

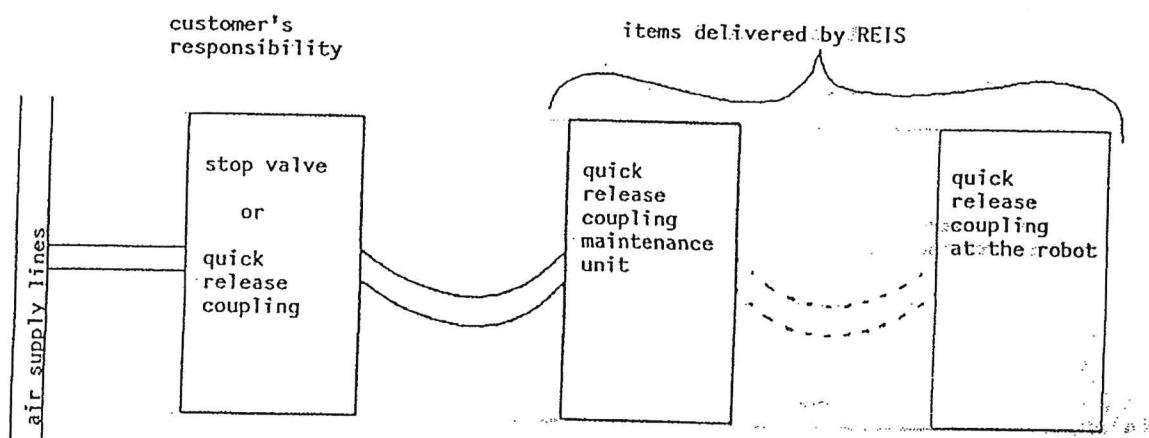
INSTALLATION OF THE CONTROL CABINET

For installation of the control cabinet the following has to be observed:

- install control cabinet close to the robot
- foundation must have sufficient bearing capacity and must be free from vibrations.
- exterior door of the cabinet must open by at least 90° and be freely accessible for operation, maintenance and repair.
- ambient temperatures between 0°C up to 45°C (273 K to 318 K) have to be kept if standard control cabinet with filter fan is used.
- for higher temperatures up to $+55^\circ\text{C}$ (328 K) a cooling unit is required. Correct flow-off of the condensing water has to be considered.
- the maximum hygroscopic moisture must not exceed 75 %

OPTION

For machine-specific connection data please see installation drawing and circuit diagram.

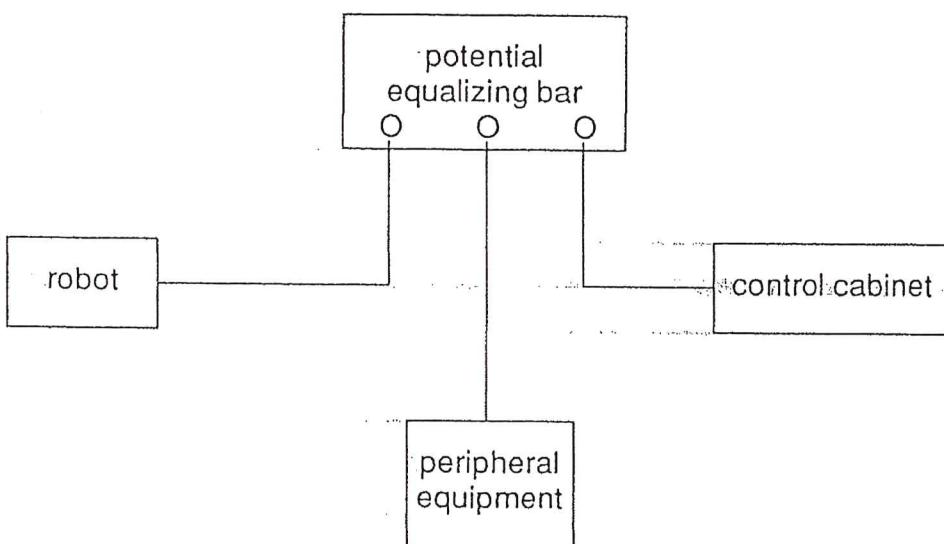


For compensation of minor vibrations during machine operation the maintenance unit and the connection to the robot have to be connected to the air supply lines with a hose line having a length of at least 30 cm.

ELECTRICS

For machine-related connection data please see installation drawing and circuit diagram.

In order to ensure a high electro-magnetic freedom from interference of the total unit, all components of a robot cell have to be radially led to a potential equalizing bar outside the control cabinet.



The potential equalizing bar has to be connected to a foundation earth wire. A flexible wire with min. cross section of 10 mm² has to be provided for this purpose.

SWITCH-ON

After having switched on the supply voltage, the robot is synchronous in general. If, however, the supply voltage was disconnected with drives being switched on or in case of a power failure, the robot has to be synchronized. In the status line of the display the following message is indicated:

ASYNCH

Synchronization of the Robot

1. Set the axes to their markings at the housing via operating mode HAND/AXIS
2. Select program ADPROG
3. Enter the number 63 into the date "SYNCHRO" (step 25) via the function "edit" (for installations without additional axes).
4. Select the function "HOME_POS" from the operating mode "SPEC_MODE" and acknowledge with key "ENTER".
5. Operate the "START" key (drives are switched off and the display indicates the message "Robot synchronous").
6. Check the home position (switch on drives, repeat step 4 and 5, drives remain switched on). The axes have to be on their markings.
7. If the markings of the axes are not correct, the procedure has to be repeated as described above.

The positions of the axes towards their markings may be checked in the operating mode "HOME_POS" any time (see 4.). If the "START" key is operated, the axes directly approach their home position in dead man operation. Danger of collision !

ATTENTION !

Remark concerning item 3:

The following numbers have to be entered for installations with additional axes:

1 additional axis:	127	2 additional axes:	255
3 additional axes:	511	4 additional axes:	1023
5 additional axes:	2047	6 additional axes:	4095

AXIS 1

The rotary column (3) of axis 1 mounted on the robot base (10) is guided via a preclamped cross roller bearing (5). External installation of the drive to ensure ease of assembly and maintenance.

The drive system consists of a maintenance-free, brushless AC servomotor (2) equipped with an absolute path measuring system (1). The motor equipped with a brake is directly coupled to the gear kit (4). The sealing (6) protects the drive elements against contamination and moisture from outside.

The electric supply lines from the control cabinet are connected in the robot base with multipolar plugs (11). The electric supply lines and the connected pneumatics are fastened as spiral cables (8) to the cable clamps (7) in the robot base. These clamps are easily accessible behind the sheet casing (9).

The cables are guided via a bolting with sealing kit (13) in the swivel arm at the rotary tower.

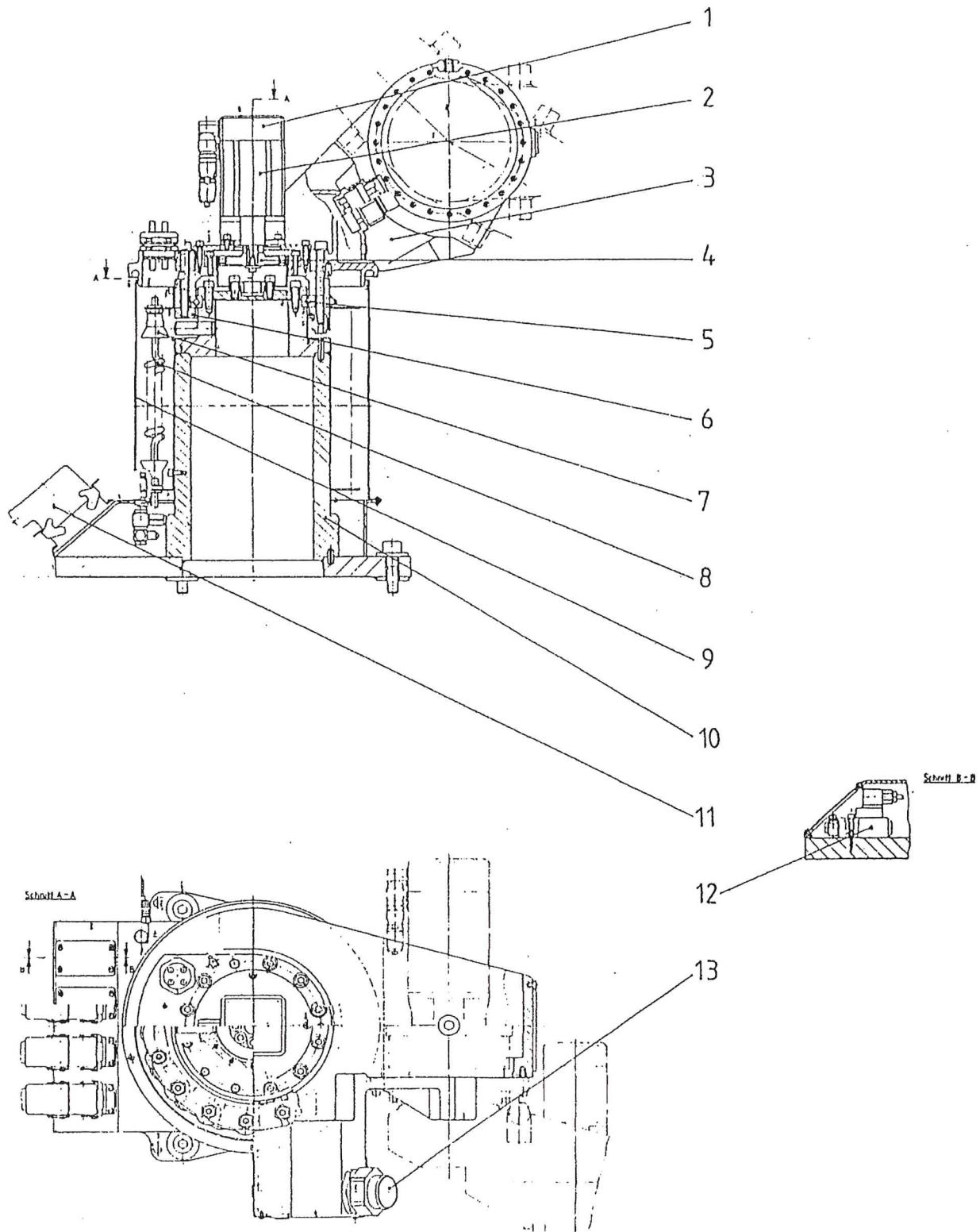
The pressure switch (12) for the pneumatics (option) is mounted close to the plugs (11) under a covering plate.

r e i s

RV6/RV16

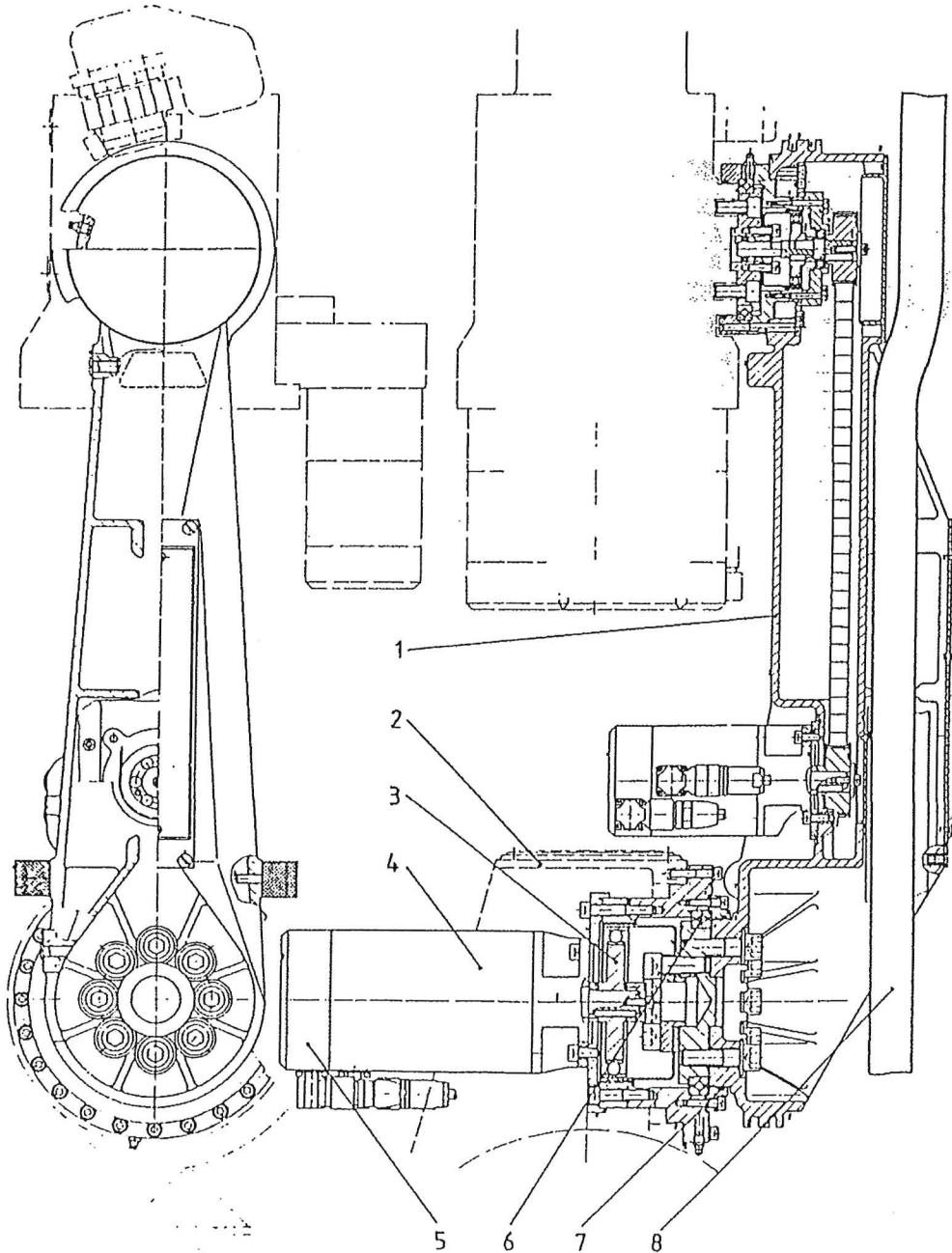
DESCRIPTION OF ASSEMBLIES - 5

AXIS 1



AXIS 2

The swivel arm (1) of axis 2 is guided in the rotary tower (2) of axis 1 via a preclamped cross roller bearing (6). The rotation movement of the motor (4) equipped with a brake is transferred to the swivel arm via the directly coupled gear kit (3). The sealing (7) protects the drive elements against dirt and moisture. Path measurement is ensured via an absolute measuring system (5). The supply lines are guided to the swivel arm in a protective hose (8).



AXIS 3

Axis 3 (8) is guided at the front end of the swivel arm (6) of axis 2 via a preclamped cross roller bearing (5).

Drive of the rotation axis is ensured via a play-free and preclamped belt drive (7) located in the swivel arm of axis 2.

The belt transfers the rotation movement to a highly reducing gear kit (3) directly installed at the driven end of axis 3.

The absolute path measuring system (12) is integrated in the AC servomotor (11) equipped with brake.

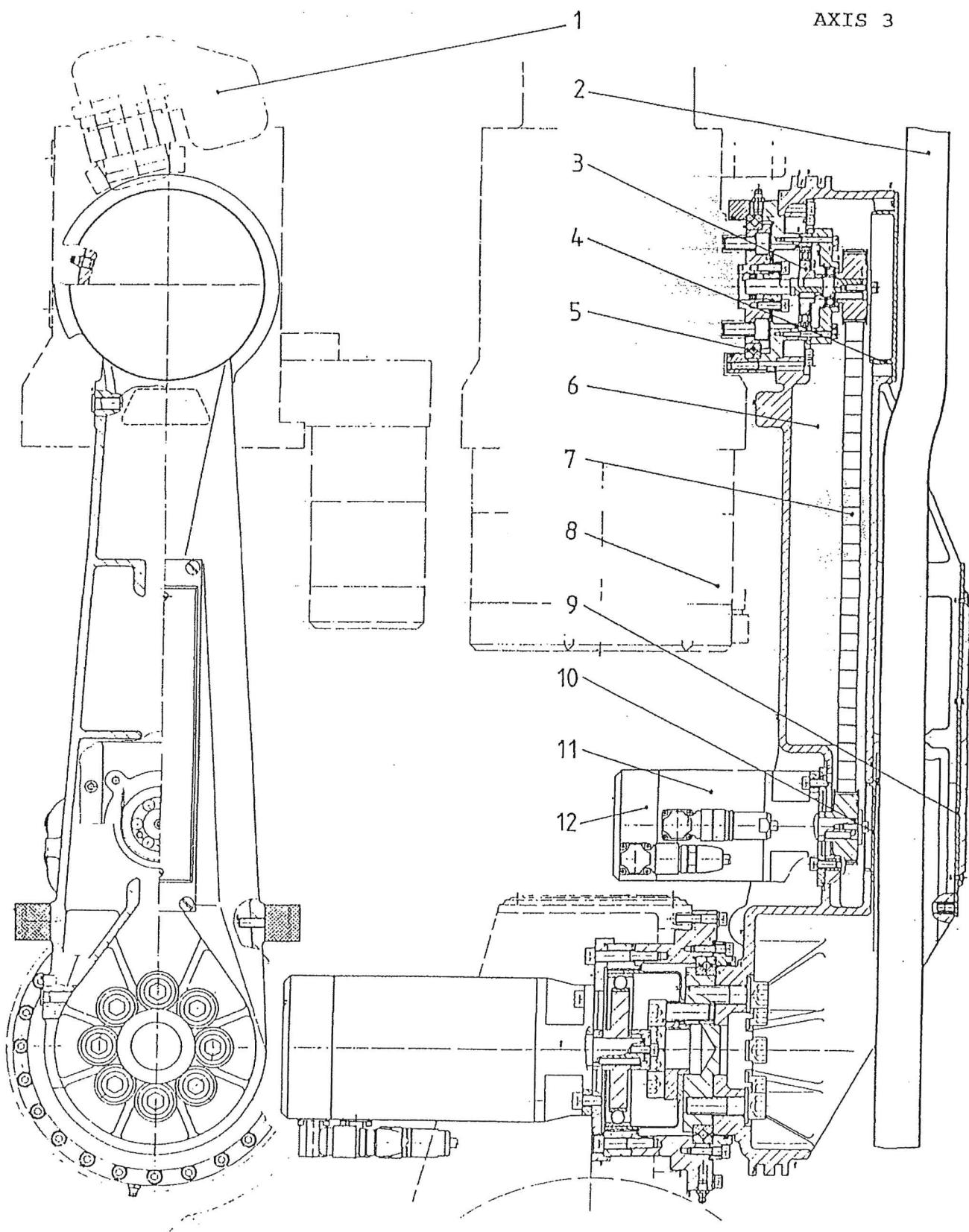
Good accessibility of the total drive system is ensured due to openings for mounting (4,9,10).

The supply lines are guided to the cable fixture of axis 4 (1) in the protective hose (2).

reis

RV6/RV16

DESCRIPTION OF ASSEMBLIES - 5



AXIS 4

Via play-free adjusted gear drive (1) flanged to the housing of axis 4 (2) the rotation movement of the AC-servomotor (3) equipped with brake is transferred to the rotary flange (4) of axis 4.

The absolute measuring system is integrated in the brushless drive motor.

On the housing of axis 4 there is provided an assembly surface for mounting of customer-specific devices, e.g. pneumatic valves, wire feed unit for welding, up to a weight of 10 kg (see illus. on page 7-5).

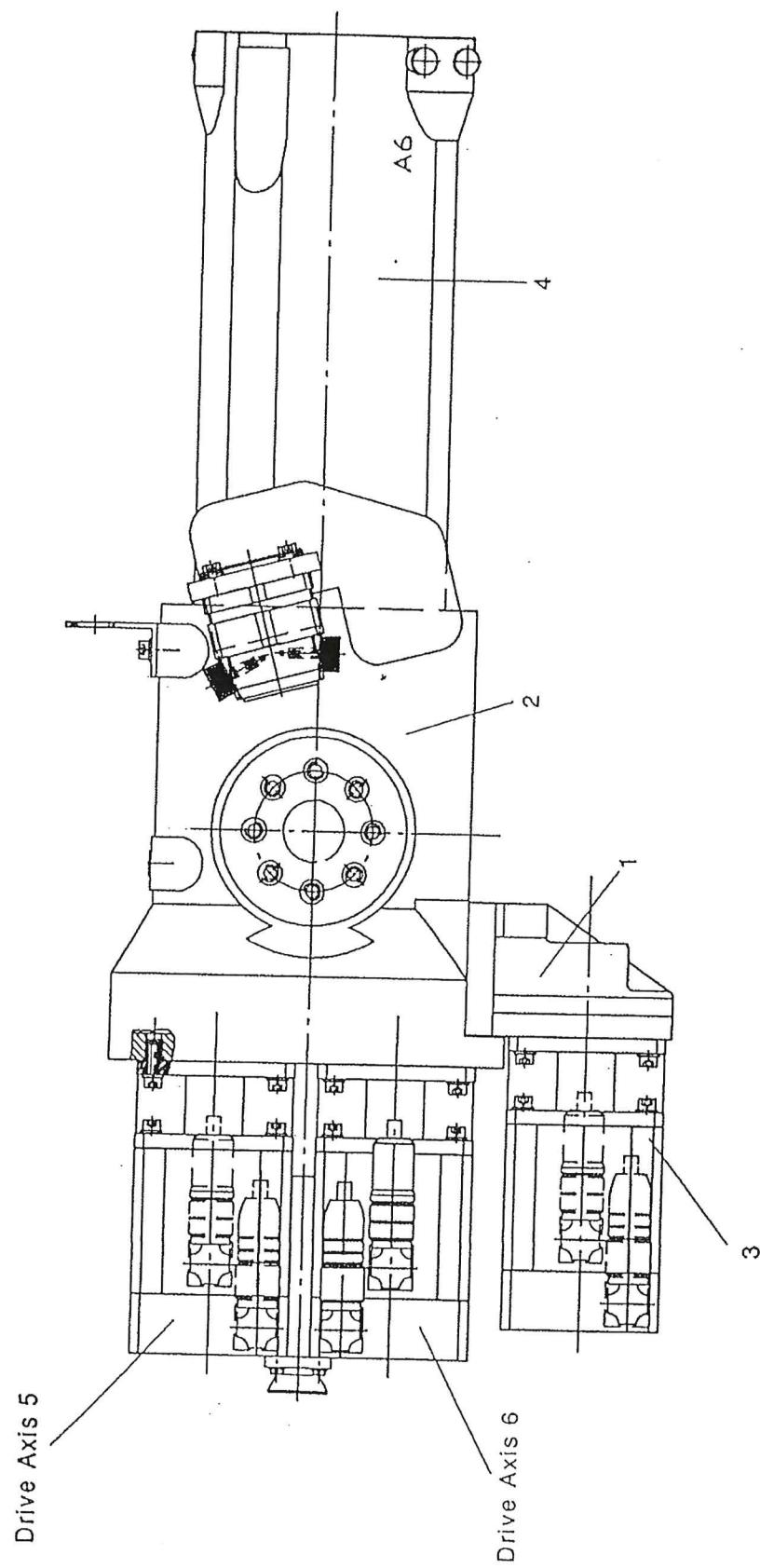
Connection of these devices is ensured via plug connectors.

r e i s

RV6/RV16

DESCRIPTION OF ASSEMBLIES - 5

AXIS 4

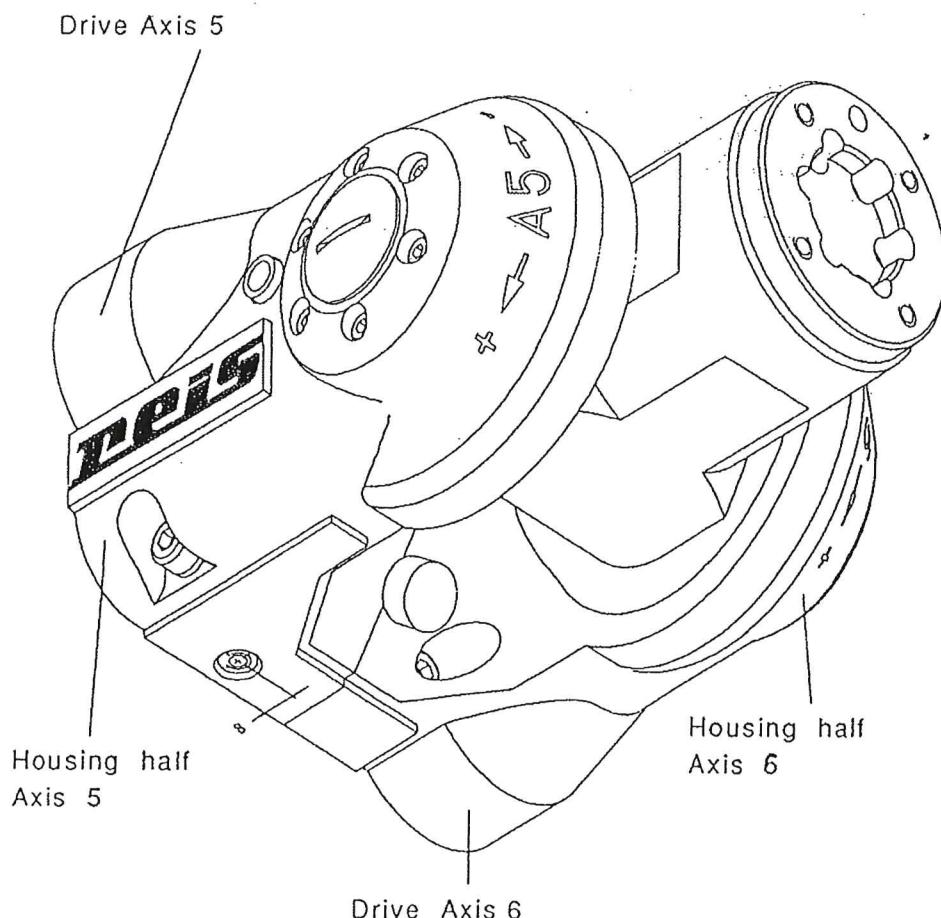


AXES 5 and 6

The AC servomotors (5,6) equipped with brake of the two axes are installed at the rotary flange (4) of axis 4 (see illus. on page 5-7).

The absolute path measuring system is integrated in the motor.

Via clutch shafts in the rotary flange of axis 4 the rotation movement of the drive motors is transferred to the modular adapted head axis (see illus.).



MAINTENANCE INSTRUCTIONS

In order to achieve a long durability of the machine, regular attendance and maintenance works are indispensable.

Switch off the complete unit for all works at the machine or at the peripheral equipment in order to avoid any danger for both man and machine.



All safety sheets and covers may only be removed for maintenance purposes and have to be mounted correctly and completely prior to new start-up.

ATTENTION

Warning and indication plates as well as coloured markings of danger areas must be clearly visible and have to be cleaned or replaced if necessary !

Warranty becomes void if the items mentioned in this chapter are not observed.

Observe safety instructions mentioned in chapter 2 !



PNEUMATICS

Filter and water separator of the maintenance unit

We recommend a weekly check of the air filter and draining of the water separator. The filter element should be exchanged every 6 months (for 2-shift operation).

For draining of the water separator the drain screw at the filter cup has to be untightened. The condensate is blown off under pressure. ATTENTION!

If the filter element is to be changed, the air pressure has to be switched off. Then, the filter cup can be taken off downwards.

Cleaning of the filter element is not recommended. Cleaning of the filter cup however, must be made with water only. ATTENTION!

Oiler of the maintenance unit:

The oil level has to be checked weekly. If oil level is at minimum, air pressure has to be switched off, unit has to be evacuated and oil has to be filled up.

For cleaning of the oiler cup water must be used only. ATTENTION!

Adjustment of the drop quantity

The drop quantity is regulated at the setscrew and can be seen at the drop sight glass. The dropper should be adjusted so that in automatic operation approx. 1 drop per minute can be seen.

We recommend the following oil brands as lubricants:

Avia Avilub RSL 10
BP Energol HLP 10
Esso Spinozzo 10
Shell Tellus Oil C 10
Mobil DTE 21

Sound absorbers at pneumatic valves

Contaminated pores of the sound absorbers reduce the operating speed of the valves.

In this case, the sound absorbers have to be exchanged. Cleaning is not recommended.

Dirt in the control cabinet affects the durability of the electric components and jeopardizes the operating safety. The max. hygroscopic moisture must not exceed 75 %. Always keep closed control cabinet and distribution boxes.

Control cabinet with filter fan (basic design)

Admissible ambient temperature: 0°C up to +45°C. Regular cleaning of the filter mats is required resp. replacement in case of heavy contamination. In case of extremely fine dust below 10 micrometer a fine filter mat has to be used.

Control cabinet with heat exchanger

Admissible ambient temperature: 0°C up to +45°C. The heat exchanger is almost maintenance-free. The components of the exterior air circulation can be cleaned with compressed air from time to time, depending on the degree of contamination.

Prior to maintenance works the heat exchanger has to be disconnected from the mains supply so that voltage is off. Observe the protective conductor connection !

Control cabinet with cooling unit

Admissible ambient temperature: 0°C up to +55°C. The cooling unit works with freezing mixture free from CFC and is almost maintenance-free.

Detailed information concerning a.m. components:
For documentation of the manufacturer of the components please see control cabinet !

LUBRICATION INSTRUCTIONS

For arrangement of lube points please see page 6-6.

ADDITIONAL REMARKS

Axes 1, 2 and 3

Axis bearing: see lube points 1, 2 and 3
The gear units of the axes are greased for life.

Axis 3 - toothed belt

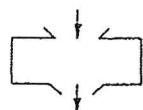
With regard to damage or wear the condition of the toothed belt has to be checked every 2000 service hours when checking the belt tension.

Axes 5 and 6

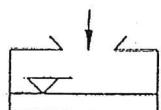
Spindle bearing of the head axes: see lube points 4 and 5.
The gear unit of the axes 5 and 6 is lubricated with the bearing grease.

LUBRICATION INSTRUCTIONS

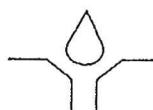
Explication of symbols



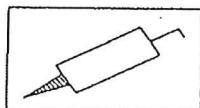
oil change



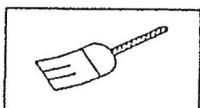
check and fillup if required



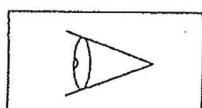
oiling



regreasing with grease gun



apply lubricant with brush



visual check

(2)

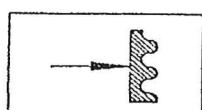
lube point (e.g. No. 2)



visible lube point

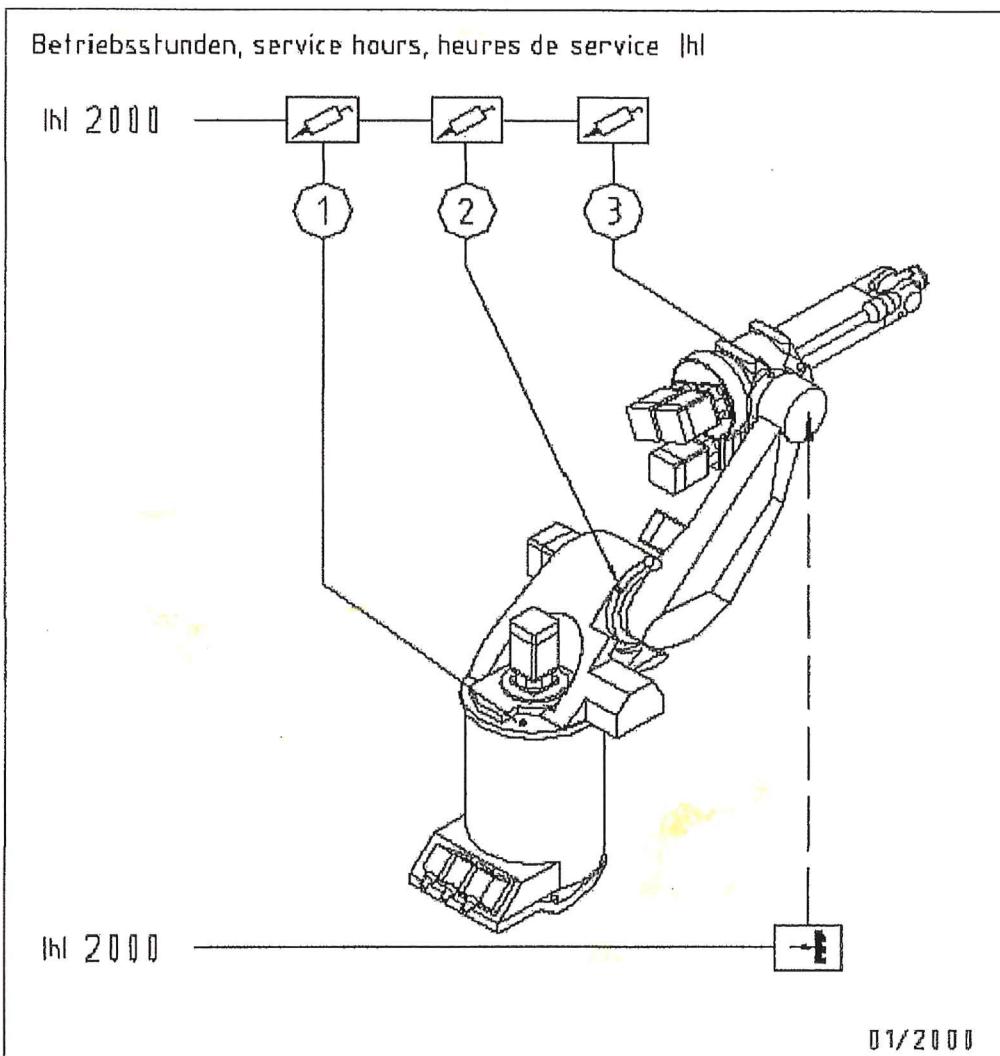


covered lube point



check belt tension and retighten if necessary

LUBRICATION INSTRUCTIONS



SRAM BUFFERING

Battery exchange - intervals and procedure

Valid for ROBOTstar II/III/IV

The SRAMs are buffered by means of a lithium battery which is installed in a battery holder at the VME rack.

Data of the lithium battery:

Manufacturer:	Sonnenschein
Type:	SL-780
Capacity:	13.5 Ah
Nominal voltage:	3.6 V
Duration:	10 a

Table: Current consumption and buffering time

VME board Type	function	current consumption typical	min.	buffering time days	years
CPU23 XS/XB	CPU RSIV	0.06 mA	0.3 mA	1875 d	5 a
SRAM 7	MEM RSIV	0.01 mA	0.15 mA	-	10 a
ELTEC SAC	CPU RSII/III	0.02 mA	0.3 mA	1875 d	5 a
RARO	MEM RSII/III	0.02 mA	0.3 mA	1875 d	5 a

Robot	Axis	Components	Relubrication point	Relubrication quantity	Lubrication interval	Lubricant Id.No.	First lubrication quantity	Remarks
RV6	1	Gear unit	none	none	Durability	Harmonic Drive SK1A 1868018	300 cm ³	Fill toothing of the gear unit and the grooved ball bearing of the Wave Generator. grease cable in cable duct with Shell Retinax LX2 Id.No. 2454058
	bearing	①	10 cm ³	2000 h		Harmonic Drive SK1A 1868018	30 cm ³	turn A1 slowly during greasing
RV16	2	Gear unit	none	none	Durability	Harmonic Drive SK1A 1868018	350 cm ³	Fill toothing of the gear unit and the grooved ball bearing of the Wave Generator.
	Bearing	②	10 cm ³	2000 h		Harmonic Drive SK1A 1868018	25 cm ³	turn A2 slowly during greasing
3	Gear unit	none	none	Durability		Harmonic Drive SK1A 1868018	170 cm ³	Fill toothing of the gear unit and the grooved ball bearing of the Wave Generator.
	Bearing	③	10 cm ³	2000 h		Harmonic Drive SK1A 1868018	20 cm ³	turn A3 slowly during greasing
4	Gear unit and bearing	none	none	Durability	Shell Alvania EP1 1512715	290 cm ³	grease cable in cable duct with Shell Retinax LX2 Id.No. 2454058	
5	gear unit and bearing	none	none	Durability	Shell Alvania EP1 1512715	RV6 130 cm ³ RV16: 260+20 =280 cm ³	RV16: observe the gear stage in the motor flange	
6	gear unit and bearing	none	none	Durability	Shell Alvania EP1 1512715	RV6: 130 cm ³ RV16: 260+20 =280 cm ³	RV16: observe the gear stage in the motor flange	

Attention: Clean all lube points prior to lubrication!

It is strictly forbidden to use molybdenum disulfide (MoS_2) as lubricant

Absolutely observe the instructions in the safety data sheet

all lubricants can be purchased from Reis Robotics under the indicated Id. No.

SRAM BUFFERING

Calculation of the recommended battery exchange interval

$$\text{buffering time/ interval [days]} = \frac{13500 \text{ [mA]}}{\text{Imax [mA]} * 24}$$

Imax: addition of the max. current consumption according to
the above table for each board used in the VME rack.
unit: [mA] - [milliampere]

Procedure for battery exchange

1. Switch on the control at the main switch
2. Back-up the data and programs
- on disk or via DNC interface
3. Keep switched on the supply voltage of the control during
battery exchange !

Remove the old battery from the battery holder and insert a new one.

CLEANING

For cleaning of the installation do not use any compressed air or high-pressure /steam jet cleaning apparatus and avoid penetration of washing agents into the bearings, sealings, motors, and other electric components. Dirt or detergents may impair the functioning of the machine or cause damage of the components concerned.

Clean lines, tubes, and plastic parts with solvent-free detergents only.

For cleaning use a rag soaked with detergent and observe the instructions given by the detergent manufacturer.

Choose the cleaning intervals adapted to the ambient conditions of the installation site.

GENERAL REMARKS

Technical data and dimensions mentioned in this chapter are standard dimensions only. Customer-specific adaptations of the machine have not been taken into consideration.

The data and dimensions of the delivered machine are indicated on the installation plan and the machine card.

Max. ambient temperatures of the machine
(without control cabinet):

In operation: 0°C (273 K) up to +45°C (318 K)

For transport
and storage: -40°C (233 K) up to +60°C (333 K)

Utilization in other temperature ranges on request.

Max. ambient temperatures of the control cabinet:

See operating manual of the robot, chapter "Maintenance".

PEPS

Robot

Noise emission

NOISE EMISSION

Kind: Robot

Noise measurements
acc. to DIN 45635 part 1

Uncertainty in measurement 3 dB

Emission value at the
workshop LpA < 70 dB(A)
(without accessory)

Used measuring unit: sound level meter
Brüel & Kjaer
Type 2231
class of accuracy 1

