



Leadtron & DH2116 Series Dexterous Hand User Manual

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1. Product Overview

The DH2116 series dexterous hand is a high-degree-of-freedom product series by Shenzhen Leadtron Technology Co., Ltd.

The DH2116 series dexterous hand features 21 degrees of freedom with 16 active degrees of freedom, uses trapezoidal screw drive transmission, supports Windows, Linux, and ROS2 operating systems, supports development on x86 and ARM platforms, supports C++ and Python programming languages, supports CAN, CANFD, and RS485 communication protocols, provides a highly visual and interactive host PC debugging tool, and includes open-source SDK and DEMO.

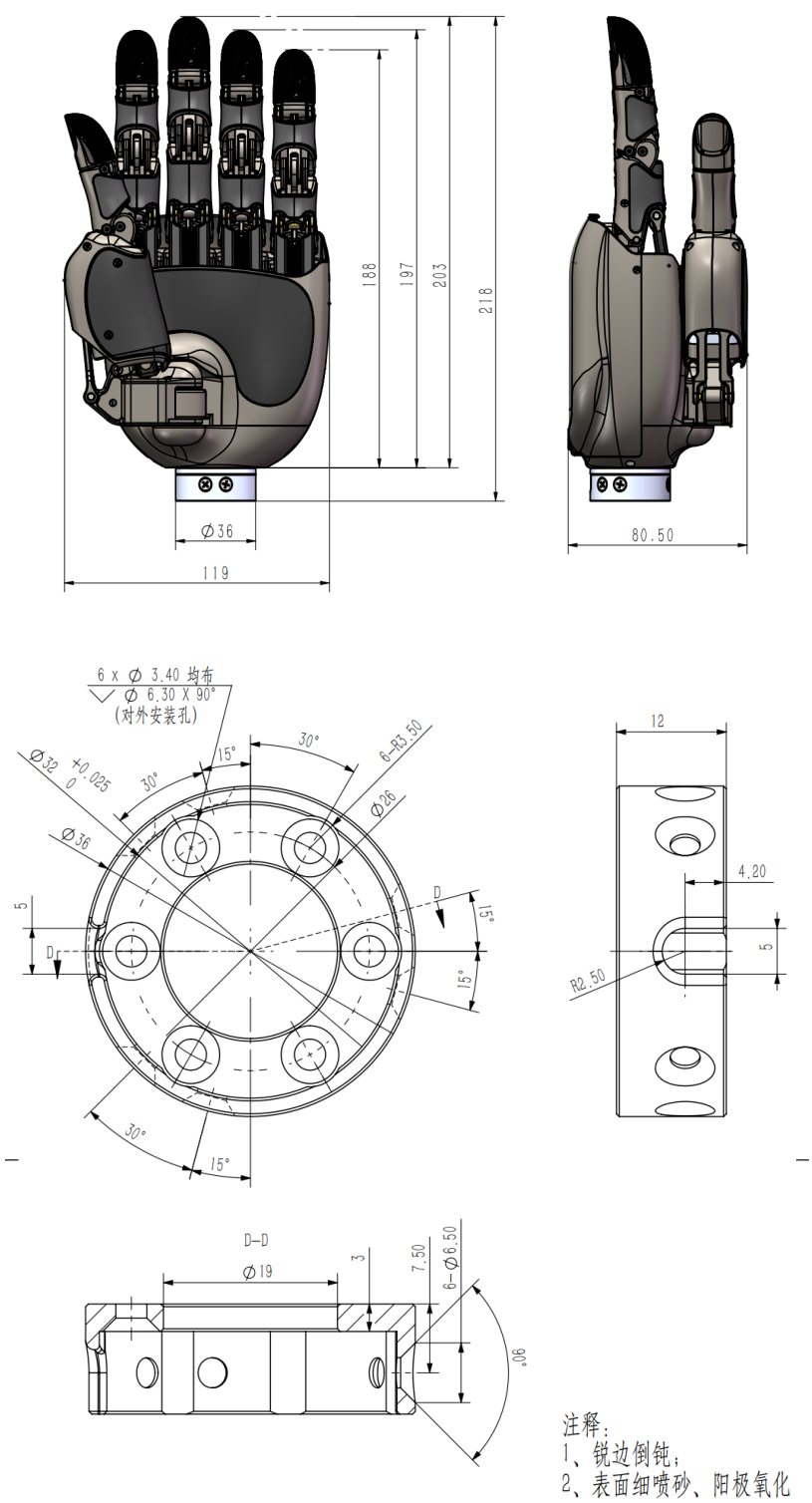
2. Accessory List

Accessory Name	Quantity	Description
DH2116-L1 (Left Hand) / DH2116-R1 (Right Hand)	1	Dexterous Hand

M9 Communication Debug Cable	1	
PCAN-USB Communication Module	1	USB-to-CAN communication module, connects with M9 communication debug cable

3. Technical Specifications

3.1 Product Dimensions



3.2 Pin Definitions

线缆使用0B9芯插头线9*28AWG外径5.0mm, 1/9红-黑-黄-灰-蓝-绿-棕-橙-紫			
	管脚	颜色	信号
	1	红	NC-P
	2	黑	NC-N
	3	黄	24V-60V IN
	4	灰	NC
	5	蓝	RS485-B
	6	绿	CANFD-L
	7	棕	GND
	8	橙	CANFD-H
	9	紫	RS485-A
插座端线序			

3.3 Performance Parameters

3.3.1 Appearance and Structure

Dimensions	218 * 119 * 80.5 mm
Weight	850g ± 10g
Color	Ink Jade Gray
Drive Mechanism	Trapezoidal Screw
Repeatability	±0.6mm
Degree of Freedom Distribution	

3.3.2 Electrical Parameters

Operating Voltage	24~60V
Quiescent Current	0.16A@24V
Rated Current	1A@24V
Maximum Current	5A@24V

3.3.3 Load and Speed

Minimum Open/Close Time	0.6s
Maximum Recommended Load	5kg
Five-finger Grip Force (Maximum)	150N

3.3.4 Service Life

No-load Open/Close	300,000 cycles
Loaded Open/Close (Full Load Side Grip)	300,000 cycles
Designed Service Life	2 years

3.4 Software-related parameters

3.4.1 Finger to ID mapping relationship

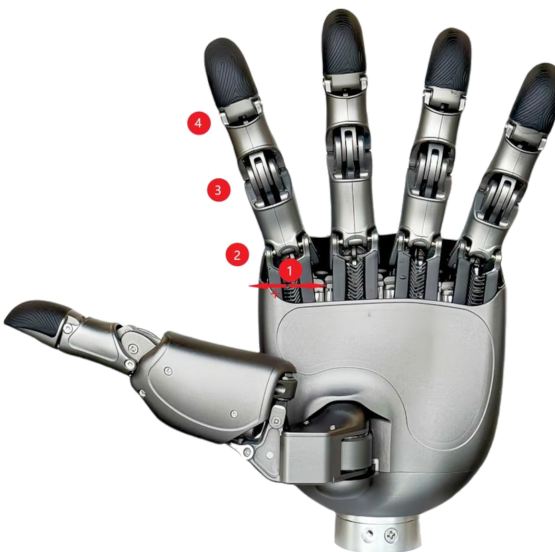
	Left Hand	Right Hand
Finger corresponding ID		

3.4.2 Mapping relationship between motor position and finger joint angle

Explanation of the mapping	
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relations
hip
between
motor
position
and joint
angle

- A single finger is controlled by 3 motors, as shown in 1, 2, 3 in the figure above. The movement of the motors controls the angles of the 4 joints of the finger, as shown in 1, 2, 3, 4 in the upper right figure.
- Among them, joint 4 is a follower joint, which moves with the movement of joint 3. It can be approximately considered that joint angle 4 moves linearly with joint angle 3, and joint 4 is approximately equal to joint 3. The movement of joint 3 is only related to motor 3, so motor 3 controls joint 3 and joint 4.
- Motors 1 and 2 jointly control joints 1 and 2; the average value (common mode component) of motors 1 and 2 controls joint 2, and the difference value (differential mode component) of motors 1 and 2 controls joint 1.
- The angle range of joint 1 is -20° to $+20^{\circ}$; the angle ranges of joints 2, 3, and 4 are 0° to 90° .
- There will be a mutual restraint relationship between motors 1 and 2, and the above-mentioned range of motion cannot be achieved under all circumstances
- During control, it can be approximately considered that the motor command position value ranges from 0 to 4095, corresponding to joint angles from 0 to 75° , and **the bent state is 4095, and the extended state is 0**



Explanati
on of the
mapping
relations
hip
between
joint
angles
and

Let the angles of joints 1 to 4 be θ_1 , θ_2 , θ_3 , and θ_4 ; the command for motor 1 be M_1 , the command for motor 2 be M_2 , and the command for motor 3 be M_3 . Note that the angle is 0° when fully extended, and the corresponding motor command is 0.

Mapping relationship between the angle of joint 1 and the commands of motors 1

motor
comman
ds

and 2:

- The range of the angle θ_1 of joint 1 is -20° to $+20^\circ$.
- The difference (differential mode component) between motors 1 and 2 controls joint 1.
- According to the mapping relationship, $M1 - M2 = \theta_1 * (4095 / 90)$.

Mapping relationship between the angle of joint 2 and the commands of motors 1 and 2 :

- The angle range of joint 2 is 0° to 90° .
- The average value (common mode part) of motors 1 and 2 controls joint 2.
- According to the mapping relationship, $(M1 + M2) / 2 = \theta_2 * (4095 / 90)$.
- can be solved

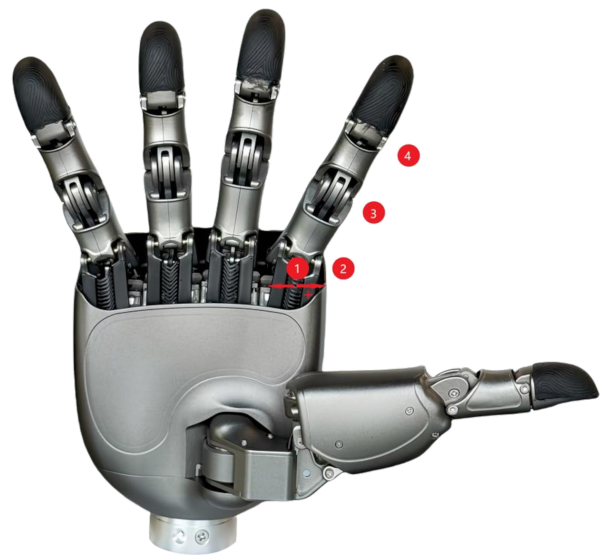
$$M1 = \frac{4095}{90} \cdot \frac{\theta_1 - 2\theta_2}{2} + 0$$

$$M2 = \frac{4095}{90} \cdot \frac{2\theta_2 - \theta_1}{2} - 0$$

Mapping relationship between the angle of joint 3 and the command of motor 3:

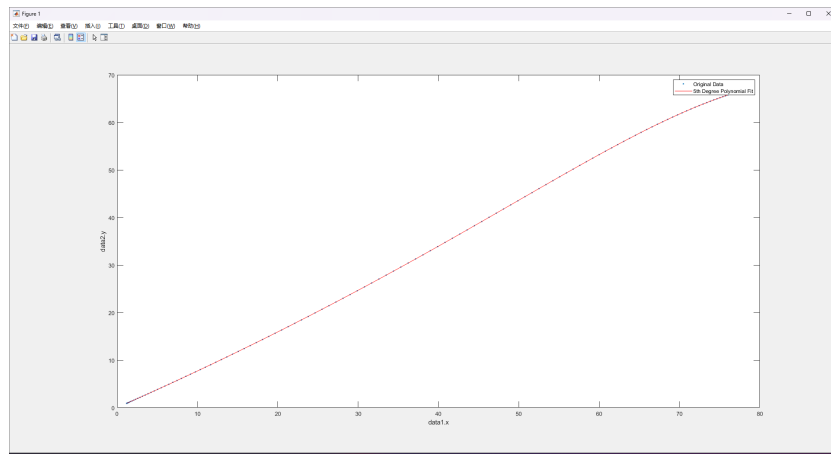
- The angle range of joint 3 is 0° to 75° .
- Motor 3 controls joint 3.
- $M3 = \theta_3 * (4095 / 75)$.

The angle of joint 4 can be approximately considered the same as that of joint 3, and both are controlled together by M3.



3.4.3 Movement relationship between fingertip follower joint and active joint

Thumb



$$y = -1.4264e-08x^5 + 1.5116e-06x^4 + -5.7459e-05x^3 + 0.0035797x^2 + 0.73708x + 0.019328$$

$$p1 = -1.426426e-08$$

$$p2 = 1.511570e-06$$

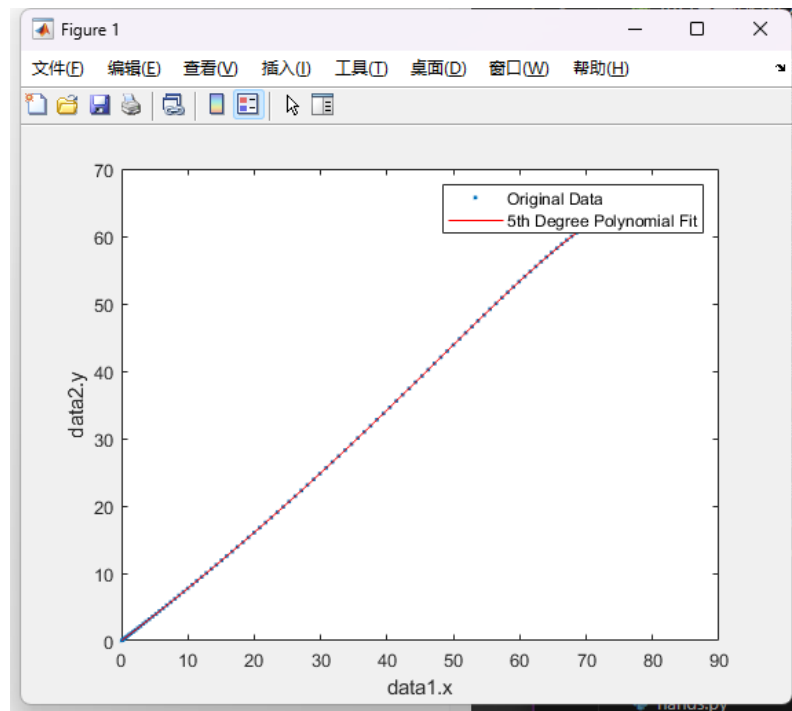
$$p3 = -5.745938e-05$$

$$p4 = 3.579750e-03$$

$$p5 = 7.370831e-01$$

$$p6 = 1.932756e-02$$

Index
finger,
ring
finger



$$y = -1.3309e-08x^5 + 1.2419e-06x^4 + -3.9363e-05x^3 + 0.0031031x^2 + 0.74921x + 0.0047049$$

$$p1 = -1.330914e-08$$

$$p2 = 1.241940e-06$$

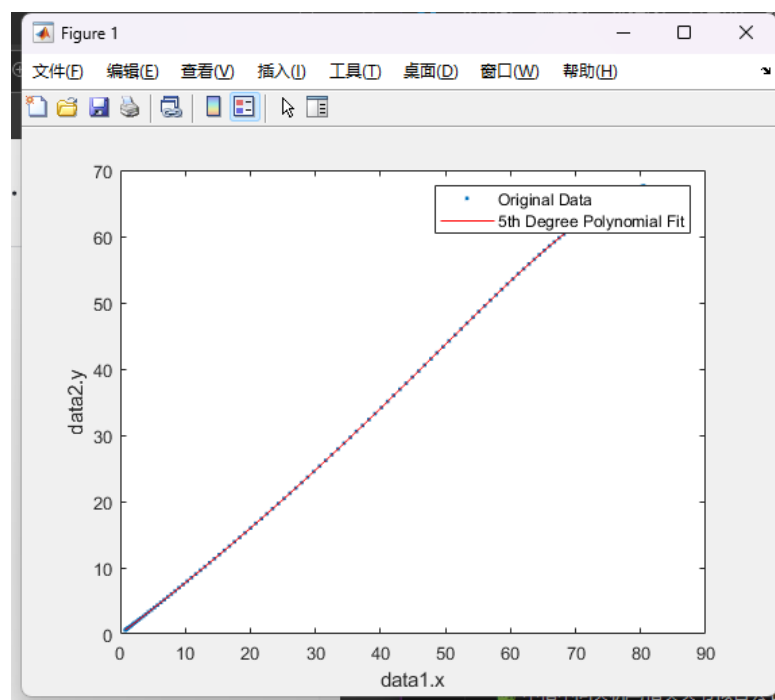
$$p3 = -3.936331e-05$$

$$p4 = 3.103138e-03$$

$$p5 = 7.492099e-01$$

$$p6 = 4.704934e-03$$

middle
finger

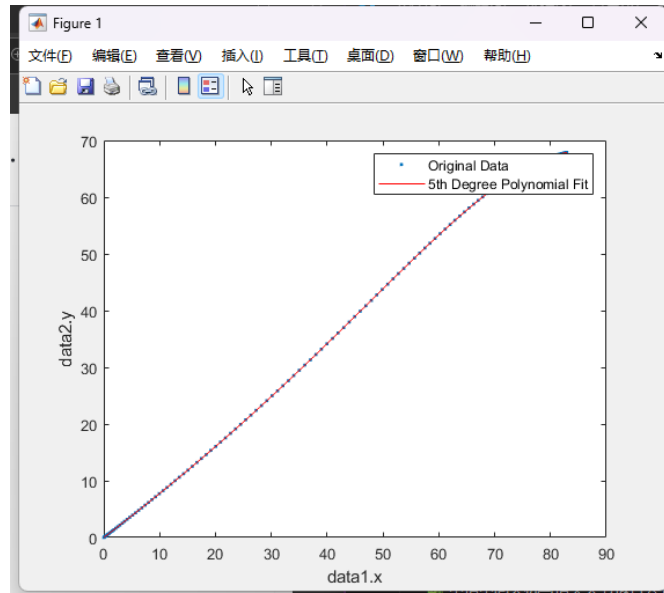


$$y = -1.3667e-08x^5 + 1.3745e-06x^4 + -4.8315e-05x^3 + 0.0033341x^2 + 0.74168x + 0.012076$$

$$p1 = -1.366696e-08$$

p2 = 1.374499e-06
p3 = -4.831522e-05
p4 = 3.334065e-03
p5 = 7.416797e-01
p6 = 1.207550e-02

Little
finger



$y = -1.2037e-08x^5 + 1.0274e-06x^4 + -2.5723e-05x^3 + 0.0027485x^2 + 0.75074x + 0.00087657$
p1 = -1.203748e-08
p2 = 1.027438e-06
p3 = -2.572295e-05
p4 = 2.748458e-03
p5 = 7.507384e-01
p6 = 8.765663e-04

4. Download Resources

4.1 Debugging Tool

[LHandPro 上位机下载页](#) | [LHandPro Host Computer Download Page](#)

4.2 SDK

[LHandProLib SDK下载页](#) | [LHandProLib SDK Download Page](#)

4.3 STEP



DH2116 STEP 20260311.rar

113.44MB



4.4 URDF



DH2116_URDF_Files_2026_3_16.zi

p

16.84MB



4.5 Protocol



Communication_Protocol.xlsx

13.33KB

