Teatwand EXACT

INSTALLATION MANUAL

U.K. EURO TEATWAND EXACT V4

VERSION 4.0

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Teatwand EXACT

Teatwand RAPID

Congratulations on your purchase of a Teatwand product.

Teatwand is the flagship brand of Onfarm Solutions Ltd. The **Teatwand** concept was developed by Adrian Joe a veterinary consultant and Gary Arnott an automation engineer. They formed Onfarm Solutions Ltd in 2008 to develop automated teat spraying systems. Five prototype **Teatwand** systems were installed in Canterbury New Zealand in 2009. The **Teatwand 400** was introduced in 2010 and the **Teatwand Exact** in 2013. **Teatwand Rapid** was introduced for large scale fast-moving rotaries in the USA in 2018.
These new models are the result of farmer feedback and the implementation of new technology and engineering solutions that have emerged.
At Onfarm Solutions we are committed to continuous improvement the **Teatwand Exact** and **Teatwand Rapid** systems are testament to this.

Teatwand is now across the world with over 700 installations in New Zealand, Australia the USA, the UK and Europe. South Africa in 2021.

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 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 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 Exact System.

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

A 50mm conduit between Pre and Post sides is required for cabling.

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

Single systems – Pre or Post fit the touchscreen controller to the same side. A second module can be easily be added.

Refer to Appendix D – Teatwand Pre/Post Layout Drawing for installation recommendations.

- Fit Spread Eagle Leg Spreaders to the deck of the rotary. This is best done at least 2 weeks prior to Teatwand™ install to allow time for cows to adjust. See install 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. See install manual.
- Talk to Dairyman/Manager about location of Teatwand™ and Touchscreen Controller, refer to Install Manual for preferred locations.
- Determine position of 4'' Pole. Mark on floor. See Appendix D Teatwand Pre/Post Layout Drawing . This is a target for conduits.
- Run conduits. See Layout Drawing.
- Provide a 12mm compressed air supply to each system. A single system operating at 12 cycles/min will use 15 litres/min of compressed air.
- Provide for teat spray supply line from bulk supply to each system.

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

Teatwand™ Exact

The Teatwand™ Exact automatic teat sprayer was developed in 2013 for rotary dairy parlours. The Teatwand™ Exact utilizes the movement of the rotary by extending out under one side of the cows udder and as the rotary moves the Teatwand™ Exact retracts under the other side of the cows udder. 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

Teatwand™ Exact Installation.

Teatwand™ Exact can be used as a Pre-Spray or Post-Spray system, Single Systems, or both, a Double System. One Controller/Touchscreen is used for both Single and Double Systems and is pre-programmed for both to allow for the addition of a second Teatwand™ Exact to a Single System. Appendix D – Teatwand™ Exact Pre-Post System Layout - depicts a typical layout for a Double System.

The Teatwand™ Exact and the Controls Cabinet are mounted on a pole secured to the floor of the parlor. Services are run to the pole and connected in the Controls Cabinet.

Positioning the Pole.

- Angled Stalls.

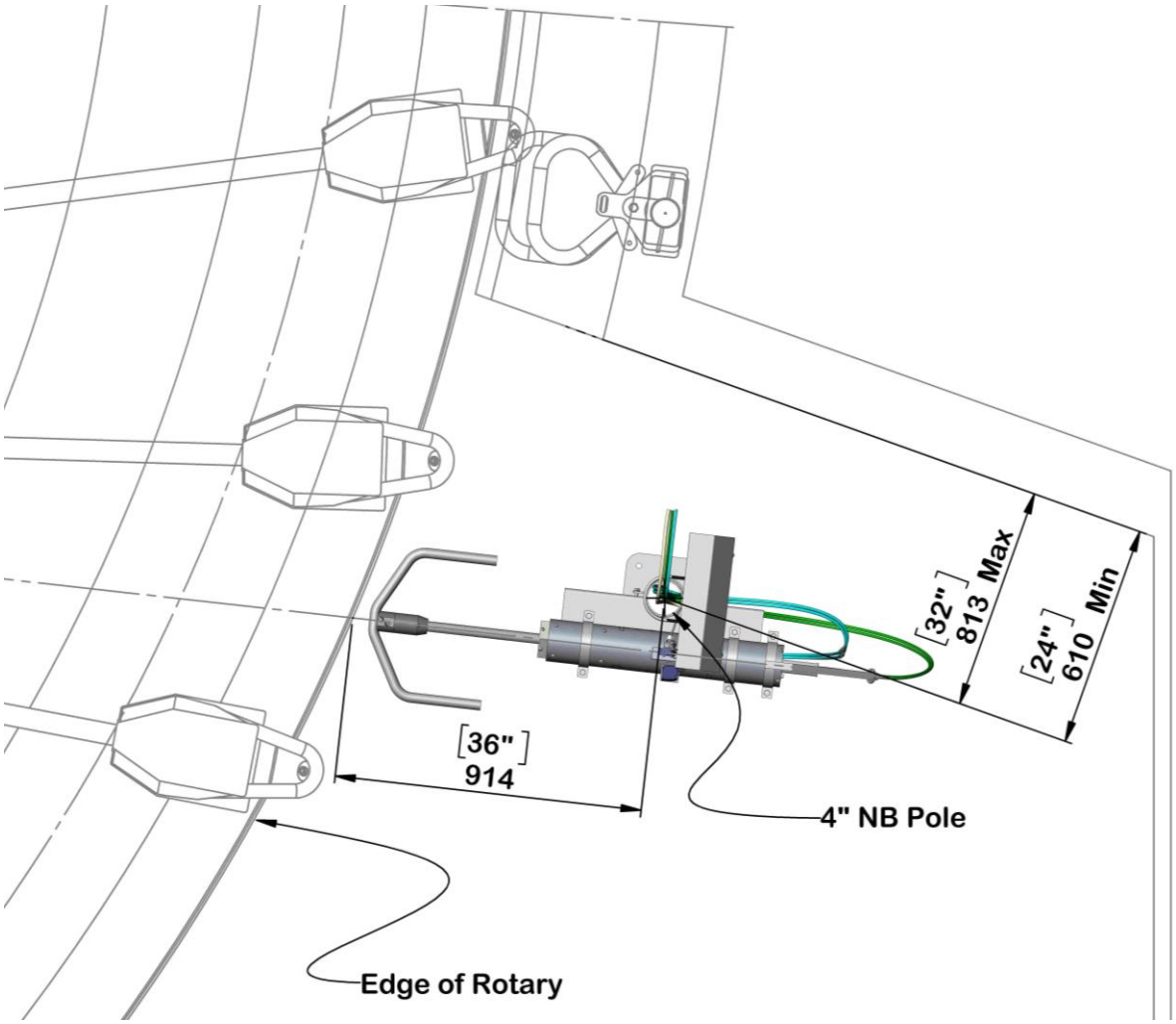


Figure 2

Figure 1

- Straight Stalls

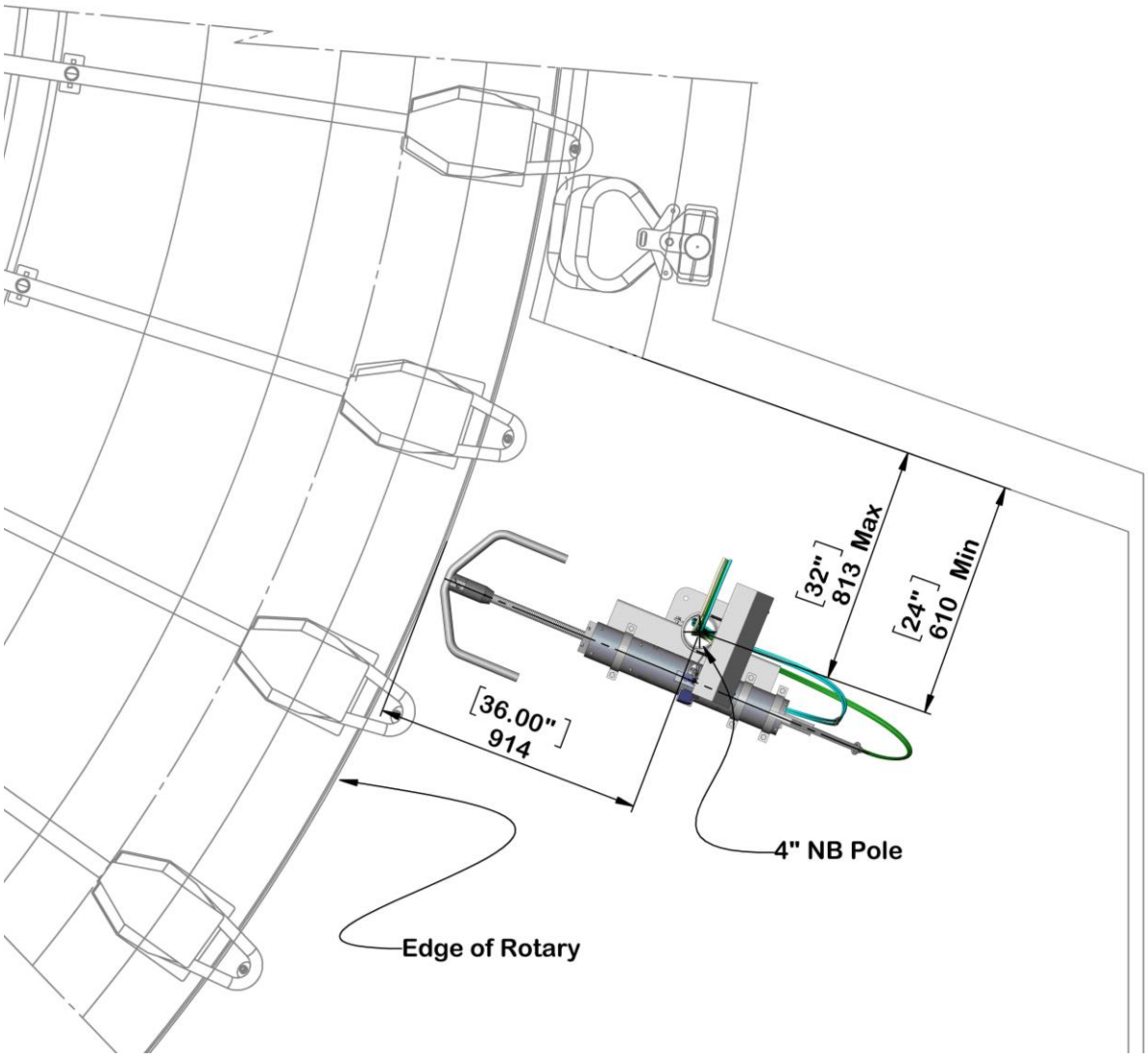


Figure 3

- 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 2.5m 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.

Fitting the Teatwand™ Exact Pole Bracket and Controls Cabinet.

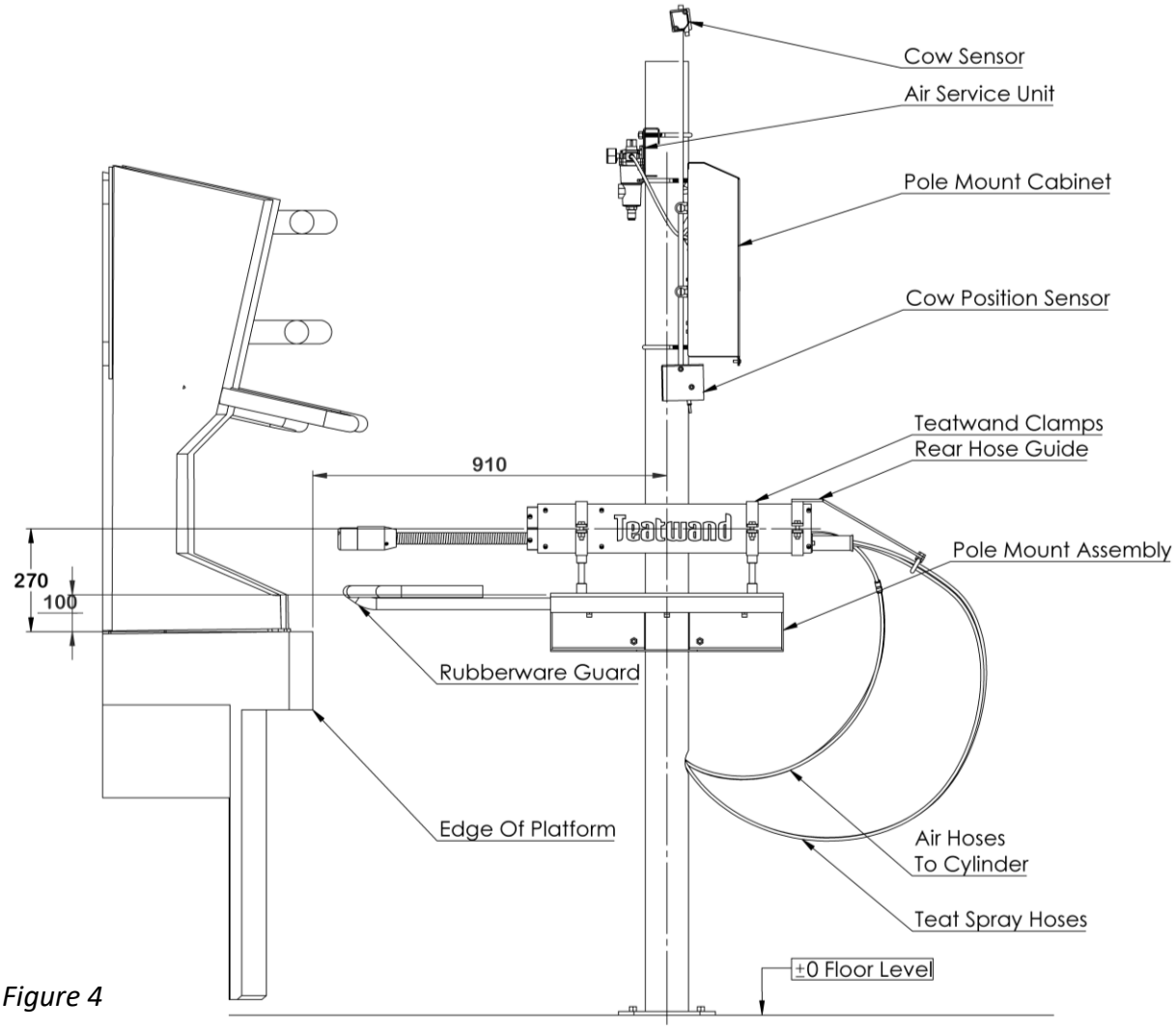


Figure 4

Fitting the Teatwand™ Exact Pole Mount Assembly.

- Use a level to mark on the Pole the height of the rotary deck surface.
- Measure 100mm up from this and mark. This is the height position for the Teatwand™ Pole Mount Assembly
- Use the clamps supplied to fit Teatwand™ Exact Pole Mount Assembly at correct height and align suit the angle of the stall. See *Figures 2,3 &4*
- The clamps are used for setup. Once the correct position is decided (with Teatwand™ mounted and tested) the Pole Mount Assembly is to be welded to the pole.

Fitting the Controls Cabinet.

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

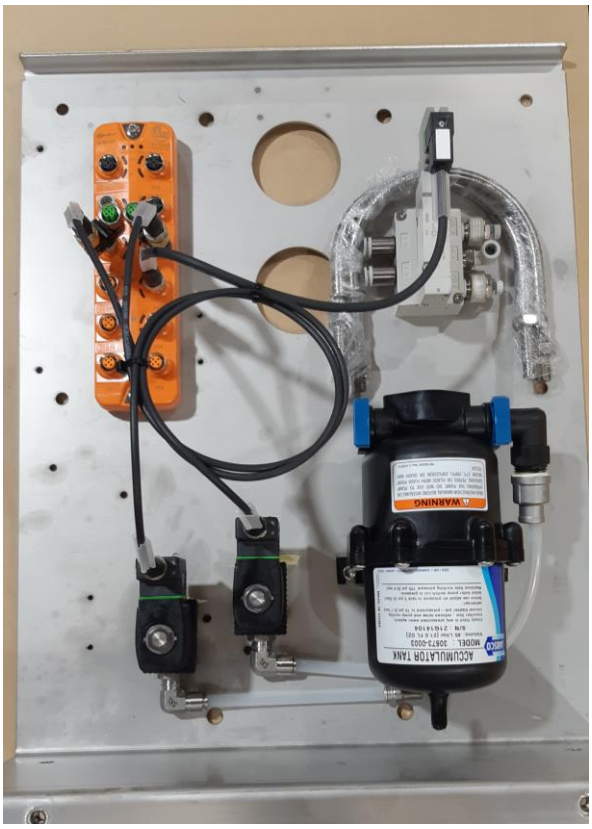


Figure 5

- Use the U Bolts supplied to fit the backplate towards the top of the pole. See Figure 4
- Mark on the Pole the 2 pre-cut 50mm holes in the backplate. Remove Backplate, cut 2 holes in the pole, deburr holes for cables, air and spray hoses.
- Refit Backplate to Pole.
- Measure 300mm down the pole from the top face of the Teatwand™ Pole Bracket in line with the 2 holes at the top of the pole, cut a 38mm hole for air and spray hoses.

Fit the Rubberware Guard, fit the Teatwand and fit the Rear Hose Guide

See Figure 6 below.

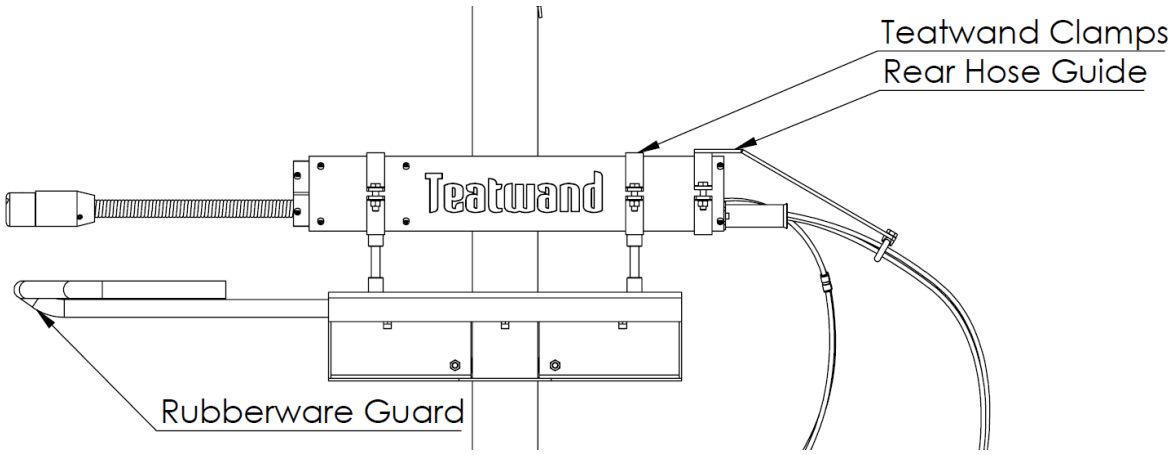


Figure 6

- The Rubber Ware Guard is supplied in 2 pieces to be welded together onsite.
- Use 2 pieces of ⅝'' S/S round bar 4'' long to mount the Teatwand. Position the Teatwand™ in the Clamps with the nozzle head close to the edge of the rotary taking care the nozzle does not interfere with any rubber ware.
- The Teatwand™ Rear Hose Guide must be fitted to the rear end of the Teatwand™ to guide and support the 8mm hoses where they enter the rear of the Teatwand™.

Fit the Touchscreen/Power Supply

A 240/110V to 24VDC power supply
is located in the touchscreen enclosure.

Position the Touchscreen/Power Supply on a wall nearby away from high pressure wash areas. Consult with the local Dairyman for location.

Refer to Appendix C for a larger drawing.

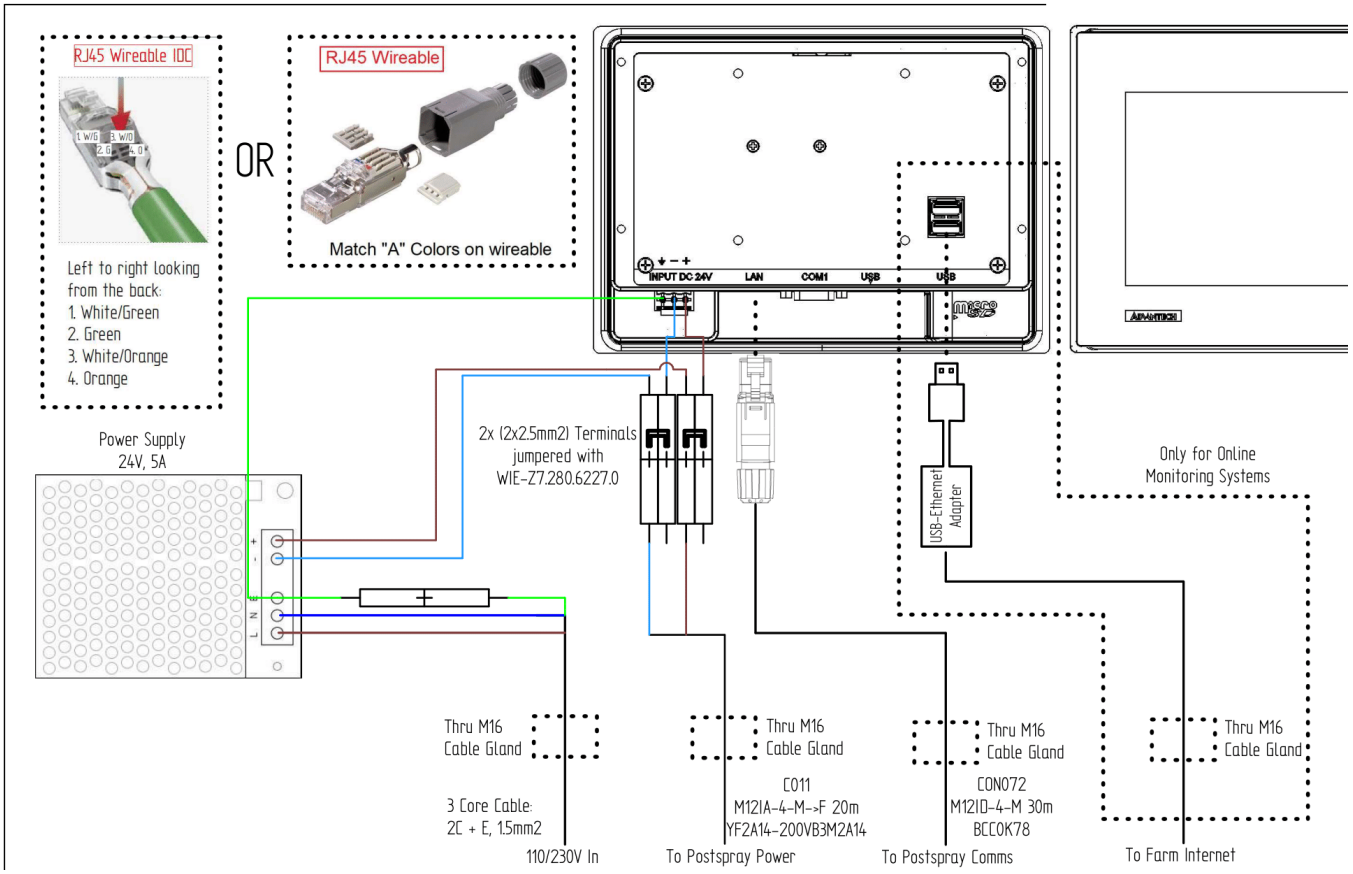


Figure 7

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 5m.
- 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.

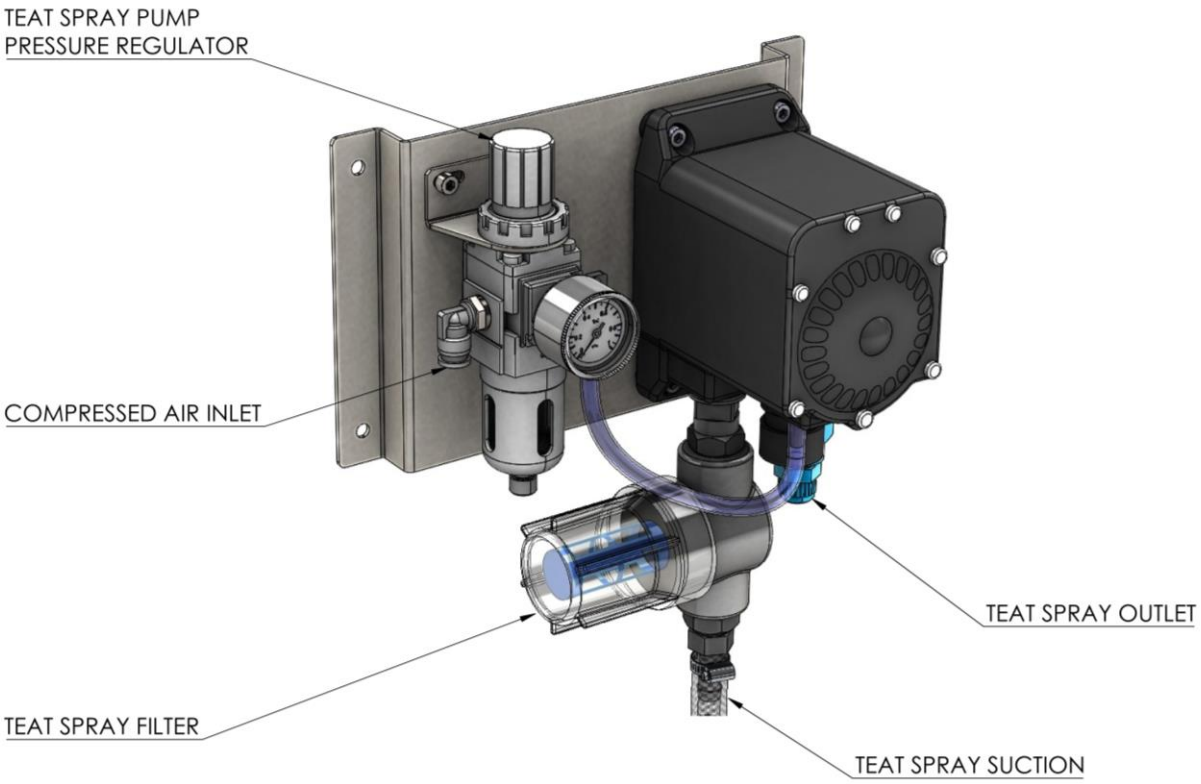


Figure 8

Connecting Services to Teatwand™ Exact.

All services are to be provided to the top of the 4'' Pole. Entry into the Controls Cabinet is through the holes cut in the pole.

Compressed Air.

- A 12mm compressed air line is required to supply compressed air at 100psi (minimum) to the Air Service Unit on each Pre-Spray and Post-Spray system. The pressure regulator on the Air Service Unit will be set at 90psi.
- Connection from the Air Service Unit is made into the Teatwand Extend Solenoid inside the Controls Cabinet. See *Figure 5.*
- Fit two hoses into the fittings on the Teatwand™ Extend Solenoid manifold and run through one of the holes in the Controls Cabinet Backplate down the pole and out through the hole cut under the Teatwand™ Pole Bracket.
- Connect to the push fit fittings on the Teatwand™ air supply hoses.

Teat Spray.

- A teat spray supply is required from the Teat Spray Pump located close to the bulk supply of teat spray to the Teatwand™ Exact.
- Teat spray connection is made in the Controls Cabinet into the accumulator fitting using standard Onfarm Solutions 8mm hose.
- Fit hoses to each Spray Solenoid these will follow the same route as the Teatwand™ air supply hoses exiting the pole below the Teatwand™ Pole Bracket.
- Allow for 500mm of hose outside of the pole. Fit the 8mm push fit Unions (supplied) to each hose. These will then be connected to the hoses that run through the Teatwand™ to the nozzles.

Electrical Connections.

- The Teatwand™ Exact control system is 24VDC.
- A 110/240V to 24VDC Power Supply is supplied with the system. This is located inside the Touchscreen enclosure. Connect to a local supply.
- See Appendix 1 & 2 for Electrical Layout.

Compressed air and teat spray suppplies are connected in the Controls Cabinet.

Power from the Touch screen enclosure is connected to the I/O Link with a cable supplied.

All sensors and solenoids are connect to the I/O Link with cables supplied.

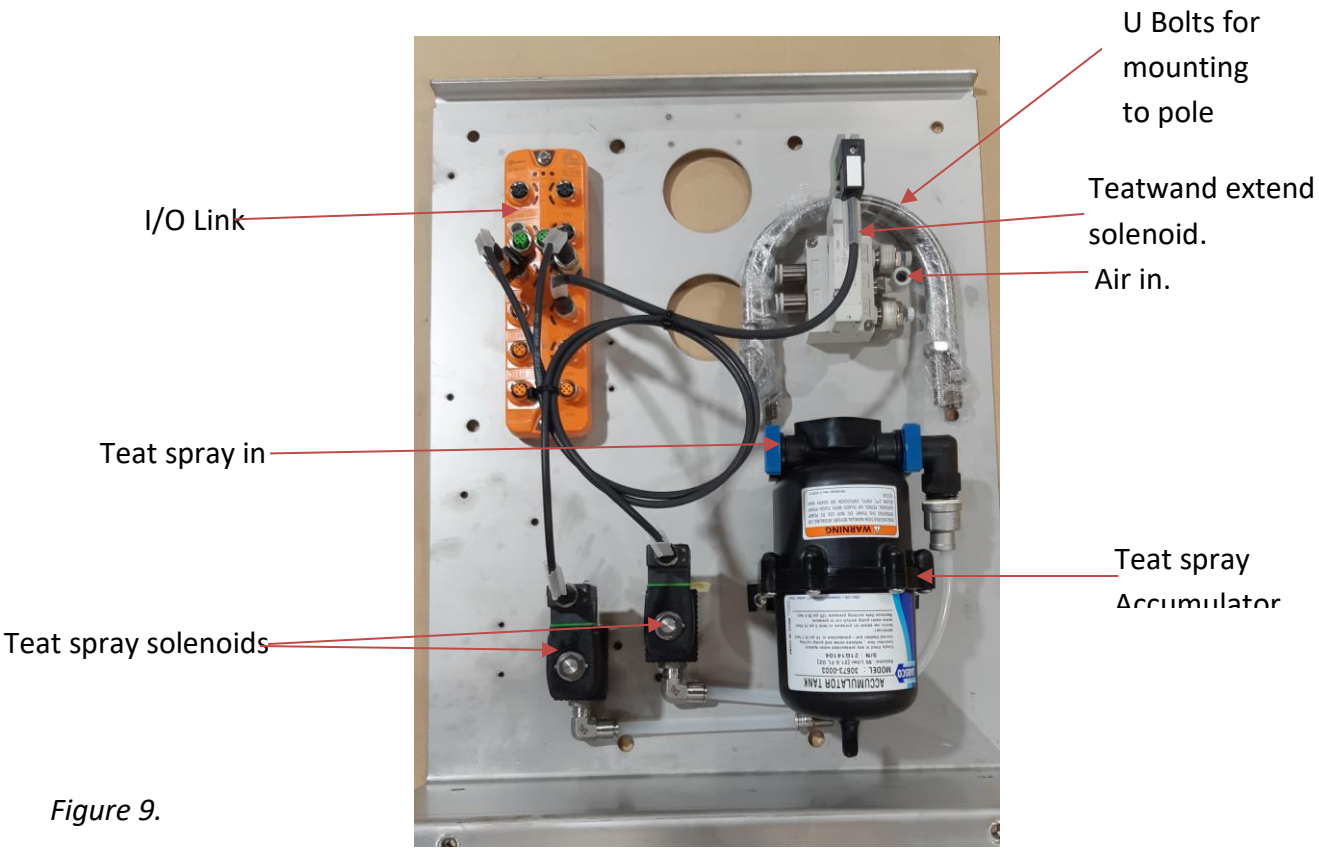


Figure 9.

Cabling

Solenoids and Sensors are connected to the I/O Link in the Controls Cabinet with pre-made cables.

Cables supplied with a Single System.

1. Extend Solenoid Cable - *C007* x 1. Extend Solenoid
2. M12 T Coupler – *C023* x 2. Fitted to the I/O Link.
3. Y Cable M12 to 2 x M12 plugs 3m – *C006* x 1 Stall sensors
4. Sensor cable 5m – *C010* x 3. Cow sensor, Cup sensor, Cow Position sensor.
5. Sensor cable 0.6m – *C022* x 2. Euro System only. I/O Link to Spray Solenoids
6. Sensor cable 20m – *C011* x 1. From I/O Link to touch screen.
7. Sensor cable 20m – *C011* x 1 Euro System only. Stall sensors in basement.
8. Wireable RJ45 Plug – *CON071* x 1. Connect Ethernet cable to touchscreen.
9. M12 Single Ended Ethernet cable 30m – *CON072* x 1. I/O Link to touchscreen.
10. Sensor cable 5m – *C010* x 2 NZ System only. I/O Link to Spray Solenoids

For a double system, cables 1 to 6 are supplied. Use cable no.6 to go between I/O links on post and pre.

Also supplied for a double system.

1. M12 T Coupler – *C023* x 1. I/O Link power connection between pre and post.
2. Sensor cable 0.6m – *C022* x 1. I/O link to T Coupler.

Fitting the Teatwand™ Spray Hoses.

- Remove 3 cap screws from Nozzle Holder using a 5mm Allen key.

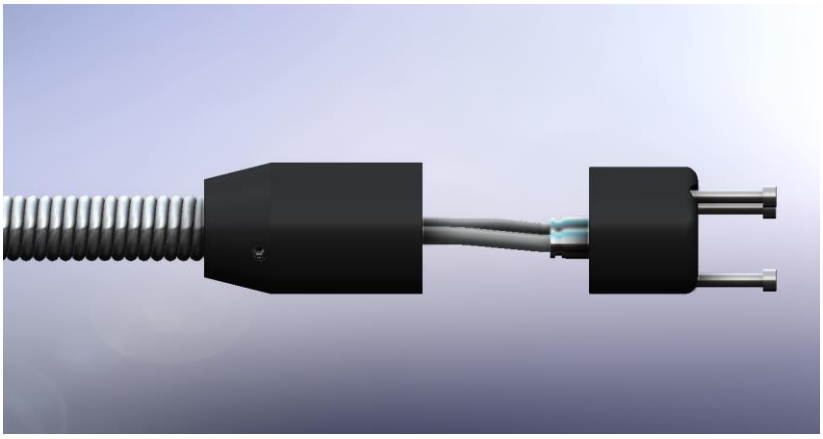


Figure 10

- Remove Spray Hoses from the push fit fittings in the back of the Nozzle Holder.
- Pull the old Spray Hoses through Teatwand from the Rear Pinch Guard.
- Unplug Spray Hoses from 8mm Unions between the back of the Teatwand and the Pole.
- Take 2 new Spray Hoses 10ft long.
- Fully retract the Teatwand.
- Fit the 2 hoses through the spring and through Teatwand taking care not to twist. There will be some resistance as the hoses are pushed through the Teatwand inner guard.

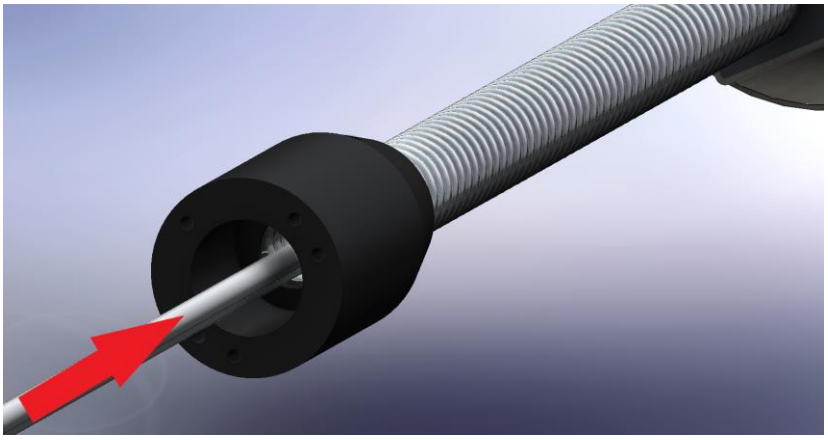


Figure 11

- Push the 2 hoses right through the Teatwand until they appear through the Pinch Guard on the rear plate of the Teatwand. Pull the 2 hoses through the Teatwand leaving about 200mm at the nozzle end.
- Plug the hoses into the push fittings in the Nozzle Holder. Take care not to twist the hoses.

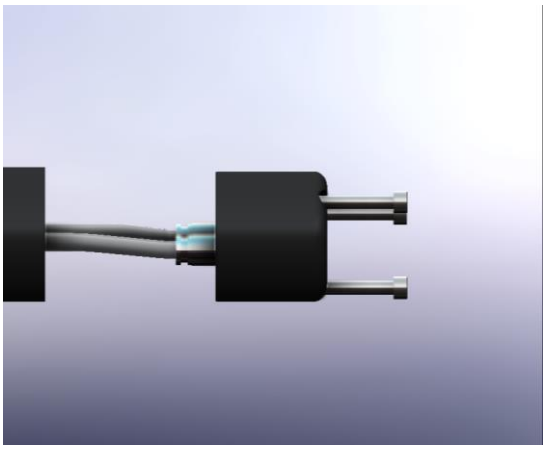


Figure 12

- Refit the Nozzle Holder using the 3 cap screws.
- Thread the hoses through the eyelet on the Rear Hose Guide and plug them back into the 8mm Unions.
- Go to the Touchscreen Manual Controls page and use the Purge Forward and Backward Nozzle buttons to purge the air from the hoses.
- Take note that the forward nozzle sprays when the Purge Forward Nozzle button is used. Simply swap the hoses at the 8mm Unions if the wrong nozzle is spraying.

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 2 weeks from new or after fitting a new spring

- Loosen the 3 grub screws that secure the nozzle head to the spring.
- Rotate Nozzle Head to vertical.
- Tighten grub screws.

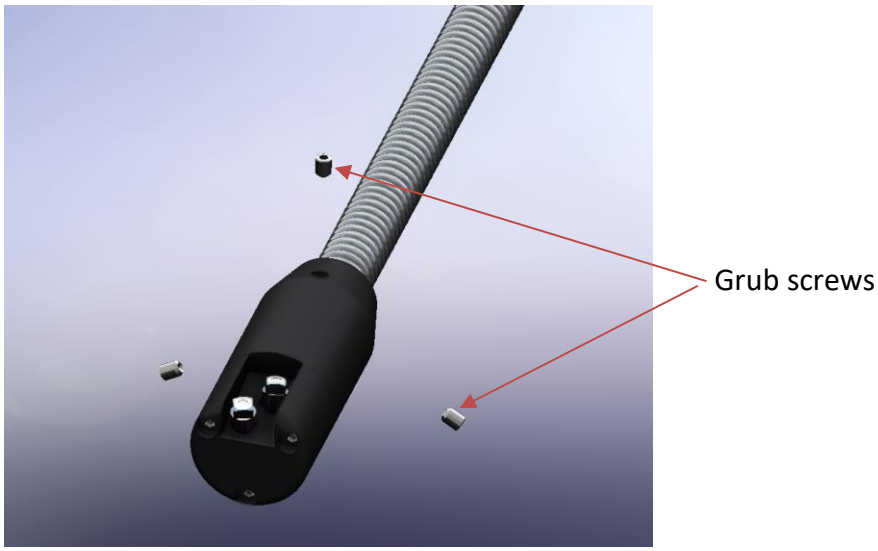


Figure 13

Sensor Installation.

Stall Sensors.

These sensors are photoeyes and will detect anything from 6mm to 300mm 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 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.

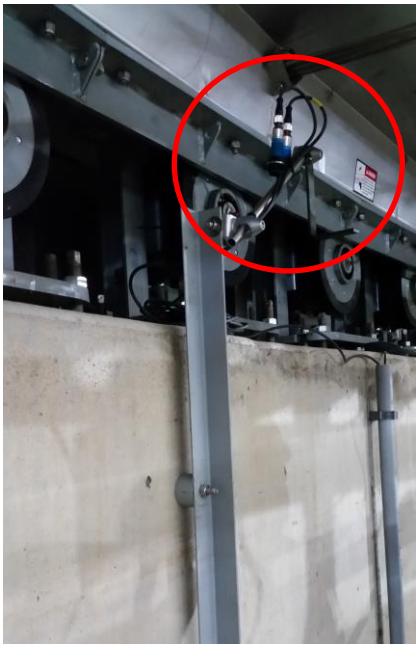
The Stall Sensors can be fitted anywhere around the internal diameter of the basement. It is the positioning of the sensors within any given stall that is critical. Where the cable/s enter the basement is often the best area for the Stall Sensors to be fitted.

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 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.



This example shows a metal bracket fitted to the rotary and an angle iron bracket mounted to the concrete wall of the basement with the sensors mounted off that.

This example shows a bracket mounted to the rotary 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

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 to top of the 2.5m 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.

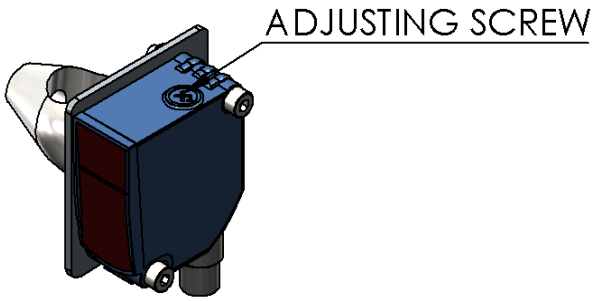


Figure 14

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 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.

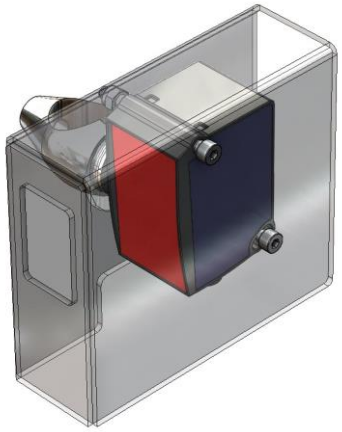


Figure 15

Cluster/Cup Sensor.

- The purpose of this sensor is to detect if the cluster is attached to the cow. In some cases, there will be cows doing a second lap on the rotary in which case this sensor will detect the status of the cluster and deter a spray sequence if they are still attached. Many will have Position Take Off of the cluster and cows never do a second lap in these cases this sensor should be bypassed in the Manual Controls page on the touchscreen.

The LED screen on the side of the sensor indicates distance from the sensor to the object being detected. Adjust sensor to be 250mm from the target.

To reset this sensor to the factory settings, remove the plug from the sensor, hold down 'T1' button, refit plug, continue holding 'T1' for about 15s until "rESEt'' has passed through the screen.

This set up is used when detecting ACR stall gates

Figure 16

This set up is used when detecting the cluster hanging up.

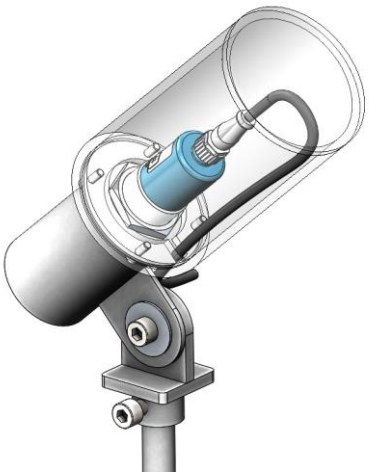


Figure 17

Locating the Cow and Cow Position Sensors

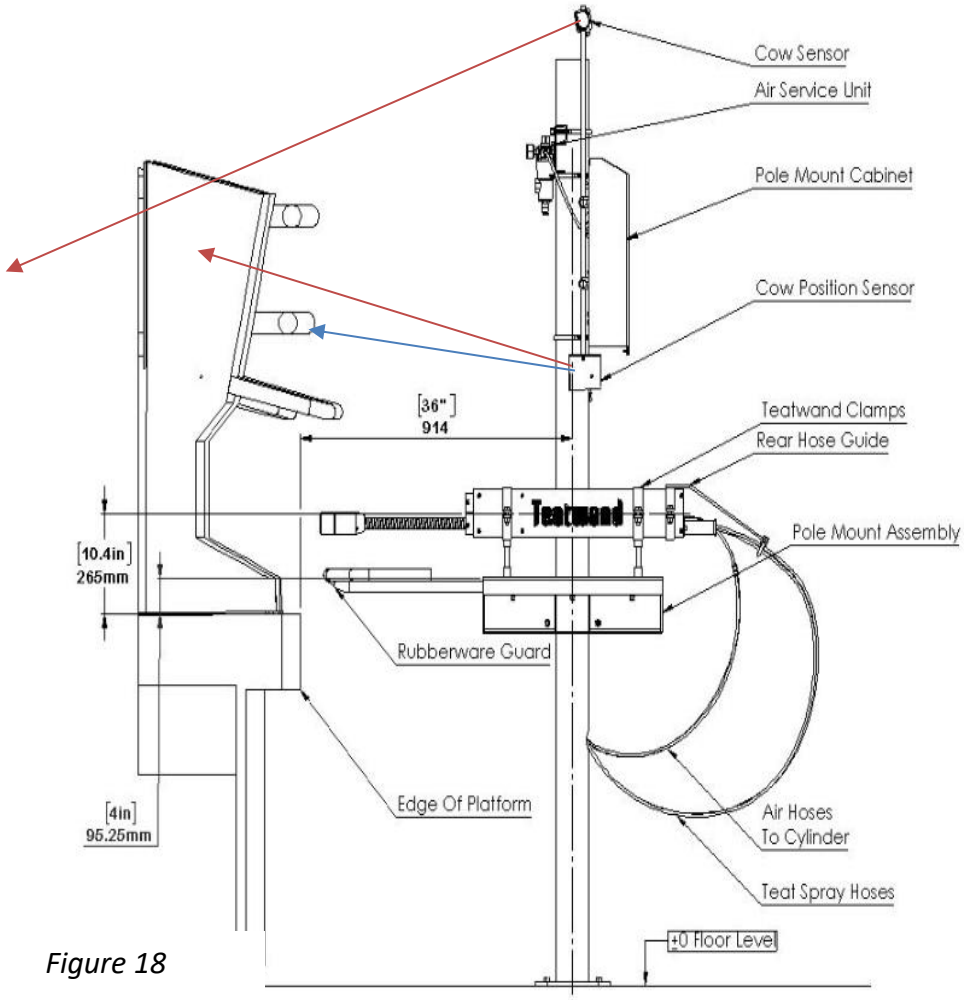


Figure 18

Cow Sensor.

- Set the distance the Cow Sensor will detect to be 1 metre into the stall using the adjusting screw. Two orange LED's on the sensor will be lit when the sensor is detecting an object. Direct the laser dot at the hips of the cow, the widest point.

Cow Position Sensor.

- 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.

Navigating the touchscreen.

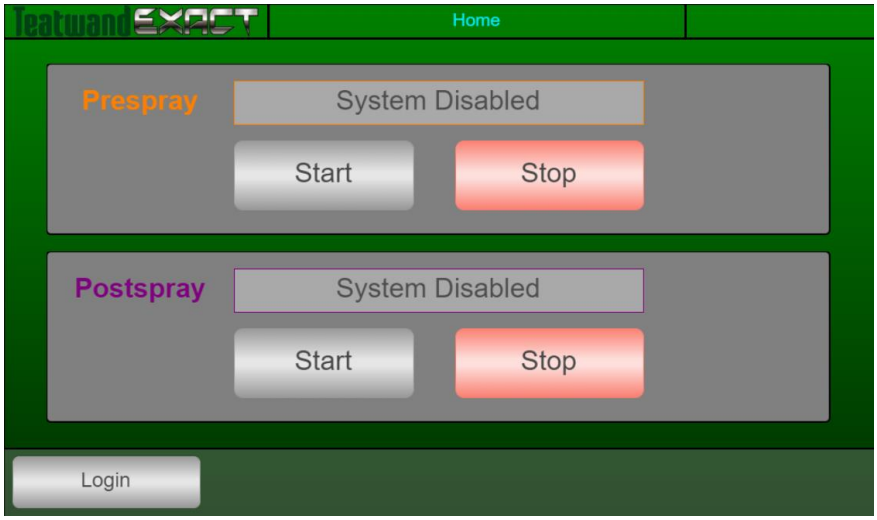
On most pages there will be blue question mark icons **?** next to the various buttons. These provide the user with explanations about the various functions.

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 – **2002**

In operator mode you can:

- Manually trigger the Teatwand
- bypass sensors
- toggle/bypass backoff
- view all system settings (but not edit)

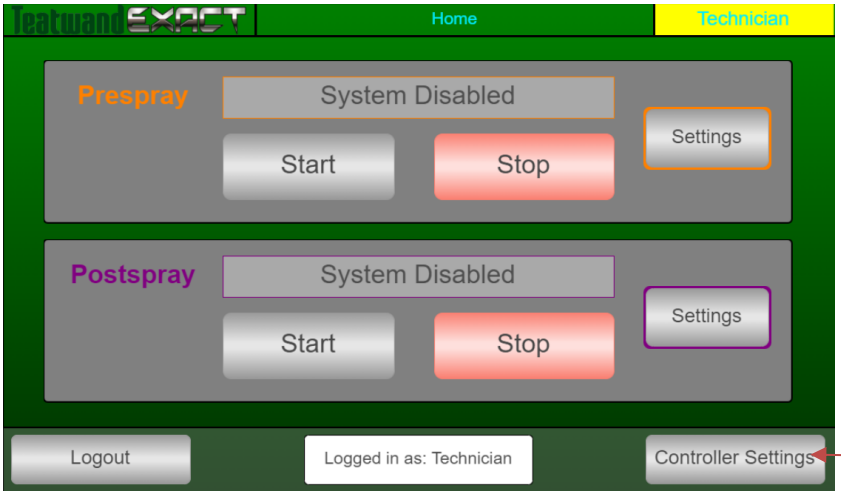
Technician – **5927**

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.

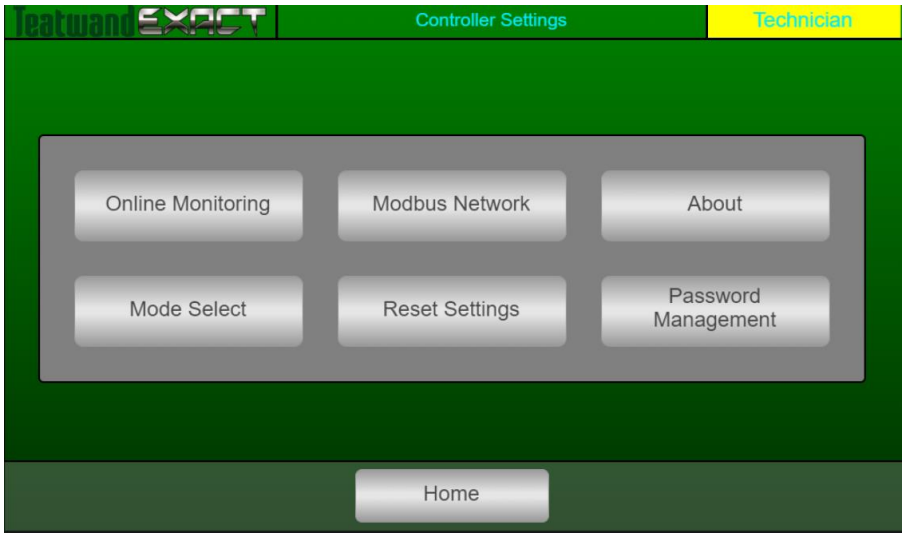
Once logged in as a Technician this page will appear.



Controller Settings

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.



Online Monitoring.
If Online Monitoring has been optioned use this page to Enable or Disable Online Monitoring, information regarding the connection status and Device ID is also displayed.

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.

About Page.
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 Settings.
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.

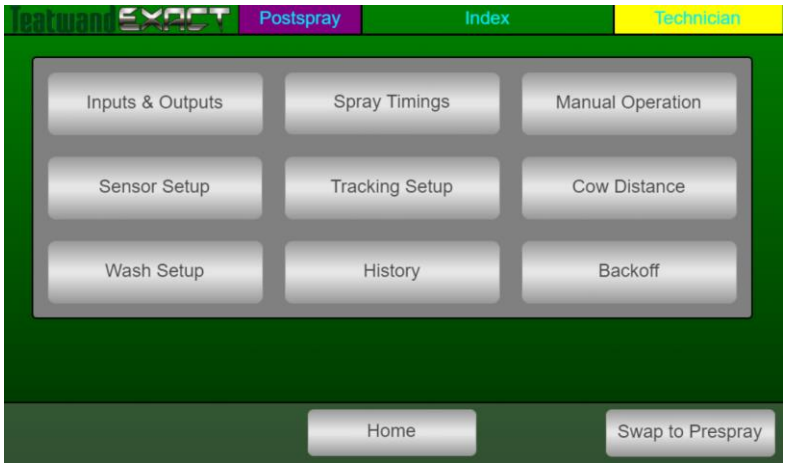
Mode Select page.

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.

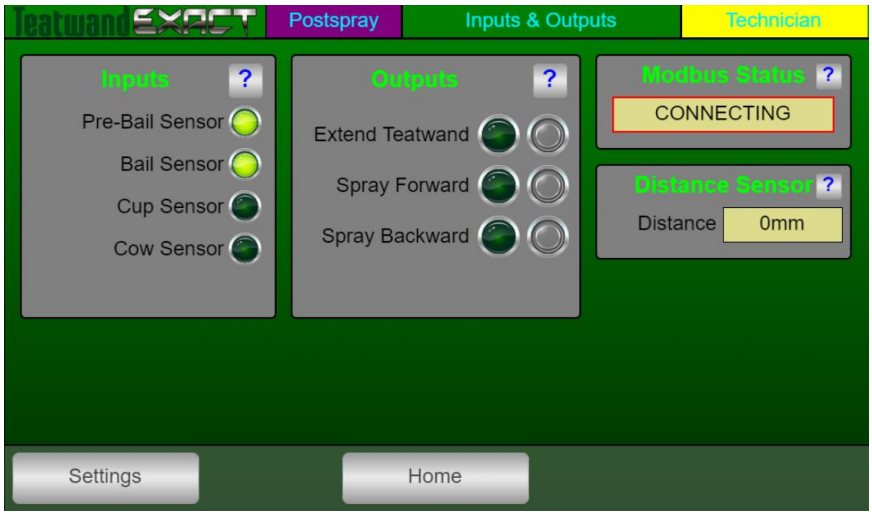
Settings Index page.



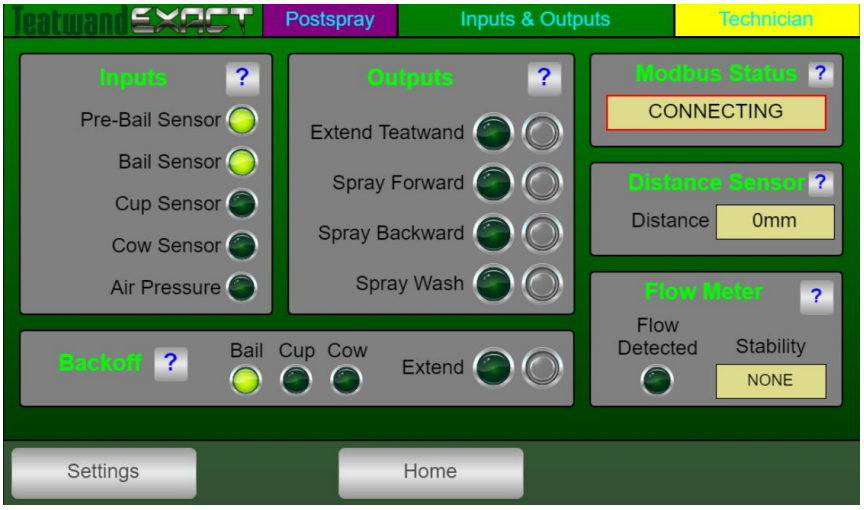
This page provides access to all settings sub-menus.

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

Inputs & Outputs page.

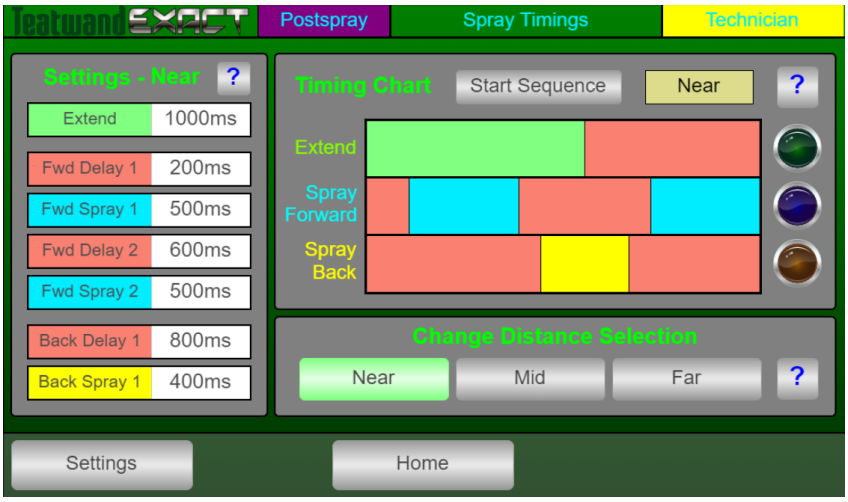


This page is used to check on the status of the inputs and outputs. Press the buttons to trigger an output.
Modbus Status monitors communications with the I/O block and reports errors. It should display 'CONNECTED'.
Distance Sensor box displays the raw value from the Cow Position Sensor.
The above image is how this page will appear when none of the options have been activated.



If the Teatwand™ System is fully optioned this page will include an Air Pressure input a Wash output a Flow Meter indicator and Backoff input indicators and a manual Extend output button.

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.

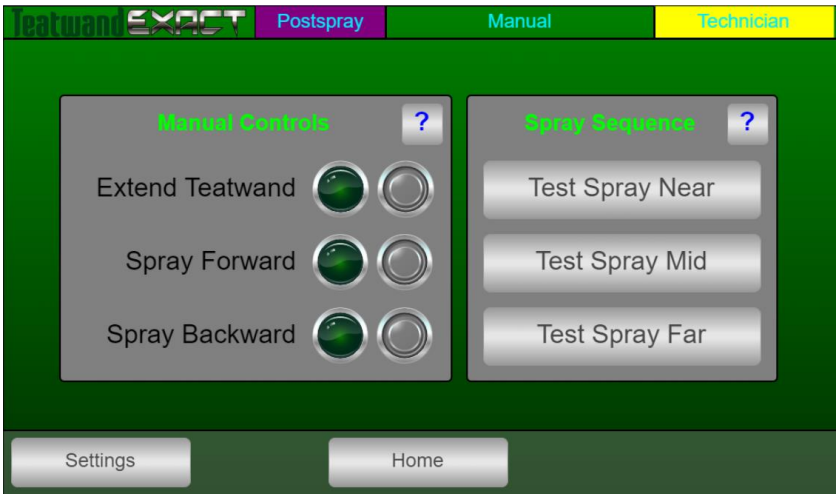
Delay and Spray time settings. The Teatwand™ selects from 3 different spray profiles for each cycle based on the cows position in the stall, Cow Near, Cow Mid and Cow Far.
With each cycle of the Teatwand™ there are 3 bursts of Teat Spray from 2 nozzles.

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 C 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.

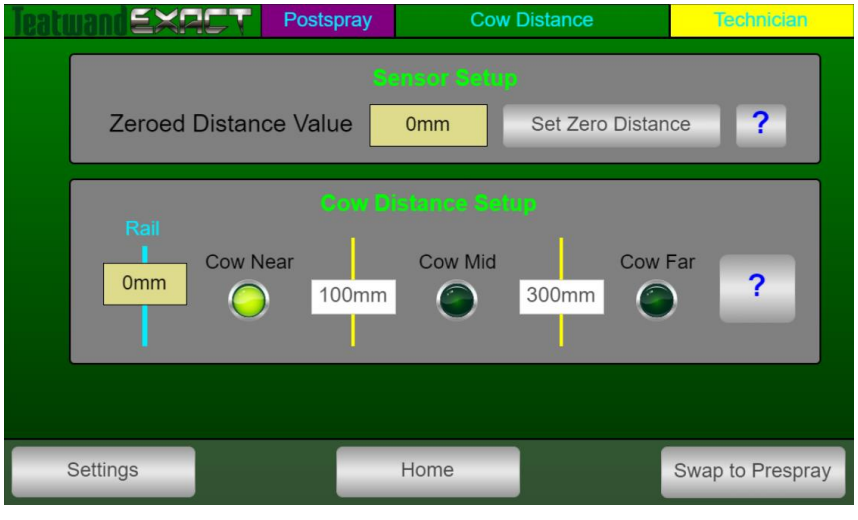
The Cup and Cow sensors can be bypassed. This feature is useful during commissioning and when operating the Teatwand™ with no cows on the rotary. If the Cow or Cup sensors fail, they may be bypassed temporarily. When the Cow sensor is bypassed the Teatwand™ will spray empty stalls and if the Cup sensor 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.
Latching. The Cup Sensor can be latched on for a set period.
Cow Sensors Final. Indicates the status of the Cup and Cow sensors during operation.
Bail Sensors. Indicator lights illuminate when the sensors are triggered. Both are illuminated by default if the sensors are not plugged in.

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.

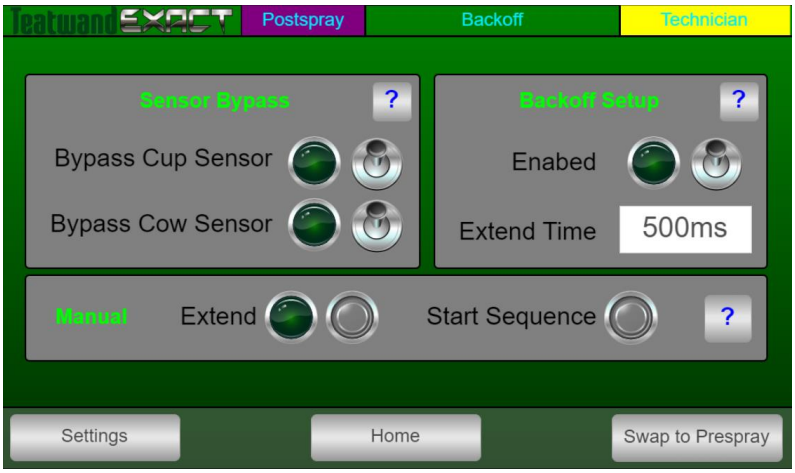
Bail trigger history shows when the bail sensors detect something:
FORWARD – Standard bail trigger. This is what we want to occur
REVERSE – Platform is detected to be moving backwards
BAIL – Bail sensor triggered but no prebail sensor detected
PREBAIL – Prebail sensor triggered but no bail sensor detected

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.

This page will only be available if the system is configured with the wash option. Use Spray Time to set the duration of the wash. Enter the number of cycles in the Frequency box to trigger how often the wash will activate. Use the 'Test +1' button to manually increment the cycle counts. If the Frequency is set at 5 press the Test +1 button 5 times to manually check the wash function. Wash Output light is on when a wash cycle is active, the adjacent button will manually activate the wash for as long as the button is held on.

Backoff Page.



The Backoff is a device used in conjunction with the Teatwand™ Exact to encourage cows to exit their stall as the rotary passes the bridge.

Commissioning Procedure.

Set 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.

Set the Extend Time on the Spray Settings page.

- The Teatwand™ 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™ 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™ will Extend and Retract at the fastest speed.
- On the Settings page select Far Cow Timing, with this page open the Teatwand™ 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™ 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™ is not fully extending. For the Far Cow setting the Teatwand™ 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™ 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.

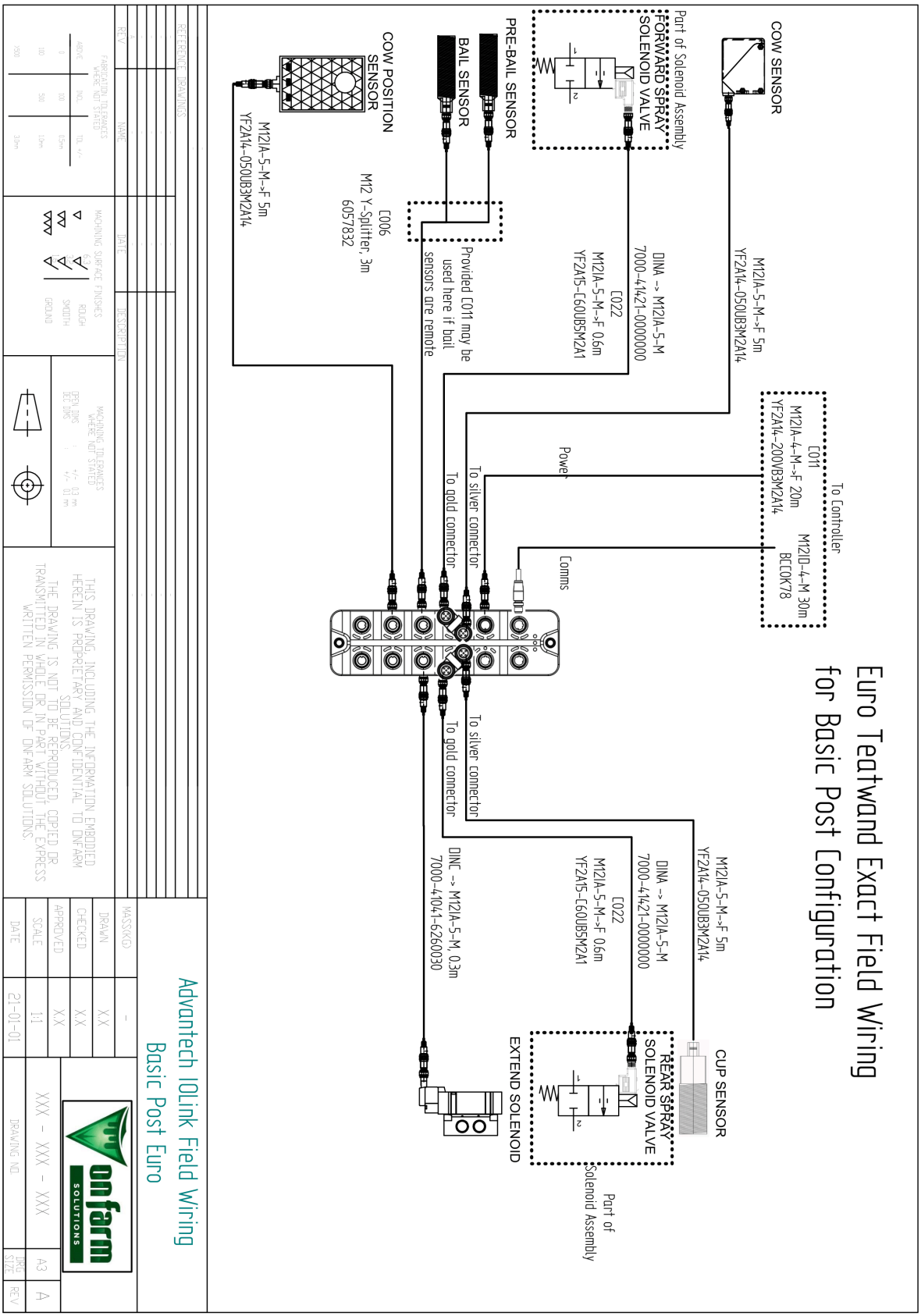
Tracking Setup. Go to the Tracking Setup page.

- 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™ 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™ is firing centrally over the leg spreader.

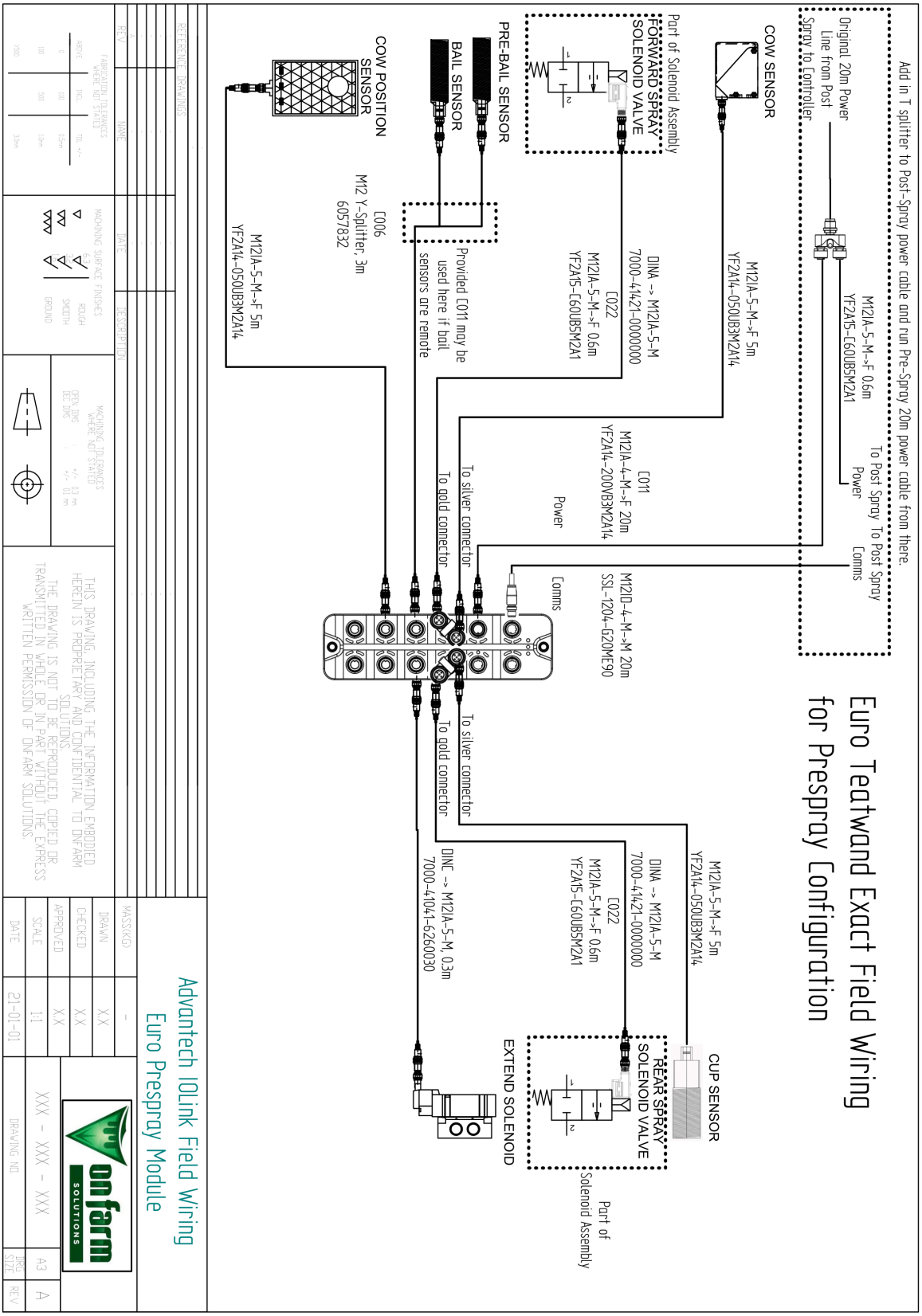
Setting the Spray Timings. Go to the Spray Timings page.

- In the Spray Settings Selection box choose the cow position, Near, Mid or Far. The Teatwand™ 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.

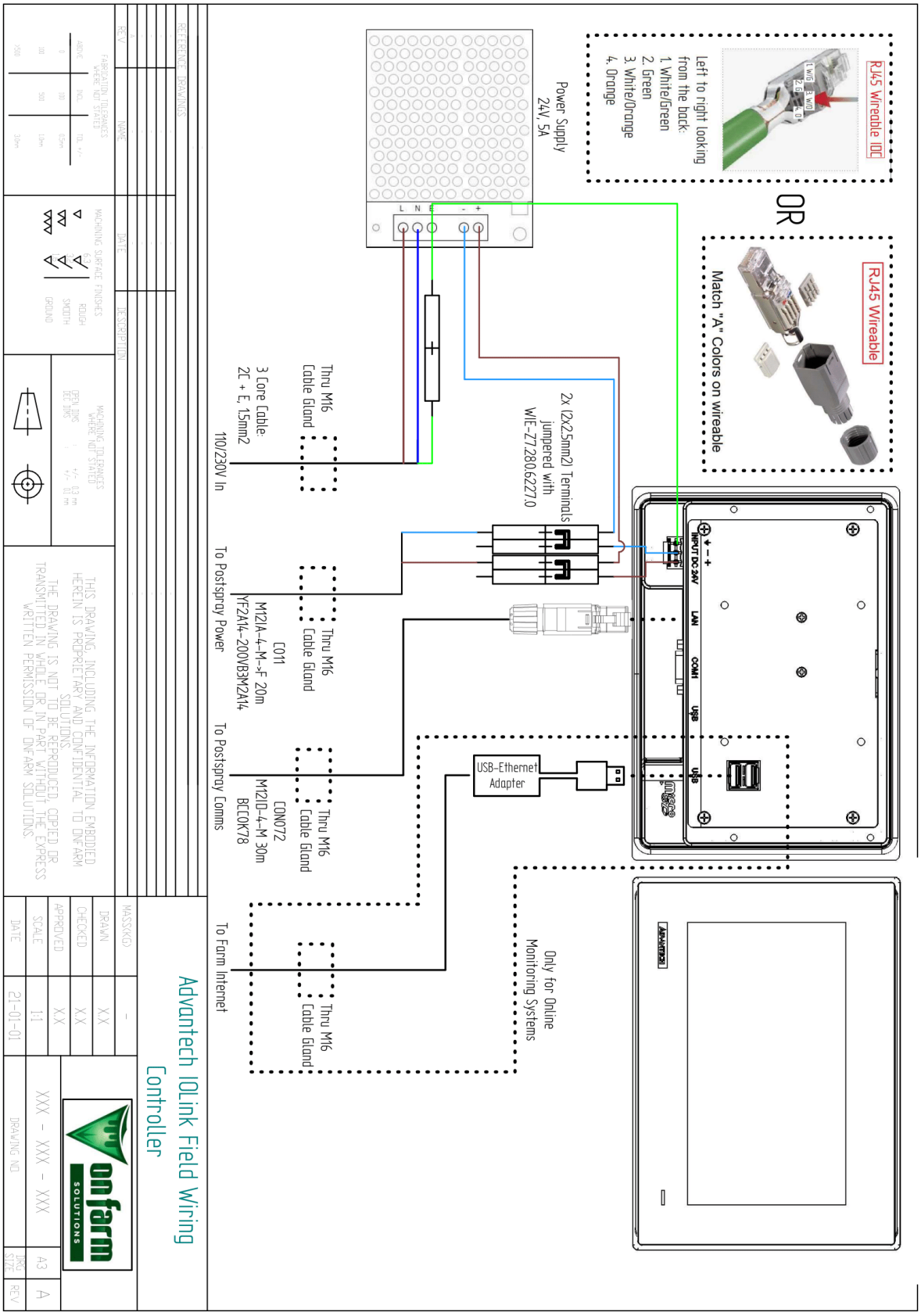
Appendix A - Electrical Layout - Exact Post Spray



Appendix B – Electrical Layout - Exact Pre Spray.



Appendix C – I/O Link Field Wiring Controller.



Appendix D – 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

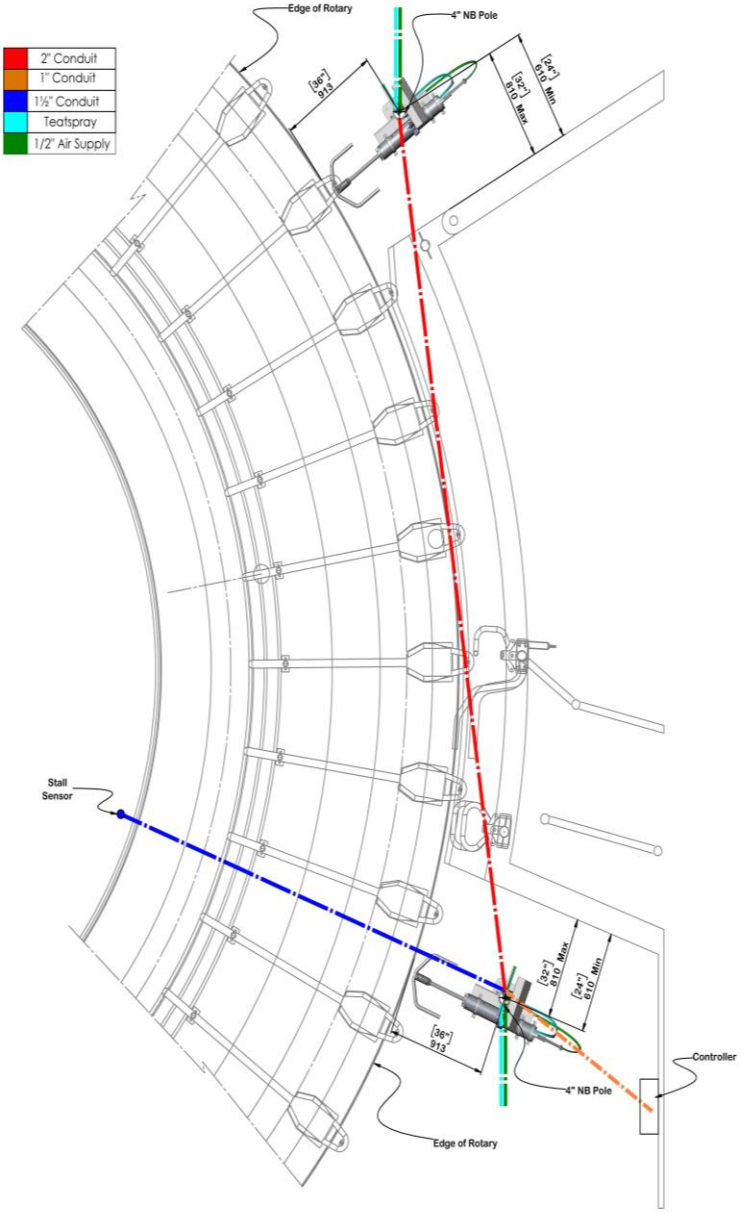
Mid Spray Timing		
Extend Time: 1100 ms		
Fwd Delay 1: 300 ms	Back Delay 1: 880 ms	Fwd Delay 2: 560 ms
Fwd Time 1: 500 ms	Back Time 1: 400 ms	Fwd Time 2: 500 ms

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

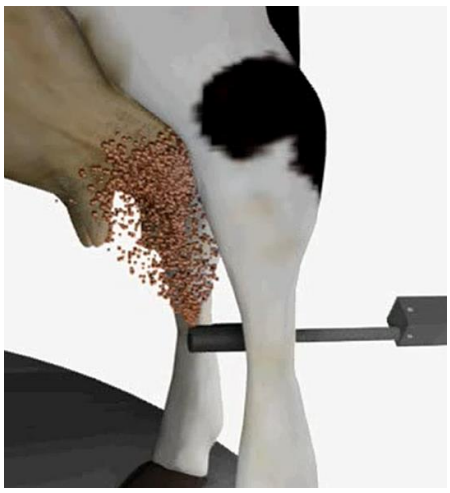
Speed Limits
Fast Speed: 4000 ms
Slow Speed: 15000 ms

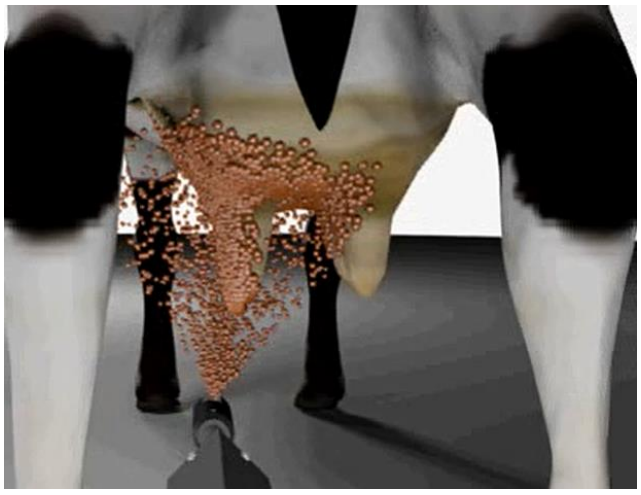
Cow Distance Settings	
Near Distance: 100 mm	Mid Distance: 300 mm

Appendix E - Teatwand Exact Pre/Post System Layout.

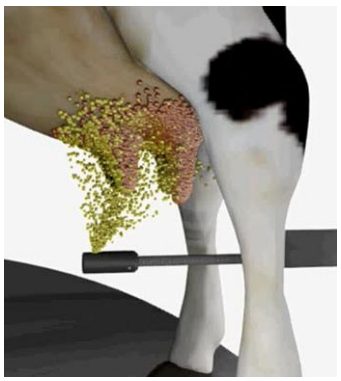


Appendix F - Spray sequence teat coverage

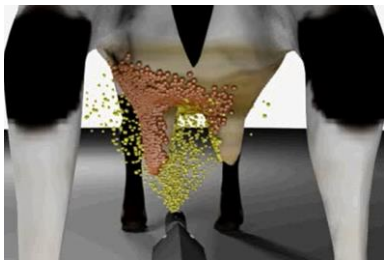




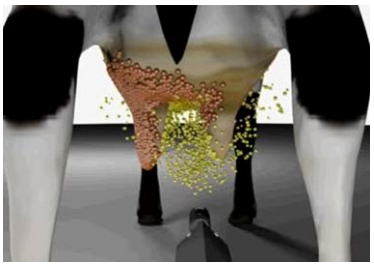
First Forward Spray



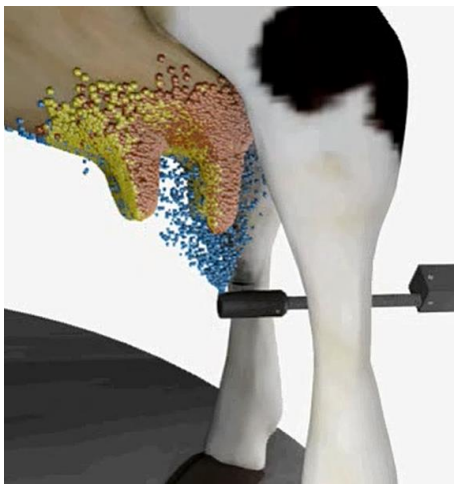
Reverse Spray

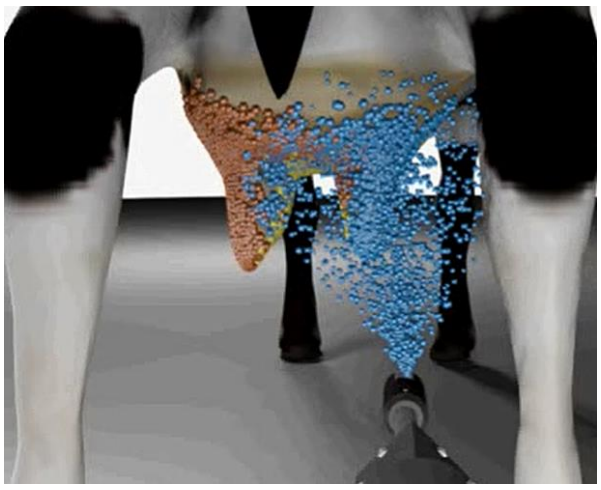


Reverse Spray Starting



Reverse Spray Stopping





Second Forward Spray