AIM ROBOTICS™

FD400 & FDhighV

USER MANUAL

ORIGINAL INSTRUCTIONS (EN) VERSION 0.4

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FD400

A ROD HANDLE

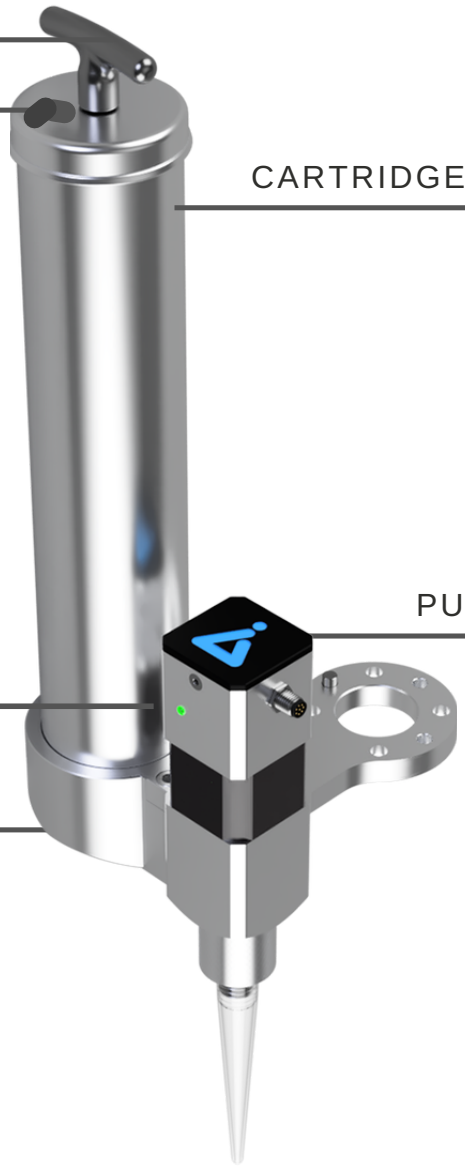
a ROD TAB

CARTRIDGE BARREL B

PUMP UNIT C

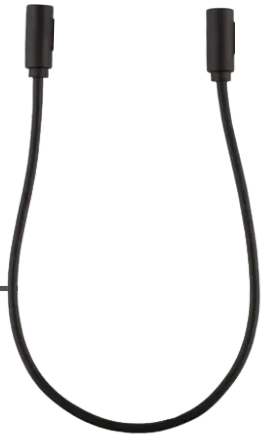
D LED INDICATOR

E FLUID FUNNEL



USB WITH URCAP

8PIN LEAD



3 X NOZZLES

6xM6 SCREW

1x ORIENTATION PIN

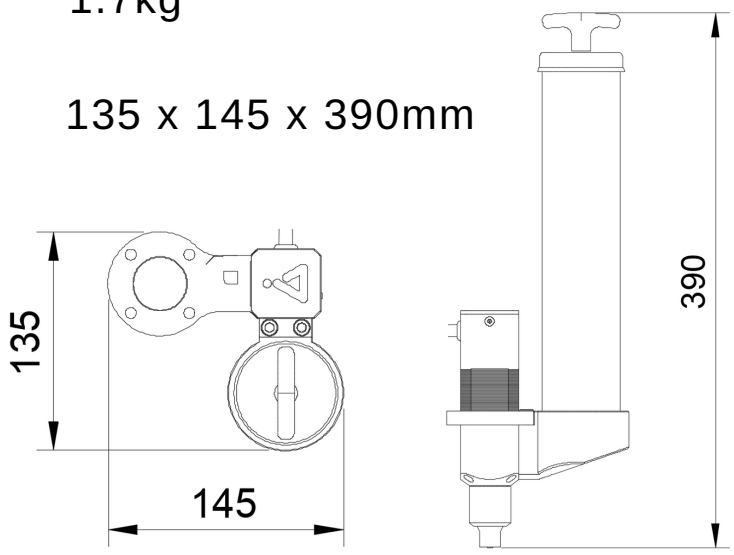
TECHNICAL DATA

FD400 FEATURES

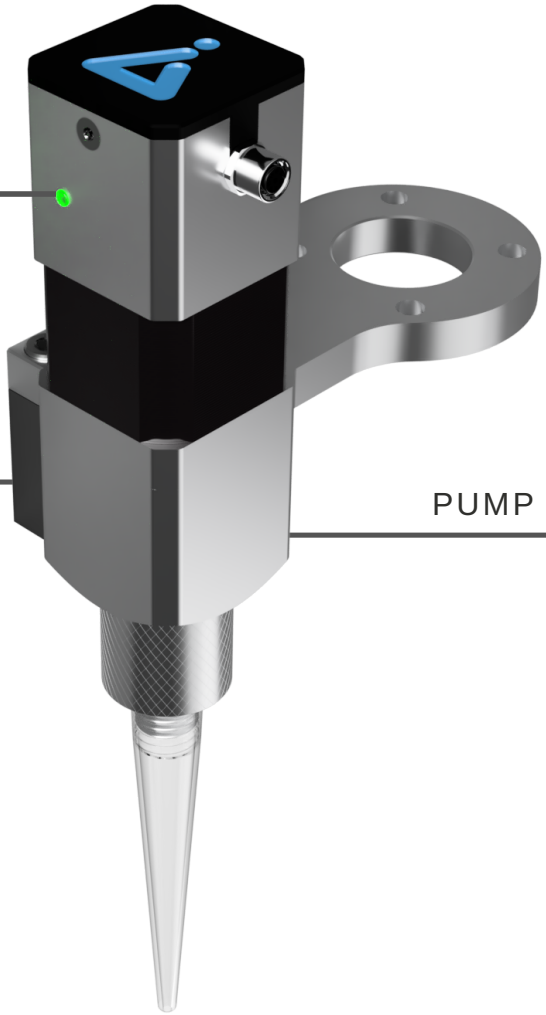
- Only connect to cobot, no need for external air supply
- Use with 400ml cartridges DIN 1284
- Recommended for single-component medium viscosity fluids, NLGI class 2-3

Model #	**FD400**
URCap version	**⩾3.0**

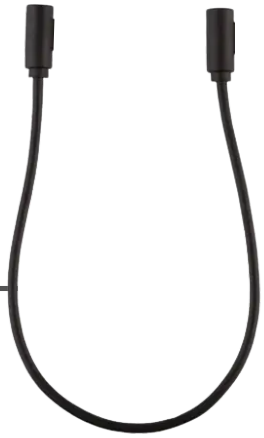
Mechanical interface:	ISO 9409-1, type 50-4-M6
Electrical interface:	8-pole M8
Digital interfaces:	URCap, PolyScope ⩾5.5 URCap, API ⩾1.8 RS485 24V I/O
Weight (without cartridge):	1.7kg
Dimensions:	135 x 145 x 390mm



WHAT'S IN THE BOX



USB WITH URCAP



8PIN LEAD

3 X NOZZLES

6xM6 SCREW

1x ORIENTATION PIN

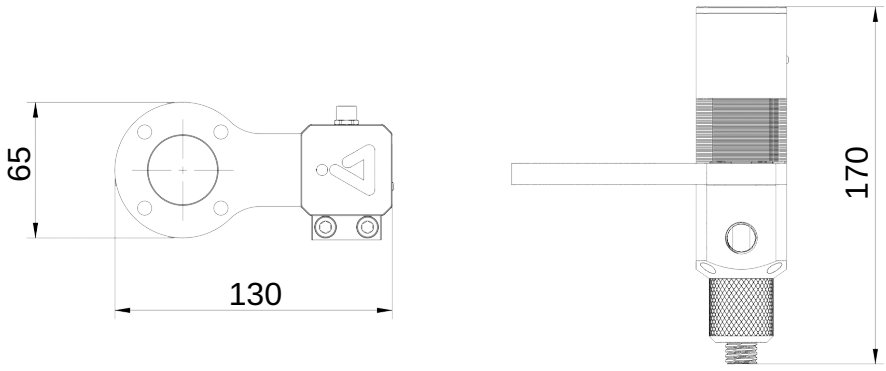
TECHNICAL DATA

FDhighV FEATURES

- Use with external feeding system
- Recommended for single-component medium to high viscosity fluids

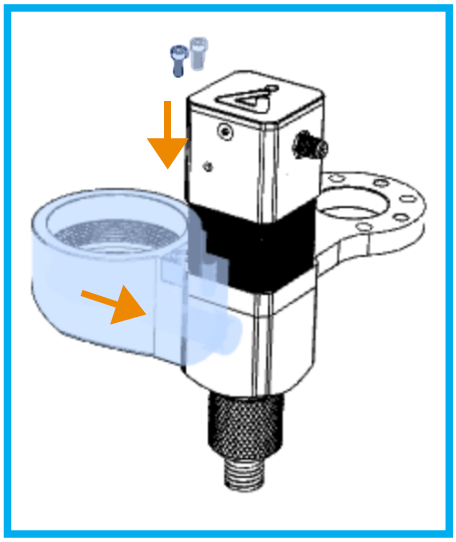
Model #	**FDhighV**
URCap version	**⩾3.0**

Mechanical interface:	ISO 9409-1, type 50-4-M6 NPT 1/4
Electrical interface:	8-pole M8
Digital interfaces:	URCap, PolyScope ⩾5.5 URCap, API ⩾1.8 RS485 24V I/O
Weight:	0.8kg
Dimensions:	65 x 130 x 170mm

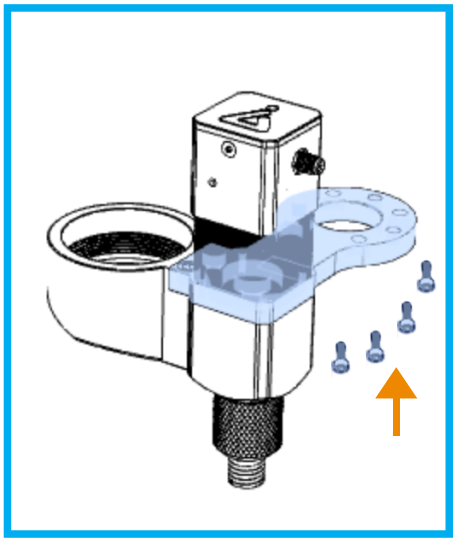


INSTALLATION: FD400

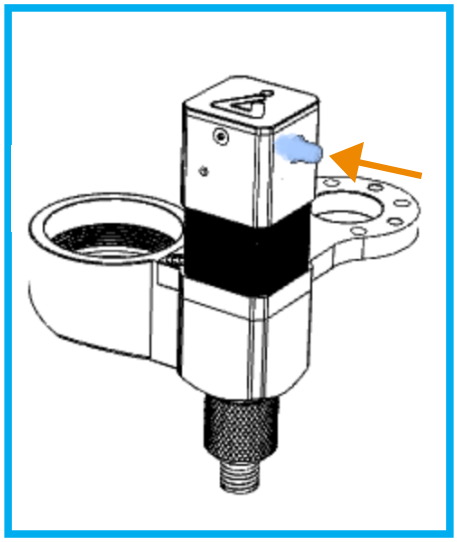
1. Assemble unit and attach to robot



- Attach funnel (E) with 2 screws



- Attach unit to robot flange with 4 screws



- While the robot is off or tool I/O is zero: Plug in the 8 pin connector* into unit and robot.

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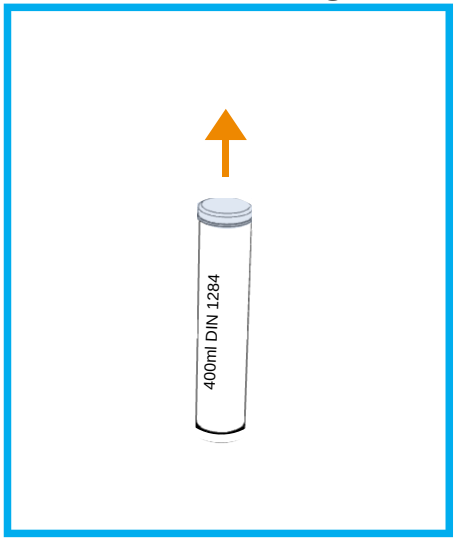
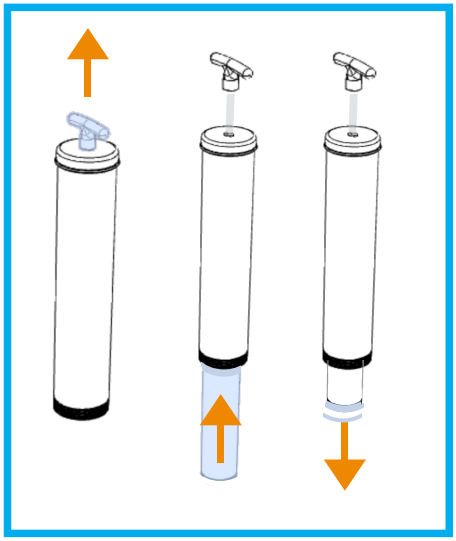
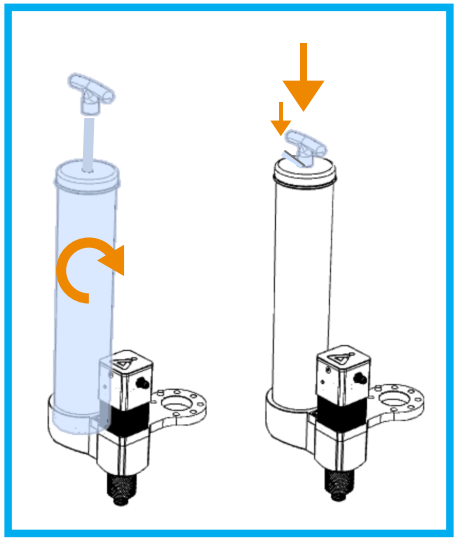
2. Load cartridge



- On the cartridge remove back lid



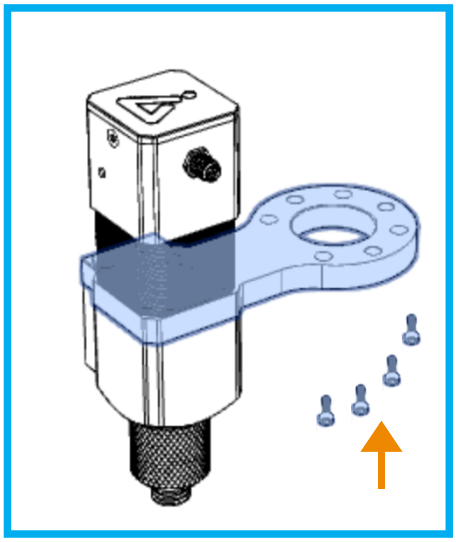
- Pull the rod handle (A) fully back
- Insert new cartridge
- Remove top lid of cartridge



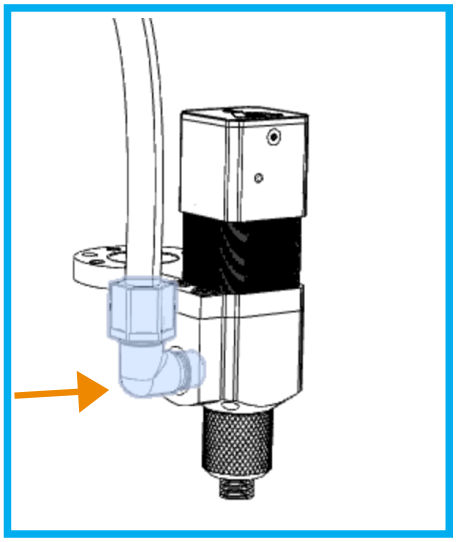
- Screw cartridge barrel into funnel (E)
- Release the rod handle by pulling it back and pressing the tab (a)
- The rod is now fully inserted into the fluid and the handle is fully against the barrel

INSTALLATION: FDhighV

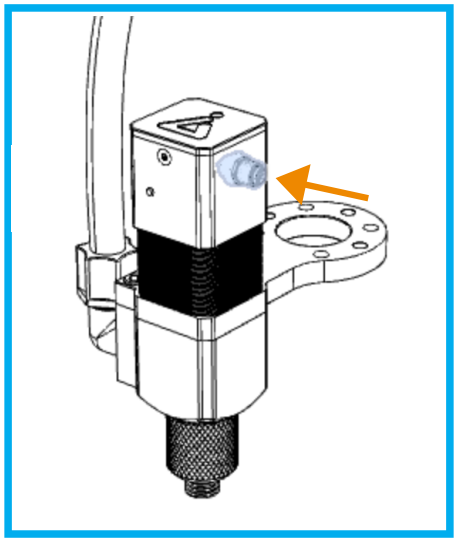
Assemble unit and attach to robot



- Attach unit to robot flange with 4 screws



- Attach NPT1/4" connector with feeding line to inlet (F)



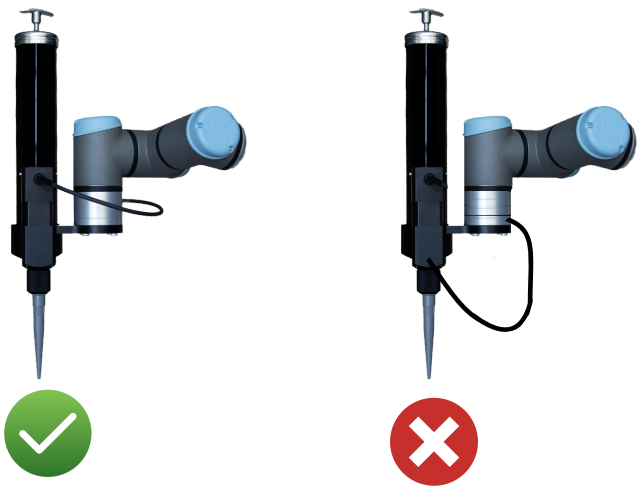
- While the robot is off or tool I/O is zero: Plug in the 8 pin connector* into unit and robot.

LED indicator (D)

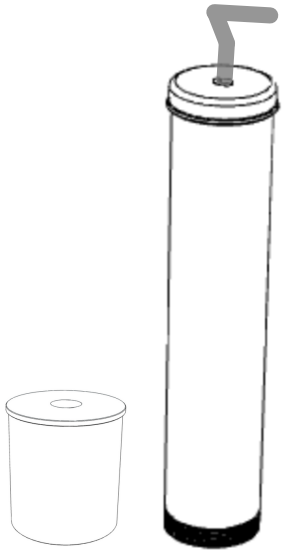
The unit has a LED indicator. When the unit has power a steady light is shown.

* The 8 pin connector lead

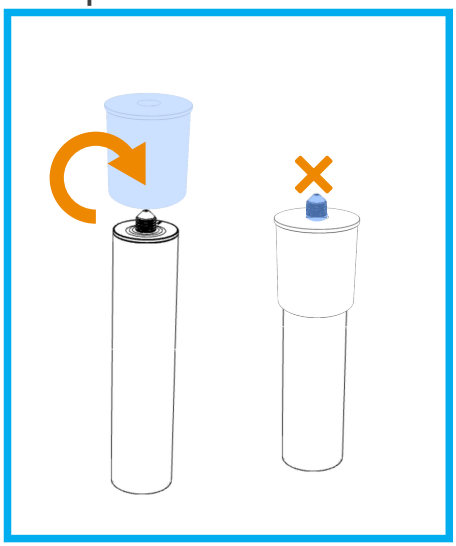
- Ensure Tool IO voltage is set to 'zero' or **robot is off** before attaching tool. Refer to the 'How to' page for guidance.
  - If robot shows error after attaching tool - restart the robot to reset.
- Position the lead from the unit to the robot so that it does not create a risk.
- The pin can be inserted for orientation.



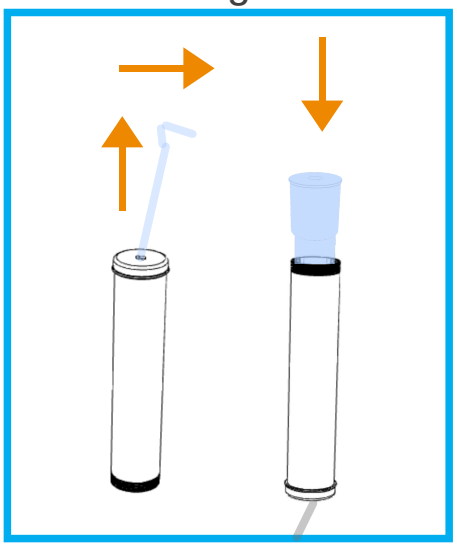
INSTALLATION: 310adapt



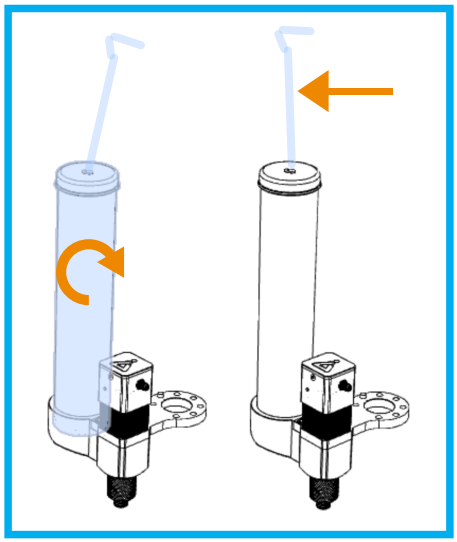
Adapt FD400 to use 310ml cartridges



- Screw adaptor on to the cartridge
- Cut tip off cartridge



- Pull back rod handle and angle it to keep it extended
- Insert cartridge into barrel



- Attach barrel into funnel (E)
- Release rod handle from ledge (It will stay extended)

OPERATIONS GUIDE

Start up

After the unit has been paused or stopped, through flow should be tested and the tip changed

- In Installation > URCaps > Setup tab, select the Press&Hold to dispense button and press until there is a steady flow through the dispenser.

Cleaning

We recommend filling the unit with a fluid cleanser and letting it run through the system. It is also possible to disassemble the unit and clean the parts individually. Any part containing electronics or motor must NOT be opened and cleaned.

"Purge Cycle"

The **Purge Cycle**, when activated, is a predefined cycle that ensures the fluid does not settle in the unit. This can be useful in pauses, production breaks or at setup.
When the unit is positioned over the **Purge Position** the unit will dispense for 0,5 seconds every 5 minutes ensuring flow.

"Purge Position"

This is an operator defined position which is where the robot will know it can dispense if the **Purge Cycle** has been activated.

- Place a container at this position to collect the fluid dispensed.
- Use this position to purge the unit at cartridge refill, at pause or at end of shift.

"Press & Hold to dispense"

When using a new cartridge or after a pause then it is recommended to purge the system. **Press & Hold** the button to dispense fluid continuously. Use this to ensure even flow in the unit.

"PullBack"

The **PullBack** function holds back the fluid to ensure more precise dispensing at the end of the path. Use this to prevent fluid 'hanging' from the nozzle after dispensing along thepath.

Change of Cartridge

If Empty: Remove cartridge from funnel
If not Empty:

- Pull back rod handle and lock it in place, then remove cartridge holder form unit
- Pull out old cartridge and clean holder with a dry cloth before inserting new cartridge

After replacing with new cartridge:

- In Installation > URCaps > Setup Tab: select Press&Hold to dispense button and press until there is a steady flow through the dispenser.

SOFTWARE CONFIGURATION

1. Install URCap *

- If password protected:
  - Enter **Manual Mode**: Press  and select  manual
  - Enter Password
- If not protected by password:
  - Press  and select Settings > System > URCaps
  - Press + symbol to add a new URCap: Navigate to USB device and select **Aim URCap**

Accept when the robot prompts to restart before continuing.

2. Payload and TCP

Select the **Installation** tab

for Payload select **General > TCP: Payload and Centre of Gravity** and press the wizard button 

or enter manually (unit itself + weight of cartridge).

To define Tool Centre Point, TCP select **General > TCP: Tool Center Point** and press the wizard button 

- This feature will guide you though setup of the Tool Centre Point (the position of the tip relative to the flange).

* Multiple URCaps

- If multiple URCaps are installed the tool might not perform as intended
- Some tools are programmed to takeover and control the Tool IO and will not allow the Aim URCap to change the Tool IO.
- It is recommended to remove all other tool URCaps to avoid this OR ensure that Tool IO is controlled by user and input manually entered as described in point 3. Installation of SD unit

3. Unit Installation

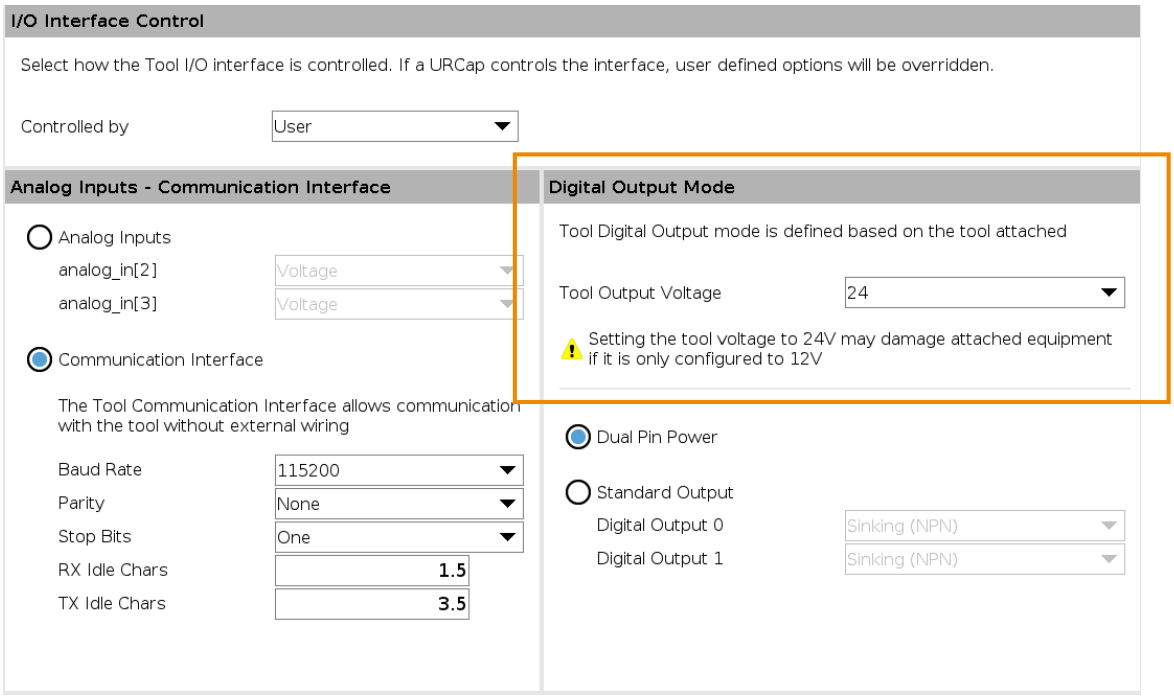
The Tool IO can be controlled by the Aim URCap

- Select the Installation tab and select **General > Tool IO**
- In the IO interface control section use pull down menu to select **Aim URCap**

The Tool IO can be controlled by user and manually entered

- In the IO interface control section use pull down menu to select **User**
- Change Tool Output Voltage to 24

You are now ready to start programming your unit to start dispensing.



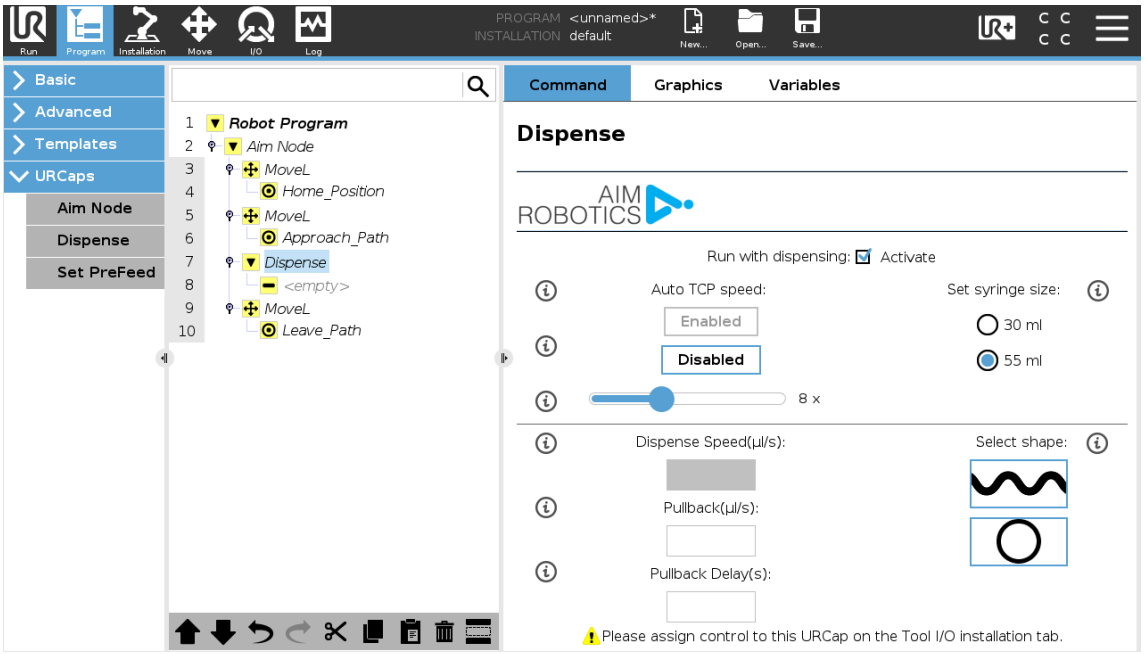
PROGRAMMING

Aim Dispense Node

Programming the unit

- Select the **Program** tab and select **URCaps > Dispense Node**
  - In the Program tree; insert moves and waypoint to define the dispensing path *
- Select **Dispensing speed** (normally start with 25 microlitre).
- If necessary, select **Pullback**, which holds back the fluid to ensure more precise dispensing at end of path or to prevent fluid 'hanging' from the nozzle after dispensing.
- Activate **Run with Dispensing** when path is tested and ready for dispensing.

- **Auto TCP speed** ensures the dispensing speed varies with the robot speed. It is disabled as default. It it possible to multiply the dispensing speed for thicker lines. To enable **Auto TCP speed** press the **Enable** button.



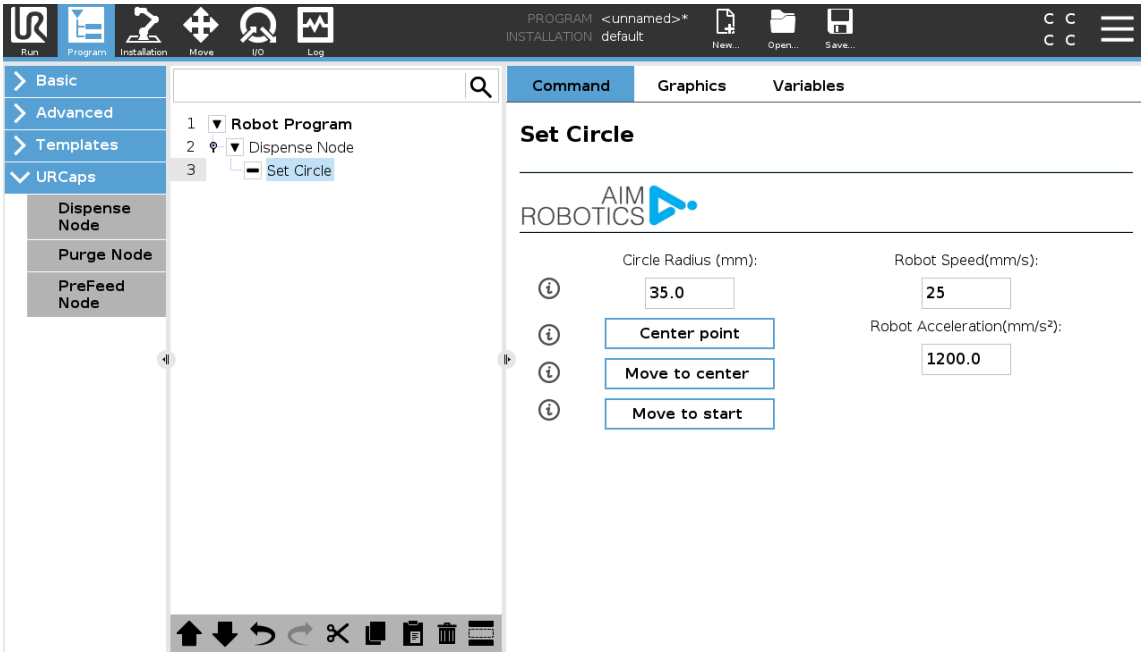
* Maintaining the same distance to the surface

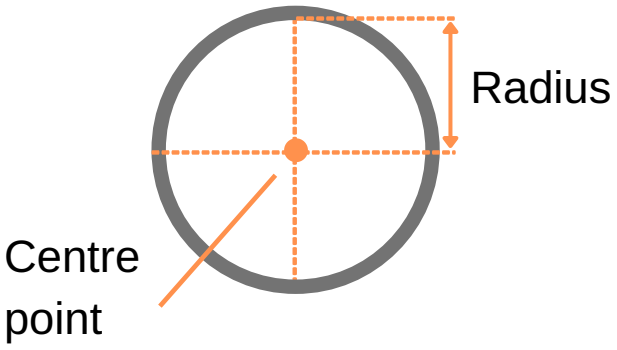
- When programming the dispensing path it is recommended to lock to the z-axis while in freedrive mode.

PROGRAMMING

Programming **CIRCLES**

- To program circles select the ○ button.
  - In the Program tree the **Set Circle** move has been inserted.
- Enter **Circle Radius** and select **Center Point** to define the center of the circle.
- After entering the **Robot speed** and **Robot Acceleration** press **Move to start**. This will be the point where the robots starts dispensing the circle. Consider the run-up to this point when programming.



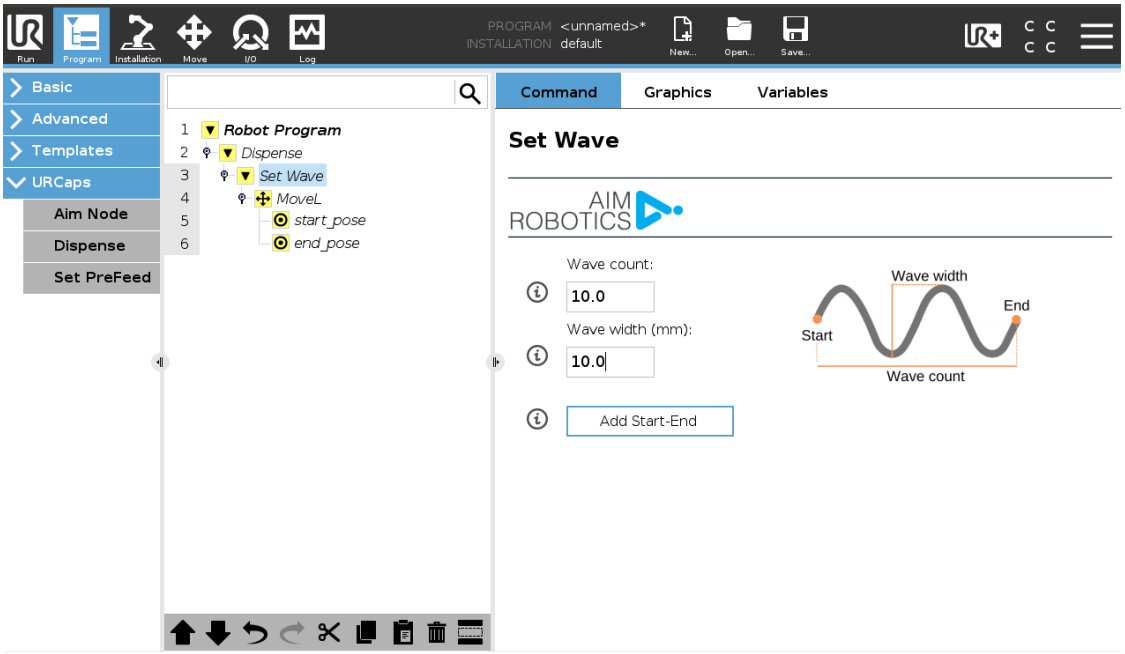


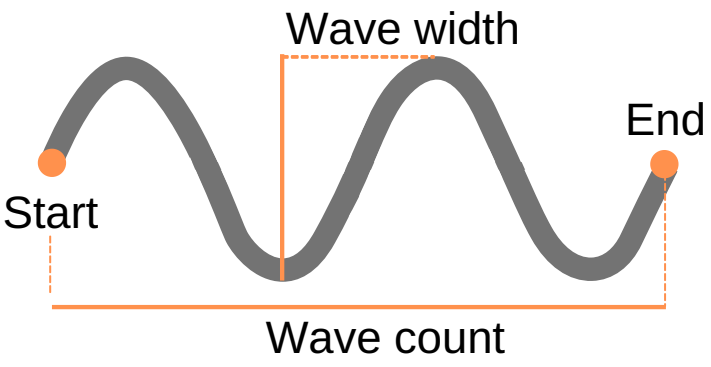
PROGRAMMING

Programming **WAVES**

- To program waves select the  button.
  - In the Program tree the **Set Wave** move has been inserted.
- Enter **Wave Count** (amount of waves between start and end point)
- Enter **Wave Width**
- Press **Add Start-End** to select the start and end point of the line for the wave to follow

The wave curve is also dependant on the robots movements.

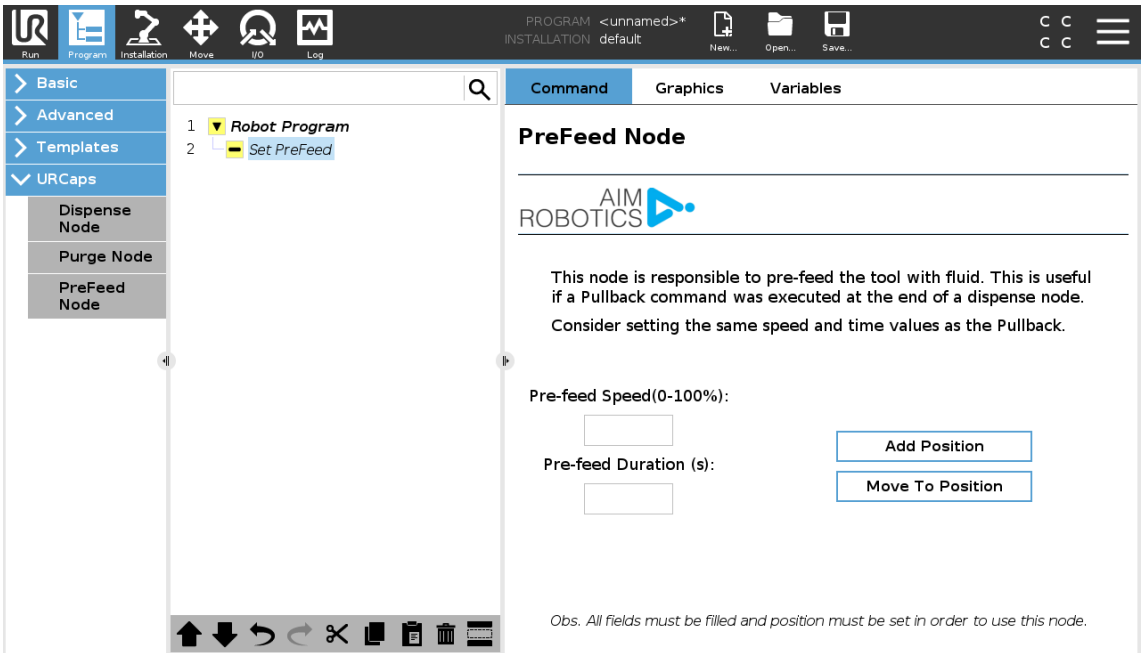




PROGRAMMING

Aim Pre-Feed Node

This node can be used if the **PullBack** command is also used. When adding a pullback it 'returns' a little fluid in the nozzle.
In order for the next path to start dispensing at the start point defined the **PreFeed** will start the dispensing the just before the path starts to ensure the fluid is ready at the tip of the nozzle for a smooth start.

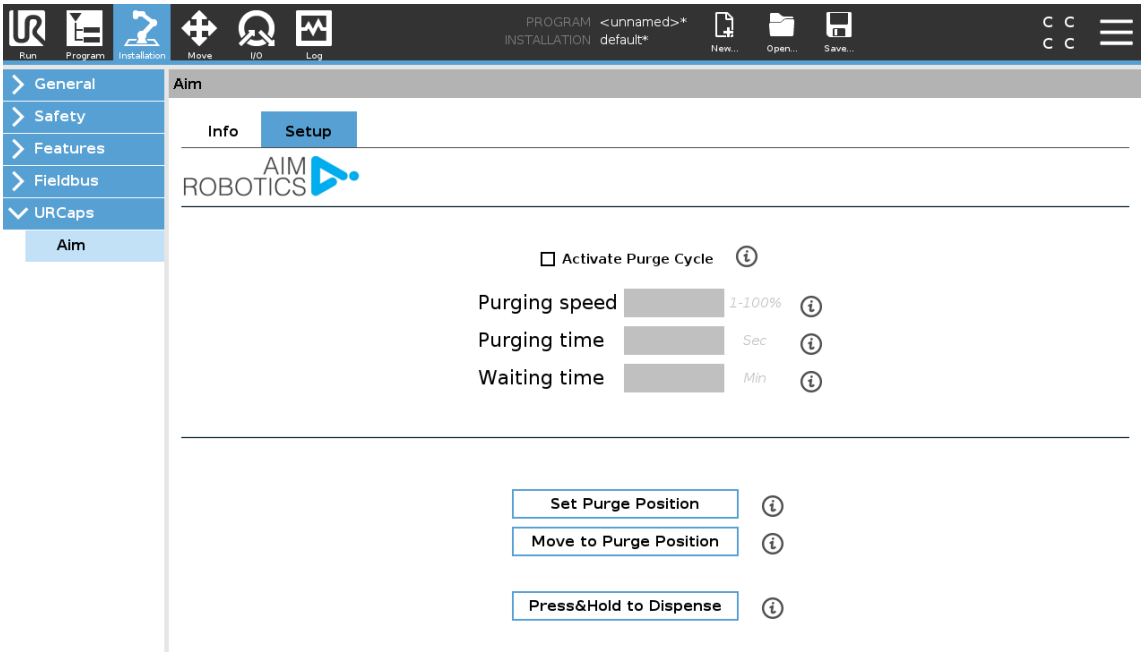


Fluid out of tip | Fluid after PullBack | Fluid after PreFeed

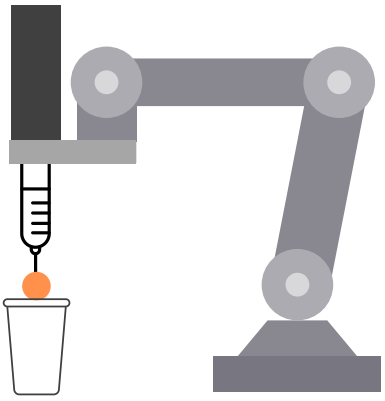
PROGRAMMING

Aim Installation Node / Purge Cycle

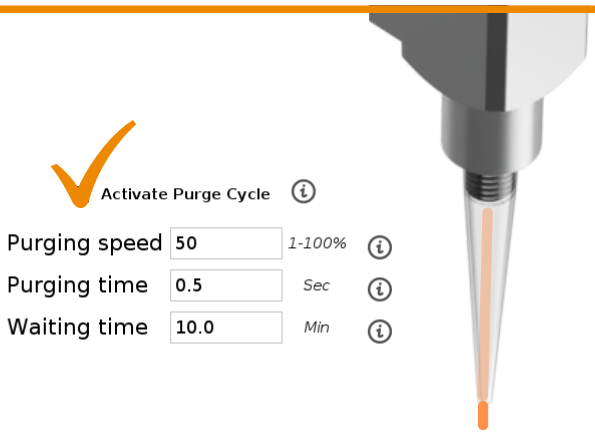
- Select the **Installation** tab and select **URCaps > Aim**
  - In **Setup** you can activate the **Purge Cycle** and the connected inputs (Purging speed, time and waiting time). These options are only available if the **Purge Cycle** has been activated. The **Purge Cycle** is not part of the program and only runs if the program is stopped and positioned over the **Purge Position.** This can be useful if the unit has to stand for a longer period of time.
  - Use **Set Purge Position** to define the position the robot has to been in when purging / cleaning.
  - Use **Press and Hold to Dispense** to dispense the fluid at startup to fill system



Example



Purge Position



Dispenses for 0.5 seconds
every 10 minutes, when in Purge Position

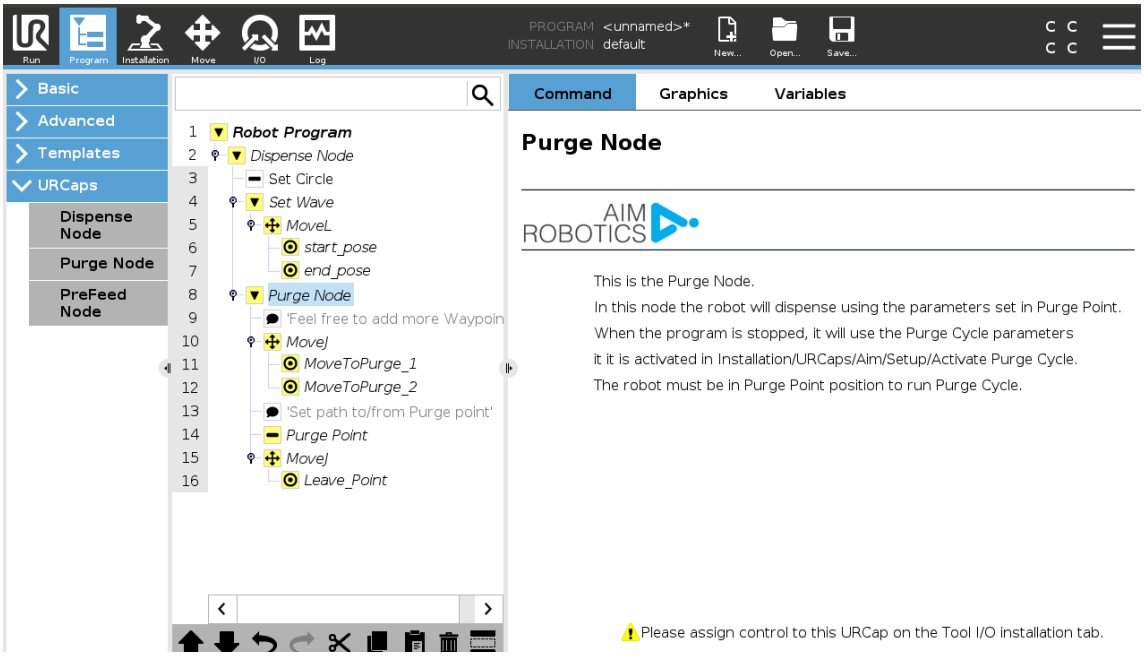
PROGRAMMING

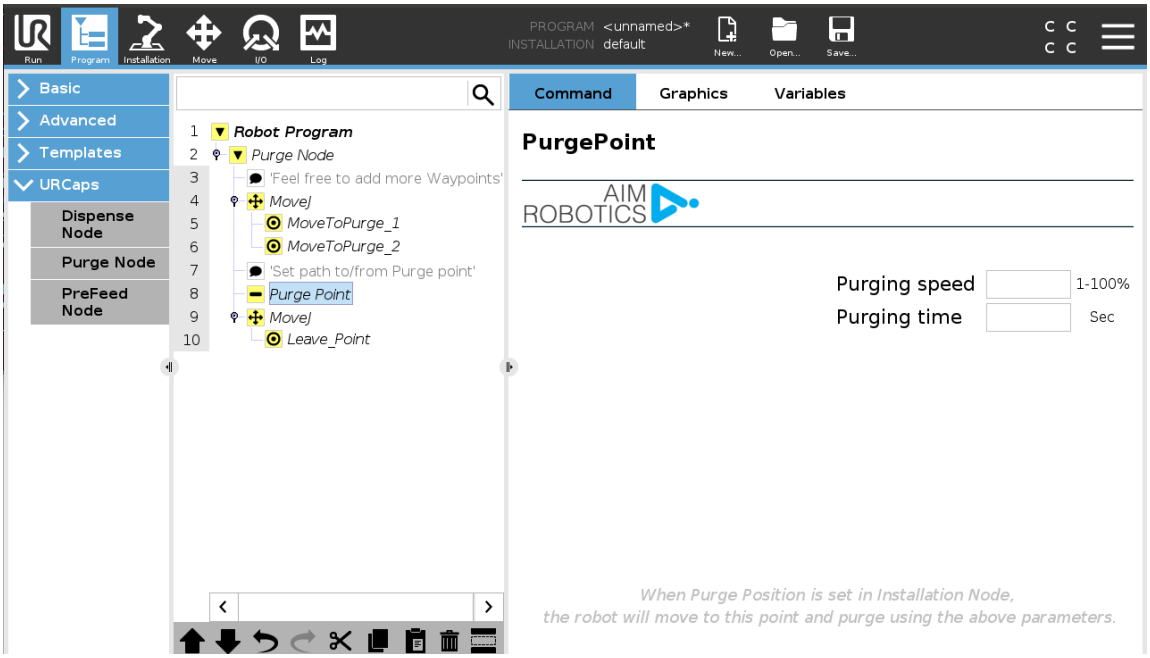
Aim Purge Node

This node will run in the program tree, if inserted.

- This can be used to ensure the fluid does not harden in the tip while the program is running or to wipe the tip.
- The parameters and the **Purge Point** must be defined in the Purge Node. Select **Purge Poin**t in the program tree.

If a Halt command is added at Purge Position, and the Clean Cycle is active, the cleaning cycle will start.





SAFETY

Control path of tip

As the units can be used with nozzles care should be taken when defining the movement for the robot ensuring the tip does not cause incidents.

- Define path to and from the dispensing path
- Define path to and from the purge point

Sharp objects

The FD400 can be equipped with nozzles and needles to dispense as desired.
Caution should be taken when using these attachments, because they can puncture your skin.

Limitations

It is recommended to set robot limitations in **Installation > Safety > Robot Limits**: reduce limits to ensure greater safety so that the robot will stop dispensing if it exceeds these limits.

- Tool Speed / Elbow Speed: In the safety settings consider changing speeds to ensure only full speed when dispensing and reduced speed when away from the path to avoid needle injuries.
- Tool Force / Elbow Force: Limit the maximum force exerted by the tool or elbow on the environment.

CAUTION

- Take care when inserting / removing / releasing the handle on the container as the spring might release the container from the unit with great force. Hold on tight.
- Ensure the container is correctly fitted to unit before releasing the handle to avoid it falling of the unit
- Take care when attaching the container to the unit. If it is done while the unit is on the robot be careful to not use too much force, to protect the robot.
- Any change to the unit or in-correct assembly, such as removing o-rings or not screwing the unit on correctly , may lead to accidents, failures or leaks.
- Ensure that the orifice of the tip is suitable for the fluid to avoid pressure build up.
- The electronics box must not be opened or the warranty will be void.

SAFETY

AVOID: Clamping between nozzle and work item

- Select the right (low) force settings in the safety system of the UR robot.
- Move slowly towards the work item.

AVOID: Dangerous chemical substances damaging eyes

Can happen if nozzle is blocked and pressure is built up in the system.

- Use cleaning node in programming.
- Change nozzles regularly.
- Use appropriate protective equipment when dispensing or handling dangerous substances (glasses / gloves / etc).
- Do not inspect nozzle at close range when attached to the unit.

AVOID: Collision between nozzle and eye when robot is moving

Can happen when moving between work units or between separate dispensing paths.

- Ensure safe (orientation down) versus unsafe travel paths between work units or separate dispensing paths.
- Move at slower speeds between work units / separate gluing points.
- Keep a short distance between nozzle tip and dispensing path.
- Whenever possible lock degrees of freedom in safety system.

AVOID: Entrapment of fingers / limbs

Entrapment of fingers between tool motor and cartridge can happen when inserting a hand between motor and cartridge and the robots program involves rotation in joint 6. Entrapment of fingers or limbs can happen if operator has extremities within the robots movement area.

- If possible select the right (low) torque/force settings in the safety system of the robot.
- Whenever possible limit rotational range of joint 6.
- Rotate a low speeds or when clearance to robot links are small.
- Where possible ensure minimum gap to robot links and cartridge.

RECOMMENDATION

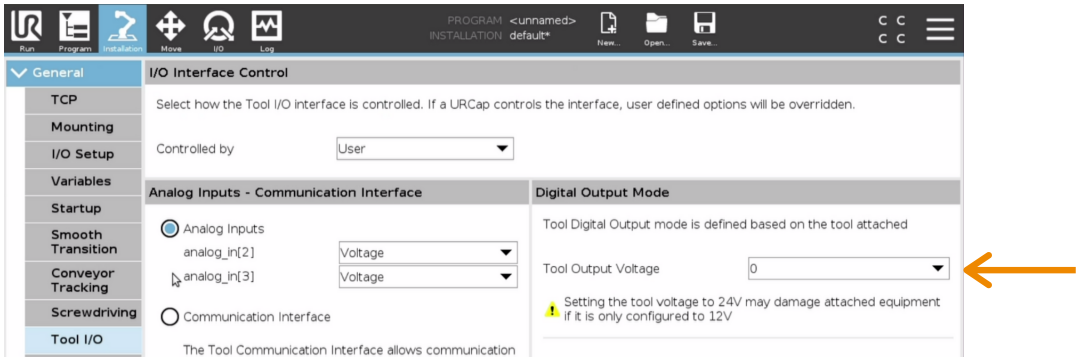
It is recommended that products from Aim Robotics are integrated in compliance with the following standards, technical reports and specifications:

- **ISO 10218-2:2012**
- **ISO 10218-1:2012**
  - **§5.10 and one or more of the requirements in 5.10.2 to 5.10.5**
- **ISO 12100:2011**
- **ISO/TR 20218-1:2018**
- **ISO/TS 15066:2016**

HOW TO

Set Tool IO to 'zero'

Tool IO: Power must be ´zero´ when plugging in the end-effector
Select the **Installation** tab and select General > Tool IO



FAQ

The unit does not dispense

- Too many URCaps controlling the Tool I/O
  - Try to delete all other URCaps to avoid interference
- Restart
  - Ensure that restart has been done after installation and LED light is a steady green

AIM ROBOTICS™

DESIGNED IN DENMARK BY AIM ROBOTICS APS

AIM-ROBOTICS.COM / CONTACT@AIM-ROBOTICS.COM

RoHS compliant

ORIGINAL INSTRUCTIONS (EN) VERSION 0.4