

AR Series Humanoid Force-Controlled Arm

Key Features

Human-Like Dexterity and Motion Fidelity

- 7DoF + cross-axis wrist, 1:1 mapping of human arm motion
- Full-series payload-to-weight ratio of 1:2, 3kg–10kg payload range, ± 0.1 mm repeatability, Maximum TCP speed 2m/s, Efficient execution of complex postures and trajectories



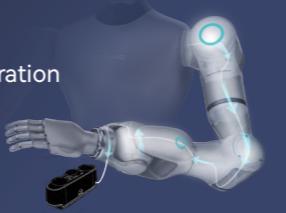
High-Performance Force Sensing and Control

- High-precision force sensing and force control across all joints
- System-level force resolution < 0.05N
- System-level force control bandwidth > 30Hz
- Designed for applications like precision assembly and material handling.



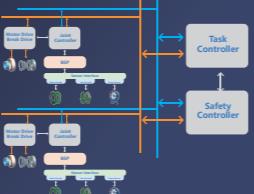
Easy and Fast for Integration and Deployment

- Max hollow wrist bore diameter 15mm, supports internal camera cabling for plug-and-play vision integration
- 48V \pm 20% wide voltage input for complex working conditions; EtherCAT / RS485 / CAN interfaces for multi-scenario deployment
- Integrated, modular design for easy installation and maintenance



Safe, Open, and Compatible Control Architecture

- 22 TÜV-certified safety functions + dual encoder redundant design + electromagnetic holding brake + high responsive collision detection
- High-order Secondary Development Kit



Proven Reliability

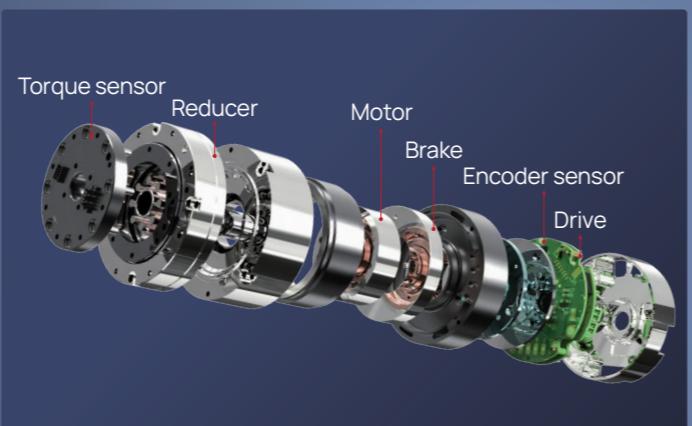
- 10 years of global leadership in full force-controlled collaborative robot technology; fully validated in industrial applications

HSA Series Integrated Force-Controlled Joints

Key Features

Lightweight & Highly Integrated

- Single-plane encoder layout; minimum joint weight: 450 g
- Large hollow bore diameter 10% larger than industry average, saving 20% installation space and significantly lowering equipment integration burden



Benchmark Force-Control Technology

- "Micro-gram" force sensing ≤ 0.05 N·m torque sensor resolution
- High-performance frameless torque motor, max speed 6000 rpm
- 32 kHz force-control sampling + 1 kHz impedance control
- Force-controlled closed-loop bandwidth 100 Hz

Powerful & Reliable Performance

- High-precision harmonic reducer, torque density up to 48 Nm/kg, peak torque 459 Nm
- 300% FS. overload capacity + electromagnetic holding brake, operating temperature 0–50°C, dual absolute encoder redundancy for stable operation under extreme conditions



Note:

ROKAE AR Series humanoid force-controlled arms integrates self-developed HSA series force-controlled joints, offering extreme compatibility and performance. The design aims to help build embodied intelligence platforms.

Both the AR Series arms and the HSA Series joints are available as standalone, general-purpose products, allowing flexible configuration to meet diverse needs.

ROKAE

ROKAE Embodied Intelligence Products



Industry-Grade Quality

Human-Like and Force-Controlled

Open and Intelligent

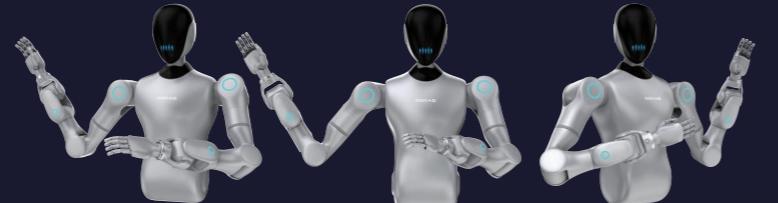


Pioneer Embodied Intelligence Robotics Standards

Propel Large-Scale Industrialization

Humanoid Force-Controlled Arms AR Series

Parameter Specifications



Parameter Category	AR3	AR5	AR10	
Specifications	Rated load	3 kg	5 kg	10 kg
	Weight	7 kg	10 kg	18 kg
	DoF	7	7	7
	Operating radius	650 mm	683 mm	760 mm
	Repeated positioning accuracy	±0.1 mm	±0.1 mm	±0.1 mm
	Absolute positioning accuracy	±1 mm	±1 mm	±1 mm
	TCP maximum speed	≥2 m/s	≥2 m/s	≥2 m/s
	Joint hollow aperture	6 mm	9 mm	10 mm
	IP rating	IP54	IP54	IP54
	Axis 1	±360°	±178°	±360°
Range of motion	Axis 2	±120°	±120°	±120°
	Axis 3	±178°	±178°	±178°
	Axis 4	-60°~+145°	-60°~+145°	-60°~+145°
	Axis 5	±178°	±178°	±178°
	Axis 6	±110°	±60°	±110°
	Axis 7	±180°	±90°	±180°
	Brake	Joint with the brake		
Force control	Joint torque sensor	Standard configuration		
	End 6-DoF force sensor	Supports (range 200 N/7 Nm, accuracy ≤ 2% F.S.)		
	Force control accuracy	≤0.15 N, ≤ 0.05 Nm (reference value)		
	Force control resolution	≤0.05 N, ≤ 0.02 Nm (reference value)		
	Overload capacity of force sensor	≥300% F.S.		
	Comprehensive accuracy of force control	≤1% F.S.		
	Sampling frequency of force sensor	≥5 kHz		
	Torque closed loop	In initial scheme, controller performs torque closed loop, while in advanced scheme, joint performs torque closed loop		
	Admittance control	Single arm admittance is used alone. Update admittance control parameters in real time during admittance execution		
	Load recognition	Automatic recognition of load		
Input power supply	Power voltage	48 V DC(±15%)		
Communication	Communication mode	EtherCAT (Cycle 1±0.1 ms)		
Noise	Noise	≤60 dB		
Temperature	Operating temperature	0°C-50°C, The temperature rise shall not exceed 30°C, and the overall temperature of the machine shall not exceed 60°C		
Humidity	Operating humidity	10%-90% RH (non-condensing)		
Vibration	Vibration resistance	Refer to GB/T 4798.5-2007 Severity: 5M2		
	Impact strength	Refer to GBT39266-2020 Impact acceleration: 10 g		

Application

Applicable to humanoid robots, dual-arm wheeled robots; for AI, data collection, learning & training, factory applications, etc.

Next Generation Integrated Force-Controlled Joints HSA Series

Parameter Specifications



Parameter Category	HSA-11	HSA-14	HSA-17	HSA-20	HSA-25	HSA-32
Motor Type	Inner-rotor Frameless Torque Motor					
Dimension (Diameter/Length, mm)	52/68	60/74	72/98	82/107	110/115	142/135
Hollow Inner Diameter (mm)	6	9	10	13	15	21
Weight (With/Without Brake, g)	450 (without) *1	600(with)	1100 (with)	1700 (with)	2950 (with)	6000 (with)
Operating Voltage (V)	48	48	48	48	48	48
Joint Rated Power (W)	40	120	160	250	600	950
Gear Ratio	100	100	100	120	100	120
Rated Speed (rpm)	30	30	30	30	30	20
Torque Density (Nm/kg)	19.8	12.8	46.4	37.6	47.5	46.8
Max Allowable Avg Load Torque (Nm)	8.9	7.7/14*2	51	64	140	281
Peak Torque (Nm)	11	19	70	113	204	459
Torque Sensor Rated Torque (Nm)	12	25	70	110	210	480
Torque Sensor Resolution(Nm)	≤0.05	≤0.05	≤0.05	≤0.05	≤0.05	≤0.05
Torque Limit (Nm)	36	75	210	330	630	1440
Force Control Closed-Loop Bandwidth	100Hz					
Impedance Control Frequency	1kHz					
Force Control Sampling Frequency	32kHz					
Encoder Precision (bit)	18					
Encoder Type	Dual Absolute					
Communication	EtherCAT					

Note: *1 Supports optional configurations with Brake, *2 Supports optional configurations



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For Chinese Version

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