FORCE 80
Robotic Nozzle System

Generic Installation and Setup Manual

UNIFIRE

INTRODUCTION TO THIS MANUAL

UNIFIRE FORCE 80 SYSTEM

This installation and setup manual is intended to provide generic guidance for installation and commissioning of the UNIFIRE FORCE 80 system, including the TARGA Robotic Nozzle PLC and the Ammolite User Interface,

Your system is delivered with user specific functions that may be different than what is described in this manual. Therefore, it is important that you reference the order-specific documents provided with the delivery.

This can include custom I/O. terminal socket specification, M12 pin-specifications and special customer specific software.

UNIFIRE CONTACT DETAILS

For further info please see Unifire Robotic Nozzle catalogue

And visit our websites at

www.unifire.com

and our YouTube channel at

www.youtube.com/unifireab

Also refer to the system specific documentation.
If you have any doubts or questions, please contact Unifire by email at **support@unifire.com**

Acronym definitions

Table 1 defines the acronyms in the user manual.

TABLE 1: ACRONYM DEFINITIONS

Acronym	Definition
AFS	Autonomous fire suppression
AHJ	Authority having jurisdiction
DSP	Digital signal processor
dm	Decimeter
ft	Foot (or Feet)
FACP	Fire alarm control panel
HR	Horizontal range
IR	Infrared
kg	Kilogram
lb (lbs)	Pound(s)
m	Meter
mm	Millimeter
Lpm	Liters per minute
PLC	Programmable logic controller
VDC	Volts of direct current

WARNINGS

Read the warnings

⚠️ **WARNING**	**READ THIS INSTRUCTION MANUAL IN ITS ENTIRETY PRIOR TO INSTALLING, MAINTAINING OR OPERATING THE UNIFIRE FORCE ROBOTIC NOZZLE** (a.k.a. ”robotic nozzle” or “water cannon” or “fire monitor”)**.** Failure by any installer, maintenance personnel or operator to receive proper training, including reading and understanding this manual, prior to its use constitutes misuse of the equipment and could result in serious bodily injury or death and/or damage to the robotic nozzle or other property. Only qualified and trained professionals who are familiar with this equipment and general safety procedures may operate the Force robotic nozzle. The purpose of this Manual is to provide all users, installers, and maintenance personnel with the relevant information concerning the design, proper use, installation and maintenance of the equipment and should be read and made available to all such persons. This Manual will help prevent danger and injury to you and others. If you would like further copies of this manual, ask Unifire or download it at www.unifire.com. If you have any questions relating to this equipment and its safe use please contact Unifire prior to use at: support@unifire.com
⚠️ **WARNING**	**DO NOT ATTEMPT TO MODIFY THIS EQUIPMENT IN ANY WAY.** Modification of the equipment may result in damage to, or malfunction of, the equipment, which could lead to serious injury of the operator and/or others. Internal inspection, maintenance and repairs should only be performed by, or under the specific, express authority of Unifire AB.
⚠️ **WARNING**	**NEVER POINT THE FORCE 80 OR ANY ROBOTIC NOZZLE DIRECTLY AT HUMANS WHILE WATER IS SPRAYING THROUGH IT,** as doing so can result in serious injury or possibly death. The FORCE 80 is capable of directing flows of up to approximately 5500 liters per minute (1450 gallons per minute) at pressures of up to 12 bars (175 psi) and has a maximum throwing range of up to approximately 85 meters (90 yards). Such forces are very dangerous and capable of producing serious injury or death to persons and serious damage to property. They are also capable of throwing objects with extreme force and velocity into other objects or persons. Accordingly, only professional, trained firefighters or other qualified individuals may operate this equipment after being thoroughly familiar with the Manual, and always by exercising extreme caution to avoid hitting people or lose objects with the water (or other fluid) stream.
⚠️ **WARNING**	**BE SURE THAT THE ROBOTIC NOZZLE IS TIGHTLY AND PROPERLY SECURED AT ALL TIMES DURING OPERATION!** Serious injury or death can occur if the robotic nozzle is not fully and properly secured and supported. Be sure that the mounting pipe for the FORCE 80 robotic nozzle is capable of withstanding a nozzle reaction force of at least eight thousand (30,000) Newtons (3000 kgf). The FORCE 80 robotic nozzle should not be used on a portable stand of any kind, as such use can be extremely dangerous and can result in serious injury or death.

WARNING	**The FORCE 80 IS HEAVY.** Use caution and assistance when installing and take care to avoid injury to your back. Seek assistance to help support and twist the robotic nozzle during installation and take care to avoid injury during handling and installation.
WARNING	**NEVER USE THE ROBOTIC NOZZLE AT PRESSURES HIGHER THAN 12 BARS (175 PSI).** The maximum operating pressure for the FORCE 80 robotic nozzle is 12 bars (175 psi). Use of the FORCE 80 at pressures higher than 12 bars is dangerous and can lead to serious injury or death or may damage the robotic nozzle. Moreover, the recommended operating pressure of the FORCE 80 is between 7 and 8 bars (100 and 115 psi), which also will provide optimal performance.
WARNING	**ONLY MOUNT THE FORCE ROBOTIC NOZZLE SO THAT ITS BASE IS PERPENDICULAR TO THE GROUND.** DO NOT install the robotic nozzle at an angle or upside-down without the specific prior written consent of Unifire AB. Doing so may cause damage to the robotic nozzle gears and motors, which could lead to malfunction. If you plan to install the robotic nozzle at an angle or upside-down, please consult UNIFIRE when ordering. Special gear ratio and programming may be required.
WARNING	**FOLLOW ALL MAINTENANCE & INSPECTION PROCEDURES IN THIS MANUAL.** Failure to do so could result in the malfunction of this equipment.
WARNING	**Be sure to use the proper type and size of flange at the robotic nozzle base** and also between the robotic nozzle and nozzle (if using a nozzle not supplied by Unifire specifically for use with this robotic nozzle). Use of the wrong type or size of threads will result in an improper connection which can cause leaking and also may cause the robotic nozzle and/or nozzle to dislodge under high pressure, possibly leading to serious injury or death to persons and/or serious damage to property. If you have any doubts as to the exact thread supplied by Unifire, contact Unifire for clarification prior to connecting the robotic nozzle and nozzle.
WARNING	**KEEP A SAFE DISTANCE DURING OPERATION AND MOVEMENT.** The FORCE 80 Robotic nozzle has moving parts. Be sure to keep a safe distance from the robotic nozzle as it moves and keep hands and fingers away from pinch points to avoid injury.
WARNING	**AVOID RAPID CHARGING**. Rapid charging of the robotic nozzle is potentially dangerous and can cause serious injury to persons and/or property and may cause damage to the robotic nozzle. Charge the robotic nozzle slowly to avoid creating a potentially dangerous, high-pressure surge.

⚠️ **WARNING**	**USE ONLY UNIFIRE-APPROVED NOZZLES / NOZZLE TIPS.** The FORCE 80 was designed for use with the Unifire INTEG 80 and Unifire Smooth Bore and JETRANGE nozzle tips. Use of any nozzle other than a Unifire nozzle made for the FORCE 80 without specific, written approval in advance by Unifire AB constitutes misuse of the product and could affect the safety, performance and/or operation of the robotic nozzle. Such malfunctions could also result in the nozzle coming loose and being rapidly ejected with high force, which could cause serious injury or even death.
⚠️ **WARNING**	**DO NOT OPERATE IN EXPLOSIVE ZONES OR ENVIRONMENTS!** The electric motors and other components are potential ignition sources and could spark ignition if used in explosive environments. The FORCE 80 is not approved for operation in explosive environments and therefore it should never be used in such environments.
⚠️ **WARNING**	**DO NOT IMMERSE EQUIPMENT IN WATER**. Do not immerse the robotic nozzle, its control box (the TARGA PLC or X-TARGA PLC) nor the joystick in water and be sure to keep water out of their interiors. Unifire's robotic nozzles, and joystick are designed to withstand moderate exposure to rain and water splashing during normal use of the robotic nozzle. Prolonged or extreme exposure to water, including submersion, however, will cause damage and could also cause electrical shock resulting in injury. The TARGA PLC must be installed so that it is protected from water and dust. Unifire also offers the TARGA PLC in optional IP66 (X-TARGA) and IP67 (X-TARGA-S) rated enclosures.
⚠️ **WARNING**	**Do not use the electrical controls during operation of the emergency manual override cranks as doing so could cause injury.**
⚠️ **WARNING**	**ONLY USE THE MANUAL OVERRIDE IN CASE OF TRUE EMERGENCY & POWER FAILURE**. The manual override controls on the FORCE 80 are not designed for normal operation and should only be used in the case of extreme emergency and when the remote control feature is not working sufficiently to control the robotic nozzle by means of the electronic controls. In case of use in such an emergency, first disconnect the cables from the motor connections. !!
⚠️ **WARNING**	**DISCONNECT POWER PRIOR TO INSTALLATION, MAINTENANCE OR REPAIR.** Prior to installation, maintenance or repair be sure to disconnect power and disable flow.

⚠️ **WARNING**	**Be sure to use the proper type and size of threads (or flange, if applicable) at the robotic nozzle base and also between the robotic nozzle and nozzle** (if using a nozzle not supplied by Unifire specifically for use with this robotic nozzle). Use of the wrong type or size of threads or flange will result in an improper connection which can cause leaking and also may cause the robotic nozzle and/or nozzle to dislodge under high pressure, possibly leading to serious injury or death to persons and/or serious damage to property. If you have any doubts as to the exact thread supplied by Unifire, contact Unifire for clarification prior to connecting the robotic nozzle and nozzle.
⚠️ **WARNING**	**Consult a network professional to ensure any networked connection to the Unifire system is fully secure.** For systems connected to a network, it is important that the network be highly secure and inaccessible to non-qualified persons, hackers or bad actors, who may be able to activate and control the system, which could lead to serious injury or death and/or damage to property.
⚠️ **WARNING**	**USE AN UNINTERRUPTIBLE POWER SOURCE (UPS):** It is strongly advised to use an appropriate UPS to ensure that the TARGA PLC has power at all times. A power failure of the PLC will cause the Force 80 system to be inoperable during power loss. Moreover, after power returns, the PLC and any fire detecton system may take several minutes to reboot, and it will be inoperable during that time. A UPS should be capable of providing power for 2 hours of active operation, at least 250 W for 2 hours = 0,5 KWh

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PLANNING - BEFORE INSTALLATION

About This Manual

This manual is a comprehensive guide that contains the information necessary to design, install, operate, and maintain the FORCE 80 Robotic Nozzle system.

Users of this manual are assumed to be competent fire engineers with a basic knowledge of such systems. Users who are not familiar with the equipment should first read the complete manual.

Only certified personal who have undergone UNIFIRE AB training are allowed to install this equipment.

Contacts

Should any part of this manual not be understood, or there are queries concerning the system, contact UNIFIRE AB Technical Support using the following details:

UNIFIRE AB,
Bultgatan 40B
442 40 KUNGÄLV
SWEDEN

Mail: support@unifire.com

www.unifire.com

Approvals and standards

See www.unifire.com for approvals and listing information for the various components.

Safety warnings

A properly designed and installed FORCE 80 Robotic

Nozzle system should not present any significant health or safety problems. Take basic precautions to avoid accidents. The various aspects of the system's operation must be understood. Observe best practices.

WARNING!

Do not operate this device without a full understanding and comprehension of this manual. Personnel responsible for the FORCE 80 system must be fully trained on the system components.

WARNING!

The installer should pay specific attention to the danger, caution, WARNING, and notice statements in this manual. Failure to observe safety WARNINGs could cause serious injury, and potentially create liability.

⚠ DANGER

Do not direct the flow stream towards people as it could result in serious personal injury or death.

• Operate and maintain the FORCE 80 Robotic Nozzle system in compliance with this document and with applicable standards, in addition to the standards of any other authorities having jurisdiction (AHJ). Failure to do so impairs the proper operation and integrity of this device.

• The owner must maintain the fire protection unit or system and devices in proper operating conditions.

• Do not, under any circumstance, operate this system outside the water flow or pressure range indicated in this manual.

• The owner must ensure that an uninterrupted supply of water is maintained to the Robotic Nozzle.

• The owner must ensure that an uninterrupted supply of power to the TARGA PLC is maintained to the Robotic Nozzle.

Authorized Personnel

The FORCE 80 system shall be installed by authorized personnel trained and certified by UNIFIRE AB. Only use components and accessories authorized by UNIFIRE AB.

Structural Alterations

This installation manual details the suggested installation method. Any structural alteration necessary for installation must comply with local building code and fire code requirements.

⚠ **DANGER**

DO NOT PRESSURIZE THE UNIT until the flange has been properly tightened.

DO NOT PRESSURIZE THE UNIT until the electrical installation and software calibration procedure has been completed

DO NOT PRESSURIZE THE UNIT until the system commissioning has been completed by certified technicians, and a formal release note / approval has been issued.

System Limitations

The system designer shall take into account the building construction or vehicle requirements, location, hydraulic design, coverage area, and number of systems required. If the limitations in these areas are not maintained, the system may not operate correctly.

Building Construction

- **Water demand:** Evaluate the FORCE 80 water system demand as an independent addition to the existing building water supply. Conduct a hydraulic analysis to ensure that it does not affect the building's existing water system design criteria. It is possible to achieve this without significant system supply modifications. However, the system may require increased pump sizes, storage tank capacity, and pipe sizes.

Determining a Location

Contact your local technical support team for assistance in determining the optimal location of the system components.

Water connection

The FORCE 80 is normally delivered with a DN80/PN16 stainless steel flange.

Options include 3" male BSP thread, or JIS and ANSI flanges, and customer specific brackets.

Please discuss the connection with your sales representative and please specify the requested connection when ordering.

MECHANICAL INSTALLATION

Installation geometry

The FORCE 80 Robotic Nozzle may only be installed with Normal orientation, meaning the connection flange is facing directly to the ground, with the water supply coming from below.

This allows a maximum of up to 360° horizontal rotation

and 180° (+/- 90°) vertical movement.

The TARGA PLC cabinet should be installed next to the Robotic Nozzle, preferably so that the motor cables can be 5 meters long (the standard cable length).

The DN80/PN16 flange is installed with 8 x M16 bolts and nuts. The flange is sealed with a flat seal.

UNIFIRE can offer custom connection pipes and bracket.

Please contact UNIFIRE if you have special requests.

Reaction forces

At 10 bar and 5000 liters per minute, the reaction force is 3600 N.
However, the transient forces may by much greater due to water hammering.

Therefore, the installation and bracket must withstand at least a factor of 5 and expected force of 6000 N = minimum 30 000 N.

The DN80/PN16 flange willl easily support this load.

The stand pipe should be at least 88,9 mm (3") and properly supported with pipe clamps.
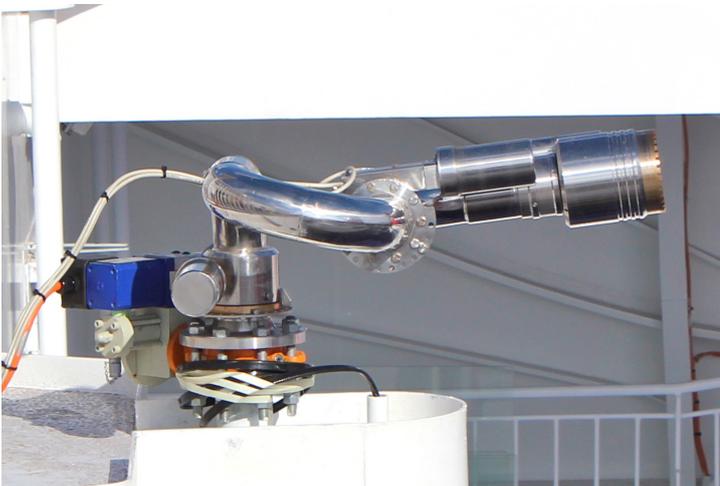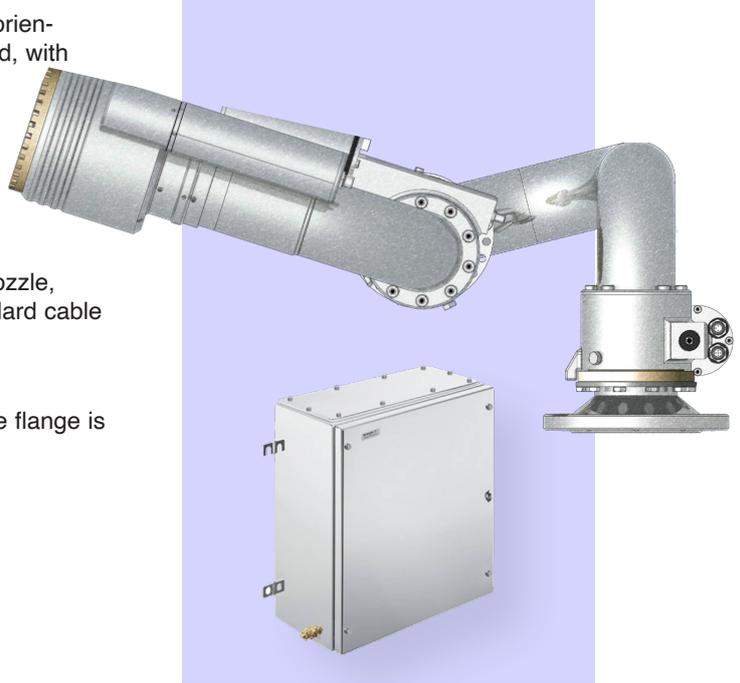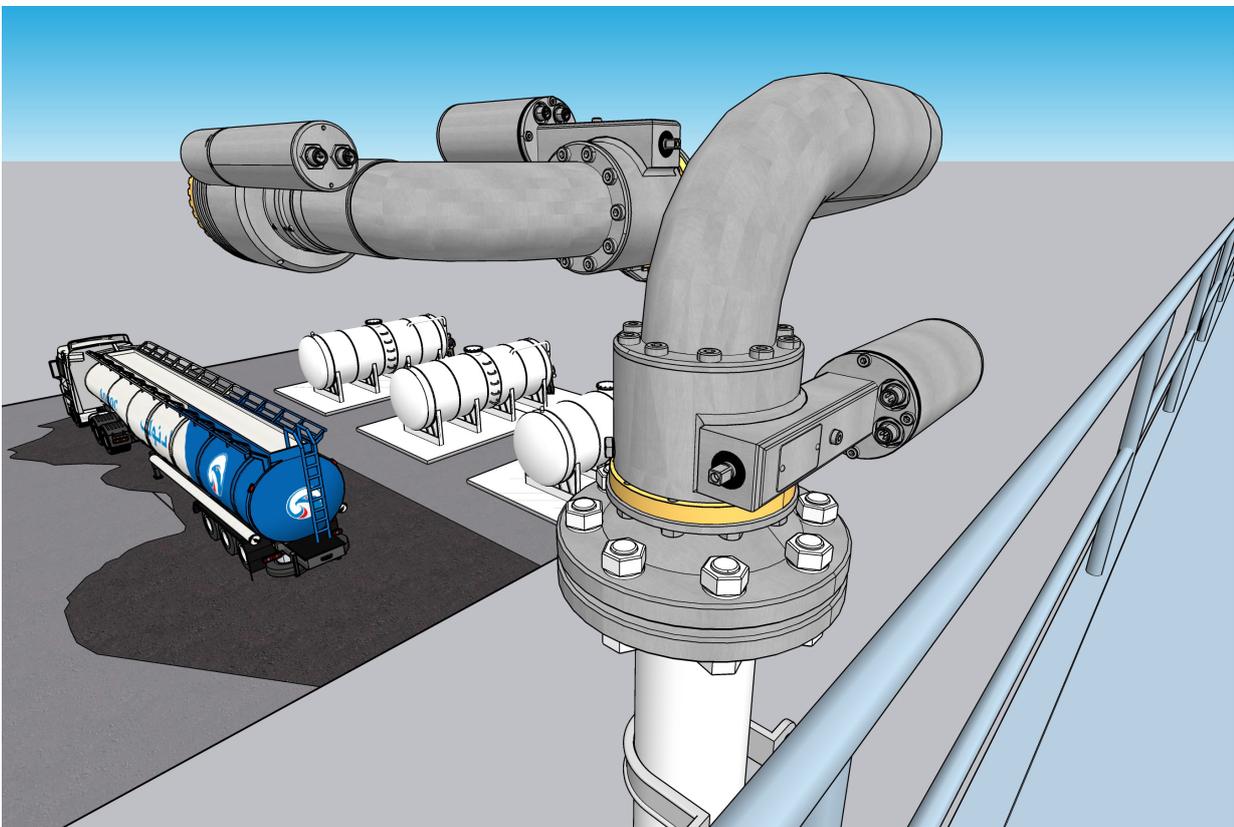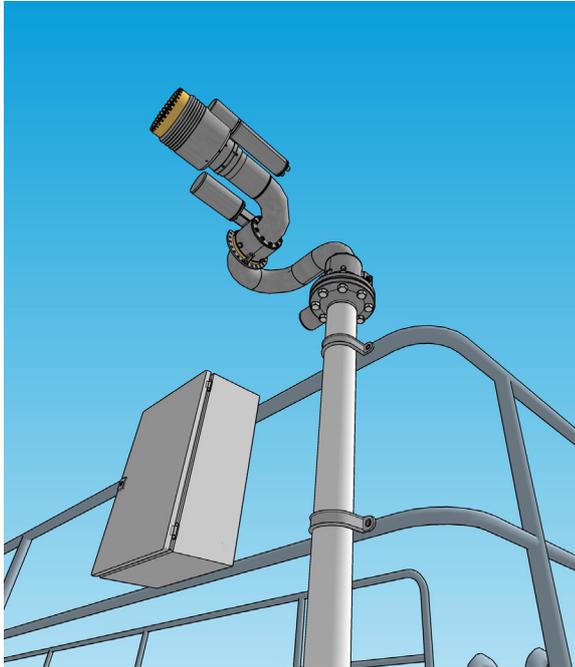
Installing The Robotic Nozzle

The FORCE 80 Robotic Nozzle is fitted with a DN80/PN16 flange (or similar size 3" ANSI flange or JIS flange).

WARNING!

The maximum reaction force at 5500 lit/min and 12 bar is 4500 N. The mounting pipe and bracket must withstand a minimum force of 30 000 N in order to provide a safe and stable base.

The flange itself provides the required support to hold the FORCE 80. Additional support and brackets must be applied to the feeding pipe to keep it stable under operation. This is especially important during fully automatic operation.

Use suitable M16 bolts and a flat seal to install the flange.

CAUTION!

Clearance!!

Take special precaution to ensure the Robotic Nozzle can move and rotate freely in all directions of its operating range (max: 360° horizontally and +/- 90° vertically).

Make sure there are no obstructions with 700 mm from the centre of rotation.
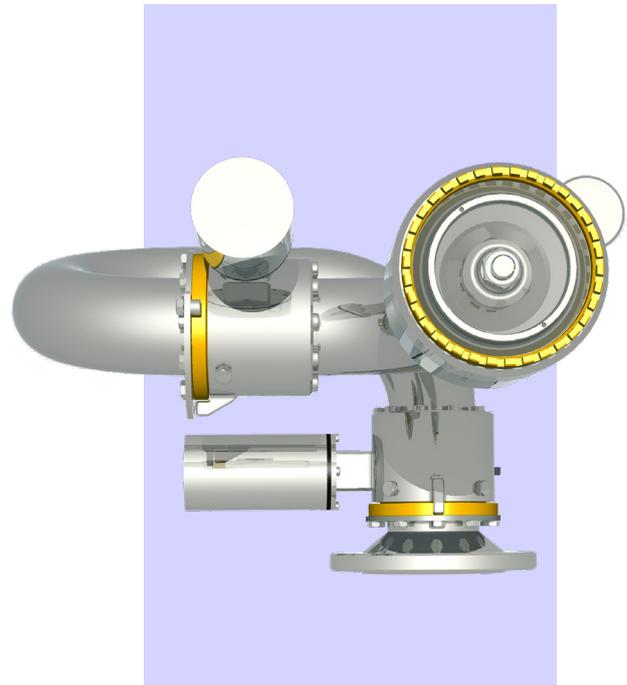
The FORCE 80 weighs 30 Kg, including flange and nozzle tip.

450 mm

700 mm

770 mm

320 mm

490 mm

490 mm

DN80/PN16 flange
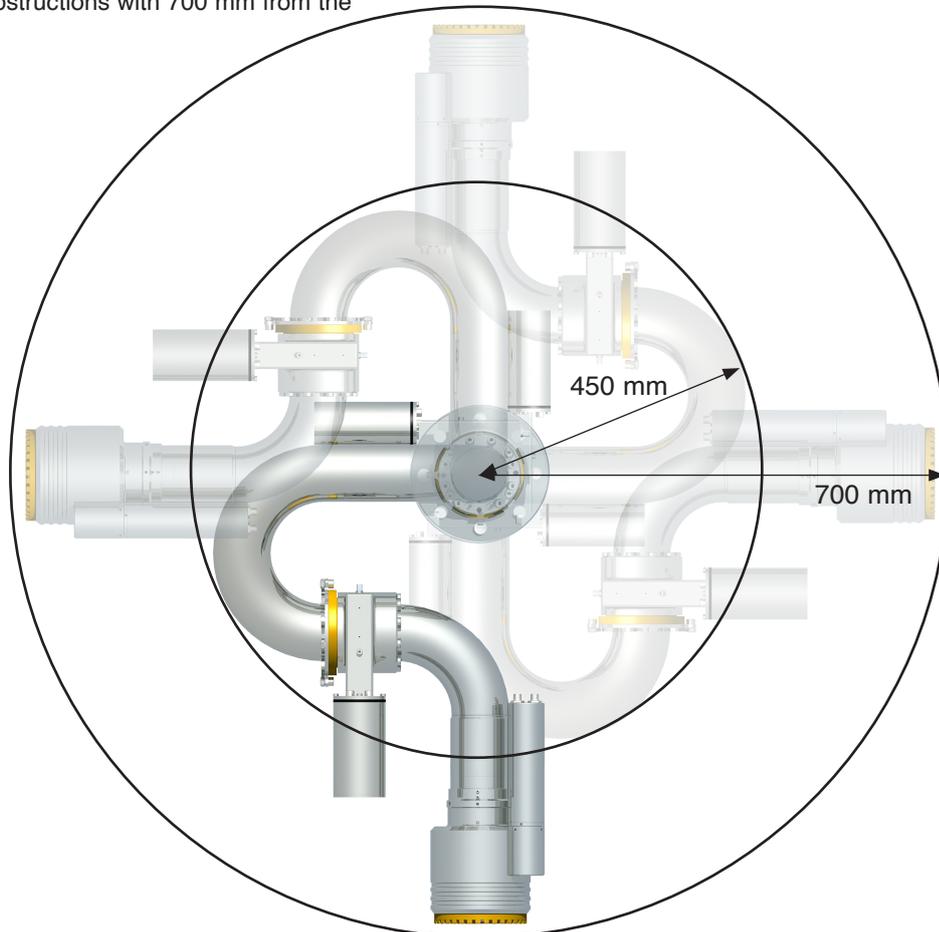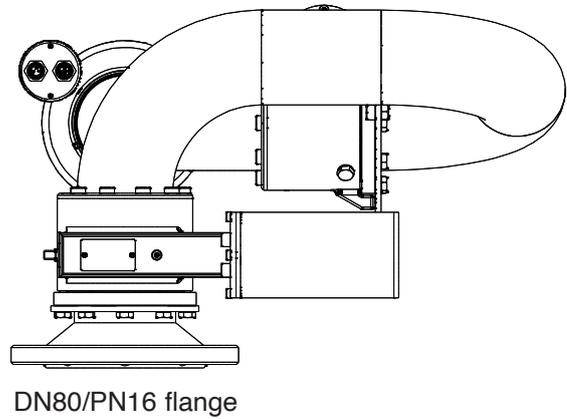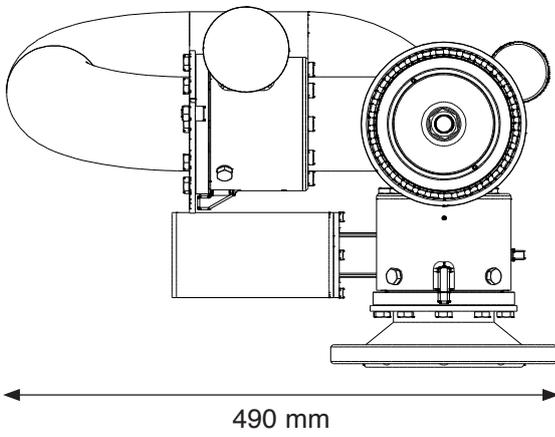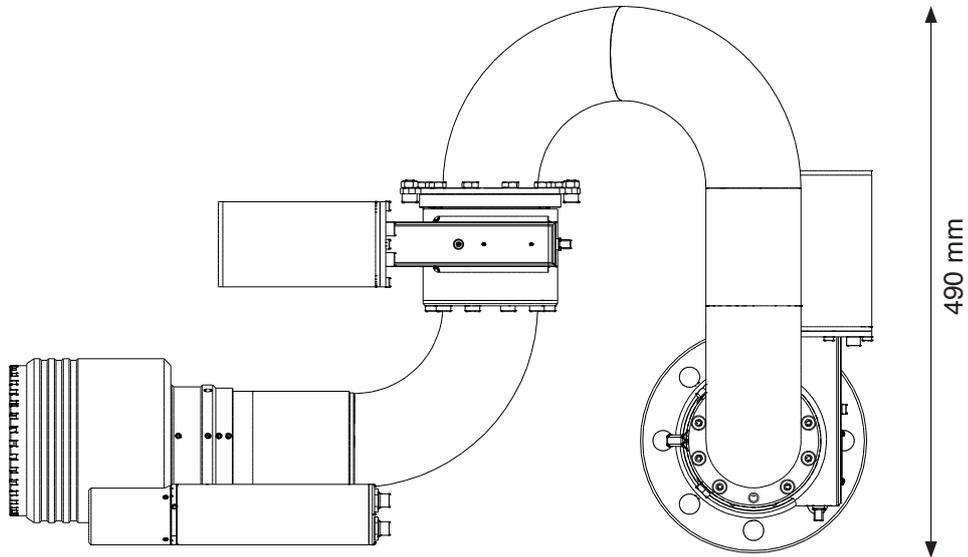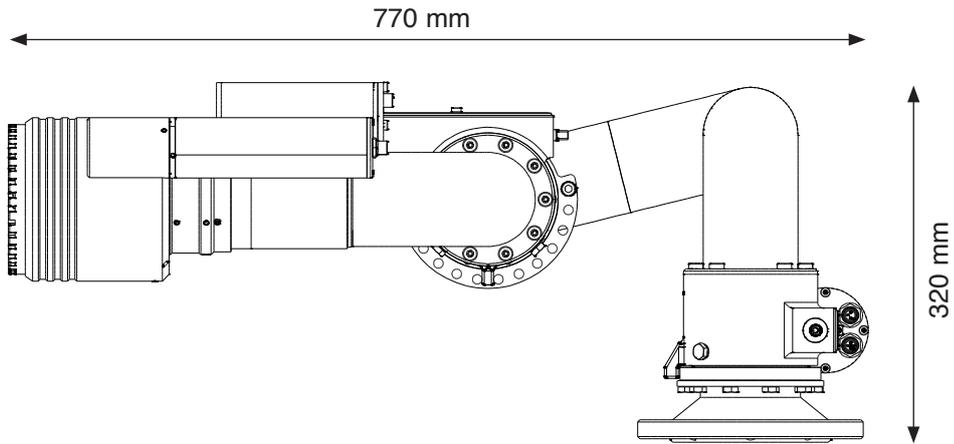
FLOW SETTINGS

Nozzle Flow Setting

The Nozzle flow can easily be adjustred by rotating the baffle, thereby adjusting the nozzle opening orifice.
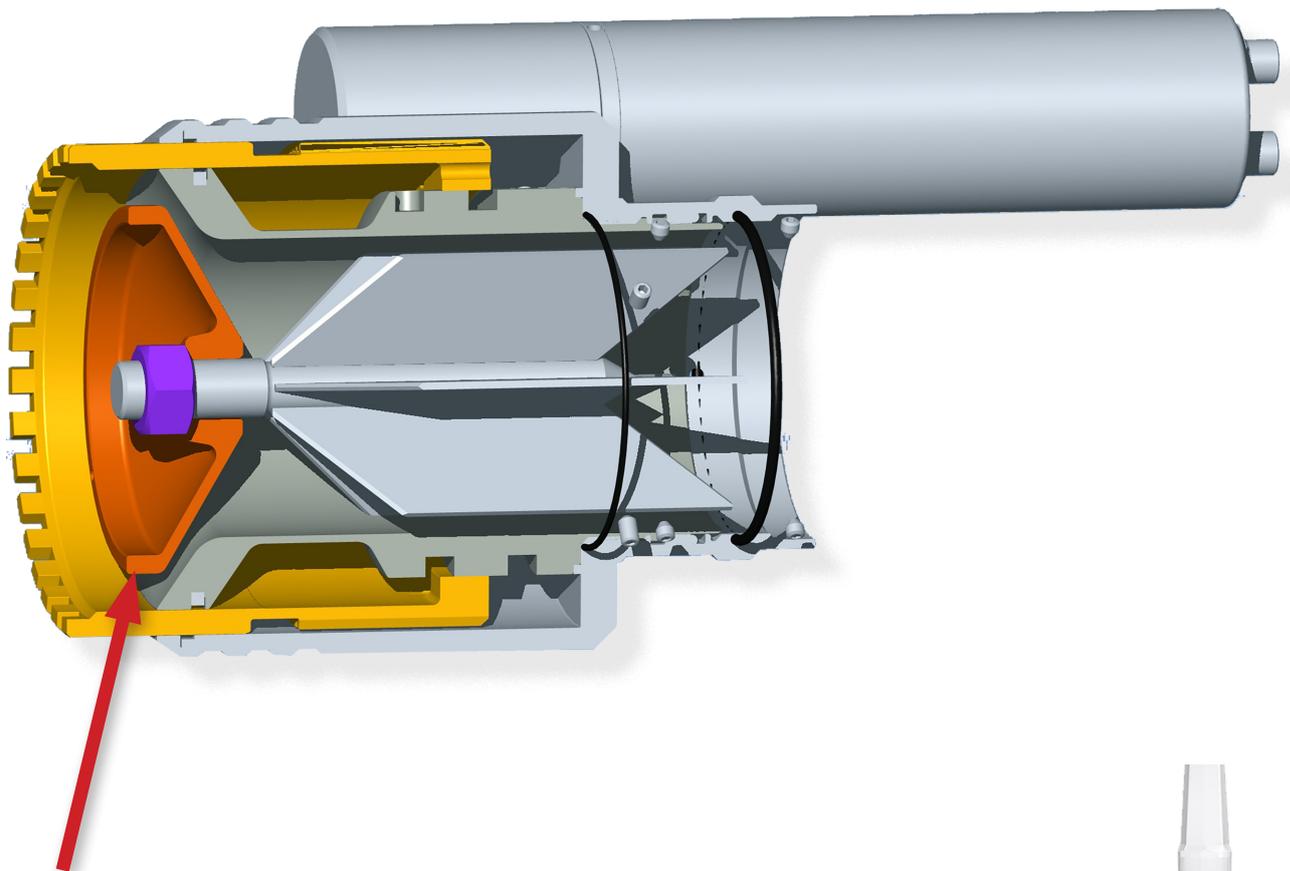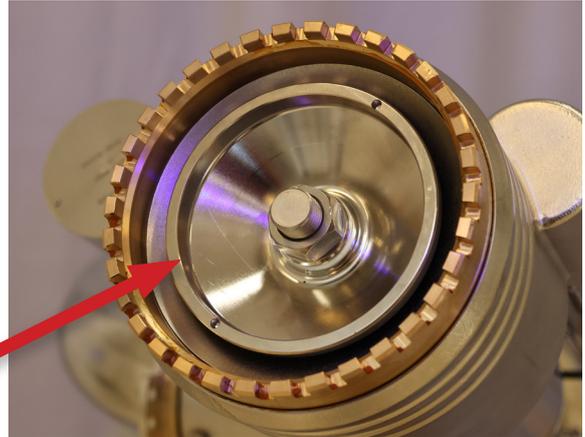
To adjust the desired flow, refer to the flow and reach charts on the following pages:

1. Remove the counter nut.

2. Rotate the baffle clockwise, to a fully cloosed postion (reference or starting point)

3. Then rotate the baffle counter clockwise the indicated number of turns (0.5 to 3.5 turns); and

4. Refit and lock the counter nut, using locktite 577 or similar.

Flow chart

FORCE 80 with INTEG 80
Flow setting (baffle rotations)

Reach chart

FORCE 80 with INTEG 80
Reach vs. baffle rotations
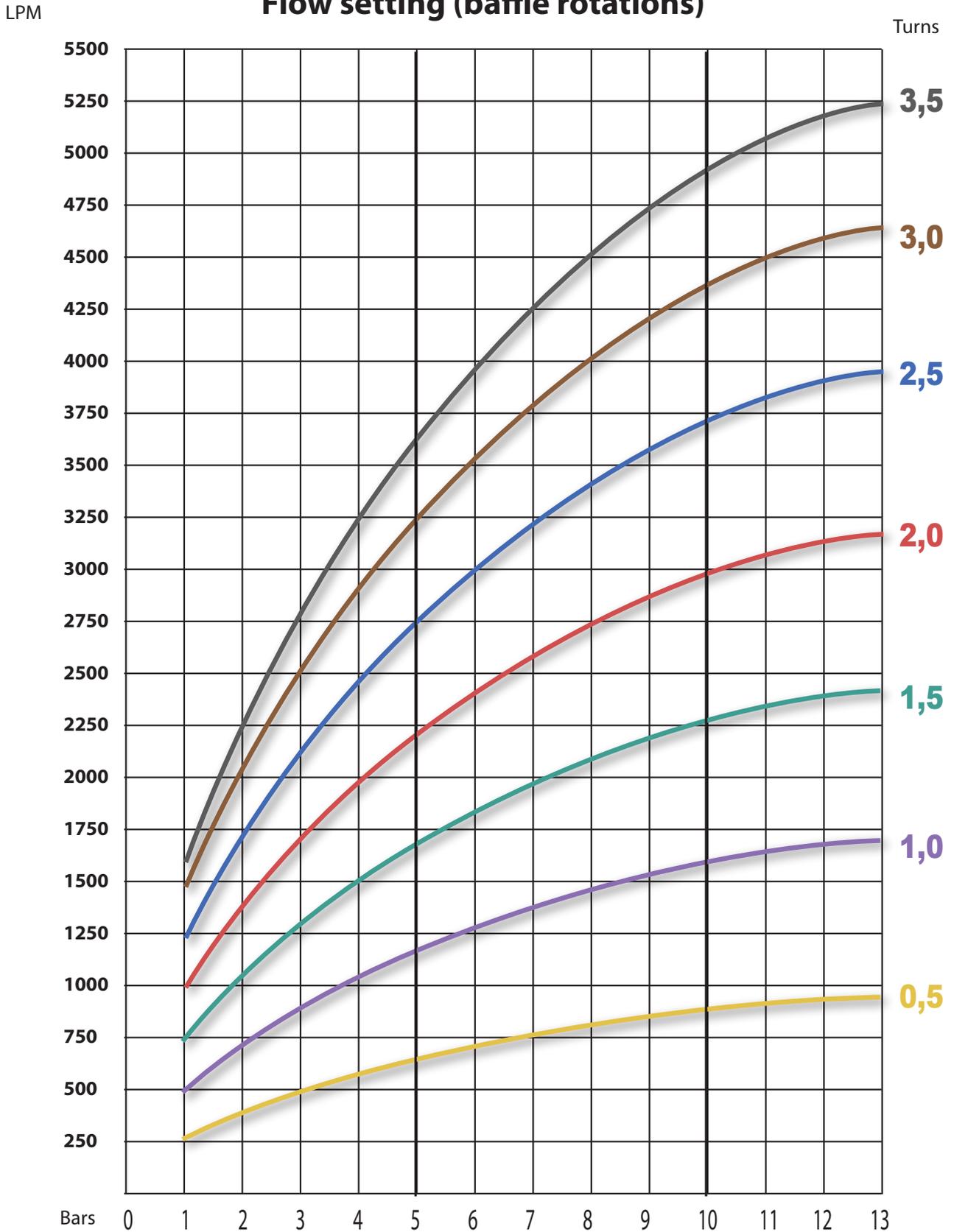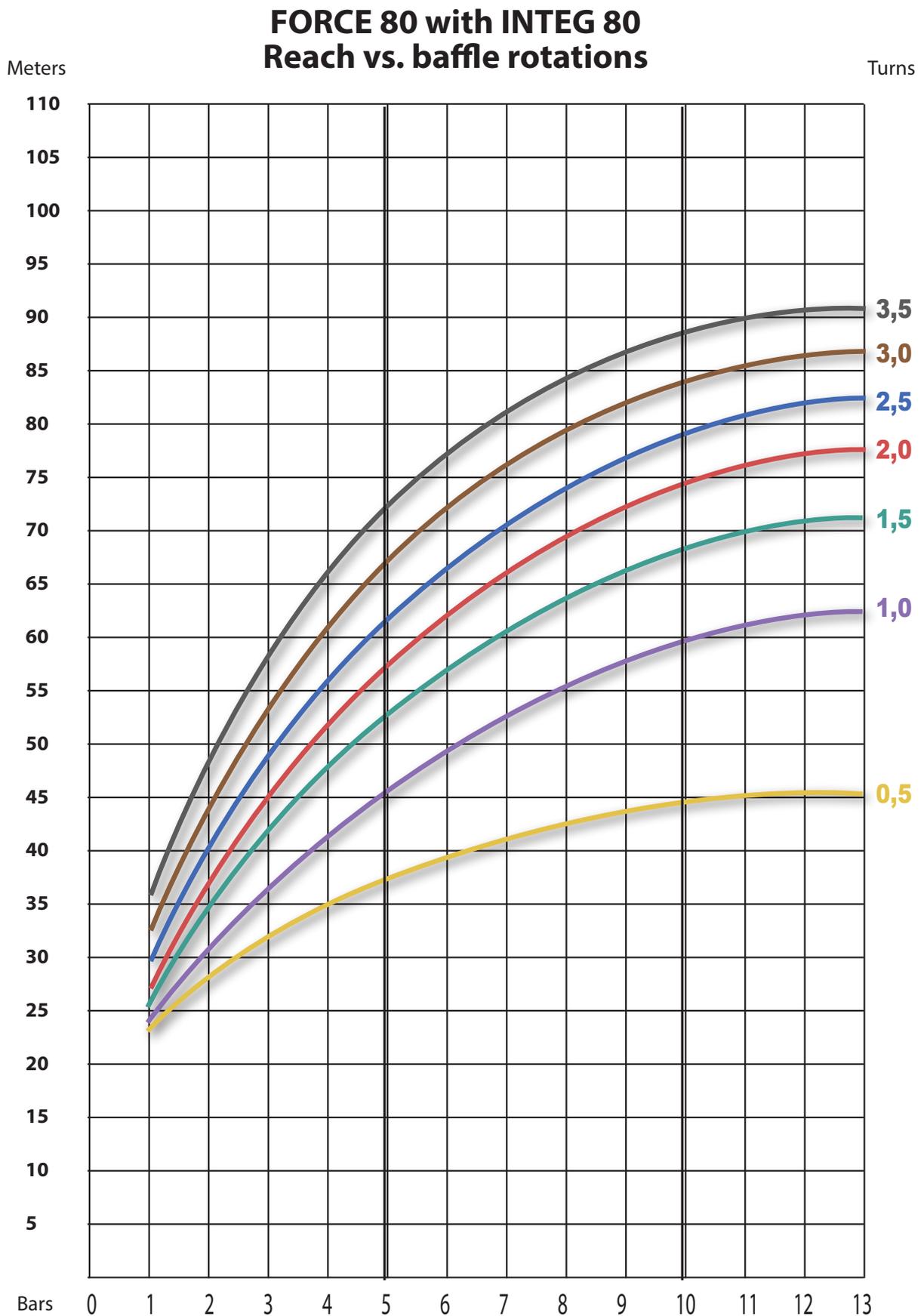
ELECTRICAL INSTALLATION

Generic System Overview

The TARGA Robotic Nozzle PLC is a highly capable programmable progerammable logic controller ("PLC"), with support for up to 6 x BLDC motor drivers.

Communication Protocols: 2 x CAN 2.0 29-bit header (UniCAN) 125,250,500 kB/s, RS232, RS485 (Modbus, DMX, etc.)

Physical Layer Protocols: USB, Ethernet (TCP/IP, web socket), others available per customer requirements

6 BLDC Motor Driver Card Slots (optional: slots for DO or DI/AI expansion cards)

Inputs: 4 digital inputs (NPN) + 2 per installed motor driver card, 6 analogue inputs (4-20 mA or 0-5V), expandable & customizable to customer requirements

Outputs: 8 digital outputs, of which 4 can be set to PWM.

Below is a generic example of what a system can look like.

A DHCP Router is required to set up the system with the Ammolite GUI. This will also allow for the ONE App to be activated.

Over the web interface, the systems can be remote controlled and remotely configured and monitored, from anywhere in the world by means of a secure network connection.

A cabled Canbus Joystick can be connected for local control.

An industrial radio remote control (Hetronic ERGO-S) can also be locally connected.

Digital and analogue outputs are generic and can be used to operate valves, and send or receive status signals.

Ammolite GUI

TARGA PLC with web server

ONE App

Radio Remote

100-230VAC

Valve output

Canbus transciever

Canbus Joystick

up to 10 digtal inputs to activate the zone responses

Digital input expansion box (option)
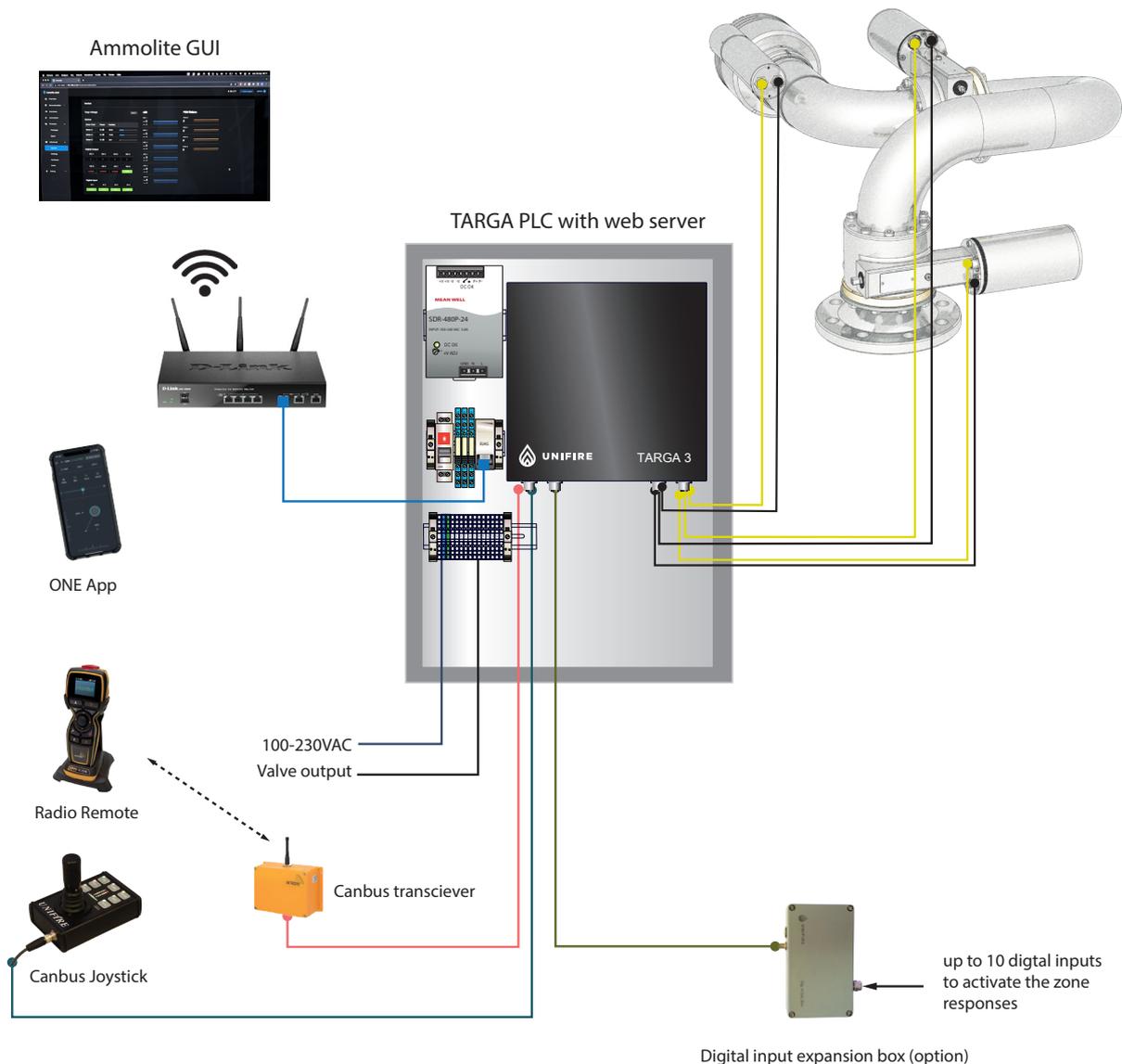
Connecting the FORCE 80 to the TARGA PLC

The FORCE 80 system is fitted with M12 multi connector. The standard system is delivered with 5-meter M12 cables.

Connect the 6 x 5 meter M12 cables from the PLC to the Robotic Nozzle.

From left to right: Rotation, Vertical, Nozzle

Yellow A-coded connectors are for the BLDC Motor Sensors.

Black B-coded connectors are for the BLDC Motor Phases.

The key-coding makes it impossible to accidentally cross the cables.

Cables to Vertical (MK5)
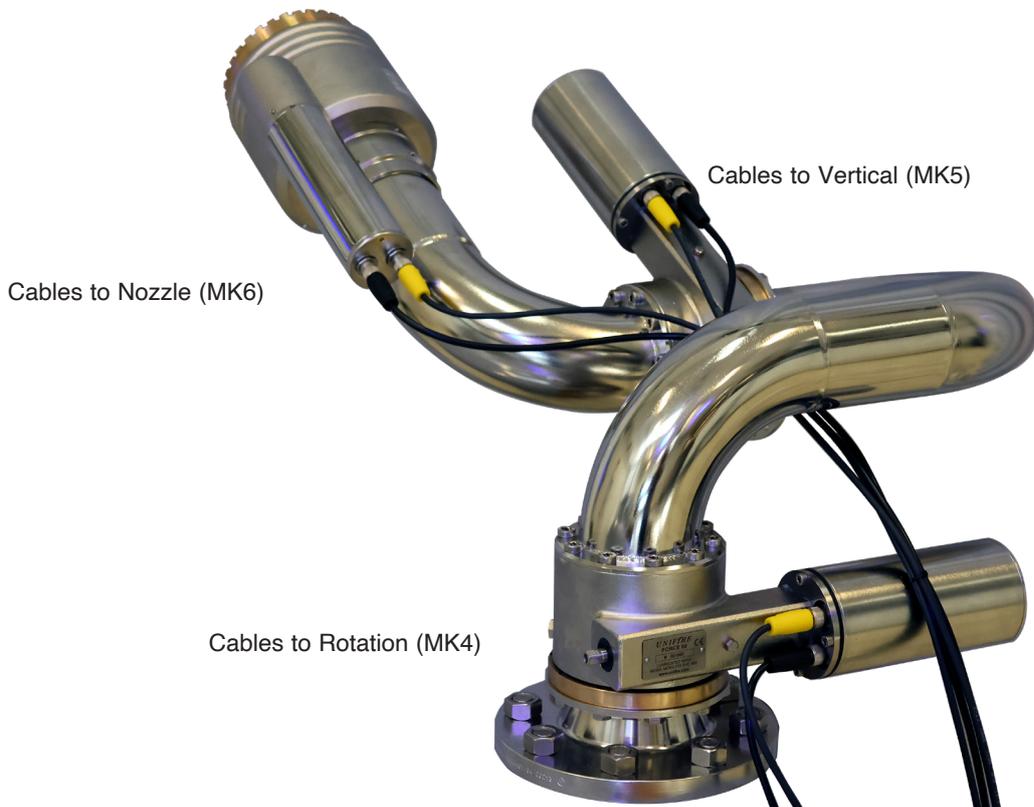
Cables to Nozzle (MK6)

Cables to Rotation (MK4)

TARGA PLC Generic Pin Specification

5-PIN A-coded (sensors)
1 - BROWN
2 - WHITE
3 - BLUE
4 - BLACK
5 - GREY
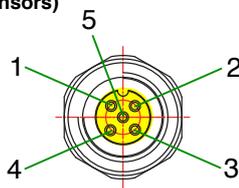
| Joystick | | BLDC sensors M12 A-coded 5-pin | |
5P Canbus		Rotation / Vertical / Nozzle	
P1	Shield	P1	GND
P2	24 VDC	P2	5 VDC
P3	GND	P3	HALL 3
P4	CAN H	P4	HALL 2
P5	CAN L	P5	HALL 1

**3-PIN B-coded
(phases)**
1 - BROWN
2 - n/a
3 - BLUE
4 - BLACK
5 - n/a
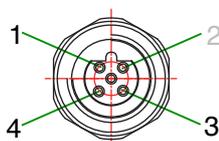
| M12 | | BLDC phases M12 B-coded 4-pin | |
Dig In/Out		Rotation / Vertical / Nozzle	
P1	generic	P1	PHASE 1
P2	generic	P2	not connected
P3	generic	P3	PHASE 2
P4	generic	P4	PHASE 3
P5	generic	P5	not connected

TARGA PLC M12 - 12 Pin specification

These are the default and generic specification for the 12-pin digital in- and outputs.

Please note your system may have special functions and therefore other pin distribution.
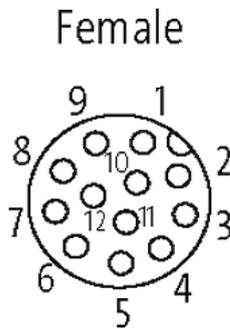
		Dig Out 12P			Dig Out 12P		
#	Colour	PCB connector	Default	Colour	PCB conn	Default
1	Brown	MK1 DI1 J11:2	-	Brown	DO1 J13:2	-
2	Blue	MK2 DI1 J11:3	-	Blue	DO2 J13:3	-
3	White	MK3 DI1 J10:2	-	White	GND J13:4	GND
4	Green	MK4 DI1 J10:3	-	Green	DO3 J14:2	-
5	Pink	MK5 DI1 J10:4	-	Pink	DO4 J14:3	-
6	Yellow	MK6 DI1 J26:1	-	Yellow	GND J14:4	GND
7	Black	MK6 DI1 J26:1	-	Black	DO5 J15:2	Valve relay
8	Grey	MK6 DI1 J29:1	-	Grey	DO6 J15:3	Valve relay
9	Red	MK6 DI1 J29:2	-	Red	GND J15:4	GND
10	Violet	MK6 DI1 J32:3	-	Violet	DO7 J16:2	Sum alarm relay
11	Grey/Pink	MK6 DI1 J32:2	GND	Grey/Pink	DO8 J16:3	-
12	Red/Blue	MK6 DI1 J32:3	GND	Red/Blue	GND J16:4	GND

12-Pin Extension Box Terminal Socket Specification

This is the generic and default specification for the optional digital input extension box

1	Brown	Dig in 1	11	Pink	GND
2	Blue	Dig in 2	12	Blue/Red	GND
3	White	Dig in 3	13		GND
4	Green	Dig in 4	14		GND
5	Yellow	Dig in 5	15		GND
6	Black	Dig in 6	16		GND
7	Grey	Dig in 7	17		GND
8	Red	Dig in 8	18		GND
9	Purple	Dig in 9	19		GND
10	Grey/pink	Dig in 10	20		GND
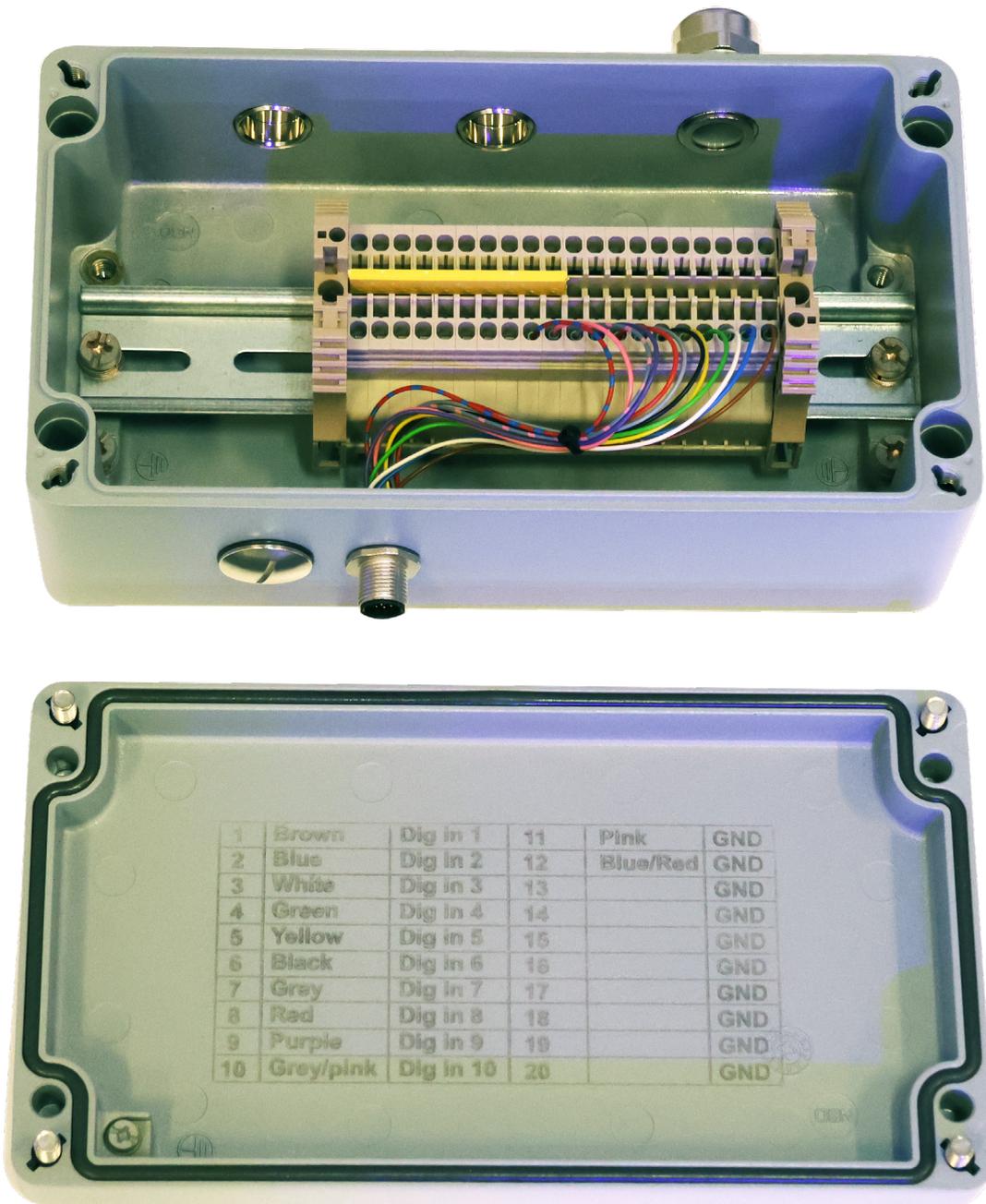
TARGA Robotic Nozzle PLC TERMINAL SOCKETS

This is the generic and default terminal socket specifi-
cation for the X-TARGA PLC. Your system may have
different terminal specifications.

Weidmüller IP67
Stainless Steel cabinet

Terminal Spec

Terminal	Function	Internal connection	External connection	Function	Cable mark	Cable dim.	Color marking
1	L	PSU (L)	L	Power	1	1,5 mm^2	
2	N	PSU (N)	N	Power	2	1,5 mm^2	
3	⏚	PSU (⏚)	⏚	Power	3	1,5 mm^2	
4	CAN 1 H	Main board	Joystick Connection Box	CAN		0,3 mm^2	Black
5	CAN 1 L	Main board	Joystick Connection Box	CAN		0,3 mm^2	G/Y or Grey
6	GND	Main board	Joystick Connection Box	CAN		0,3 mm^2	Blue
7	VCC	Main board	Joystick Connection Box	CAN		0,3 mm^2	White
8	NC	Relay 1 (DO5)	Valve	Relay	8	0,5 mm^2	
9	COM	Relay 1 (DO5)	Valve	Relay	9	0,5 mm^2	
10	NO	Relay 1 (DO5)	Valve	Relay	10	0,5 mm^2	
11	NC	Relay 2 (DO6)	Valve	Relay	11	0,5 mm^2	
12	COM	Relay 2 (DO6)	Valve	Relay	12	0,5 mm^2	
13	NO	Relay 2 (DO6)	Valve	Relay	13	0,5 mm^2	
14	COM	Relay 3	Spare	Relay	14	0,5 mm^2	
15	NO	Relay 3	Spare	Relay	15	0,5 mm^2	

SOFTWARE & CALIBRATION

Calibrating the Robotic Nozzle's Operating Range

Before attempting to operate, the Robotic Nozzle must be calibrated, i.e., assigned an operating range.

The calibration is performed through the Ammolite user interface as described in this section.

There are two methods of calibrating; either the "Center" method or the "Min/Max" (minimum/maximum) method.

*   The Center method is used for special applications when the operating range is preset in the software - typically to +/-90° exactly. (See: Example 1, steps 13-15, below.)

*   The Min/Max method allows you to set the end positions freely. (See: Example 2:, steps 16-20, below.)

Calibrate the operating range by following steps 1-25 on the following pages.

Note: avoid setting the minimum and maximum values at the extreme mechanical limits. Rather, if you wish a complete minimum, set the limit to just before the monitor or nozzle reaches its mechanical stop. This avoids unnecessary mechanical wear and tear and will still provide the full range of motion.
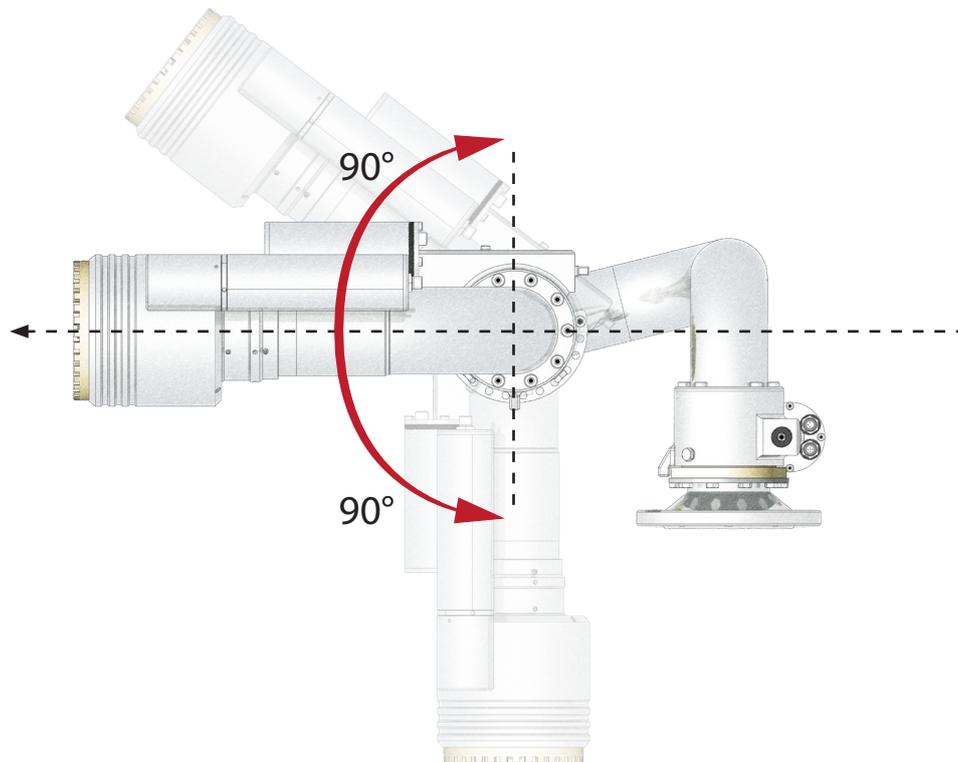
The maximum vertical range is +/-90° if there are no mechanical obstructions.

Wall Mounted Monitor

For a wall mounted system, the normal default position is that the
nozzle is pointing center (with +/.90° horizontal movement), and
level to the ground (with +/-90° vertical movement)

WALL (from above)

min 450 mm

90°

90°
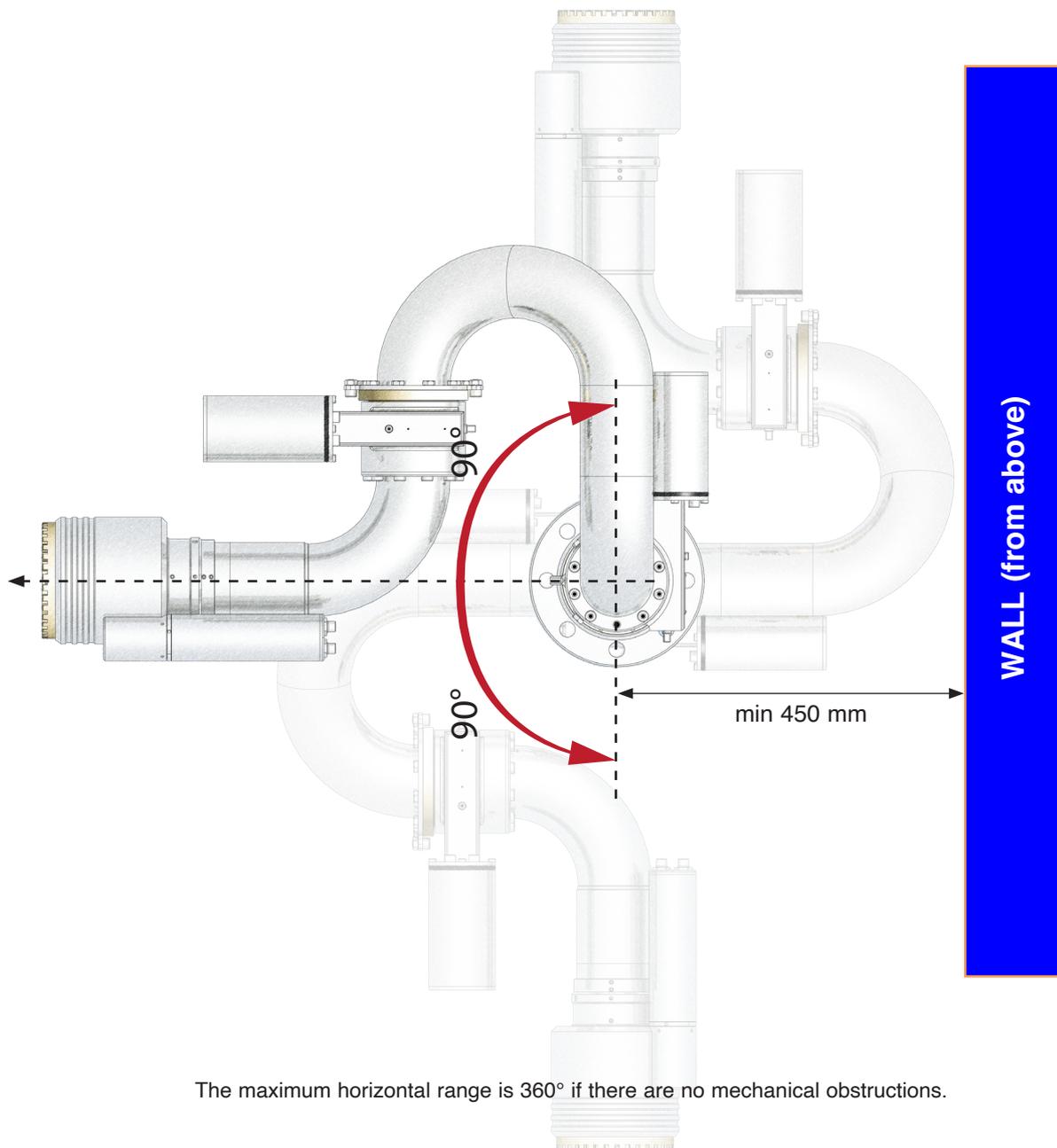
The maximum horizontal range is 360° if there are no mechanical obstructions.

Ammolite Software Introduction

The set up of the Unifire FORCE 80 is achieved through Unifire's web browser-based graphical user interface (GUI), called "Ammolite™".

The Unifire TARGA ROBOTIC NOZZLE PLC connects to a standard TCP/IP based network. The built-in web server has been set up to be assigned an IP address by an external DHCP server. This can be a local router or a dedicated server in a larger network, administered by your IT department or similar.

To connect to the web-server, open a browser (Safari, Chrome, Firefox or other...) on your computer or tablet, and enter the IP address followed by :81 (e.g.: http://192.168.0.45:81, replace 192.168.0.45 with the actual IP).

Enter the username and password provided for your system to access the setup environment.

It is required that you make a note in the service log at login.

Connect Your Computer or TABLET

1. Connect your computer or tablet by WiFi or network cable to the same network as the TARGA PLC.

2. Find the IP address of the TARGA PLC as automatically assigned by the DHCP server.

3. Enter the IP address, followed by :81 in the browser window (e.g., http://192.186.0.45**:81)**

4. To calibrate, follow the instructions on the following pages.
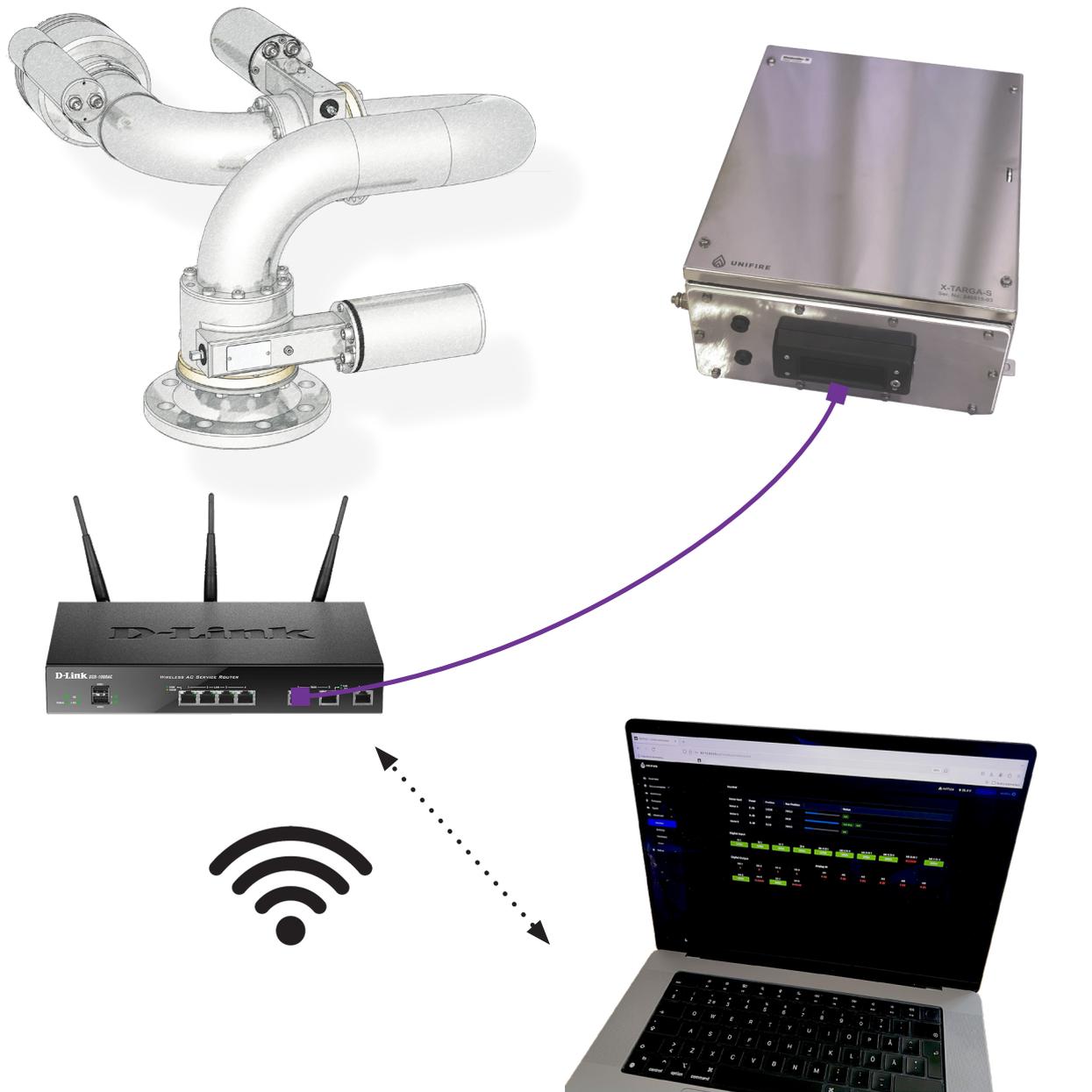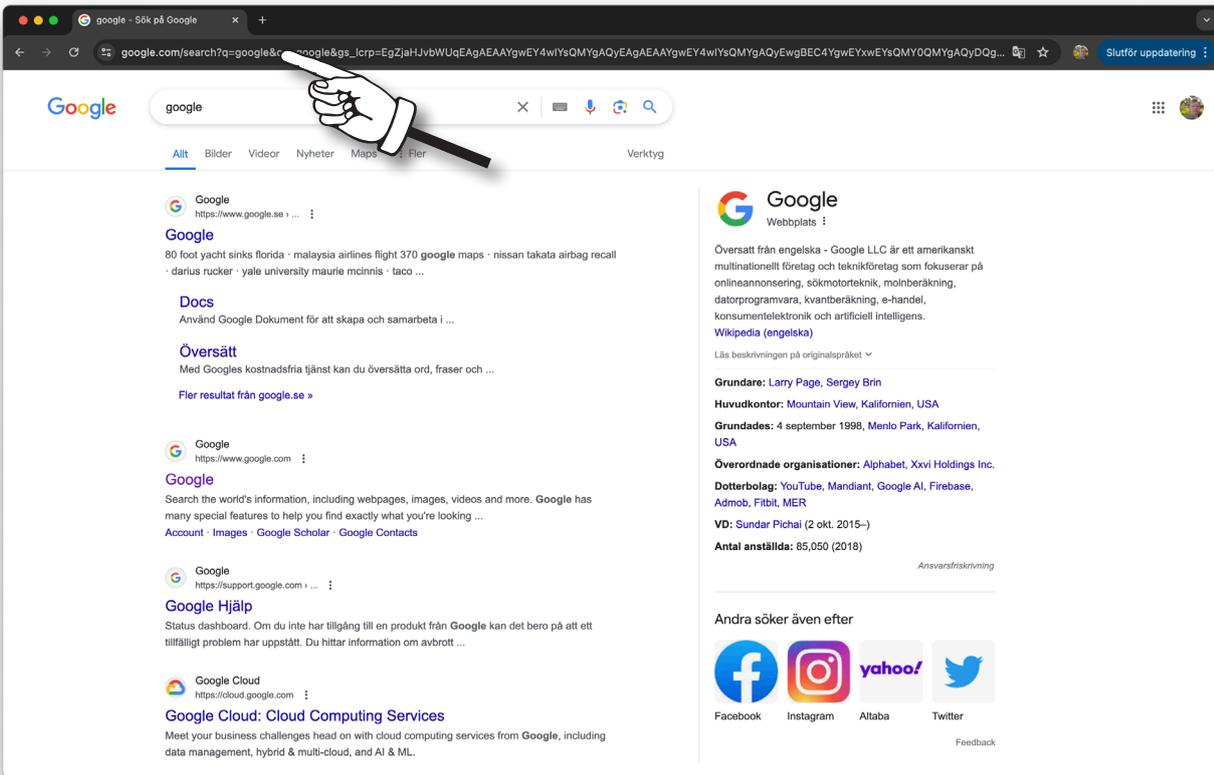
1) Open your web-browser (Safari, Chrome, Firefox or other...)
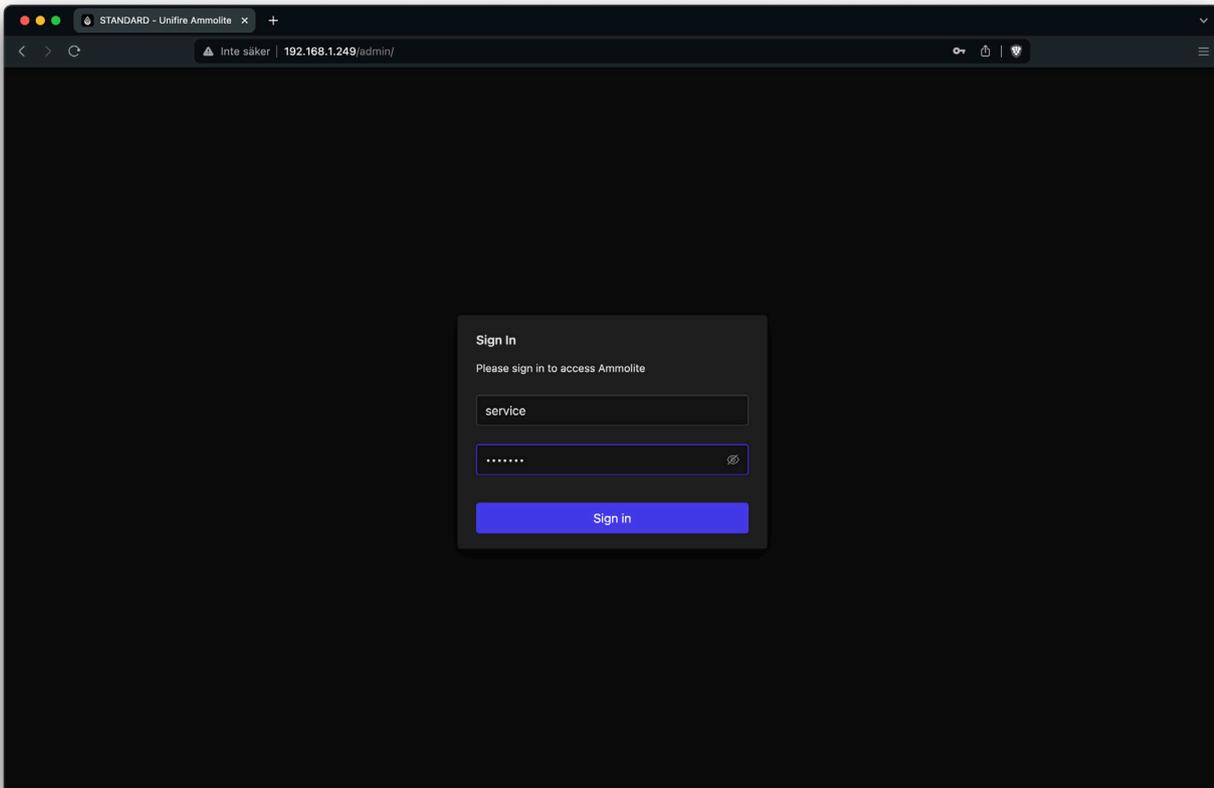
2) Enter the IP Address of the TARGA PLC, followed by :81 (for example http://192.168.0.217:81). Push Enter.
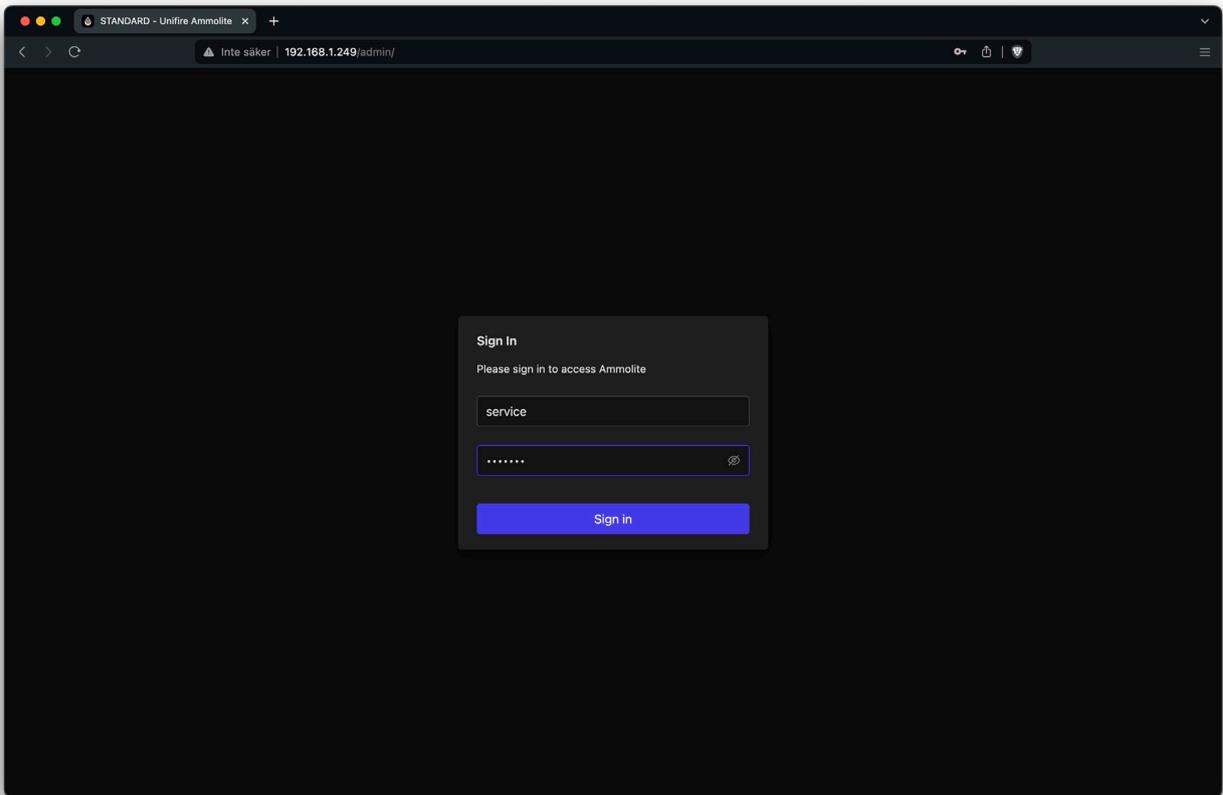
3) Enter the username and password provided with your delivery.
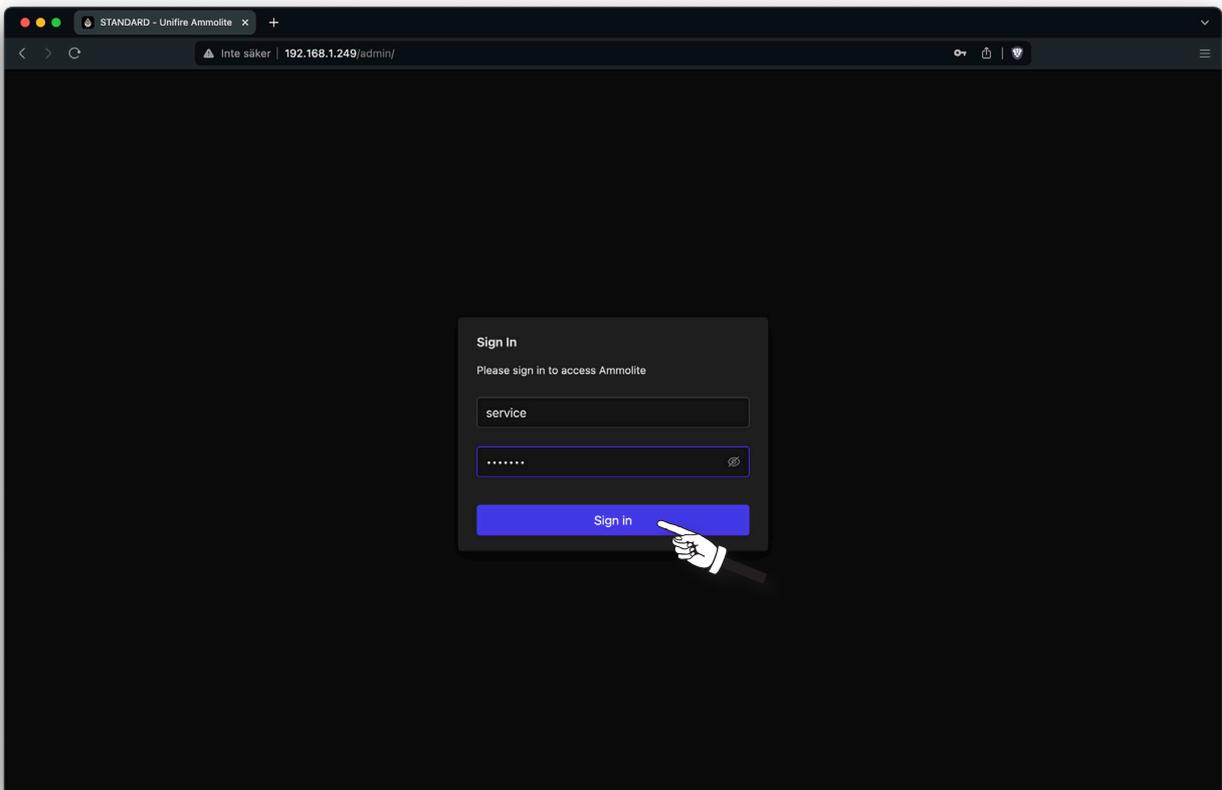
4) In this example it is "service" and "service". Click Login.
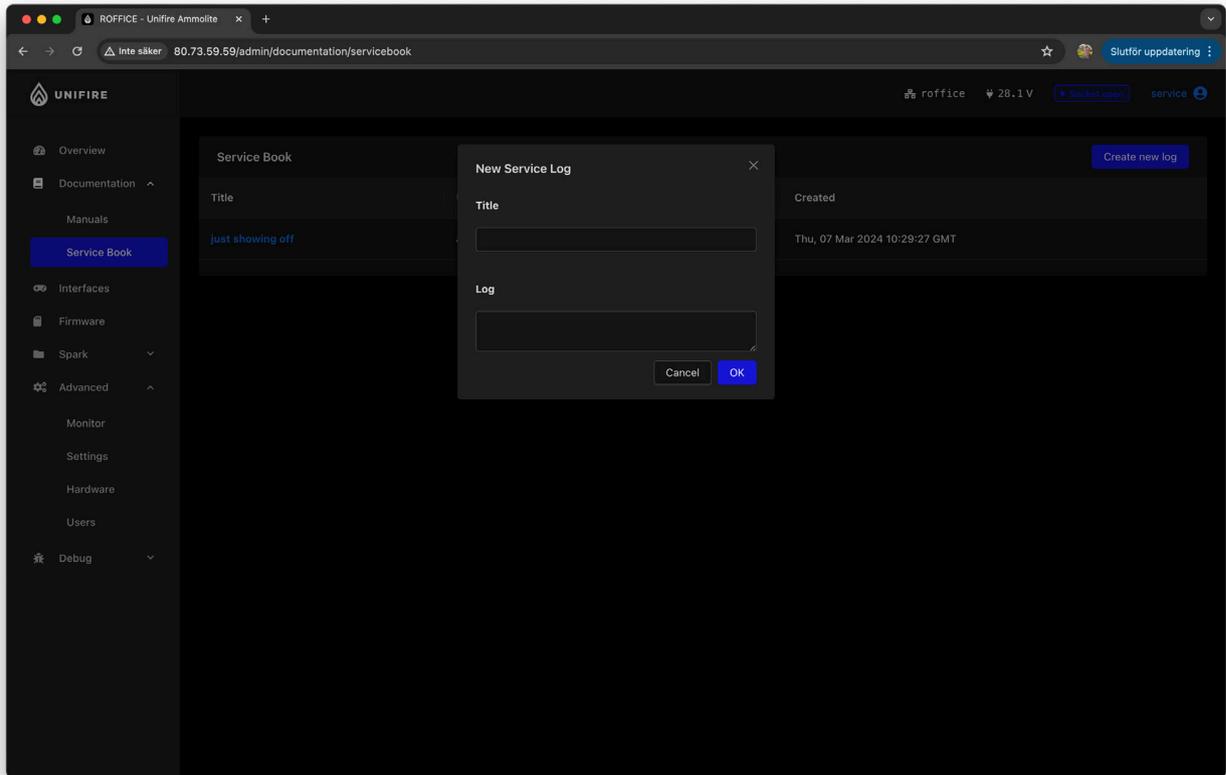
5) You are now required to make a note in the service log.
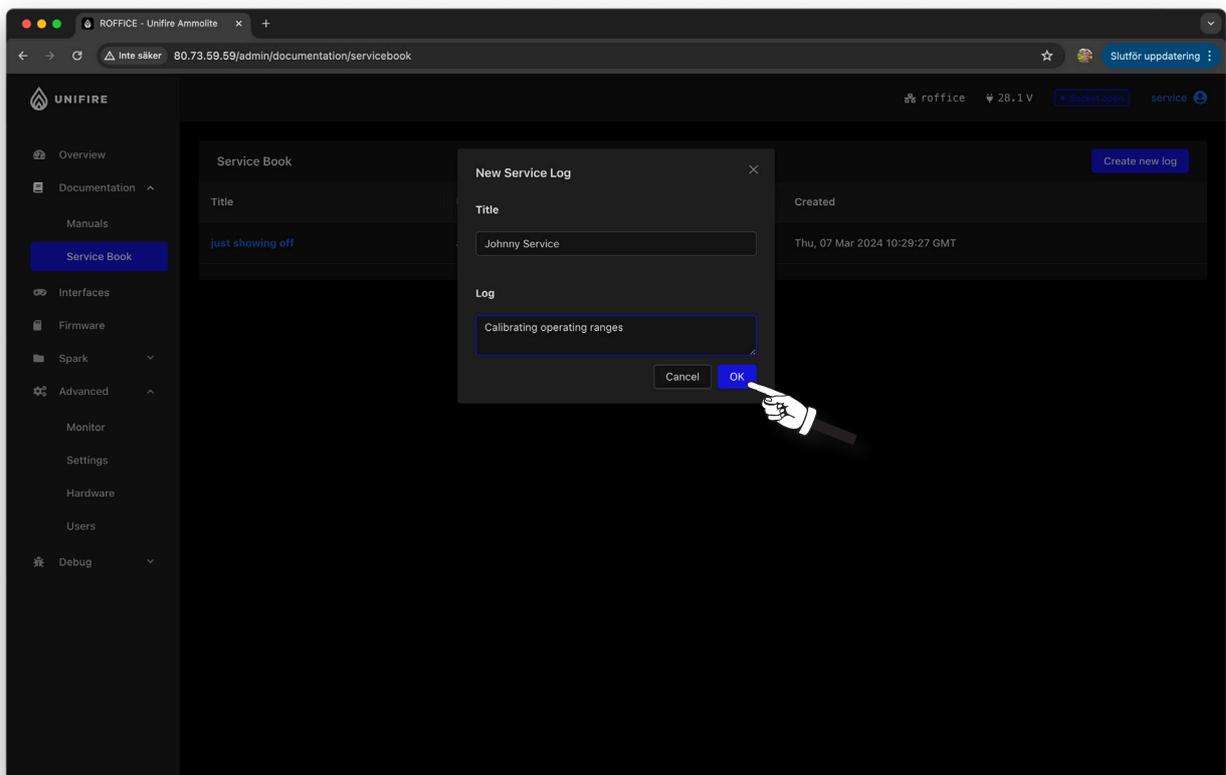
6) In this example, we write, "Johnny Service,   "Calibrating operting ranges".... Any text can be entered.
Click OK.
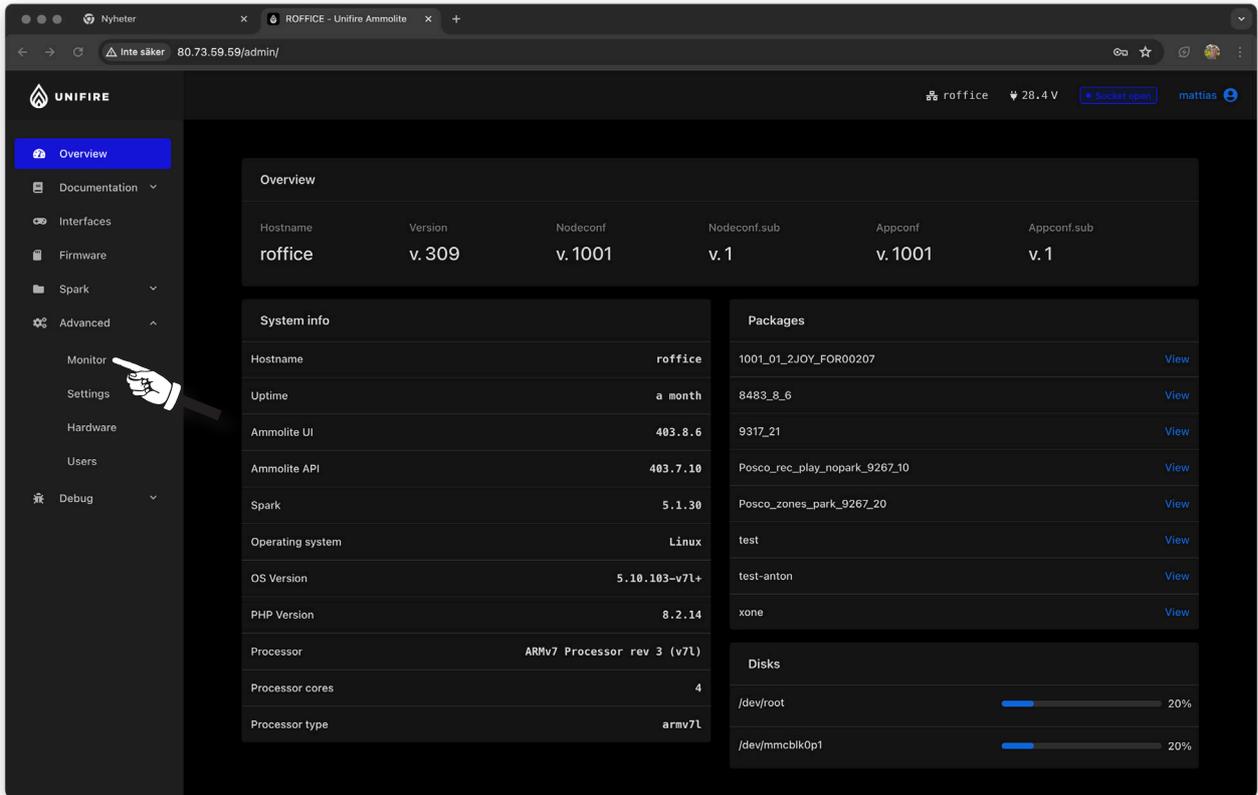
7) This opens up the start page of Ammolite. To see the system status, click Monitor
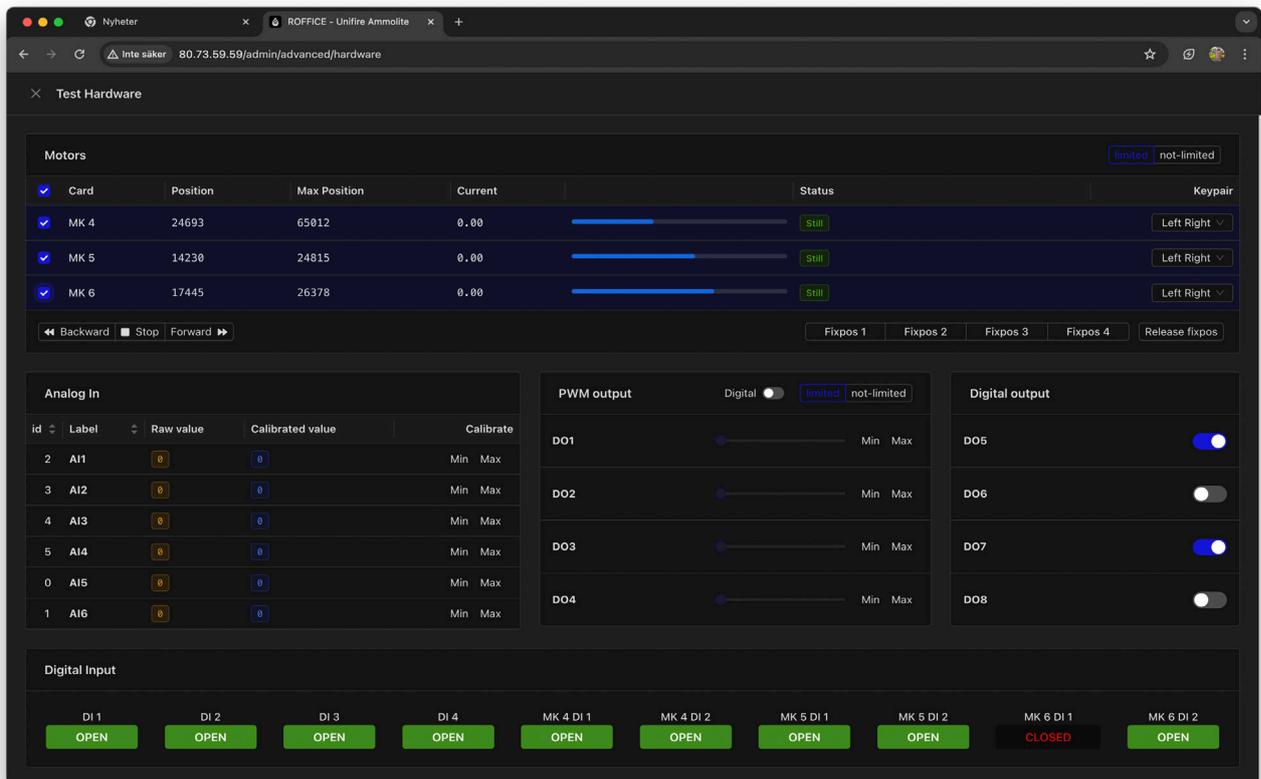
8) This opens up the system overview page. Here, you can read the position of the motors, calibrated max, see the actual real time current draw (A), and the motor status. You can also see the status of the generic digital and analog inputs and outputs. (MK4 is usually horizontal, MK5 usually vertical, and MK6 usually nozzle jet/spray.)
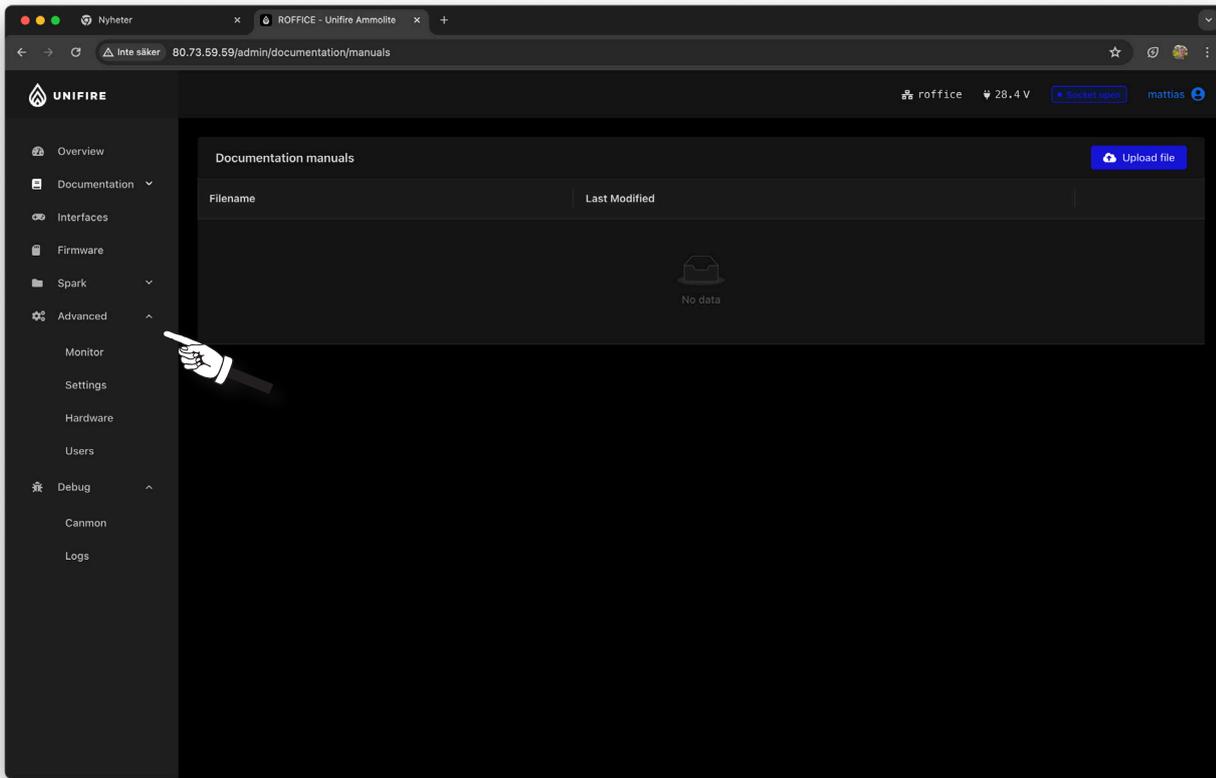
9) To open the calibration window, click "Advanced"...
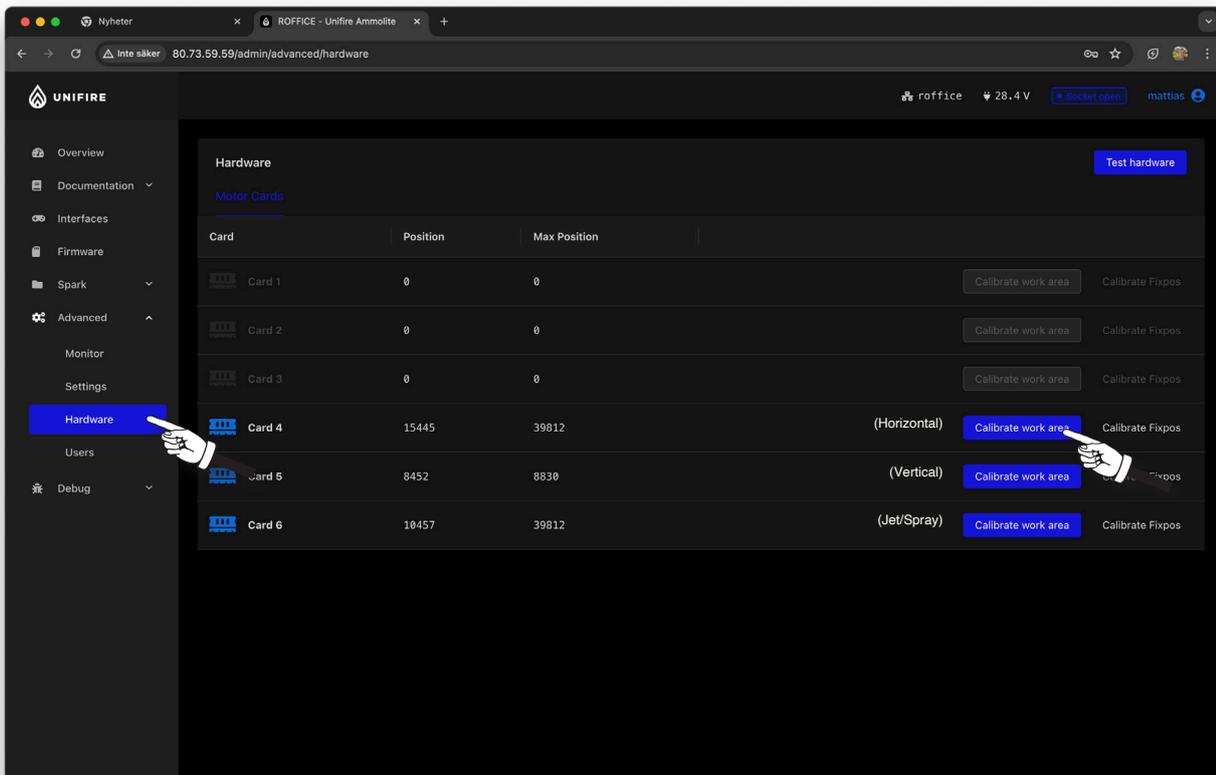
10) ....and then Hardware..., and then select a BLDC motor driver to calibrate. In this example, we start with Card 4, the horizontal motor with normal orientation.

UNIFIRE FORCE 80 Robotic Nozzle
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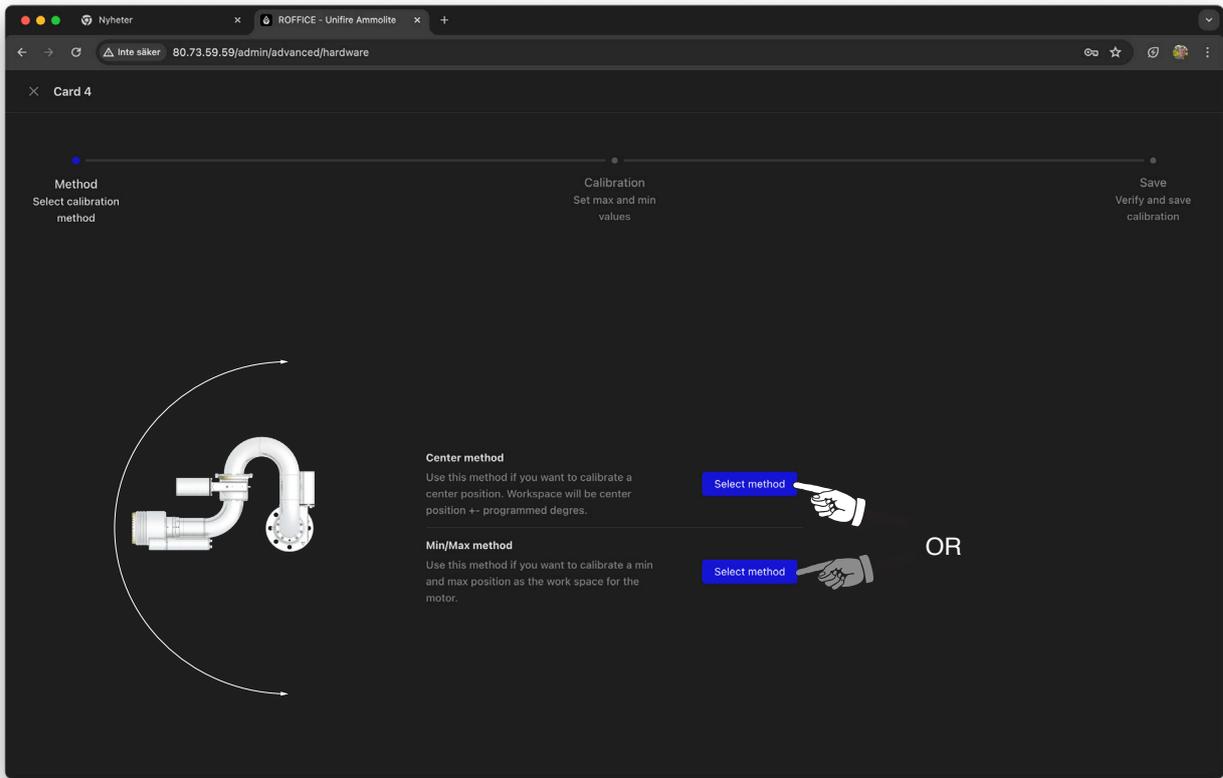
11) Now choose Center method or Min/Max method. Center method is used for special applications when the operating range is preset in the software - typically to +/-90° exactly. Min/Max allows you to set the end positions freely.
In Example 1 (steps 13-15, below), we use the Center method; in Example 2 (steps 16-20), the MIN/MAX method.
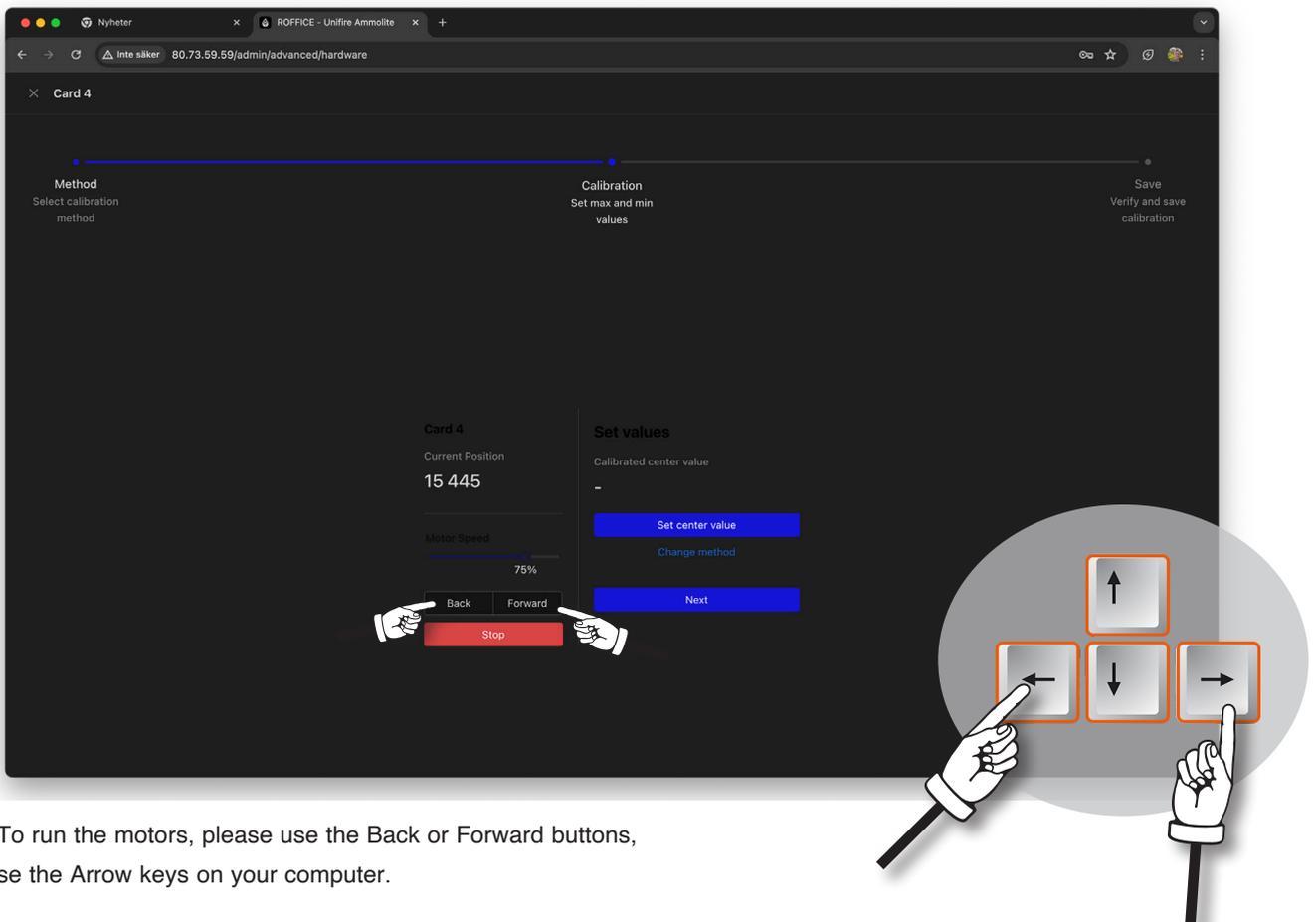
12) To run the motors, please use the Back or Forward buttons,

 or use the Arrow keys on your computer.

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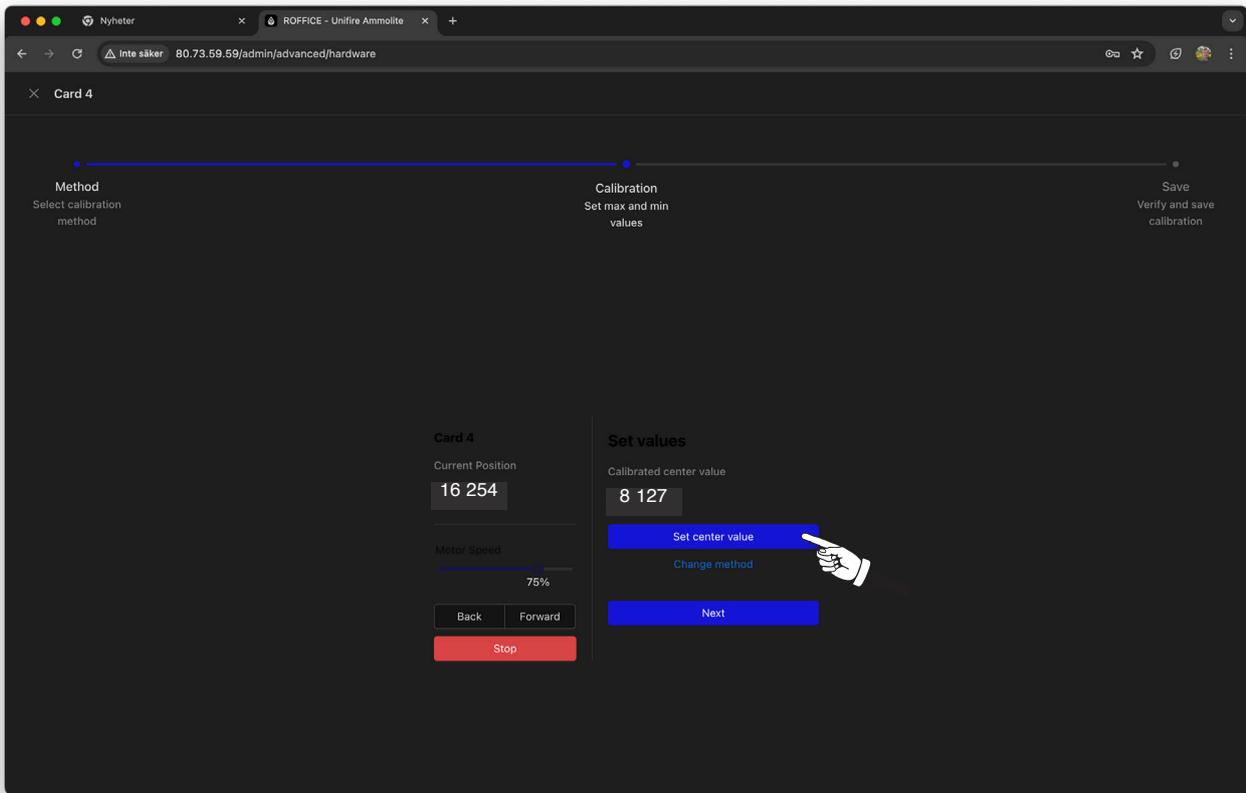
13) **Example 1, Center Method**: When you have moved the robotic nozzle to the required center position, click "Set center value". (Typically, the calibrated total range will be exactly twice the calibrated center value.)
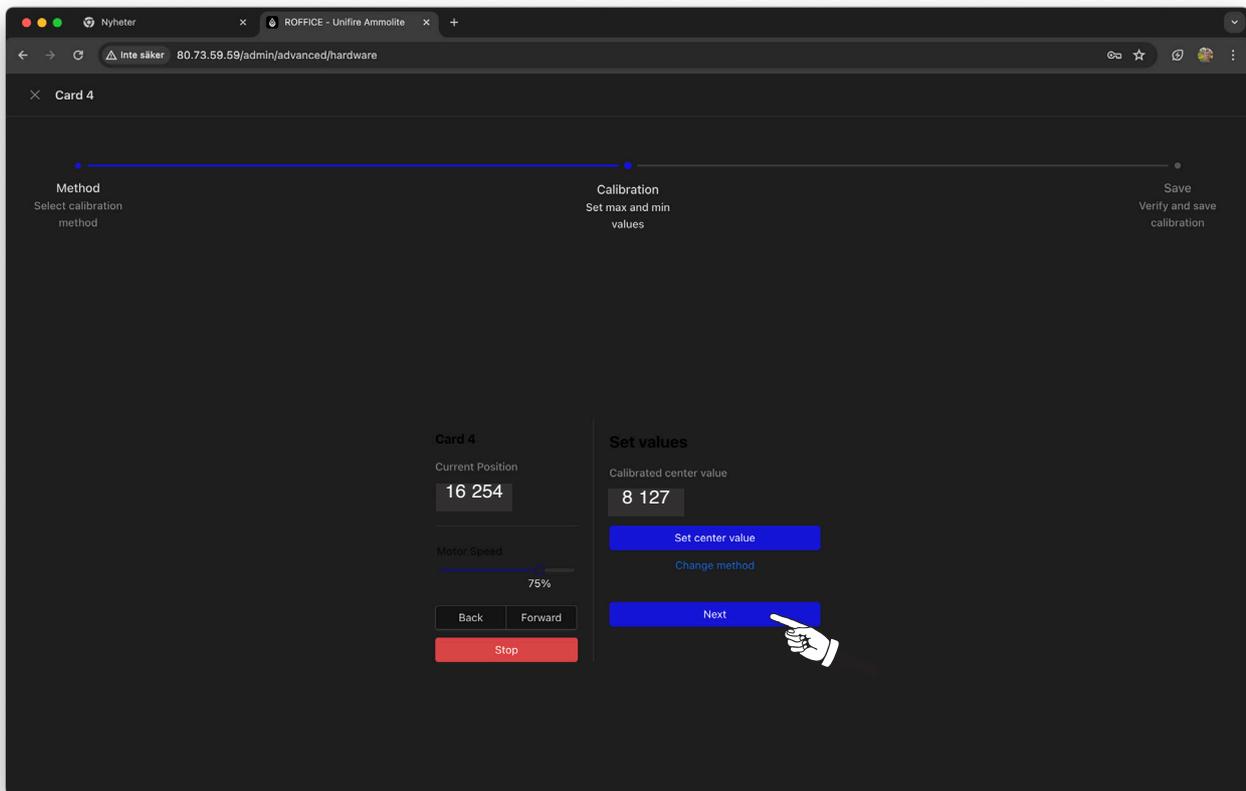
14) Click Next to exit the calibration.

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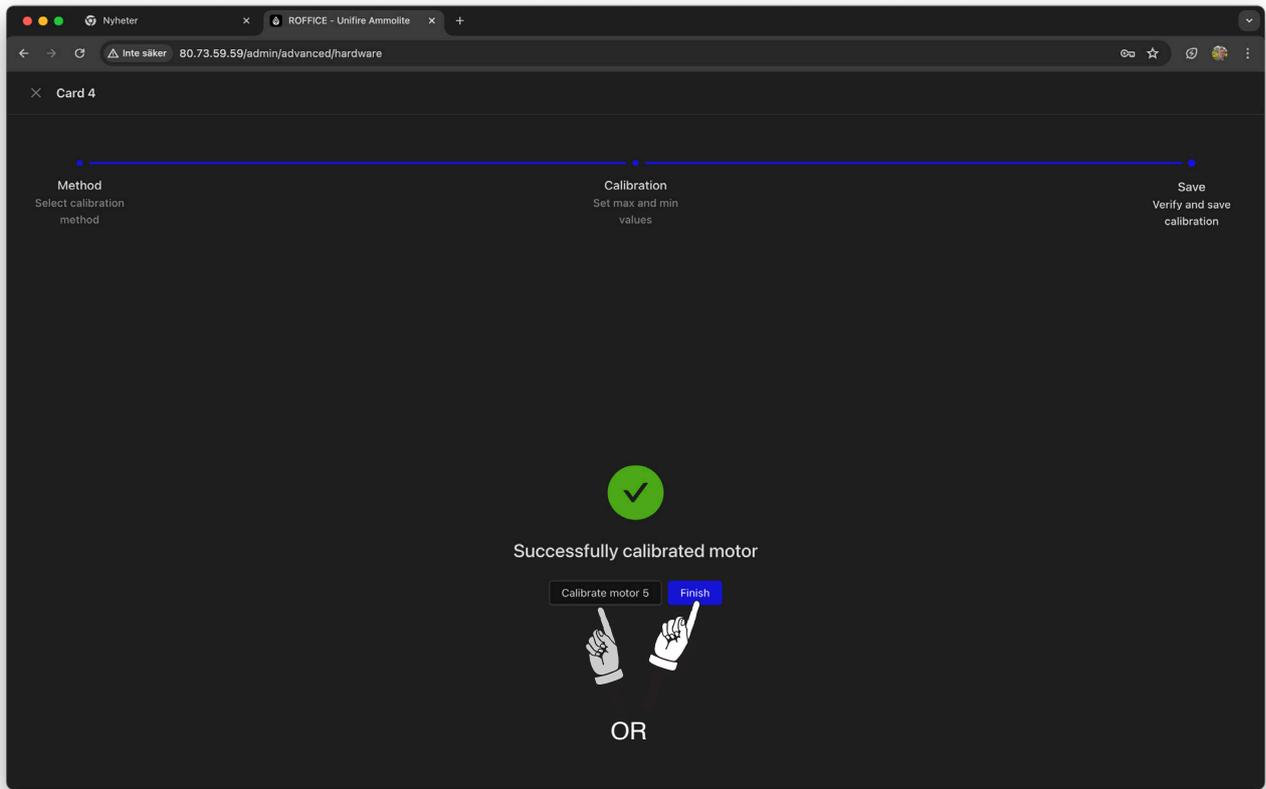
15) When you have sucessfully calibrated motor 4, you may want to continue with motor 5 (and repeat steps 12-14), or exit calibration. (Be sure that all connected motors are calibrated prior to operating the system.)
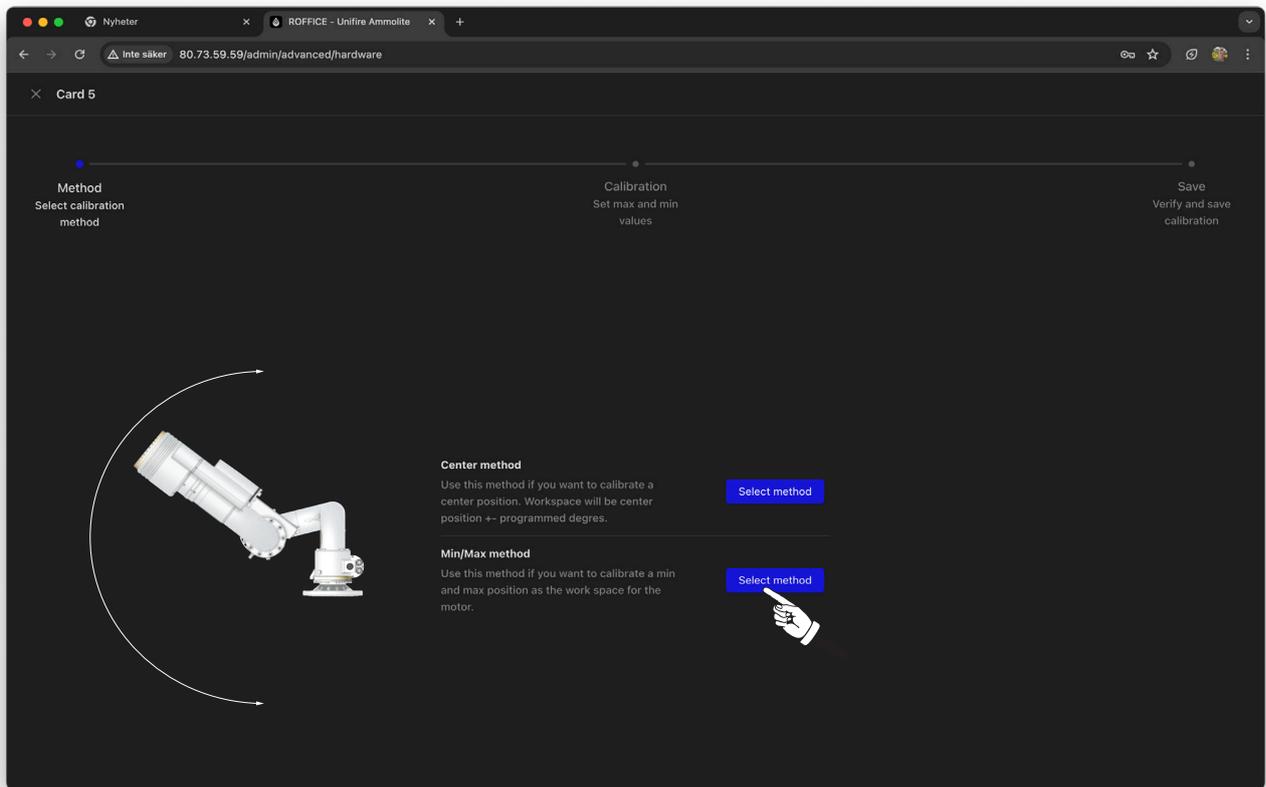
16) **Example 2, Min/Max method:** Click "Select method" next to Min/Max to proceed.

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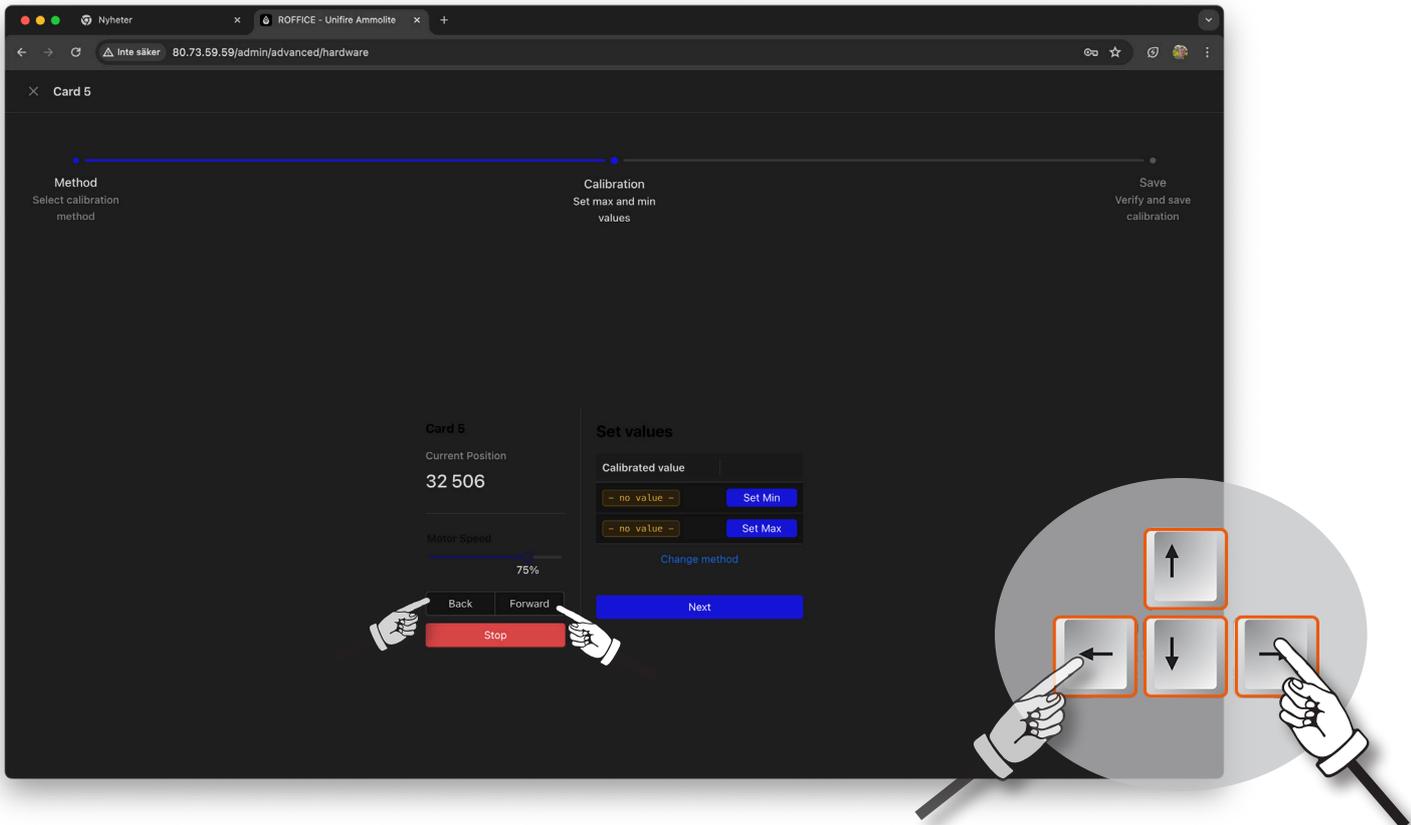
17) To run the motors please use the Back or Forward buttons - or use the Arrow keys on your computer.
Move the robotic nozzle to the required minimum position.
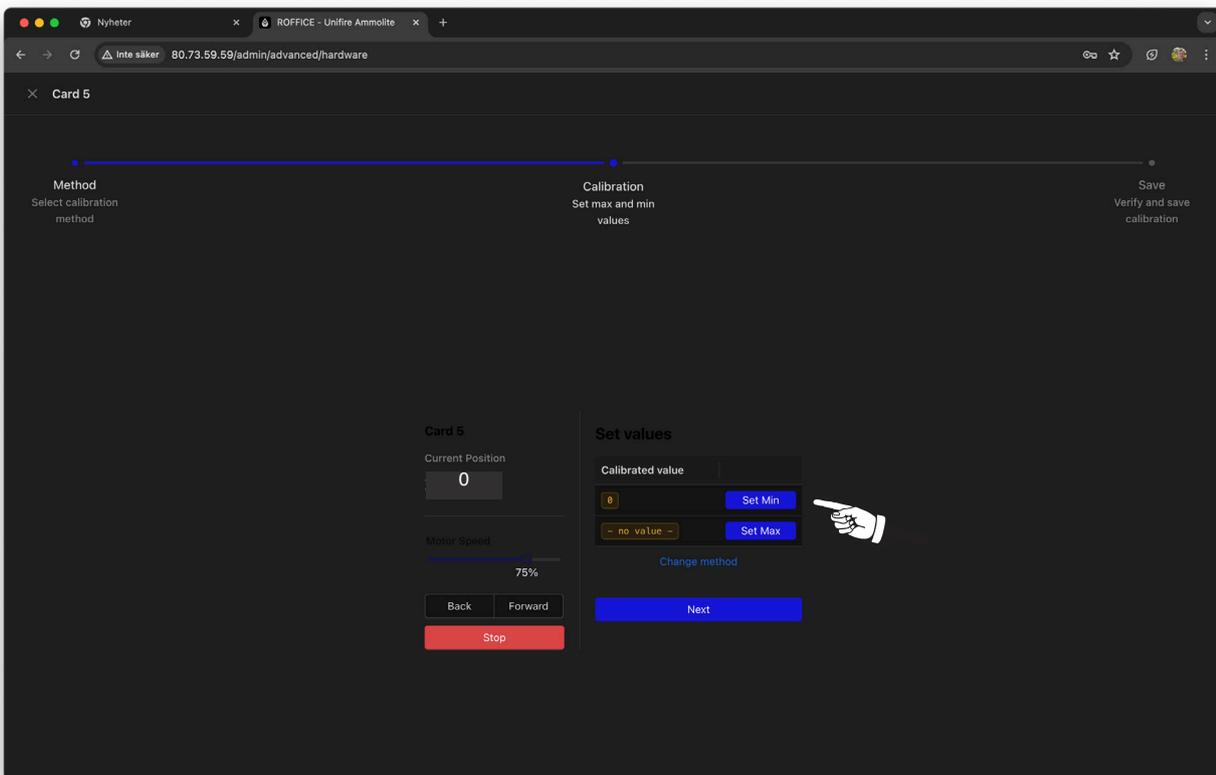
18) Now save and set the minimum value (it will be zero (0))/

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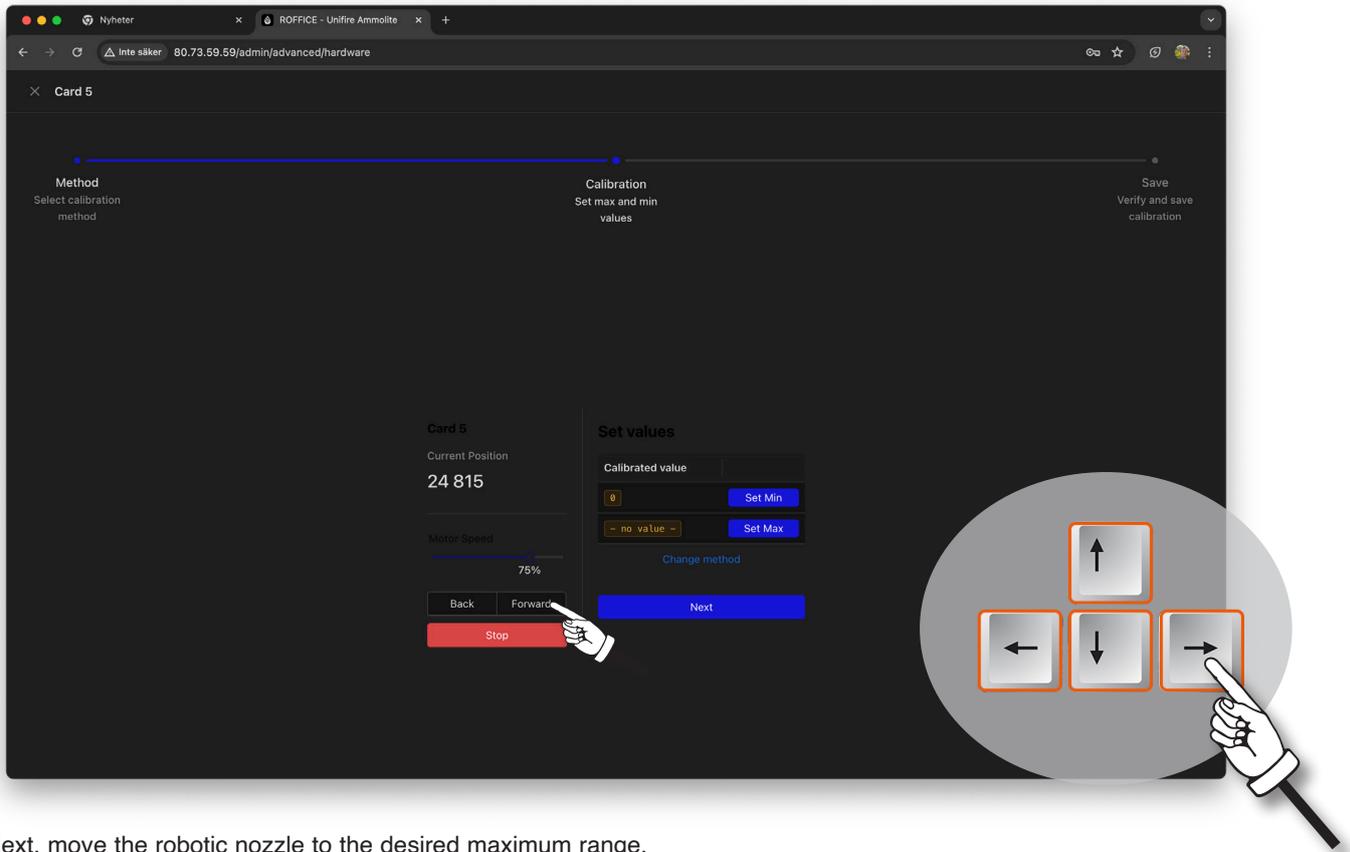
19) Next, move the robotic nozzle to the desired maximum range.
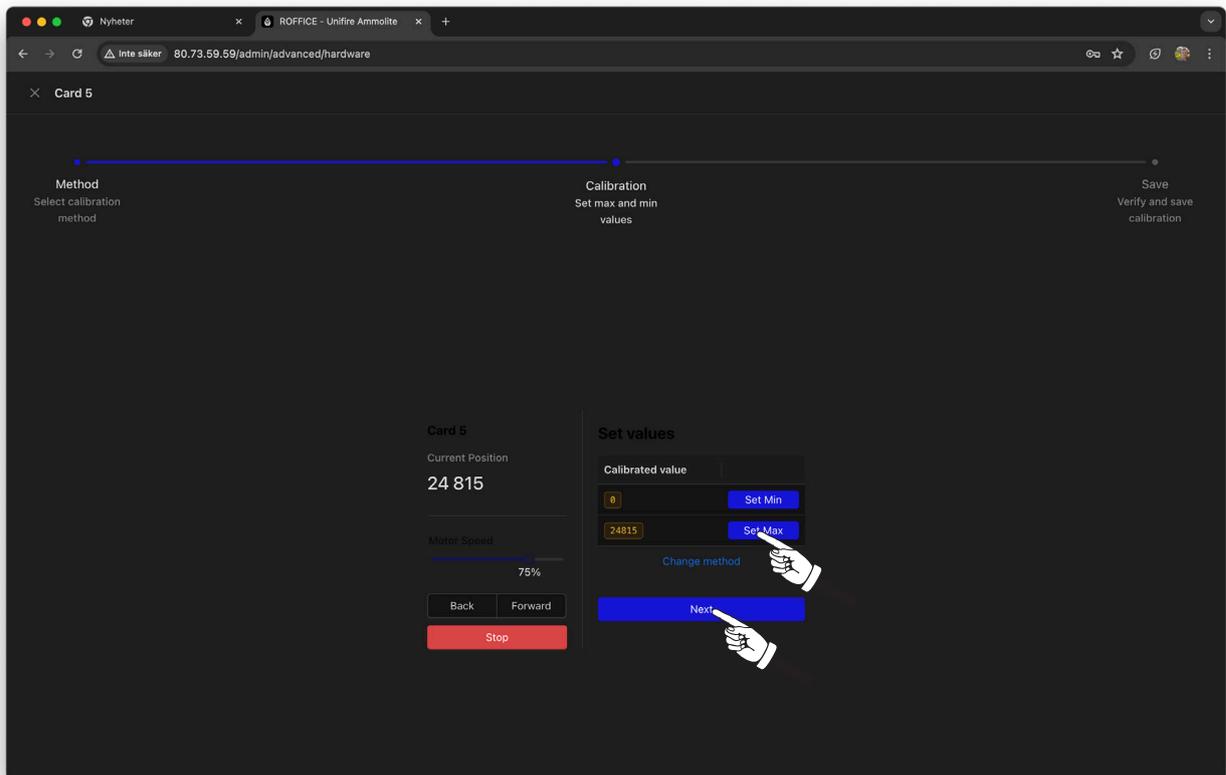
20) Click Set Max. Set Max calibrated value and the Current Postion will read the same value. Click Next to exit.

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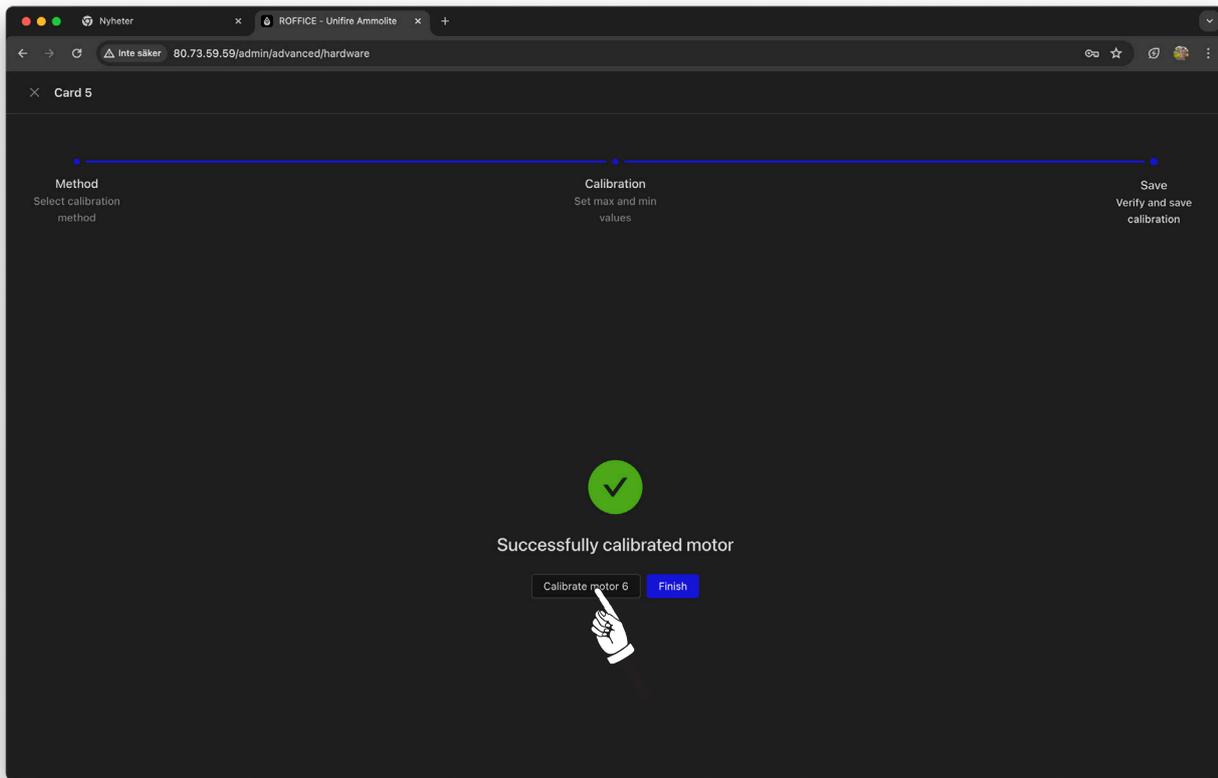
21) **INTEG Nozzle Tip Calibration:** Next, calibrate the INTEG jet/spray nozzle motor (typically, motor 6).
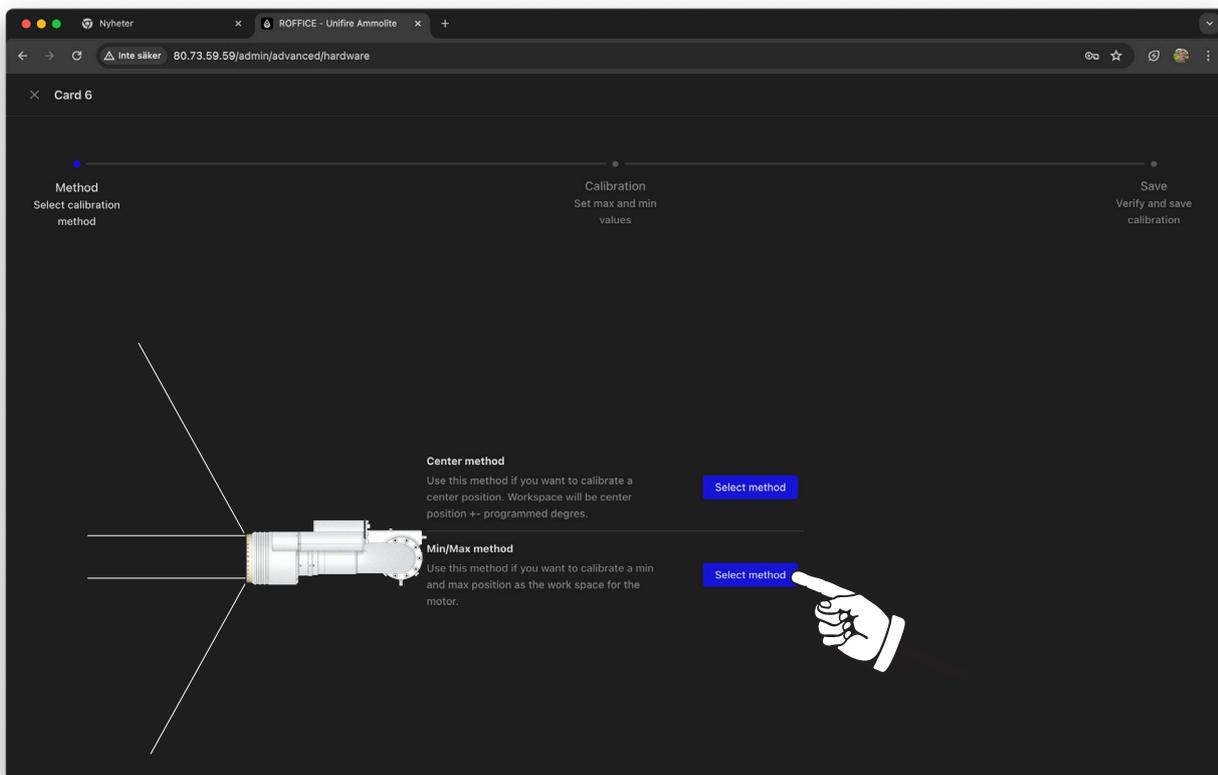
22) The INTEG nozzle motor is always calibrated using the Min/Max method (*not* the Center method).

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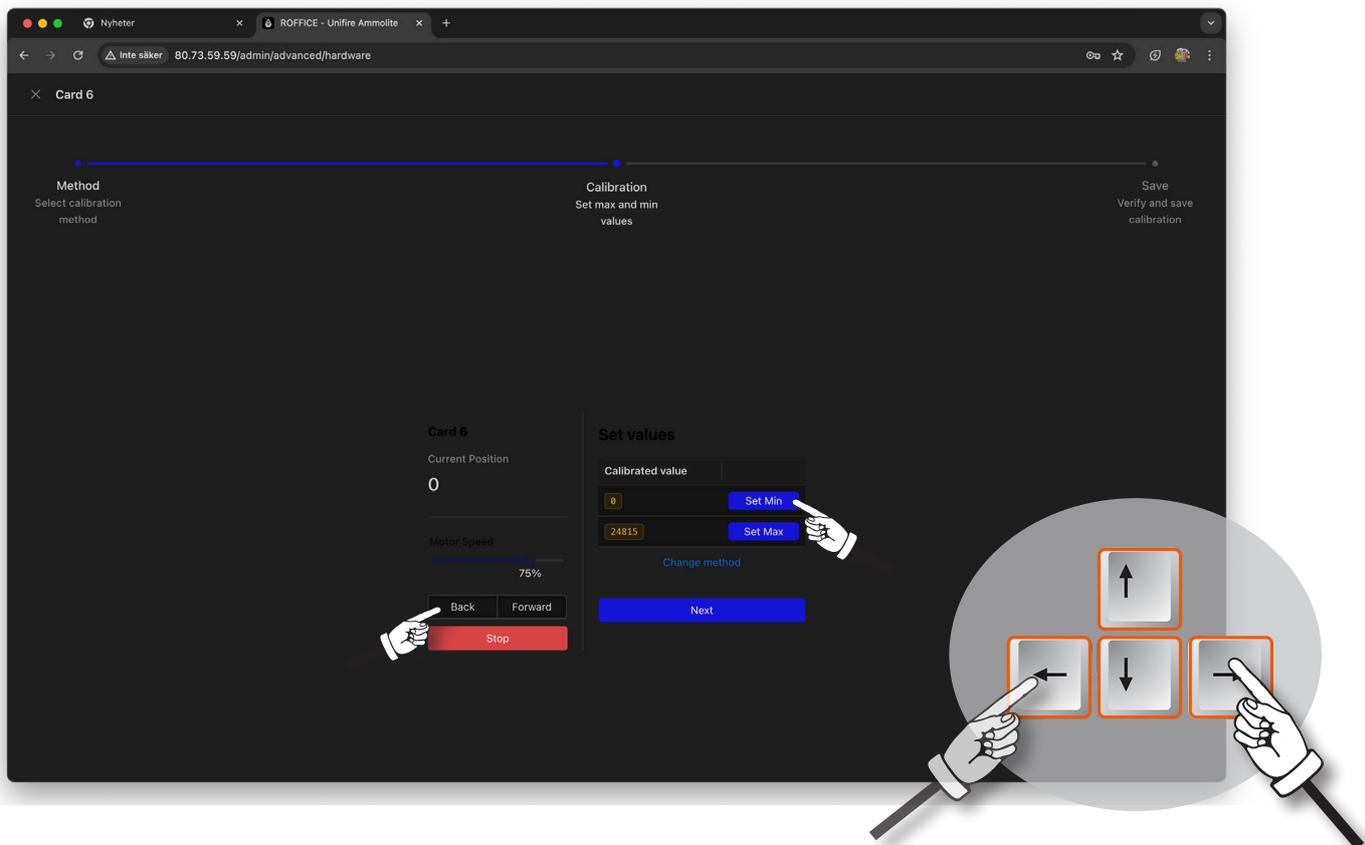
23) Run the motor to the Min (minimum) position, which is fully retracted and provides the widest spray angle). Click Set Min.
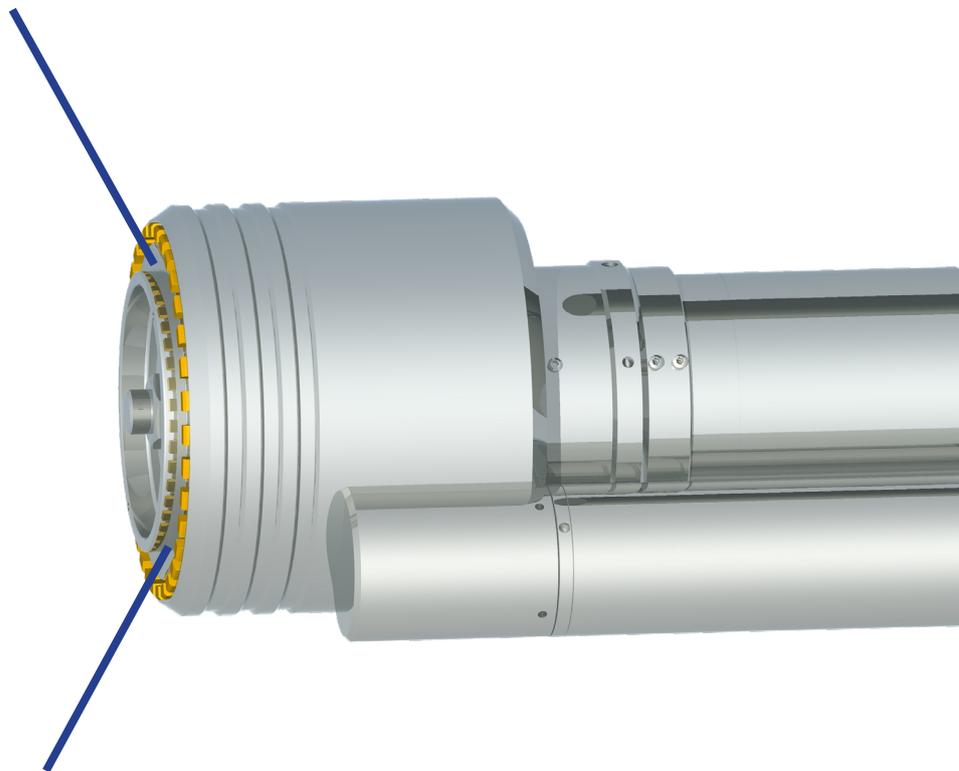
Set the nozzle minimum (Motor 6), to stop just before the mechanical stop.

This is effectively selecting the widest/maximum spray angle,

and here you can limit the maximum spray allowed, as appropriate.

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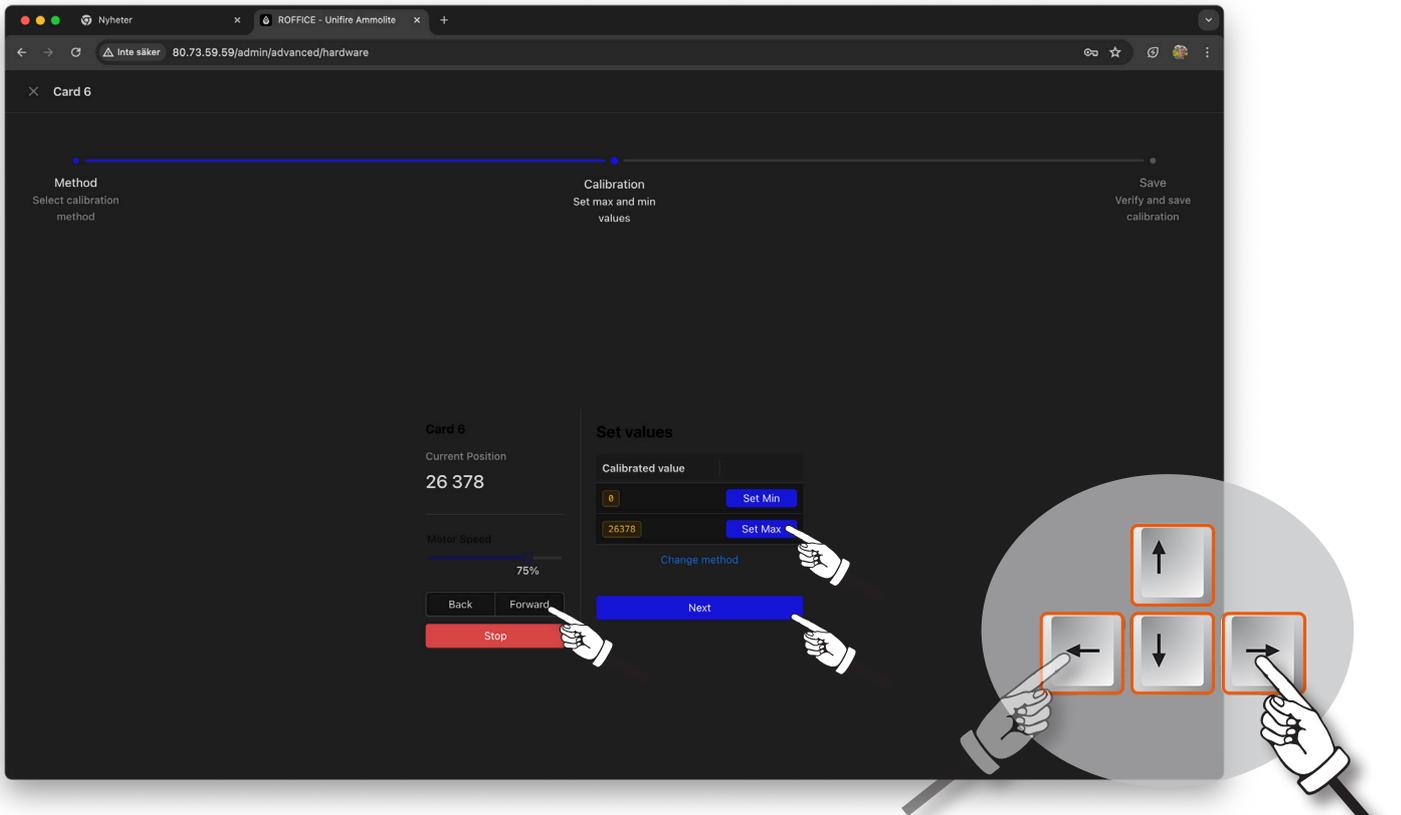
24) Run the motor to the Max (maximum) position desired. In the fully extended position, the nozzle tip provides the narrowest jet stream. **Note**: as with the other motors, if you intend to set the position to the fully minimum or maximum position, do not set the Min or Max position to the very end of the mechanical stop; rather slightly retract it from the extreme mechanical stop, in order to avoid mechanical wear and tear. When satisfied with the Max setting, click Set Max. Exit by clicking Next.
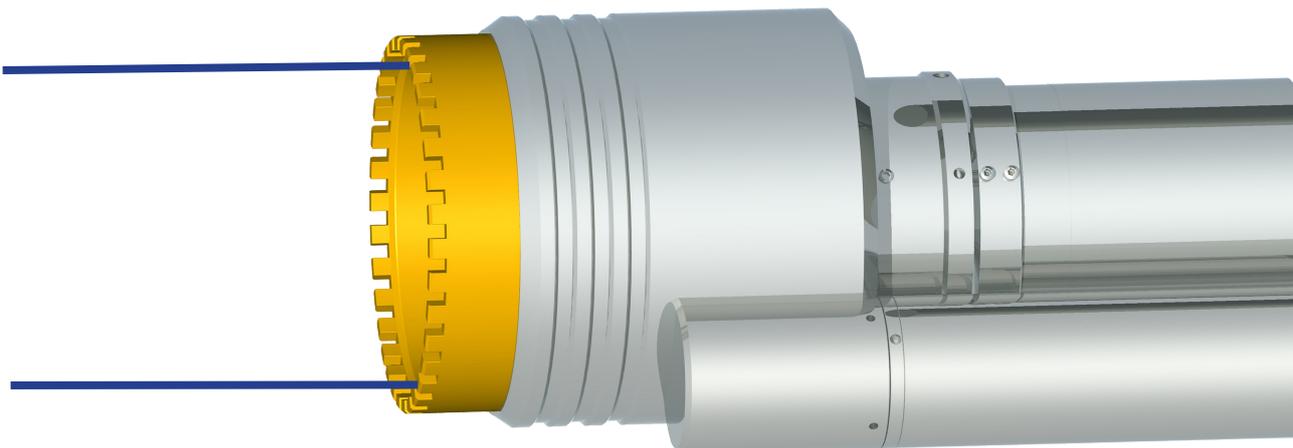
Set nozzle maximum (Motor 6), just before mechanical stop.

This is effectively selecting the straight stream.

Here you can block the straight stream by setting the

Maximum to, for example, 10° spray, and thereby fully avoid using a straight steam.

This is useful when the required reach is short, and you want to avoid a hard-hitting straight steam all together.

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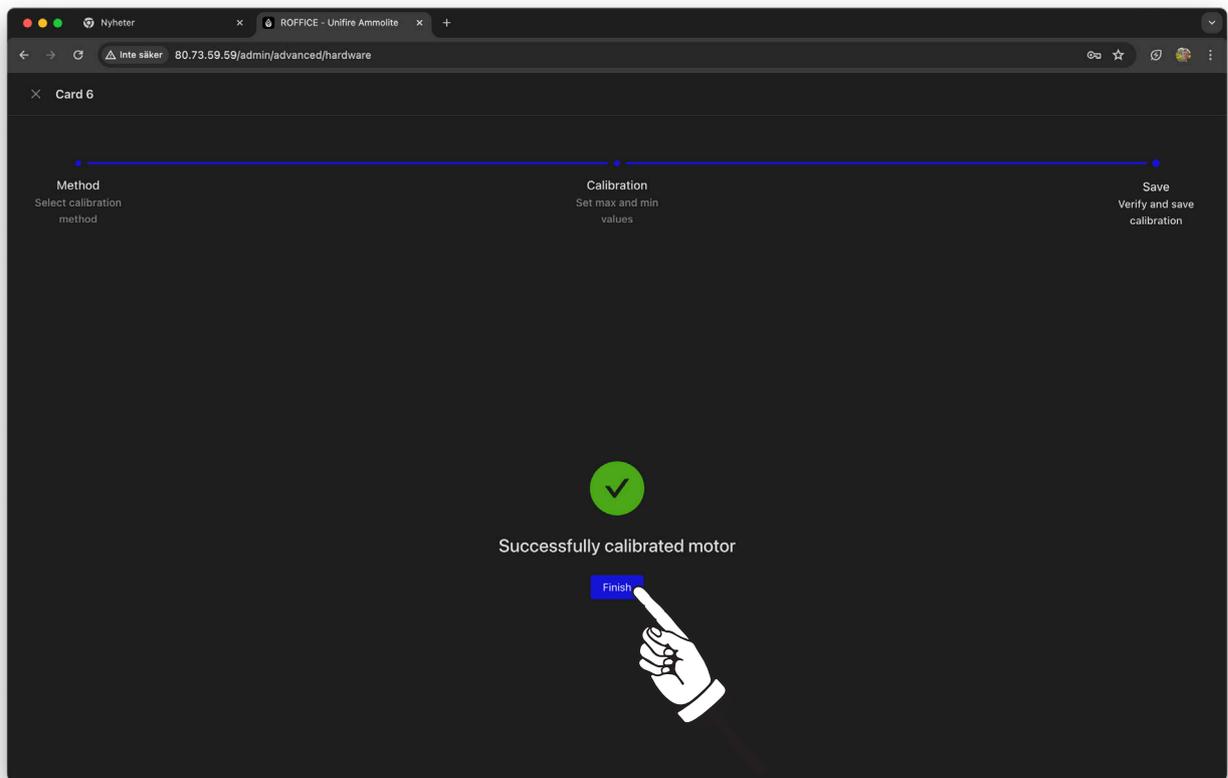
25) Now when you have successfully calibrated all three motors, please click Finish to Exit.

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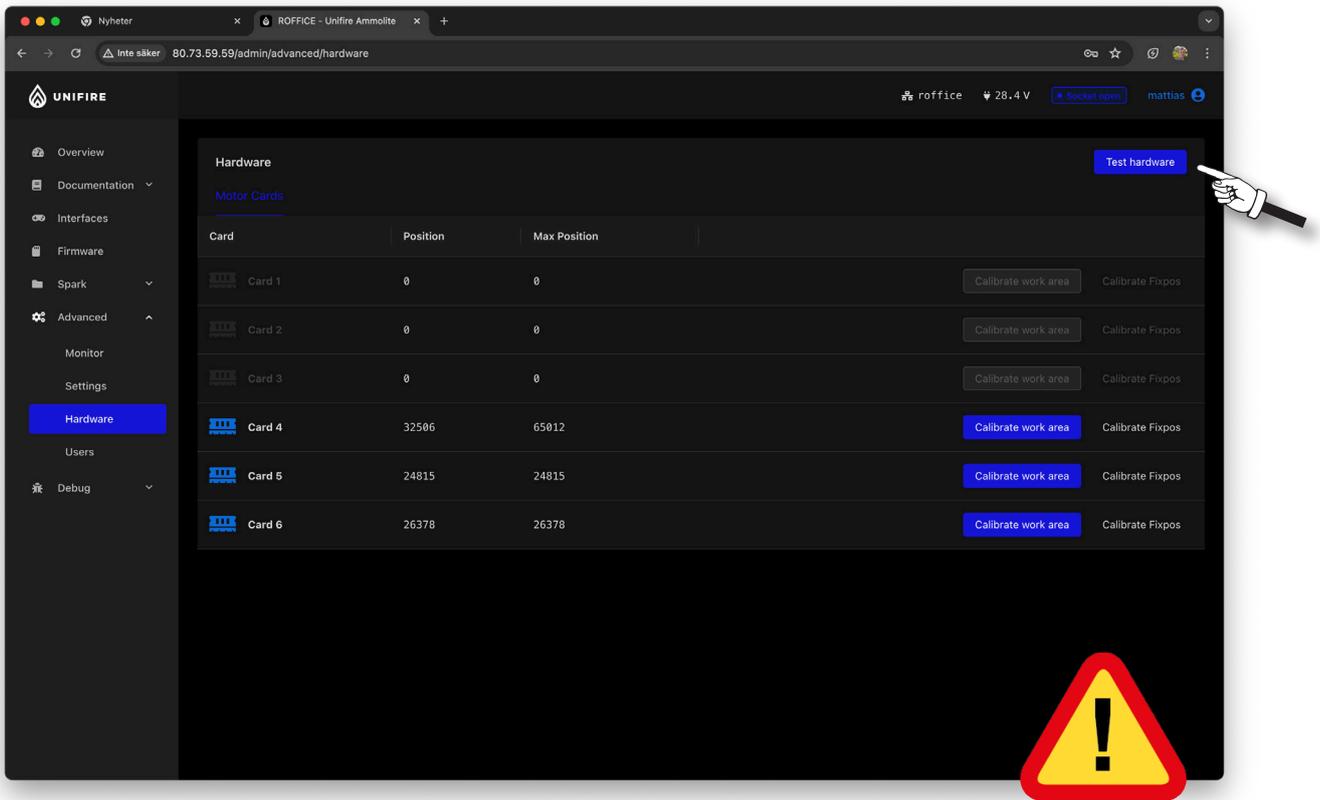
24) Next you can test the motors and the calibrated range directly form your PC. From the Hardware tab, please click Test Hardware. **Please note that "Test Hardware" blocks any other Joystick or controller connected to the system. Hence, you must remeber to exit this view when done.**
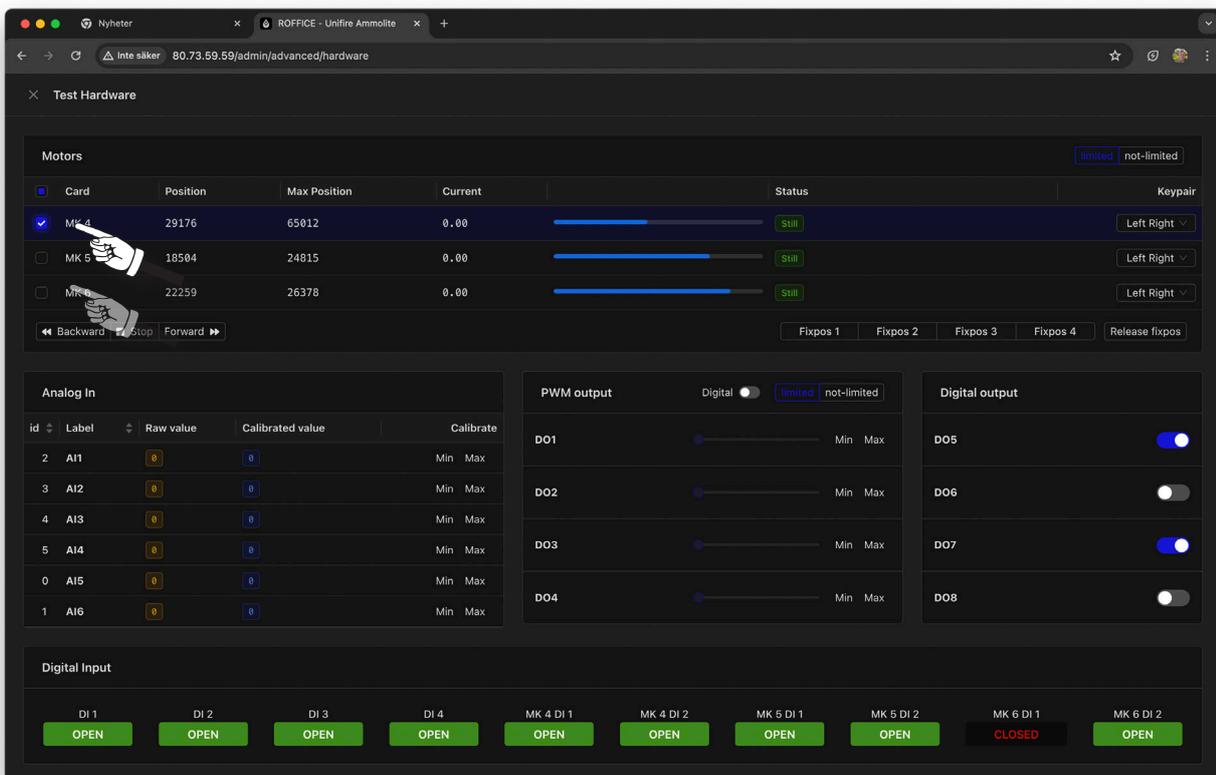
25) Check the boxes for each motor you want to run. Select one or several motors.

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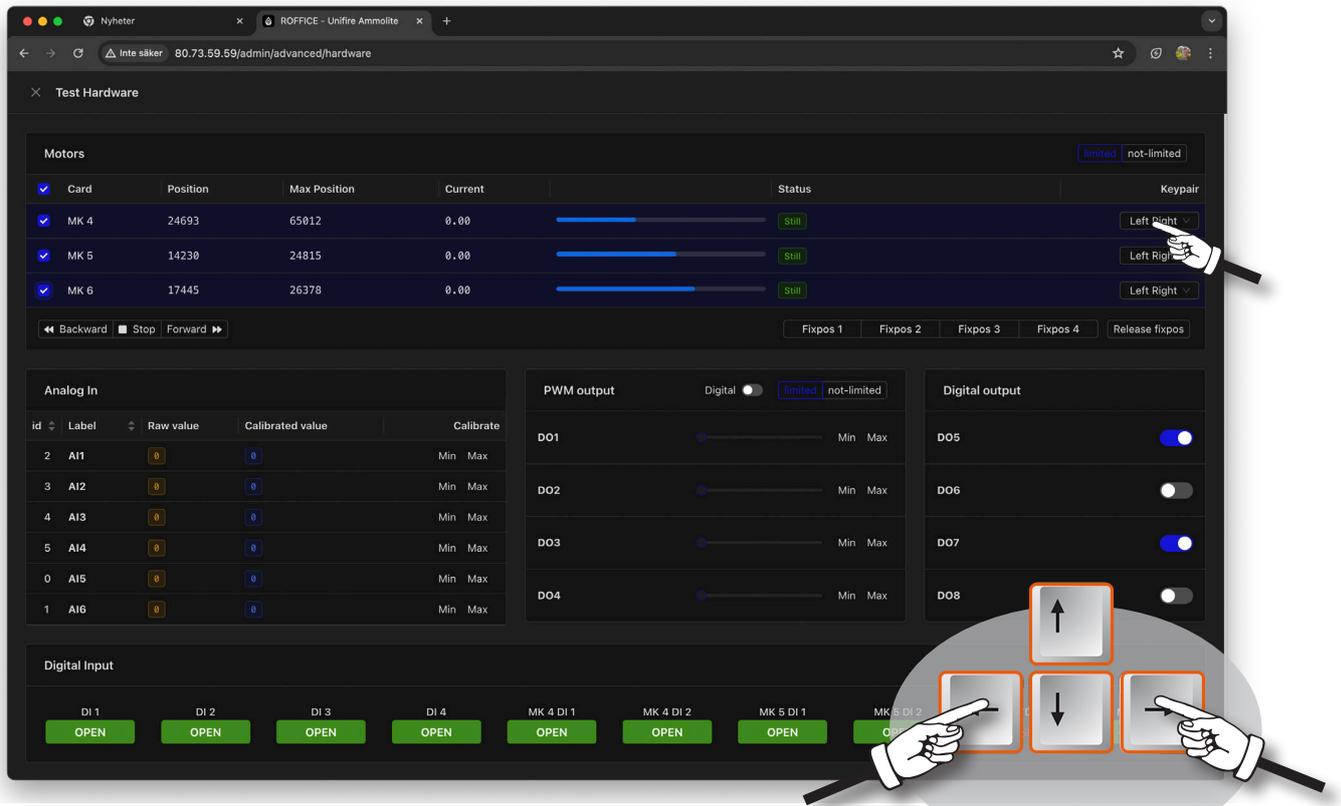
26) Now you can run the motor with the selected key pair. The Left/Right arrows on your keypad are set as the default.
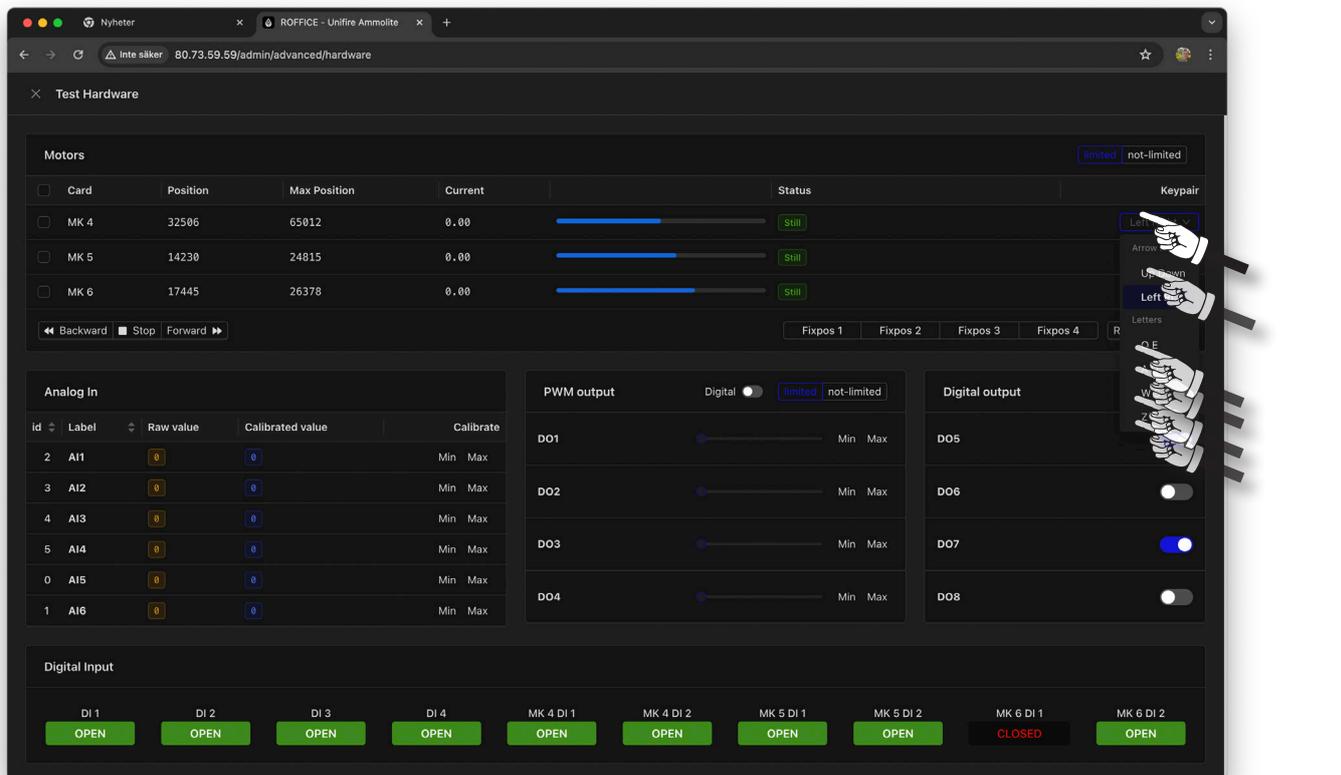
27) .... but you can choose a different Key-pair for each motor

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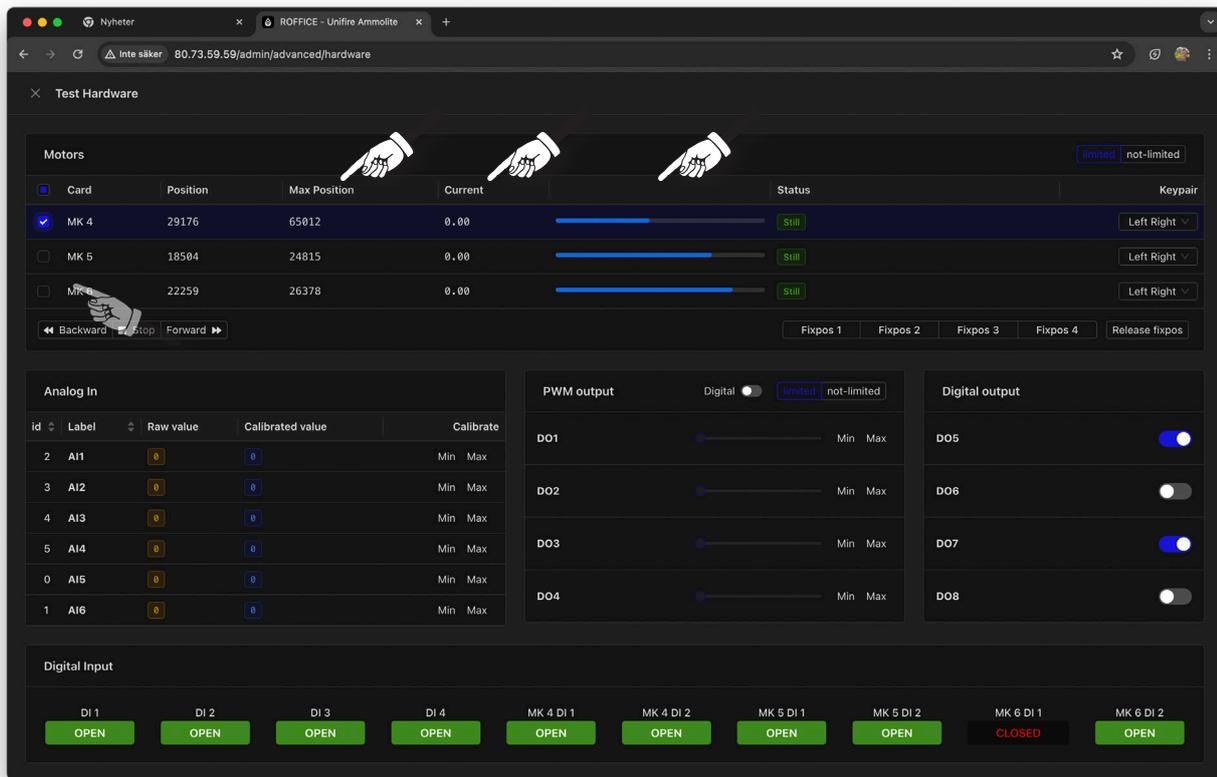
25) When you run the motors, you can read the absolute positon on pulse-level, and you can see the real time current draw for each motor. The blue bars show the current real time position in relation to the calibrated range.

The other information dispalyed in this view is regarding the status of the analogue inputs, PWM outputs, Digital outputs and digital inputs. The TARGA PLC is a generic piece of hardware that is highy capable of supporting auxilliary componenets and devices. It can be an analogue joystick, a level gauge or pressure gauge, or any other analogue signal connected to the TARGA PLC.

Connet push-buttons or relays to activate zoned resposnes, control valves and/or get postion feedback from potentiometers and limit switches.

You can read the status of the PWM outputs, the digital outputs, and, at the bottom, you see status of the digital inputs.

The TARGA PLC is a very capable PLC, with plenty of generic functionallity making it suitable for custom system designs, projects and solutions. The TARGA PLC electronic hardware and software have been developed by Unifire for industrial robotic nozzle systems for use on vehicles, in fixed industrial applications, and on ships and other marine and off-shore applications.

Please contact Unifire for more in-depth information and training.

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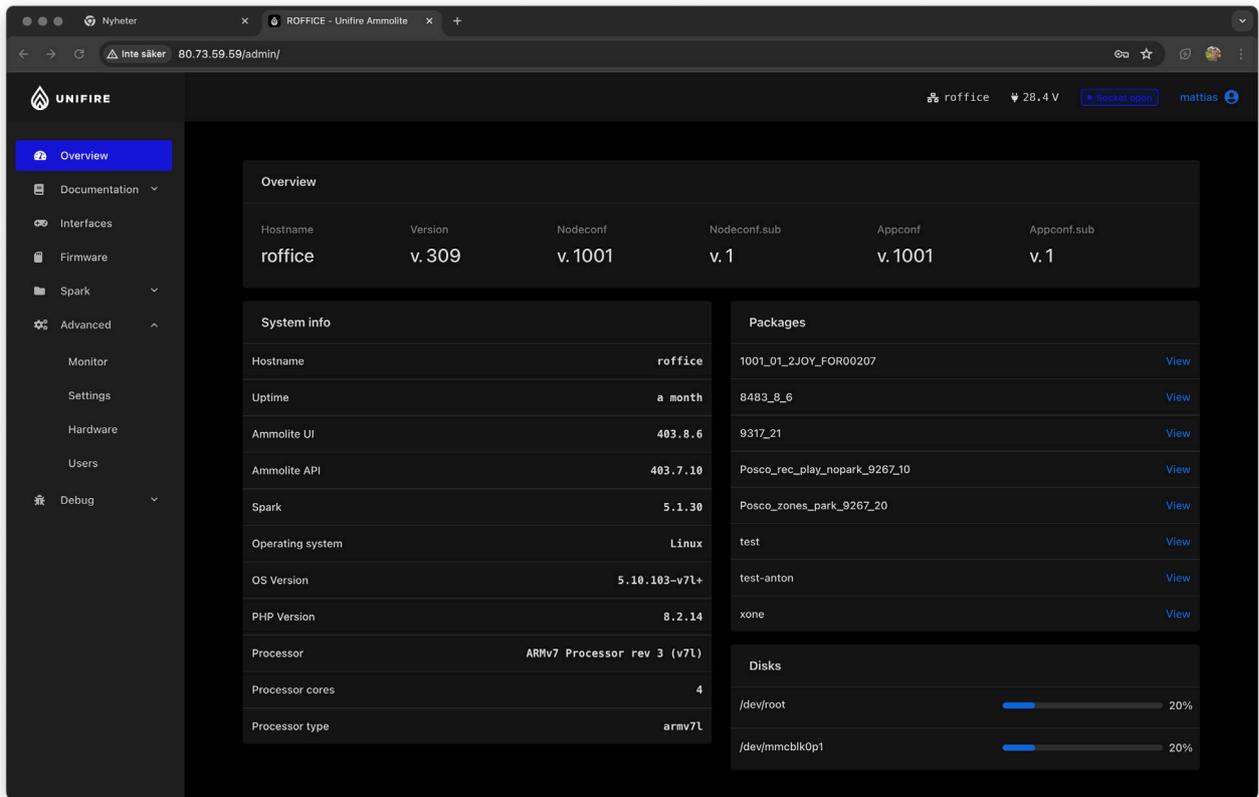
26) Calibration is now complete and you can exit Test Hardware and Ammolite.

*REMEMBER to check that you have exited the "Test Hardware" view, as described in step 24, above.
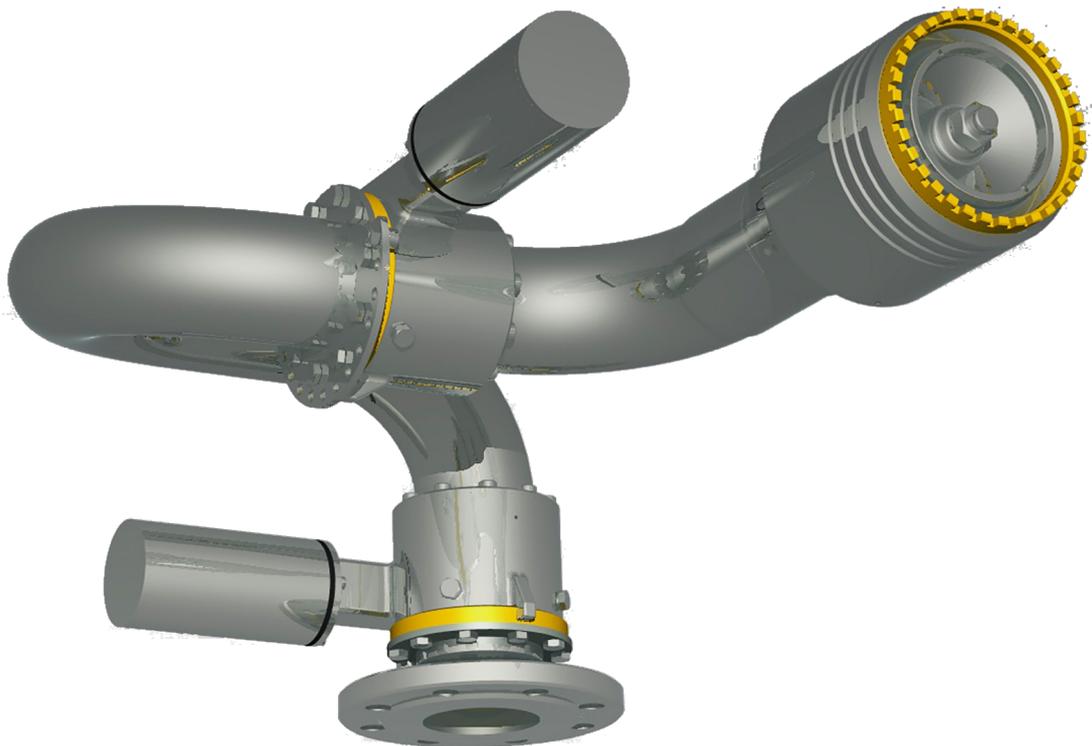
Manual Joystick operation

The FORCE 80 robotic nozzle can be manually operated in various ways:

• With a cable connected Canbus Joystick

• With the Unifire ONE App on a smartphone or Tablet

• With the Unifire ONE Web / PC

• With the ONE-DIRECT floor plan graphical aiming

• From a hand-held industrial remote control (Hetronic ERGO-S or similar)

The PI Canbus Joystick

is a convenient fully self contained device that can be hand. held or be installed in a dashboard or control room.

How to operate

Push the ON button to activate the Joystick - this will take over control from any other manual or autonomus system currently in control.

Move the Joystick in the desired direction to manually operate. The speed is proportional to the angle.

Rotate the tip of the joystick grip to control the nozzle spray pattern.

The LED's indicate the position of the Robotic Nozzle relative to the calibrated operating range.

VALVE will open/close the valve (if connected)

PARK will send the Robotic Nozzle to it's predefined parking position

AUX 1 is a generic button for custom fuctions

AUX 2 is a generic button for custom fuctions

REC - push REC to start recording a sequece - including velocity changes, pauses, nozzle spray pattern for up to 3 minutes. Save by pushing REC again.

PLAY - push PLAY to run the recorded sequence. Abort playback by simply taking over with the Joystick manually (or pusch PLAY again)

Setting a new PARK position

With the Pi Joystick, move the robotic nozzle to the desired PARK position. Turn the Joystick OFF (= green LED goes out). Press and hold the PARK button, while turning the Joystick back on. A new PARK postion has now been set.

UNIFIRE ONE App

The ONE App provides exactly the same functions as the PI Joystick.
With the added conveneince of being wireless, and the controller is
always in your pocket, always ready.

Several ONE Apps can be assigend to the same system, allowing
multiple operators to have the abillity to take control instantly.
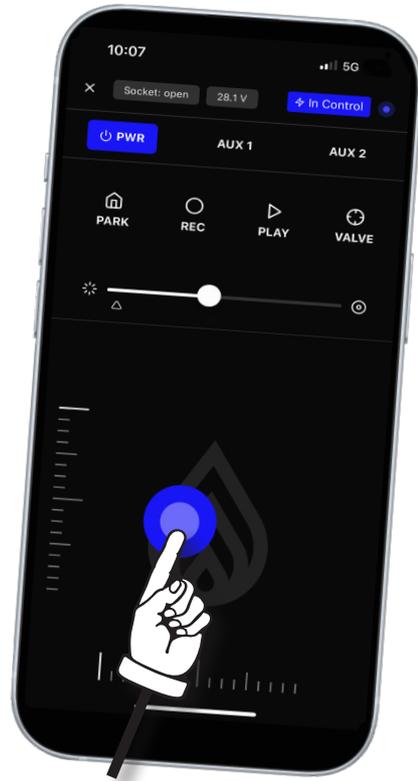
To get started:

Download the UNIFIRE ONE app from App Store or Google Play

Open the App. Click the add connection icon.

Enter the TARGA IP address or URL.

You can add several systems to your ONE App, alowing the control of a large number of systems directly from your phone.

You can assign nicknames to each unit

Click to choose which system to control. Click PWR to activate the ONE App. The "In control" button is used to take control,
if another App, Joystick or high level system is currently in control (for exaple an autonomous Flameranger system)
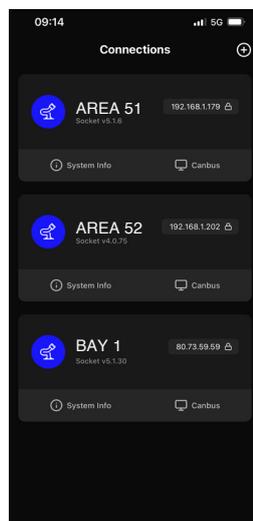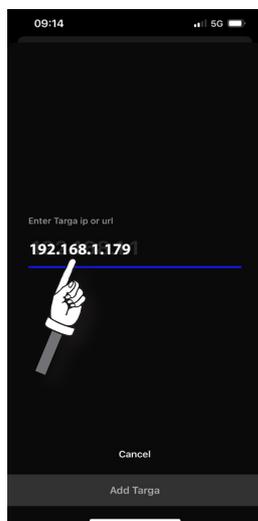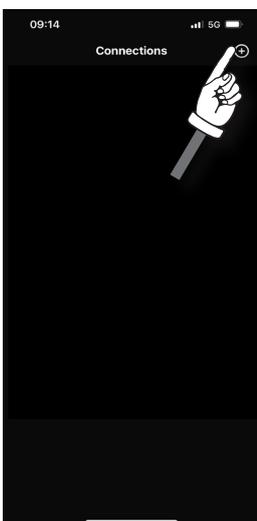
Maintenance, Testing & Inspection Schedule

The following are Unifire's minimum recommendations for the proper maintenance, testing and inspection of Unifire's Force robotic nozzle systems and FlameRanger autonomous robotic fire suppression systems.

It is important to note that some components delivered by Unifire are manufactured by third parties, and those components should be maintained, tested and inspected according to the respective manufacturer's recommendations. Moreover, the proper function of Unifire's equipment depends on the proper functioning of other third-party systems and components, such as valves, pumps, piping, foam proportioning systems, continuous and proper electrical supply to all system components, etc.

Due to the importance of properly-functioning fire safety equipment, Unifire strongly advises strict adherence to the recommendations below, as well as the proper maintenance, testing and inspection of all other components of the fire fighting system, of which Unifire's equipment is only a part. In that regard, please refer and strictly adhere not only to Unifire's recommendations set out below, but also to the recommendations of third-party manufacturers' components delivered by Unifire, as well as to all relevant local and international requirements (including, when used on ships, MSC.1/Circ. 1432 and MSC.1/Circ. 1516, as amended; see also: LASH FIRE D10.3 Report starting at page 89).

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BALLUFF
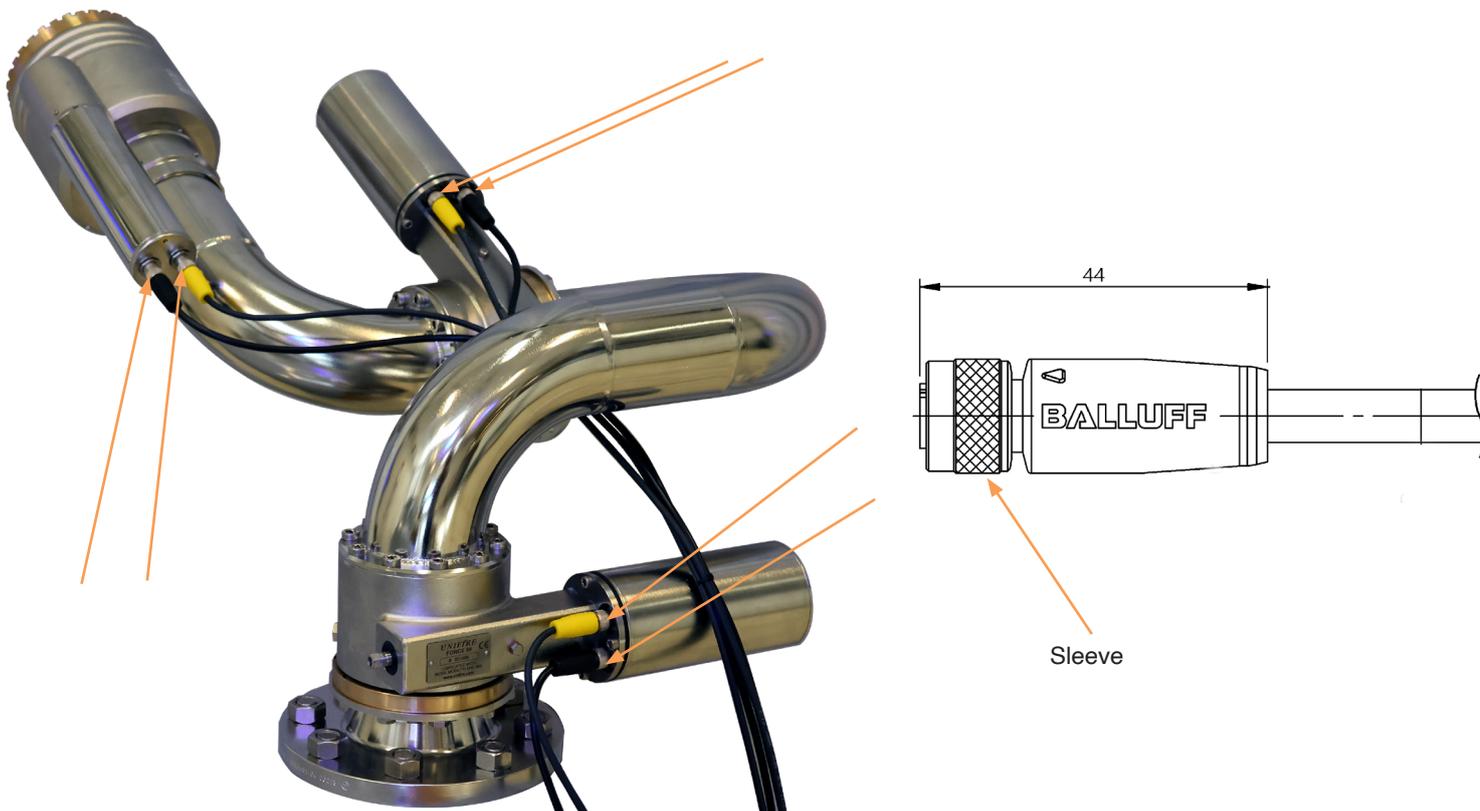
Sleeve

PLEASE NOTE

It is very inportatat that the M12 connectors be properly tightend **by hand;** do <u>not</u> use any tools to tighten them.

The M12 connector is fitted with an O-ring to provide a perfect seal when properly installed.

If the sleeve is left loose, water will enter the connector and cause corrosion.

If over-tightend, such as with a pair of pliers, the sleeve may easily break.

It is recommended that **every three (3) months (quarterly)**:

· Inspect the <u>connectors</u>. A drop of WD40 can be applied to the pins to ensure longevity.

· Inspect the <u>cables</u> for any mechanical damage.

Time Interval	Type of System	Action
Monthly	Force remote control fire monitor system	Briefly run the Force remote controlled fire monitor in all axes (directions) and adjust the spray pattern several times to "exercise" the gears to prevent gear locking. This should be done without the use of water. Ensure the proper function of all system joysticks and controllers, including all functions thereof.
Quarterly	Force remote control fire monitor system	Visually inspect the monitors' motors, motor cables and connectors to ensure they are in good condition. Open the motor cover to make check for moisture. Dry clean and spray with some WD40 or similar if required. (See pages below and see: https://youtu.be/3CIE1Zt-pZE?si=ZxJnojPk2r29gJMu) Inspect exterior and interior of X-TARGA PLC; ensure that the interior is dry and clean and all electrical contacts are properly connected and that the seal is in good condition.
Annually	Force remote control fire monitor system	Verify the proper operation of the Force fire monitor system by flowing water and confirming full coverage of the area it is intended to protect. Ensure all piping is thoroughly flushed with fresh water after service. Visually inspect all accessible components for proper condition. Flow test all pumps for proper pressure and capacity. Verify all pump relief valves, if provided, are properly set. Examine all system filters/strainers to verify that they are free of debris and contamination. Clean surfaces of the monitor, nozzle tip and cable connections. Test emergency power supply switchover, where applicable. Check for any changes that may affect the system such as obstructions.
5-year	Force remote control fire monitor system	Perform internal inspection of all control/section valves and all fire monitors. Replace all system M12 motor cables and joystick M12 cable with new cables supplied by Unifire AB.
10-year	Force remote control fire monitor system	These systems should be inspected and tested by a competent person as per the manufacturer's instructions, and as a minimum should include a hydrostatic test and internal examination for gas and water pressure cylinders according to EN 1968:2002.

Quarterly maintence and inspection

please watch the full instruction video here:

https://youtu.be/3CIE1Zt-pZE?si=U2nxWuOnWIGXGt3e
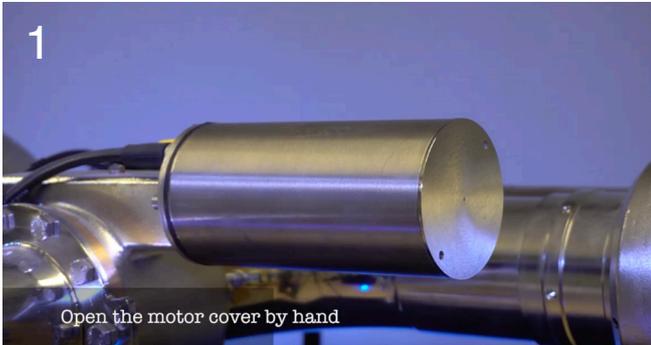
Open the moter cover for the vertical motor.
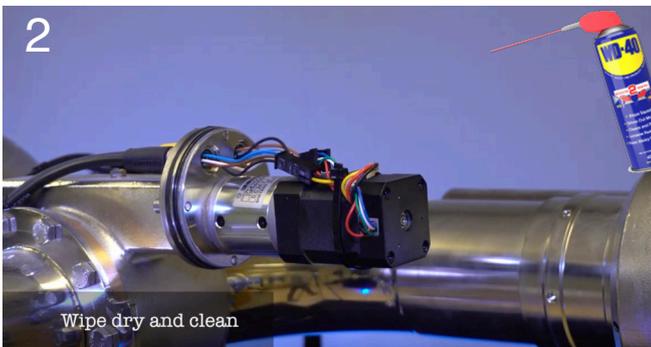
Wipe off any moisture, visually inspect, and then cover the motor with some WD40 before reassembly.

Repeat 1-3 for the horizontal motor.
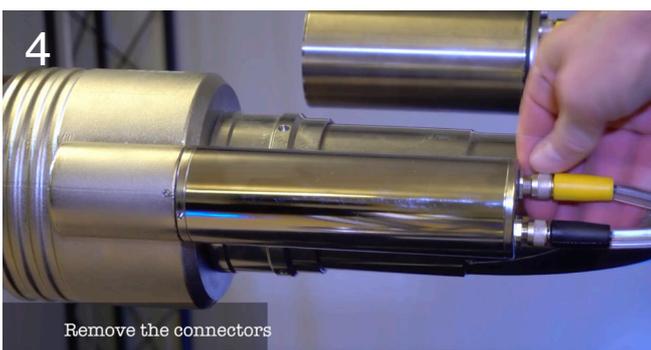
To inspect the nozzle motor, first remove the connectors.
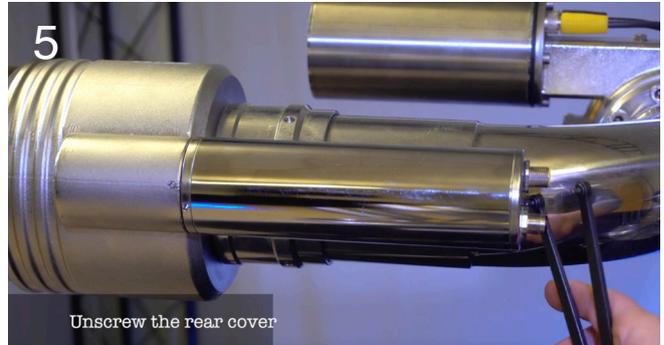
Loosen the cover with a wrench.
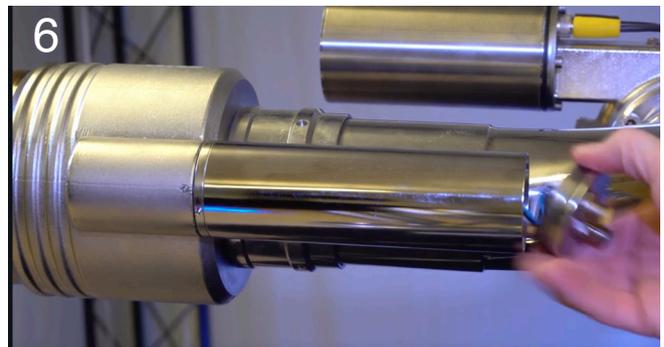
Unscrew the end-cap by hand.
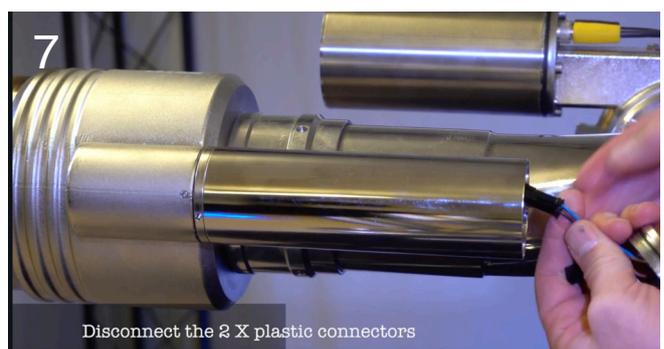
Disconnec the connectors.
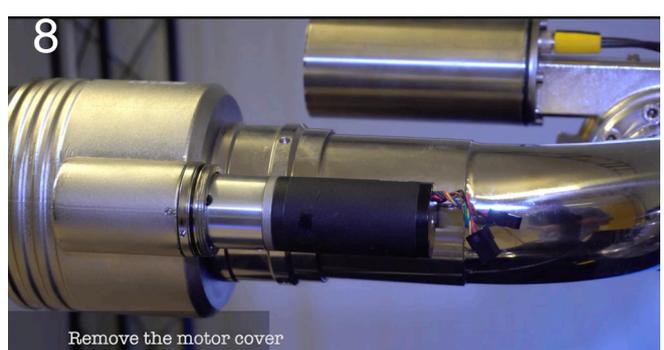
Unscrew the cover by hand.

Remove the motor cover
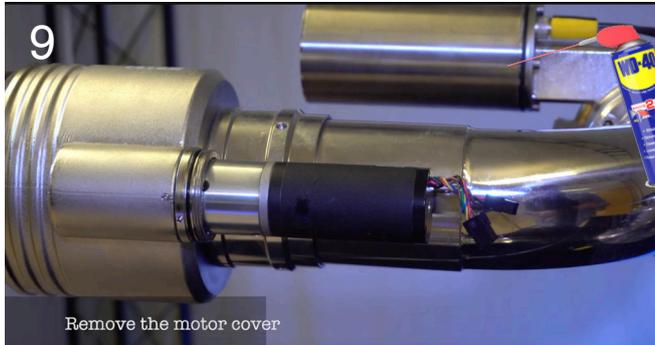
Wipe off any moisture, inspect, and cover the motor with some WD40 before reassembly.

Reinstall the motor cover
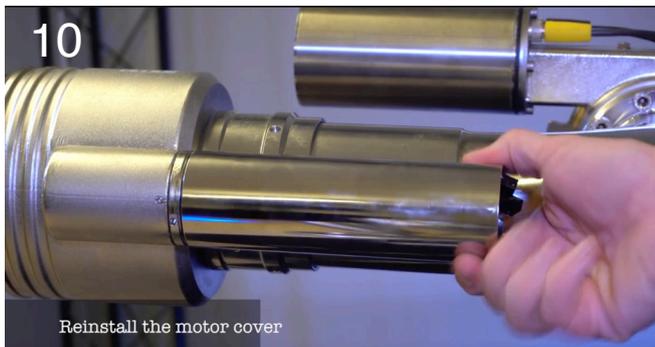
Reinstall the motor cover by hand.

Reconnect the 2 X plastic connectors

Reconnect the 2 x plastic connectors.

Counter-rotate the cables before assembly

Counter-rotate the wires at the end of the end-cap 720° before assembly.

Reinstall the rear cover

Reasemble by hand.
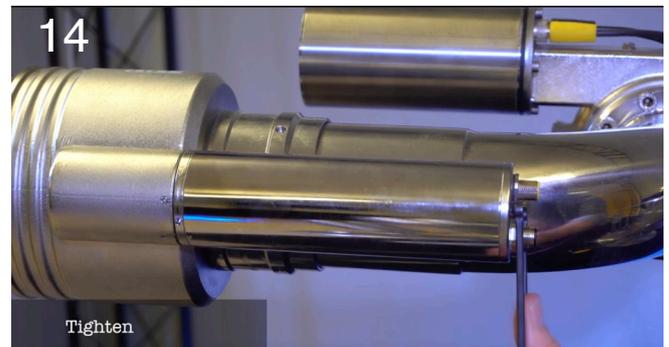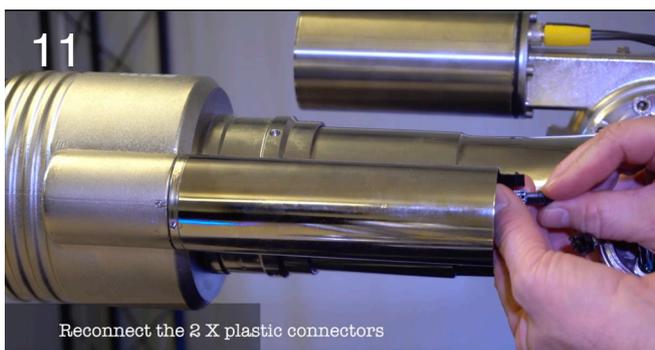
Tighten

Tighten.

Install the connectors. Make sure to tighten the M12 connector by hand (do not use any tools).
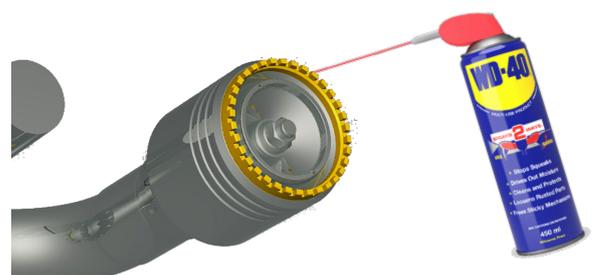
Wiping off and putting a few drops of DW40 on the stream shaper prevents the build up of grime and goo. Please perform when required.