Teatwand HEAVYDUTY

INSTALLATION & USER'S GUIDE

PRE AND POST SPRAY SYSTEM (NORTH AMERICA)
VERSION 2.7
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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 an 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 Teatwand Exact System.

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

A 2'' conduit between Pre and Post Teatwands is required for cabling a double system.

A 1 ¼''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 be easily be added at a later date.

Refer to Appendix C – Teatwand Pre/Post Layout Drawing 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 20-23.
- Talk to Dairyman/Manager about location of the Touchscreen Controller, refer to Installation Manual for preferred locations.
- Determine position of 4'' Pole. Mark on floor. See Appendix C Teatwand Pre/Post Layout Drawing . This is the target for conduits.
- Run conduits. See Layout Drawing. Refer to Appendix C
- Install a ½'' 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 allowing the user to make adjustments to 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.

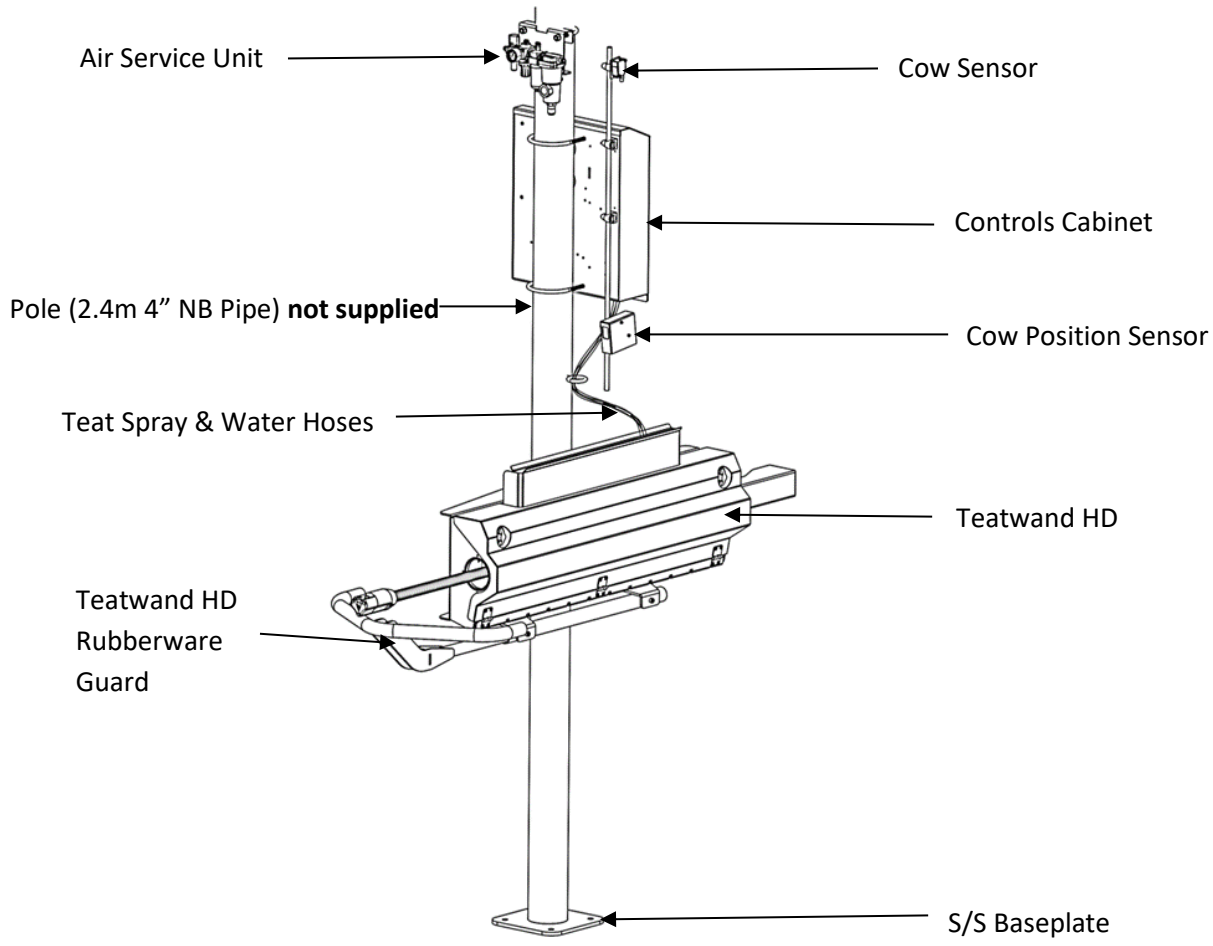


*Figure **1***. Sprayer general arrangement

Teatwand HD can be retrofitted to an existing Teatwand Exact installation or it can be installed as a new Teatwand HD system.

Teatwand™ HD Retrofit from Teatwand Exact Installation.

Sequence of Events.

1. Remove the Teatwand Exact from the pole.
2. Brace the pole, if not already braced (see figure 4 as an example)
3. Modify the Pole Controls Cabinet (see figure 5)
4. Mount the Air Service Unit (older TW Exact installs will not have this)
5. Mount the Teatwand HD to the pole.
6. Fit air cylinder to the sprayer (see below)
7. Run cabling and services (compressed air, teat spray, water)
8. Check I/O's, check for air, spray and water leaks
9. Commission

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.

Teatwand HD from scratch install.

Sequence of Events.

1. Fit the pole
2. Mount the sprayer
3. Fit the air cylinder
4. Mount the Pole Controls Cabinet
5. Mount the Air Service Unit
6. Fit the Touch Screen
7. Fit the spray Pump Assembly
8. Run cabling and services (compressed air, teat spray, water)
9. Check I/O's, check for air, spray and water leaks
10. Commission

Items 5 & 6 can be done at any time in conjunction with 1, 2, 3 & 4 and must be done before progressing to 7, 8 & 9.

Fitting the Pole.

- Mark centre point of Pole on floor. See *Figures 2 & 3*
- Bolt Baseplate to floor - where there is in-floor heating use a thermal imaging camera to find safe places to drill.
- Stand the 8' long 4'' pole in pre-cut hole in Baseplate.
- Level both ways and fully weld.
- From the top of the Pole weld a brace back to a wall or to an existing structure. This can often be used to support a conduit.

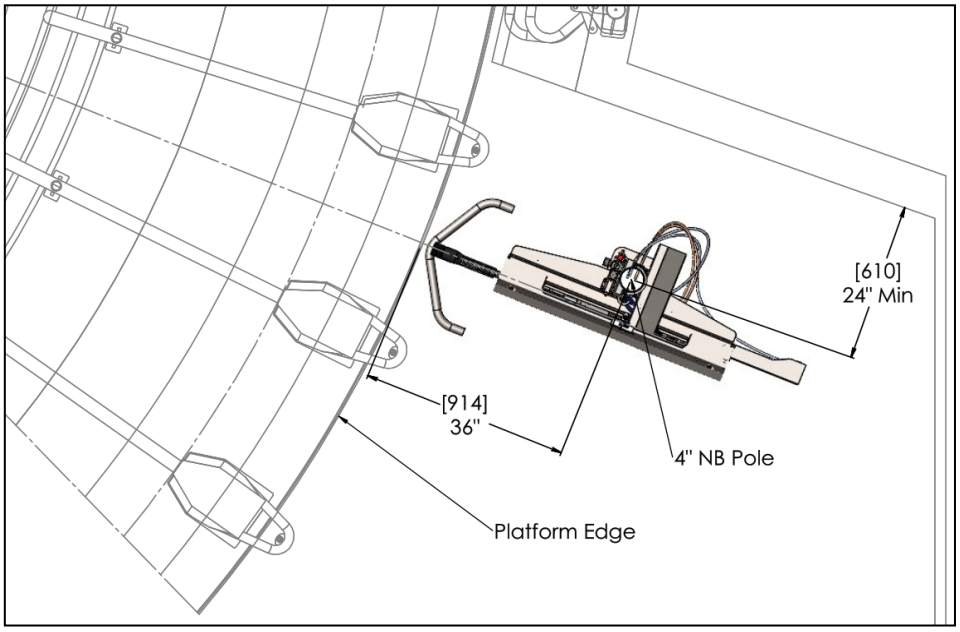


Figure 2. Pole location for angled stalls

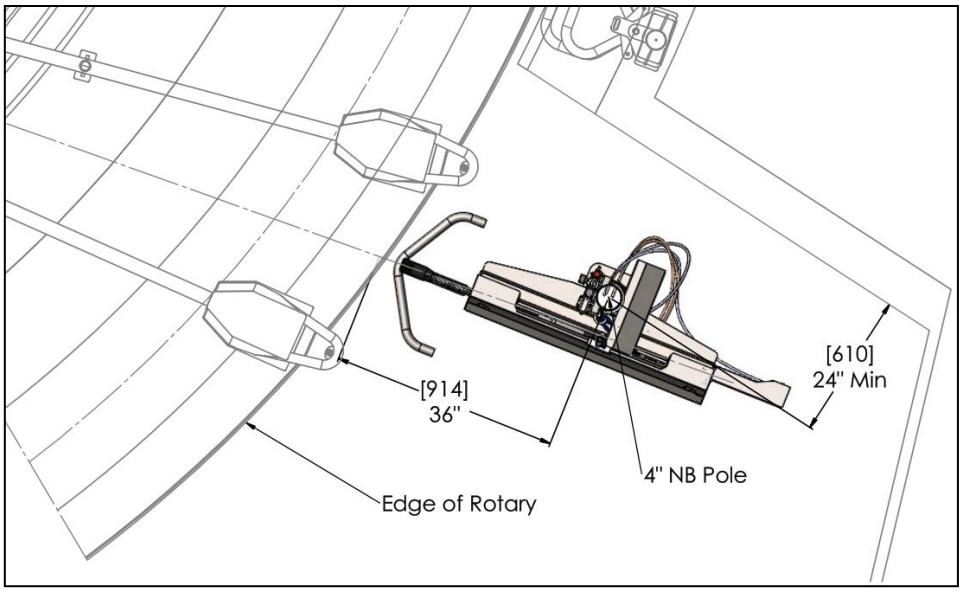


Figure 3. Pole location for straight stalls

Bracing the Pole.

Figure 4 below shows an example of a braced pole.

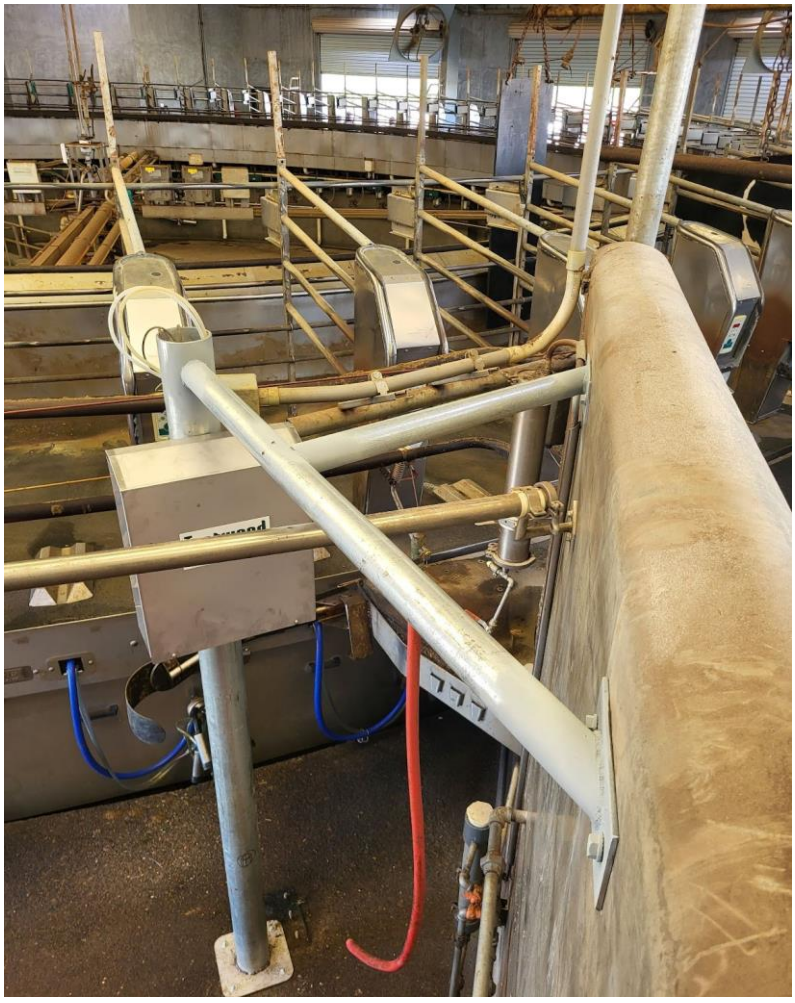


Figure 4.

FITTING THE TEATWAND™ HD TO THE POLE

Use a level to mark on the Pole the height of the rotary platform surface.
Measure 15'' up from this and mark. This is the height position for the top surface of the Teatwand™ HD frame. See figure 5.
Use the clamp supplied to secure the Teatwand™ HD at correct height and align to suit the angle of the stall.

Check the height of the nozzles is 10” 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.
From the top of the Teatwand HD to the bottom of the Pole mount Controls Cabinet must be at least 20” to allow for teat spray hose movement as the wand extends and retracts.

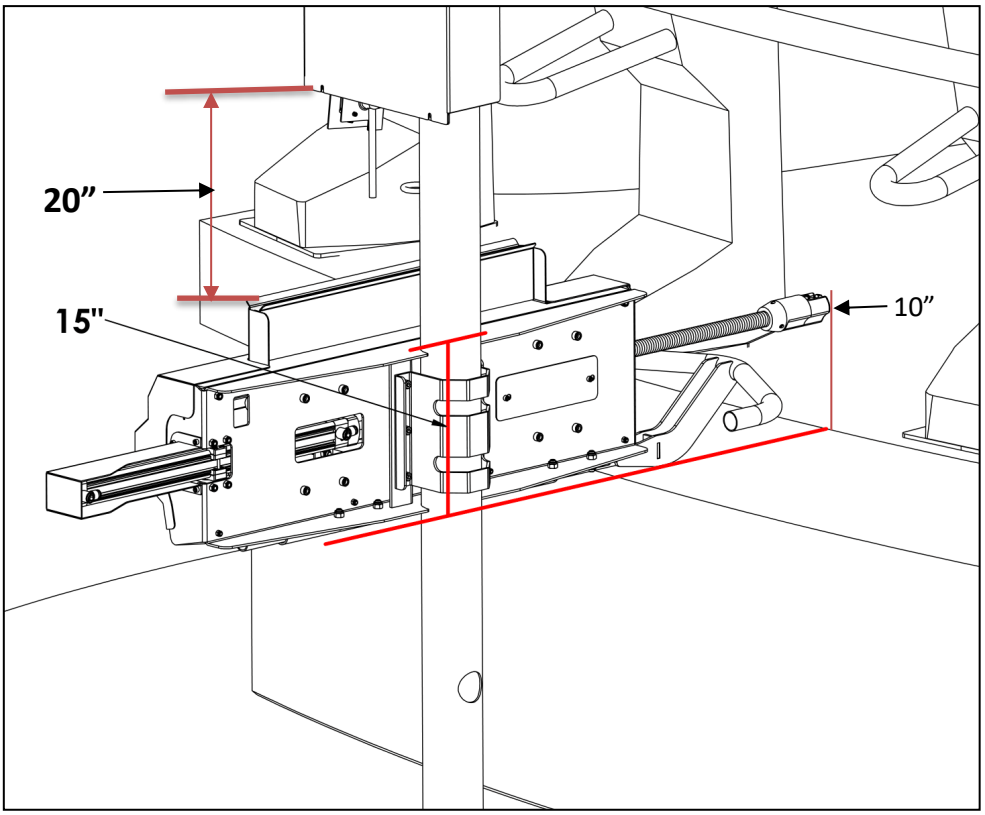


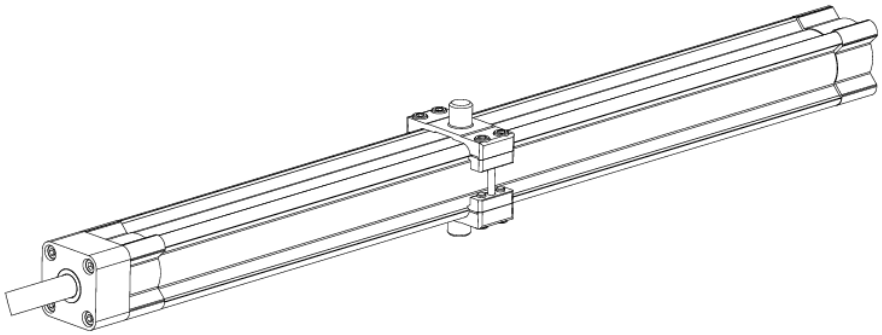
Figure 5. Location of Teatwand™ HD on Pole

The Teatwand™ HD as the name implies is a heavy unit, use a suitable support, for example a 40-gallon 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.

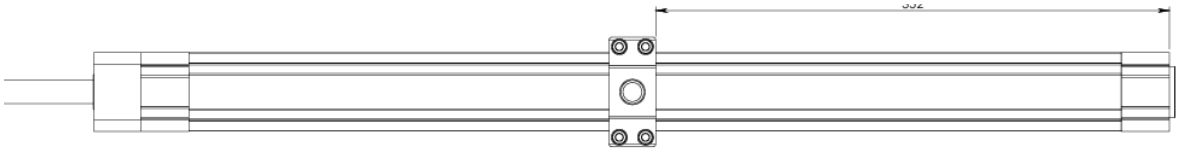
Fitting the Air Cylinder to the Teatwand™ HD

The air cylinder and cover have been removed for shipping. The air cylinder will have the elbow fittings fitted, the nose bush and rod end fitted, and the trunnion mounts will be located in the correct position and tightened to the required torque settings.

Check the correct location of the trunnion mounts.



352mmm 13 7/8 inches



IMPORTANT: Follow this procedure when fitting the air cylinder.

Remove the trunnion mounting blocks (Figure 8) from the pole mount frame and insert the complete cylinder through the hole in the frame.

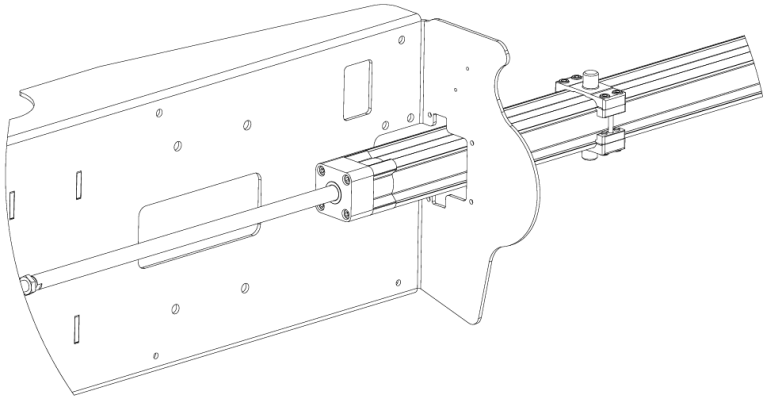


Figure 1. Cylinder inserted

Refit the lower trunnion mounting block loosely and locate the cylinder onto it.

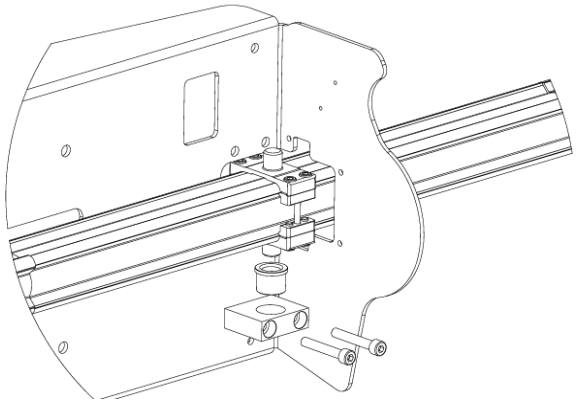


Figure 2. First Trunnion mounting block fitted, not yet tightened

Next fit the upper trunnion mounting block and **leave both blocks loose until the rod end is connected.**

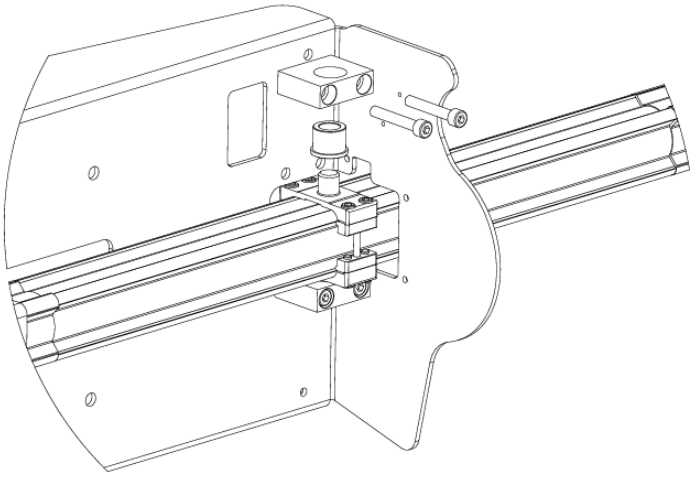
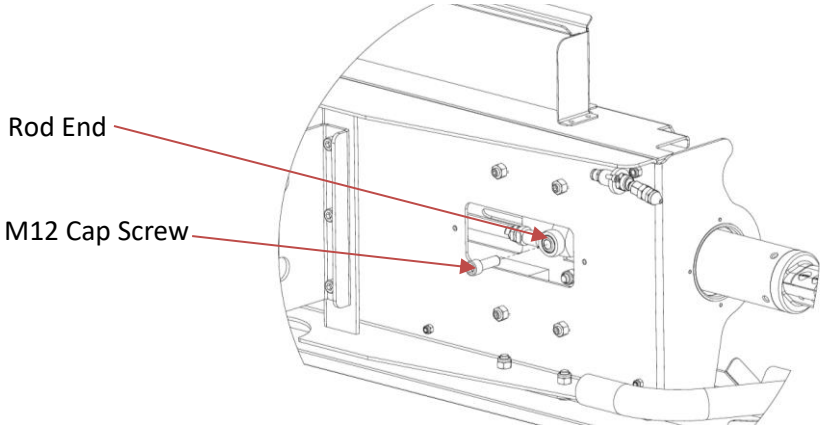


Figure 3. Cylinder inserted

Refit the lower trunnion mounting block loosely and locate the cylinder onto it.

Next connect the rod end on the cylinder shaft to the front wand tube clamp with the M12 cap screw. Use a medium strength threadlocker on the first 5 threads only of this cap screw and tighten into the boss on the front wand tube clamp.



IMPORTANT: Follow this procedure

Fully extend the Teatwand HD by hand, it should move freely. Now begin to sequentially tighten the trunnion mounting blocks. Check the free movement of the wand before fully tightening the trunnion mounting blocks.

Finally fit the cylinder guard to the outside of the frame using medium strength threadlocker.

Fitting the Pole Controls Cabinet

The Controls Cabinet is in two pieces (Figure 9). A Controls Cabinet Backplate with components fitted, plumbed and pre-wired and a Controls Cabinet Cover (not shown).

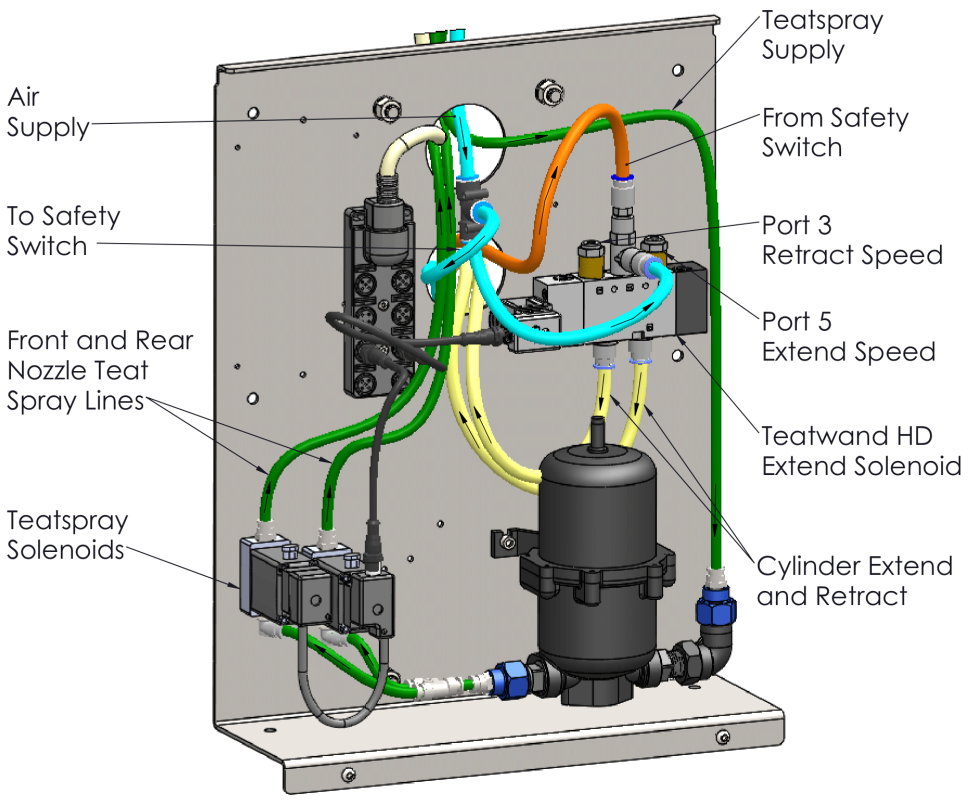


Figure 4. Control cabinet backplate with components fitted

Use the U Bolts supplied to fit the backplate towards the top of the pole. See Figure 1

NOTE: There must be a gap of 500mm 20 inches between the top of the sprayer and the bottom of the cabinet to allow for movement of the spray hoses.

- Mark on the Pole the 2 pre-cut 2'' holes in the backplate. Remove Backplate, cut 2 holes in the pole, deburr holes for cables, air and teatspray hoses.
- Refit Backplate to Pole.
- Measure 12'' down the pole from the top face of the Teatwand™ Pole Mount Assembly in line with the 2 holes in the controls cabinet, cut a 1½'' hole for air and spray hoses.

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.

A 1/2inch 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 1/2 inch push fit fitting for the supply line and a 10mm push fit fitting to connect to the Pole Controls Cabinet.

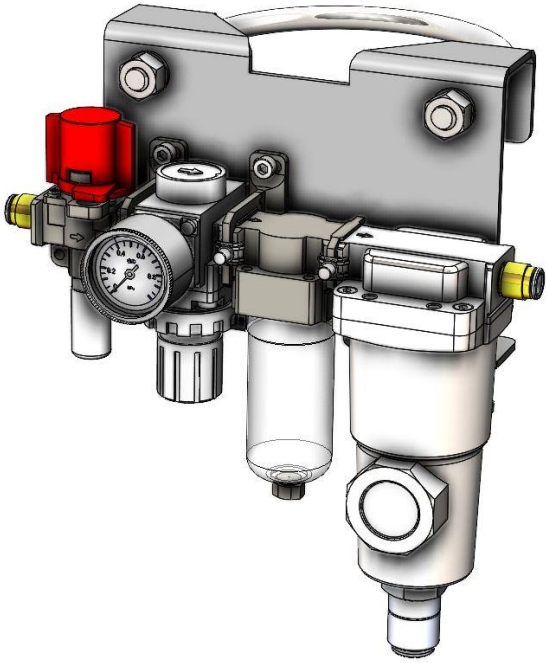


Figure 5. Air service unit

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.

Fitting the Teatwand™ HD Spray Hoses

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

Take two new Spray Hoses 5ft long.

Fit the two hoses through the spring as shown in **Error! Reference source not found.** a nd into the wand tube, taking care not to twist. Push the two hoses through until they reach the slotted hole in the Wand Tube. Extract the hoses from the Wand Tube through the slotted hole.

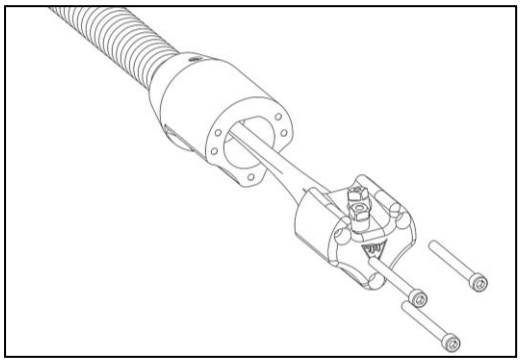


Figure 9.

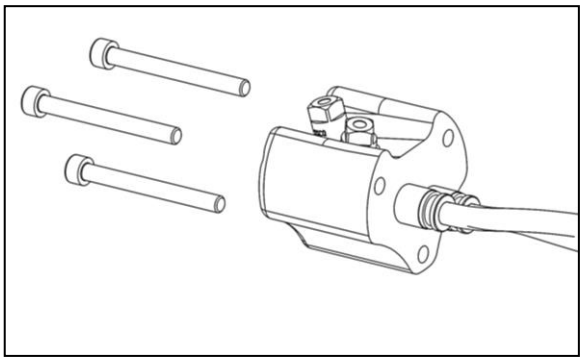


Figure 10.

Insert the hoses into the push fittings in the Nozzle Holder as shown in **Error! Reference s ource not found.**. Take care not to twist the hoses. Reassemble the nozzle holder.

Where the hoses exit the Wand Tube loop them down and back up behind the Wand Tube and into the bulkhead fittings as shown in Figure 6.

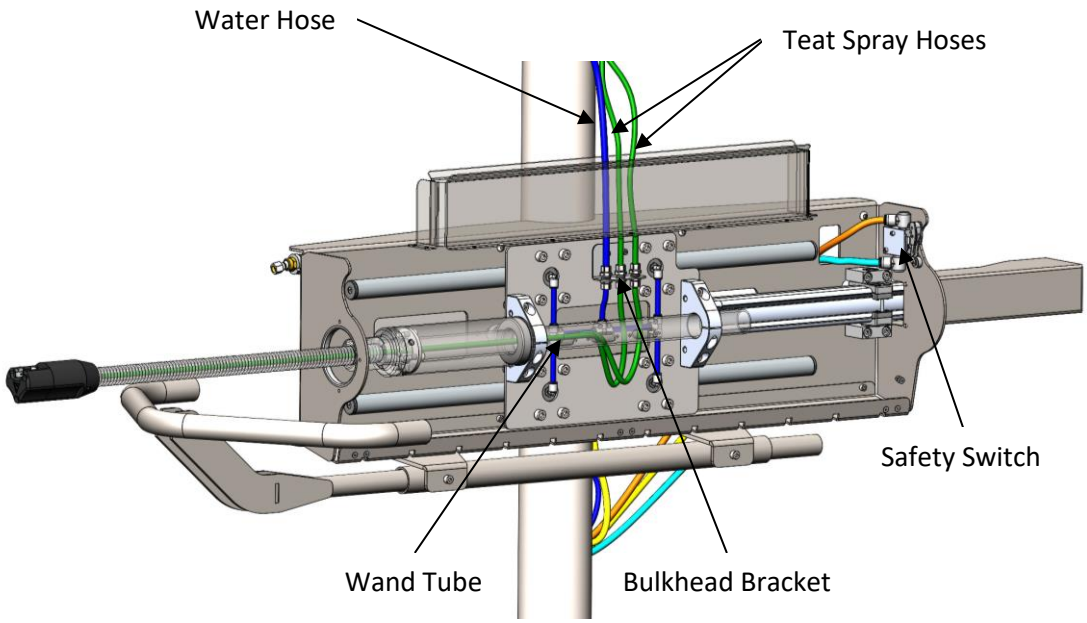


Figure 61. Spray line hose routing

From the other side of the bulkhead fittings the hoses go directly to the Pole Controls Cabinet. Ensure there is sufficient slack in the hoses to allow for the movement of the wand.

Routing the tubing to the Teatwand™ HD

The air lines, safety switch lines, and teatspray hoses should be routed as shown in 3. The teatspray hoses are to be routed through the eyelet mounted to the pole. Leave a loop of teatspray hose so that there is enough slack in the hoses to allow for Teatwand™ HD extending and retracting.

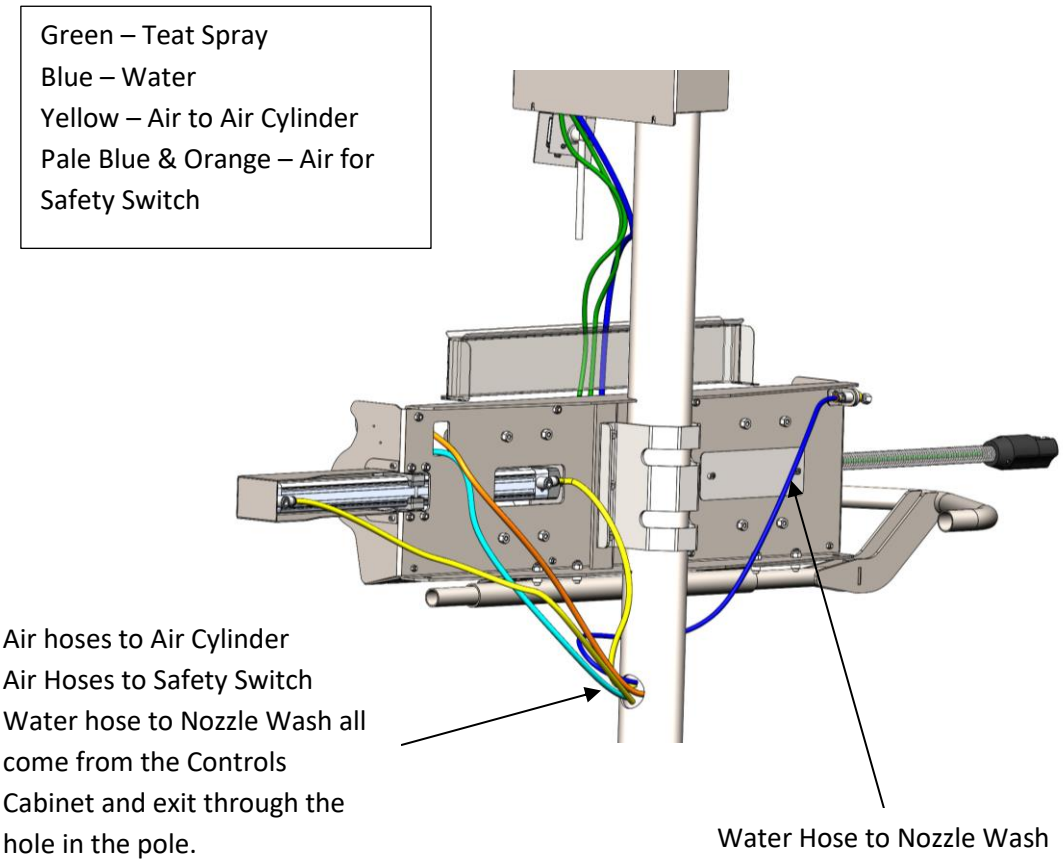


Figure 7. Hose routing to the mounting pole

Safety Switch

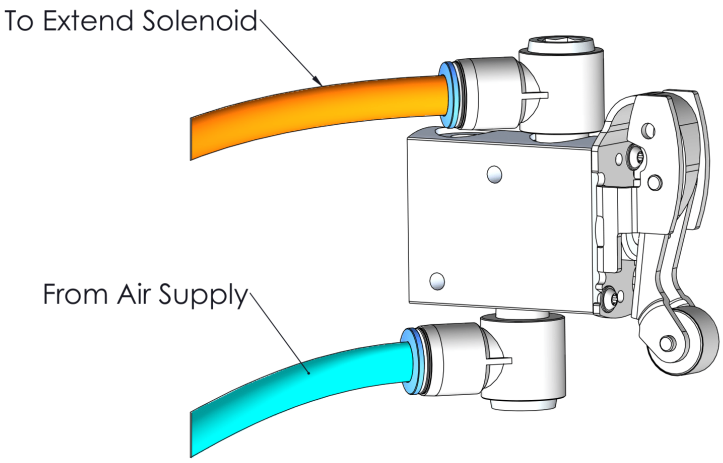


Figure 8. Safety switch hosing diagram

Extend Solenoid

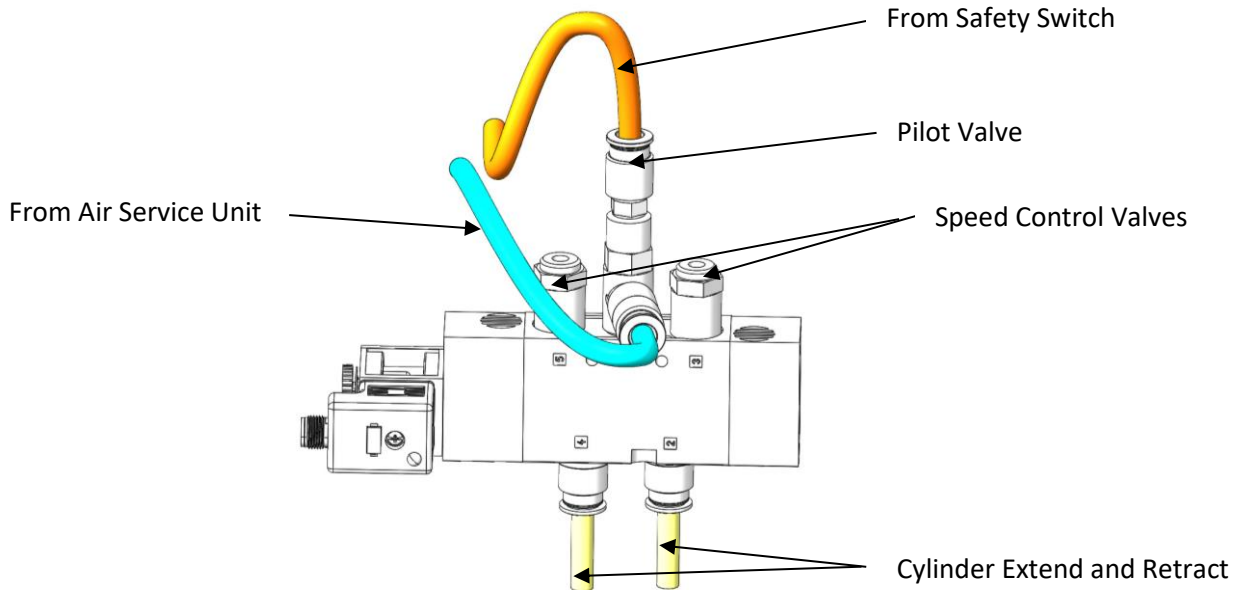


Figure 9. Extend solenoid hosing diagram

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 each water solenoid. One solenoid is for the slide rail wash, the other is for the spray nozzle wash.

The Teatwand™ HD has two wash functions.

1. 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.
2. Spray Nozzle Wash. There is a wash nozzle fitted to the main frame of the Teatwand™ HD directed at the Spray Nozzles to keep them free of manure to help reduce cross contamination. This wash nozzle will have to be adjusted to aim at the spray nozzles when the Teatwand™ HD is retracted. To adjust, loosen the lock nut, aim the nozzle, tighten the lock nut.

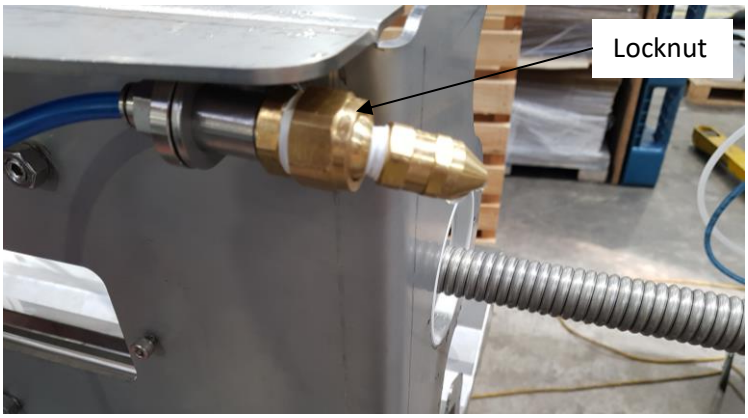


Figure 10. Spray nozzle wash

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 prefered location.

Fit the Power Supply.

- A 110/240V to 24VDC Power Supply is supplied with the system.
- Position the Power Supply somewhere close to the Touchscreen controller, connect to a local power source.

Install the Teat Spray Pump Assembly.

- Air supply to regulator is required, 8mm line or ¼'' threaded fitting.
- 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.

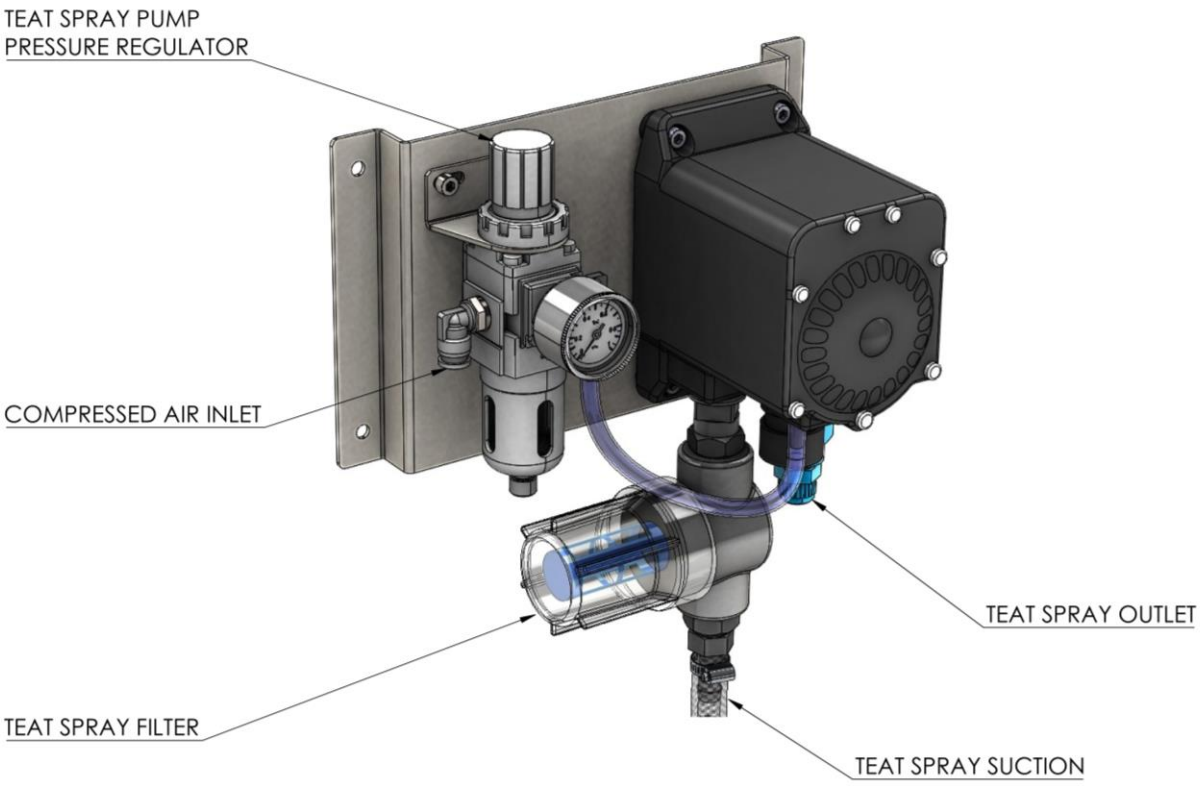


Figure 8

Connecting Services to the Teatwand Exact.

Compressed Air.

- A ½'' 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 extend solenoid 2 hoses run down through the pole to the hole below the Pole Mount Assembly and connect to the Teatwand.

Teat Spray.

- Use the 8mm hose supplied to run from the Teat Spray pump to the Controls Cabinet.
- 2 spray hoses follow the same route as the air hoses to the Teatwand.

See figures 9, 12 &13

Electrical Connections.

- The Teatwand™ Exact system is 24VDC.
- Run 1.5mm 24VDC cables from the power Supply to the Controller/Touchscreen. See Appendix B – Electrical Layout Drawing.
- From the Distribution Board in the Controls Cabinet a multicore cable is connected to the Controller/Touchscreen.

See Appendix A – Electrical Layout Drawing.

Cabling

Solenoids and Sensors are connected to the Distribution Board 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.

See Appendix B for cable identification and applications

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 11* 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.

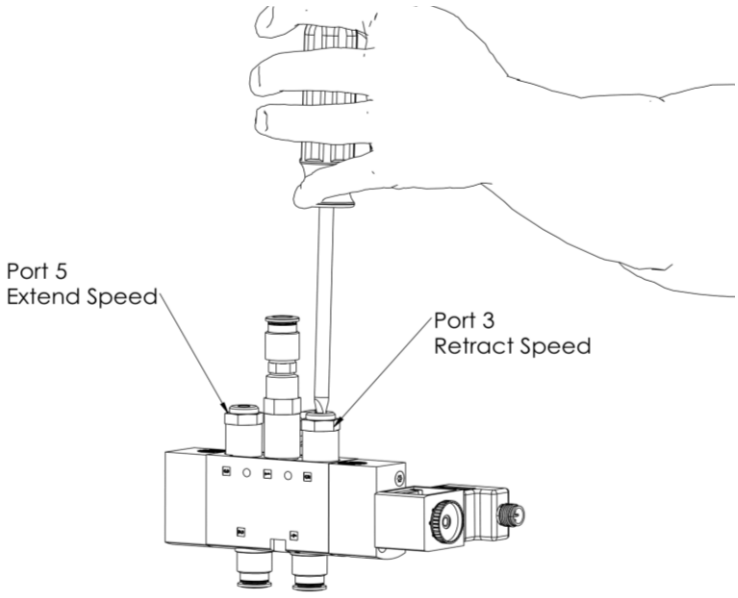


Figure 11. Adjusting the speed control valves

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.

Setting the air cylinder cushioning valves

The air cylinder has cushioning valves at each end to decelerate the speed of travel for the last 20mm of stroke. These soften the impact of a hard stop and bring the Teatwand™ HD to a gentle halt at each end of the stroke.

The cushioning valves are located adjacent to the fitting at each end of the cylinder as shown in Figure 12.

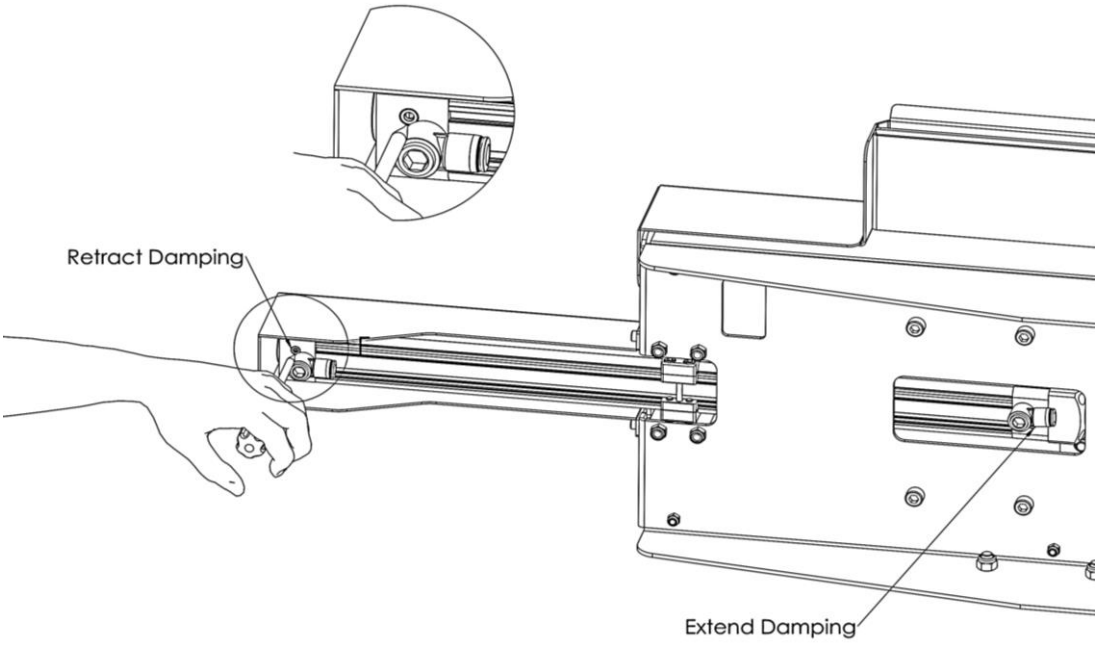


Figure 12. Adjustment of the cushioning on the cylinder

Using a small screwdriver adjust the cushion valves in (clockwise) to increase the cushioning effect. These are quite sensitive, start by screwing the valve all the way in and unwind (counterclockwise) three complete turns. This is a starting point; fine adjustment will be required to achieve a smooth gentle result.

Observe the action of the Teatwand™ HD, at each end of each stroke there will be a noticeable slowing of the Teatwand™ HD as it comes to rest. It should be gentle and quiet.

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 13*.
- Rotate Nozzle Head to vertical.
- Tighten grub screws with 4mm Allen key.

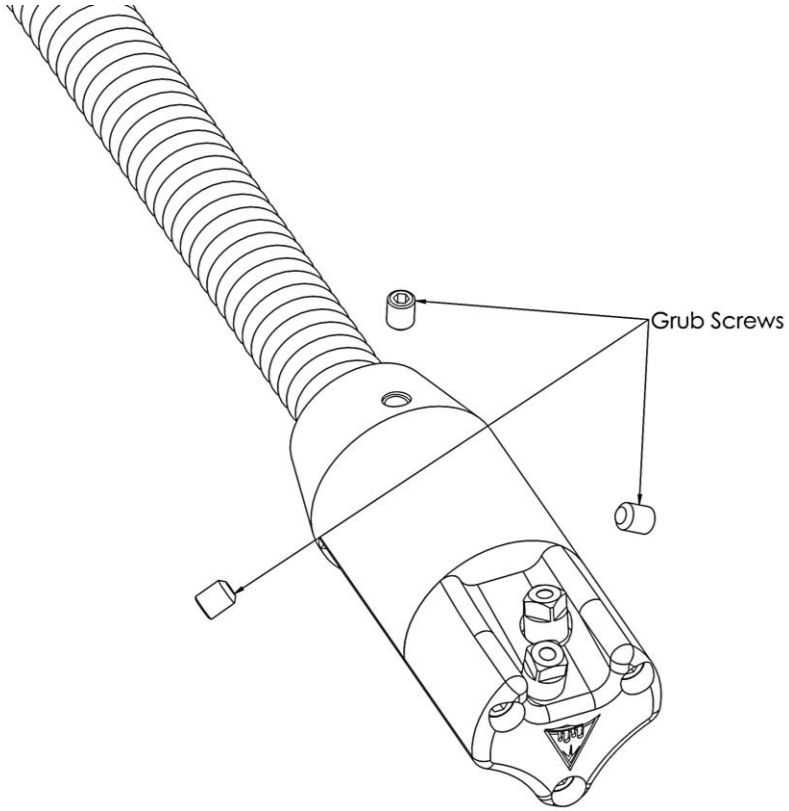


Figure 13. Grub screws x3 for attachment onto spring

Sensor Installation.

Stall Sensors.

These sensors are photoelectric and will detect anything from ¼'' to 14'' 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™ Exact spray sequence.
Each Teatwand™ Exact 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™ 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™ Exact 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/60ft 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™ is mounted on the Teatwand™ Pole Mount Bracket.
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™ will activate. That is where the Teatwand™ 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 *Figures 9 through 15.*
7. Mark the position of the selected tag on the basement wall.
8. The Stall Sensors will be mounted with 1'' of clearance between the face of the sensor and the tag.
9. Fabricate a bracket and fit the Stall Sensor Assembly using a 1ft 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 1'' 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 14

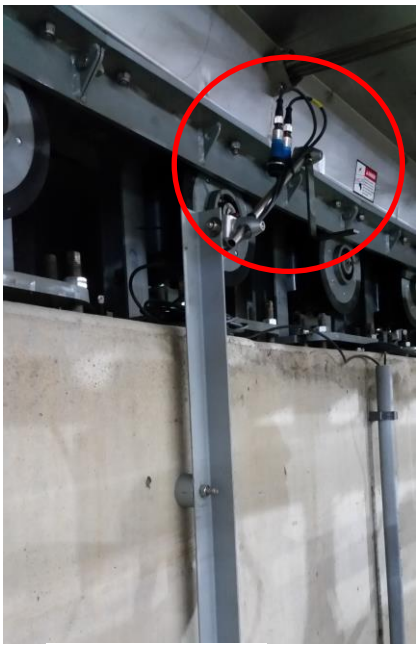


Figure 15

Figure 16

This example 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.

Figure 17

Figure 18

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

Figure 19

Figure 20

This example uses existing brackets on the rotary with the sensors mounted on the basement wall facing up. 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

Cow Sensor.

This is a Digital Laser sensor that emits a red laser dot.

It has adjustment to set a maximum distance it will sense. Mounted on the Controls Cabinet above the top of the 8’ Pole it looks 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.

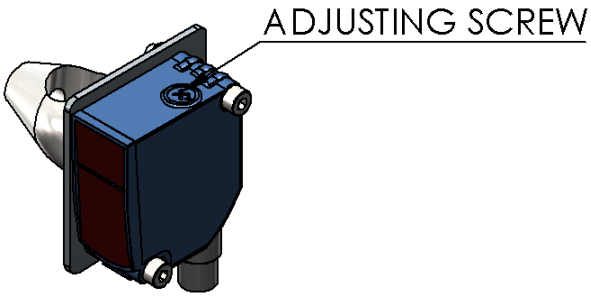


Figure 21

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. 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 ‘Tare’ 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.

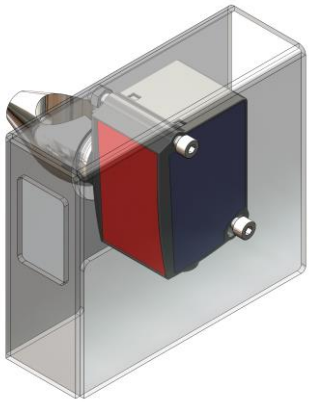


Figure 22

Aligning the Cow and Cow Position Sensors

Cow Sensor

Please consult **Error! Reference source not found.** for the Cow Sensor. Adjust the sensor's d etection 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 14*. 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.

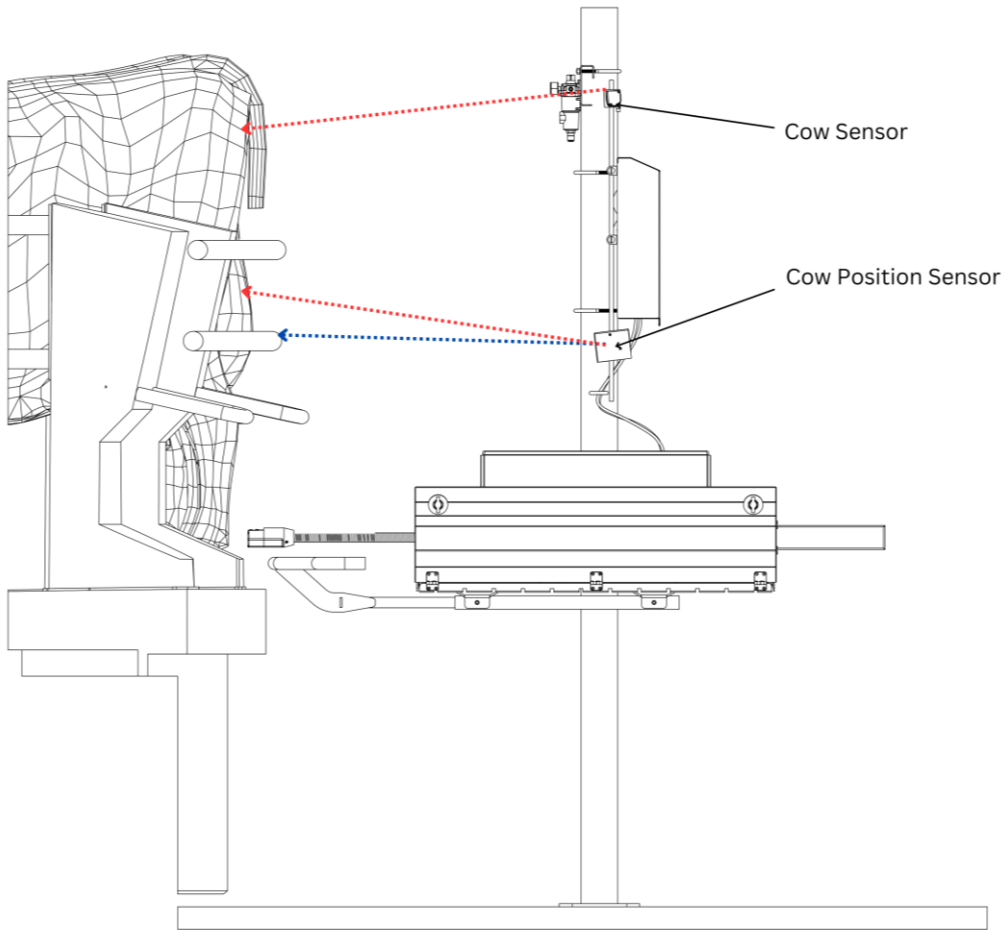


Figure 14. Sensor alignments

Navigating the Touchscreen

Main Screen Login/ Enabling the Teatwand™

The Main Screen is the starting point for all Teatwand™ adjustments and operation. Either system can be **Enabled** and **Disabled** by pressing **Start** or **Stop.**

To gain access to the Teatwand™ Settings use the Login Button. Login is **2002** for the farmer and **5927** for a technician

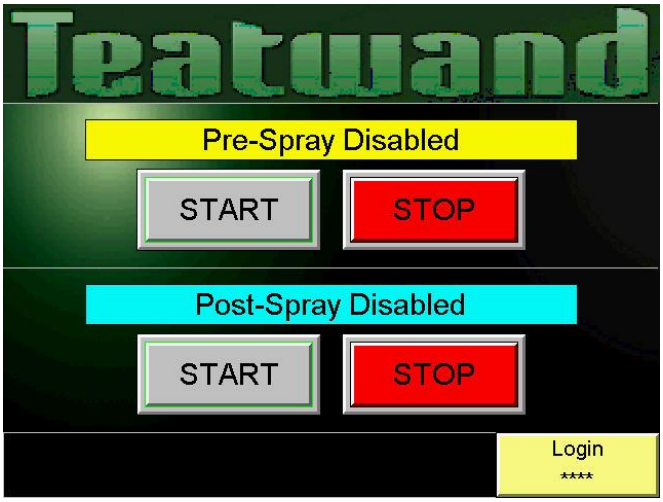


Figure 24

Main Screen with Settings

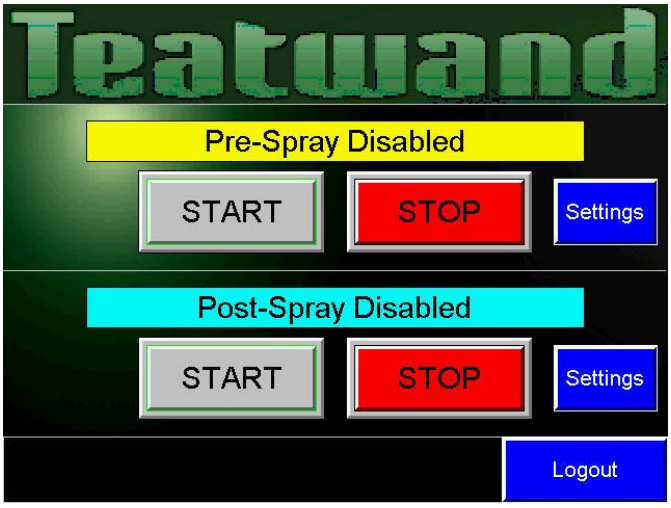


Figure 25

The pre spray and post spray setup procedures are identical and accessed by pressing the Settings button.

Settings Page

There are separate settings pages for Pre-Spray and Post-Spray, both pages are the same and allow for different settings to suit different spray profiles for Pre and Post.

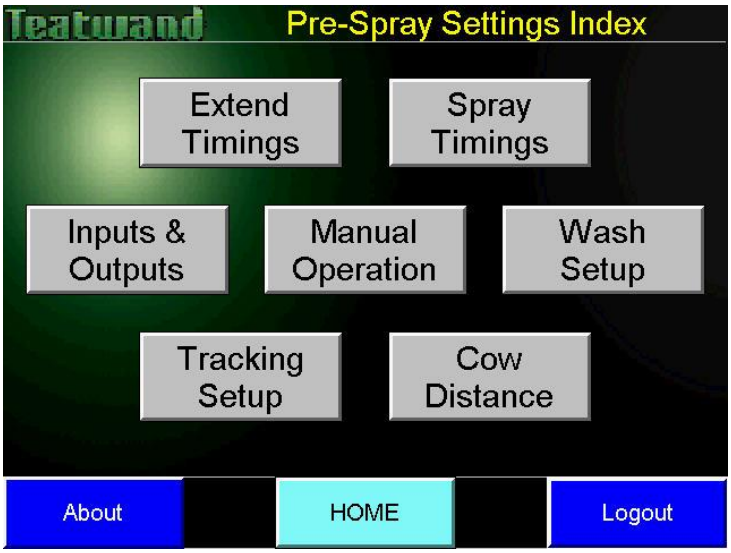


Figure 26

Teatwand™ Extend Timings Page

The Teatwand™ Settings page allows for adjustment of the Teatwand™ Extend Time (how long the Teatwand™ stays extended for).

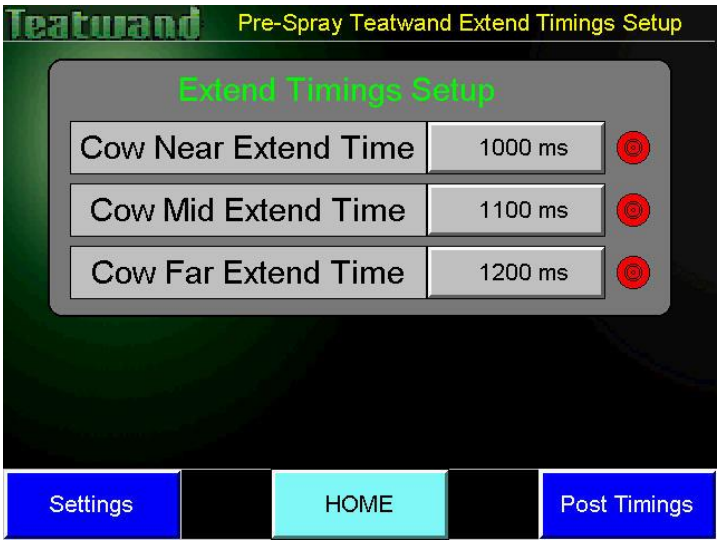


Figure 27

For every settings page on the bottom right corner there is a button that will read 'Pre …' or 'Post…'. Use this button to swap between Pre Spray settings and Post Spray settings.

The Extend Time determines how long the Teatwand™ remains extended. By increasing the Extend Time, the Teatwand™ will pause in the extended position for longer.

There are three different settings; 'Cow Near', 'Cow Mid' and 'Cow Far'. The 'Cow Far' setting should be the greatest value of the three as the Teatwand™ needs to do most of its spraying at its most extended position as the teats are further away. A green dot will show the last spray profile used.

Spray Timings Setup Page.

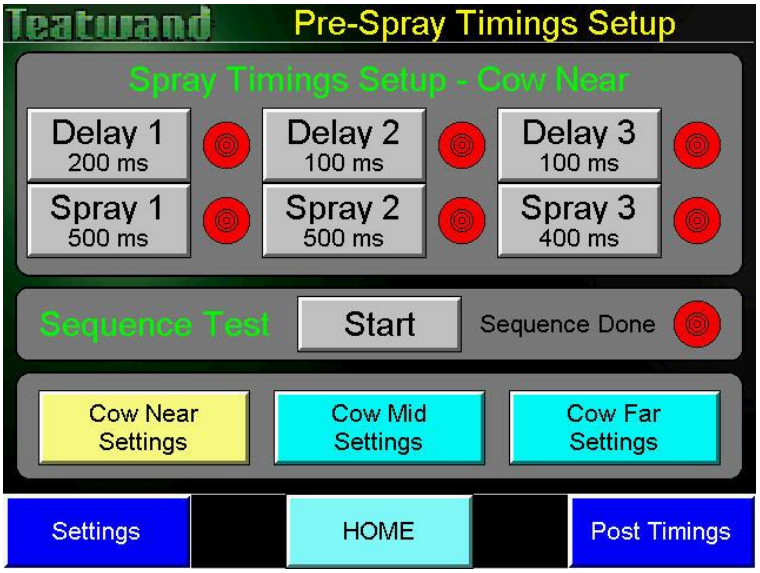


Figure 28

- 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.
- Spray and Delay times are adjusted on the Spray Timings Setup pages.

See Appendix C for default timings.

- **Delay Spray (1,2,3):** Delay spray introduces a pause before each spray operation to manage the amount of spray used.
- **Spray (1,2,3) Time:** This is the amount of time the spray solenoids are held open for. Spray 1 and 3 is the forward spray solenoid and Spray 2 is the reverse spray solenoid.
- **Start** button will start a spray sequence. Ensure Teatwand can extend safely before using this function.
- The Teatwand™ will spray in the mode shown on screen, ignoring the Cow Position Sensor. For example when Cow Near Settings is highlighted the Teatwand™ will only spray using the Cow Near spray profile.

Cow Distance Settings Page.

The Cow Position sensor is an Analog Laser sensor that must be zeroed once installed. This sensor registers the position of the cow within the stall and provides the program with information to select either Near, Mid or Far Cow spray patterns.

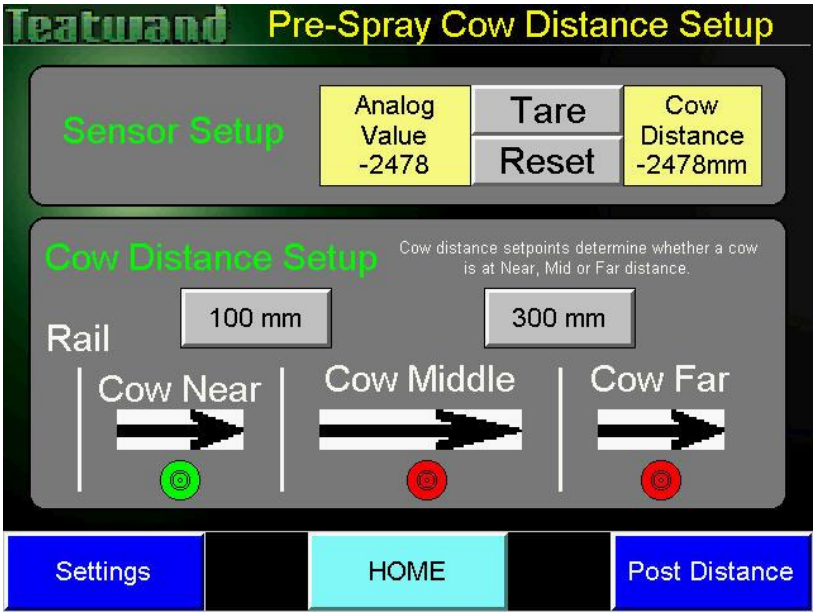


Figure 29

With the laser directed at the rump rail directly behind the cow press the Tare button to zero the sensor. The Analog Value will be zero or very close to it. This sensor is very sensitive and vibration will be detected, the value will modulate around a zero point.

The 2 grey buttons indicate the points where the spray pattern will change from one cow position to the next. 100mm and 300mm are the default settings for this sensor. These are adjustable. By pressing either button a touchpad will appear where a new value can be entered. In cases where there are many smaller cows in the herd the 300mm value may need to be increased.

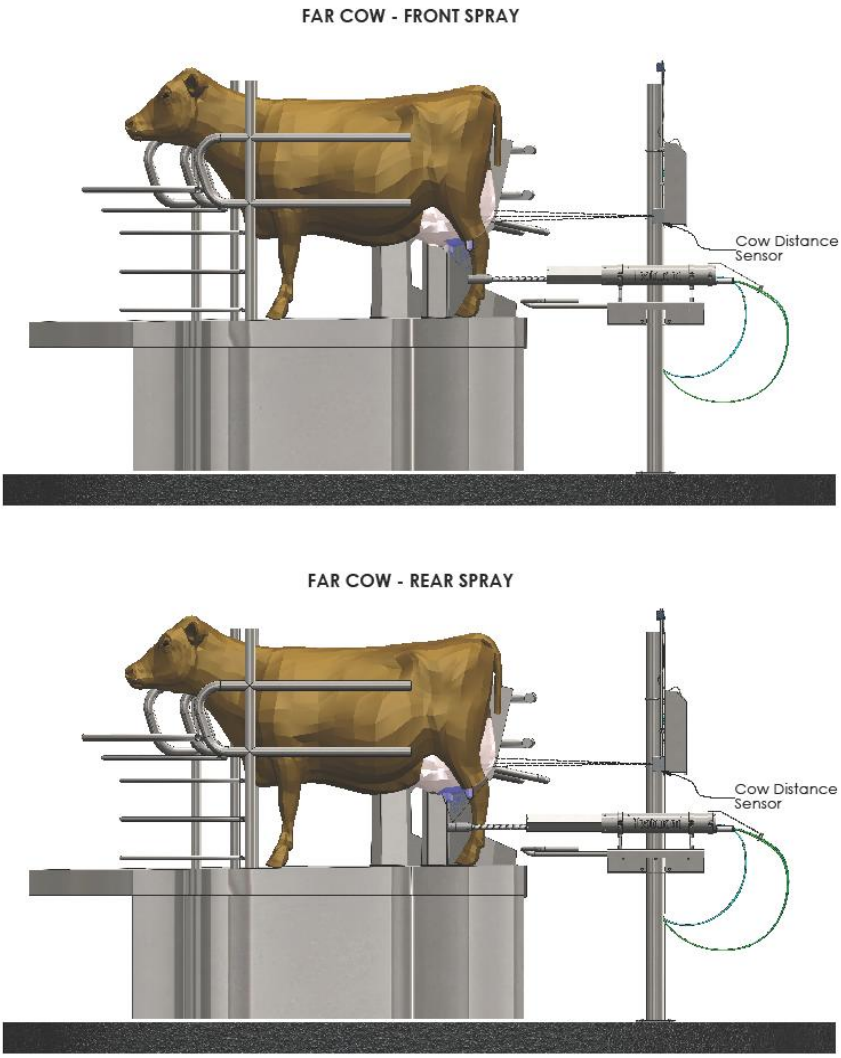


Figure 30

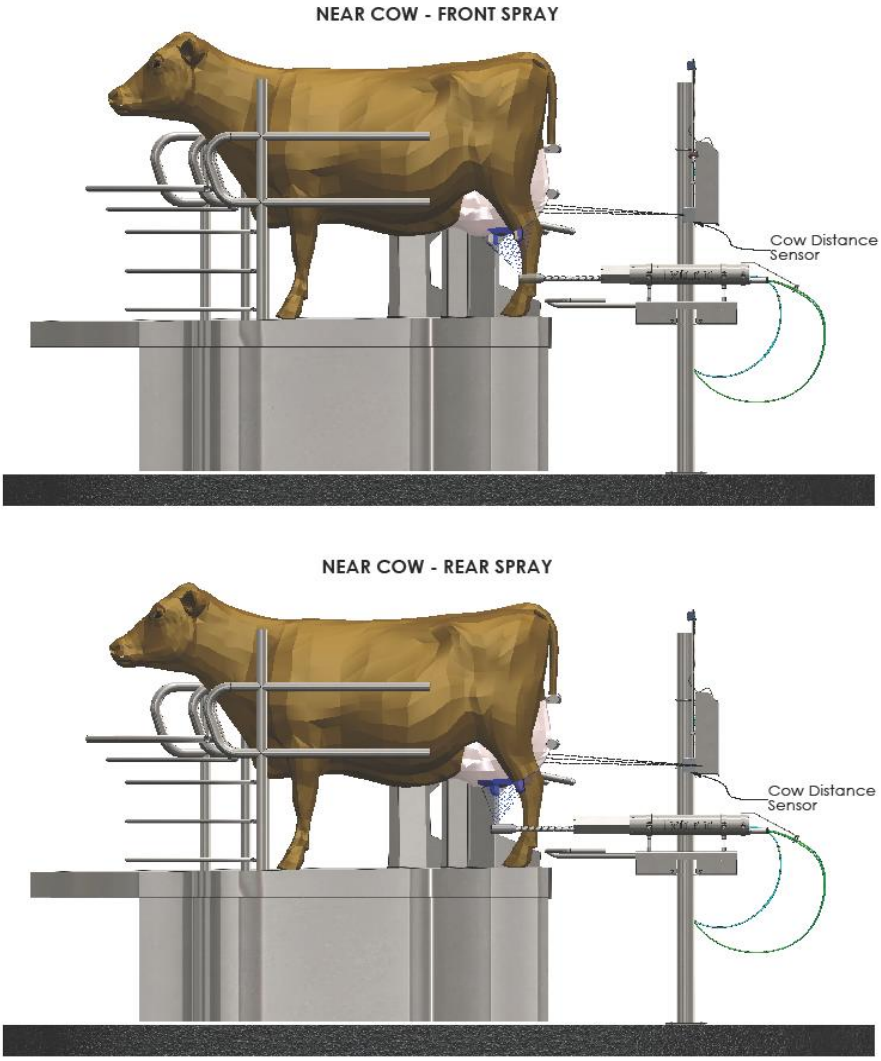

NEAR COW - FRONT SPRAY
Cow Distance Sensor
NEAR COW - REAR SPRAY
Cow Distance Sensor

Figure 31

Tracking Setup Page.

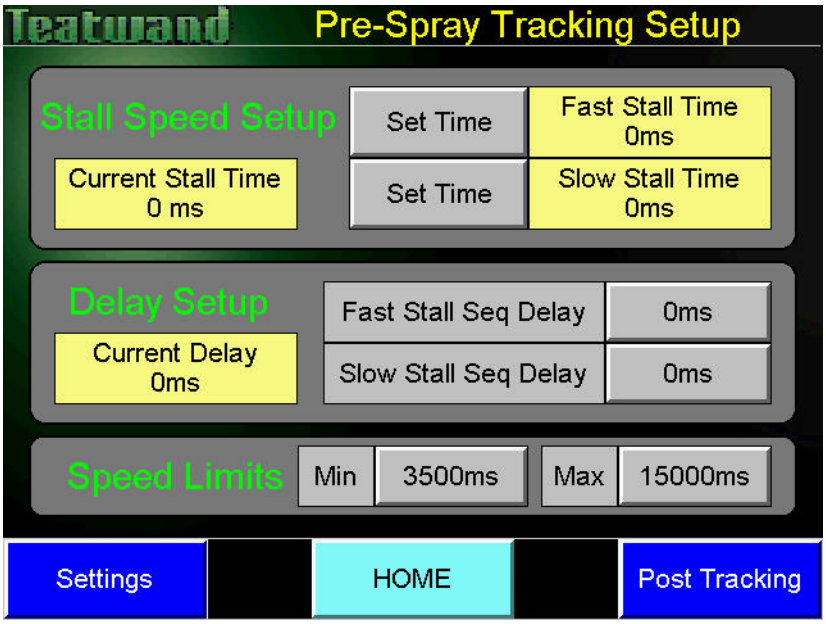


Figure 32

The Teatwand™ automatically calculates an 'Extend Delay' for variable platform speeds. This has the effect of delaying the spray sequence from the stall sensor pulse. The following steps need to be taken to calibrate the tracking for a new system

Fast Speed Calibration

The software is first calibrated for the rotary platform running at a fast speed. Set your rotary platform running at the fastest speed that it would be run during a normal milking session. Wait for at least 5 stalls to pass while the system updates to the new rotary platform speed. Press "*Set Time*" beside "*Fast Stall Time*" to set the fast stall speed.

Fast Stall Seq Delay

At this fast speed your stall sensor should be aligned so that as soon as it triggers the Teatwand™ extends straight away. When set correctly at fast milking speed the Teatwand™ should extend down the inner ridge of the leg spreader and retract down the outer ridge of the leg spreader avoiding the animal's legs.

- If the Teatwand™ is extending too early or too late, then physically move the stall sensors either left or right to correct this.
- Alternatively, the "*Fast Stall Seq Delay*" setting can be increased to delay when the Teatwand™ extends. There is a 1000ms limit on this delay, the stall sensors need to be accurately positioned and this delay is for fine tuning only.

Slow Speed Calibration

The software is then calibrated for the rotary platform running at a slow speed. Set your rotary platform running at the slowest speed that it would be run during a normal milking session. Wait for at least 5 stalls to pass while the system updates to the new rotary platform speed. Press "*Set Time*" beside "*Slow Stall Time*" to set the slow stall speed.

Slow Stall Seq Delay

At this slow speed the Teatwand™ will be extending very early into the stall. Check the Teatwand™ to see if this is the case. The "*Slow Stall Seq Delay*" setting needs to be modified to delay the extend time until it extends and retracts more down the centre of the leg spreader avoiding the animal's legs.

Slowly increase this delay time and monitor your Teatwand™ to see when it is extending. Continue to increase this delay until your Teatwand™ extends centrally over the legspreader.

Speed Limits

Rotary platform speed limits are required to ensure the system stops running when the platform is going too fast or too slow. This will prevent the Teatwand™ extending into cow's legs or the clusters.
The fast speed limit should be set at a speed slightly lower than is listed in "*Fast Stall Time*". For example, if the "*Fast Stall Time*" is set to 6000ms then an appropriate speed limit would be 5500ms.

The slow speed limit should be set a few seconds slower than the slowest stall speed that you run at. For example, if the "*Slow Stall Time*" is set to 12000ms then an appropriate speed limit would be 15000ms.

Manual Controls page.

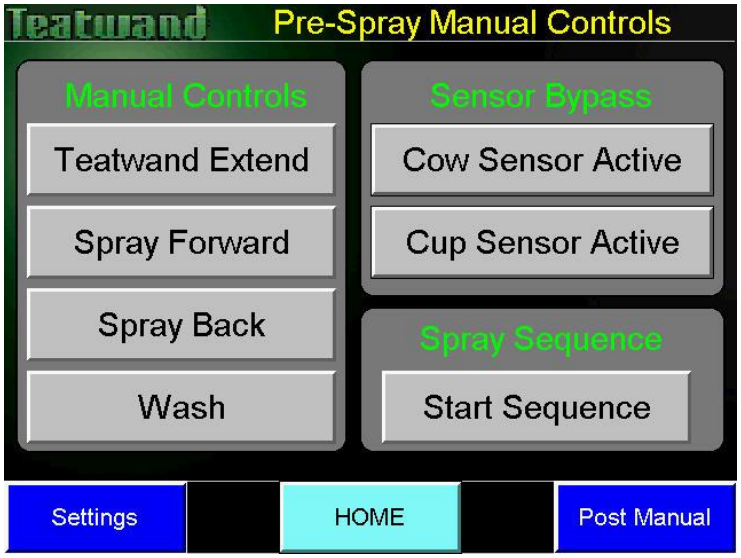


Figure 33

Manual Operation.

The Manual Controls page allows for the Teatwand™ and Spray Solenoids to be operated manually. To manually operate the solenoids, hold down the 'Teatwand™ Extend', 'Spray Forward' or 'Spray Back' buttons. The solenoid will open as long as the button is pushed.

Spray Forward and Spray Back buttons are used to purge the Teatwand™ spray hoses when these hoses are replaced.

For systems that feature a wash nozzle, the wash button will activate the wash solenoid

Sensor Bypass

This feature is useful when operating the Teatwand™ with no cows on the rotary platform. 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 is bypassed all the time.

When the sensors are bypassed the 'Cow Sensor Installed' / 'Cup Sensor Installed' buttons will change to 'Cow Sensor Bypassed' / 'Cup Sensor Bypassed'.

Spray Sequence

This button will trigger an example spray sequence. Ensure that the platform is paused and the Teatwand™ will not hit into anything if you press this button.

Inputs & Outputs

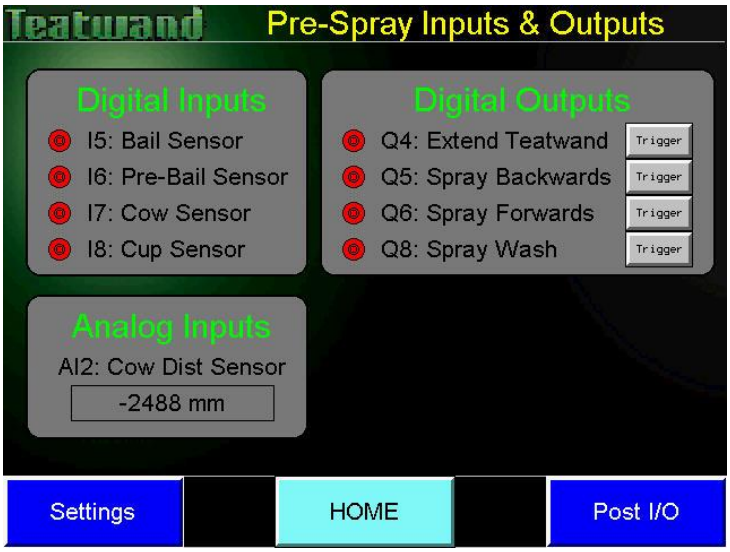


Figure 34

The inputs and outputs page shows the status of Teatwand™ Sensors (Inputs & outputs). When the sensors are detecting an object the dot next to the description will change from red to green. This is a very useful feature for commissioning and trouble-shooting. All outputs can also be manually triggered

Wash Setup

Some Pre/Post Exact systems will feature a wash nozzle for cleaning the Teatwand™. This page allows for the setup of how often you want the wash cycle run and how long the wash spray should be enabled for.

Figure 35

About Screen

The about screen shows the details about your system. These details will be required to load any software updates.

Figure 36

Figure 37

If a Micro SD card is plugged into your system, green buttons will appear on the help page to allow for saving/loading system settings and software.

Commissioning.

Turn on power to controller.

- Check the Touchscreen displays the Home page.

Turn on air supply to System

- Check for leaks.
- Check Teatwand™ is plumbed correctly, i.e. It stays retracted with air on.
- Use Manual page in Touchscreen to check Teatwand™ Extend operation

Turn on Teat Spray

- Set pressure at pump regulator to 40psi.
- Check for leaks
- Use Manual page in Touchscreen to purge teat spray through lines.
- Check Forward spray and Back spray are correct, swap spray lines at 8mm unions if required.

Check Inputs. (Sensors)

- With the rotary turning go to the Help Page
- Check Stall sensors are connected correctly, the Pre-bail first then Bail Sensor. Swap plugs on Sensors if required.
- Check Cow sensor is aligned correctly – looking down and slightly angled across the stall to look at the cows back. Set the distance so the sensor is reading towards the front of the stall but not picking up on steelwork beyond that.
- Set the Cow Position Sensor. Point the red laser dot at the rump rail. Go to the Settings Page in the touchscreen, open the Analogue Settings page. Press the 'Tare Button'. This sets a zero point for the sensor and it measures from that point. Realign the Cow Position sensor to look at the back end of the cow.

Setting the Stall Sensor position.

- Stop the Rotary at a position where the Teatwand™ 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.

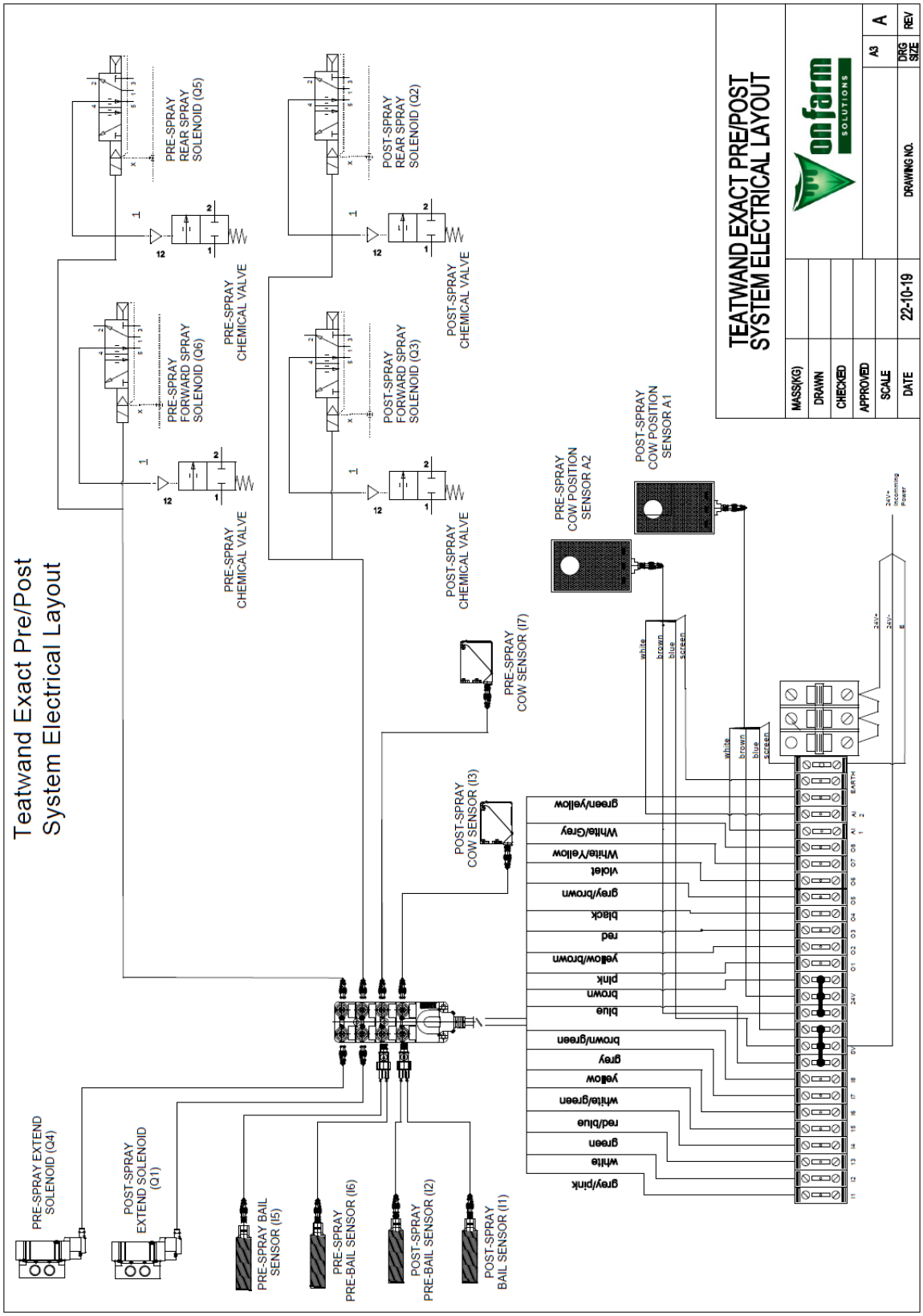
Ensure the default settings are entered into the Spray Settings and Teatwand™ Settings pages – *see Appendix C.*

Set Up and Fine Tuning Teatwand™

When setting up ensure the Teatwand Speeds and Extend times are such that the Teatwand extends fully. Set speeds and timings to use all available time to get the Teatwand extended and retracted without hitting cows legs. It is best to have the Teatwand travelling as slow as time will allow.

- Set Teatwand™ speed and timing first.
- Set Teat spray Pump regulator to zero to avoid wasting spray product.
- Run the rotary at the fastest milking speed used at the dairy.
- Press Start Button, check timing. Is the Teatwand™ extending at the correct time?
- Adjust the Stall Sensors so the Teatwand™ is extending over the first ridge of the leg spreader.
- Set speed of Teatwand™ extend and retract using the flow controls on the Extend Solenoid manifold. See *Figure 5.*
- Check the Teatwand™ is extending fully, on slower moving rotaries the extend times will be greater
- Set Teat spray Pump pressure to 35psi – 60psi.
- The default settings for delays and spray times (Appendix C) may need to be adjusted on the Spray Settings page to achieve good coverage of all 4 teats.

Appendix A – Electrical Layout



Appendix B – Cable identification and application.

All cables are labelled with the Onfarm Solutions part numbers fitted into a sleeve at each end of the cable adjacent to the plugs.

Cables supplied with a Single System.

- ***C007*** x 3. Solenoid cable. Extend Solenoid x 1. Chlorine Pilot valves x 2. These are supplied pre fitted to the 8 Way Distribution Board.
- ***C010*** x 1. Sensor cable 5m. For the Cow sensor.
- ***C011*** x 1. Sensor cable 20m. For the Stall sensors, to run to the basement.
- ***C006*** x 1. Y cable 3m. For the Stall sensors, to connect each sensor to *C011*
- ***C009*** x 1. Analog sensor cable 20m. For the Cow Position sensor to run from the sensor back to the Touchscreen Controller. This cable has a plug on one end only and is wired into the terminals in the Touchscreen Controller cabinet. See Appendix 1 – Electrical Layout.
- ***C005*** x 1. 8 Way Distribution Board with 20m multicore cable – To run from the Pole Controls Cabinet to Touchscreen Controller. This cable is wired into the terminals in the Touchscreen Controller cabinet. See Appendix 1 – Electrical Layout.

Cables supplied with a 2nd Module.

- All of the above.
- ***C007*** x 3. Solenoid cable. Extend Solenoid x 1. Chlorine Pilot valves x 2.
- ***C023*** x 1. M12 T Coupler – To connect 2 x Chlorine Pilot valve cables.
- ***C011*** x 4. Sensor cable 20m – Stall sensors, to run to basement x 1. Cow sensor on 2nd module x 1 to run to Distribution Board in the Pole Controls Cabinet on the 1st module. Extend Solenoid on 2nd module x 1 to run to the Pole Controls Cabinet on the 1st module. Chlorine Pilot valves to T Coupler on 2nd module x 1 to run to the Pole Controls Cabinet on the 1st module.
- ***C006*** x 1. Y cable 3m. For the Stall sensors, to connect each sensor to *C011*
- ***C021*** x 1. Analogue Sensor cable 30m. For the Cow Position sensor to run from the sensor back to the Touchscreen Controller. This cable has a plug on one end only and is wired into the terminals in the Touchscreen Controller cabinet. See Appendix 1 – Electrical Layout.

Appendix C – Default Timing Settings

Near Spray Timing		
Extend Time: 1000 ms		
Spray 1 Delay: 200 ms	Spray 2 Delay: 100 ms	Spray 3 Delay: 100 ms
Spray 1 Time: 500 ms	Spray 2 Time: 500 ms	Spray 3 Time: 400 ms

Mid Spray Timing		
Extend Time: 1100 ms		
Spray 1 Delay: 300 ms	Spray 2 Delay: 80 ms	Spray 3 Delay: 80 ms
Spray 1 Time: 500 ms	Spray 2 Time: 500 ms	Spray 3 Time: 400 ms

Far Spray Timing		
Extend Time: 1200 ms		
Spray 1 Delay: 400 ms	Spray 2 Delay: 50 ms	Spray 3 Delay: 50 ms
Spray 1 Time: 500 ms	Spray 2 Time: 500 ms	Spray 3 Time: 300 ms

Distance Settings	
Near Distance: 100 mm	Mid Distance: 200 mm

Appendix D – Teatwand™ Exact Pre/Post System Layout

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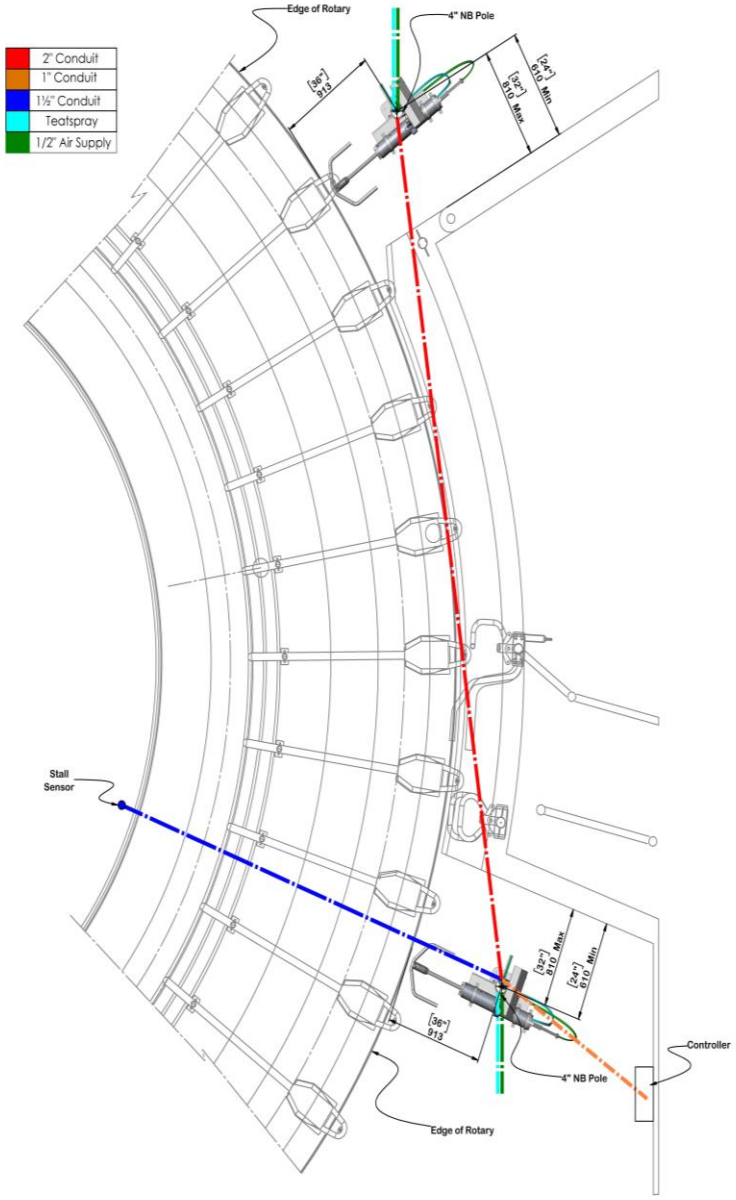
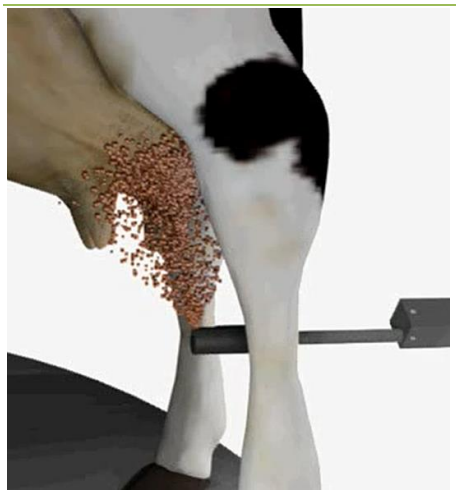
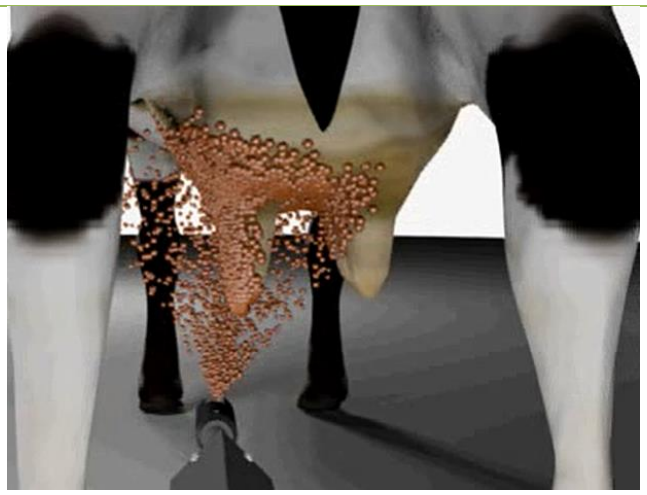
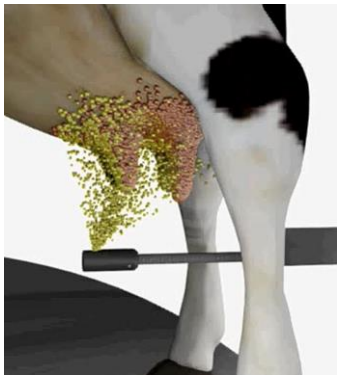


APPENDIX E - SPRAY SEQUENCE TEAT COVERAGE

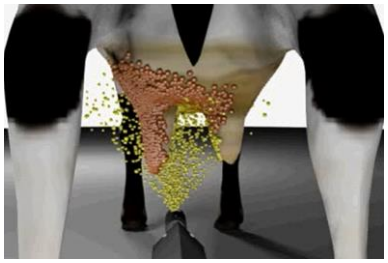




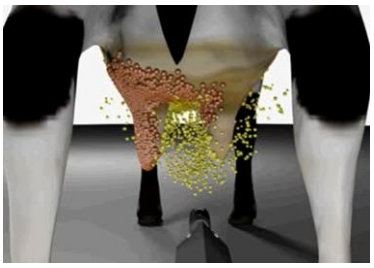
First Forward Spray



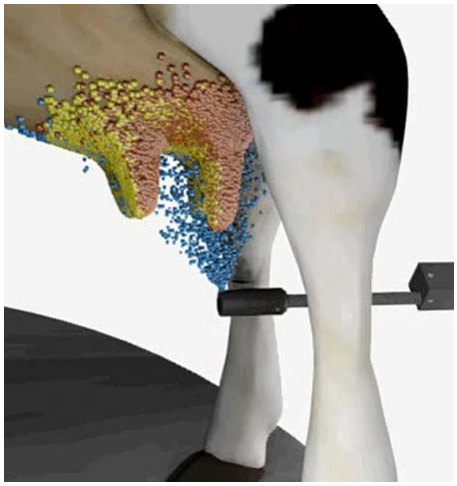
Reverse Spray

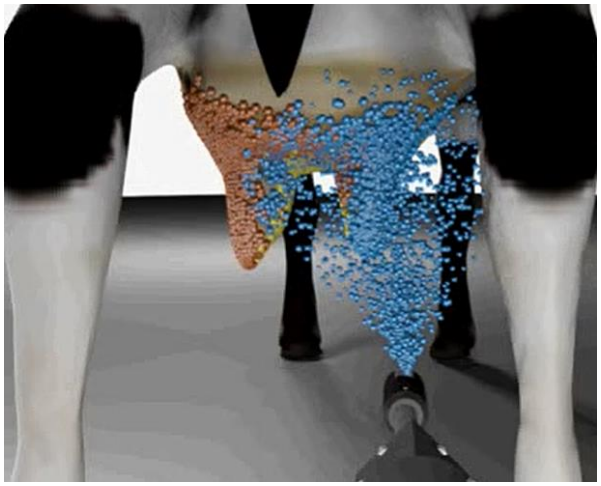


Reverse Spray Starting



Reverse Spray Stopping





Second Forward Spray