A6Z 520



Robotics interface

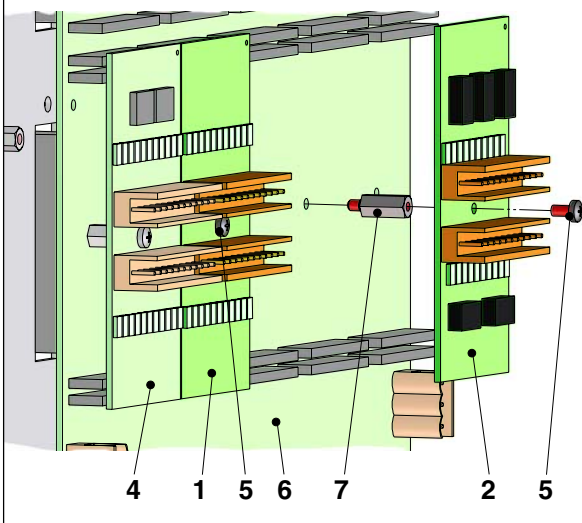
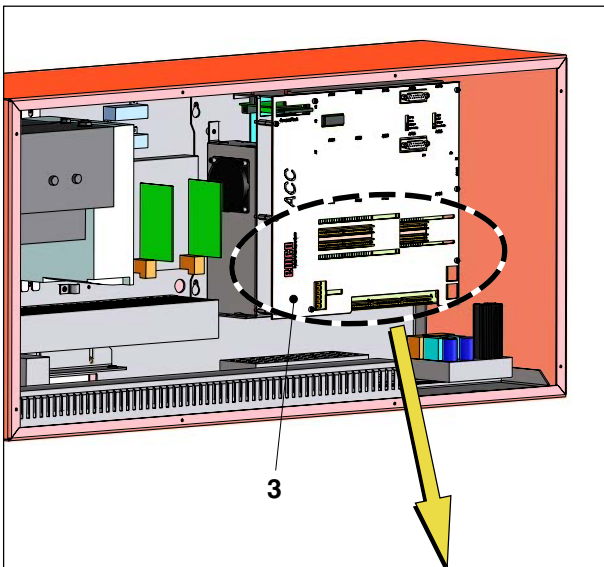
Order-no. X1A 000



I/O-extension modules

**Danger:**

Mounting the I/O-modules may only be carried out by an electrician expert and during machine standstill. (Take off mains plug!).



Backside of machine - mounting the I/O-modules

I/O-Extension

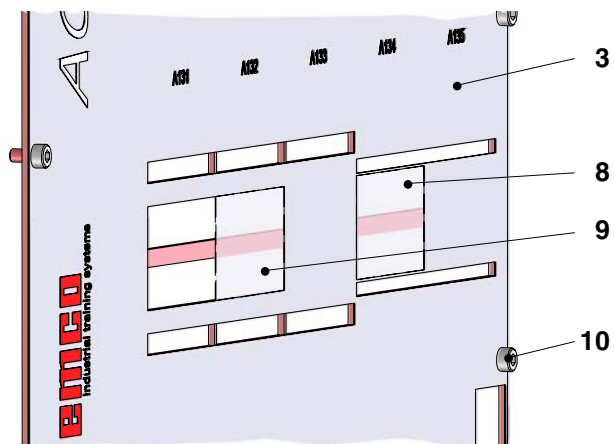
Order-No. **A6Z 640**

The I/O-extension is necessary for triggering the automatization devices.

Furthermore there are inlets and outlets on the I/O-modules for triggering other devices such as e.g. a robot control.

Mounting the I/O-modules

- Take off cover of electrical cabinet on the rear side of the machine
- Dismount front plate (3) of the ACC-axis controller by untightening the 8 socket head screws KS2,5 (19).
- Untighten the screws M2,5x5 on the board (6) at the positions "A132" and "A134" (see front plate), and replace it with the distance bolts (7).
- Put the input-module (1) at the position "A132" of the board (6) (right side of the reference module (4)).
- Put output-module (2) at the position "A134".
- Fix the modules with the screws M2,5x5 (5).
- Clip out the perforated parts at the positions "A132" and "A134" of the front plate (3) and mount the front plate.



Pneumatic unit

Order-no. A6Z 550

The pneumatic unit is needed for the automatic door mechanism and/or the pneumatic chuck with blow-out device.

It contains all connections and valves to be able to trigger the accessories.

The valves are already mounted on a supporting sheet.

Scope of supply of pneumatic unit

- Mounting sheet (2) with mounted and partially already connected pneumatic valves
- supporting sheet (4)
- cover over pneumatic unit (5)
- various screws and washers

Mounting the pneumatic unit



Danger:

Prior to mounting the pneumatic unit the machine has to be separated from the mains (take off mains plug)!

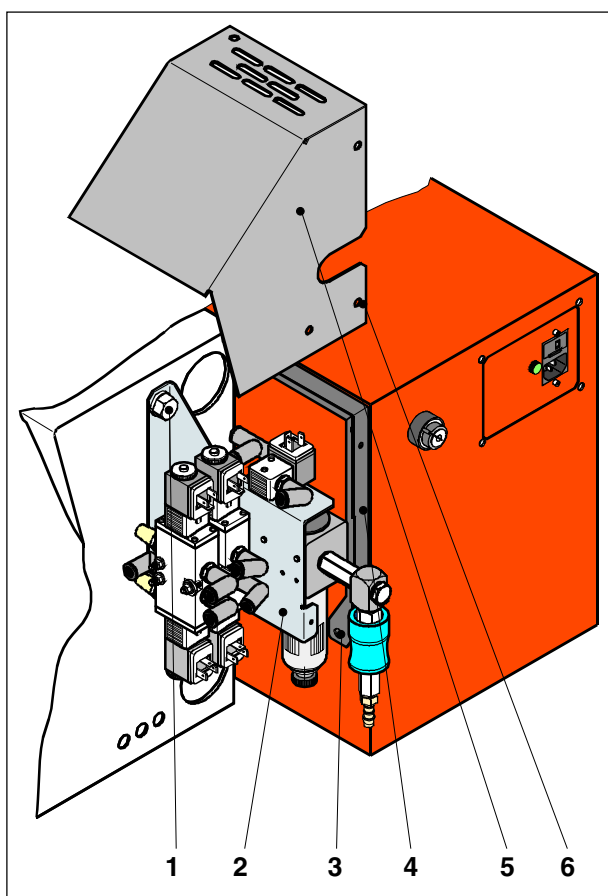
- Mount support sheet (4) at electrical cabinet. The supporting angle is screwed down by means of the filister head screws (3) already used at the electrical cabinet, with hexagonal screws SW4 and with a sheet metal screw 3.5x9.5 included in the scope of supply.
- Mount the mounting sheet (2) with the pneumatic valves laterally at the machine by means of the hexagonal screws M5x12 SW8 (1) provided for this purpose. The lower of both screws must be mounted with a hexagon nut at the cover sheet.



Note:

If an automatic door mechanism is mounted use the support sheet for the pneumatic cylinder instead of the hexagon nut. See "Mounting the automatic door mechanism".

- The cover (5) is mounted with the 4 filister head screws M5x10 (6) with the washers B5.3.



Mounting the pneumatic unit

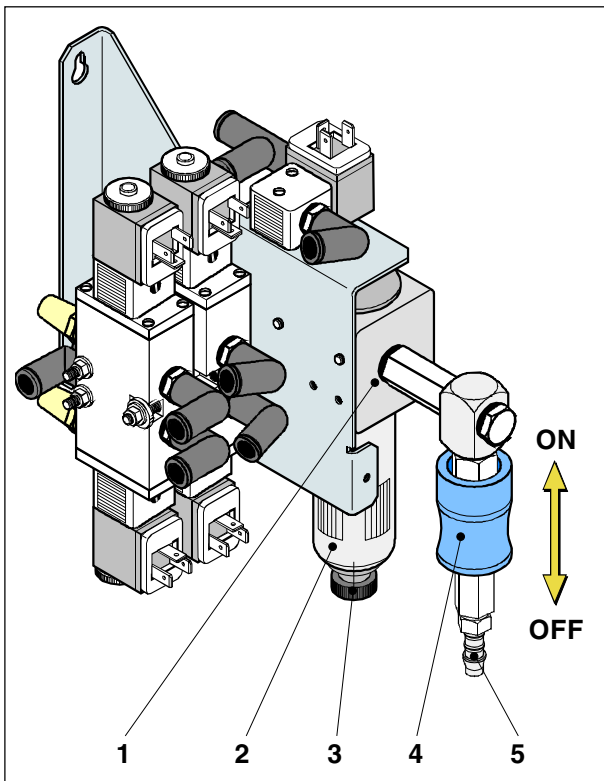
Connection of the pneumatic unit

Maximum working pressure 6 bar



Caution:

To avoid misfunctions or damage at the accessories connected at the pneumatic unit it is not permitted to carry out modifications at the valves.



Maintenance and air supply at the pneumatic unit

- Connect air supply at the connection piece (5) of the pneumatic unit.
- By pushing the manual slide (4) upwards the accessories are supplied with compressed air via the filter (1) and the valves.
- Lock air supply by pushing the manual slide (4) downwards.

Maintenance of the pneumatic unit

Check in regular periods (at least monthly) the liquid level in the separator tank (2). If the liquid level is near the maximum admissible filling level the tank has to be emptied.

Procedure:

- Loosen the screw (3) at the tank (2) during working pressure.
The water flows out of the tank under pressure.
- Retighten screw (3).

Automatic door mechanism

Order-No. **A6Z 510**

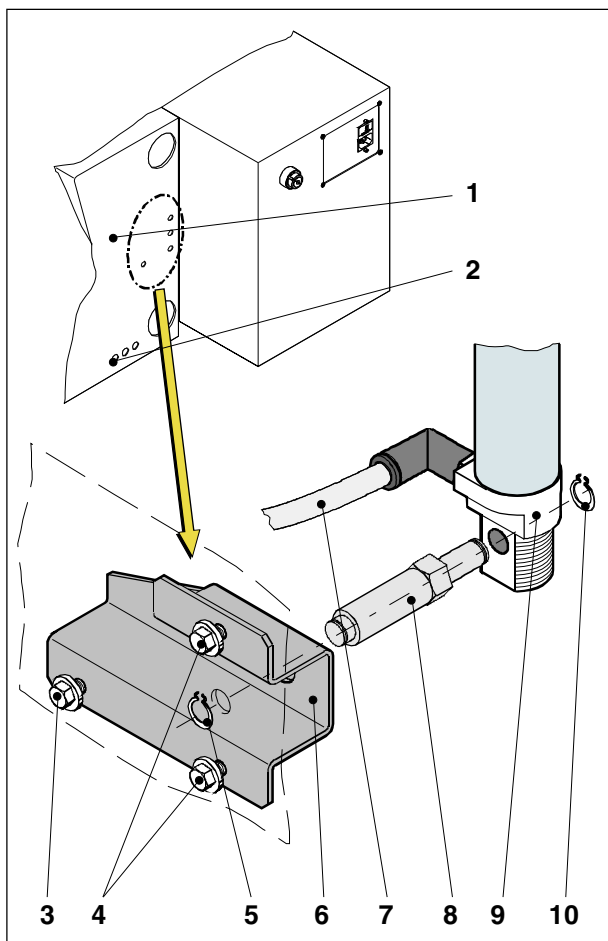
With the automatic door mechanism the chip guard door is opened or closed via a pneumatic cylinder.

Mounting the automatic door mechanism



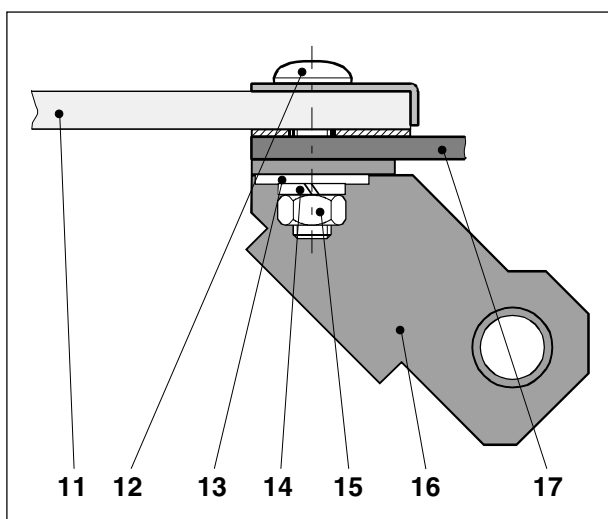
Danger:

Prior to mounting the automatic door mechanism the machine has to be separated from the mains (take off mains plug)!



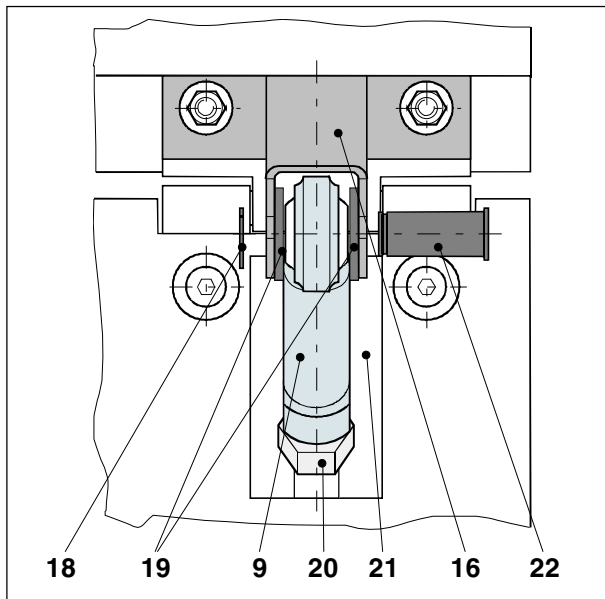
Mounting the automatic door mechanism and the lifting cylinder

- Screw down support sheet (6) from the inner side onto the left side sheet (1) of the machine by means of hexagonal screws M5 SW8 (3 and 4).
The screw (3) is the lower fixation screw with which the pneumatic unit has been mounted.
- Mount axis (8) with retaining ring (10) onto lifting cylinder (9).
- Put both synthetic hoses $l=400$ mm (7) into the connections at the lifting cylinder.
- Put lifting cylinder (9) with axis (8) through support sheet (6) and side sheet (1) and secure with retaining ring (5).
- Put plastic hoses through the outlet (2).



Mounting the coupling device

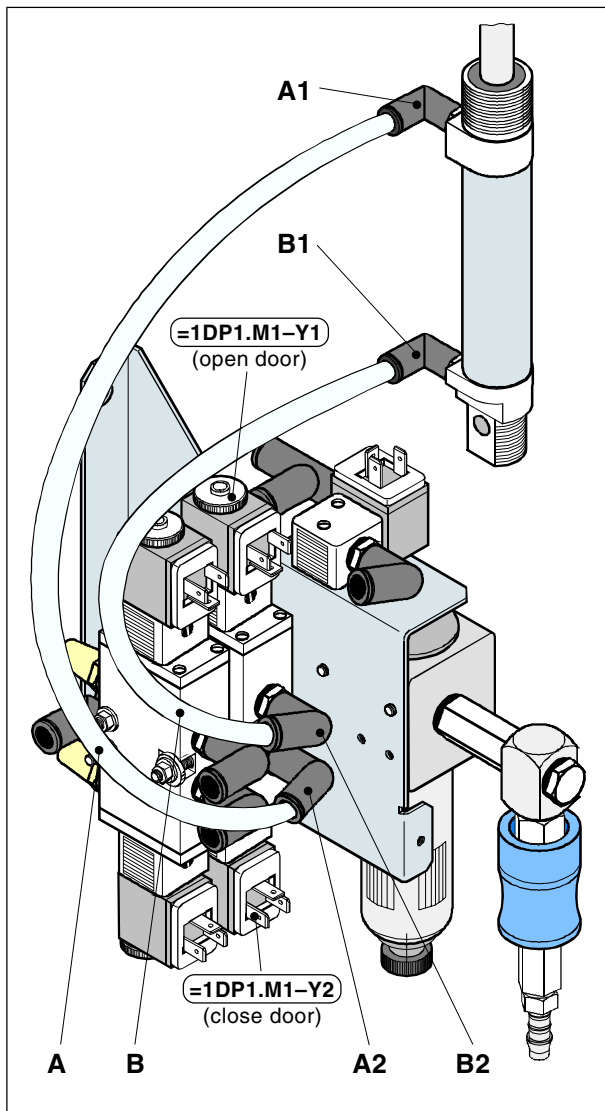
- Replace cheese head screws M5x10 with which the chip guard door (11) is adjusted at the right hinge (17) by the supplied cheese head screws M5x20 (12).
- Mount coupling device (16) with washers (13), spring washers (14) and hexagonal screws M5 (15).



Connection lifting cylinder - coupling device

- Unscrew cover sheet for recess (21) from the inner side.
- Put lifting cylinder (9) through recess (21) and connect it, using the two washers (19), the axis (22) and the retaining ring (18), with the coupling device (16).
- The lifting height is set on the lifting cylinder by loosening the counter nut (20) and twisting the flexible head at the cylinder (9) in dismantled state.

With closed chip guard door the lifting cylinder has to be in its back home position, i.e. any tensile forces from the lifting cylinder must not be exercised on the door.

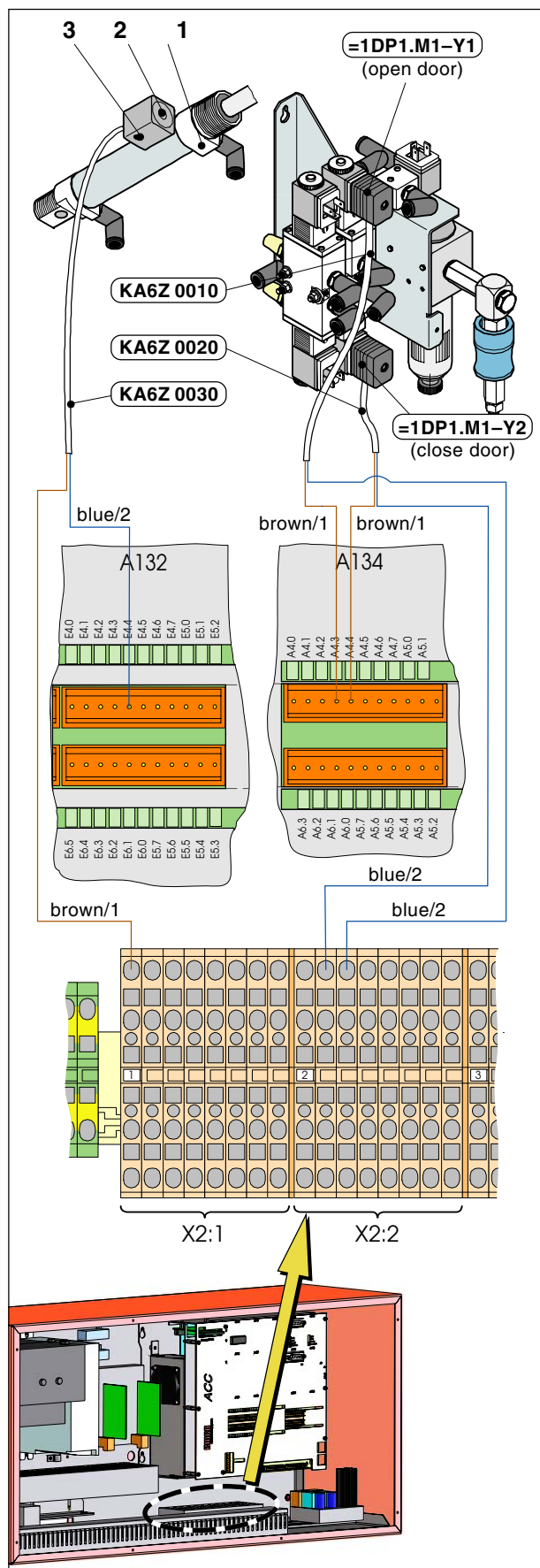


Pneumatic connection of the lifting cylinder

Pneumatic connection

The lifting cylinder of the automatic door mechanism is connected with the valves on the pneumatic unit via both plastic hoses (A and B).

Hose	Length [mm]	Function	Connection	
			from	to
A	400	open door	A1	A2
B	400	close door	B1	B2



Electrical connection



Danger:

The electrical connection may only be established by an electrician expert.

- Each of the cables (KA6Z 0010), (KA6Z 0020) and (KA6Z 0030) is to be laid under the machine along the cables already placed into the electrical cabinet.
- Plug in the cables (KA6Z 0010) and (KA6Z 0020) at the plugs (=1DP1.M1-Y1) and (=1DP1.M1-Y2) at the valve of the pneumatic unit and fasten with screws.
- Each of the cores of the cables is to be connected at the I/O-modules and the connecting terminal X2 in the electrical cabinet of the machine (see figure and following table).

Cable No.	Function	Color / No.	Module		X2
			A132	A134	
KA6Z 0010	open door	brown/1	A4.3	—	—
		blue/2	—	—	X2.2
KA6Z 0020	close door	brown/1	A4.4	—	—
		blue/2	—	—	X2.2
KA6Z 0030	limit switch	brown/1	—	—	X2.1
		blue/2	—	E4.4	—

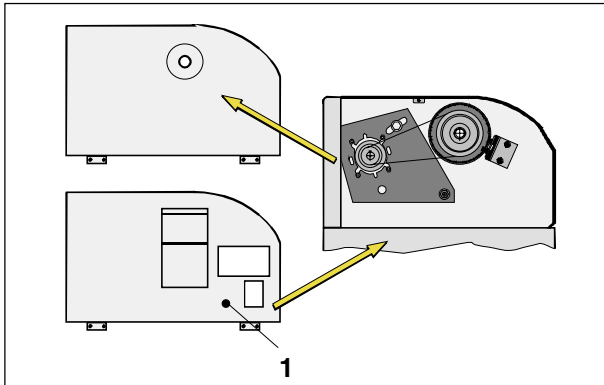
Note:

- Further hints on the electrical connection of the automatic door mechanism are to be seen in the electric documentation of your machine.
- For the activation of the automatic door mechanism in your control software see the manual of your software.

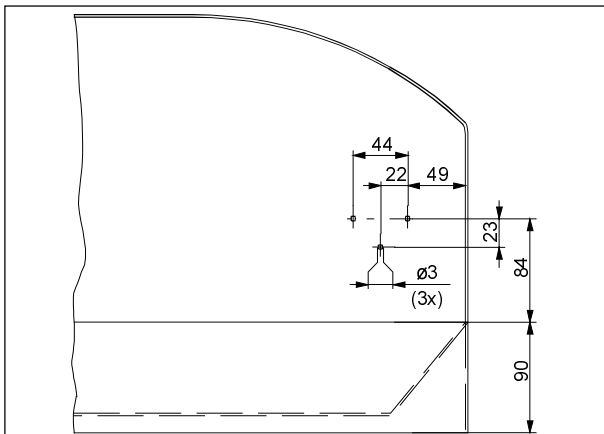
Adjusting the cylinder limit switch

The cylinder limit switch (2) must be adjusted in such a way that the LED (3) with moved-out cylinder just illuminates.

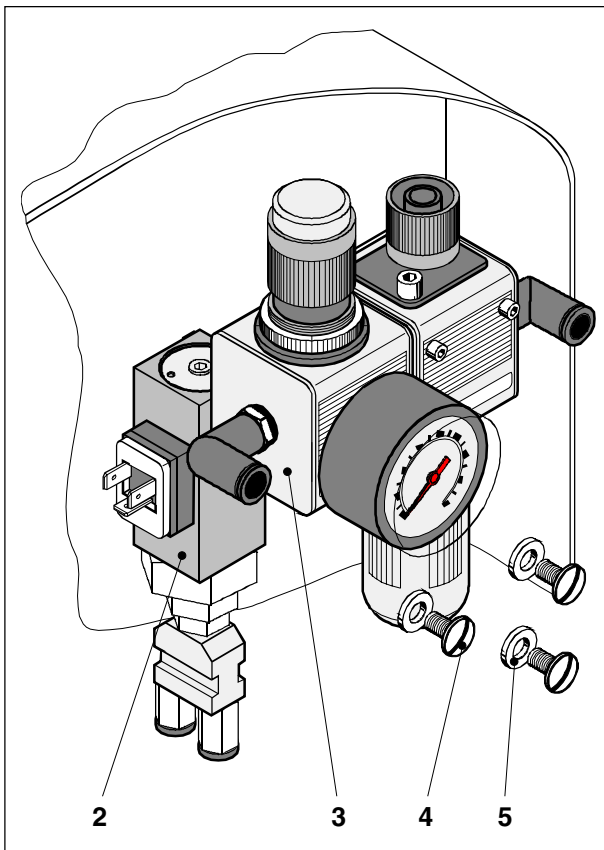
- Open chip guard door (move out cylinder)
- Loosen (1) strap.
- Shift strap (1) with switch (2) at the cylinder until LED illuminates.
- Clamp strap.



Exchanging the gear cover



Bore pattern for mounting pressure control unit



Mounting the pressure control unit

Pneumatic chuck

Order-no. **A6Z 530**

The pneumatic chuck is supplied with compressed air via an additional pressure regulator and oiler. Additionally, a blow-out device for superficial cleaning after a turning operation is integrated in the pneumatic unit.

Mounting the pneumatic chuck



Danger:

Mounting the pneumatic chuck may only be carried out during machine standstill.
(Take off mains plug!)

- Replace gear cover by supplied gear cover (1).



Danger:

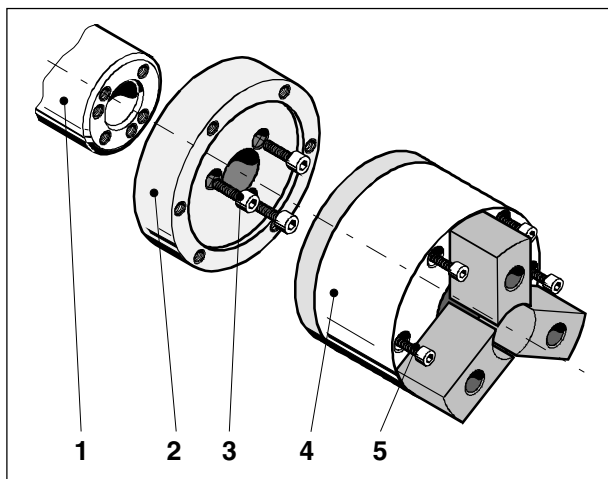
The function of the door limit switch must not be impaired by the exchange of the gear cover.

- Mount pressure control unit (3) of the chuck by means of 3 sheet metal screws 3.5x9.5 (4) and the washers (5) in the gear box.
- If necessary drill the bores $\varnothing 3$ mm, as shown in the bore pattern.



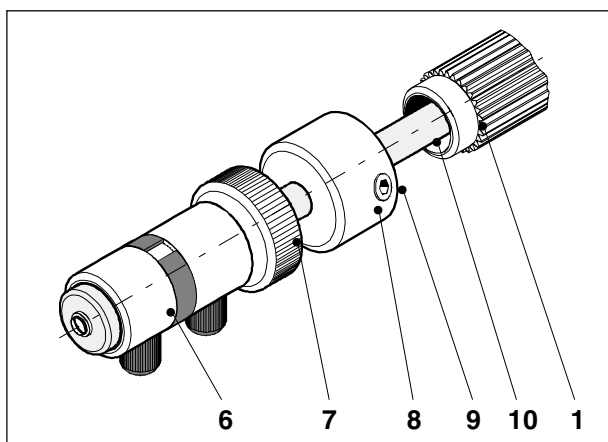
Notes:

- To be able to carry out the settings at the pressure control valve (2) more easily, the whole pressure control unit can be taken out by slightly lifting after loosening the three fixation screws.
- When lifting the unit take care that the light barrier is not damaged.



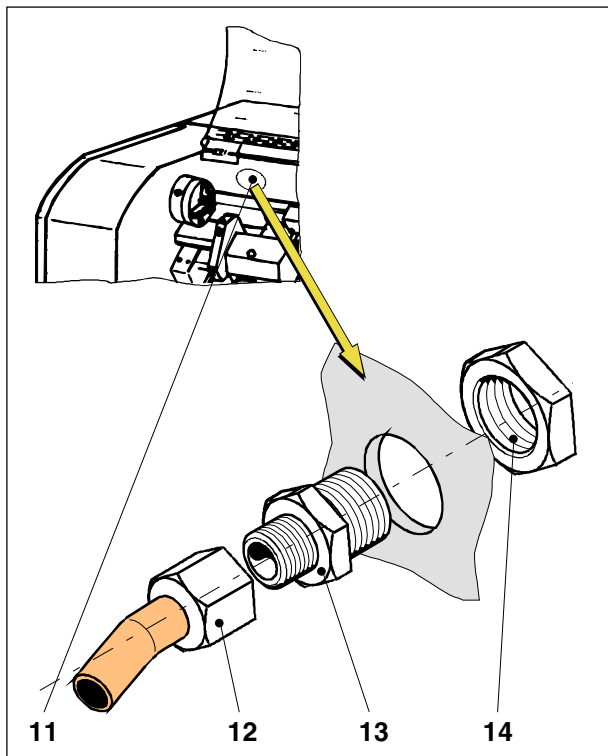
Mounting the chuck on the main spindle

- Mount adapter plate (2) by means of the hexagon socket screws SW4 (3) at the main spindle (1).
- Mount chuck (4) with the 6 hexagon socket screws SW9/64" (5) at the adapter plate (2).



Mounting the air supply on the chuck

- Push eccentric ring (8) over brass air tube (10).
- Insert brass air tube (10) with eccentric ring and rotational connection (6) from the left into the main spindle(1).
- Screw brass air tube at the knurled wheel (7) into the chuck.
In doing so take care that the thread at the brass tube is not damaged.
- Push eccentric ring (8) over main spindle relief(1) and secure with the 3 locking screws (9).

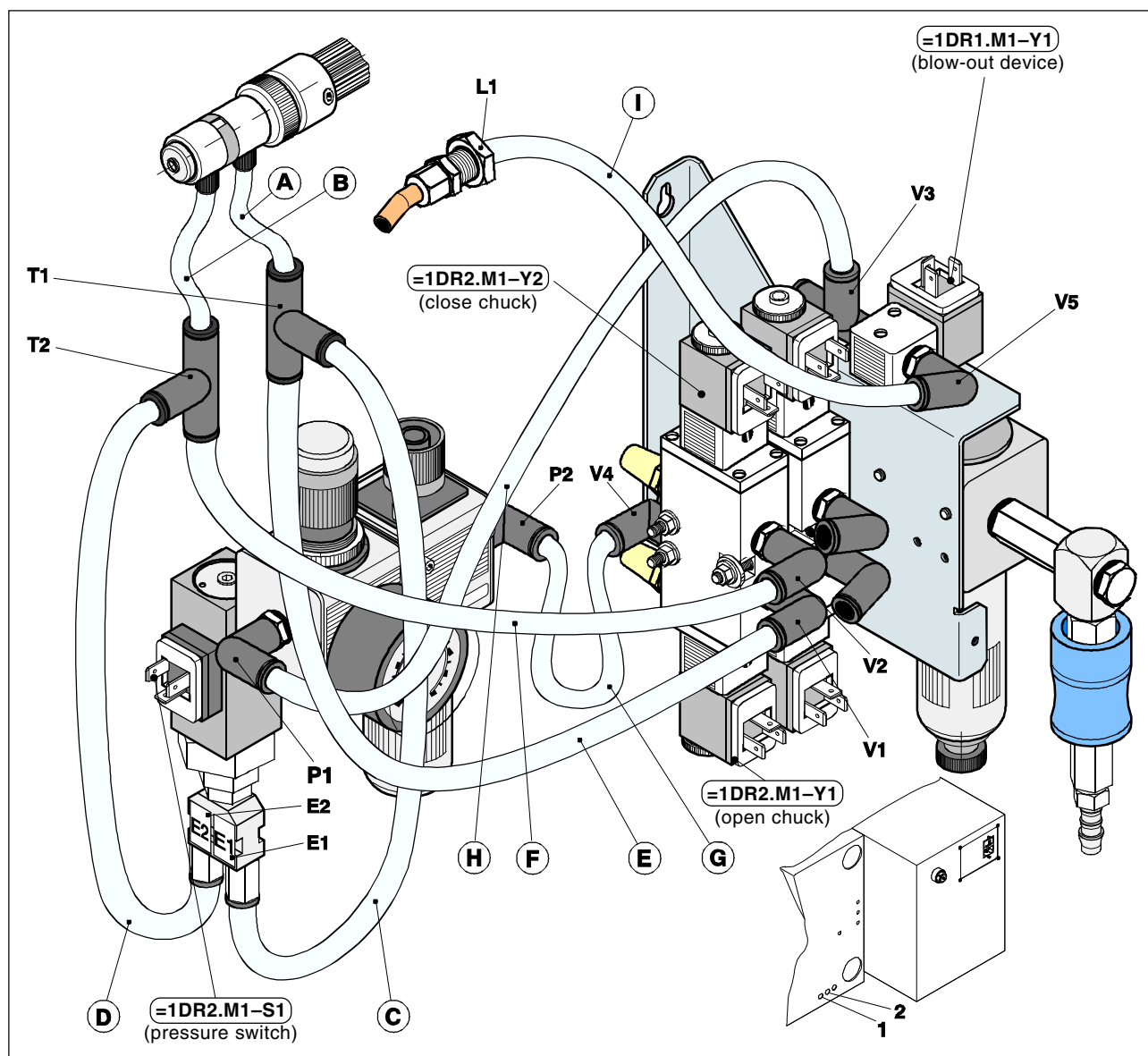


Mounting the blow-out device

Mounting the blow-out device

- Remove blind cover (11).
- Pass connection piece (13) through bore and fix it from the rear side with nut (14).
- Screw blow-out tube onto connection piece with union nut(12).

Pneumatic connection of chuck and blow-out device



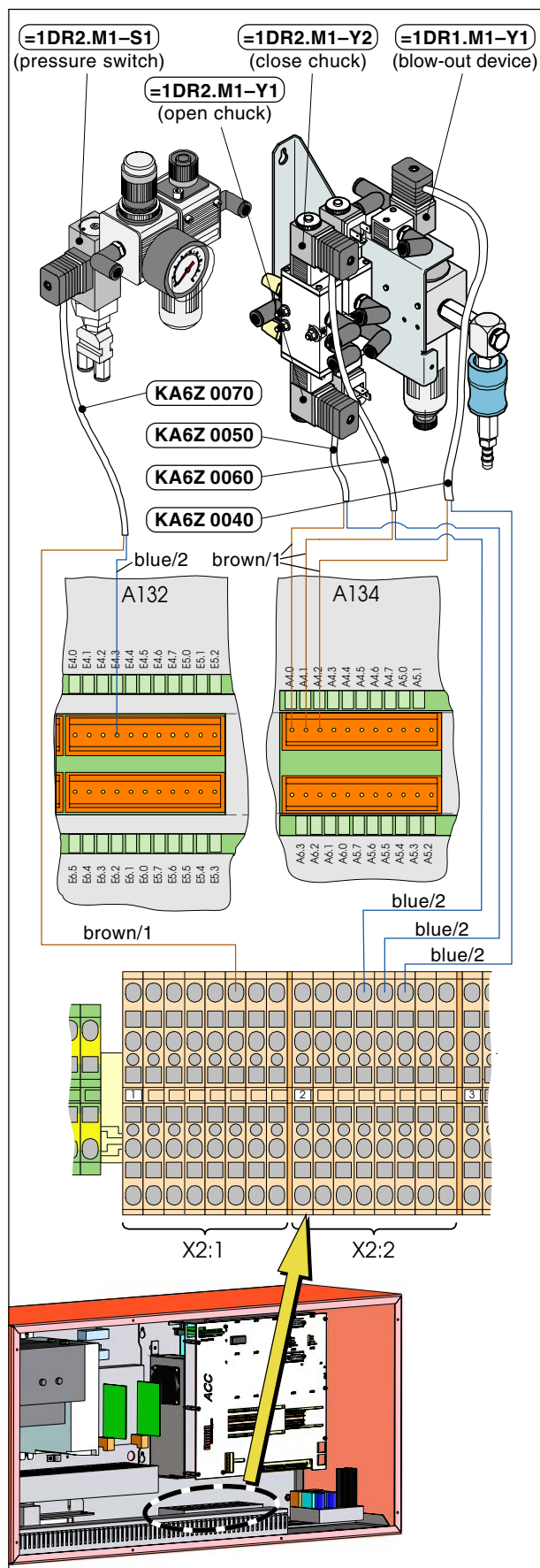
Pneumatic connection of chuck and blow-out device

Hose	Length [mm]	Connection	
		from	to
A	200	R1	T1
B	200	R2	T2
C	200	T1	E1
D	200	T2	E2
E	1000	T1	V1
F	1000	T2	V2
G	1300	P2	V4
H	1300	P1	V3
I	1000	L1	V5

- The hoses which have been placed in direction to the pneumatic unit are to be threaded through the bores (1 and 2) laterally at the machine under the pneumatic unit (see small figure):

Hoses E, F through the bore (1)
Hoses G, H through the bore (2)
Hose I through the big bore $\varnothing 62$ mm

- The connections E1 and E2 are labelled at the valve and must not be exchanged.



Cabling of pneumatic chuck with blow-out device

Electrical connection of the chuck



Danger:

The electrical connection may only be established by an electrician expert.

- Each of the cables is to be laid under the machine along the cables already placed into the electrical cabinet.
- Insert the cables according to the sketch at the plugs (1 to 4) on the valves of the pneumatic unit and fasten with screws.
- Each of the cores of the cable is to be connected at the I/O-modules or the terminal strip X2 in the electrical cabinet of the machine according to the following table.

Cable No.	Function	Color / No.	Module		X2
			A132	A134	
KA6Z 0040	blow-out device	brown/1	A4.2	—	—
		blue/2	—	—	X2.2
KA6Z 0050	open chuck	brown/1	A4.0	—	—
		blue/2	—	—	X2.2
KA6Z 0060	close chuck	brown/1	A4.1	—	—
		blue/2	—	—	X2.2
KA6Z 0070	press. switch	brown/1	—	—	X2.1
		blue/2	—	E4.3	—

Note:

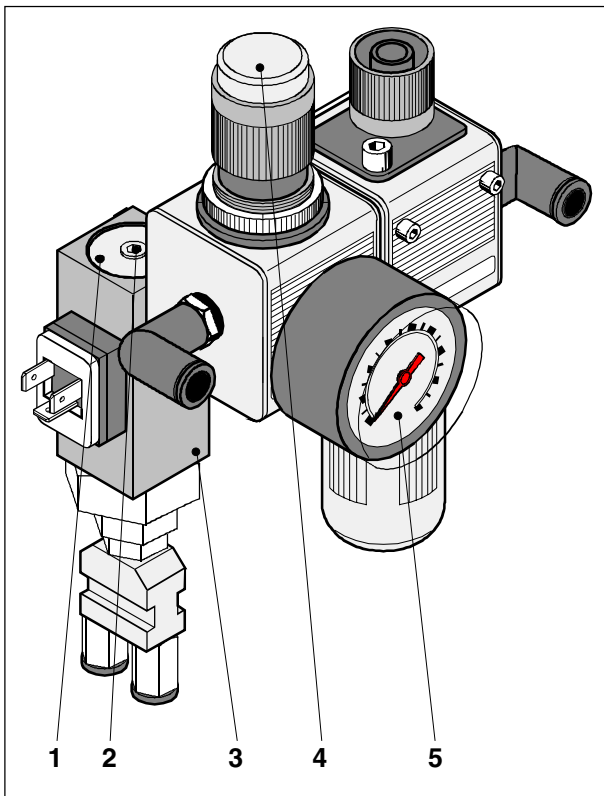
Further hints on the electrical connection of the pneumatic chuck and the blow-out device are to be seen in the electric documentation of your machine.



Setting the clamping force

The clamping force of the chuck can be regulated by changing the air pressure.

Additionally a press switch is mounted which controls the pressure set at the manometer. If the set pressure is not reached an alarm message is displayed on the screen.



Setting the clamping pressure

- Change to a display page in your software on which several alarm messages can be displayed at the same time.
(e.g. Sinumerik "Diagnosis", Fanuc "Alarm Display")
- Open gear cover at the machine.
- Set clamping device pressure – 0.5 bar.
Set pressure which lies about 0.5 bar below the desired clamping device pressure by means of the turning knob at the pressure control unit.
The set pressure can be read at the manometer (5).
- Loosen fixation screw (1).
For better accessibility of the fixation screw the whole pressure control unit (3) can be taken off.
- Clamp workpiece.
- Turn adjusting screw (2) until message "6039 - pressure control-chuck" is displayed on the screen.
Turning in clockwise direction: higher pressure
Turning in counter-clockwise direction: lower pressure
- Moderately tighten fixation screw (1).
- Set exactly the desired clamping pressure.
- Close gear cover.
- If the workpiece is clamped again no alarm message must be displayed on the screen.

Standard values for the clamping pressure

Minimum pressure 2 bar
Maximum pressure 6 bar

Iron, steel approx. 5.5 bar
Nonferrous metals (Al, Mg) approx. 3-4 bar
soft synthetics, sleeves approx. 2 bar

Maintenance of the chuck



Danger:

All maintenance work may be carried out only during standstill of the machine.

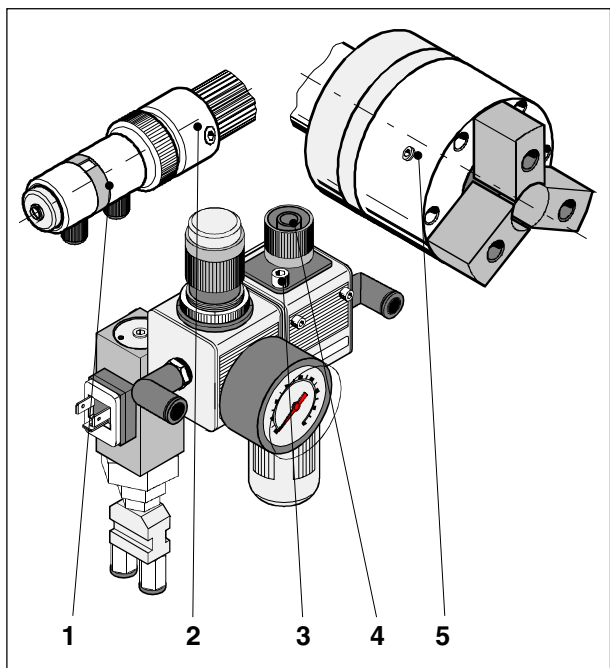
Daily (every 8 hours)

• Oiling the rotational connection:

Turn red locking ring (1) and drop some drops of oil from the enclosed 50 ml bottle into the bore.

• Oiling the eccentric ring:

Drop some drops of the enclosed oil from the 50 ml bottle between eccentric ring (2) and brass tube.



Maintenance of the pneumatic chuck

Weekly (every 40 hours)

Oiling the chuck:

- Screw off hexagon socket screw (5) and drop some drops of oil from the enclosed 50 ml bottle into the bore.
- The control knob (4) serves for setting the mixture ratio air/oil. It is preset by the manufacturer and should not be changed.

Oil quality for rotational connection and chuck:

- Glideway oil DIN 51 502 ISO VG 68
e.g.: CASTROL Magnaglide D68

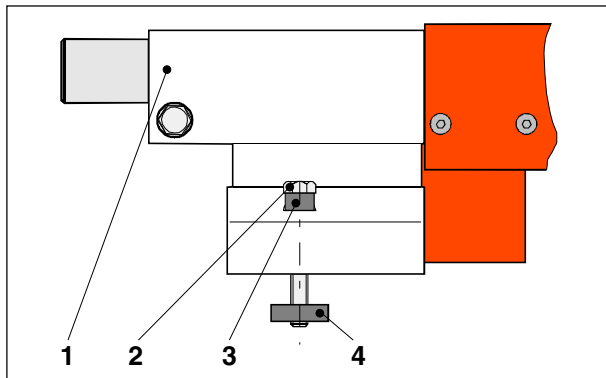
If necessary

Refill oil in the compressed-air oiler:

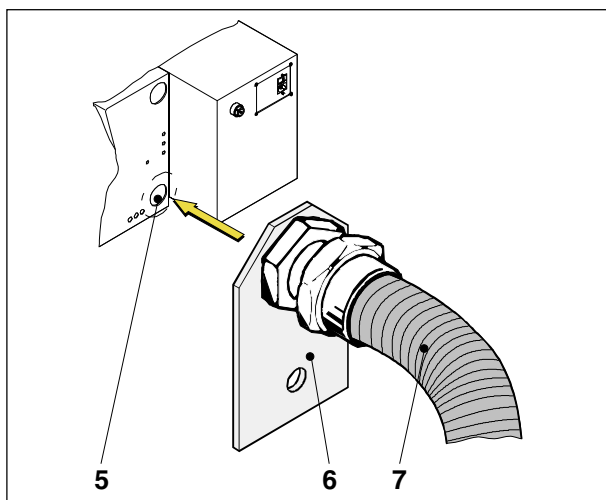
- Screw off filling screw (3) and fill oil from the enclosed 250 ml bottle to the "max" mark.

Oil quality for compressed-air oiler:

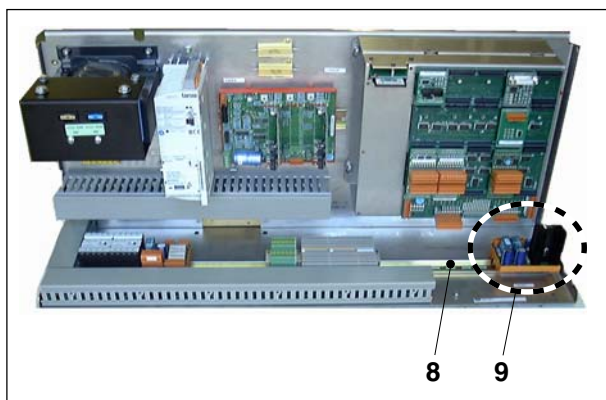
- Pneumatic oil DIN 51 524 ISO VG 32
e.g.: CASTROL Magnaglide D32
MOBIL HLP 32



Mounting the electric tailstock



Fixation of cable loom



Mounting tailstock board in electrical cabinet

Electric tailstock

Order-no. **A6Z 520**

The tailstock is adjusted and clamped manually at the machine bed.

For clamping and releasing the workpiece (counter support) the sleeve is moved in and out electrically via a motor.

The sleeve stroke can be set and is controlled by inductive limit switches.

Technical data

Sleeve diameter $\varnothing 22$ mm

Inner sleeve taper MK1

Sleeve stroke 18 mm

Note:

Tailstock accessory which has been inserted into the sleeve (e.g. rolling center punch) can be removed again from the inner cone only by means of the ejector.

The ejector is comprised in the accessory.

Mounting the tailstock

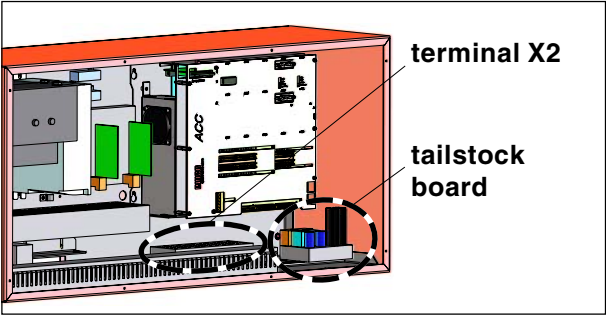
Danger:

The electric tailstock may be mounted only during machine standstill.
(Take off mains plug!)

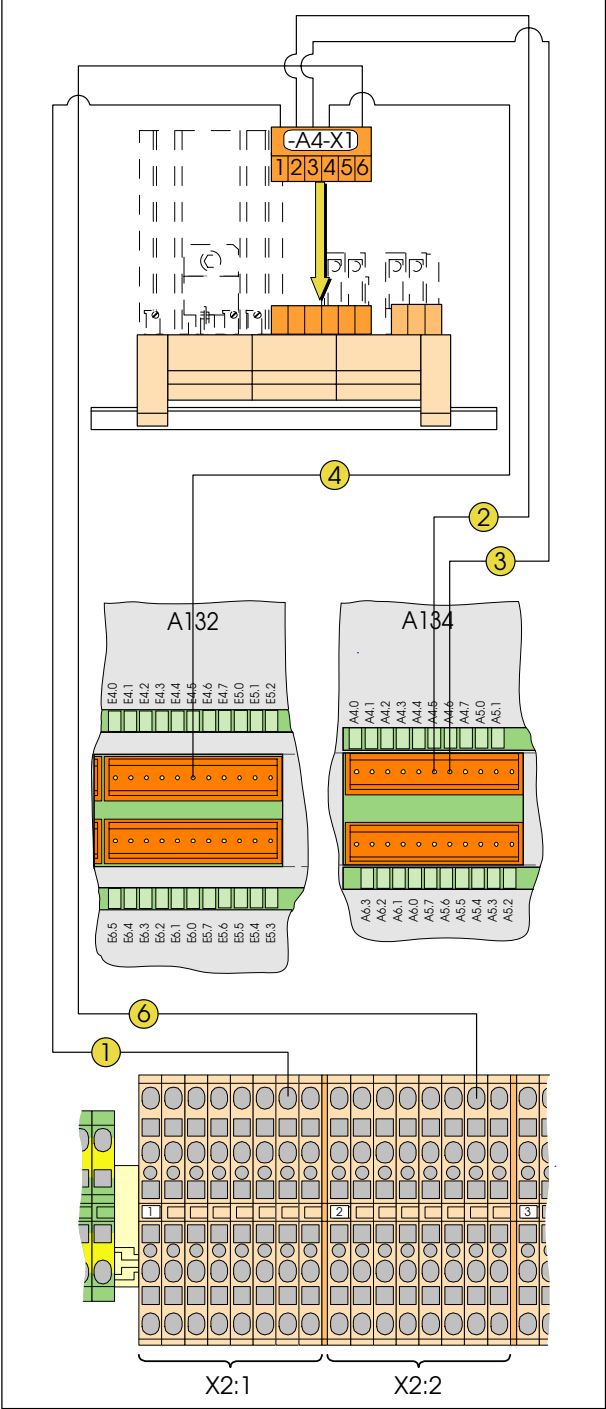
- Take off mechanical tailstock for the tailstock clamping by releasing the handle.
- Mount electric tailstock (1) on machine bed.
- Thread in clamping jaw (4) from below into the machine bed and fasten tailstock with hexagonal screw (2) and sleeve (3).
- Fasten support plate (6) with the cable loom (7) and the screwing connection laterally at the machine under the pneumatic unit with the enclosed sheet metal screw at the bore (5).
- Put cable through bore $\varnothing 62$ mm and lay it into the electric cabinet.

Mounting the tailstock board

- Put on vice board (10) on the bar (9) beside the I/O-board (8).



Position of the I/O-board and the terminal X2



Cabling the tailstock board

Electrical connection



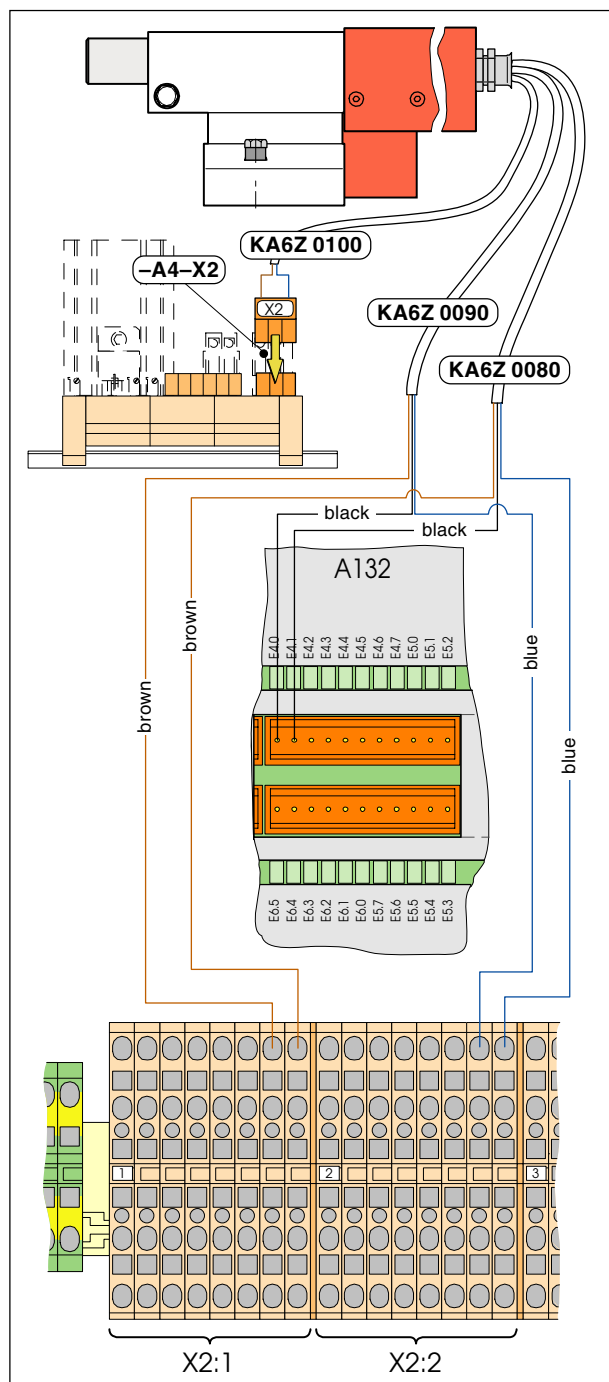
Danger:
The electrical connection may only be established by an electrician expert.
Take off mains plug!

You have to cable the electric tailstock and the tailstock board.

Cabling the tailstock board

- The cores have to be threaded in the cable channels, mounted in the electrical cabinet.
- Put cable with the plug "-A4-X1" onto the 6-pin socket of the tailstock board.
- Connect each of the cores at the I/O-modules or the terminal strip X2 in the electrical cabinet (see figure and following table).

Cable No.	Function	Module		X2
		A132	A134	
1	+24V DC	—	—	X2.1
2	quill forwards	—	A4.5	—
3	quill back	—	A4.6	—
4	part clamped	E4.5	—	—
6	GND	—	—	X2.2



Cabling the electric tailstock

Cabling the electric tailstock

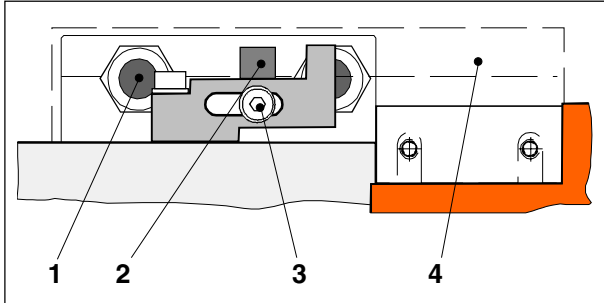
- Thread cables into the electrical cabinet along the cables already laid.
- The cores have to be threaded in the cable channels, mounted in the electrical cabinet.
- Put cable with the plug "-A4-X2" onto the 3-pin socket of the tailstock board.
- Connect each of the cores at the I/O-modules or the terminal strip X2 in the electrical cabinet (see figure and following table).

Note:

Further hints on the electrical connection of the tailstock are to be seen in the electric documentation of your machine.



Cable No.	Plug No.	Function	Color	Module		X2	Tailstock board
				A132	A134		
KA6Z 0100	-A4-X2	d.c. motor	brown	—	—	—	1
			blue	—	—	—	3
KA6Z 0090	=1DS1.M1 -B2	limit switch no part clamped	black	E4.0	—	—	—
			brown	—	—	X2.1	—
KA6Z 0080	=1DS1.M1 -B3	limit switch final back position	blue	—	—	X2.2	—
			black	E4.1	—	—	—
			brown	—	—	X2.1	—
			blue	—	—	X2.2	—



Adjusting the sleeve stroke (seen from above)

Adjusting the sleeve stroke

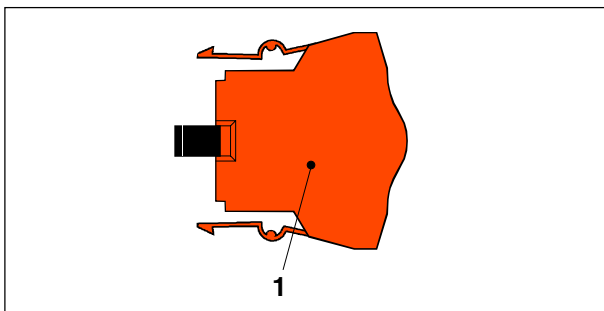
- Change to a display page in your software on which several alarm messages can be displayed at the same time.
- Screw off cover (4).
- Clamp workpiece and countersupport with sleeve.
- Adjust the jaw (2) by loosening the screw (3) in such a manner that with clamped workpiece the proximity switch just does not respond. If the proximity switch responds, the message "6030-No part clamped" is displayed on the screen.
The response of the proximity switch is also indicated on the I/O-board at the terminal strip X201 at the LED no. 2.
- Fasten screw (3) and mount cover (4).

Robotics interface

Order no. X1A 000

With the robotics interface the machine can be connected to further machines and devices (e.g. a robot).

The robotics interface consists of a disk, the software has to be installed



Break contact for emergency-off state on the robot

Break contact

The break contact (1) can be mounted at the base of the EMERGENCY-OFF key.

If, with mounted and correctly connected break contact, the EMERGENCY-OFF key on the machine is pressed, this EMERGENCY-OFF state is reported also to the robot connected.

Information on the cabling of the break contact can be seen in the manual of your robot.

Note:

The outlets and inlets at the I/O-board for triggering the robot are also to be seen in the electric documentation of your machine.



Safety

With the integration of the machine in a complete system, you have to pay attention following:

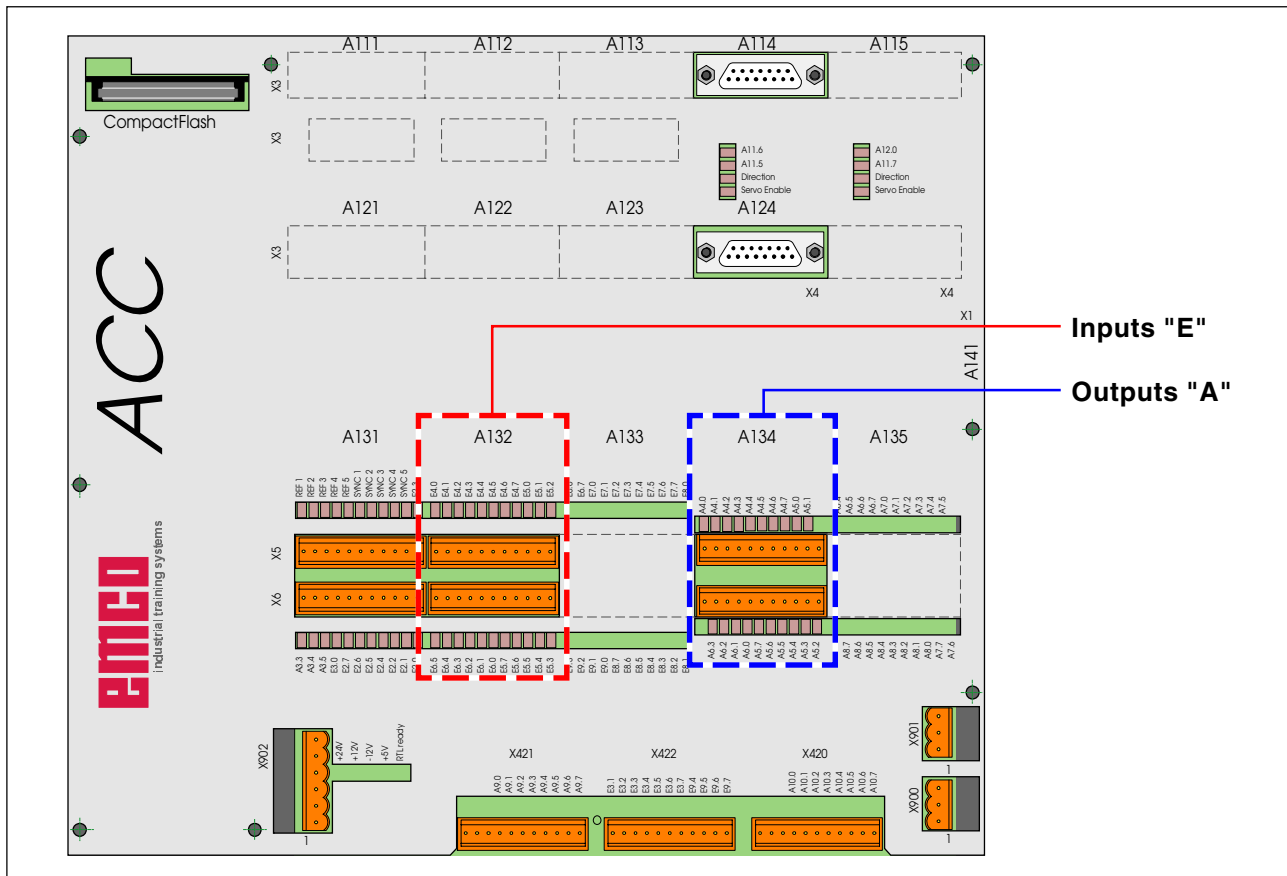
- The automatic closing of the machine door applies in accordance with CE-guidelines as a dangerous movement.
- Therefore special precautions have to be set, for the protection of persons (safety fence, footstep maps, optical safety devices, ...).
- Further the machine may only be started up, if the CE-conformity of the complete system is established, in which the machine is integrated.



Danger:

The inputs and outputs on the robotic board are **NOT** potential-free (not insulated)!

In-/ Outputs on the robotic board



INPUTS		
Signal level	0 V...5 V	LOW
	15 V...24 V	HIGH
Input impedance	2 kΩ	
Signal	Description	
E 5.0	Close pneumatic machine door with robotics With a +24V impuls (min 0,5s) the machine door will be closed	
E 5.1	Open pneumatic machine door With a +24V impuls (min 0,5s) the machine door will be opened	
E 5.2	Tailstock quill backwards With a +24V impuls (min 0,5s) the pneum. tailstock quill will be moved backwards	
E 5.3	Tailstock quill forwards With a +24V impuls (min 0,5s) the pneum. tailstock quill will be moved forwards	
E 5.4	Close clamping device With a +24V impuls (min 0,5s) the pneumatic clamping device will be closed	
E 5.5	Open clamping device With a +24V impuls (min 0,5s) the pneumatic clamping device will be opened	
E 5.6	Start program With a +24V impuls (min 0,5s) the program will be started, which is set on the machine	
E 5.7	Stop feed With a +24V signal the axis-movements could be stopped	

OUTPUTS	
Signal level	20 V...24V HIGH
All outputs are overload protected and bearable with 0.2 A	
Signal	Description
A 5.0	Machine in the Reset-state +24V signal if on the machine M0,M1,M2 or M30 is active.
A 5.1	Clamping device open +24V signal if the clamping device is open
A 5.2	Clamping device closed +24V signal if the clamping device is closed
A 5.3	Pneumatic door open +24V signal if the pneumatic machine door is open
A 5.4	Pneumatic door closed +24V signal if the pneumatic machine door is closed
A 5.5	Tailstock quill backwards +24V signal if tailstock quill is in backwards position
A 5.6	Tailstock quill clamped +24V signal if tailstock quill is in front position
A 5.7	Output on the axiscontroller! Alarm-output The output has a +24V signal, if a machine-alarm occurs
A 4.7	Axes are standing on reference-point

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