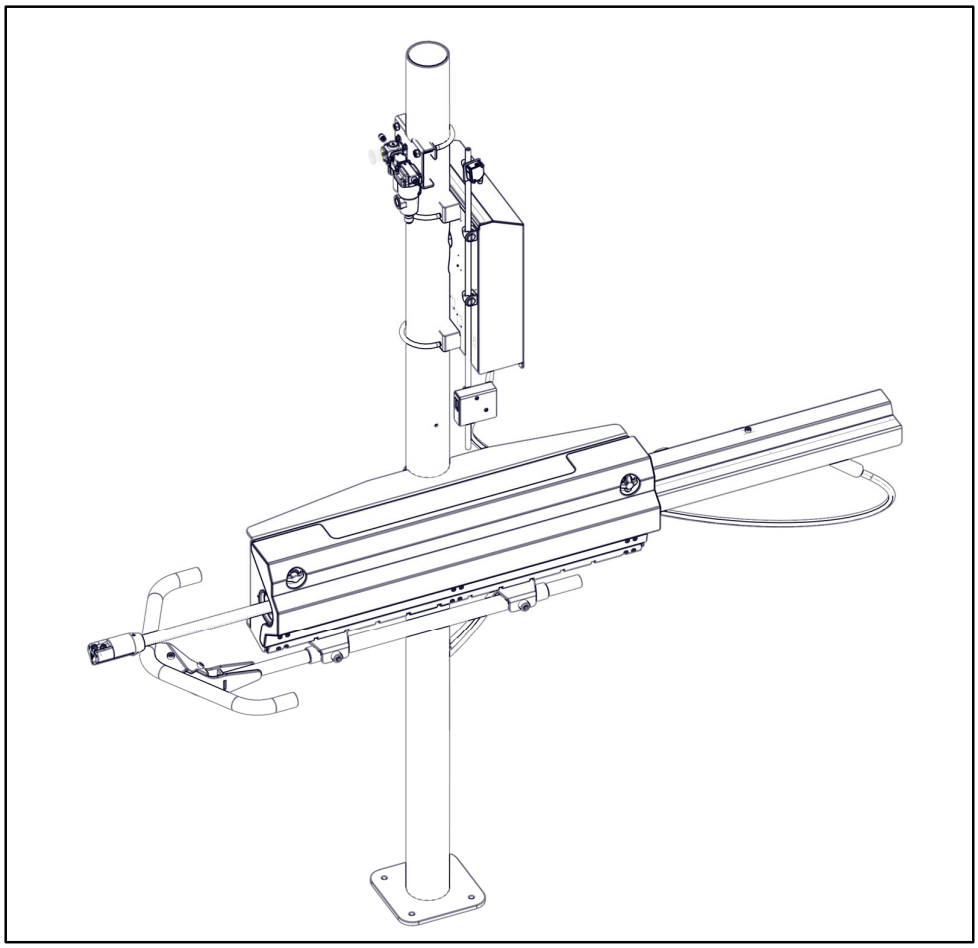
onfarm SOLUTIONS

Teatwand HEAVYDUTY

INSTALLATION & USER'S GUIDE



Contents

General Safety Warnings

For installers and operators

WARNING – **Read all safety instructions and warnings**. Failure to do so may result in personal injury.

Work Area Safety

Keep work area clean and well lit.

Keep children and bystanders away during installation and operation of machine.

HAZARDS:

- Wet floors – wear appropriate safety footwear to avoid slips.
- Cows – maintain a safe distance from the rotary platform to avoid being kicked.
- Electric Shock – take care using extension leads. Always use a Residual Current Device (RCD).

Personal Safety

Use appropriate PPE for the task at hand.

Observe manufacturers safety recommendations while using power tools.

Identify the location of all Emergency Stops. This is often a pull cord for the rotary platform both above and in the basement.

HAZARDS:

- Noise – Milking parlours can be noisy places, use appropriate PPE.
- Pinch Points - Maintain a safe distance from the moving rotary platform and any fixed pinch points.
- Crushing Hazards – Maintain a safe distance from the moving rotary platform and any potential crush points.
- Electric Shock - Electrical connection to power supply is 240/110V. Electrical connection between controller/power supply and the device is 24VDC eliminating the risk of electric shock.
- Compressed Air - Turn off compressed air supply and remove residual pressure from the device when doing service work or maintenance. Immediately repair any compressed air leaks.

- Chemical Hazards - Teat spray can be hazardous. Avoid contact with skin and eyes. Use appropriate PPE.

Preliminary Installation work for the Teatwand™ Heavy Duty

Double systems – Pre and Post Teatwands use one touchscreen controller for both Teatwands.

A 50mm conduit between Pre and Post Teatwands is required for cabling a double system.

A 32mm conduit to the basement is required for cabling to the Stall Sensors. Double systems require 2 cables.

Single systems – For either a Pre or Post Teatwand™ fit the touchscreen controller to the same side as the Teatwand™. A second module can easily be added later.

Refer to Appendix G for installation recommendations.

- Fit Spread Eagle Leg Spreaders to the deck of the rotary platform. This is best done at least 2 weeks prior to Teatwand™ installation to allow time for cows to adjust. See the Spread Eagle installation manual.
- Establish a target for the Stall Sensors. This may require brackets/tags to be fitted to the rotary. This is best done immediately as some fabrication may be required. Refer to Pages 27 & 28.
- Talk to Dairyman/Manager about location of the Touchscreen Controller, refer to Installation Manual for preferred locations.
- Determine position of 4'' Pole (not supplied). Mark on floor. See Appendix G. This is the target for conduits.
- Run conduits. See Layout Drawing. Refer to Appendix G.
- Install a 12mm compressed air supply to each Teatwand™ system.
- Install the teat spray pump above the teat spray supply.
- Install a teat spray supply line from each pump to each Teatwand™ system.

Please call/email your Onfarm Solutions contact with any questions.

Teatwand™ Heavy Duty (HD) overview

The Teatwand™ HD automatic teat sprayer has been developed for high volume rotary dairy parlours. Based on the same principles as the Teatwand™ Exact the Teatwand™ HD uses the same proven control system with a more robust sprayer that has an extra 4 inches of reach. Thorough spray coverage of all four teats is achieved with the use of two independently controlled spray nozzles in the spray head, accurate control of the spray sequence and speed control of the extending arm. The use of optical sensor technology and the unique PLC program allow the user to adjust suit individual requirements. Adjustments are made on a Touchscreen which is ideally positioned on a nearby wall away from high pressure wash areas. Consult with Dairyman for their preferred location.

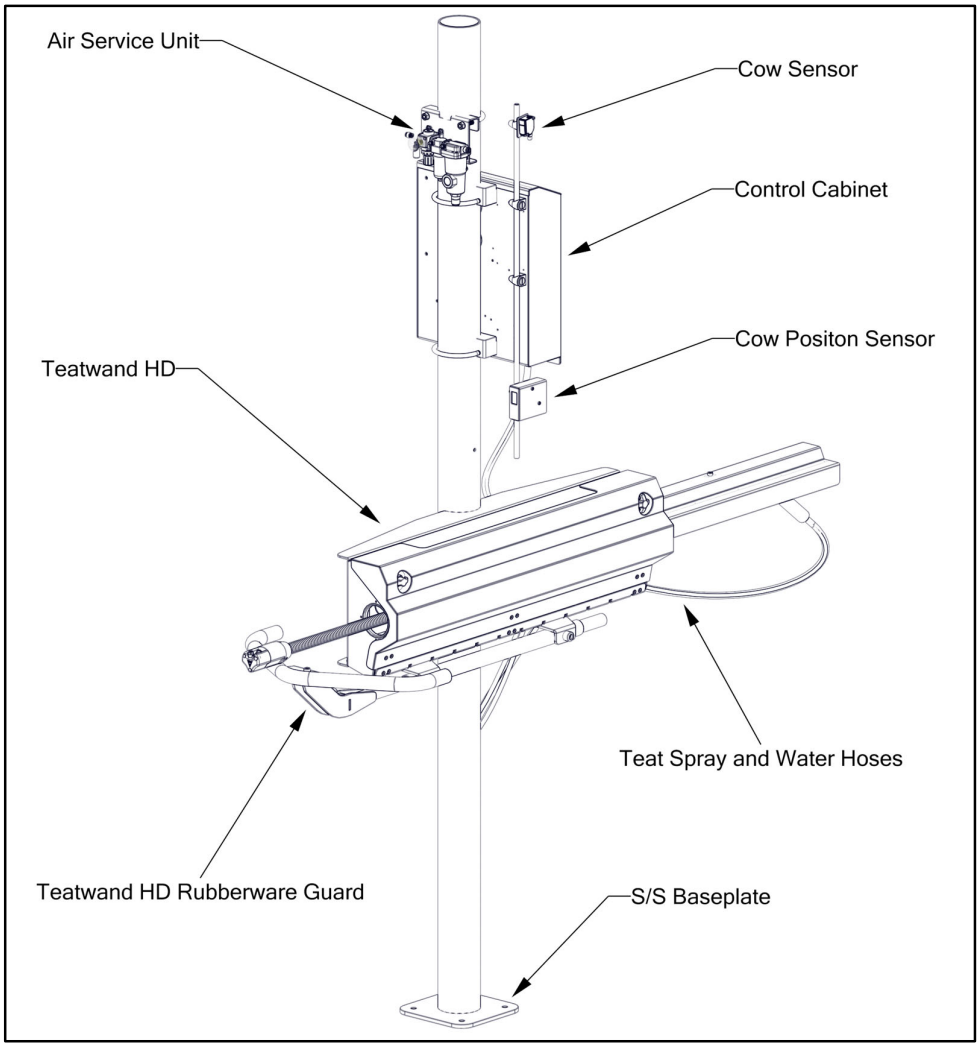


Figure 1. Sprayer General Arrangement

Teatwand™ HD Installation

Teatwand™ HD is a modular system that can be used as a pre or post sprayer or combined for a double system. One Controller/Touchscreen is used for both Single and Double Systems. The sprayer mounts to a pole fitted to the floor close to the bridge and braced at the top.

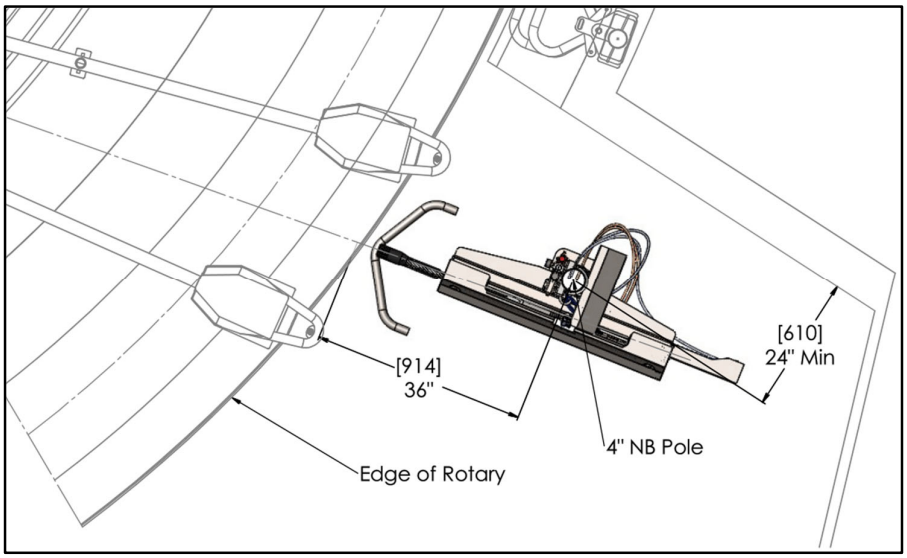


Figure 2. Pole location for angled stalls

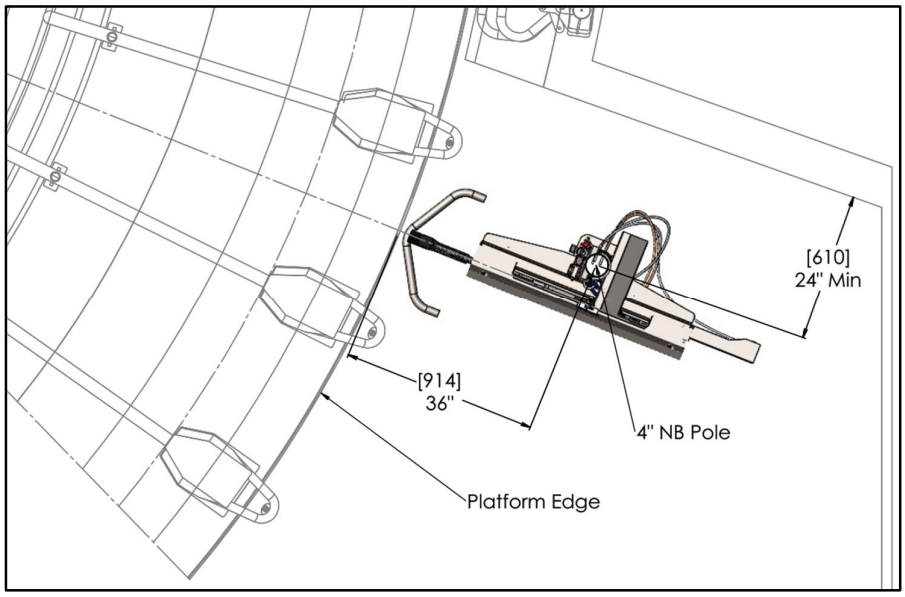


Figure 3. Pole location for straight stalls

Assembly Guide

Step 1 – Installing the Baseplate

Mark centre point of the pole on floor. See Figure 2 and Figure 3.

Bolt Baseplate to floor. If there is in-floor heating, use a thermal imaging camera to find safe places to drill.

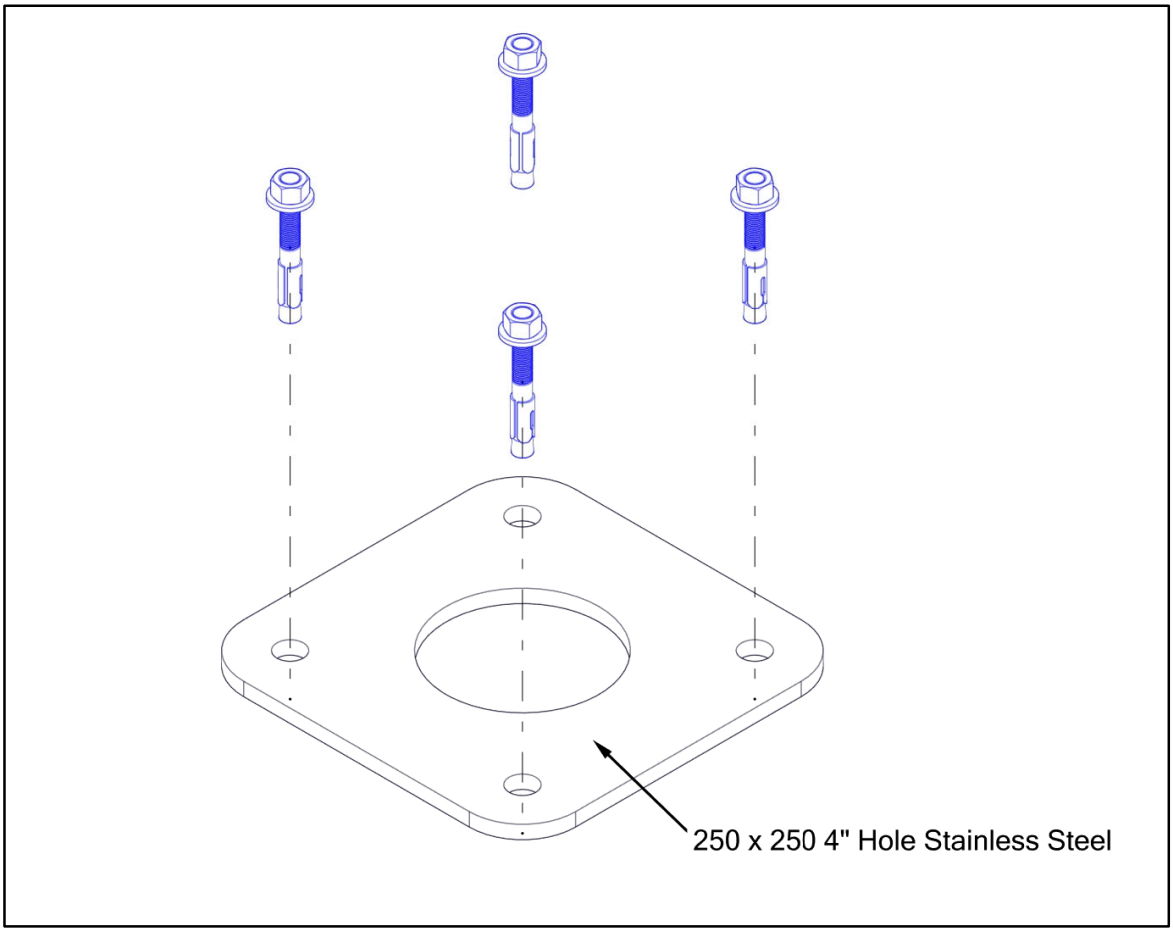


Figure 4. Fitting the Baseplate

Step 2: Installing the Post

Stand the 2.5m long 4” NB pole in the pre-cut hole in the baseplate.

Make sure that the pole is standing at Vertical from the floor (this is a vital step which creates a stable base for the rest of the unit to work off)

Tack weld the pole and base together.

Finish by welding all around the pole

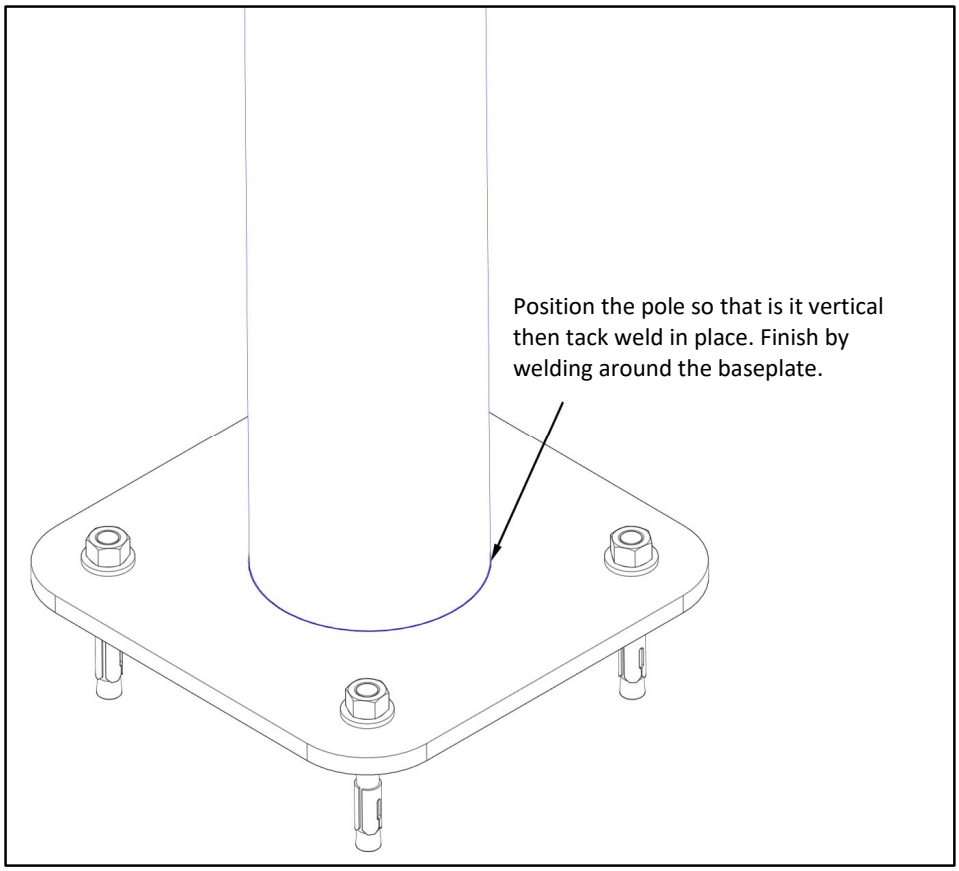


Figure 5. Pole Installation and Weld Details

Step 3: Bracing the Post

Figure 6 below shows an example of a braced pole.

Figure 6. Example of pole bracing

Step 4 – Measure Position of Teatwand

Using a spirit level put a mark on the Pole at the height of the rotary platform surface.

Measure 380mm up from this and mark and create a mark to use as height refence for installation. This second mark is the height position for the top surface of the Teatwand™ HD frame. See Figure 7.

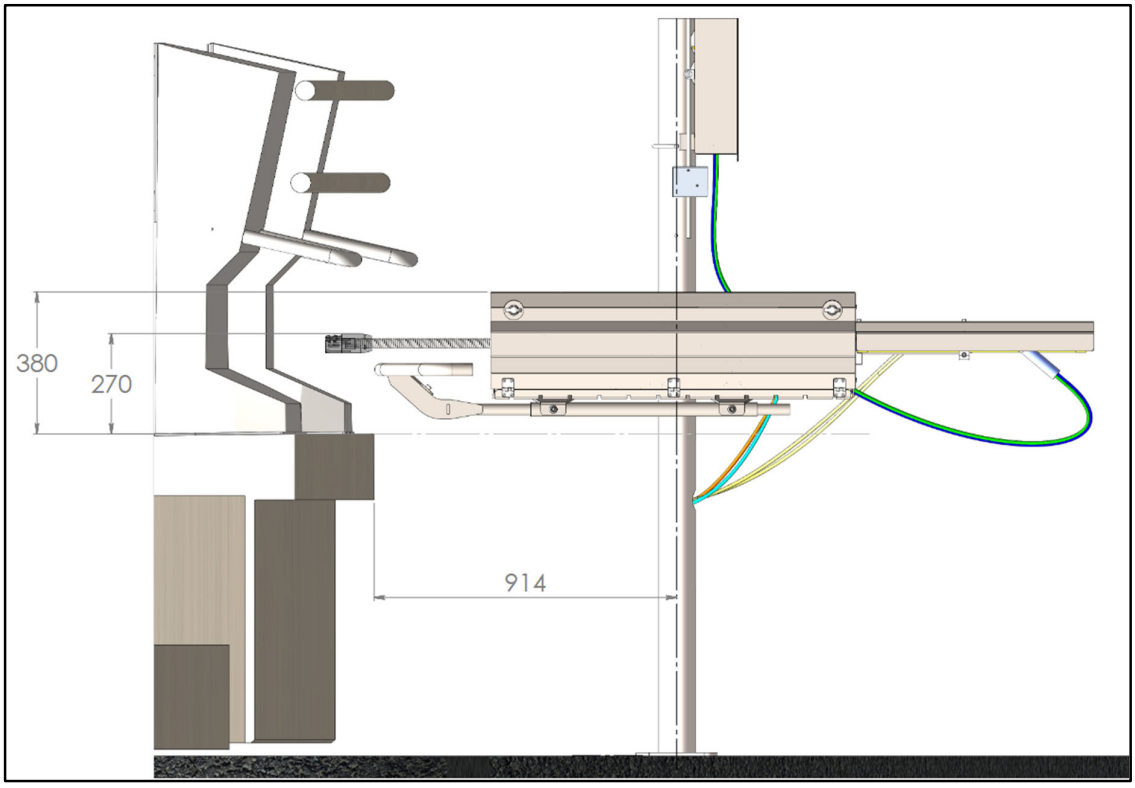


Figure 7. Location of Teatwand™ HD on pole

Step 5 – Install Main Housing

The Teatwand™ HD as the name implies is a heavy unit, use a suitable support, for example a 200 litre barrel or a couple of people when offering the Teatwand™ HD up to the pole to fit the pole clamp. Once clamped to the pole the height can be safely adjusted.

Use the clamp and the M10 Bolts and Lock nuts supplied to secure the Teatwand™ HD at correct height. Align the Teatwand to suit the angle of the stall. See Figure 8. Installation of Teatwand™ HD Main Housing

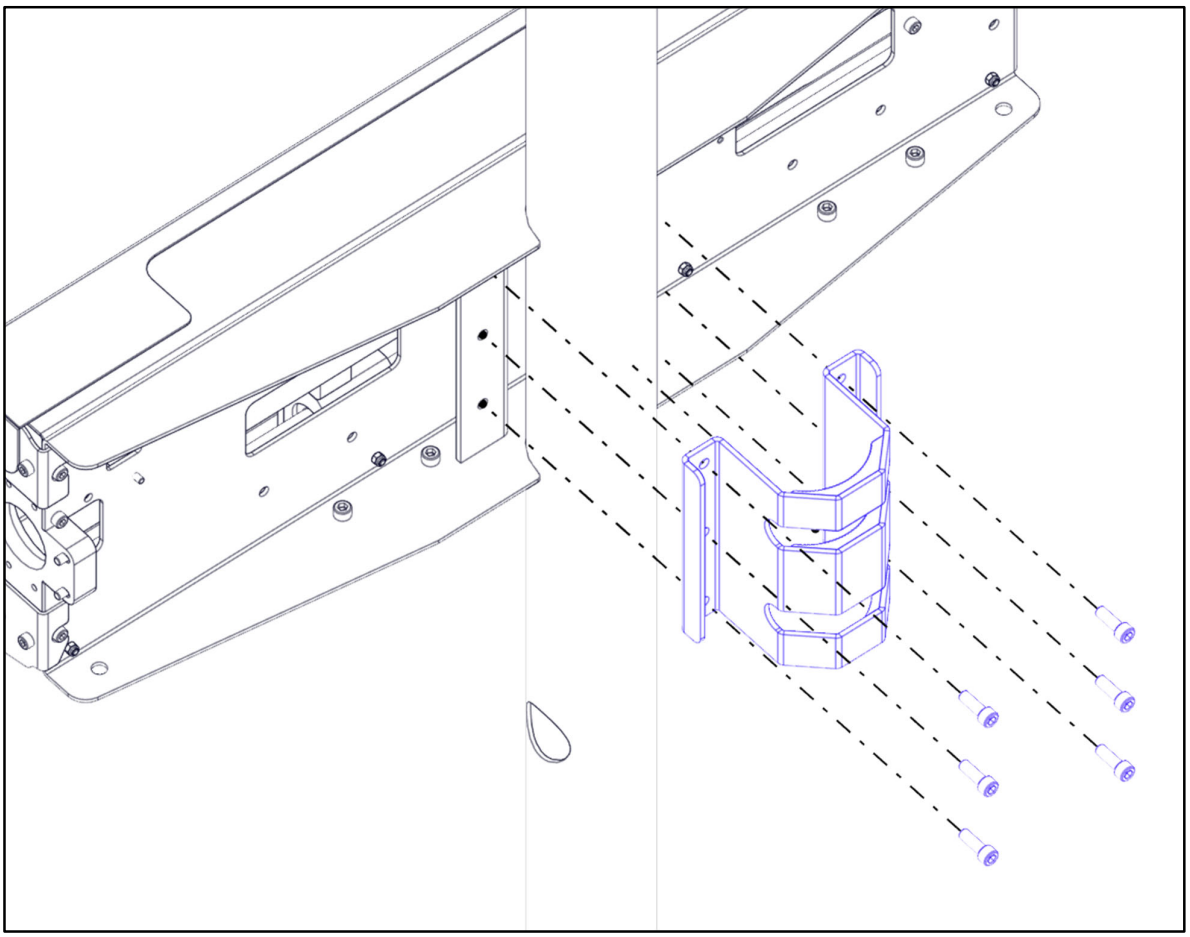


Figure 8. Installation of Teatwand™ HD Main Housing

Step 6 – Temporarily Remove Cylinder Shaft Cover

Remove the M6 nut and Button screw tilt the Shaft Cover up out of the way so that the cylinder can be fitted.

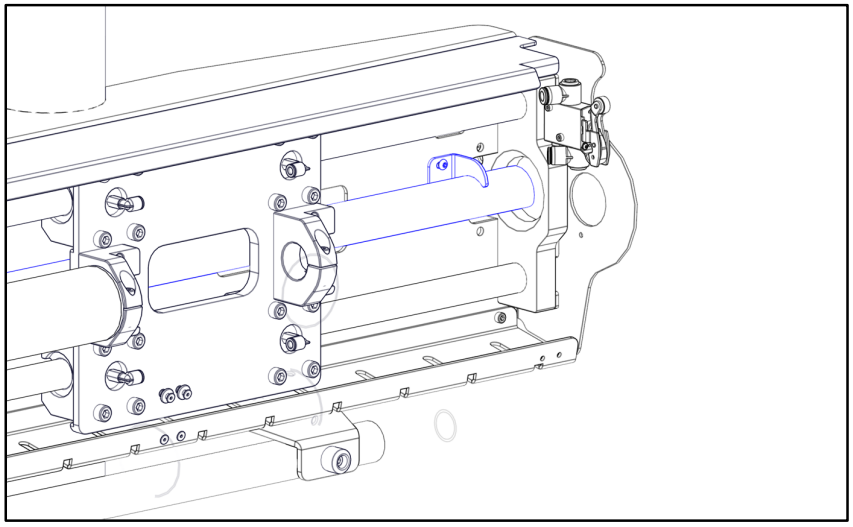


Figure 9. Installed Cylinder Shaft Cover

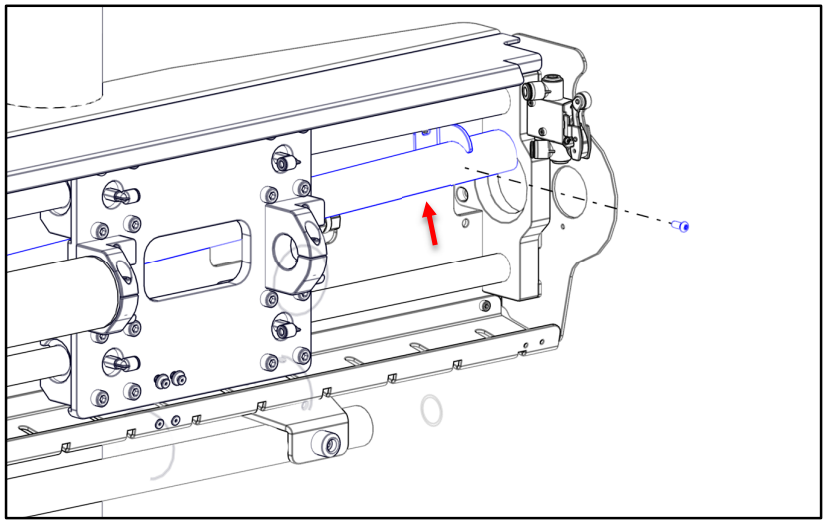


Figure 10. Shaft Cover temporary removal

Step 7 – Install Cylinder Assembly

Tilt the rear of the cylinder assembly down to fit the aluminium bracket (blue) through the hole on the main housing. See Figure 11.

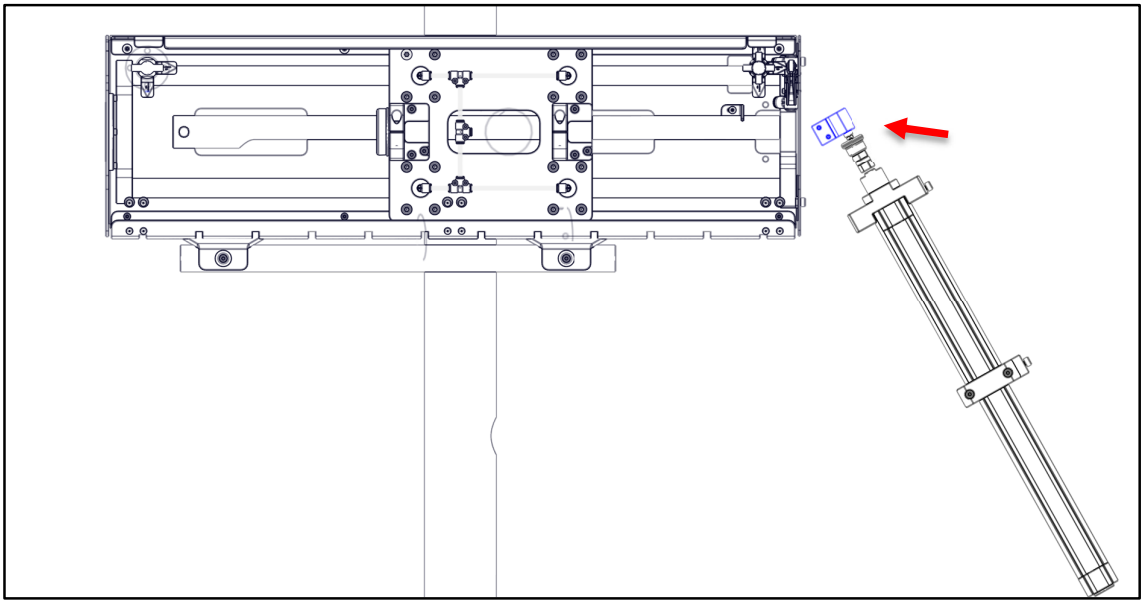


Figure 11. Inserting Cylinder Bracket

With the bracket now inside the HD main housing, Lift rear until the cylinder is parallel with the carriage. Insert the cylinder assembly into the corresponding hole in the HD housing (Figure 12).

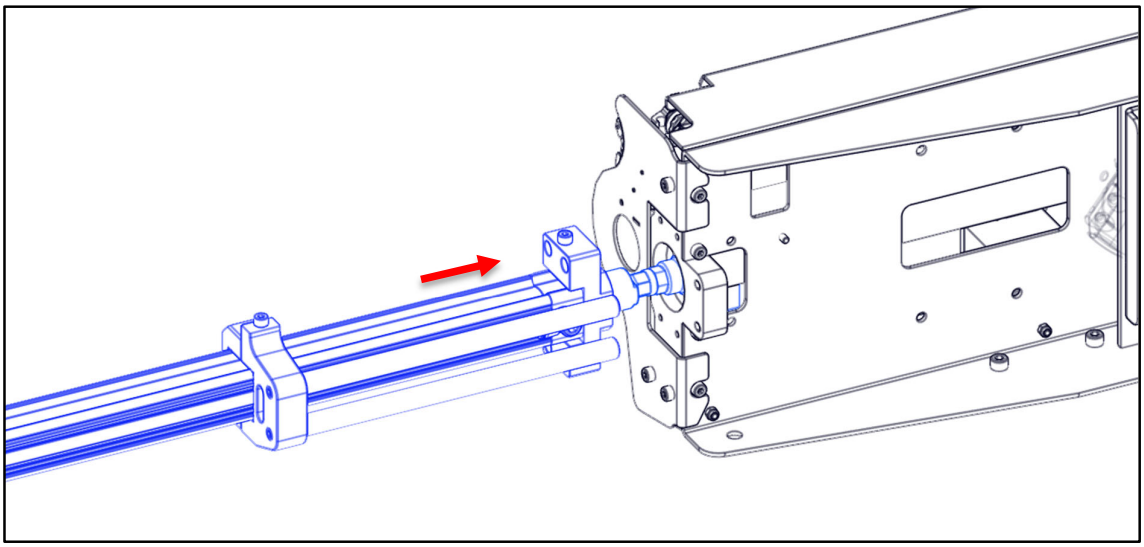


Figure 12. Installation of Teatwand™ HD cylinder assembly

Step 8 – Install Cylinder Assembly Fasteners

Install the four M8x30 Cap screws install the cylinder into the housing.

Install the two M8x25 Cap Screws into the cylinder support rails.

Re install the cylinder shaft cover bolt to return it the original position shown in Figure 9.

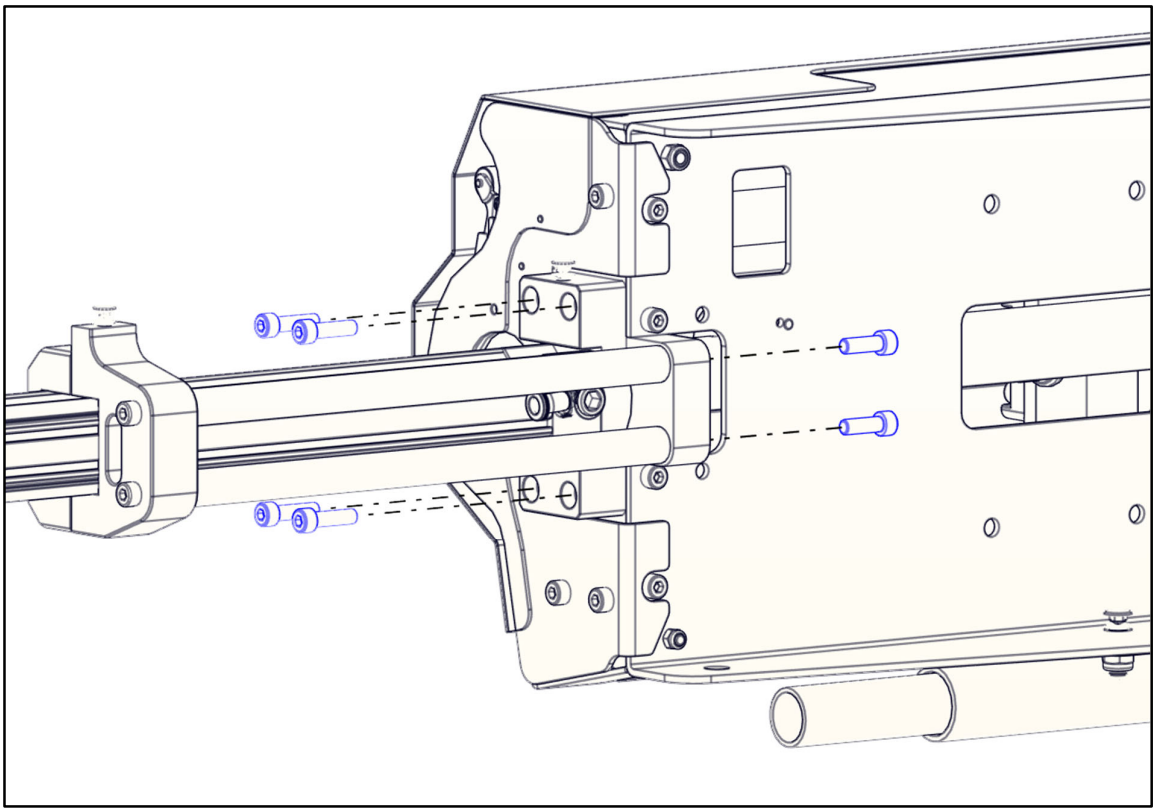


Figure 13. Fasteners for Cylinder Assembly

Step 9 – Connect Cylinder shaft to the Carriage

Install the two M8x35 bolts through the wand tube clamp and carriage plate into the aluminium bracket. See Figure 14.

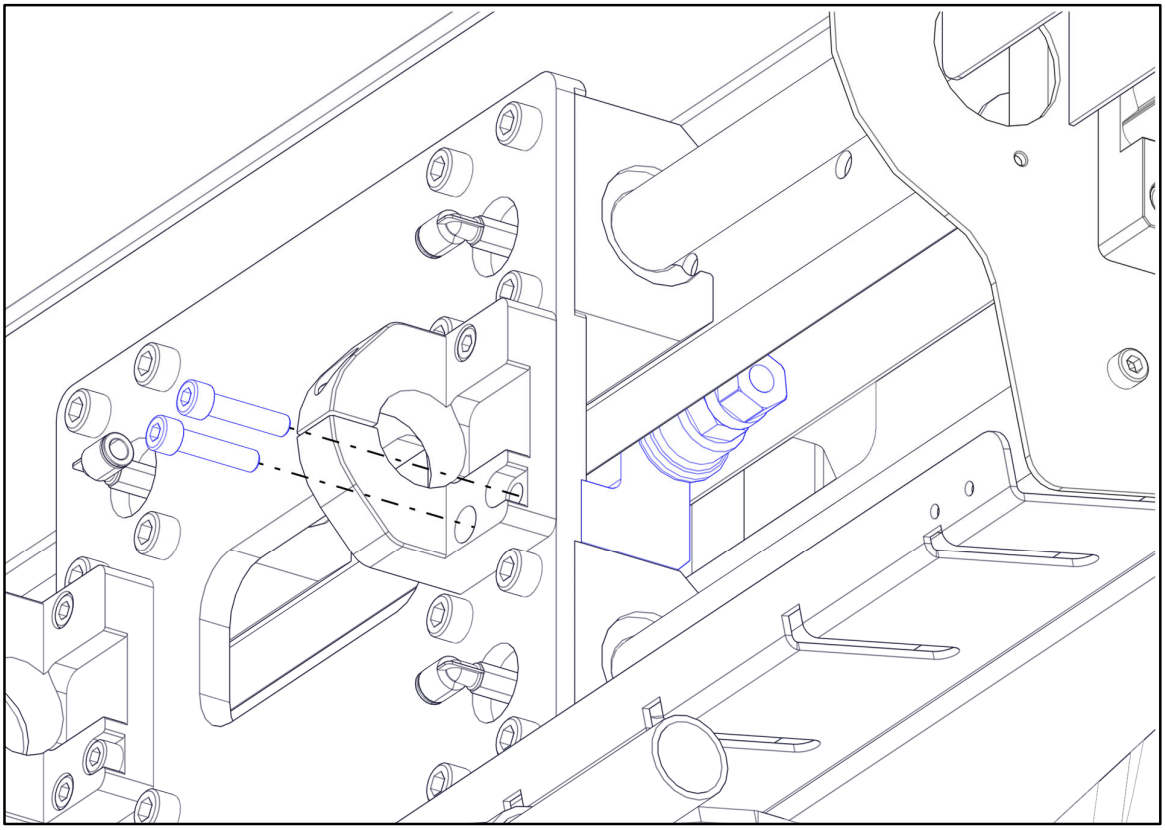


Figure 14. Coupling Cylinder with Carriage

Step 10 – Insert Wand Tube and Rubberware Guard

Insert the Wand tube through the front of the Teatwand HD until it bottoms out against the tube clamp. Loosen off the six M8 cap screws (red) and ensure that the wand tube is concentric will the hole in the Teatwand HD enclosure. Re tighten these screws, then tighten the two wand tube clamp bolts. Ensure the hole in the side of the wand tube is facing outward so a hose ca be easily routed through it.

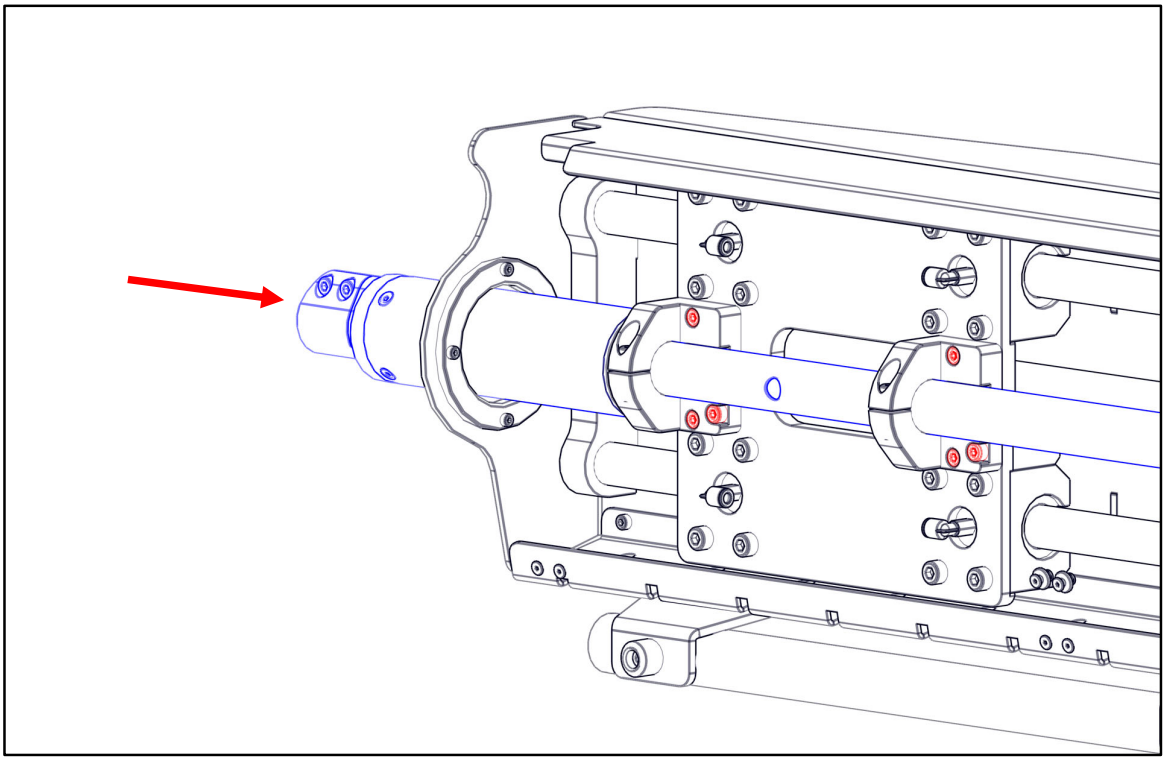


Figure 15. Adjustment of Wand

Step 11 – Insert Spring and Nozzle

Insert the Spring/Nozzle assembly and tighten the two clamp bolts (Figure 16).

Insert Rubberware guard and tighten the bolts to fix it in place.

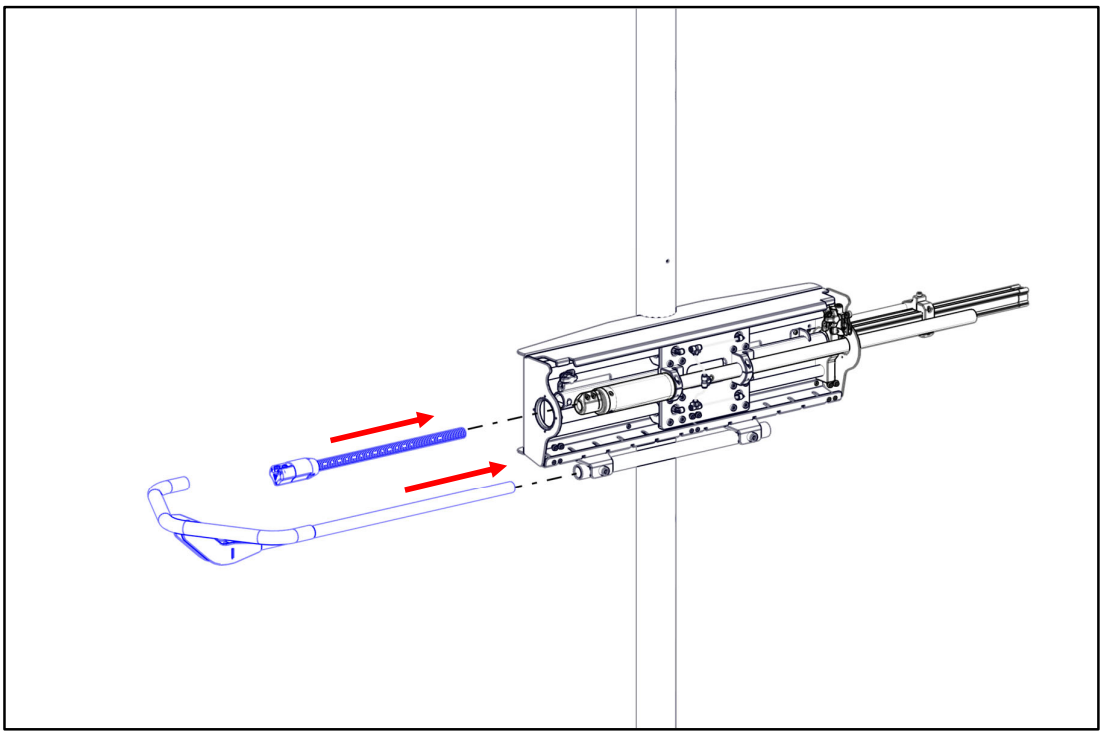


Figure 16. Inserting Spring

Verify that the top of the nozzle is 270mm above the surface of the rotary platform. This is the recommended best position for most cases, however different herd characteristics may dictate mounting slightly higher or lower. Adjust this by loosening the 6xM10 Cap screws as per Step 5 and slide the Teatwand up or down the pole.

Step 12 - Fitting the Pole Controls Cabinet

The Controls Cabinet is in two pieces (Figure 18). A Controls Cabinet Backplate with components fitted, plumbed and pre-wired and a Controls Cabinet Cover (not shown). It is installed with 2 U bolts as per Figure 17.

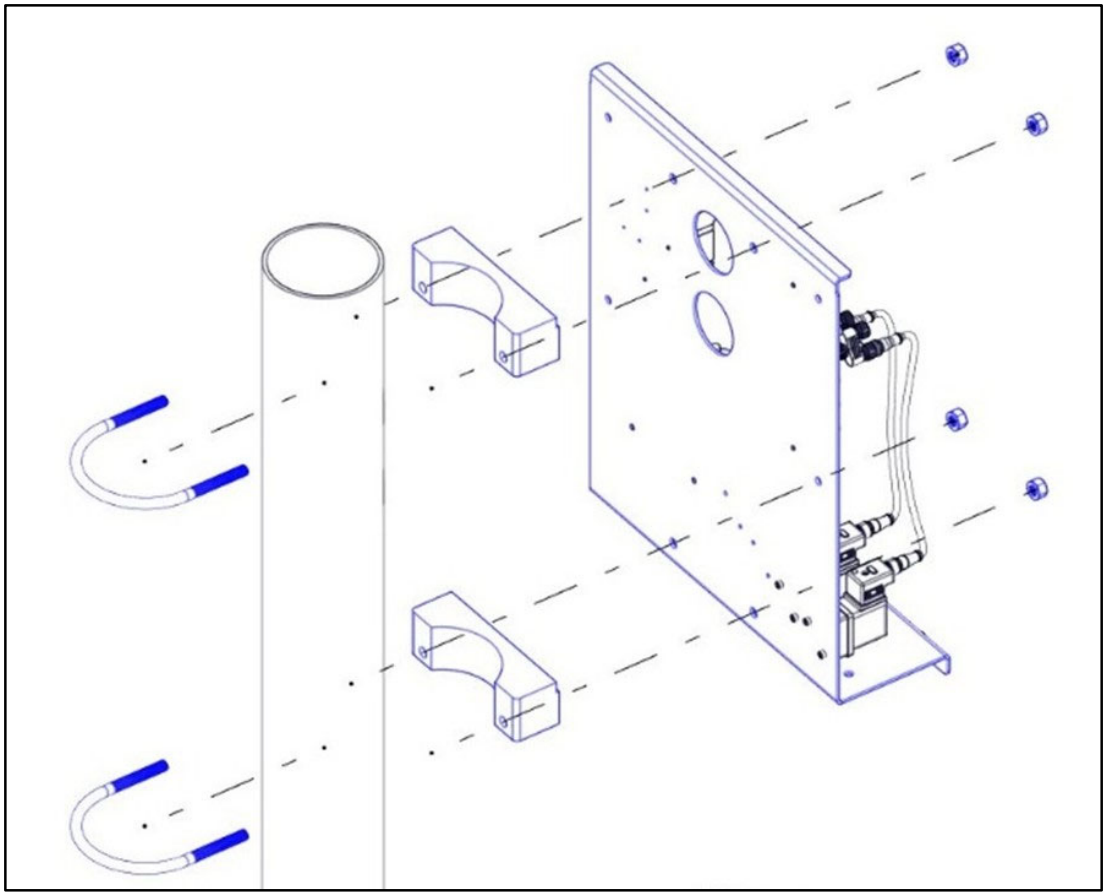


Figure 17. Installation of Teatwand™ HD Controls Cabinet

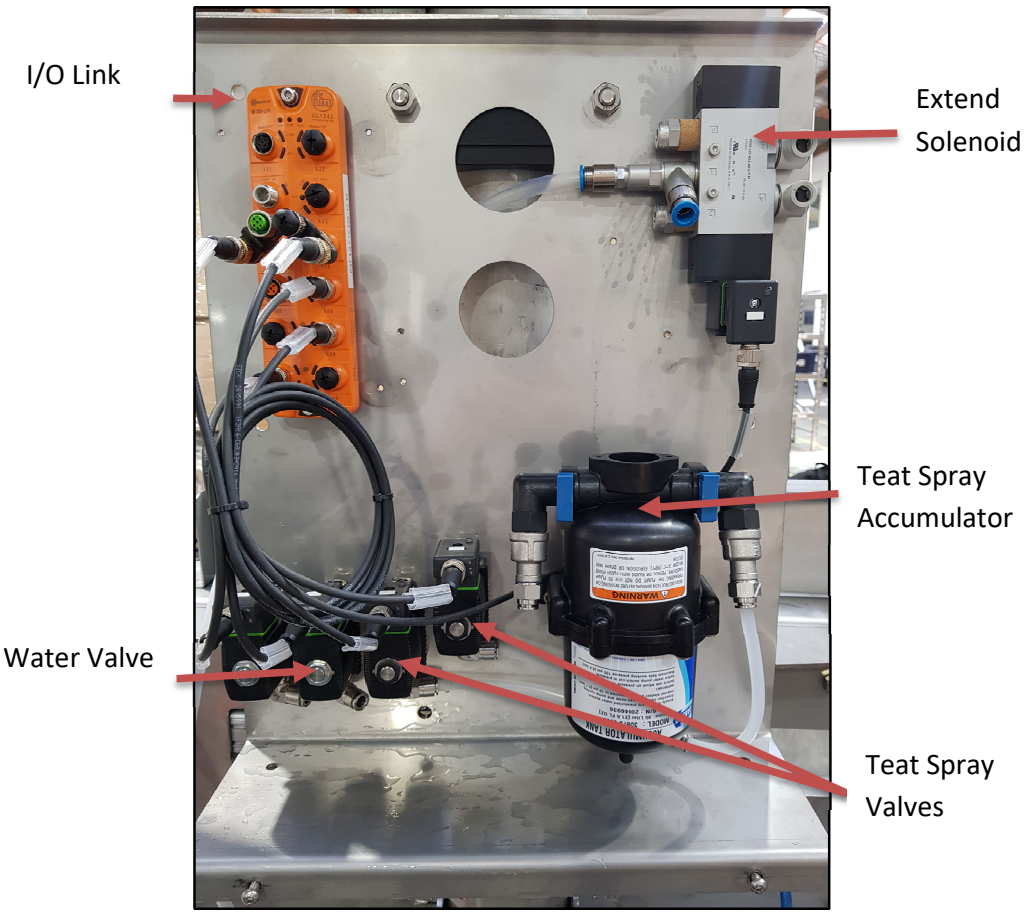


Figure 18. Control cabinet backplate with components fitted

Use the U Bolts supplied to fit the backplate towards the top of the pole. See Figure 17.

- Use the 2 pre-cut 50mm holes in the backplate to mark on the pole where holes are to be cut. Remove the Backplate, cut 2 holes in the pole, deburr holes for cables, air, water and teat spray hoses.
- Refit Backplate to Pole.
- Measure 300mm down the pole from the top face of the Teatwand™ HD Pole Mount Assembly in line with the 2 holes in the control's cabinet, cut a 38mm hole for the 2 air hoses and 2 safety switch hoses.

Step 13 - Fitting the Air Service Unit

The Air Service Unit fits to the pole above the Pole Controls Cabinet using the U-bolt supplied. It comprises of an on/off dump valve, a pressure regulator, a particulate filter, and a water separator. Install the unit above the control cabinet with the supplied U bolt (Figure 19).

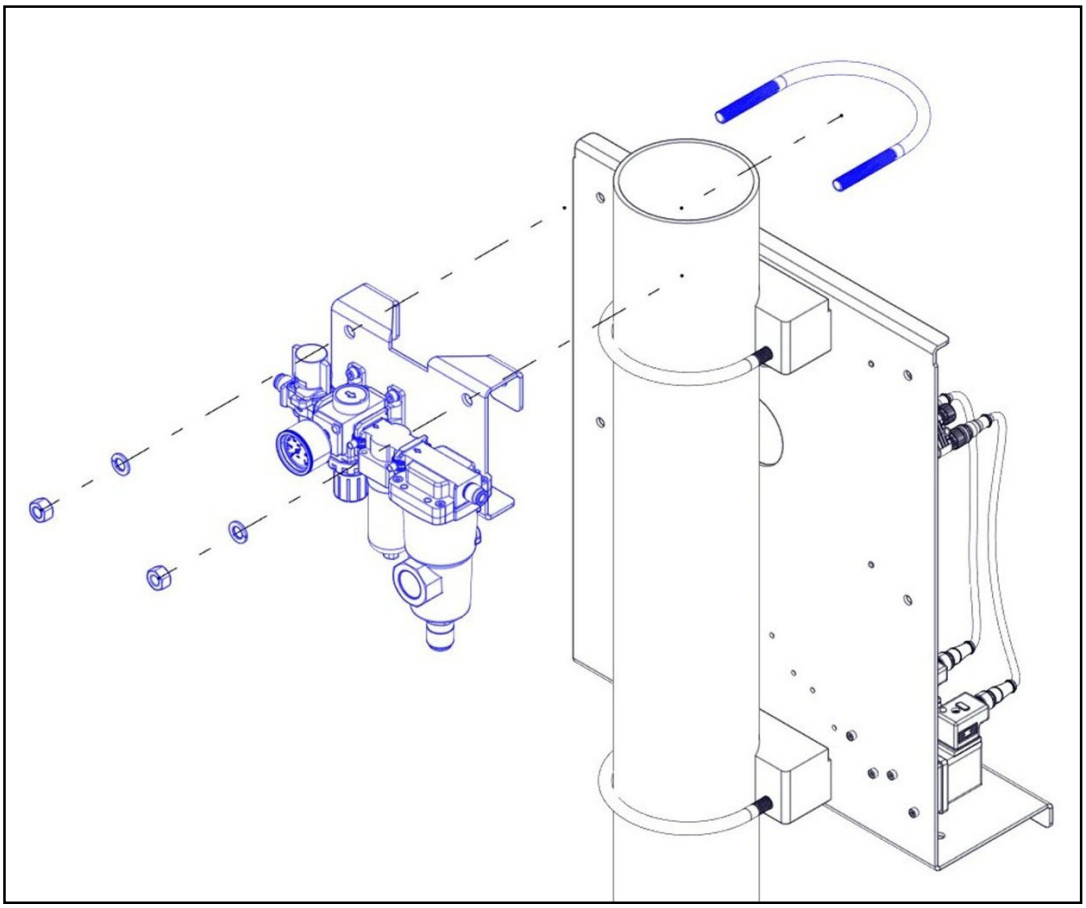


Figure 19. (a) Installation of Teatwand™ HD Air Service Unit

A 10mm compressed air supply line is required; this should be a dedicated line that supplies only the Teatwand™ HD. The Air Service Unit comes with a 10mm push fit fitting for the supply line and a 10mm push fit fitting to connect to the Pole Controls Cabinet.

From the Air Service Unit, a 10mm line delivers compressed air to the Teatwand™ HD Extend Solenoid located in the Controls Cabinet. Run the 10mm line through the centre of the pole and through the precut hole into the Controls Cabinet.

Step 14 – Fitting The Sensor Clamps

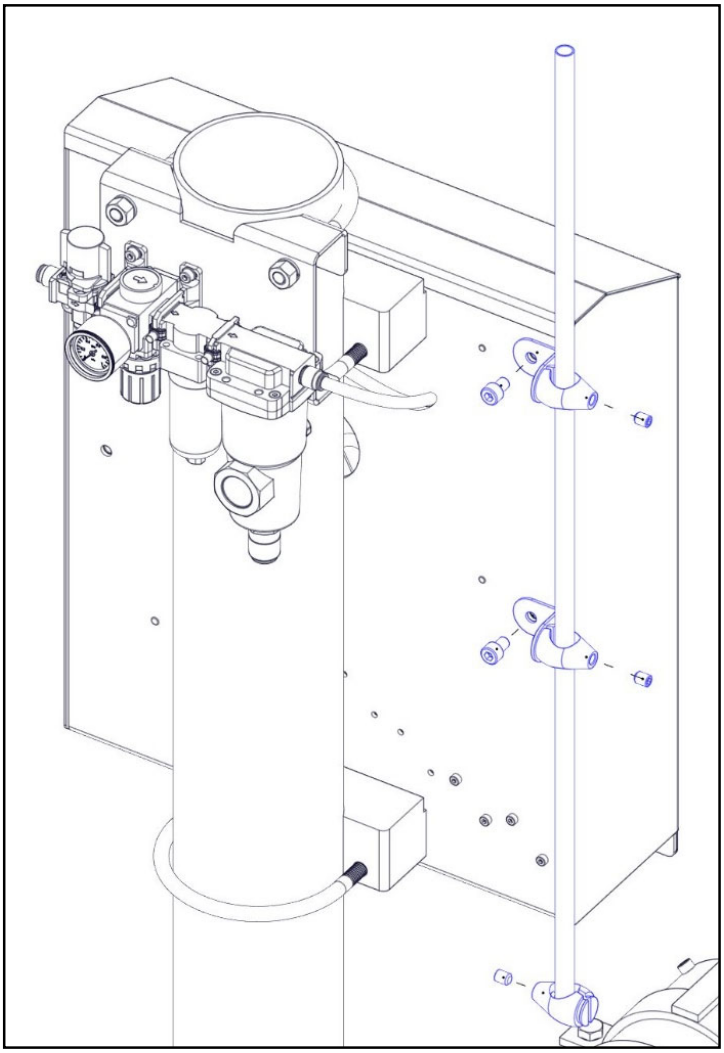


Figure 20. Installing the Sensor Clamps

Step 15 – Fitting The Sensors

Fit the Cow and Cow position as shown in Figure 21. The sensors need to be facing toward the platform. The alignment of the sensors will be set at a later step.

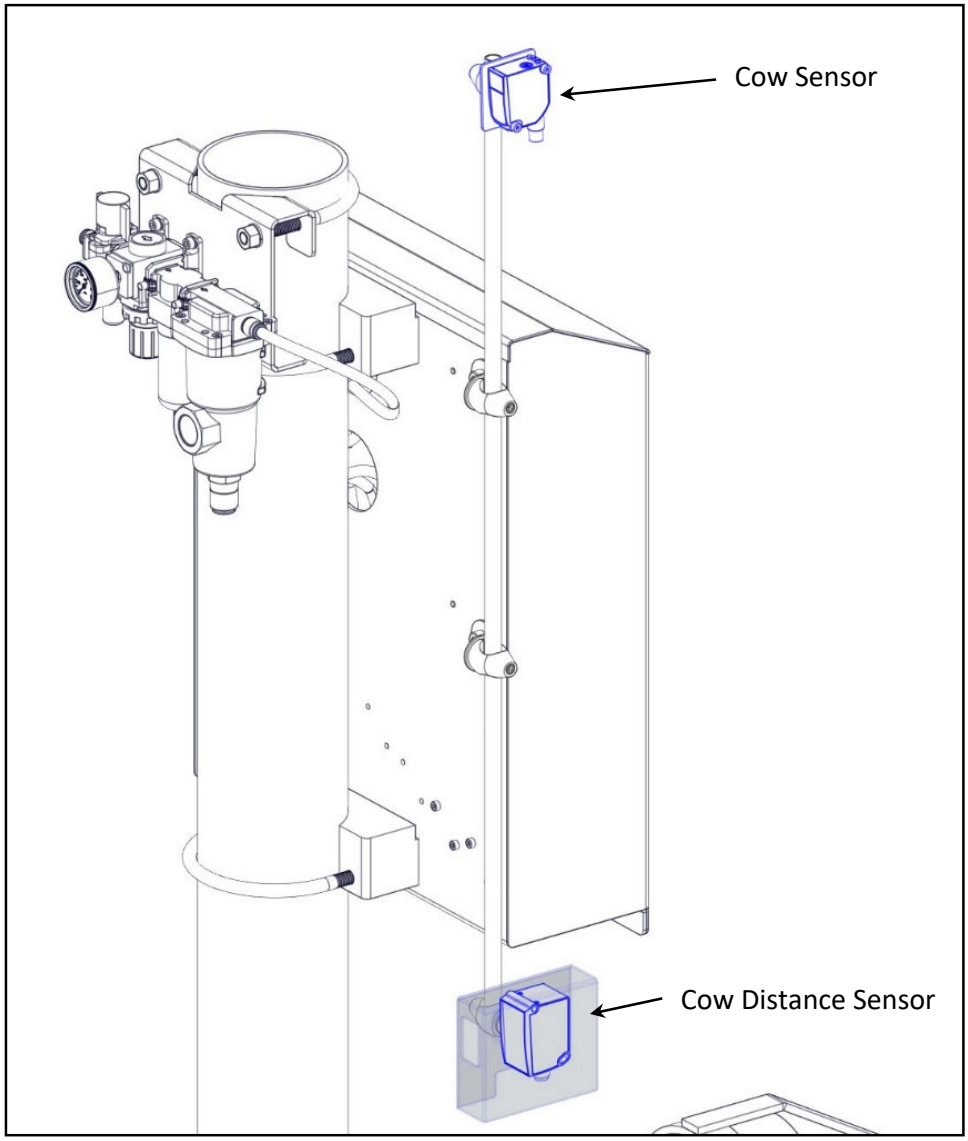


Figure 21. Sensor Mounting

Step 16 - Fitting the Teatwand Water Hose

Take three new Spray Hoses 3 meters long, one for water and two for spray. Take the water hose and pass it through the hole in the side of the wand tube.

Feed through until it comes out the rear of the wand tube. Insert the end of the hose into the wash manifold on the carriage plate. Mark the end of this hose as the water hose so it is not confused with the teat spray hoses when connecting it to the control's cabinet.

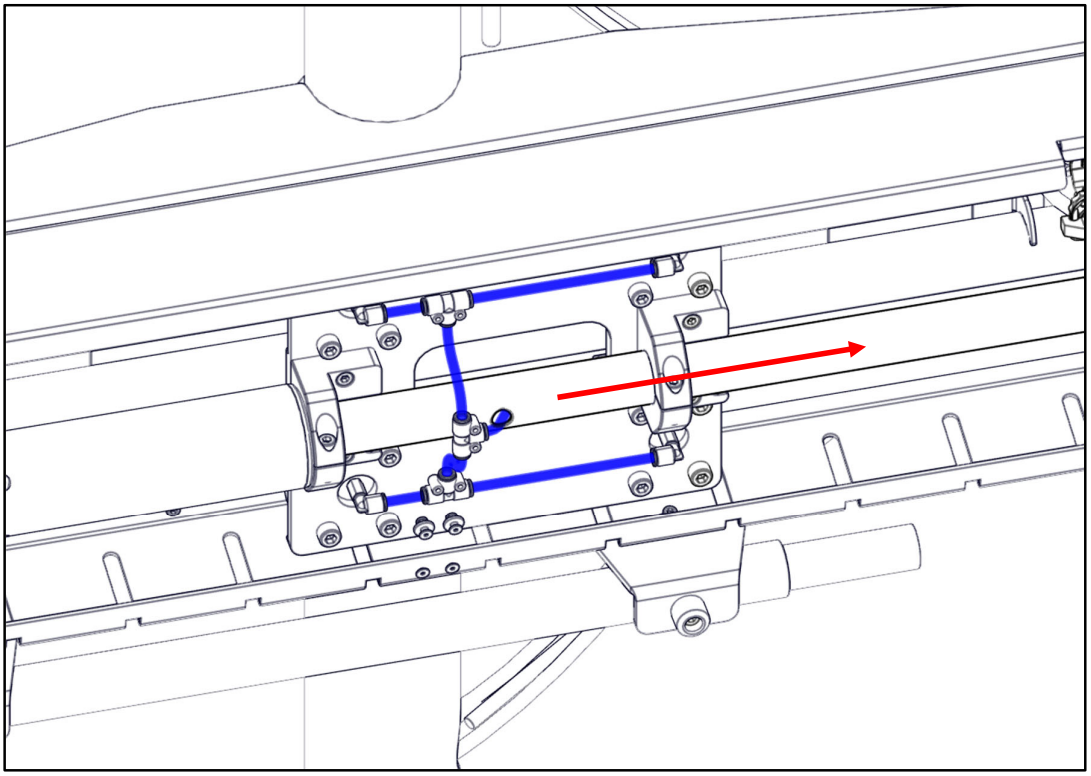


Figure 22. Water Hose Routing

Step 17 - Fitting the Teatwand Teat spray Hoses

Remove the three cap screws from Nozzle Holder using a 5mm Allen key.

Insert the two Teat spray hoses through the spring shown in Figure 23*a*, taking care not to twist. Push the two hoses through the entire wand tube. These hoses and the water hose should now be hanging out the end of the wand tube.

Insert the hoses into the push fittings in the Nozzle Holder as shown in Figure 23*b*. Take care not to twist the hoses. Reassemble the nozzle holder with the 5mm Allen key.

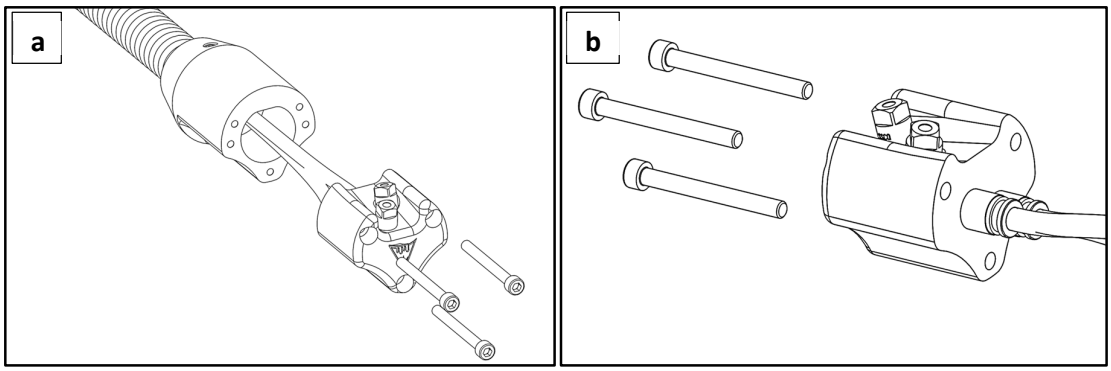


Figure 23. (a) Hoses pushed through spring. (b) Hoses fitted to push lock fittings.

Slide all three hoses (Two teat spray and one water) through the black plastic end plug and the silicone Hose Guard. Press the black plastic plug in the end of the wand tube then slide the silicone hose guard over the wand tube. See Figure 24.

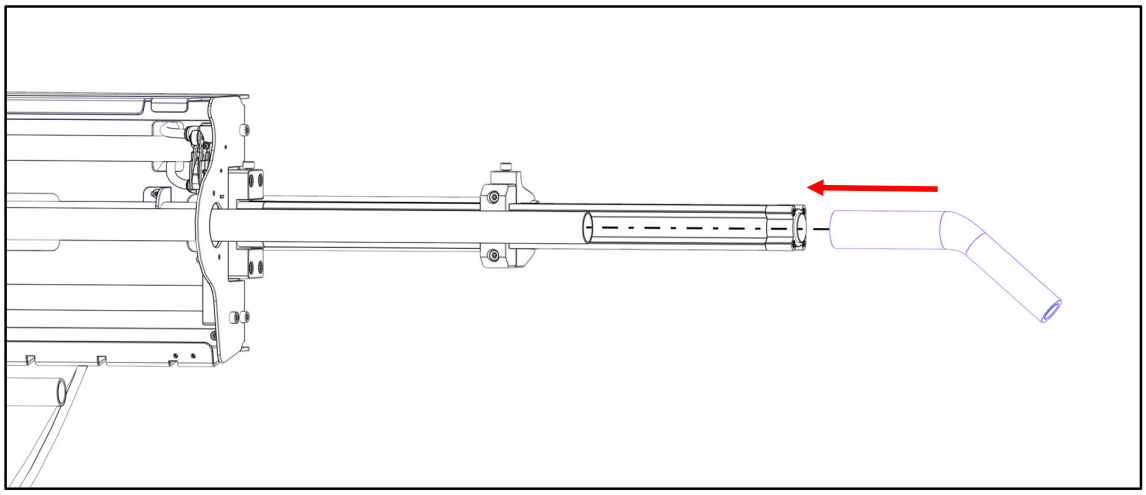


Figure 24. Installation of Hose Guard

Step 18 – Install Cover

Drop the cylinder cover over the cylinder then slide the cover until the slot on the rear cover plate mates with the tab on the rear cover plate. Insert the two M8x16 Cap screws with washers into the slots at the front and in the middle of the cover. See Figure 25.

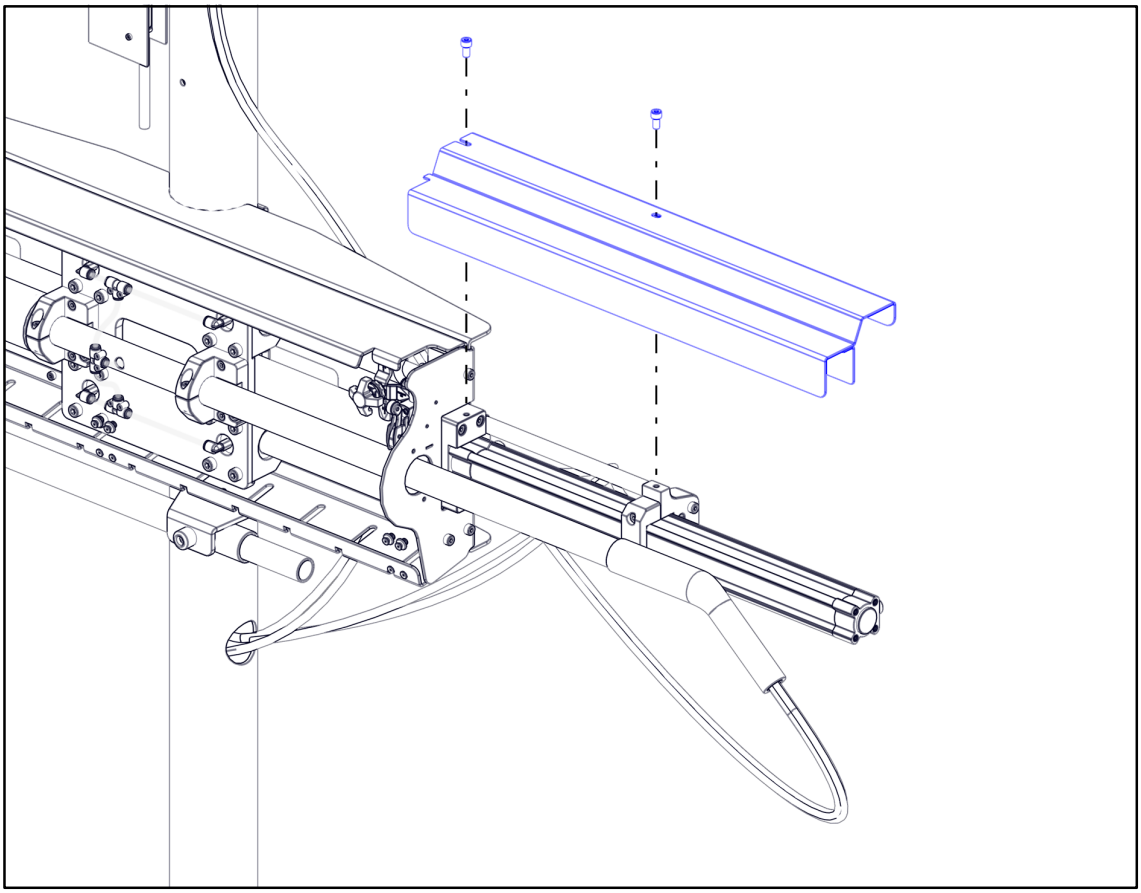


Figure 25. Cover Installation

Step 19 - Routing the Hoses to the Teatwand™ HD

The teat spray hoses, and the water hose go directly to the Pole Controls Cabinet. Ensure there is sufficient slack in the hoses to allow for the movement of the wand. Connect these three hoses with cable ties approximately every 4 inches. Ensure that they stay together throughout the movement of the Teatwand.

Cylinder Air Hoses and Air Hoses to Safety Switch both are routed from the Controls Cabinet through the inside the pole and exit through the lower hole in the pole.

When routing these tubes label each of the end before inserting through the Mounting Pole to ensure the correct end up connected to the correct connector.

Make appropriate connections in the control's cabinet shown in Figure 27.

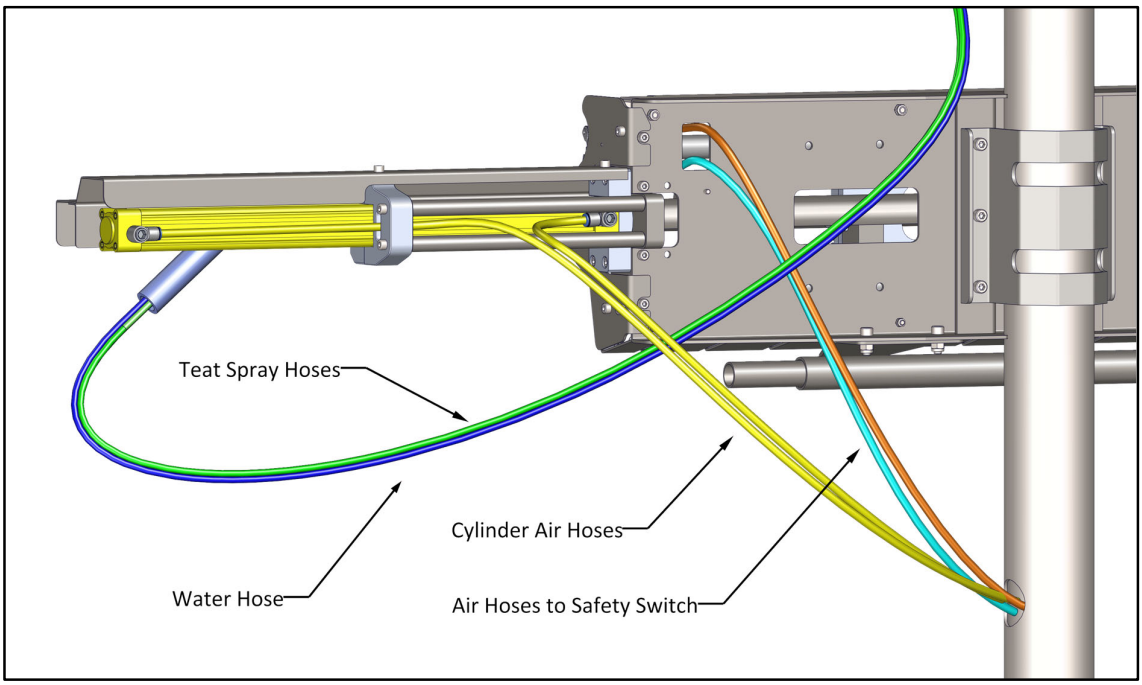


Figure 26. Hose routing to the mounting pole

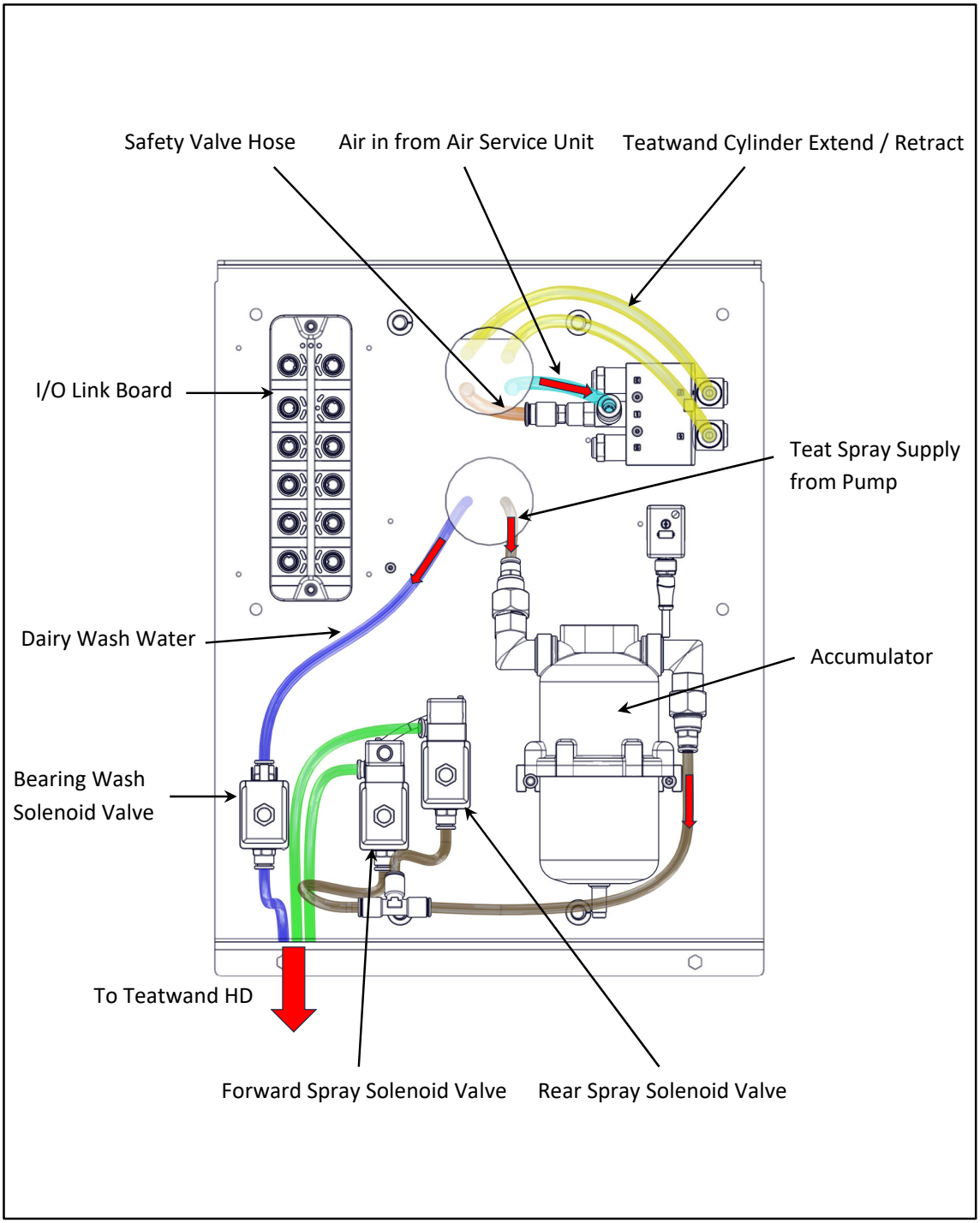


Figure 27. Control Cabinet Plumbing

Connecting compressed air to the Safety Switch

The Safety Switch is designed to immobilise the Teatwand™ HD and dump residual air pressure whenever the cover is opened. From the Air Service Unit run a hose into the Controls Cabinet and fit a Tee to provide supply to both the Safety Valve and the Extend Solenoid (Blue). Connect the safety switch and the extend solenoid with a length of 10mm Hose (Orange).

Safety Switch

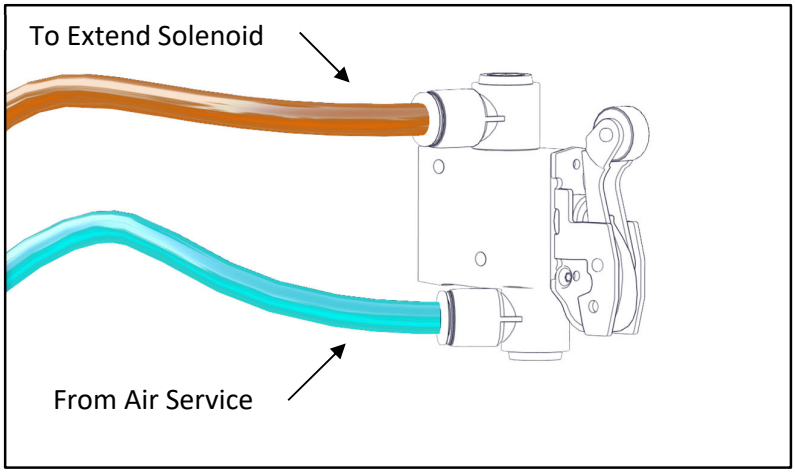


Figure 28. Safety switch hosing diagram

Extend Solenoid in Controls Cabinet

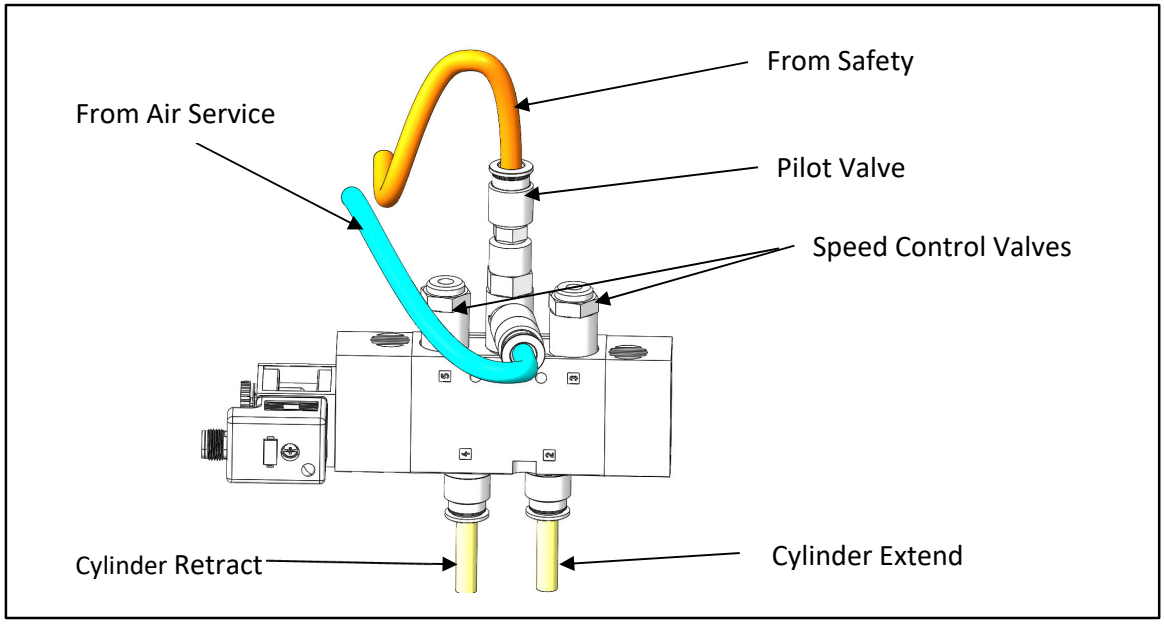


Figure 29. Extend solenoid hosing diagram

Wash Functions

A connection to the dairies wash water circuit is required. An 8mm hose connected to the dairy supply goes into a tee fitting in the Controls Cabinet supplying the water solenoid. The water solenoid is for the slide rail wash. Each slide bearing has internal channels for wash water. Water is supplied from a solenoid valve in the Pole Mount Controls Cabinet to fittings in the slide bearings. This feature keeps the slide rails clean and extends the bearing life. The frequency and duration of the water flow is adjusted in the Wash Settings page on the touch screen.

Fit the Touchscreen/Controller.

- Position the Touchscreen/Controller on a wall nearby away from high pressure wash areas. Consult with the local Dairyman for a preferred location.
- A 110/240V to 24VDC Power Supply is fitted inside the touchscreen enclosure

Install the Teat Spray Pump Assembly.

- An 8mm air supply to the pump regulator is required.
- Install above or close to the teat spray vessel.
- The pump will draw teat spray vertically from a maximum of 15ft.
- Air pressure minimum 20psi, maximum 100psi.
- For standard Nozzles pressure will be between 35-65 PSI.
- Higher pressure results in more teat spray being applied.

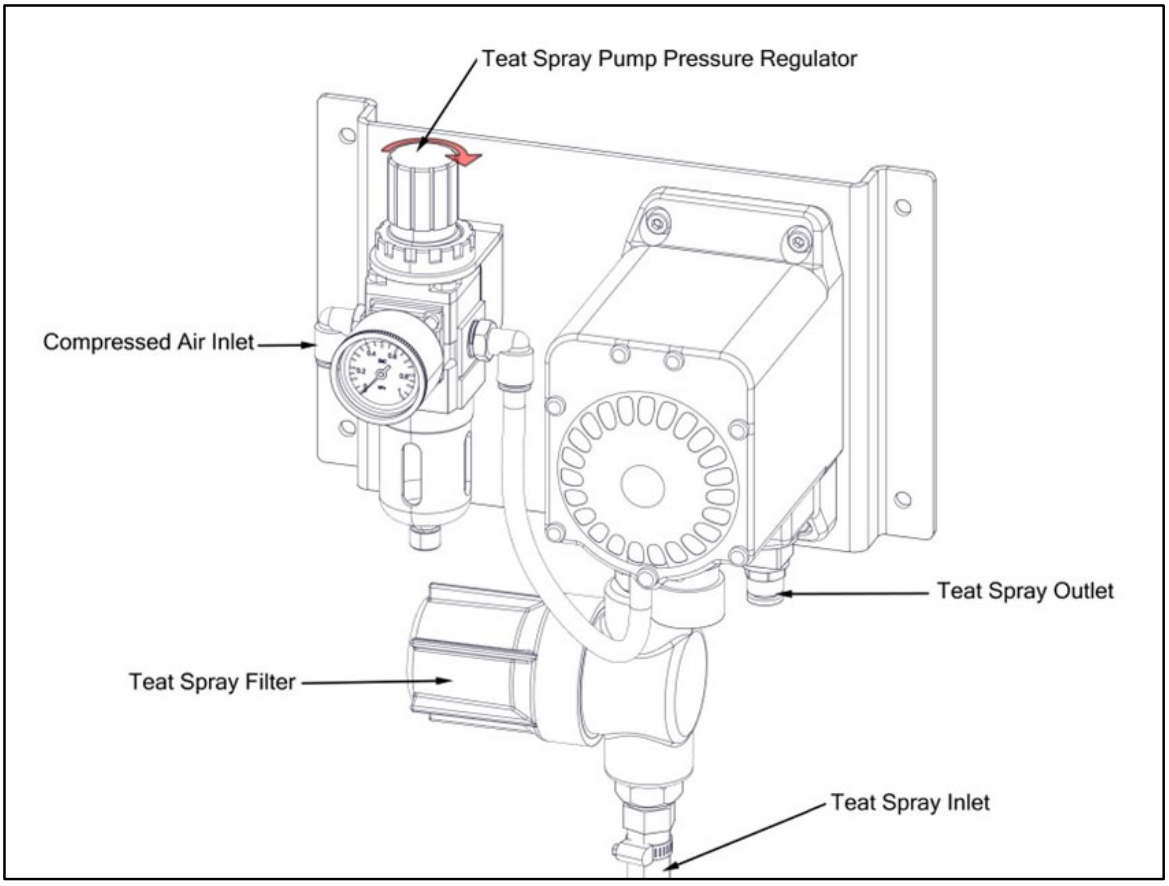


Figure 30. General arrangement of pump

Connecting Services to the Teatwand™ HD.

Compressed Air

- A 10mm compressed air supply at 100psi is required to be connected to the Air Service Unit located on the pole above the Controls Cabinet.
- From the Teatwand™ HD extend solenoid, 2 hoses run down through the pole to the hole below the Pole Mount Assembly and connect to the Teatwand™ HD.

Teat Spray

- Use the 8mm hose supplied to run from the Teat Spray pump to the Controls Cabinet.
- 2 spray hoses exit the end of the Wand Tube and go directly into the Controls Cabinet.

Wash Water

- A connection to the dairy wash water circuit is required via an 8mm hose that connects in the Controls Cabinet.
- The bearing wash hose exits the end of the Wand Tube and goes directly into the Controls Cabinet.

Electrical Connections

- The Teatwand™ HD system is 24VDC.
- Run 1.5mm 24VDC cables from the power Supply to the Controller/Touchscreen. See Appendix C.

Cabling

Solenoids and Sensors are connected to the I/O Link in the Controls Cabinet with pre-made cables. All cables are labelled with the Onfarm Solutions part numbers fitted into a sleeve at each end of the cable adjacent to the plugs.

Tuning the Pneumatics of the Teatwand™ HD

With the TW HD fitted, the air hoses connected, and the pressure regulator set at 80psi there is some fine tuning required.

- On the HMI navigate to Index > Spray Timings page in the settings section and set the Extend time to 1200ms.
- Increase the Near, Mid, and Far times by 20% e.g. 1000ms becomes 1200ms.
- **The Teatwand™ HD should extend to the end of its stroke before retracting.**
- Fine tuning of these time settings may be required after observing a few cycles.

With the platform travelling at the fastest milking speed, set up the extend and retract speeds first using the speed control valves on the Extend Solenoid as shown in *Figure 31* below. Port 5 controls the extend speed, Port 3 controls the retract speed. Screwing the flow controller adjustment in (clockwise) slows the speed of travel, screwing the adjuster out (counterclockwise) increases the speed.

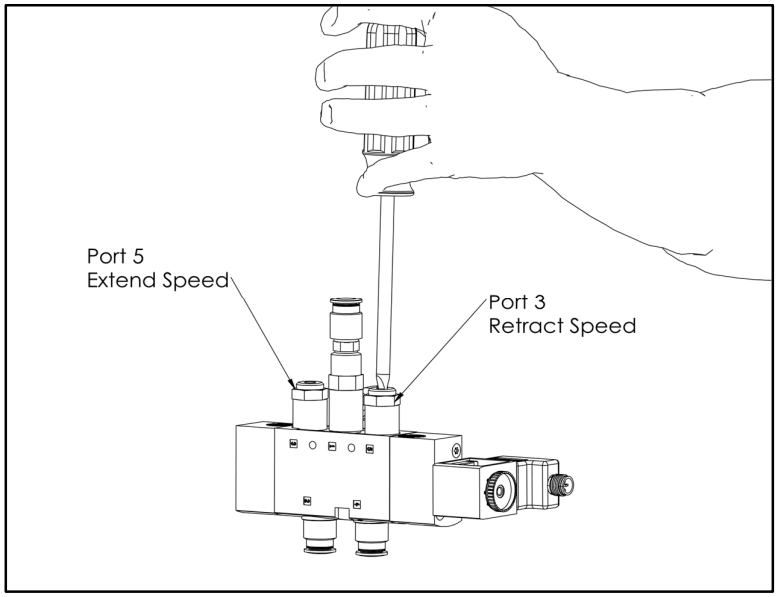


Figure 31. Adjusting the speed control valves

Ensure the Teatwand™ HD has time to fully extend over the leading edge of the Leg Spreader and retract over the trailing edge. Slight adjustment to the positioning of the Pre-bail and Bail sensors may be required for fine tuning the timing of the Teatwand™ HD.

Adjusting the Nozzles to Vertical

From new, the spring will relax causing the nozzle head to rotate a few degrees. Adjustment will be required during the first two weeks from new or after fitting a new spring.

- Loosen the three grub screws shown in *Figure 32*.
- Rotate Nozzle Head to vertical.
- Tighten grub screws with 4mm Allen key.

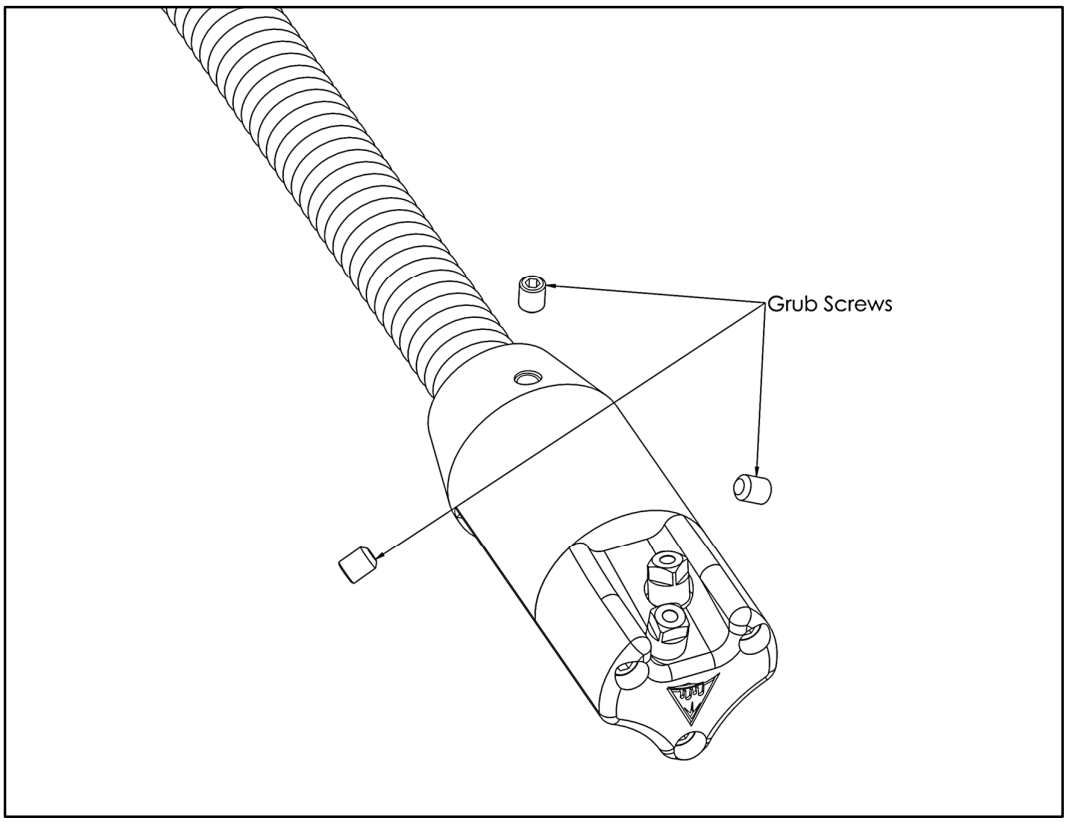


Figure 32. Grub screws x3 for attachment onto spring

Sensor Installation

Stall Sensors

These sensors are photoelectric and will detect anything from 10mm to 150mm away. Two sensors are used side by side to determine the direction the rotary is moving.

The first sensor to be activated as the rotary is going forward is the Pre-Stall Sensor, the second sensor is the Stall Sensor; this is the trigger that activates the Teatwand™ HD spray sequence.

Each Teatwand™ HD system requires an individual Stall Sensor Assembly. Pre-spray and Post-spray installations will have 2 x Stall Sensor Assemblies.

IMPORTANT:

- Stall Sensors need to sense a point that is constant on every stall.
- These sensors must be activated only once per stall. Any unintended signal from pipework, hoses etc. will result in a sequence being activated at the wrong time causing possible damage to either the Teatwand™ HD or equipment on the rotary.
- They must be mounted in such a way to allow for adjustment as they are used to fine tune the timing of the Teatwand™ HD sequence.
- Stall Sensors are usually mounted in the basement.
- Tags or brackets may need to be fitted to the rotary for these sensors to detect.
- In some cases, these sensors can be mounted to look at high framework on top of the rotary above the cows.
- A 20m cable is supplied to connect from the Pole mounted Controls Cabinet to the Stall Sensors. From this cable a 'Y Cable' is used to connect to each sensor.

A Bracket for this assembly to suit the parlour is to be made onsite.

Locating the Stall Sensors

The Stall Sensors can be fitted anywhere around the internal diameter of the basement. It is the positioning of the sensors within any given stall that is critical. Where the cable/s enter the basement is often the best area for the Stall Sensors to be fitted.

1. Ensure the Teatwand™ HD is mounted on the Pole.
2. Press the stop button on the home screen to disable the system. With the system disabled the sensors remain live.
3. Turn off air supply at the Air Service Unit.
4. Stop the rotary at any stall in the exact position where the Teatwand™ HD will activate. That is where the Teatwand™ HD will extend over the first ridge of the Spread Eagle Leg Spreader. This may have to be done during a parlour wash time.
5. With the rotary stopped in position go to where the cables enter the basement.
6. Select a tag for the Stall Sensors to detect. Consider potential mounting options. See *Figure 33* through to *Figures 36.*
7. Mark the position of the selected tag on the basement wall.
8. The Stall Sensors will be mounted with 25mm of clearance between the face of the sensor and the tag.
9. Fabricate a bracket and fit the Stall Sensor Assembly using a 300mm length of Sensor Rod. Position the Stall Sensors in the centre of the Sensor Rod.
10. Fit the bracket with the Stall Sensor Assembly aligned to the position marked on the wall and with the Stall Sensor Assembly detecting the tag with 25mm of clearance. There will be adjustment (left and right) of the sensors on the Sensor Rod. The bracket will be off set from the mark on the wall.
11. Position the Stall Sensor to detect the tag.
12. Fit cables, tie off all excess. Check clearance with all moving parts.

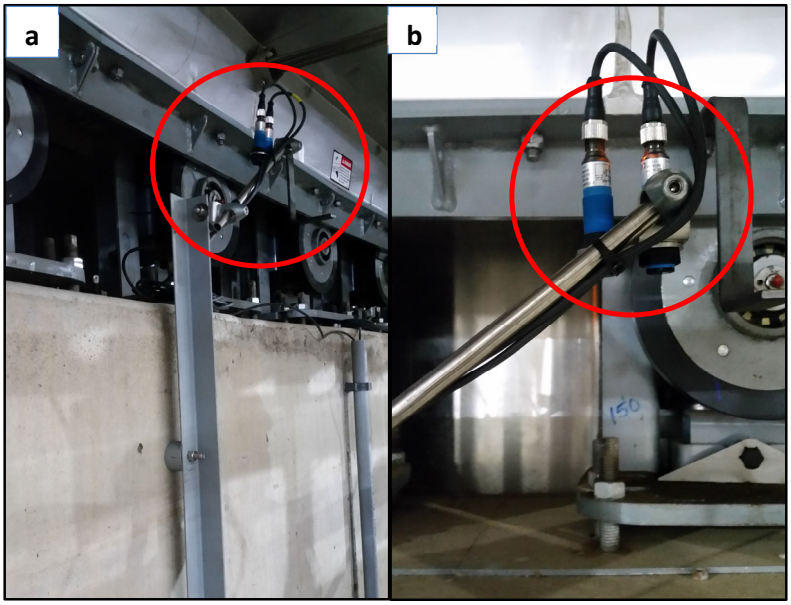
When installing over the rotary follow steps 1,2,3 & 4. Use existing overhead pipework or framework or fabricate a suitable frame. Follow steps 11 & 12. Tags may be needed.

IMPORTANT: Check for at least 2 full rotations there is clearance of tags with all stationary objects and the sensors have clearance with all moving objects. Check both sensors are activated with every tag, there is a LED at the plug end of these sensors.

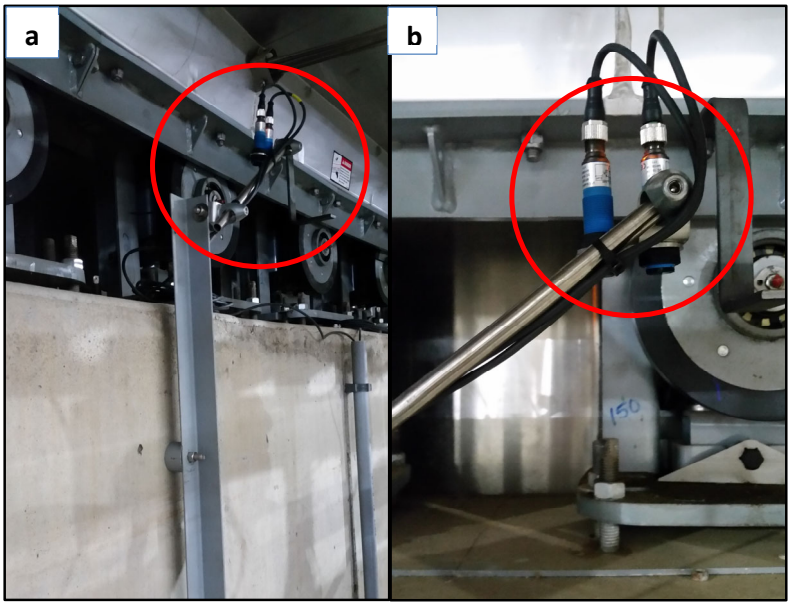
This example shows sensors mounted above the cows detecting a metal tag close to the Stall Gate ram (Figure 33)

Figure 33. Typical overhead bail sensor arrangement

This example (

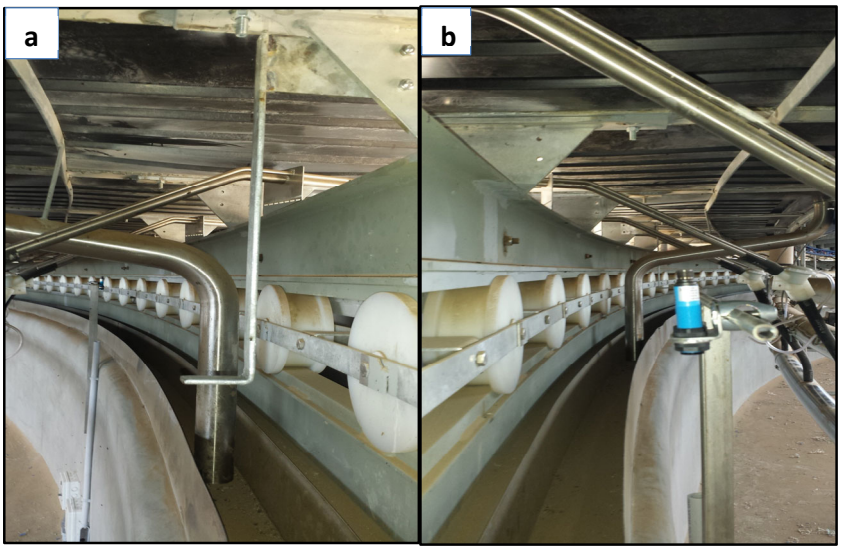


Figures 34) shows a metal bracket fitted to the rotary platform and an angle iron bracket mounted to the concrete wall of the basement with the sensors mounted off that.



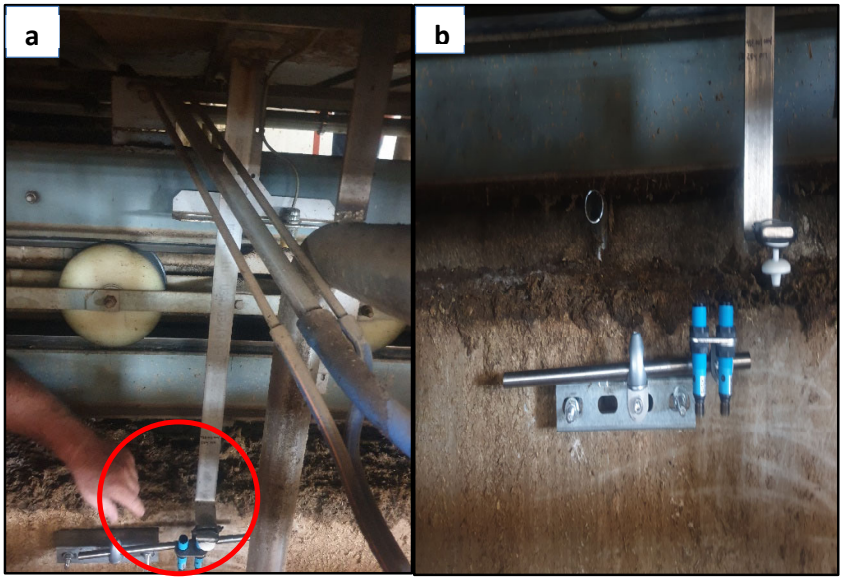
Figures 34 a & b. An example of bail sensors mounted in the basement.

This example shows a bracket mounted to the rotary platform using existing holes in part of the structure and the sensors are mounted off an angle iron bracket fitted to the concrete wall of the basement (Figures 35).



Figures 35 a & b. Another example of bail sensors mounted in the basement.

This example uses existing brackets on the rotary with the sensors mounted on the basement wall facing up (Figures 36). Where possible it is recommended sensors point down to limit the build-up of dirt on the sensor face and reduce the need for cleaning.



Figures 36 a & b. An example of using an existing feature for bail sensors to detect.

Cow Sensor

The Digital Laser sensor emits a red laser dot (

Figure 37).

It has adjustment to set a maximum distance it will sense. Mounted on the Controls Cabinet high enough to look down into the stall to sense there is a cow. The Cow sensor must be sensing a cow when the stall sensor is triggered for the spray sequence to start.

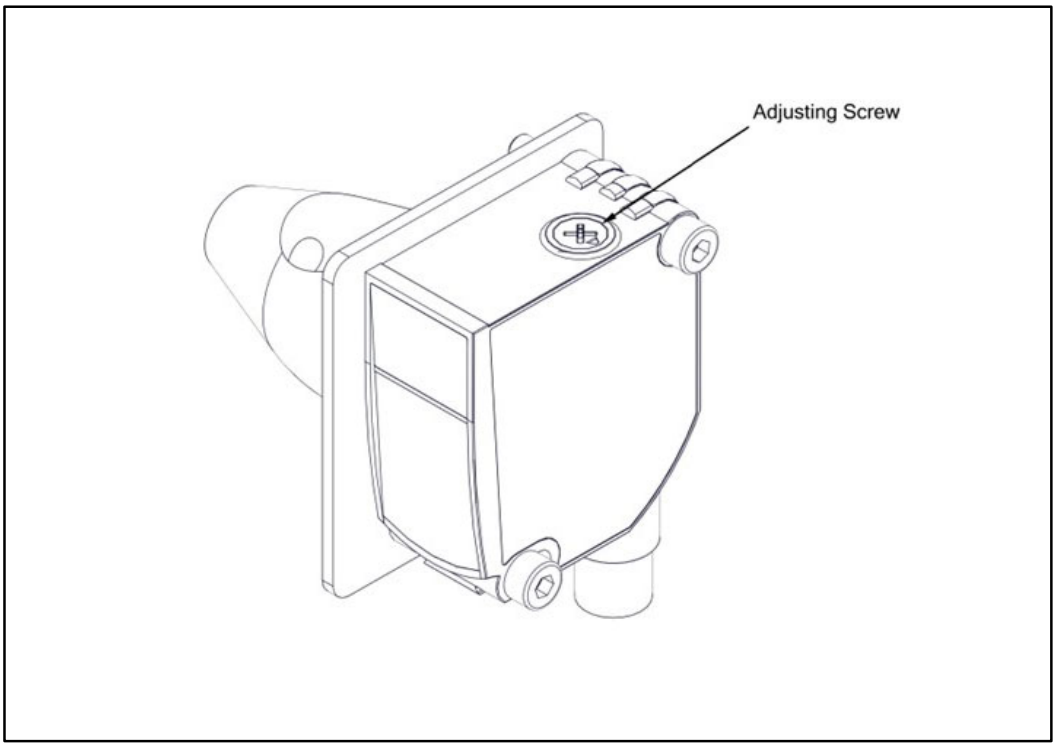


Figure 37. Cow sensor

Cow Distance Sensor

This is an analogue laser sensor mounted towards the bottom of the Controls Cabinet to look at the back end of the cow (

Figure 38). It feeds back information to the PLC regarding the cow's position in the stall. This information is used to select the spray pattern best suited.

The Cow Distance Sensor must be zeroed. To do this loosen the sensor clamp and point the laser dot at the rump rail. Go to the touchscreen, in the Analogue Settings page press the 'Set Zero Distance' button.

To reset this sensor to factory settings, remove the plug from the sensor, hold the 'select' button down, refit the plug, continue holding the 'select' button until Q1 near and far, Q2 near and far and slow LEDs flash.

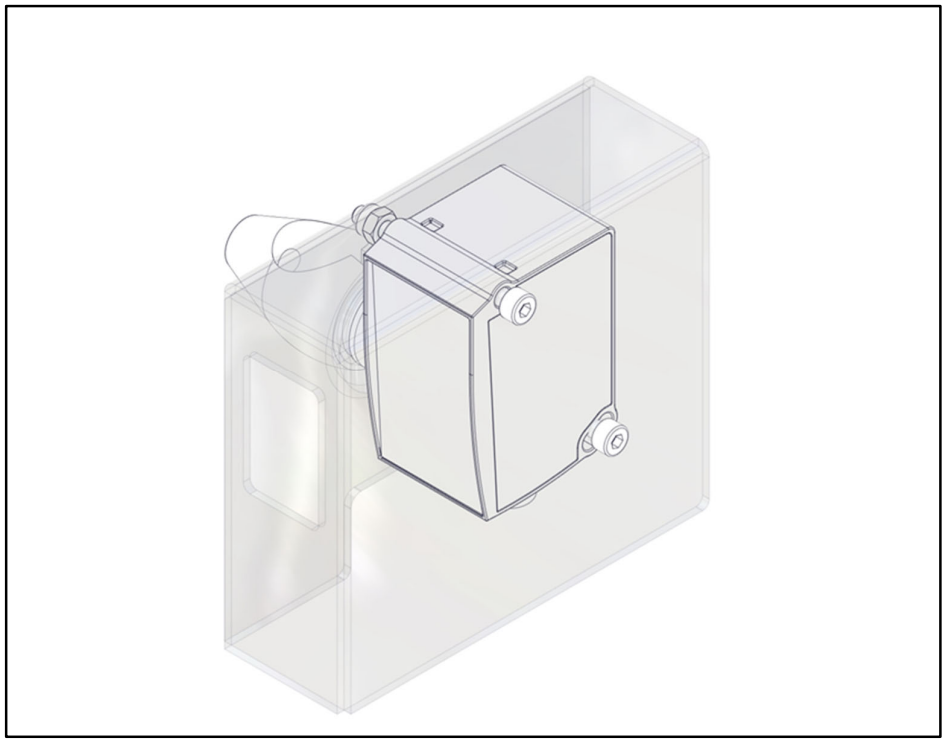


Figure 38. Cow distance sensor

Aligning the Cow and Cow Position Sensors

Cow Sensor

Please consult

Figure 38 for the Cow Sensor. Adjust the sensor's detection range to three feet inside the stall by using the adjusting screw. When the sensor detects an object, two orange LEDs on the sensor will light up. Aim the laser dot at the widest point, which is the hips of the cow.

Cow Position Sensor

The sensor alignment is shown in *Figure 39*. To zero the sensor, point the laser dot at the rump rail – the blue arrow, then reposition the sensor to detect the back end of the cow – the red arrow.

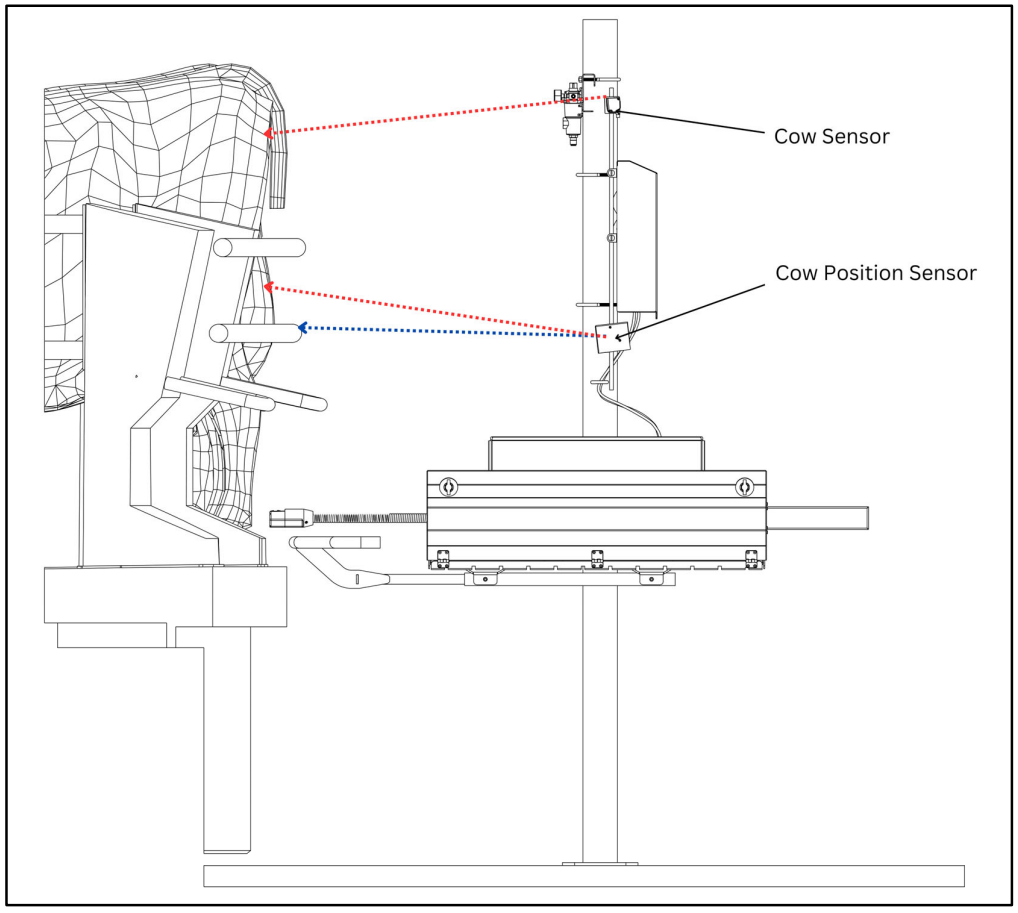


Figure 39. Sensor alignments

Navigating the Touchscreen

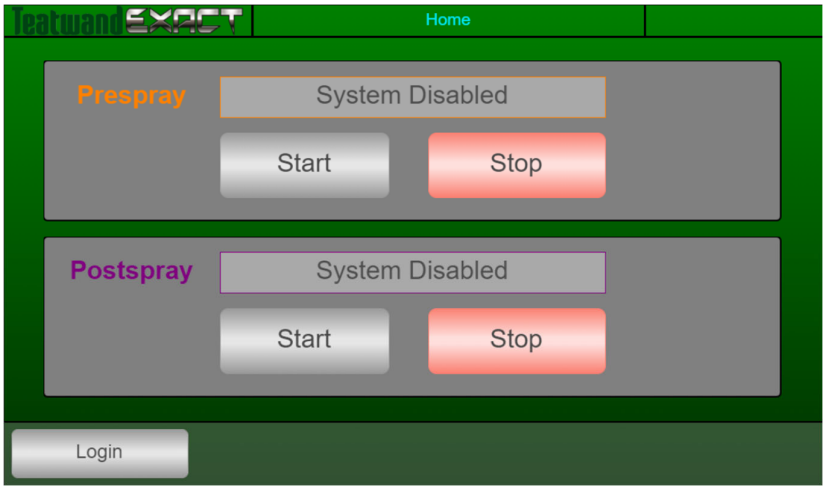
On most pages there will be blue question mark icons ? next to the various buttons. These provide the user with explanations about the various functions.

Home Pages

The Home page is the starting point for all Teatwand™ adjustments and operations.

This is the default Home screen. This screen will come up when the controller is powered up.

Once logged in the screen can be configured as a single system and other functions can be activated.



Logins

Logins are required to access many of the settings. The system **Start** and **Stop** buttons are active without logging in.

Customer Logins:

Operator Login – **2002**

In operator mode you can:

- manually trigger the Teatwand™
- bypass the cow and cup sensors
- toggle/bypass backoff
- view all system settings (but not edit)

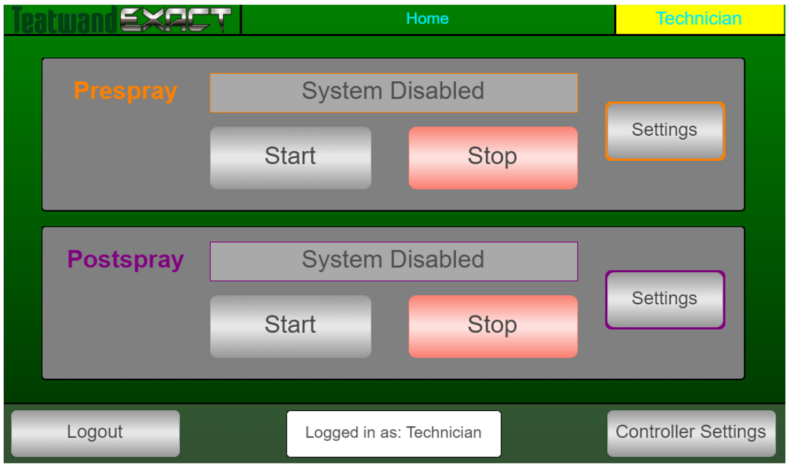
Technician Login – **5927**

When logged in as a technician you can access and edit all settings.

Once logged in a banner will appear on the top right-hand corner of the Home Page indicating which Login has been applied.

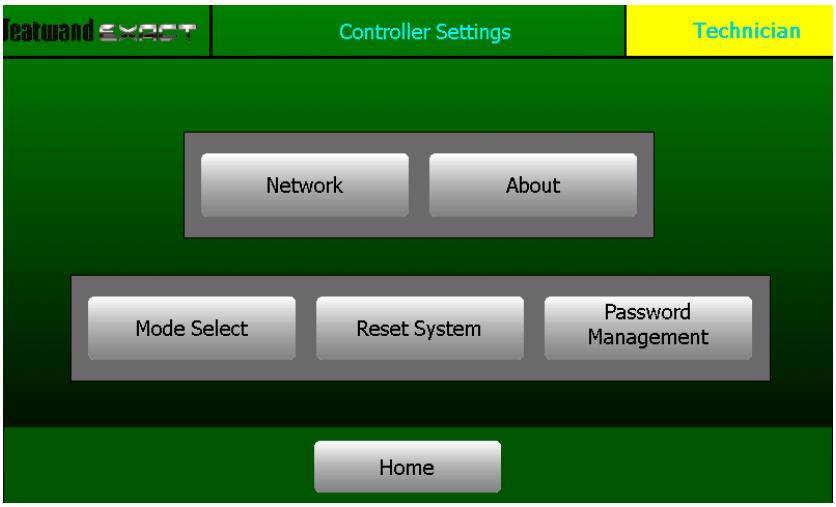
Login times out after 30 minutes or use the Logout button on the Home Page to Logout.

Once logged in as a Technician this page will appear.



Use the Controller Settings button to access the Controller Settings Page where the Home Page can be changed to a single system either Pre Spray or Post Spray. On the Controller Settings page other options can also be activated.

Controller Settings page



Modbus Network

This page indicates the status of the Ethernet connection and if it is a double system there will be 2 Slaves connected, a single system will have 1 Slave connected.

This page displays information regarding the software version and controller identification.

Mode Select

This is where the correct System Mode can be selected, Pre, Post or Pre & Post and other options can be activated. See below.

Reset System

Use this page to reset all settings to factory default settings. This will also reset the passwords to the defaults. If the Reset All Settings button is used the system will need to be recommissioned.

Password Management

Both the Operator and Technician passwords can be changed on this page.

Once changed it is important to remember the change. The original default passwords can be recovered using the Reset All Settings button.

Mode Select page

Select System Mode. Use the drop-down box and select the correct system, Pre spray, Post spray or Pre/Post spray.

Postspray & Prespray Options

If the system has been optioned with Backoff, Wash and or Monitoring the appropriate option must be activated. These options are set to **off** by default if any are being used, they must be activated on this page.

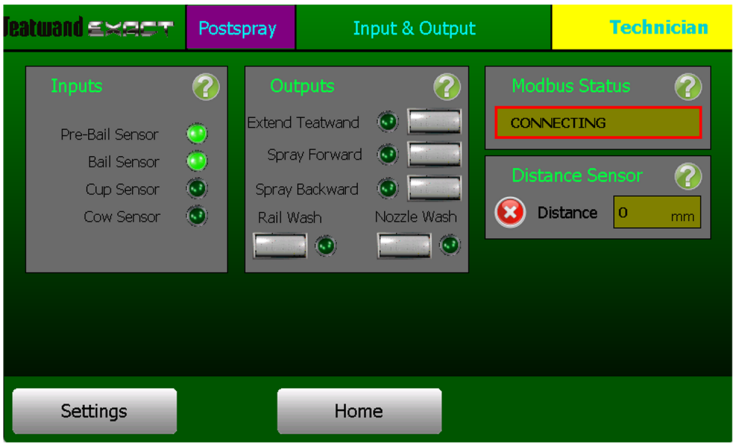
Once logged in as a Technician a 'Settings' button will be accessible from the Home page. This opens the Settings Index page.

Settings Index page

This page provides access to all settings sub-menus.

Depending on how the system is configured, some of the settings sub-menus may be hidden (Backoff/Wash).

Inputs & Outputs page



This page is used to check on the status of the inputs and outputs. Press the buttons to trigger an output.

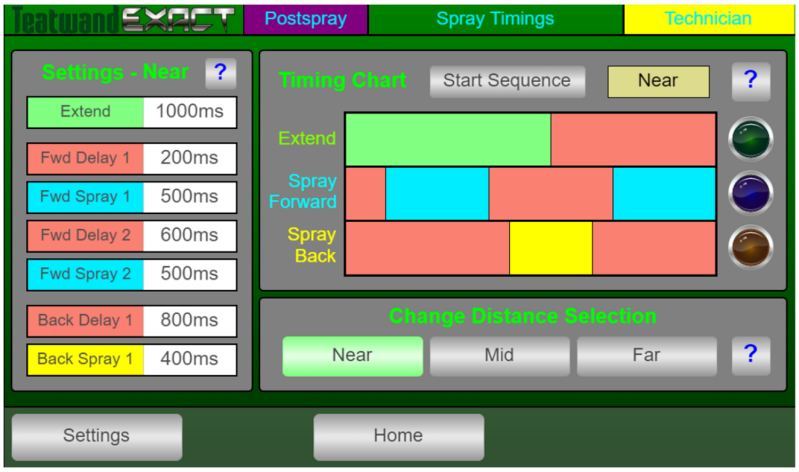
Modbus Status monitors communications with the I/O block and reports errors. It should display 'CONNECTED'.

Distance Sensor box displays the raw value from the Cow Position Sensor.

The above image is how this page will appear when none of the options have been activated.

Bail Sensor indicator lights illuminate when the sensors are triggered. Both are illuminated by default if the sensors are not plugged in.

Spray Timings page



The Settings box. These settings are used to set up individual spray patterns for each spray distance. Near, Mid and Far distances are measured by the Cow Position sensor.

Teatwand™ Extend time can be set for each cow position. Extend times will be set during commissioning.

Delay and Spray time settings. The Teatwand™ selects from 3 different spray profiles for each cycle based on the cows position in the stall, Cow Near, Cow Mid and Cow Far.

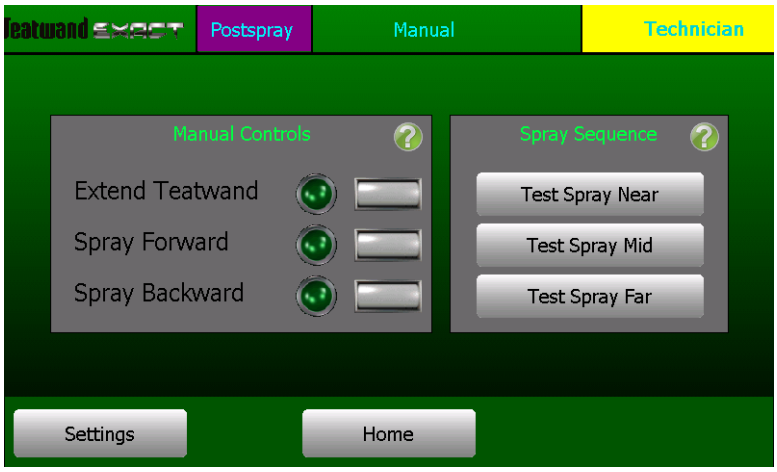
With each cycle of the Teatwand™ there are 3 bursts of Teat Spray from 2 nozzles.

Spray 1 from the forward nozzle, Spray 2 from the back-facing nozzle and Spray 3 from the forward nozzle. A delay prior to each spray determines when each spray will start. See Appendix F for default settings.

The Timing Chart shows a visual representation of the spray pattern timings. Start Sequence button will force the Teatwand™ to cycle for the selected spray distance.

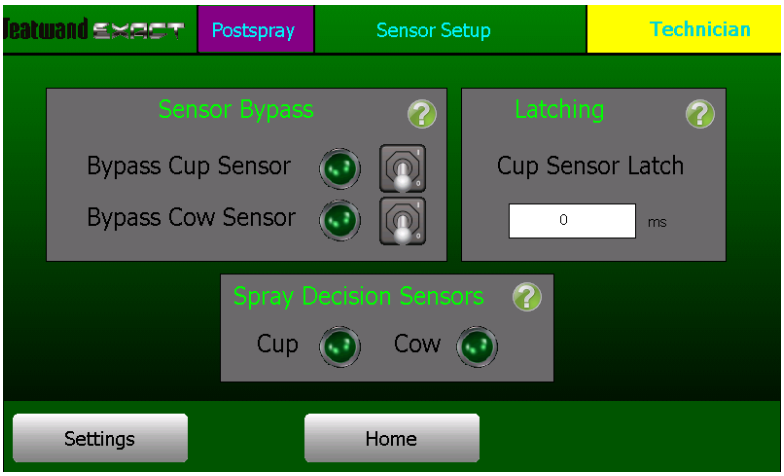
Change Distance Selection box allows for the selection of different distances. This is used when setting spray and delay timings. The Teatwand™ will spray in the selected distance mode while this page is open. Go out of this page to return the Teatwand™ to automatically selecting the correct distance.

Manual page



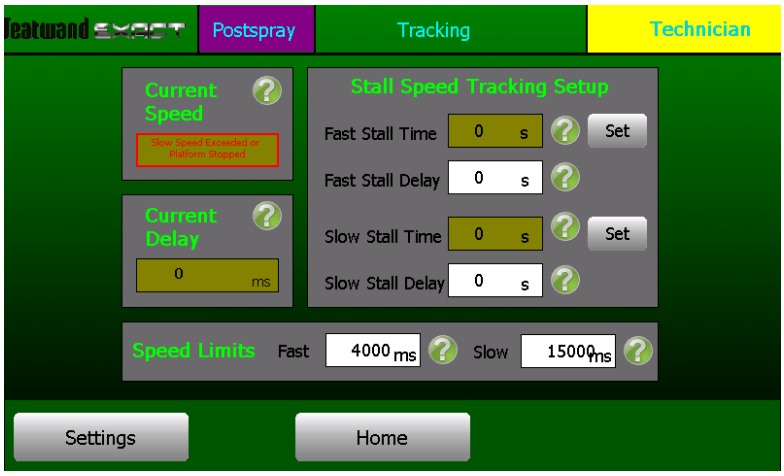
Teatwand™ can be extended manually, Spray Forward and Spray Backward can be manually triggered and different spray sequences can be tested.

Sensor Setup page



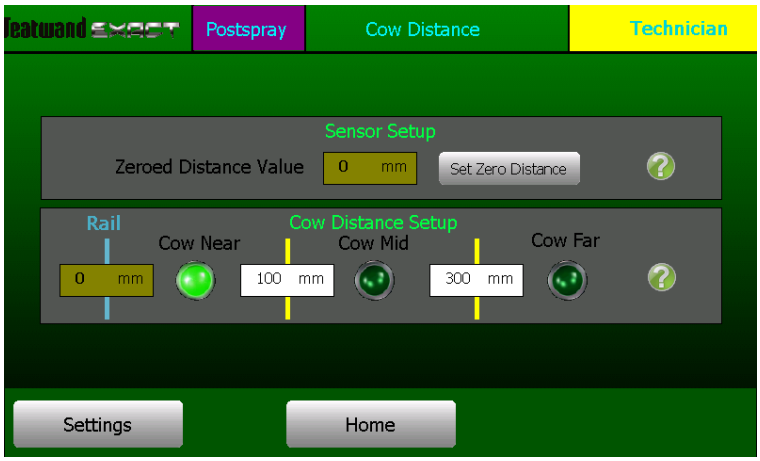
The Cup and Cow sensors can be bypassed. This feature is useful during commissioning and when operating the Teatwand™ with no cows on the rotary. If the Cow or Cup sensors fail, they may be bypassed temporarily. When the Cow sensor is bypassed the Teatwand™ will spray empty stalls and if the Cup sensor is bypassed the Teatwand™ will spray regardless of whether the cluster is still on the cow. When there is no Cup sensor, in parlours with position take-off, the Cup sensor must be bypassed all the time.
The Cup Sensor Latch is used to hold the sensor signal on for a set period of time.
Spray Decision Sensors indicates the status of the Cup and Cow sensors during operation.

Tracking Setup page



This page is used during commissioning to set the maximum fast stall time and minimum slow stall time. Using the Delay settings the Teatwand™ must be fine tuned to suit the different rotary speeds. The Teatwand™ program is constantly monitoring the speed of the rotary and will automatically adjust the Teatwand™ operation to suit. The Teatwand™ must be set up to operate correctly at the fastest milking speed of the rotary. For slower rotary milking speeds a delay is added to the starting time of the Teatwand™ sequence. This page can be a useful diagnostic tool, if the rotary is being run at speeds outside of the parameters set this will be flagged in the Current Speed box.

Cow Distance page



Used during commissioning or if a new Cow Distance Sensor is fitted. The sensor must be zeroed at the rump rail. With the laser dot aimed at the rump rail use the Set Zero Distance button to set a zero distance value. The near/mid/far thresholds are configured in this page.

History Page

Bail trigger history shows when the bail sensors detect something:
FORWARD – Standard bail trigger. This is what we want to occur
REVERSE – Platform is detected to be moving backwards
BAIL – Bail sensor triggered but no prebail sensor detected
PREBAIL – Prebail sensor triggered but no bail sensor detected

Spray sequence history shows the decisions around if it should spray or not and the distance selected to spray at. (near/mid/far)

Wash page

Use Spray Time buttons to set the duration of the wash. Enter the number of cycles in the Frequency box to trigger how often the washes will activate. Use the Nozzle Wash Delay

value to adjust the timing of when the Nozzle Wash is activated. Spray Time values can be altered to set the length of time the washes are activated. The Wash Output buttons are used to manually trigger either wash function.

Commissioning Procedure

Set the Stall Sensor position.

- Stop the Rotary at a position where the Teatwand™ HD would extend over the first ridge of the Leg spreader.
- Go to the Stall Sensors and position so that the Pre-Bail sensor is activated. There maybe some fine tuning required later.

Set the Extend Time on the Spray Settings page.

- The Teatwand™ HD should be set up to extend and retract as slowly as possible without hitting cows legs with the rotary running at the fastest milking speed. The Extend Time determines how long the Teatwand™ HD remains extended for and is closely related to the Speed Control Valves found in the Controls Cabinet on the Extend Solenoid manifold. There are two, one to control extend speed and one to control retract speed.
- Open the speed control valves fully. The Teatwand™ HD will Extend and Retract at the fastest speed.
- On the Settings page select Far Cow Timing, with this page open the Teatwand™ HD will operate with these settings. Use the default settings as a starting point.
- Run the rotary at the fastest milking speed and observe the Teatwand™ HD sequence.
- Increase the Extend Time value in increments of 100ms until a pause can be observed at the end of the stroke.
- If there is available time and the Teatwand™ is well clear of the cows legs slow the Extend and Retract speeds down using the Speed Controllers in the Controls Cabinet. Adjust these in increments of one half of a turn.
- Observe the operation. Increase the Extend Time value if the Teatwand™ HD is not fully extending. For the Far Cow setting the Teatwand™ HD needs to pause at the end of the stroke.
- The aim is to balance the Speed Controller settings with the Extend Time setting while maintaining a pause at the end of the stroke and not hitting cows legs.
- Go back to the Spray Settings page and select Near Cow Timing in Extend Time enter a value 300ms less than the Far Cow Extend Time.
- Observe the operation. Is the Teatwand™ HD fully extending? If not increase the Extend Time value in increments of 50ms until there is a brief pause.
- Set the Mid Cow Extend Time to a value between the Near and Far settings.

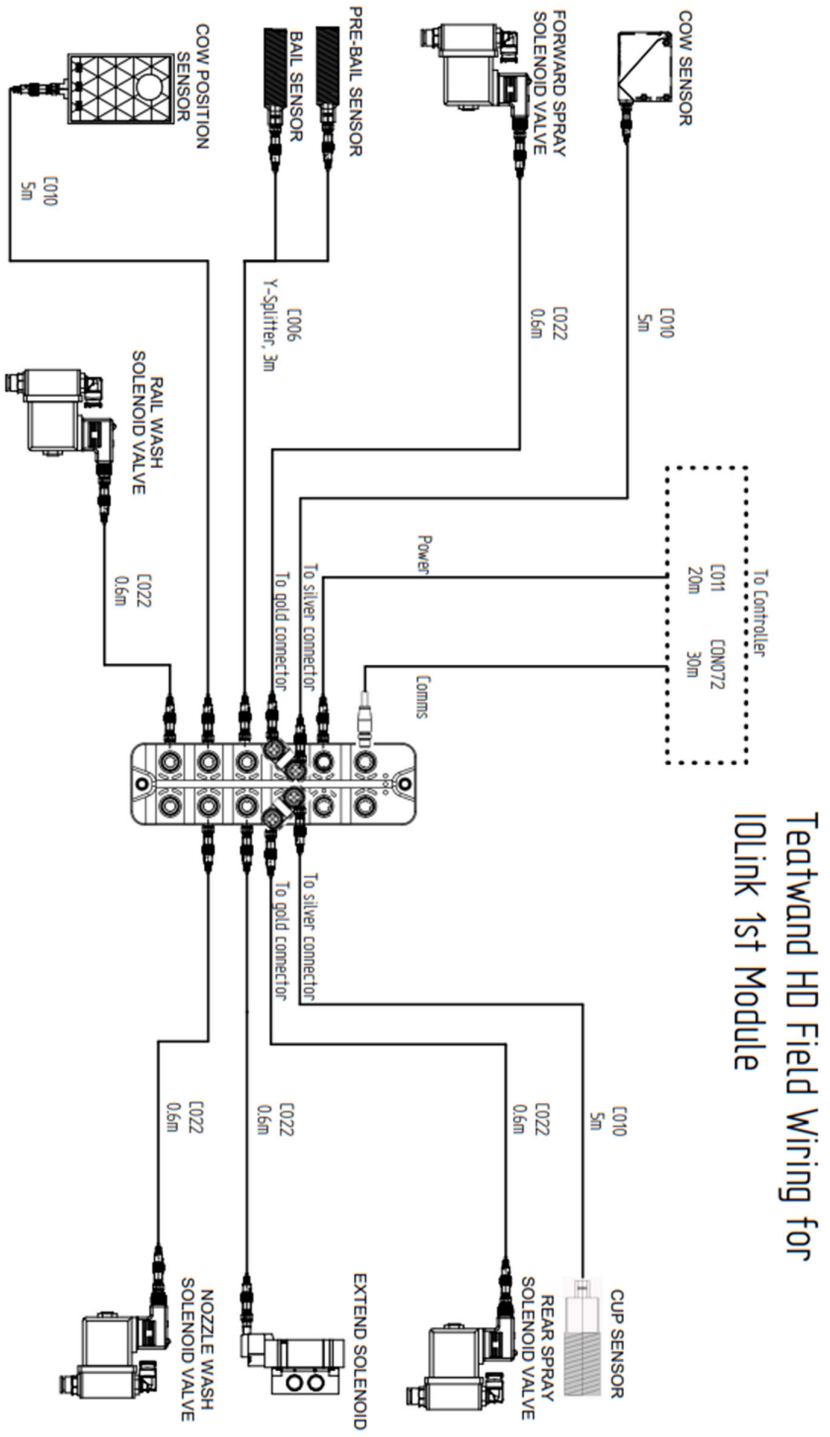
Tracking Setup. Go to the Tracking Setup page.

- Check all fast and slow speed values are set at zero.
- Run the rotary at the fastest milking speed, allow at least 3 stalls to pass.
- Press the Set button for Fast Stall Time, the Current Speed will be copied into the Fast Stall Time box.
- Run the rotary at the slowest milking speed, allow at least 3 stalls to pass.
- Press the Set button for Slow Stall Time, the Current Speed will be copied into the Slow Stall Time box.
- With the rotary running at the slowest milking speed observe the Teatwand™ HD operation. It will be firing too early, go to the Slow Stall Delay box and enter 200ms. Observe the Teatwand™, it will now be firing later. Adjust the value in the Slow Stall Delay box until the Teatwand™ HD is firing centrally over the leg spreader.

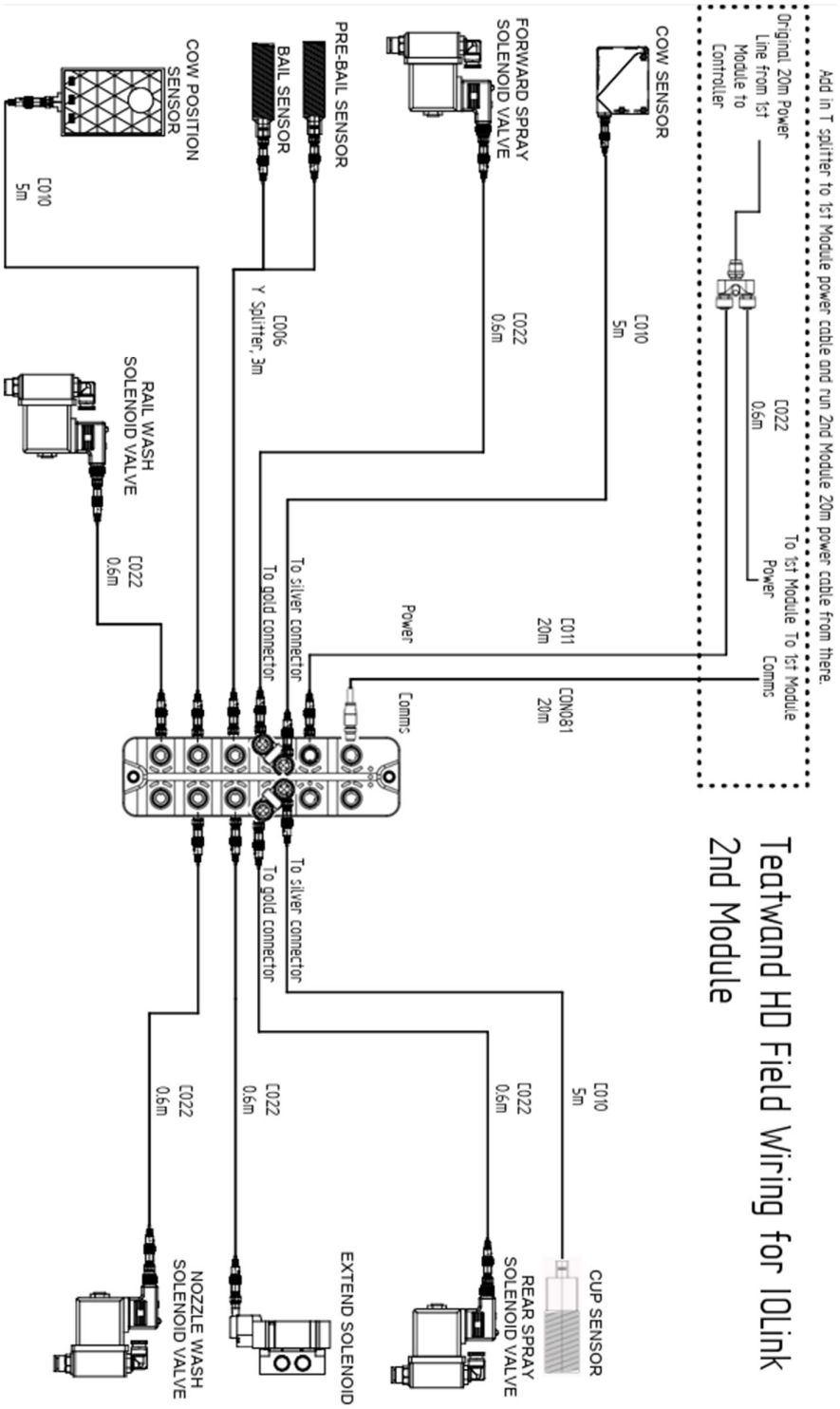
Setting the Spray Timings. Go to the Spray Timings page.

- In the Spray Settings Selection box choose the cow position, Near, Mid or Far. The Teatwand™ HD will spray for whatever cow position is selected while this page is open. Going out of this page will reinstate automatic selection of the appropriate cow position.
- Use the default settings for each cow position and observe the spray pattern. Make adjustments to the delays and spray times to achieve good teat spray coverage.

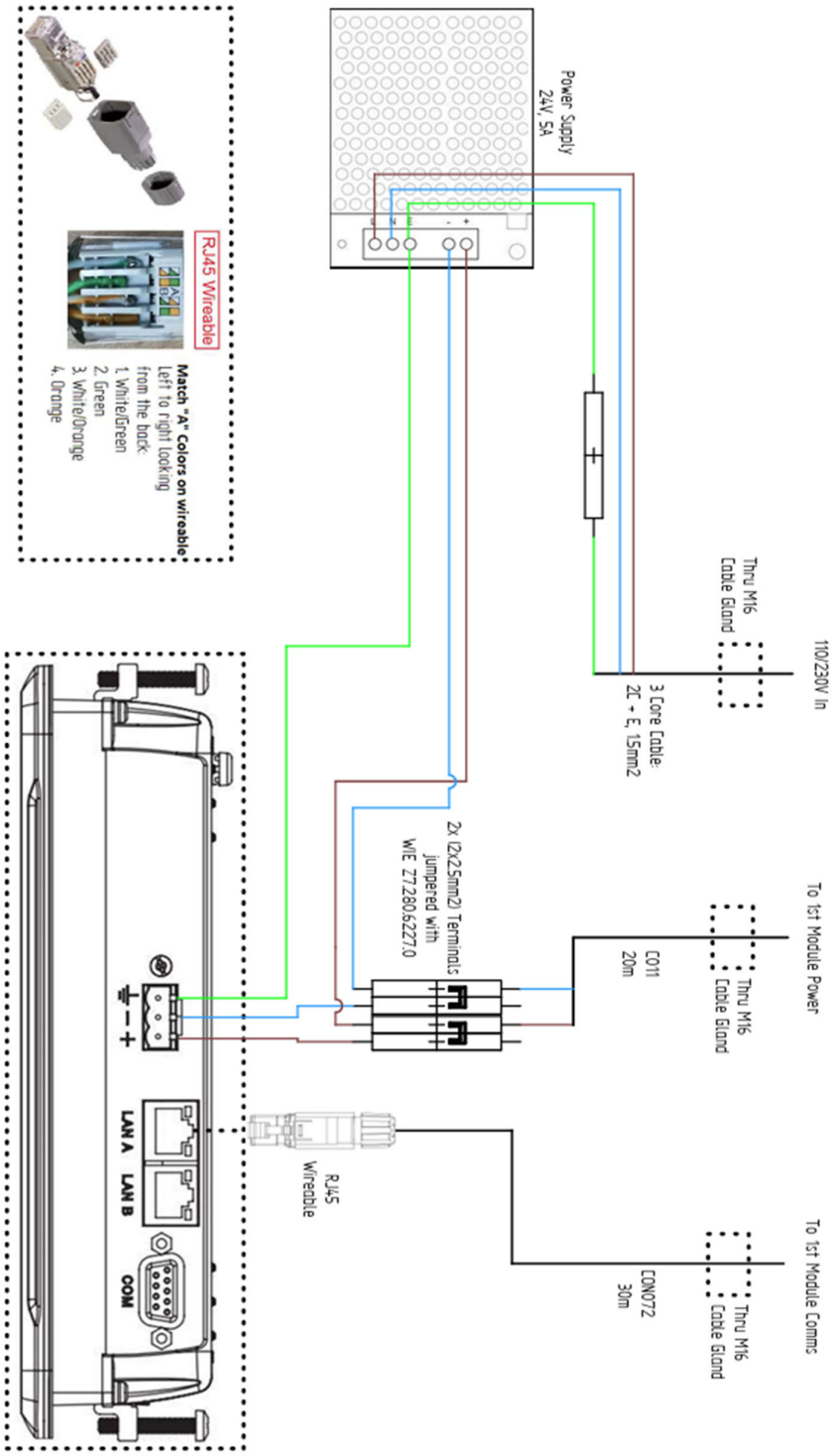
Appendix A – Electrical Layout – Teatwand™ HD I/O Link 1st Module



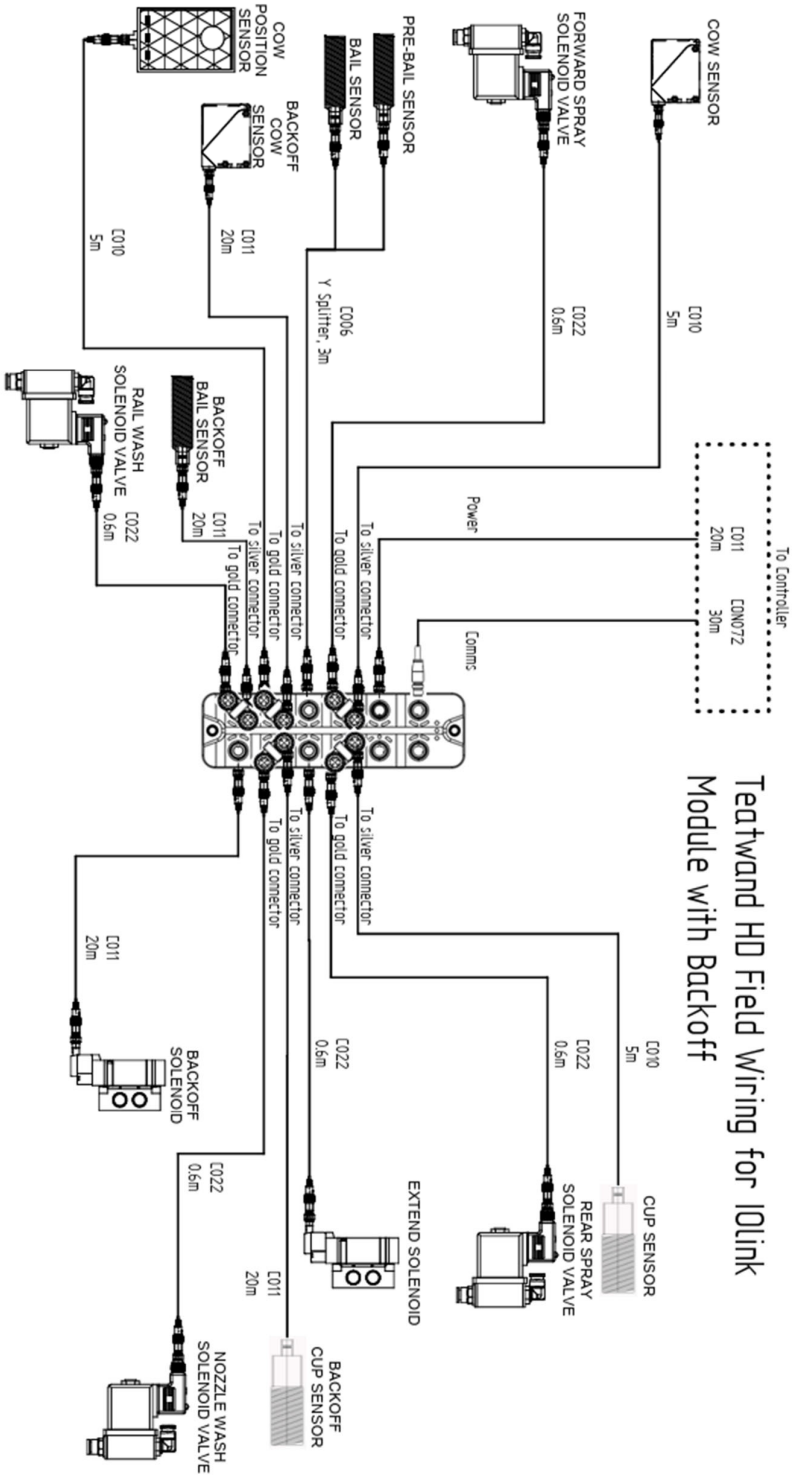
Appendix B – Electrical Layout – Teatwand™ HD I/O Link 2nd Module



Appendix C – I/O Link Field Wiring Beijer X2 Control



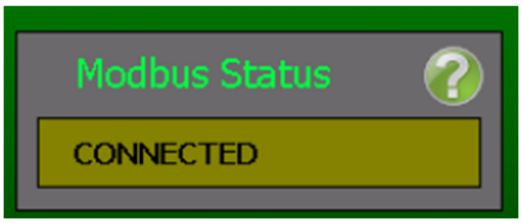
Appendix D – I/O Link Field Wiring with Backoff



Appendix E – RJ45 Wiring Instructions

It is critical that the field wireable RJ45 plug is wired correctly to ensure stable connection between the PLC and the IO Link. You will be able to use the full 30m moulded cable but in the case where the cable needs to be cut and wired, please follow these instructions.

1. Use the full 30m moulded cable to test the system prior to cutting. The system should show “Connected” on the Input & Output screen in the settings menu.



2. Cut the RJ45 end off of the cable to the desired length.

3. Remove the casing from the supplied field wireable plug
4. Splice the RJ45 cable and pull back the internal shielding as shown in the image to the right. Use the colour codes below to ensure the correct colours are fitted.

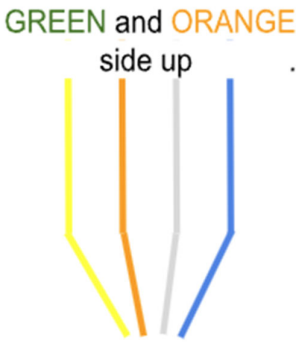
.

The colours on the plug **DO NOT MATCH** the colours of the wires.

Start by ensuring that you see the side of the plug that shows **GREEN** and **ORANGE** colours like the image.

From left to right, install the following coloured wires:

1. Yellow
2. Orange
3. White
4. Blue



5. Re-fit the cover by pushing down on the plastic clamp, ideally with a pair of pliers.

Then refit the plastic case and tighten by hand.

Appendix F – Default Settings

Near Spray Timing		
Extend Time: 1000 ms		
Fwd Delay 1: 200 ms	Back Delay 1: 800 ms	Fwd Delay 2: 600 ms
Fwd Time 1: 500 ms	Back Time 1: 400 ms	Fwd Time 2: 500 ms

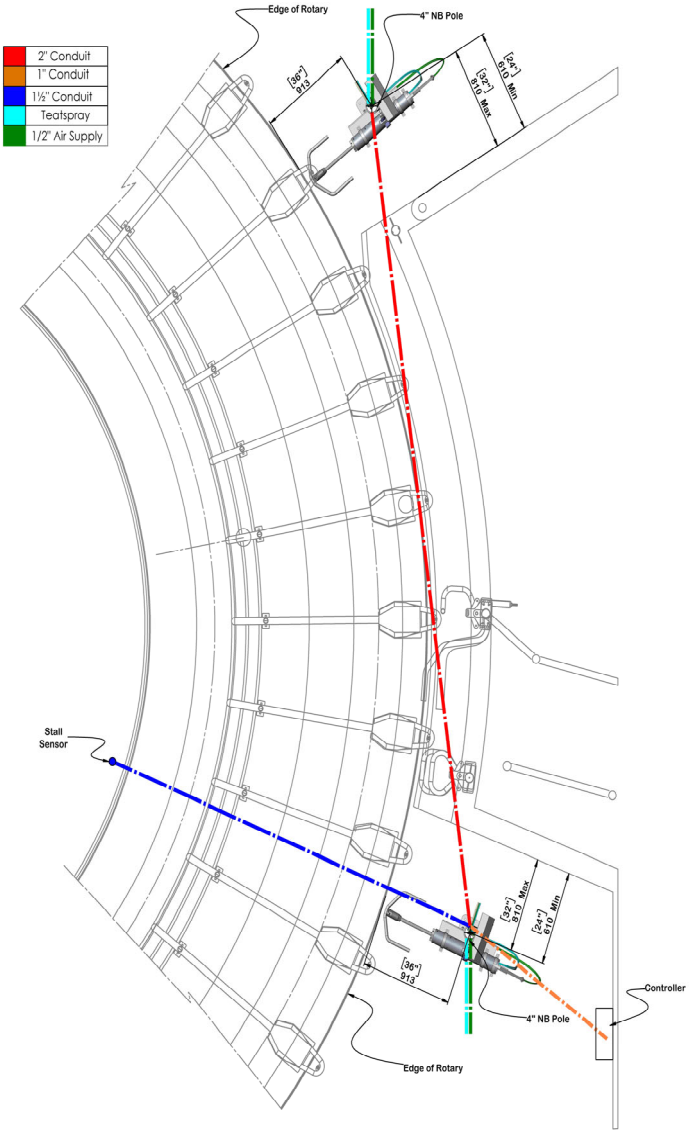
Mid Spray Timing		
Extend Time: 1100 ms		
Fwd Delay 1: 300 ms	Back Delay 1: 880 ms	Fwd Delay 2: 560 ms
Fwd Time 1: 500 ms	Back Time 1: 400 ms	Fwd Time 2: 500 ms

Far Spray Timing		
Extend Time: 1200 ms		
Fwd Delay 1: 400 ms	Back Delay 1: 950ms	Fwd Delay 2: 400 ms
Fwd Time 1: 500 ms	Back Time 1: 300 ms	Fwd Time 2: 500 ms

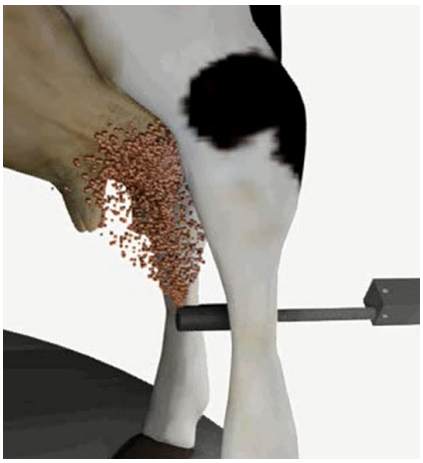
Speed Limits
Fast Speed: 4000 ms
Slow Speed: 15000 ms

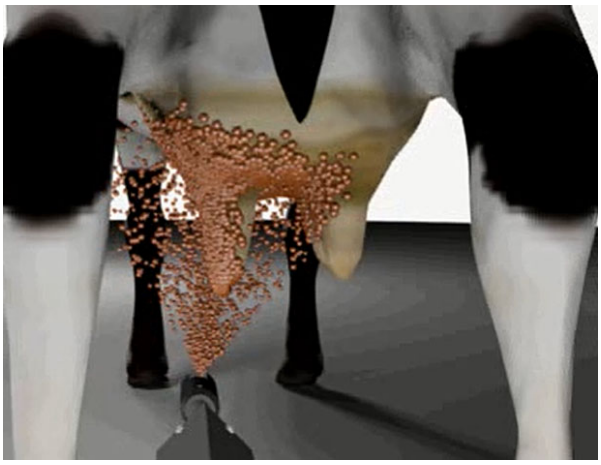
Cow Distance Settings	
Near Distance: 100 mm	Mid Distance: 300 mm

Appendix G – Teatwand™ HD Pre/Post System Layout

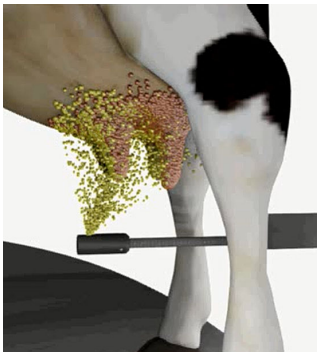


Appendix H – Spray Sequence Teat Coverage

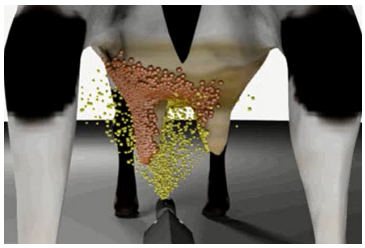




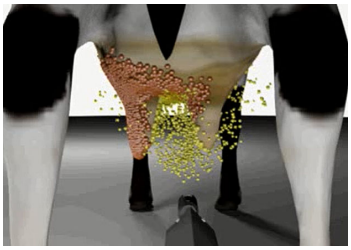
First Forward Spray



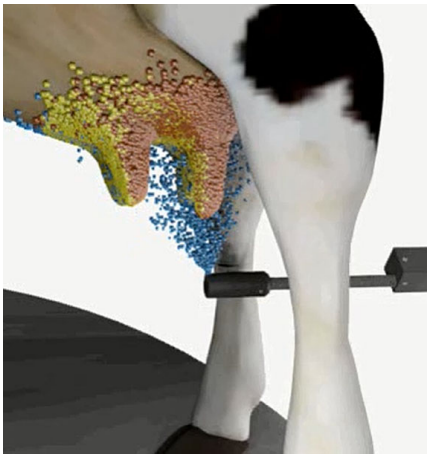
Reverse Spray

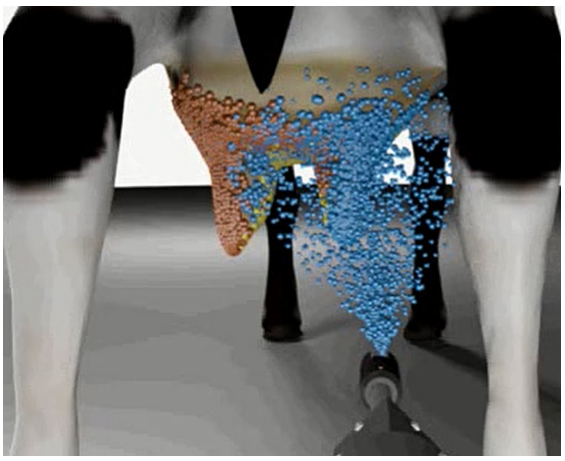


Reverse Spray Starting



Reverse Spray Stopping





Second Forward Spray