

REACH
ROBOTICS

Reach Alpha Integration Manual

V6.1

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1 Introduction

This manual is designed help users of the Reach Alpha get familiar with the integration and usage of the system.

Reach Robotics website and Help Centre

Our website, www.reachrobotics.com, holds all our documentation as well as FAQs, knowledge articles, and downloads. You can find some quick links below:

- [Datasheets and manuals](#)
- [FAQs](#)
- [Product theory](#)
- [Software downloads](#)

Reach Robotics contacts

If you can't find what you're looking for on our website or Help Centre, please get in touch with Reach Robotics Support at support@reachrobotics.com. You can also get in touch with us at sales@reachrobotics.com (for all sales enquiries), or info@reachrobotics.com (for any other enquiries).





Feedback

If anything in our manuals, FAQs or knowledge articles is out-of-date, poorly explained, or erroneous, please don't hesitate to let us know. We always appreciate the opportunity to improve our documentation for the benefit of all users.

2 Safety Information

This section describes the necessary safety information and precautions relevant to the setup and operation of the Reach Alpha. To ensure correct and safe use of Reach Robotics products and to avoid injury and damage to property, carefully read this section and make yourself well acquainted with the contents. Follow any warnings and cautions included; these are highlighted by warning triangles and are shown as follows according to the level of danger. In conjunction with this manual, it is important that the users have knowledge of safety considerations and make correct judgments on safety procedures during operation.


2.1 Hazard Classification

 DANGER	Denotes a hazard with a high degree of risk that will result in death or serious injury if not mitigated or avoided.
 WARNING	Denotes a hazard with a medium degree of risk that will result in death or serious injury, or serious damage to the product, if not mitigated or avoided.
 CAUTION	Denotes a hazard with a low degree of risk that will result in moderate or minor injury, or damage to the product, if not mitigated or avoided.
 INFO	Denotes important information about a product or procedure.

2.2 Personal Safety

This section describes the necessary safety information and precautions relevant to the setup and operation of the Reach Alpha manipulator system. To ensure correct and safe use of Reach Robotics manipulators, carefully read this section and make yourself well acquainted with the contents. Follow any warnings and cautions included. In conjunction with this manual, it is important that the users have knowledge of safety considerations and make correct judgments on safety procedures during operation.

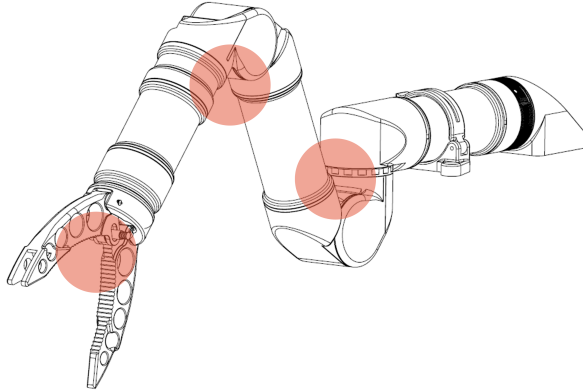
Reach Alpha manipulators are highly dexterous, electromechanical devices that can move with a high degree of freedom. Failure to take necessary safety measures or mishandling due to not following the instructions in this section may result in damage to the robot or injury to personnel.

 WARNING	Do not attempt to open the joints of the Reach Alpha to access any part of the motors or electronics. This will void your warranty and poses a serious health risk due to crushing or electrical shock. It also risks damaging internal components, which will require repair at the Reach Robotics facility.
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WARNING

The Reach Alpha presents multiple crush and/or cut hazards: in the jaws or end-effector, and at any point where two limbs can compress together. When cutter jaws are installed, the operator must ensure that the working area of the manipulator is clear prior to operation.



CAUTION

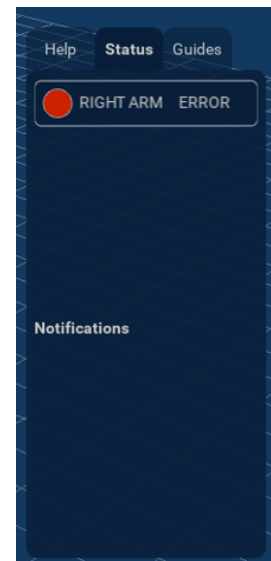
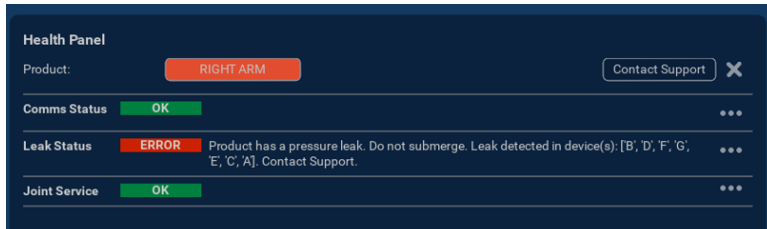
When bench-testing or operating the Reach Alpha in a human environment, it is strongly recommended that the following safety procedures are adhered to:

- Install and operate the unit below head height
- Wear safety goggles when installing or working closely to the manipulator
- Include an easily accessible E-stop button in the power circuit
- Avoid physical interaction with the end-effector or limbs to prevent crush and/or cut hazards
- Install barriers/signage to prevent untrained personnel from entering the manipulator workspace
- Implement stop, speed and separation monitoring and torque limiting to reduce the risk of human contact and injury

2.3 Product Safety

2.3.1 Leak Detection

If there is a breach in the vacuum, an error will be thrown and the Status tab in the Help menu of Reach Control will open. To view more details of the error, click on the product button. This will open the Health Panel.




Click the ellipsis [...] to view more details if required.



2.3.2 Obstacle Setup

Virtual obstacles can be defined within the manipulator workspace to reduce the risk of collision between the Reach Alpha and other equipment. Care should be taken to ensure that any obstacles configured are defined correctly to cover all potential collision points. Configuring obstacles does not completely remove the risk of collision due to factors including joint compliance and excessive control input, so users should take every care to move the manipulator in a way that avoids the real-world obstacles. See the [Reach Control User Manual](#) for more information.



INFO

All Reach Alpha units with 3+ functions are shipped with a pre-configured “floor” obstacle under the base of the manipulator.

2.3.3 Physical Installation

Prior to operation, ensure that the manipulator is firmly secured using the supplied mounting kit, or an alternative solution with the appropriate specifications.



When the manipulator is under load, ensure that the mounting surface is sufficiently stable to avoid unbalancing, which may cause injury to personnel or damage to other equipment.

2.3.4 Operating Environment

The Reach Alpha is intended for in-water operation. The system is designed and tested as partially completed machinery to be integrated into a complete underwater robotic system (please see the included [Declaration of Incorporation](#)). It is possible to use this system in ambient laboratory conditions, however, it should be noted that radiated emissions from this product may not comply with limits imposed by local authorities.



Explosive environments

The Reach Alpha is not ATEX compliant, and is not designed to meet explosion-proof specifications. Do not use the robot and controller in environments containing inflammable gas, gasoline, or solvent. Explosions or fire may otherwise result.



Harmful substances

The Reach Alpha is not designed to operate in areas in which harmful substances as defined in EN 60721 may be encountered, such as oils, acids, gases, vapours or dusts.



The Reach Alpha is specified for operation in water between 5°C-35°C and storage between -10°C-80°C.



The Reach Alpha is depth-rated to operate at the equivalent of 300 MSW (Metres below Sea Level).

2.3.5 Backdriving

“Backdriving” is the action of moving a manipulator’s joints when the unit is unpowered, which can be dangerous to the manipulator.

If the joint does not have a slipping installed (e.g. Axis E), the wires between joints can twist, over time disconnecting from internal connectors and leading to a loss of comms to joints. This will result in an RMA (see [Repairs](#)).

If the joint has an internal hardstop (e.g. Axis B), this can be broken by rotating with excessive force (either by hand or by a controller), which can lead to twisted cables and damage from debris within the joint.

3 Product Overview

The Reach Alpha is the world's smallest, lightest subsea manipulator system intended for precise remote intervention by militaries, service providers, researchers, and other operators. Please discuss your requirements with our [Sales team](#) prior to purchase to ensure that the Reach Alpha is the correct manipulator for you.

The Alpha is a modular robot, available in configurations ranging from a one-function rotate actuator up to a 5-function manipulator. Multiple tooling options are available for the end-effector interface.





It can be controlled using a Reach Robotics Master Arm, a Gamepad or SpaceMouse, or commands sent using the RR Software Development Kit (SDK). For more information, please see the appropriate [manuals](#) for each control method.

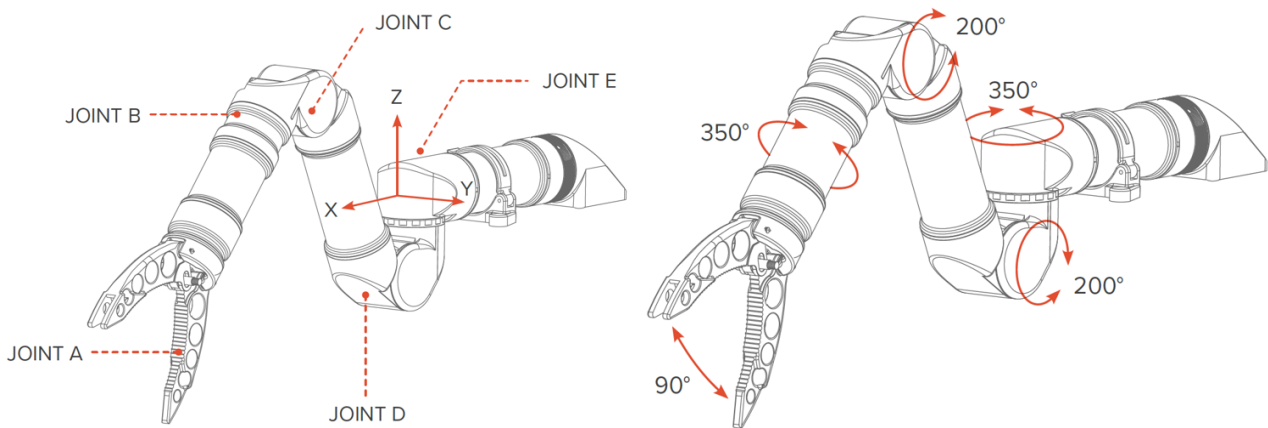
4 Specifications

4.1 Mechanical

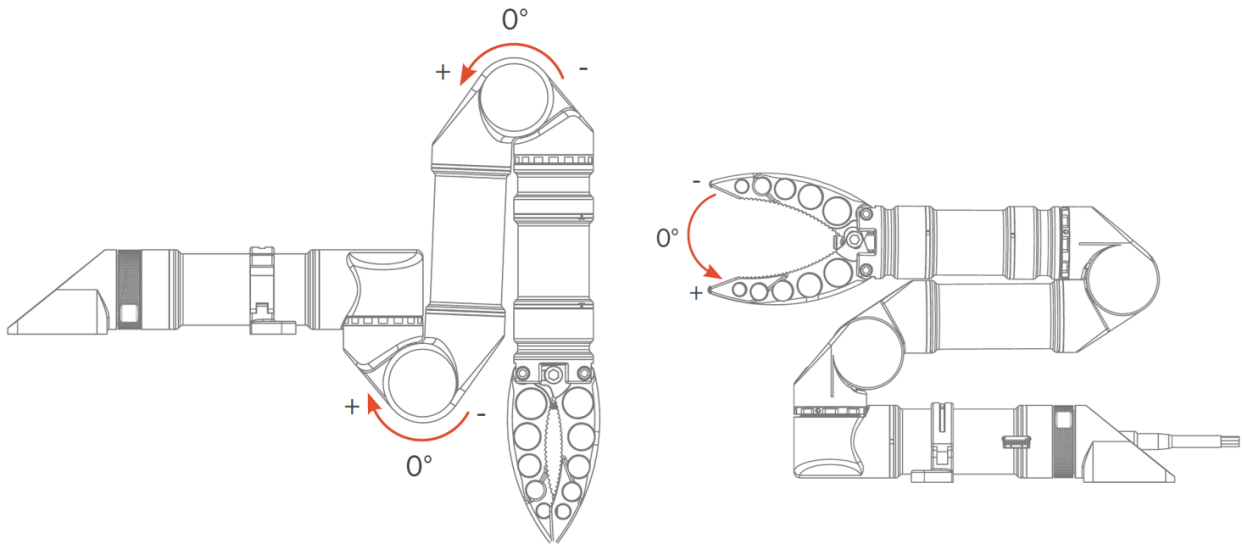
	Alpha 5 RA-5001	Alpha 4 RA-4001	Alpha 3 RA-3001	Alpha 2 RA-2130
<i>Functions</i>	5	4	3	2
<i>Full extension reach</i>	400 mm	400 mm	250 mm	198 mm
<i>Dynamic full-extension lift</i>	2 kg	2 kg	2.5 kg	N/A
<i>Grabber closing force</i>	60 kg (600 N)			
<i>Weight (in air)</i>	1.36 kg	1.15 kg	0.9 kg	0.39 kg
<i>Weight (in water)</i>	0.9 kg	0.8 kg	0.65 kg	0.24 kg
<i>Joint speed (18-30V)</i>	60°/s / 2.5 mm/s			
<i>Joint accuracy</i>	0.1° / 0.1 mm			

	Alpha Grabber RA-1300	Alpha Pan Tilt RA-2140	Alpha Bend RA-1400	Alpha Inline RA-1100
<i>Functions</i>	1	2	1	1
<i>Full extension reach</i>	184 mm	159 mm	145 mm	97 mm
<i>Dynamic full-extension lift</i>	N/A			
<i>Grabber closing force</i>	60 kg (600 N)	N/A		
<i>Weight (in air)</i>	0.28 kg	0.46 kg	0.34 kg	0.24 kg
<i>Weight (in water)</i>	0.15 kg	0.27 kg	0.16 kg	0.14 kg
<i>Joint speed (18-30V)</i>	2.5 mm/s	30°/s (pan) 60°/s (tilt)	30°/s	60°/s
<i>Joint accuracy</i>	0.1° / 0.1 mm			

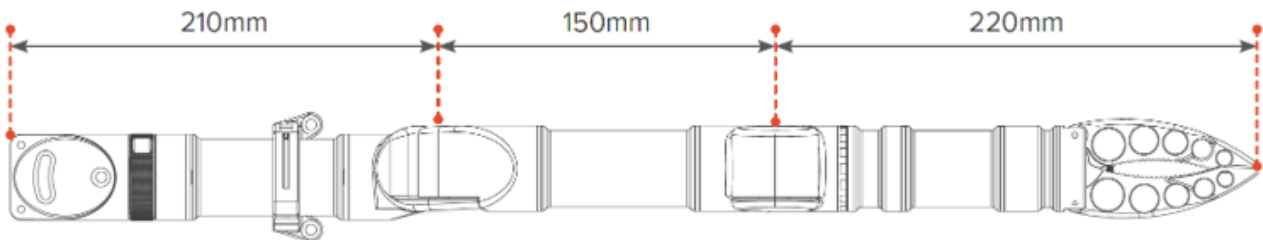
4.1.1 Alpha 5 Mechanics



Alpha 5 – joint designations and rotational capacity



Alpha 5 – Zero Point travel/direction



Alpha 5 - dimensions

4.2 Environmental

	All Alpha manipulators
Operating temperature range	5-35°C (water)
Storage temperature range	-10-80°C (air)
Depth rating	300 MSW
Housing material	AL6061 (Hard Anodised Type III, Class 2)

4.3 Electrical

	Alpha 5 RA-5001	Alpha 4 RA-4001	Alpha 3 RA-3001	Alpha 2 RA-2130
<i>Input voltage</i>	18-30 V DC			
<i>Power (max)</i>	35 W			11 W

	Alpha Grabber RA-1300	Alpha Pan Tilt RA-2140	Alpha Bend RA-1400	Alpha Inline RA-1100
<i>Input voltage</i>	18-30 V DC			
<i>Power (max)</i>	6 W	11 W		6 W

Note: The Reach Alpha series can operate as low as 14V. However, voltages below 18V will result in a decrease in joint speed.

4.4 Communication

	All Alpha manipulators
<i>Interface low-level protocol</i>	RS485 (half-duplex), RS232 (full-duplex)
<i>Baud</i>	115200 bits/s
<i>Word length</i>	8 bits (including parity)
<i>Parity</i>	None
<i>Stop bits</i>	1
<i>Proprietary communication protocol</i>	Reach Robotics Reach System Communication Protocol

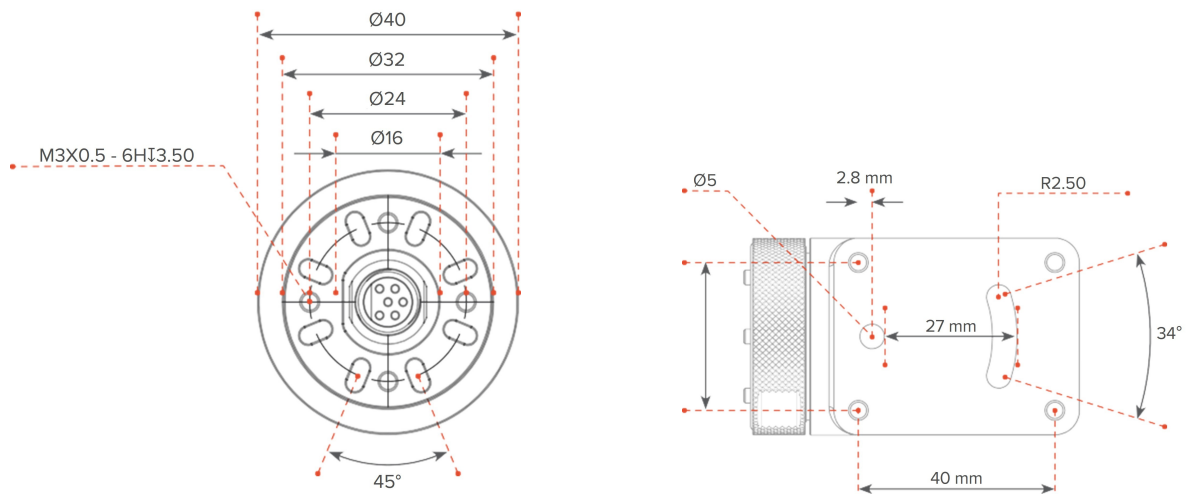
Note: Please contact Sales for access to the Reach System Communication Protocol documentation.

5 Interfacing and Integration

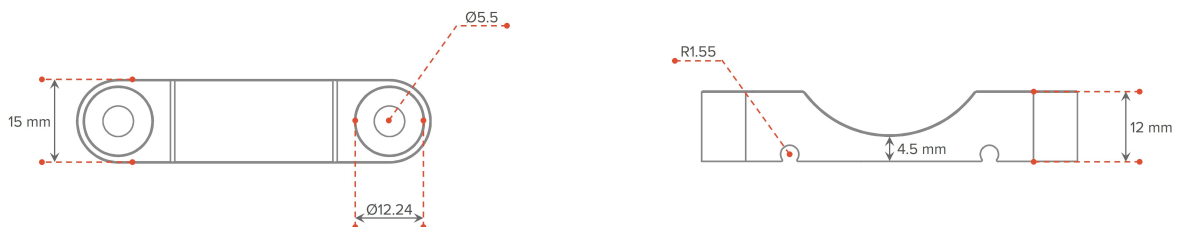
This section covers the mechanical and electrical requirements for integrating the Reach Alpha into a full system. Please contact Support if you require 3D CAD files or any additional information to assist with integration.

5.1 Mechanical

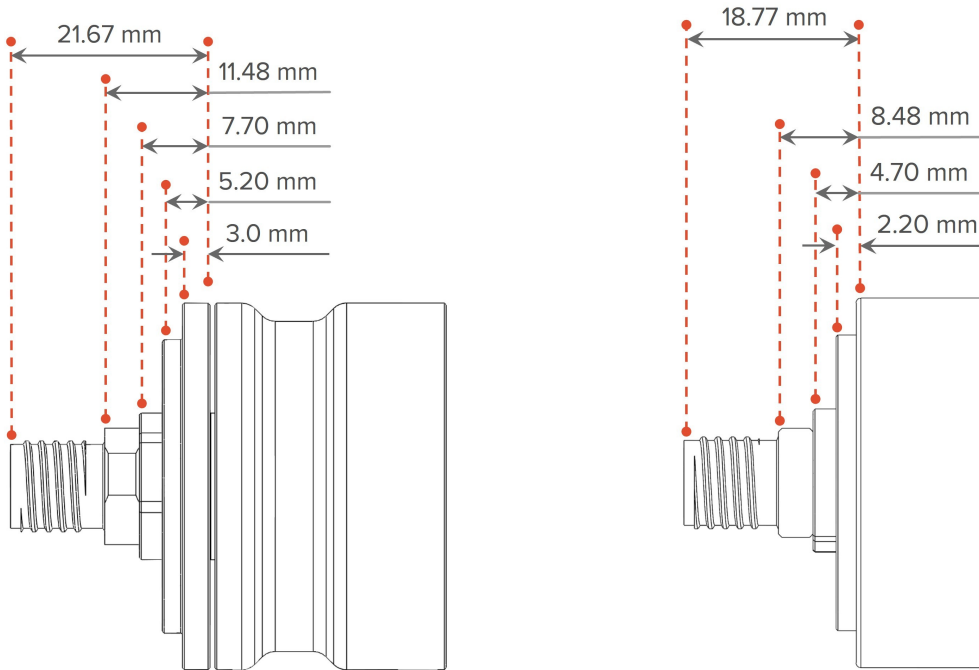
All Alpha manipulators, grabbers and actuators have the same mounting flange which can be attached to a mounting kit for easy installation. The mounting kit is designed to absorb moderate shock to help protect the Alpha from external impact.



Alpha base mounting flange and mounting kit dimensions



Alpha mounting kit brace dimensions



Alpha bulkhead dimensions (Left: RA-2130, RA-2140, RA-1100. Right: RA-5001, RA-4001, RA-3001, RA-1300, RA-1400)



CAUTION

If using a **3-function Reach Alpha**, ensure the unit is mounted so any downward force from lifting or carrying objects is parallel to the bend joint, rather than perpendicular. This will avoid damage to the joint.

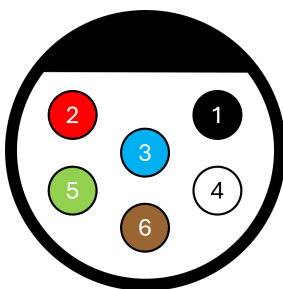
5.2 Electrical



INFO

TX in the table below refers to **data to the vehicle**.
RX in the table below refers to **data from the vehicle**.

Bulkhead connector (IE55-1206-BCR)



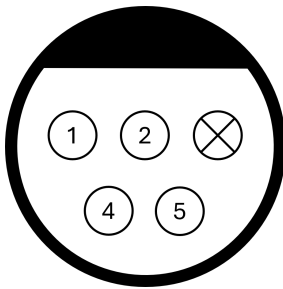
Pin #	Description	Colour
1	GND	Black
2	PWR	Red
3	RS485 A	Blue
4	TX	White
5	RX	Green
6	RS485 B	Brown

Interface cable (supplied): IE55-1206-CCP (6-pin female to unterminated ends, 200cm)

Legacy bulkhead connector

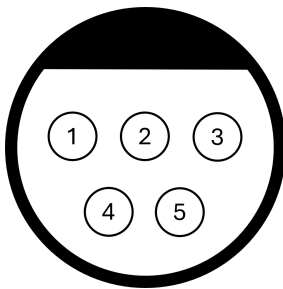
Older Alpha units may have a 5-pin connector instead of a 6-pin connector and will communicate over either RS232 or RS485 as specified at the point of purchase.

RS232 configuration



Pin #	Description
1	GND
2	PWR
3	(not used)
4	RS232 TX
5	RS232 RX

RS485 configuration



Pin #	Description
1	GND
2	PWR
3	RS232 TX
4	RS485 B
5	RS485 A



CAUTION

The wires in the 5-pin cable are **not colour-coded**. All cables white with attached labels denoting their function. Care must be taken to wire the cable correctly into the system.



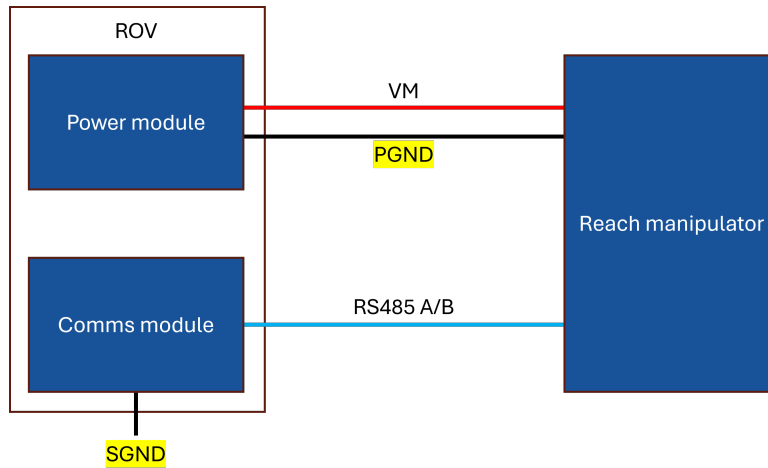
CAUTION

5-pin connectors are not air-tight and can **cause leak warnings to occur** if left uncapped for an extended period of time.

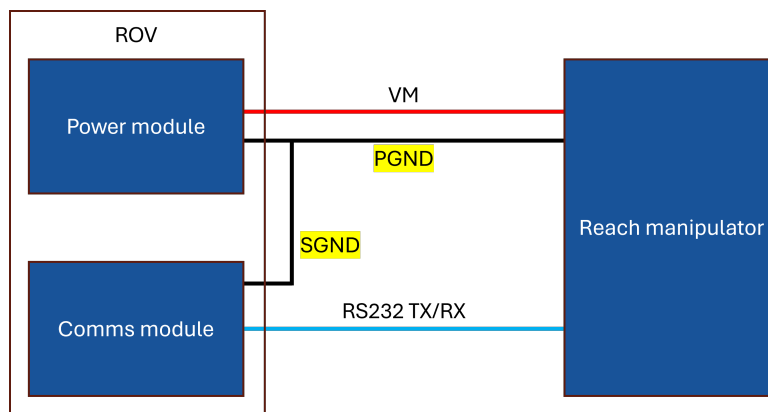
5.2.1 Grounding with Serial Comms

Ensure that the Reach Alpha is grounded correctly when using serial communications to avoid a ground loop, which can introduce interference or damage the device. This is detailed in the diagram below, using a Remotely Operated Vehicle (ROV) power and comms module as an example.

- When using **RS485**, ensure that PGND and SGND in the diagram below have a **maximum voltage difference of +5V or -7V**.



- When using **RS232**, ensure that PGND and SGND in the diagram below are **tied directly together**.



6 Control Options

The Reach Alpha can use serial (RS232 and RS485) for comms, and is commanded either through the Reach Control software, with a physical hand-held controller, or by a custom-built program.

6.1 Reach Control Software

Reach Control provides a graphical means to control each joint of the connected manipulator(s) in position or velocity mode. Each purchase of a Reach Robotics manipulator includes the software, which can be downloaded from [our website](#) along with the Reach Control manual.

6.2 Hand-Held Controllers

The manuals for hand-held controllers can be downloaded from [our website](#).

6.2.1 Master Arm

The Reach Robotics Master Arm system is a topside controller that maps the human operator control inputs to the movement of the manipulator's joints in a corresponding manner. In this way, the Master Arm controller allows the manipulator to "mimic" the movement of the operator.

6.2.2 Third-Party Controllers

Reach Control includes support for several third-party controllers. Only one of each type of third-party controller can be used at one time, for example a gamepad and a keyboard, but not two SpaceMice.

A simple HID **gamepad** (Reach Robotics supplied or BYO) can be used in conjunction with Reach Control. The gamepad control inputs can be customised and mapped to the different functions and joints of the manipulator. The gamepad can be used to control the manipulator in joint velocity, or end-effector Cartesian (XYZ) mode.

For controlling the manipulator in end-effector Cartesian (XYZ) mode, a **SpaceMouse** can also be used. This translates 3D motion on the controller into kinematic control of the manipulator end-effector relative to its current position.

For simple joint control a standard computer **keyboard** can have keys mapped to certain commands.

6.2.3 Custom-Built Programs

Reach Robotics can provide a Software Development Kit and Communication Protocol to aid in creating custom software for communicating with Reach products. Please contact our [Sales team](#) for more details.

7 Bench Setup and Acceptance Test

7.1 Bench Test

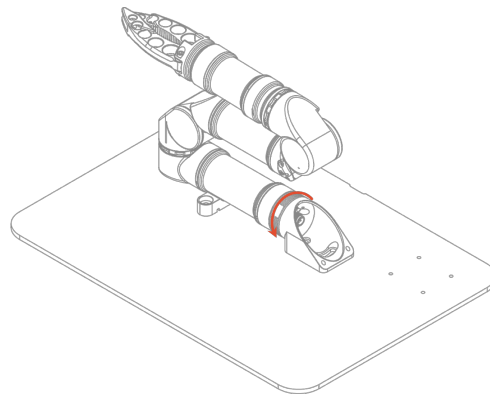
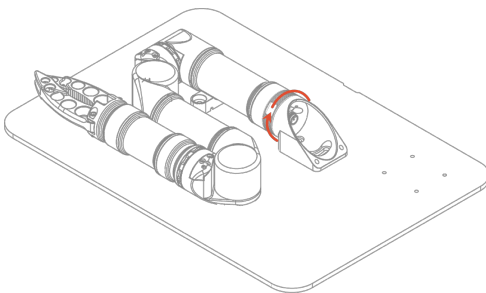
Prior to vehicle integration activities, a bench level test is recommended. This builds familiarity from the ground up and assists with product acceptance. The following procedure walks you through the bench setup procedure.

You will need:

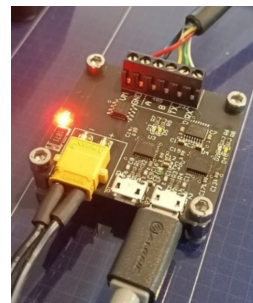
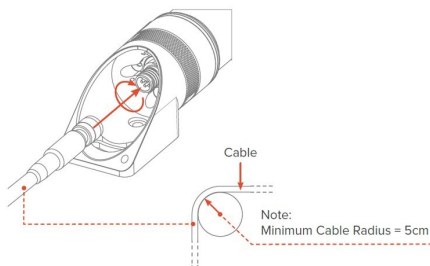
- Reach Alpha Product
- Supplied testing setup
 - Break-out board (BOB)
 - 24V power supply
 - Reach Alpha comms/power cable
 - USB-MicroUSB cable
- Reach Control software
- PC/laptop running Windows

7.1.1 Physical Interfacing

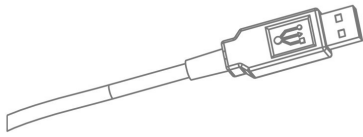
1. Remove the manipulator and stand from the transport case and place on the bench. Loosen the mount locking nut, rotate the manipulator 90° to the upright position, align the pins and re-tighten.



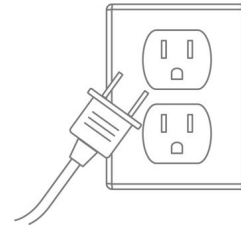
2. Connect the Impulse Connector to the base of the manipulator.
3. Plug the micro-USB into the BOB and attach the power supply.



4. Plug the USB into the PC/laptop.



5. Turn on the power at the wall socket. The red LED on the BOB will illuminate.

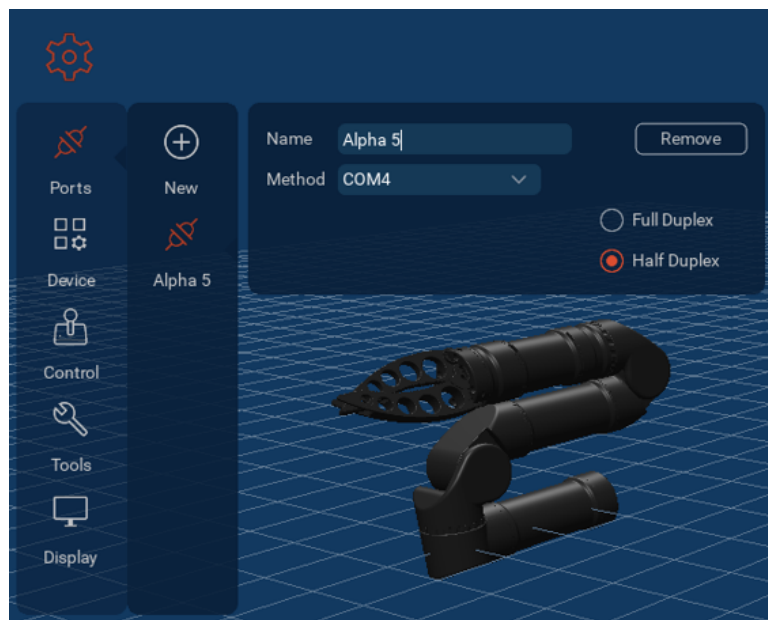


This completes the mechanical setup procedure.

7.1.2 Software Interfacing

You can download the Reach Control software for Windows or Linux from [our website](#); if you have any questions, please contact [Reach Robotics Support](#). You can also download the Reach Control manual from [our website](#) for more information on how to use the software.


1. Install Reach Control on your PC/laptop.
2. In the software, go to Settings (cog icon) > Ports > Add. Click the new port that has appeared, and name it as required. Select the COM port that the arm is communicating on, and the duplex option you require: Full Duplex for RS232, Half Duplex for RS485.



- Go to Settings > Device > RIGHT ARM. This is the default device that appears with each fresh install of Reach Control, and can be deleted or edited. Select the name of the port you just created, then select the type of manipulator you have connected.



- If the Alpha is set up correctly, the 3D model will update to reflect the physical position of the manipulator.


INFO

You can navigate the 3D model view using the following mouse operations:

Left-click + drag: rotate view **Scroll wheel:** zoom

Right-click + drag: translate view

This completes the software setup procedure.

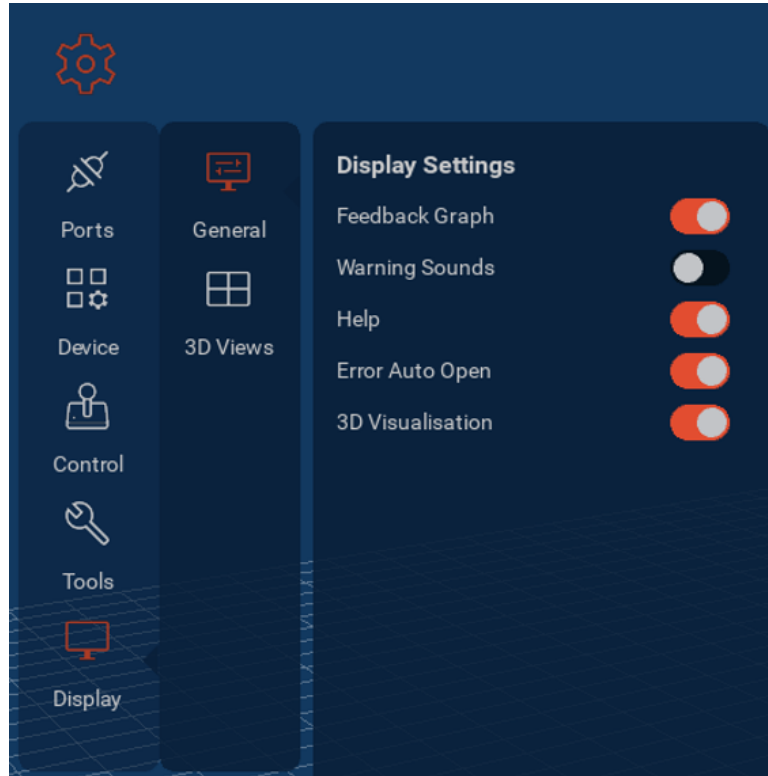
7.2 Acceptance Tests

7.2.1 Range of Motion Test

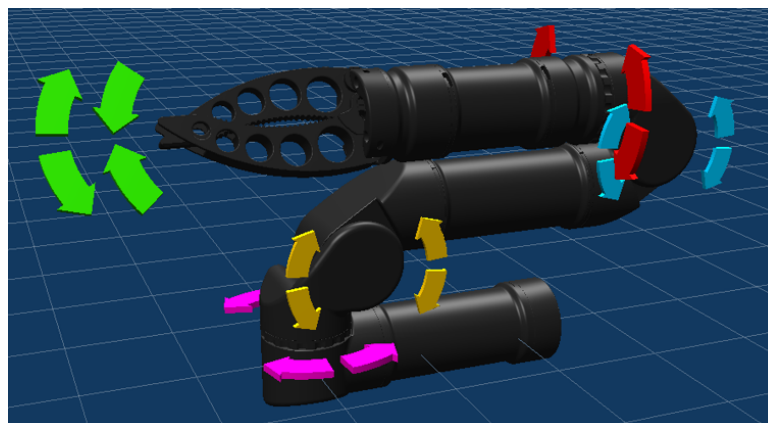
- On the control panel in the bottom right of Reach Control, click the Velocity button. Directional arrows will appear on the 3D model.



- Go to Settings > Display > General and toggle Feedback Graph. The monitoring panel will open at the bottom of the screen. Left-clicking on any of the graphs will bring up the numeric values for each joint.



- Making sure it is safe to do so**, use the directional arrows on the 3D model of the arm to rotate each joint.



4. Move each joint for a few seconds in each direction. Ensure the movement is as expected and corresponds to the control input, and that the 3D model updates accordingly.



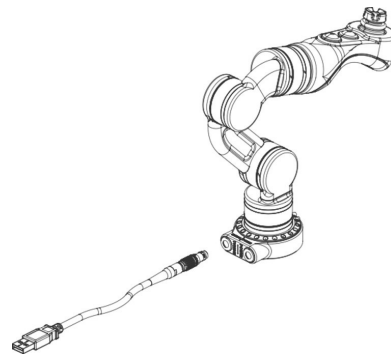
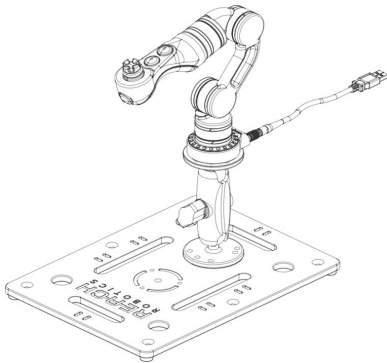
INFO

All Alpha products above 3-functions are shipped with a virtual obstacle to prevent collision with the “floor” beneath the base of the manipulator. For information on how to add, remove and edit obstacles, download the [Reach Control manual](#).

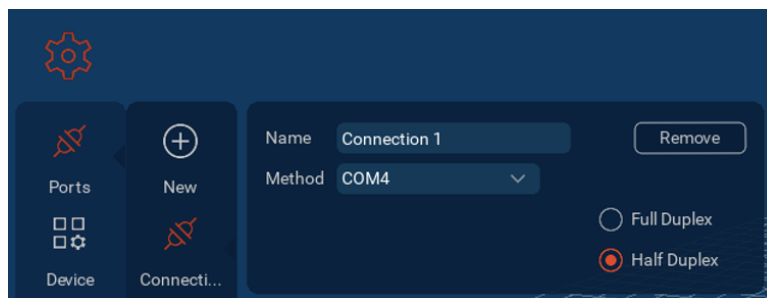
This completes the range of motion test.

7.2.2 Master Arm Test

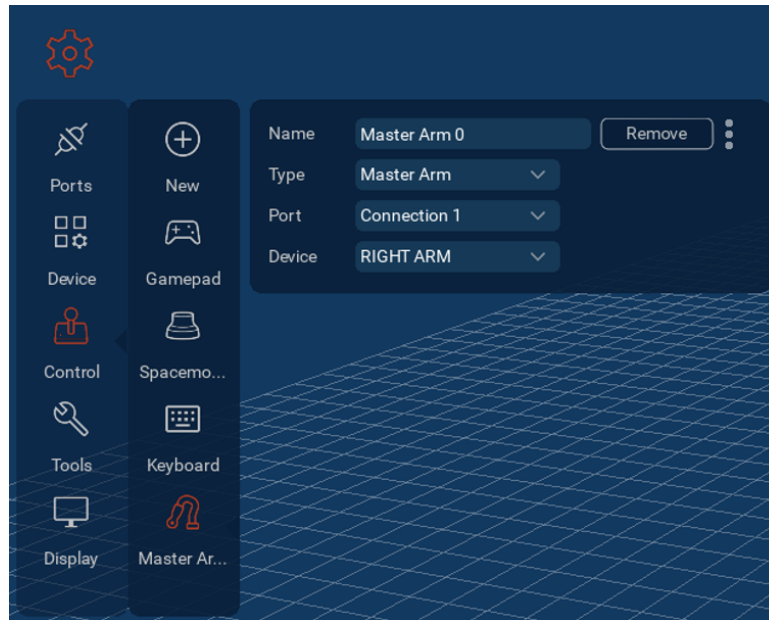
1. Secure the Master Arm mount to the metal stand provided, then attach the Master Arm to the mount using the ¼-20 UNC camera tripod thread in the base.
2. Plug the LEMO connector into the base of the Master Arm and connect the cable to the computer via the USB connector. Once powered, the Master Arm buttons will flash blue.



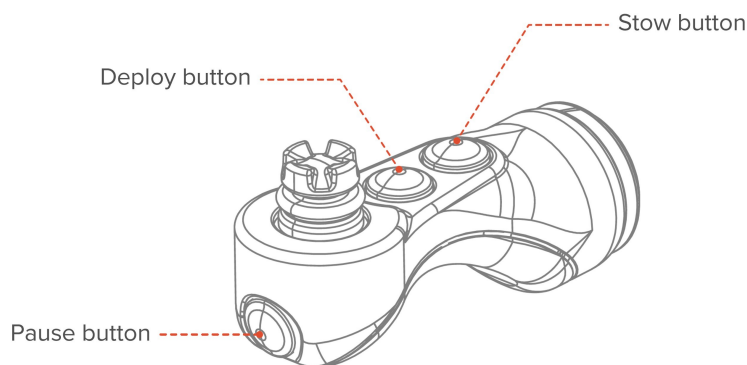
3. In Reach Control, go to Settings > Ports > Add. Click the new port and give it a suitable name. Select the correct COM port and ensure Half Duplex is selected.



4. Go to Settings > Control and select the existing Master Arm controller (add a new controller if one doesn't already exist). Select the correct product type and the port just created, then select the device you wish to control with the Master Arm.



5. The Master Arm is now ready to control the manipulator. **Making sure it is safe to do so**, press the Master Arm pause button to activate the controller. The flashing blue lights will become solid. Double press the pause button to deactivate.

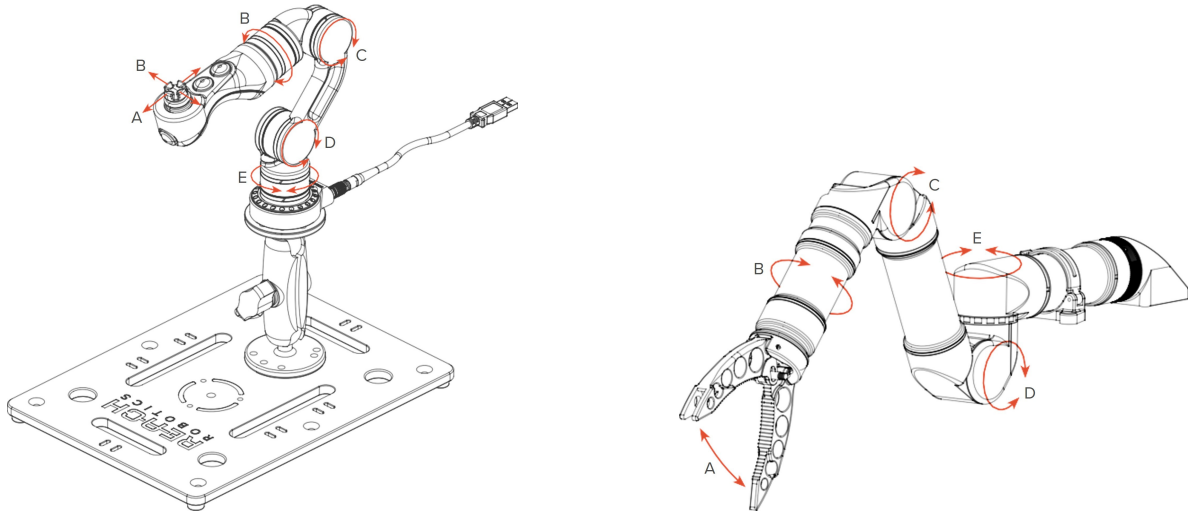


6. Move each Master Arm joint through its full range of motion. Check that:
 - a. The corresponding joint on the manipulator responds.
 - b. The joint moves in the correct direction.
 - c. The motion of controller to manipulator is a 1-to-1 ratio.
 - d. The motion is smooth and complete.



INFO

The B or “wrist” joint can be controlled by either the joystick or the rotate function of the Master Arm handle. See the [Reach Control manual](#) for more information.



7. Press and hold the **Stow** button, and ensure the arm stows completely. Release the button to stop the movement. Repeat for the **Deploy** button.
8. Whilst moving the arm, press and hold the **Pause** button, and ensure that the arm stops responding while the button is held down. Releasing the button will engage movement again.

This completes the Master Arm test.

8 Maintenance

Preventative maintenance is strongly recommended to keep your manipulator functioning as intended and to avoid unscheduled downtime and expensive repairs. Follow the steps in this section to prolong the life of your manipulator.

It is also recommended to conduct a regular [Acceptance Test](#) to check all joints for abnormal behaviour.

8.1 General Product Care

Reach Robotics products are intended for use in water or air. Other fluids may have an adverse effect on the materials used in their production.

Cleaning

- Units should be cleaned thoroughly after every deployment, dry or wet.
- After immersion in salt-water, wash units in fresh water to prevent salt deposits and corrosion.

- After immersion in water with high suspended sediment, or if the unit has come into prolonged contact with the seafloor, ensure all debris is removed from the unit, focusing particularly on joint closures and moving parts to preserve sealing surfaces.
- Do not use harsh chemicals to clean any Reach Robotics products.

Replacements

- If your unit has sacrificial zinc anodes, these should be replaced when corroded.

Connector care

- Keep connectors protected at all times when not in use.
- Do not expose connectors to heat or direct sunlight for extended periods.
- Regularly check connector pins for signs of damage or corrosion.
- Ensure female connectors are free of debris – flush with compressed air if necessary.
- Apply silicon grease to both male and female connectors prior to every mating – ensure female connector sockets are greased to 1/10-1/3 of socket depth.

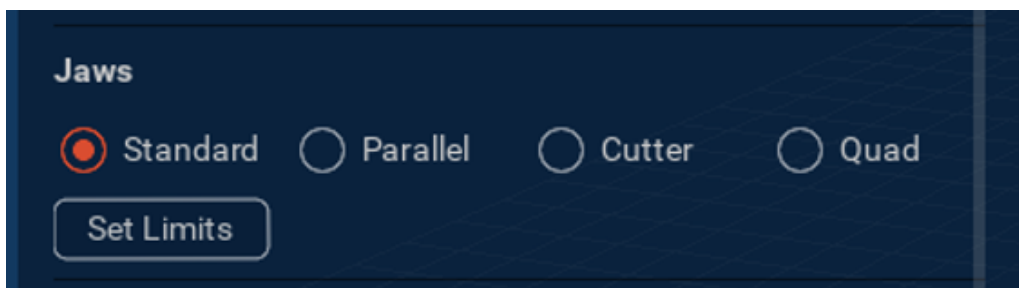
Cable care

- Avoid exceeding the minimum bend radius.
- When de-mating connectors, pull the connector rather than the cable to remove it.
- Consider strain relief methods if using externally powered tools at the end-effector of the unit.

8.2 Changing Jaws

Whenever you change between jaw types on a Reach Robotics manipulator, you must “zero” the jaws in Reach Control. This is because each jaw type has a different range of motion, and so must be calibrated in the control software prior to use to ensure correct functionality.

After physically changing the jaws, expand the Device panel in Reach Control and select the check box next to the desired jaw type. The jaws will update in the visualisation.



Click the **Set Limits** button to start the calibration. The jaws will open and close automatically to find the correct range of motion and position limits.



The jaws represent a **crush/cut hazard**. Ensure that there is nothing between the jaws and all personnel keep clear while the manipulator runs the autocalibration sequence.

CAUTION

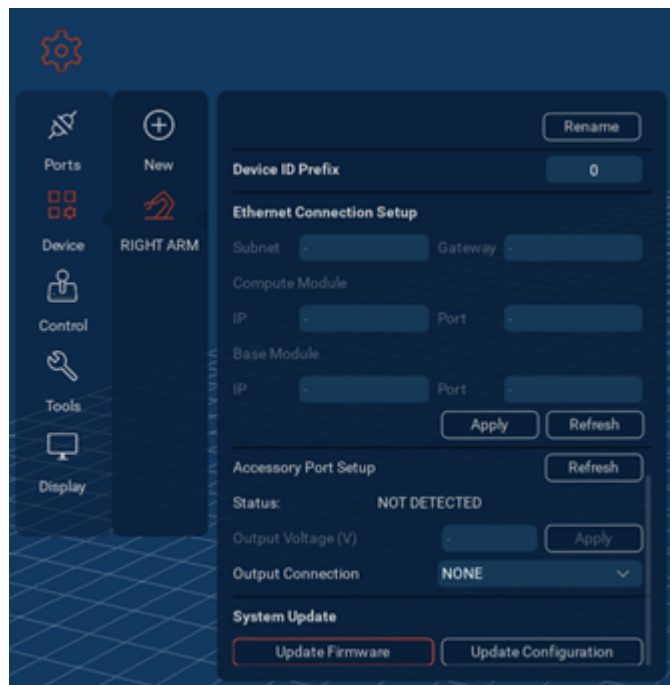
The feedback will display **Complete** once the autocalibration as run successfully.



8.3 Firmware Updates

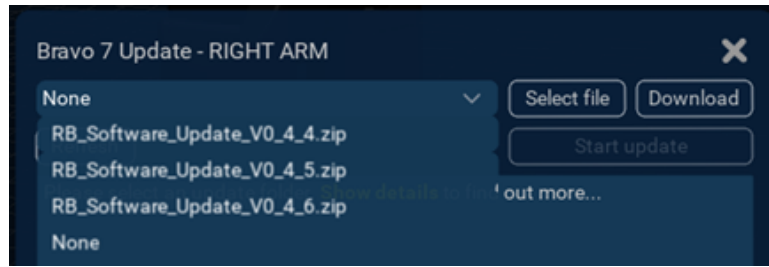
We recommend regularly checking for firmware updates using Reach Control to gain access to upgrades and bug fixes.

With the manipulator is connected, go to Settings > Device > RIGHT ARM, click the ellipsis [...] in the top right corner to expand the panel, then scroll down to “Update Firmware”.



There are three ways to update the firmware from the panel that opens:

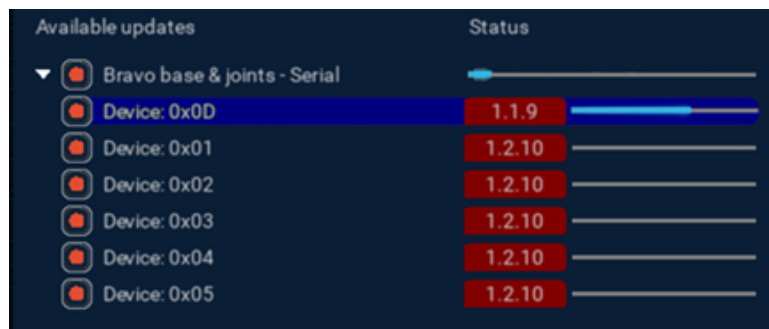
- Click “Download” to retrieve the latest software from the Reach Robotics server. Your PC must be connected to the internet.
- Click “Select file” to choose a .zip file containing the firmware you want to upload.
- Select an existing .zip file from the drop-down menu.



Once you have selected the correct firmware file, ensure that all the joints are selected under the available updates.



Click “Start update”. **Do not disconnect the manipulator during the update.** The joints will now update one-by-one.



When all the joints have updated and you get a success message, you can close the Firmware Update panel.

8.3.1 Firmware Update Errors

When updating the firmware, you may encounter the following errors:

Error/warning message	Solution
Error: Connections of type [...] are not supported.	The device port has not been selected. Check that the connection is secure and try again.
Error: Bad zip file.	The .zip file selected is empty or corrupted. Download again or contact Support for assistance.

<p>Error: Unable to get software version from device 0x1, 0x2, 0x3, 0x4,...</p>	<p>Check that the device is powered. If the device is powered correctly, contact Support for assistance.</p>
<p>Error: Unable to Update. Select Refresh to try again.</p>	<p>The update cannot go through. Click Refresh to try again. If unsuccessful, contact Support.</p>
<p>Warning: No valid software files found.</p>	<p>The .zip file selected doesn't have valid software files inside it. Check that the file is complete and uncorrupted.</p>

8.4 Repairs

If your Reach Robotics equipment becomes damaged or faulty, it may need to be returned to Reach Robotics for investigation and repair under a **Return Merchandise Authorisation (RMA)**. Only a Reach Robotics engineer may authorise a return to our factory; the requirement may be determined through a phone call, email, or video call/remote access to the unit. If you suspect that an RMA may be required, please fill in this form and someone from Support will be in touch: [Request an RMA](#)

RMA Process

1. Reach Robotics Support will request details of the issue to determine whether a return is necessary.
2. If so, an RMA Number (RMAXXX-YYMMDD) will be issued to you, and the Reach Robotics engineer will request shipping details so we can organise a pickup of the equipment. **Do not send the equipment prior to being issued an RMA Number.**
3. The equipment will be shipped to Reach Robotics Headquarters in Sydney, Australia (see Notes).
4. Our Production team will conduct an initial investigation on the unit, based on the information provided. This will take an estimated 1-2 weeks. Any delays due to the complexity of the problem will be communicated to you.
5. After the initial investigation, Reach Robotics Support will contact you with the findings of our Production team. If the unit is not under warranty, a quote for the investigation, repair work and shipping costs will be included. If the unit is under warranty, you will be notified, and the repairs will be carried out free of charge.
6. To authorise a non-warranty repair, send a PO for the work to Reach Robotics Support (see Notes). Once this is received, the repair work will start, and our Accounts team will send an invoice to you.
7. Typical repair times vary post-investigation, and the exact length of time required for the repair will depend on the product being repaired, the complexity of the repair, and the availability of spare parts.
8. Any delays to the expected shipping date will be communicated to you. Priority service may be possible; please discuss this with your usual Reach Robotics Sales Engineer.
9. When the repair is completed, our Warehouse Manager will organise returning shipping and contact you with a ship date and tracking information (see Notes).



Health and Safety

- Any unit returned to Reach Robotics must be safe for our staff to handle and cleaned thoroughly to comply with Australian biosecurity regulations.

CAUTION

We require you to declare if the unit may be contaminated. If the unit has been in contact with any contamination, you must provide proof that the unit is safe to handle.

- Possible contamination sources include nuclear radiation, sewage, hazardous chemicals, biowaste, marine/freshwater life, or soil/mud.
- Reach Robotics reserves the right to refuse to handle any contaminated goods and return them to you at your own expense.

Notes

- Standard Warranty of 1-year from date received is provided on all new Reach Robotics Products. There is no warranty extension for units following an RMA unless extended warranty has been purchased prior to the RMA being raised.
- An investigation fee is chargeable on all non-warranty RMAs. This is payable even if you choose not to have your unit repaired.
- If the nature of the repair is such that you feel it is uneconomical to carry out the work, a discount on a new unit may be possible; please discuss this with your usual Reach Robotics Sales Engineer. This remains at Reach Robotics' discretion, and no discount is guaranteed.
- All RMAs are shipped EXW. Any insurance desired by the customer is the customer's responsibility and Reach Robotics can take no responsibility for shipment losses or damages.
- If you do not make a decision regarding repairing, replacing, or scrapping your RMA within 12 months of its arrival at Reach Robotics, we reserve the right to charge storage fees on a weekly basis dependent on RMA unit type.

9 Declaration of Incorporation

See the following page for the Reach Alpha Declaration of Incorporation.

EU DECLARATION OF INCORPORATION

We, Blueprint Lab of 3 Applebee St, St Peters, NSW 2044, Australia, declare under sole responsibility that the product:

Product Code: RS1-xxxx

Product Name: Reach Alpha (previously "Reach System 1" or "Reach 5 Mini")

To which this declaration relates is in conformity with the following directives and standards.

Directives this product complies with:

Machinery Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)

EMC Directive 2014/30/EU of Official Journal of the European Union L 96/79, 29 March 2014, and repealed Directive 2004/108/EC as from 20 April 2016.

Harmonised Standard applied in order to verify compliance with Directives:

EN ISO12100 (2015) Safety of machinery: General principles of design, risk assessment and risk reduction

IEC60204-1 (2016) Safety of machinery: Electrical equipment of machines - Part 1: General requirements

EN61000-6-2 Electromagnetic compatibility (EMC): Part 6-2: Generic standards; Immunity for industrial environments

EN61000-6-4 Electromagnetic compatibility (EMC): Part 6-4: Generic standards; Emission standard for industrial environments

Signed for and on behalf of Blueprint Lab by:



Anders Ridley-Smith
Business Development Manager
Australia
11 Mar 20

10 Revision History

Version	Date	Author	Notes
V0.1 - V1.5	17/06/2018 - 25/03/2019	Paul Phillips	Initial version Added Layout and updated Specs Updated Reach 5 Mini Hook-up, Added DH parameters Changed order of steps Updated quick start for new Reach Control Updated pinout for V2 Whips
V1.6	29/04/2019	Shaun Barlow	Added Firmware Update
V1.7	20/05/2019	Paul Phillips	Added Maintenance Section
V1.8	21/06/2019	Mark Sproule	Reformatted
V1.9 – V1.10	03/07/2019 - 04/07/2019	Shaun Barlow	Added Master Arm Controller 1:1 section Master Arm Controller info moved to separate manual
V1.11 - V1.14	17/01/2020 - 17/04/2020	Jean-Luc Stevens	Updated for Reach Control V2.1.0 Reach Control V2.2.0 update. Changes made to product defined names, and Spacemouse/XBox controller widget changes. Added Config Upload tool and updated Firmware Update Local tool. Ability to select product, Alpha Dual Bend control added, 3D RS1 installation widget added.
V1.15 – V1.17	02/09/2022	James Spinks	Reformatting, single/dual function control, 3D model control, Reach Control updates Layout changes Update to Reach Robotics branding, updated images
V4.0 – V5.0	09/01/2023 - 29/03/2023	Ellie Best	Minor text updates, image updates Updated pinout for whip
V6.0	04/12/2024	Ellie Best	Updated layout for consistency Included servicing information Serial grounding instructions Safety information Legacy pinout information
V6.1	09/05/2025	Ellie Best	Specification corrections RMA policy update Declaration of Incorporation