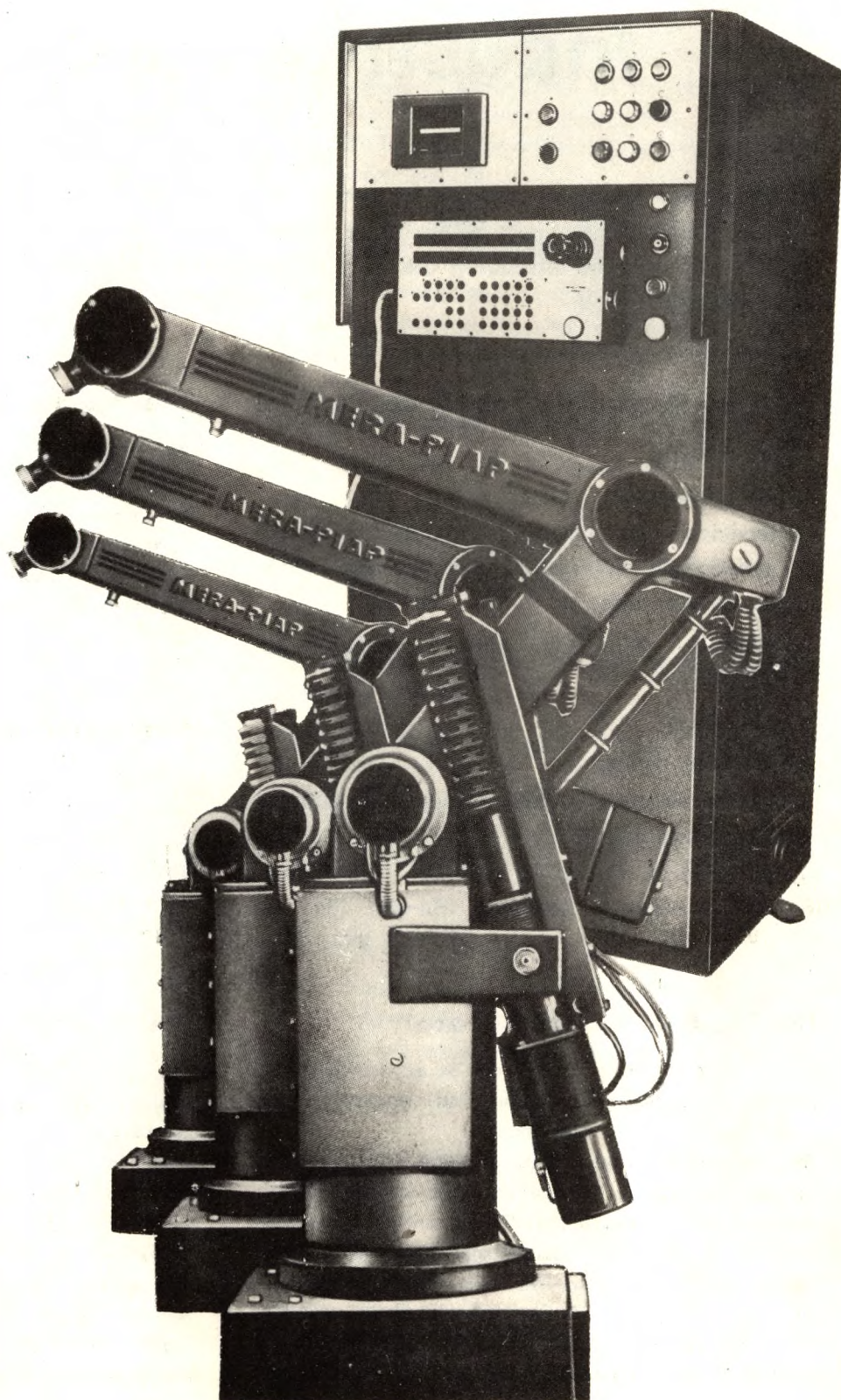




PRZEMYSŁOWY  
INSTYTUT  
AUTOMATYKI  
I POMIARÓW  
„MERA-PIAP”  
Al. Jerozolimskie 202  
02-222 Warszawa  
POLAND

# Industrial robots

## IRp



# Industrial robots IRp

Industrial IRp robots are universal measures of technological processes automation particularly of onerous conditions and operated with difficulty by a man.

These robots may be introduced into automation of the works carried out by machines and are able to work using own tools.

## The main fields of the robot's applications

- arc welding,
- spot welding,
- servicing of lathes, injection moulding machines, press, casting machines and other production cells,
- grinding, trimming, parts cleaning and polishing,
- palletizing,
- assembly works,
- special purpose stand's service (e.g. control and measurement).

Besides IRp-6 and IRp-60 industrial robots we offer new IRp robot's types as following: IRp-6W, IRp-6L, IRp-10, IRp-60Z.

## The IRp-6 W industrial robot

It's a robot provided for a work in an upside-down position (undersling) able to move on the gantry what extend the range of it's applications.

The operating area has been conveniently situated on the horizontal surface what enables the work with parts of the machining surface greater than 50 per cent in comparison with the IRp-6 robot's possibilities, without additionally devices (e.g. rotary tables).

The robot's arms drives are equipped with electromagnetic brakes protecting them to fall down on the production stand under their own weight in case the electric supply has been switched off or failure.

## The IRp-6L industrial robot

The lengthening of the robot's lower arm in comparison with IRp-6 robot up to 50 per cent state the major feature of this solution.

Such construction allows to extend the operating area to 30% and to increase the range of the robot's tool horizontal motion to 50% and also the speed of the robot's gripper to 30%.

## The IRp-10 industrial robot

This is the robot of the same dimensions as IRp-6, but of carrying capacity increased up to 10 kg what extends the field of it's applications.

The IRp-10 robot among others has been designed for cooperation with grippers and tools replacement automatic devices.

## The IRp-60Z industrial robot

This is a six axles robot designed mainly for spot welding equipped with additional electromagnetic brakes and overload coupling in the junction.

The IRp-60Z robot's control system enables the quick braking and acceleration of the robot's motion between the following welded points what considerably shortens the time of welding cycle.

The protection against gluing of welding electrodes and the function "Emergency Stop" have been introduced what enables the work after the reason of the overload was cancelled without necessity of robot's next synchronization.

## **THE BASIC TECHNICAL AND USERS IRp ROBOT'S FUNCTIONS AND FEATURES**

### **Interpolation in linear and polar coordinates; PTP and CP control systems**

The robot's control systems allow to programme and execute the tools movements between the set points without tracking (PTP control) or with tracking (CP control).

The CP control system enables to programme the tool's motions along the independently oriented in space straight line or around.

### **The tool's motion programming in 3 types of coordinates**

The tool's motion (the central point TCP) can be programmed in one of the three coordinate systems: rectangular, cylindrical, or in robot's internal coordinates.

### **Dialog programming**

The programming circuit enables the dialog programming. It is also equipped with the joystick to control the robot's movements and alphanumeric light indicator.

User's programmes may be recorded and stored inside the cassette memory built in the control cabinet.

### **Adapting control**

The IRp robot's control system ensures application of following adaptiv functions:

- "searching" function in the two- or three-dimensional space to localize surfaces, edges and object's points,
- the robot's movements speed controlling function depending on the tool's load force,
- the outlining function automatically adjusting the pre-programmed path to the actual shape of the machining detail,
- programme automatic correction function.

Adaptiv functions application requires the suitable outer information transmitters.

### **The user's programme capacity**

The capacity of the IRp robot's users programme amounts to 1000 positions and is possible to be extended to 2500 positions.

### **The possibility of 9 drives control**

The IRp-6, IRp-10, IRp-6L and IRp-6W robots have 5 degrees of freedom each, IRp-60 robot has 5 or 6 degrees of freedom and the IRp-60Z robot - 6 degrees of freedom.

The IRp robots are delivered with the system to control the track line, the gantry or other technological devices (e.g. welding positioners, feeders) drives.

These devices drives should be of the same type as the robot's drives - equipped with the D.C. motor of similar power, the selsyn generator and the tachometer.

The maximum number of the drives controlled (including the robots drives) - 9.

### **The work with grippers**

The IRp robots are equipped with the pneumatic installation with two electromagnetic valves for the grippers drives.

The valves are controlled by the robot's control system.

### **The work with outer transmitters**

The interface with outer transmitters enables to control the technological processes and the robot's cooperation with different devices.

The robot's electrical installation is adapted to direct interface with outer transmitters.

### **Increased number of the two-position inputs/outputs**

Its possible to equip the robot's control system with the additional two-positions inputs/outputs circuit, extending the number of them from 16/16 to 32/32 or, 64/64.

The two-positions signals from outer devices may supply the control system by a cluster with terminal strip.

### **Analog inputs**

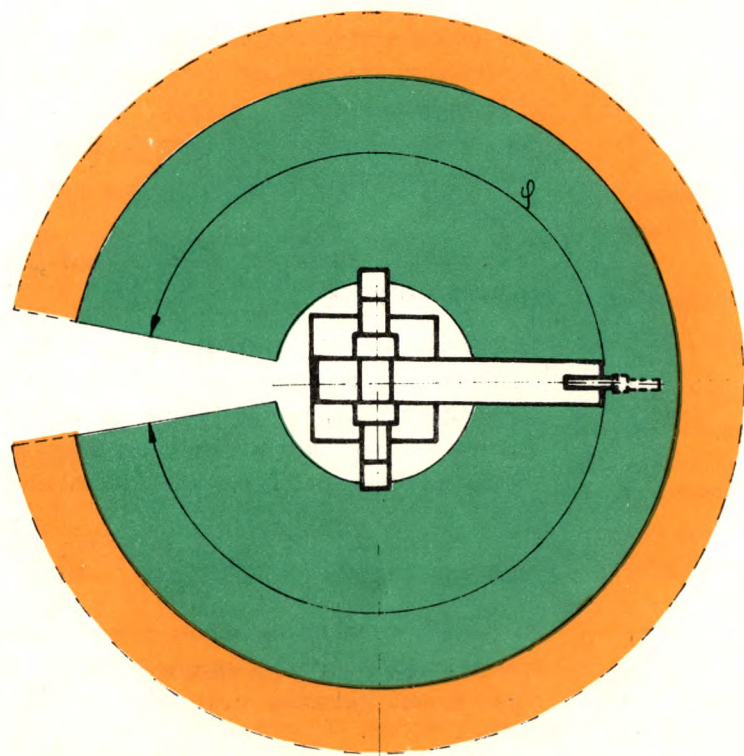
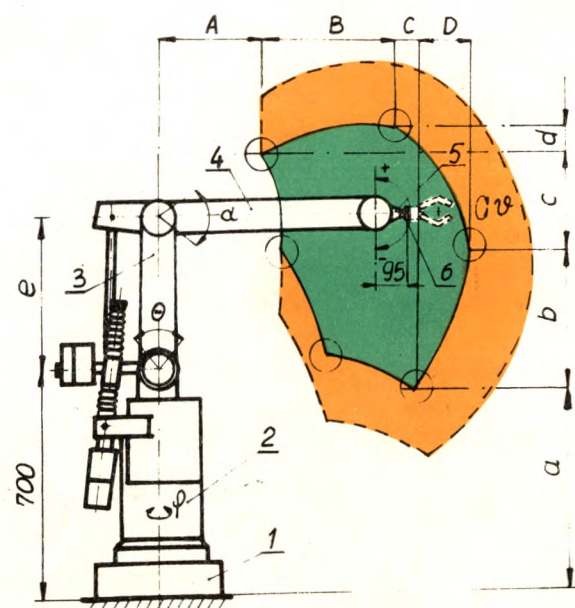
Its possible to equip the robots control system with 8 analog-inputs circuit which enables the robot to work with outer devices measuring transmitters of analog output signals.

### **The work in the flexible production systems**

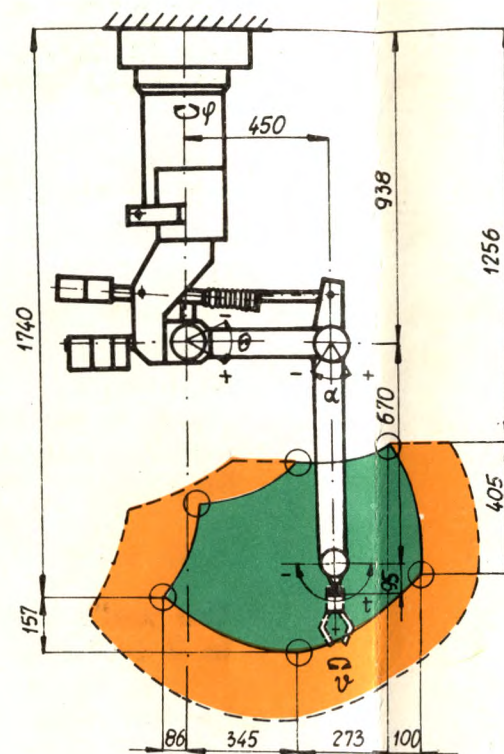
The information connection between the IRp robot's control system and supervisory control system and application of these robots in flexible production systems are possible since the robots are equipped with the V24 interface circuit or "PROWAY" multi access serial data bus interface circuit.

# THE OPERATING AREA AND THE IRp ROBOTS MAIN DIMENSIONS

## The IRp-6, IRp-10, IRp-6L robots



## The IRp-6W robot

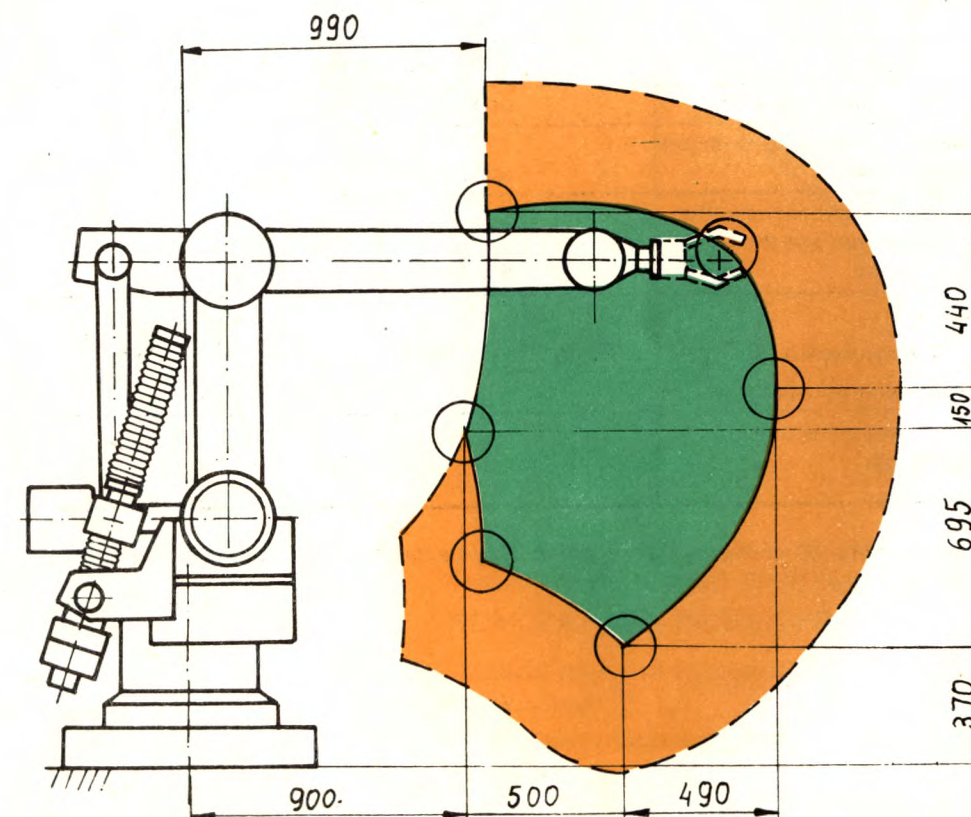
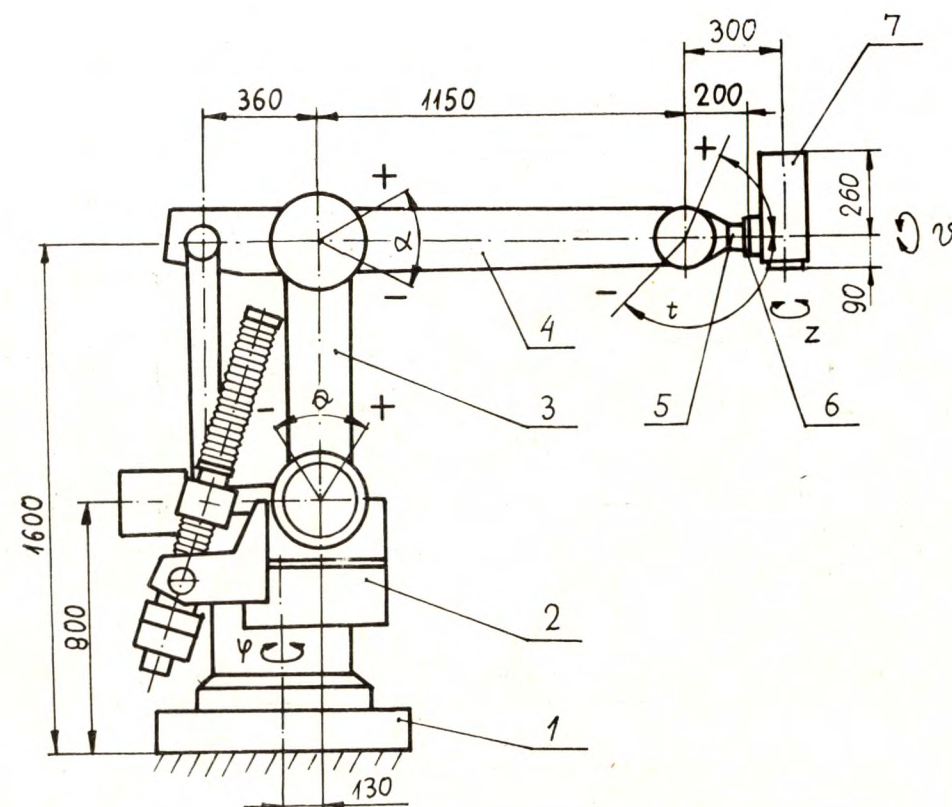


Robot	Dimension	$\varphi$	$\theta$	$\alpha$	$t$	$\vartheta$
IRp-6W		$340^\circ$	$\pm 40^\circ$	$+25^\circ \dots -40^\circ$	$\pm 90^\circ$	$\pm 180^\circ$

- 1 - pedestal
  - 2 - stand
  - 3 - lower arm
  - 4 - upper arm
  - 5 - wrist
  - 6 - bend
  - 7 - sixth axle
- $\varphi$  - stand rotary motion
  - $\theta$  - lower arm up/down motion
  - $\alpha$  - upper arm up/down motion
  - $t$  - wrist up/down motion
  - $v$  - bend turn motion
  - $z$  - sixth axle motion

Robot	Dimension	$\varphi$	$\theta$	$\alpha$	$t$	$v$	$z$
IRp-60		$330^\circ$	$+50^\circ \dots -20^\circ$	$+10^\circ \dots -50^\circ$	$+75^\circ \dots -120^\circ$	$\pm 180^\circ$	$\pm 150^\circ$
IRp-60Z							

## The IRp-60, IRp-60Z robots



Robot	Dimension	A	B	C	D	a	b	c	d	e	$\varphi$	$\theta$	$\alpha$	$t$	$v$
IRp-6 IRp-10		319	405	78	157	614	431	273	100	450	$340^\circ$	$\pm 40^\circ$	$+25^\circ \dots -40^\circ$	$\pm 90^\circ$	$\pm 180^\circ$
IRp-6L		176	605	163	157	782	431	283	134	670	$340^\circ$	$\pm 40^\circ$	$+25^\circ \dots -40^\circ$	$\pm 90^\circ$	$\pm 180^\circ$

## IRp ROBOT'S TECHNICAL DATA

Parameter	IRp-6	IRp-6W	IRp-6L	IRp-10	IRp-60	IRp-60Z
Nominal carrying capacity	6 kg			10 kg	60 kg	45 kg
Maximum static load torque of the robots bend.	12 N.m				240 N.m	60 N.m
Positioning repeatability	± 0,10 mm				± 0,40 mm	
Maximum speeds:						
– the stand turnover ( $\varphi$ )	95°/s					90°/s *
– the bend horizontal motion	0,75 m/s	1,1 m/s	1,1 m/s	0,75 m/s	1,0 m/s*	0,75 m/s
– the bend vertical motion	1,1 m/s	0,75 m/s	1,1 m/s	1,1 m/s	1,3 m/s*	0,97 m/s
– the wrist up/down motion (t)	115°/s				90°/s*	67,5°/s
– the bend turn motion (v)	195°/s				150°/s*	112,5°/s
– the sixth axle motion (z)	–				–	90°/s
The admissible surrounding temperature:						
– of the manipulator	5 ÷ 55°C					
– of the control cabinet	5 ÷ 40°C					
Power supply	3 x 380 V <sup>+ 10%</sup> <sub>- 15%</sub>					
Total power consumption	max. 1,7 kW				max. 7 kW	
The number of:						
– two-positions inputs	16(32 or 64 – opt.)					
– two-positions outputs	16(32 or 64 – opt.)					
– analog inputs	8(opt.)					
– axles controlled	5(max. 9 – opt.)					6(max. 9 – opt.)
The user's programme capacity	1000 positions (max. 2500 pos. – opt.)					
The serial digital interface	up to V.24 (RS-232 C) standard					
Interface with the multi-access serial data bus	up to PROWAY standard – opt.					
The cable length between the control cabinet and the manipulating part.	6 m (max. 15 m – opt.)					
Weight:						
– of the manipulator	125 kg	145 kg	135 kg	130 kg	~ 750 kg	
– of the control cabinet	~ 325 kg				~ 425 kg	
The programming unit cable length	6 m					

\*) If the load of IRp-60 robot exceeds the weight of 30 kg the maximum speeds are decreased by 25%.

## THE IR<sub>p</sub> ROBOTS EQUIPMENT DELIVERED ON THE CUSTOMER'S DEMAND

To fulfill the customer's extra technical requirements we offer following additional IR<sub>p</sub> robots equipment extending its technical and users features.

- IR<sub>p</sub>-60 robots sixth axle,
- control system for the driving line track or the robot's gantry drives,
- control systems for outer technological devices,
- users programm extending capacity,
- analog inputs circuit,
- the cluster with a terminal strip simplifying the two-positions input/output outer signals connection to the robot's control system,
- circuits increasing the number of two-positions inputs/outputs,
- pneumatic grippers drives,
- lengthen cable connecting the control cabinet with the manipulator,
- interface circuit for the "PROWAY" multi-access serial data bus,
- V24 (RS232) digital interface circuit.

We'd like to take a note of you that the programming circuit is capable to operate a number of robots and in such a case we treat the delivery of it as an option, in favour of our customers.

We are able to supply you also with a grippers and tools automatic replacement devices.

## "MERA-PIAP" Institut within the frame of industrial robots applications research works offers:

- expert advisory service,
- design of a robotized production stand,
- participation in assembling and starting of the robotized stand,
- training the users with the IR<sub>p</sub> robot's or the whole stand programming, operating and service.

We are experts in industrial robots application for stand, cells or technological lines servicing, e.g. arc and spot welding or lathes and other machines operating.

### TECHNICAL INFORMATION:

Industrial Institut of Automation and Measurement  
MERA-PIAP  
Industrial Robots Division  
Przemysłowy Instytut Automatyki i Pomiarów  
MERA-PIAP  
Ośrodek Robotów Przemysłowych  
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