



Basic Knowledge

Structural principle explosion function

Basic Composition

1. Composition Introduction
2. Introduction To The Main Body
3. Controller:
 - Industrial Computer Type
 - PLC Type
4. Operation Unit:
 - Traditionality
 - Menu Style
5. Driver:
 - Integrated Type
 - Modular Design
 - Independent Style
6. Common Accessories - Positioner:
 - Rotary Positioner
 - Linear Positioner
7. Common Attachments - End Effectors:
 - Welding Torch
 - Mechanical Hand Claw
 - Stacking Claw
 - Sucker

Technical Indicators

1. Explanation Of Degrees Of Freedom
2. Rated Load Explanation
3. Explanation Of Work Accuracy

Structural Principle

1. Structure Demonstration
2. Principle Demonstration

Mechanical System

Structural principle explosion function

Mechanical Structure

1. Mechanical Arm:
 - Single Arm Type,
 - Double Arm Style,
 - Hanging Type
2. End Effector:
 - Welding Torch,
 - Mechanical Hand Claw,
 - Stacking Claw,
 - Sucker,
 - Nozzle,
 - Multi Claw Style

Mechanical System (cont)

3. Mechanical Wrist:

- R Wrist
- B Wrist

4. Robot Waist

5. Robot Base:

- Mobile Base,
- Fixed Base

6. Robot Body Axis:

- ABB
- KUKA
- YASKAWA
- FANUC

Joint Structure

1. Moving Joints:

- Gear And Rack,
- Motor Screw,
- Hydraulic and Pneumatic Cylinders

2. Rotate Joints:

- Rv Gearbox,
- Harmonic Reducer,
- Connecting Rod Transmission,
- Synchronous Belt Drive,
- Worm Drive

Motion Axis And Coordinate System

1. Introduction To Motion Axis
2. Joint Coordinate System
3. Cartesian Coordinate System
4. Tool Coordinate System
5. User Coordinate System

Control System

Structural principle explosion function

Robot Position Kinematics

1. Coordinate Transformation and

Homogeneous Operation:

- Robot Coordinate System Description:
 - Absolute Coordinate System
 - Base Coordinate System
 - Rod Coordinate System
 - Hand Coordinate System

Control System (cont)

- Homogeneous Coordinates and Pose Description:
 - The Position And Homogeneous Coordinates Of The Point
 - Coordinate Direction Description
 - Description Of Rigid Body Pose
 - Hand Position And Posture
- Homogeneous Transformation and Operation
 - Translational Homogeneous Transformation
 - Rotation Homogeneous Transformation
- DH Algorithm and Motion Equation

Composition Of Control System

1. Control Layering

2. Hardware Composition Of Control System

- Main Board
- IO Circuit Board
- Emergency Stop Unit
- Power Supply Unit
- Six Axis Servo Amplifier
- Operation Panel
- Fan And Heat Exchanger
- Circuit Breaker
- Regenerative Resistor
- Teaching Pendant

Teaching Demonstration and Reproduction

1. Teaching Demonstration and Reproduction

- Introduction To The Function Buttons Of The Teaching Pendant
- Path Of Particle
 - Jogging The Marking Line
 - Linkage Marking
 - Joint Interpolation
 - Linear Interpolation
 - Arc Interpolation
- Online Teaching Demonstration

Vision System

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Internal Sensors

1. Position Displacement Sensor

- *Photoelectric Switch:*
 - *Slot Type Photoelectric Switch*
 - *Opposite Type Photoelectric Switch*
 - *Reflective Photoelectric Switch*
 - *Grating*
- *Encoder:*
 - *Axial Encoder*
 - *Nested Encoder*
- *Rotating Transformer*

2. Speed Sensor:

- *Photoelectric Speed Sensor,*
- *Magneto Electric Speed Sensor*

3. Accelerometer:

- *Servo Acceleration Sensor*
- *Piezoelectric Accelerometer*

4. Force Sensor:

- *Resistance Strain Gauge Sensor*
 - *Torque Sensor*
 - *The Torque Sensor*
- *Piezoresistive Force Sensor,*
- *Six Dimensional Torque Sensor*

External Sensors

1. Contact Sensor

- *Mechanical Sensors,*
- *Elastic Sensor*

2. Proximity Sensor

- *Ultrasonic Sensor,*
- *Infrared Proximity Sensor,*
- *Inductive Proximity Switch*

3. Vision Sensor

4. Slip Sensor

Dynamic System

Structural principle explosion function

Hydraulic System

1. Hydraulic Power Components

- *External Gear Pump*
- *Axial Piston Pump*
- *Horizontal Plunger Pump*

2. Hydraulic Actuator Components:

- *Plunger Hydraulic Cylinder*
- *Gear Hydraulic Motor*

3. Hydraulic Control Components:

- *Sequential Valve,*
- *Throttle Valve,*
- *One Way Valve*

Dynamic System (cont)

Pneumatic system

1. Pneumatic Actuator

- *Deceleration Pneumatic Motor*
- *Bladed Pneumatic Motor*
- *Single Acting Spring Reset Cylinder*
- *Ordinary Double Acting Cylinder*
- *Boosting Cylinder*

2. Pneumatic Control Components:

- *Relief Valve*
- *Pressure Relief Valve*

Electric system

1. Electric power unit

- *DC motor*
- *Alternating current dynamo*
- *Stepper motor*

Typical applications

Workstation workflow

Assembly workstation

1. Assembly Overview
2. Assembling robots
3. Control cabinet
4. Teaching Box
5. Safety fence
6. Emergency operation button
7. Transmission device

Welding workstation

1. Welding Overview
2. Control cabinet
3. Teaching Box
4. Safety fence
5. Emergency operation button
6. Welding robot
7. Workpiece fixing bracket
8. Wire feeder

Handling Workstation

1. Overview of Handling
2. Control cabinet
3. Teaching Box
4. Handling robot
5. Safety fence
6. Emergency operation button
7. Transmission device
8. Sensor positioning device

Robot Disassembly

Robot disassembly training process

Robot Disassembly

1. Robot Disassembly