1. PRODUCT DESCRIPTION

1.1. Overview of the robot system

The robot system consists of all the components shown in Figure A3.1, where is presented an example of a robot system.

1.2. Robot description

The robot is designed as a cinematic structure with an articulate arm of 6 axles. The structural components of the robot are constructions of light metal or cast iron. The driving is effectuated through servo-motors of AC. In order to compensate the
torque of the axle 2 load, it is used a hydro pneumatic compensating weight. The robot is formed by all the main constructive groups shown in Figure A3.2:

1. Arm
2. Electrical installation
3. Rotating column
4. Base
5. Compensating weight
6. Central wrist
7. Oscillating arm

*Figure A3.2 – Main constructive groups*

**Central wrist**

The robot is equipped with a central wrist of three axles with a nominal load of 500 kg. The central wrist consists of the axles 4, 5 and 6. It is driven through transmission shafts which are driven, by its turn, for three AC servomotors mounted in the rear of the arm. As a drive it is used an AC servomotor without brushes and with single disk brakes of permanent magnet. The single disk brakes of permanent magnet comply a retention function when the servomotors are stopped or, in case of braking for dead short (for example, when dropping the security switch during testing service), they serve as support for the corresponding axle braking. The dead short braking must not be used for the normal detention of the robot moves. The oil supplier for the central wrist gear is done through two independent oil chambers.

If the allowed range of rotation of one of the wrist axles is exceeded, a stop and disconnection of the robot by the acting of the software limits takes place. The range of rotation of the A5 is mechanically limited through final locks with buffer effect.

The central wrist forms an interchangeable unit with a standardized mechanical connection point with the arm.

This constructive group also includes an exploration with a metering cartridge, through which it is possible to determine the zero mechanical position of the axle and memorize the control unit by means of an electronic adjusting unit (accessory).

In case of requirement of higher mechanical and thermal loads, it is available the variant “F” of the central wrist.
Arm

The arm is the union element between the central wrist and the oscillating arm. It shelters the A4, A5 and A6 motors of the wrist axles, as well as the A3 motor. The driving of the arm is effectuated with an AC servomotor through a gear mounted between the arm and the oscillating arm. The maximum admissible range of rotation is limited through mechanical final locks with a buffer effect both in positive and negative direction, in addition to the limit switches of the software.

In case of requirement of higher mechanical and thermal loads, it is available the variant “F” of the arm. The arms of the variant “F” work with compressed air in order to avoid the entrance of humidity and dust.

Oscillating arm

The oscillating arm is the constructive group set between the rotation column and the arm. It is laid on one side of a gear located in the rotation column. It is used as driving of an AC servomotor without brushes and with single disk brakes of permanent magnet. The single disk brakes of permanent magnet comply a retention function when the servomotors are stopped or, in case of braking for dead short (for example, when dropping the security switch during testing service), they serve as support for the corresponding axle braking. The dead short braking must not be used for the normal detention of the robot moves. In case of movements around the axle 2, the oscillating arm moves around the fixed rotation column. The useful range of rotation is limited through mechanical final locks with a buffer effect both in positive and negative direction, in addition to the limit switches of the software.

Rotation column

The rotation column shelters all the motors of axles 1 and 2. The rotation moves of axle 1 are done through the rotation column. It is screwed to the base by means of the axle 1 gear. Inside, the rotation column disposes for the axle 1 driving of an AC servomotor without brushes and with single disk brakes of permanent magnet. The single disk brakes of permanent magnet comply a retention function when the servomotors are stopped or, in case of braking for dead short (for example, when dropping the security switch during testing service), they serve as support for the corresponding axle braking. The dead short braking must not be used for the normal detention of the robot moves. The counter bearing for the weight compensation is integrated in the rotation column shell, located in the back.

Robot base

The robot base is formed by the frame. It is screwed to the foundation. In the base there are the interfaces of the electrical installation and power supplies (accessories). The base and the rotation column are interconnected by the axle 1 gear.

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In the base there also is the cable drag chain for the electrical installation and power supplies.

**Compensating weight**

The compensating weight is a constructive group mounted between the rotation column and the oscillating arm. This constructive group minimizes the generated moments around axle 2 during the detention and robot movement. For this, a closed hydro pneumatic system is installed. The system consists of two pressure accumulators, and hydraulic cylinder with the corresponding cables, a manometer and a rupture disk as security element for overload protection. The pressure accumulators pertain to the 0 category, fluid group 2, from the pressure equipment Directive. Both in the mounting robots of the floor and the roof and the “F” variants, the corresponding compensating weight variants are used. The performance is rotated with the mounting robot of the roof, ergo, the piston rod presses the oscillating arm.

1.3. **Axles data**

Both the movement direction and the assignation of each axle can be seen in *Figure A3.3*. Furthermore, in *Figure A3.4* it is shown the size and shape of the working area for one of the different robots KR 350/500.

*Figure A3.3 – Rotational direction of the robot axles*

*Figure A3.4 – Working area of robots KR 500-3 C*