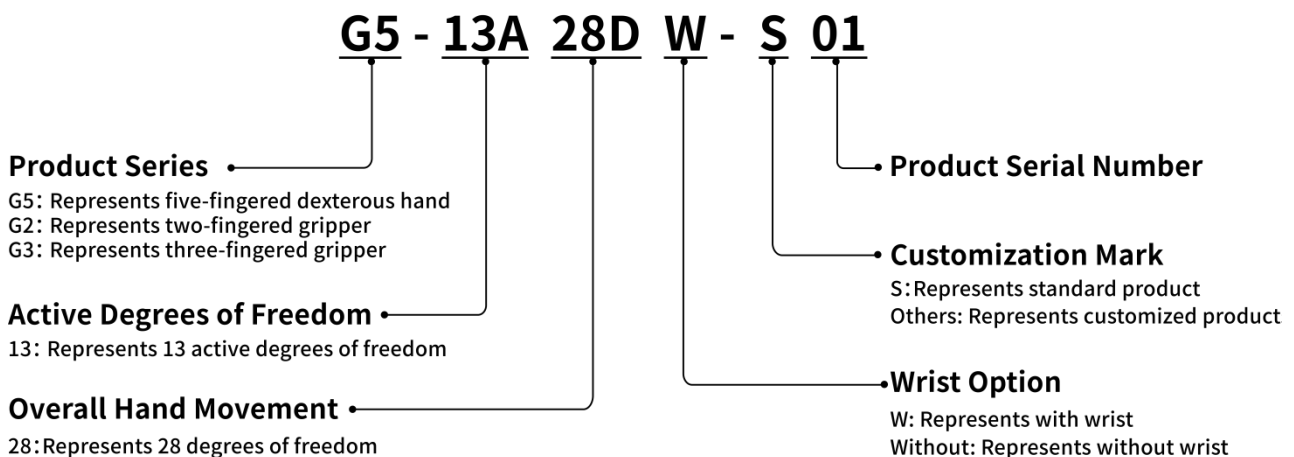


# Xiaoyao Dexterous Hand (G5-13A28D-S01) Product Manual

## 1. Product introduction

The Xiaoyao dexterous hand is a high degree of freedom deep biomimetic five finger dexterous hand with rigid-compliant-soft coupling. It has 28 degrees of freedom (13 active DOF/DOC), adopts a biomimetic topology optimization design with rigid-compliant-soft coupling, integrates tactile perception and proprioceptive capabilities, and uses reinforcement learning and diffusion models to achieve humanoid dexterity. It can be widely used in industrial manufacturing, commercial services, special environments, and household consumption scenarios.

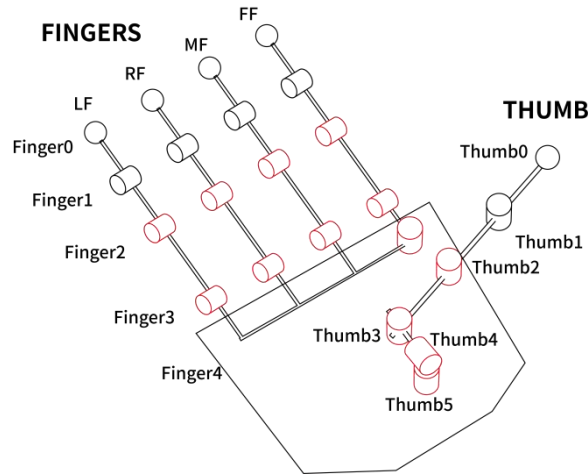
## 2. Model Description



## 3. Product Display



## 4. Degrees of Freedom



\*Note: Red represents active degrees of freedom

Palm Joint	Min (°)	Max (°)	Remarks
LF0,RF0,MF0,FF0,Thumb0	-30	30	Soft fingertips, passive twist
LF0,RF0,MF0,FF0,Thumb0	-20	40	Soft fingertips, passive bend
LF1,RF1,MF1,FF1,Thumb1	0	90	Passive bend
LF2,RF2,MF2,FF2,Thumb2	0	85	Active bend
LF3,RF3,MF3,FF3,Thumb3	0	75	Active bend
FF4	-15	15	Active side swing
Thumb4	0	100	Active abduction
Thumb5	0	70	Active rotation

## 5. Product Specification

Basic parameters	
Size	230 × 88 × 39 mm
Weight	860 g
Degrees of freedom (DoF)	28 (13 active + 15 passive)
DoF distribution	Thumb: 4 active + 3 passive Index finger: 3 active + 3 passive Middle finger: 2 active + 3 passive Ring finger: 2 active + 3 passive Little finger: 2 active + 3 passive
Motor type	High energy density brushless hollow cup motor
Body configuration	Rigid-compliant-soft coupling; modular fingertips
Load performance	
Max grasp weight (palm facing left)	5 kg

Max grasp weight (palm up)	25 kg
Whole hand max grip force	50 N
Thumb fingertip force	15 N
Single fingertip force (four fingers)	10 N

### **Motion performance**

Opening and closing time	0.7 s
Repeat positioning accuracy	0.2 mm
Thumb opposition	Index finger, middle finger, ring finger, little finger
Thumb bending speed	150°/s
Four finger bending speed	200°/s

### **Perception capability**

Number of tactile arrays	6 (a total of 168 pressure points), distributed on the fingertips and palms
Tactile array resolution	Single fingertip: 8 x 4; palm: 8
Outlier detection	Overcurrent, locked rotor, high temperature, interference detection

### **Electrical performance**

Working voltage	DC 24 ~ 60 V
Static current	0.7A @ 24 V
Maximum current	5A @ 24V
Communication interface	EtherCAT / CAN / RS485

### **Software support**

Communication frequency	1000 Hz
Packet size	Tx: Max 354 bytes(200 bytes without tactile) Rx: Max 200 bytes
SDK languages	Python / C++
Software functions	Position, speed and current control; Action sequence; GUI control; Gesture control; Tactile force control; Virtual simulation; Dexterous operation algorithm package *;
system support	Windows / Linux/ ROS

### **Reliability**

Empty load grip life	A million times
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operating temperature range	-20°~ 60°
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\*Note: The dexterous operation algorithm package is optional;