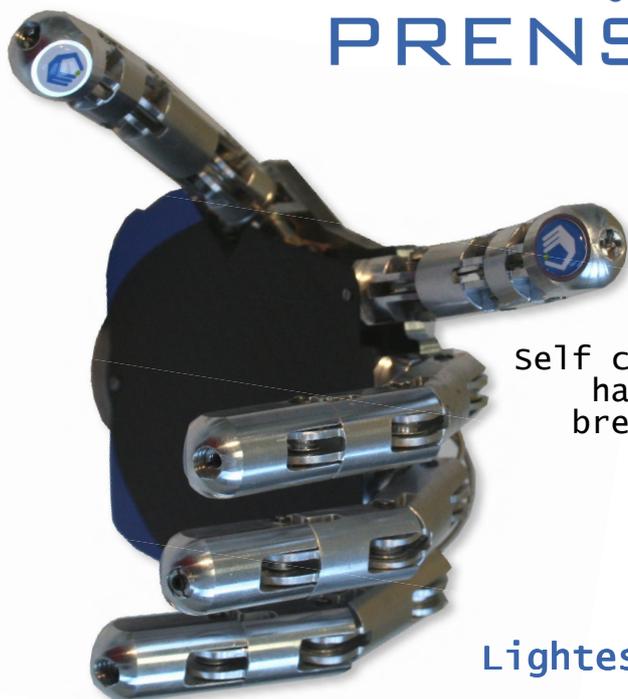




PRENSILIA s.r.l.



Self contained dexterous hand is the tool for breakthrough research

Anthropomorphic
Human sized
Lightest weight: 600gr

IH1 AZZURRA SERIES

Revolutionize your research in a finger snap

The IH1 Azzurra series is a human-sized programmable anthropomorphic hand able to grasp a variety of objects and to sense them through multiple force and position sensors. It is also able to count and press buttons.

The hand is totally self-contained, and weighing less than 600g is among the lightest available for research. It contains a CPU, firmware, sensor acquisition electronics, communication electronics, servo-controllers, and 4 brushed DC motors.

Communicating through a standard interface (RS232 or USB), the hand is ready to be easily integrated with your application within multiple research scenarios ranging from prosthetics, neuroscience, human-robot interaction, rehabilitation, etc..

The IH1 Azzurra series firmware routines allow to perform grasps automatically, by just sending a single byte from your application. Alternatively advanced users may implement completely customized control schemes, taking advantage of the embedded 1 kHz servo-control loops.

Azzurra series is the perfect tool for boosting your revolutionary idea: **are you ready for it?**

Easy: count up to 3

ONE - Customize

Starting from your requirements and field of application Prensilia will manufacture your robotic hand customizing (both software and hardware) it to your needs. Firmware code is also available for research purpose, allowing complete user customization. All of this at rapid delivery and competitive prices!

TWO - Connect

Just plug-in the USB cable to your PC, or use the RS232 connection. Take advantage of the firmware and control functions provided with the Azzurra hand series. Building your application has never been so easy!

THREE - Maintain

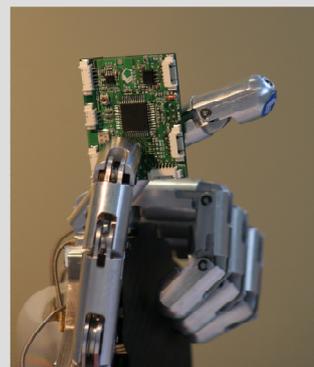
Able to use a screw-driver? The IH1 series target are researchers working in laboratories: whenever needed it will be extremely easy and fast to tune and maintain the hand by means of repeatable calibration procedures. Just a quick break before restarting your experiments!



human-sized



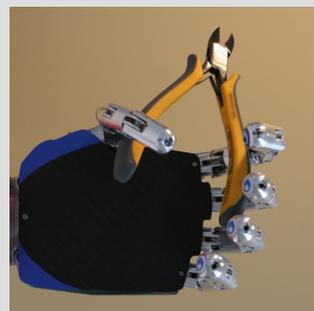
pinch grip



lateral grip



power grip

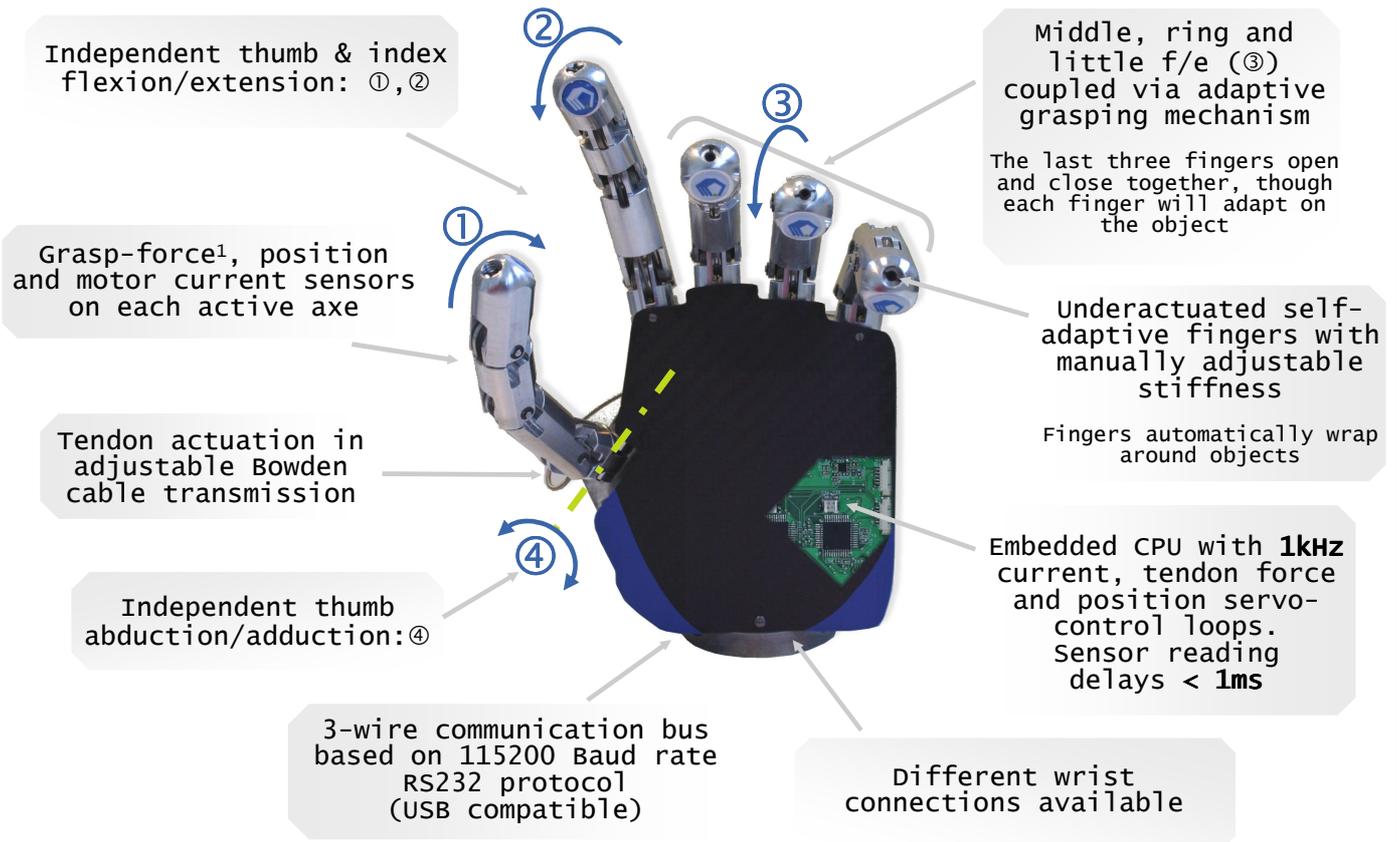


compliant grasps

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DATA SHEET

STD-FEATURES

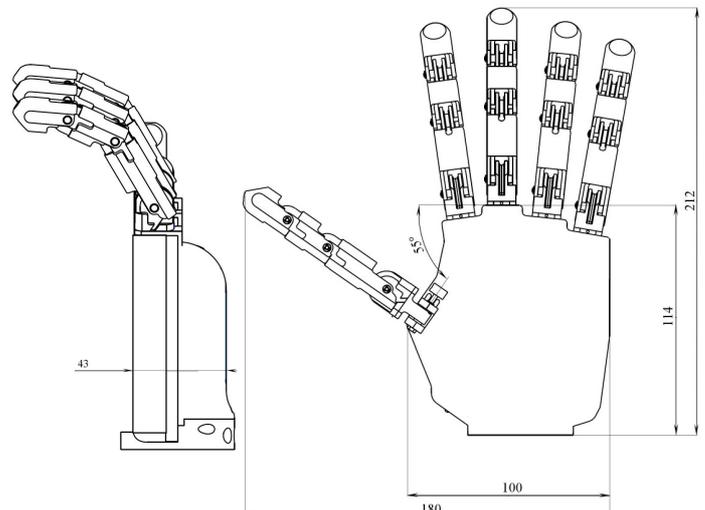


IH1 Specifications

Weight	Fully self-contained hand	580 g
Speed	Full flexion from full extension	1.5 sec
	Full abduction from full adduction	1 sec
Grasp ability	Tendon max active force	40 N
	Cylindrical power grasp ²	35 N
	Lateral grip ²	7 N
	Lifting ²	10 Kg
Kinematics	Total fingers	5
	Opposing fingers	1
	Total degrees of freedom	16
	Total hand motors	4
Range of motion	Coupled fingers	Middle-ring-little
	All joints	90 deg
Actuation	Type	Brushed DC motors with non-back-drivable mechanism (failsafe, object remains secure without power).
	Transmission	Steel tendons (180 N max force) and Bowden cables.
Sensory system	Total force sensors ¹	3
	Total position sensors	4
	Total current sensors	4
	Total limit switch sensors	8
Embedded controller	Implemented control loops	Position, Current, Force (1kHz) for each axe
	Reading delays	< 1ms
	Total preset grasps	10
	Security features	Completely programmable by the non-expert user Logic electronics with fuses; continuous motor over-current monitoring and shut-off.
Communication	Enjoy the plug and play features!	RS232 / USB Plug and play robot: controllable by all kind of PC or microcontroller based devices
	Power requirements	15 V, 2 A (full strength grip)

Sensory System

	Number and location	Type	Max resolution	Notes
Grasp force	3 thumb, index, one on MRL fingers ¹	Analog	180 mN (10 bit)	Detect force applied on the tendon, thus gives an objective measure of the grasping force applied by the hand.
Position	4 (one on each active axe)	Digital encoder	1000 pulses/deg	Digital encoder to monitor the amount of tendon released proportional to the degree of flexion/extension of the fingers. For thumb abduction axis measures the angle abduction.
Motor Current	4 (one on each active axe)	Analog	1 mA (10 bit)	Analog sensors to monitor motor current consumption.
End sensors	8 (two on each active axe)	Digital	-	Detect when motor axes are fully flexed or extended.



[1] Grasp-force sensors consist in micro-load cells measuring the force on the tendons actuating the finger. Three grasp-force sensors are normally included in the IH1 series hand: one for the thumb (flexion/extension), one for the index (f/e) and a third one interchangeable with the middle, ring, and little fingers. Sensor data sheet DS-TS-v01.pdf available online: www.prensilia.com
 [2] Detailed description of the grasp ability measurement set-up in Technical Annex TA-IH1-GM-v01.pdf available online: www.prensilia.com