# ∧lt-Bi⊛nics

#### **Technical Data Sheet Robotics Hand** Release Version 1.2

January 2025

#### **Product Name:**

Surge

#### **Key Features:**

Lift Capacity of 18 kg / 40 lbs. (Per Hand)
400 ms (180° / sec) Closing Speed
6 Powered Degrees of Freedom (DoF)
Fully Modular Fingers
Manus Glove Compatibility
48V DC Input (43 – 58V Range)
RS485 & CAN Communication
< 1mm Finger Position Repeatability</li>

#### **Product Summary:**

Surge is a 6 DoF robotic hand developed for humanoid and general robotic applications. Surge is equipped with a variety of advanced features that were inspired by human hands and simultaneously designed to overcome their limitations, helping robots better navigate and interact with a world that was built by hands, for hands.

# ∧lt-Bi⊛nics

#### **Modular Finger Overview**



#### **Modularity Benefits:**

- Enhanced Overall Hand Durability
- Motor Health Tracking
- Preventative Maintenance Alerts
- S-Minute Repair Time
- Future-proof design



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#### **Benefits Summary:**

Our **modular design** enables **fast, tool-minimal repairs in under five minutes**, reducing downtime and maintenance costs. Swappable finger modules allow for quick replacements without full-hand disassembly, ensuring continuous operation and extended lifespan. This design enhances efficiency, durability, and long-term reliability, so **your robots spend more time working and less time in repair**.

Replacement fingers can be ordered separately and **overnight shipped anywhere in the U.S.** 

## **∧lt-Bi@nics**

Surge

Mechanical	
Height	7.4"
Width	3.6"
Palm Thickness (Widest)	1.5"
Weight	1.19 lbs. (540g)
Max Grip Force (4 Fingers)	8 lbs.
Minimum Closing Time	0.4 seconds
Single Finger Carrying Strength (Distal)	5 lbs. / finger
Single Finger Carrying Strength (Proximal)	20 lbs. / finger
Palm Carrying Strength	40 lbs.
Thumb Carrying Strength	15 lbs.
Single Finger Max Lateral Strength (at Distal)	15 lbs.
Finger Range of Motion	90°
Thumb Range of Motion	95° Flexion   85° Rotation
Actuator Type	Gear-driven (Non-Overhauling)

#### **Electrical Specifications**

Nominal Input Voltage	48 VDC
Input Voltage Range	43 – 58 VDC
Nominal Input Current	40 mA
Peak Input Current	1.5 A
Electrical Protection	Reverse input, overvoltage, and overcurrent protection
Communication Interface Types	RS485 (115200, No Parity, 1 Stop Bit, Byte size 8)

1. Input voltage source is not isolated from electromechanical system. It is recommended to use an isolated supply.

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### **∧lt-Bi@nics** Surge

#### AT Commands (Current)

Prefix	Command	Postfix	Variable	EOL	Description	Example	Result	Response
AT	+SJA	=	<angle>,<joi NT NUMBER&gt;</joi </angle>	\n\r	SET an angle for joint N	AT+SJA=45,I\n\r	Sets Index to 45°. (See table of Finger codes	OK\n\r
AT	+SPP	=	<pose NUMBER&gt;</pose 	\n\r	SET predefined pose	AT+SPP=0\n\r	Sets hand to pose 0 (See table of grips)	OK\n\r
AT	+SCG	=	<value>,<joi NT NUMBER&gt;</joi </value>	\n\r	SET user defined PID gains	AT+SCG=1,P\n\r	Enables the use of use defined PID gains on the Pinky	OK\n\r
AT	+SCP	=	<value>,<joi NT NUMBER&gt;</joi </value>	\n\r	SET P gain	AT+SCP=10,P\n\r	Sets Pinky P Gain value to 10 (AT+SCG=1\n\r must be sent once first)	OK\n\r
AT	+SCI	=	<value>,<joi NT NUMBER&gt;</joi </value>	\n\r	SETIgain	AT+SCI=10,P\n\r	Sets Pinky I Gain value to 10 (AT+SCG=1\n\r must be sent once first)	OK\n\r
AT	+SCD	=	<value>,<joi NT NUMBER&gt;</joi </value>	\n\r	SET D gain	AT+SCD=10,P\n\r	Sets Pinky D Gain value to 10 (AT+SCG=1\n\r must be sent once first)	OK\n\r
AT	+SCT	=	<value>,<joi NT NUMBER&gt;</joi </value>	\n\r	SET current threshold	AT+SCT=50,M\n\r	Set Middle current threshold to 50% of max current	OK\n\r
AT	+SCE	=	<value.< td=""><td>\n\r</td><td>SET clear error</td><td>AT+SCE=1\n\r</td><td>Clear motor error and release a stuck joint</td><td>OK\n\r</td></value.<>	\n\r	SET clear error	AT+SCE=1\n\r	Clear motor error and release a stuck joint	OK\n\r
AT	+SEF	=	<value></value>	\n\r	SET Command feedback, when set to 0 no response is given to commands. When set to 1, "OK" or "ERROR" response is given	AT+SEF=1\n\r	default is 0	OK\n\r

### **∧lt-Bi@nics** Surge

#### AT Commands (Current) - Continued

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Prefix	Command	Postfix	Variable	EOL	Description	Example	Result	Response
AT	+SMC	=	<value></value>	\n\r	SET control using manus gloves	AT+SMC=1\n\r	Enables hand control using the Manus Glove	OK\n\r
AT	+SSM	=	<value>,<joi NT NUMBER&gt;</joi </value>	\n\r	SET stop command to motor	AT+SCT=1,M\n\r	Stops the middle finger from moving. Use "A" for Joint number to stop ALL joints. Must set to 0 to move again	OK\n\r
AT	+GJA	?	<joint Number&gt;</joint 	\n\r	GET angle for joint N	AT+GJA?M\n\r	Get joint angle of M	49.015\n\r
AT	+GCE	?	<joint Number&gt;</joint 	\n\r	GET error for joint	AT+GCE?P\n\r	Gets pinky error	0x0001\n\r
AT	+RCH	=	<value.< td=""><td>\r\n</td><td>Recalibrate Hand</td><td>AT+RCH=1\n\r</td><td></td><td>OK\n\r</td></value.<>	\r\n	Recalibrate Hand	AT+RCH=1\n\r		OK\n\r

Pose Codes	
Open Grip	0
Power Grip	1
Chuck Grip	2
Fine Pinch Grip	3
Key Grip	4
Hook Grip	5
'Birds Up' Grip	6

Finger Codes					
Index	Ι				
Middle	М				
Ring	R				
Pinky	Р				
Thumb - Flex	Т				
Thumb - Rotation	Х				
-	-				