TEATWAND EXACT SERVICE MANUAL

VERSION 4.0

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Tips on how to use this Manual.

- Service Technicians - follow the Teatwand Exact Predictive Maintenance Schedule.
- Selecting a Maintenance Schedule - Identify the correct schedule to use for the dairy.
- The replacement of components is covered in the relevant sections of this manual.
- Sensors – this section will give you an understanding of what each sensor does and how to set them up correctly.
- Navigating the Touchscreen – get to know the touchscreen pages.
- Troubleshooting section will help with diagnosing problems.
- Appendix – A3 size drawings are at the back of this manual

Teatwand™ Exact Servicing and Maintenance.

Regular servicing and maintenance are essential for the reliability and correct operation of the system. Daily and weekly checklists are provided. These checks are to be done by the dairy staff. More in-depth servicing and maintenance tasks will be carried out by service technicians. The frequency of servicing and maintenance will relate to the size of the dairy operation. Refer to the Predictive Maintenance Schedule that relates to the dairy.

Teatwand Exact Predictive Maintenance Schedules.

The aim of these predictive maintenance schedules is to keep your Teatwand System operating without unexpected component failures by replacing components before their predicted end of life. This is based on the number of daily operations, recommendations from our component suppliers and Onfarm Solutions experience with over 150 systems installed in the USA and Canada.

These predictions rely on certain criteria being met such as compressed air quality and following Onfarm Solutions installation recommendations. There are also local environmental situations that can affect the life of certain components, e.g. where sand is used as a bedding medium the Square Bearings and Inner Tube will wear more quickly.

Unexpected events can happen in busy dairies resulting in damage to equipment. The recommended spare parts list reflects this with components like Springs and Nozzle head parts included along with consumables and predictive maintenance requirements.

Warning – ensure Power and Air to the system is turned off before carrying out certain maintenance checks.

Note: Predictive maintenance must be completed to ensure warranty is up held.

Daily Checklist for Teatwand Exact System.

To be carried out by dairy staff.

- Visually check system operation. Watch a minimum of 10 stalls.
- Check nozzles are vertical – loosen 3 grub screws in black nozzle housing, realign, tighten grub screws. See Page 15.
- Ensure spray pattern is reaching teats – adjust spray settings if necessary. See Page 29.
- Check the air pressure on the Air Service Unit is set at 90psi.
- Check the Teatwand is not hitting cows legs.

Weekly Checklist for Teatwand Exact System.

To be carried out by dairy staff.

- Check all cap screws on Teatwands are tight. 4 on the square box section at the front, 4 around the diameter of the Teatwand body at the back and 4 in the backplate.
- Check all bolts and clamps are tight.
- Check sensor clamps are tight.
- Check filter located at teat spray pump is clean.
- Check air pressure to teat spray pump is at correct level (35psi to 60psi)
- Check moving spray lines – if any wear is obvious replace ASAP.
- Clean the faces of all sensors – Stall sensors, cow sensors and cow position sensors.

Report any problems to the local service agent immediately.

Selecting a Maintenance Schedule.

To be carried out by a Service Technician.
To select the correct Maintenance Schedule for the dairy, calculate the number of daily milkings at the dairy. For example, a dairy milking 800 cows 3 times a day will be 2400 milkings a day. Select Schedule 3 – 2000 to 3000 milkings per day. A dairy milking 4800 cows 3 times a day will be 14400 milkings per day. Select Schedule 7 – 10000 to 15000 milkings per day.
Refer to instructions later in this manual for details of how to correctly undertake the Maintenance Schedule recommendations.

Schedule 1. For Dairies with up to 1000 milkings per day.

Three Monthly Maintenance.

- Include Daily and Weekly checks
- Replace Spray lines. *TU001*
- Replace 8mm Unions. *PN024*
- Check and clean teat spray nozzles. Replace if spray pattern is irregular. *FF003*

Annual Maintenance.

- Include Three Monthly Maintenance.
- Replace Spring. *SP004EX*
- Replace spray nozzles. *FF003*
- Replace Air Service Unit filter element.

Two Yearly Maintenance.

- Include Annual Maintenance.
- Reseal Teatwand pneumatic cylinder. *SK003EX.*
  If cylinder is worn or corroded, replace it. *CY500EX*
- Replace 8mm elbows on pneumatic cylinder. *PN033*
- Replace Pneumatic Cylinder Bush. *TWEX5009*

Five Yearly Maintenance.

- Include Two Yearly Maintenance.
- Replace Extend Solenoid. *PN035*
- Replace Spray Pilot Solenoids. *PN045*.
- Replace Chlorine valves. *FF037*
- Replace Square Bearings x 2 *TWEX5003*
- Replace Inner Tube. *TWEX5002*
- Replace Aluminium Spring Block. *TWEX5005*
- Replace Speed Controllers. *PN003*
- Replace Nozzle Holder. *TWEX5007*
- Replace Nozzle End Spring Mount. *TWEX5006*
- Replace Stall Sensors. *S002*
- Replace Floating Joint. *TWEX5010*
- Replace Teat Spray Pump. *PUMP001*

Schedule 2. For Dairies with 1000 to 2000 milkings per day.

Monthly Maintenance.

- Include Daily and Weekly Checks.
- Replace Spray lines. *TU001*
- Replace 8mm Unions. *PN024*
- Check and clean teat spray nozzles. Replace if spray pattern is irregular. *FF003*

Six Monthly Maintenance.

- Include Monthly Maintenance.
- Replace Spring. *SP004EX*
- Replace spray nozzles. *FF003*

Annual Maintenance.

- Include Six Monthly Maintenance.
- Reseal Teatwand pneumatic cylinder. *SK003EX.*
  If cylinder is worn or corroded, replace it. *CY500EX*
- Replace 8mm elbows on pneumatic cylinder. *PN033*
- Replace Pneumatic Cylinder Bush. *TWEX5009*
- Replace Air Service Unit filter element.

Three Yearly Maintenance.

- Include Annual Maintenance.
- Replace Extend Solenoid. *PN035*
- Replace Spray Pilot Solenoids. *PN045*.
- Replace Chlorine valves. *FF037*
- Replace Square Bearings x 2 *TWEX5003*
- Replace Inner Tube. *TWEX5002*
- Replace Aluminium Spring Block. *TWEX5005*
- Replace Speed Controllers. *PN003*
- Replace Nozzle Holder. *TWEX5007*
- Replace Nozzle End Spring Mount. *TWEX5006*
- Replace Stall Sensors. *S002*
- Replace Floating Joint. *TWEX501*
- Replace Teat Spray Pump. *Pump001*

Schedule 3. For Dairies with 2000 to 3000 milkings per day.

Monthly Maintenance.

- Include Daily and Weekly Checks.
- Replace Spray lines. *TU001*
- Replace 8mm Unions. *PN024*
- Check and clean teat spray nozzles. Replace if spray pattern is irregular. *FF003*

Six Monthly Maintenance.

- Include Monthly Maintenance.
- Replace Spring. *SP004EX*
- Replace spray nozzles. *FF003*

Annual Maintenance.

- Include Six Monthly Maintenance.
- Reseal Teatwand pneumatic cylinder. *SK003EX.*
  If cylinder is worn or corroded, replace it. *CY500EX*
- Replace 8mm elbows on pneumatic cylinder. *PN033*
- Replace Pneumatic Cylinder Bush. *TWEX5009*
- Replace Air Service Unit filter element.

Two Yearly Maintenance.

- Include Annual Maintenance.
- Replace Extend Solenoid. *PN035*
- Replace Spray Pilot Solenoids. *PN045*.
- Replace Chlorine valves. *FF037*
- Replace Square Bearings x 2 *TWEX5003*
- Replace Inner Tube. *TWEX5002*
- Replace Aluminium Spring Block. *TWEX5005*
- Replace Speed Controllers. *PN003*
- Replace Nozzle Holder. *TWEX5007*
- Replace Nozzle End Spring Mount. *TWEX5006*
- Replace Stall Sensors. *S002*
- Replace Floating Joint. *TWEX5010*

Three Yearly Maintenance.

- Include Two Yearly Maintenance.
- Replace Teat Spray Pump. *Pump001*

Schedule 4. For Dairies with 3000 to 5000 milkings per day.

Monthly Maintenance.

- Include Daily and Weekly Checks.
- Replace Spray lines. *TU001*
- Replace 8mm Unions. *PN024*
- Check and clean teat spray nozzles. Replace if spray pattern is irregular. *FF003*

Six Monthly Maintenance.

- Include Monthly Maintenance.
- Replace Spring. *SP004EX*
- Replace spray nozzles. *FF003*

Annual Maintenance.

- Include Six Monthly Maintenance.
- Reseal Teatwand pneumatic cylinder. *SK003EX.*
  If cylinder is worn or corroded, replace it. *CY500EX*
- Replace 8mm elbows on pneumatic cylinder. *PN033*
- Replace Pneumatic Cylinder Bush. *TWEX5009*
- Replace Air Service Unit filter element.

Two Yearly Maintenance.

- Include Annual Maintenance.
- Replace Extend Solenoid. *PN035*
- Replace Spray Pilot Solenoids. *PN045*.
- Replace Chlorine valves. *FF037*
- Replace Square Bearings x 2 *TWEX5003*
- Replace Inner Tube. *TWEX5002*
- Replace Aluminium Spring Block. *TWEX5005*
- Replace Speed Controllers. *PN003*
- Replace Nozzle Holder. *TWEX5007*
- Replace Nozzle End Spring Mount. *TWEX5006*
- Replace Stall Sensors. *S002*
- Replace Floating Joint. *TWEX5010*

Three Yearly Maintenance.

- Include Two Yearly Maintenance**.**
- Replace Teat Spray Pump. *Pump001*

Schedule 5. For Dairies with 5000 to 7500 milkings per day.

Monthly Maintenance.

- Include Daily and Weekly Checks.
- Replace Spray lines. *TU001*
- Replace 8mm Unions. *PN024*
- Check and clean teat spray nozzles. Replace if spray pattern is irregular. *FF003*

Six Monthly Maintenance.

- Include Monthly Maintenance.
- Replace Spring. *SP004EX*
- Replace spray nozzles. *FF003*

Annual Maintenance.

- Include Six Monthly Maintenance.
- Reseal Teatwand pneumatic cylinder. *SK003EX.*
  If cylinder is worn or corroded, replace it. *CY500EX*
- Replace 8mm elbows on pneumatic cylinder. *PN033*
- Replace Pneumatic Cylinder Bush. *TWEX5009*
- Replace Air Service Unit filter element.

Two Yearly Maintenance.

- Include Annual Maintenance.
- Replace Extend Solenoid. *PN035*
- Replace Spray Pilot Solenoids. *PN045*.
- Replace Chlorine valves. *FF037*
- Replace Square Bearings x 2 *TWEX5003*
- Replace Inner Tube. *TWEX5002*
- Replace Aluminium Spring Block. *TWEX5005*
- Replace Speed Controllers. *PN003*
- Replace Nozzle Holder. *TWEX5007*
- Replace Nozzle End Spring Mount. *TWEX5006*
- Replace Stall Sensors. *S002*
- Replace Floating Joint. *TWEX5010*

Three Yearly Maintenance.

- Include Two Yearly Maintenance.
- Replace Teat Spray Pump. *Pump001*

Schedule 6. For Dairies with 7500 to 10000 milkings per day.

Monthly Maintenance.

- Include Daily and Weekly Checks.
- Replace Spray lines. *TU001*
- Replace 8mm Unions. *PN024*
- Check and clean teat spray nozzles. Replace if spray pattern is irregular. *FF003*

Six Monthly Maintenance.

- Include Monthly Maintenance.
- Replace Spring. *SP004EX*
- Replace spray nozzles. *FF003*

Annual Maintenance.

- Include Six Monthly Maintenance.
- Reseal Teatwand pneumatic cylinder. *SK003EX.*
  If cylinder is worn or corroded, replace it. *CY500EX*
- Replace 8mm elbows on pneumatic cylinder. *PN033*
- Replace Pneumatic Cylinder Bush. *TWEX5009*
- Replace Air Service Unit filter element.
- Replace Square Bearings x 2 *TWEX5003*
- Replace Floating Joint. *TWEX5010*

Two Yearly Maintenance.

- Include Annual Maintenance.
- Replace Extend Solenoid. *PN035*
- Replace Spray Pilot Solenoids. *PN045*.
- Replace Chlorine valves. *FF037*
- Replace Aluminium Spring Block. *TWEX5005*
- Replace Speed Controllers. *PN003*
- Replace Nozzle Holder. *TWEX5007*
- Replace Nozzle End Spring Mount. *TWEX5006*
- Replace Stall Sensors. *S002*

Three Yearly Maintenance.

- Include Two Yearly Maintenance.
- Replace Inner Tube. *TWEX5002*
- Replace Teat Spray Pump. *Pump001*

Schedule 7. For Dairies with 10000 to 15000 milkings per day.

Monthly Maintenance.

- Include Daily and Weekly Checks.
- Replace Spray lines. *TU001*
- Replace 8mm Unions. *PN024*
- Check and clean teat spray nozzles. Replace if spray pattern is irregular. *FF003*

Six Monthly Maintenance.

- Include Monthly Maintenance.
- Replace Spring. *SP004EX*
- Replace spray nozzles. *FF003*
- Reseal Teatwand pneumatic cylinder. *SK003EX.*
  If cylinder is worn or corroded, replace it. *CY500EX*
- Replace 8mm elbows on pneumatic cylinder. *PN033*
- Replace Pneumatic Cylinder Bush. *TWEX5009*
- Replace Air Service Unit filter element.
- Replace Square Bearings x 2 *TWEX5003*
- Replace Floating Joint. *TWEX5010*

Annual Maintenance.

- Include Six Monthly Maintenance.
- Replace Extend Solenoid. *PN035*
- Replace Spray Pilot Solenoids. *PN045*.
- Replace Chlorine valves. *FF037*

Two Yearly Maintenance.

- Include Annual Maintenance.
- Replace Inner Tube. *TWEX5002*
- Replace Aluminium Spring Block. *TWEX5005*
- Replace Speed Controllers. *PN003*
- Replace Nozzle Holder. *TWEX5007*
- Replace Nozzle End Spring Mount. *TWEX5006*
- Replace Stall Sensors. *S002*
- Replace Teat Spray Pump. *Pump001*

Servicing The Teatwand

Important:

Before undertaking any Service work or Maintenance disable the system by pressing the Stop button on the Home Screen at the Controller and turn the compressed air off at the Air Service Unit. This will exhaust residual air pressure from the system.

Fitting the Teatwand™ Spray Hoses.

- Turn off compressed air supply at the Air Service Unit.
- Remove 3 cap screws from Nozzle Holder using a 5mm Allen key.

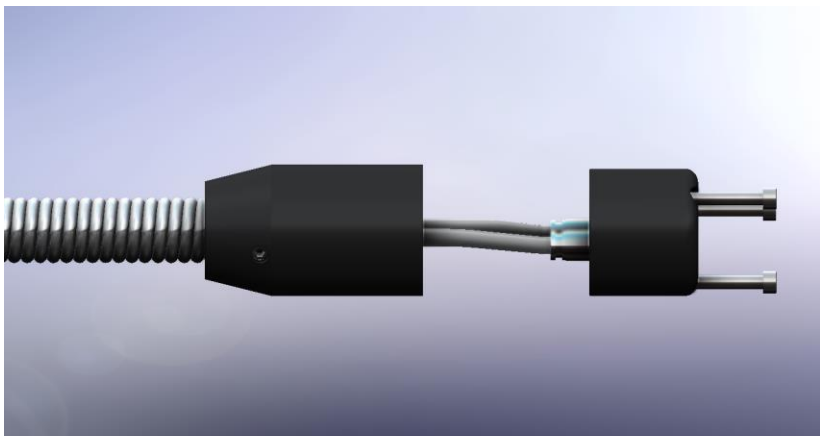


Figure 1

- 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.

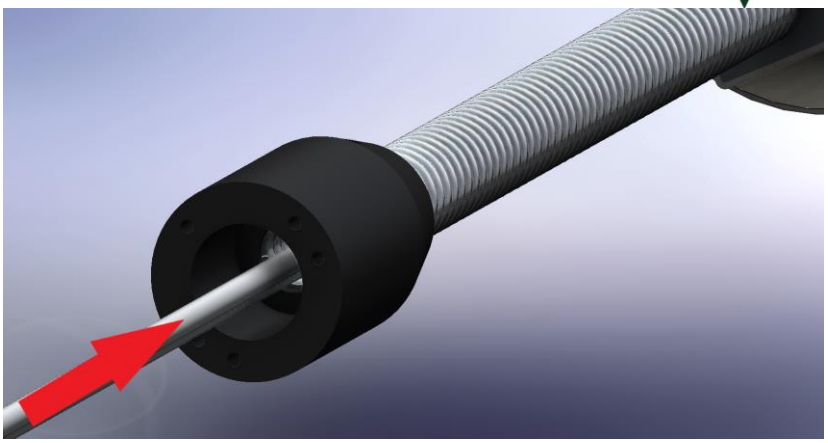


Figure 2

- 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.

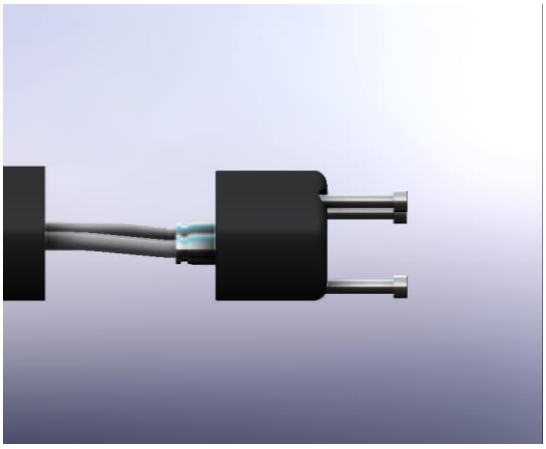


Figure 3

- 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 Spray Forward and Backward Nozzle buttons to purge the air from the hoses.
- Take note that the forward nozzle sprays when the Spray Forward Nozzle button is used. Simply swap the hoses at the 8mm Unions if the wrong nozzle is spraying.

Use these buttons to purge teat spray

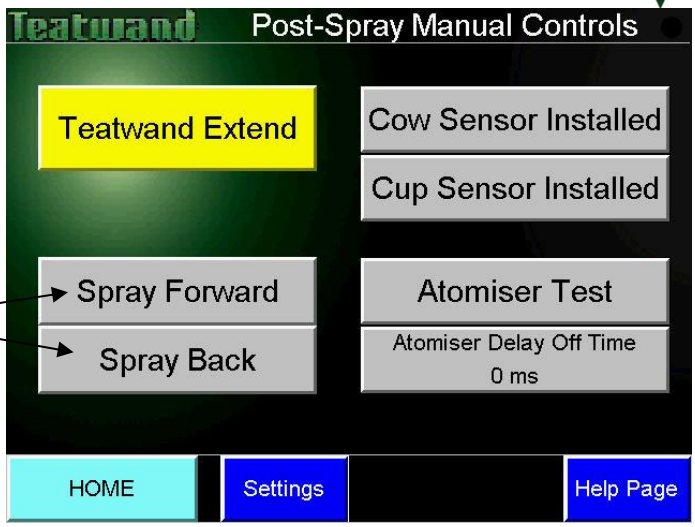


Figure 4

Check the Spray Nozzles

- Nozzles have a 60 degree full cone spray pattern. Uneven spray pattern will require the cleaning or replacement of the nozzle.
- To clean nozzle – Remove from Nozzle Head – use compressed air to blow through the nozzle from both directions, NEVER USE A SHARP OBJECT IN THE NOZZLE APERTURE. This will result in permanent damage to the nozzle.

Refit nozzle. Take care not to cross thread the nozzle in the plastic Nozzle Head.

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.

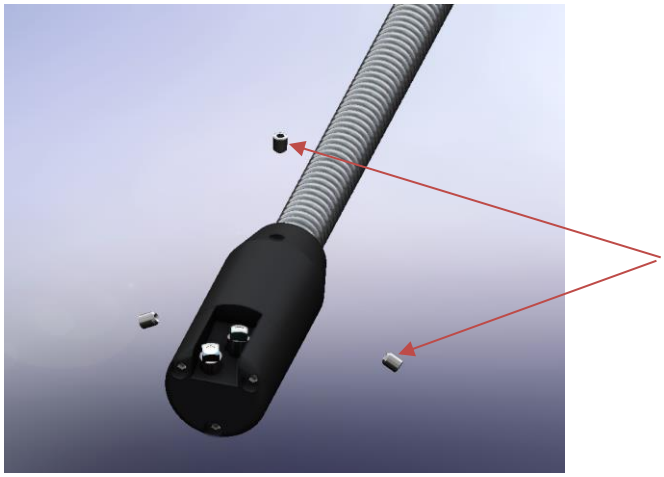


Figure 5

Replacing the spring.

The Spring will need to be replaced if it has become bent. Over time the Spring will lose it tension and require replacement.

- Turn off compressed air supply at the Air Service Unit.
- Remove the Nozzle Holder and remove the Spray Hoses. See *Figure 1.* Page 13.
- Remove the Nozzle End Spring Holder by loosening the 3 grub screws. See *Figure 5.*
- Remove the 4 cap screws that secure the Spring Block into the square Inner Tube.

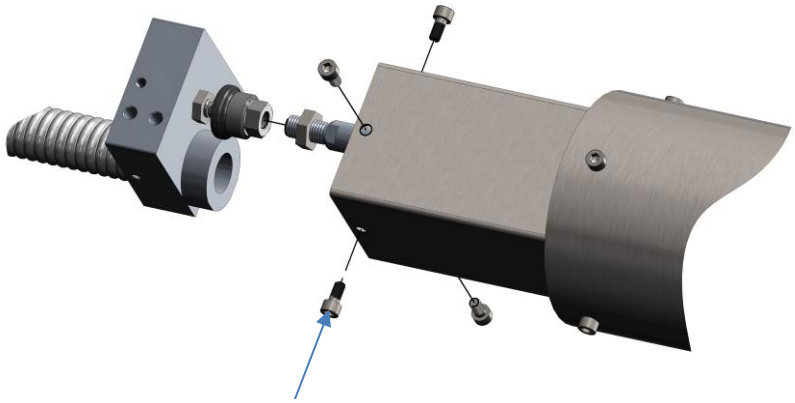


Figure 6

- Remove the Spring Block from the square Inner Tube.
- Loosen the 4 grub screws in the Spring Block. See *Figure 7*

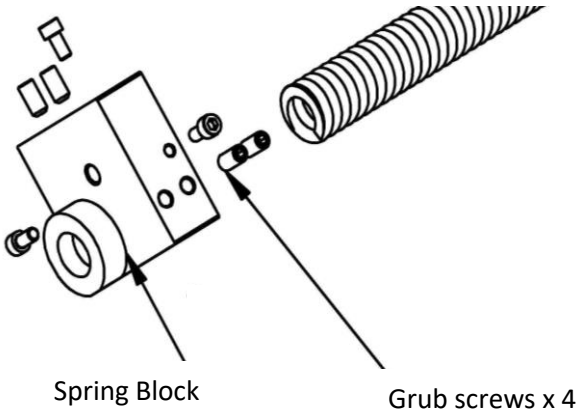


Figure 7

- Fit new Spring and reassemble.
- Use medium strength Loctite on all fasteners.
- Be sure to have the Nozzles vertical.

Replacing the Air Cylinder.

- Turn off compressed air supply at the Air Service Unit.
- Remove moving Spray Hoses from Teatwand.
- Disconnect the air supply hoses at the 8mm Unions.
- Remove the Rear Hose Guide. Appendix 1 – Item 16
- Remove the 4 cap screws that secure the Spring Block into the Inner Tube. See Figure 8.
- Unscrew the Air Cylinder shaft from the Floating Joint. See Figure 8.

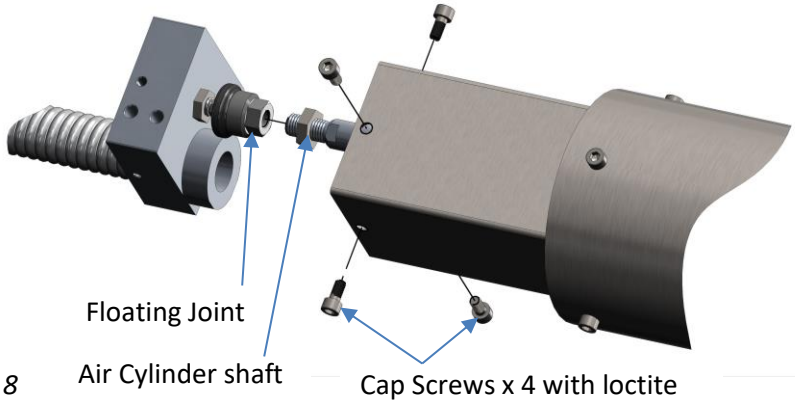


Figure 8

- At the rear of the Teatwand remove the 4 cap screws the secure the Back Mount Plate into the Outer Tube. See Figure 9
- Remove the Air Cylinder complete with Back Mount Plate from the Outer Tube. See Figure 9.

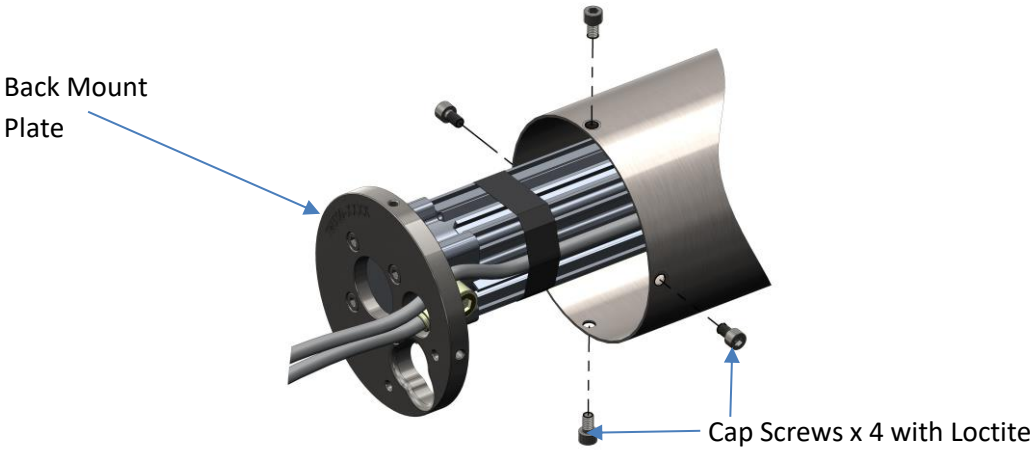


Figure 9

- Unscrew the 4 cap screws from the Backplate to remove the Air Cylinder.
  See Figure 10

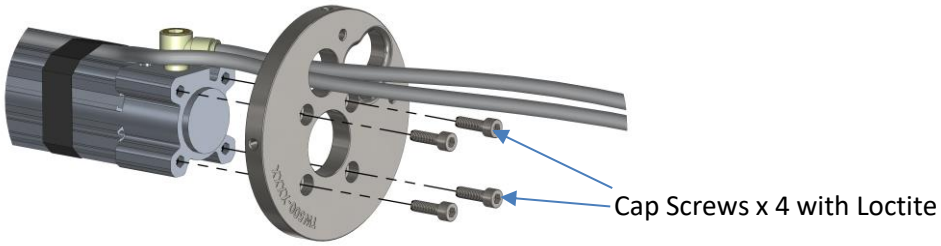


Figure 10

Fitting a new air Cylinder.

- Hold the new Air Cylinder in a vice using soft jaws.
- Set the cushions at each end of the cylinder. Take a 2mm Allen Key and screw cushion in fully, unscrew one complete turn. These provide cushioning at each end of the cylinder stroke to prevent hammering.

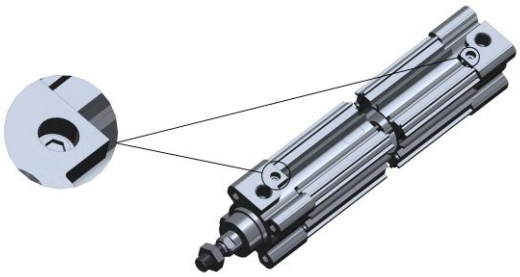


Figure11

- Fit TWEX Pneumatic Cylinder Bush to the nose end of the cylinder using medium strength Loctite. This bush must be replaced when a new Cylinder is fitted.

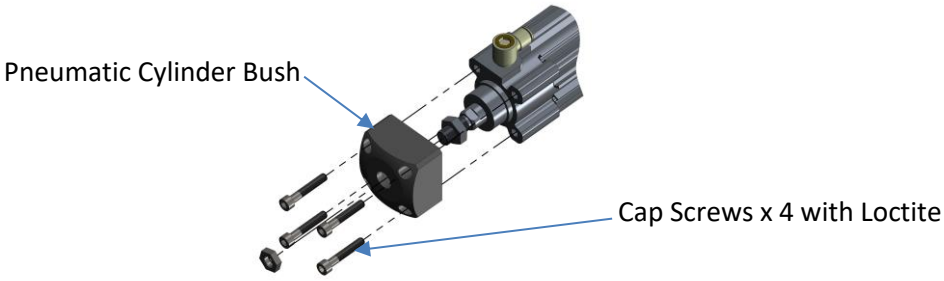


Figure 12

- Fit new Swivel Elbow Fittings. Take care to use a good quality 10mm Allen Key and screw the fittings fully into the Cylinder
- Fit new hoses to fittings allowing 1ft of hose beyond the back end of the Air Cylinder. Tape in three places.

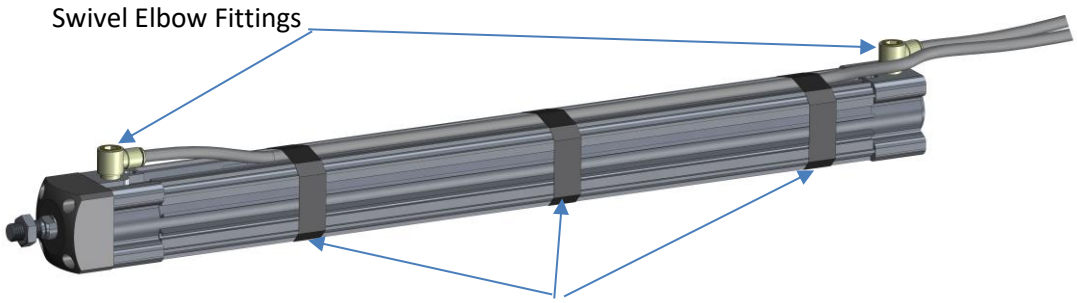


Figure 13

- Refit Back Mount Plate to Cylinder. Feed airlines through hole in Backplate as shown in Figure 14. Use medium strength Loctite.

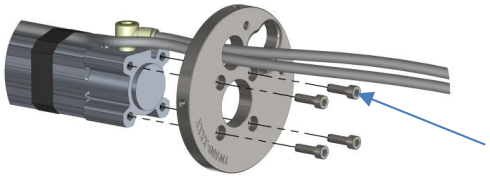


Figure 14

- Fit to Teatwand Outer Body. Insert Cylinder through inner square tube. Take note of the correct alignment. Elbow fittings align with the half circle cut out in the rear of the Inner Tube. Insert the Back Mount Plate into the Outer Tube. Fit the four cap screws through the Outer Tube and into the Back Mount Plate using Loctite.
  DO NOT TIGHTEN YET.

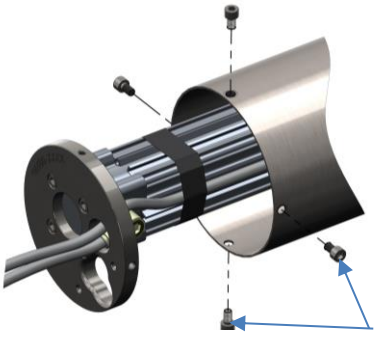


Figure 15

- Refit Cylinder shaft to Floating joint using medium strength Loctite. See Figure 8.
- Refit Spring Block into Inner Tube using medium strength Loctite. See Figure 8.
  NOW TIGHTEN THE BACK MOUNT PLATE AND THE SPRING BLOCK FASTENERS.
- Manually operate the Teatwand – pull it in and out a couple of times. It should move freely with no mechanical interference or unusual noises.

Replacing the Teatwand Square Bearings.

- There are two bearings fitted in the Outer Tube of the Teatwand to support the extending Inner Tube.
- Fit both bushes into the tube leaving the cap screws loose.
- Fit the Inner tube through the bearings, ensure it slides easily while tightening all cap screws.

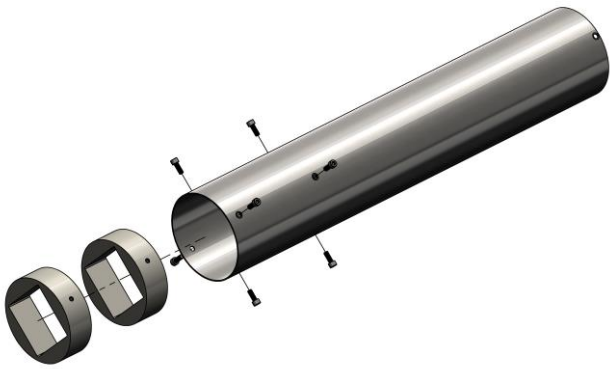


Figure 16

Figure 17

Replacing Air Cylinder Seals.

The air cylinder has replaceable seals. Before starting this operation establish a clean work space. Contaminants such as grinding dust, swarf, grit and sand will quickly destroy seals.

- To fit new seals, remove the existing air cylinder following the procedures outlined in the section – Replacing the Air Cylinder.
- Take a 5mm Allen key and remove the Pneumatic Bush at the nose end of the cylinder.
- Undo the 4 'nuts' in the nose end of the cylinder using the 5mm Allen key and gently remove the nose piece.
- Extract the cylinder shaft complete with piston. Inspect the shaft for damage, any dents or nicks will quickly damage the shaft seal. Replace the cylinder if the shaft has any damage.
- Remove the cylinder body from the tail end piece.
- Take the Seal Kit (SK003). In the Seal Kit there are 2 x cushion seals, 2 x o'rings, 1 x piston seal, 1 x wear ring, 1 x nose seal and a sachet of grease. Supplied also with the kit is a small diameter cushion seal that is not used with these cylinders.

Piston Seals.

- Use a clean rag to wipe any grease off the piston. Squeeze the piston seal between thumb and forefinger and roll it out of its' groove, the wear ring is split and easily removed. Take some grease on your finger and smear into the seal groove and the wear ring groove. Smear grease on both the seal and the wear ring, expand the wear ring and fit it into its'groove, carefully stretch the piston seal into its'groove taking care not to twist it. DO NOT USE ANY TOOL TO REMOVE THE PISTON SEAL AS THIS MAY RESULT IN DAMAGE TO THE PISTON.

Tail End Seals.

- There is a Cushion Seal and an O'ring for the cylinder body.
- Use a small screwdriver to carefully remove the Cushion Seal and remove the O'ring.
- Clean the seal groove and smear with grease.
- Smear both the Cushion Seal and O'ring with grease and refit the new O'ring.
- Note the orientation of the Cushion Seal and fit it into the groove. See Figure 18.

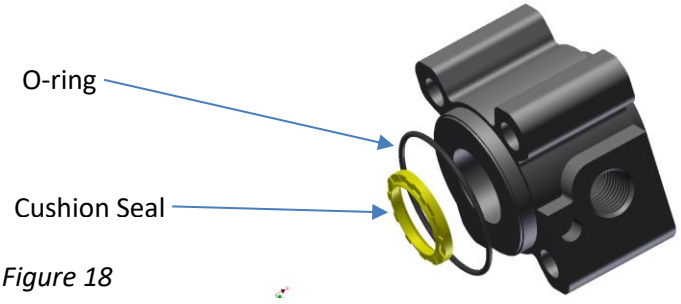


Figure 18

Nose End Seals.

- There is a Shaft Seal a Cushion Seal and an O'ring for the cylinder tube.
- Use a small screwdriver to carefully remove the Shaft Seal and the Cushion Seal and remove the O'ring
- Clean the seal grooves and smear with grease.
- Smear the Shaft Seal the Cushion Seal and the O'ring with grease.
- Fit the O'ring.
- Fit the Cushion Seal taking care to orientate correctly. See Figure 19.

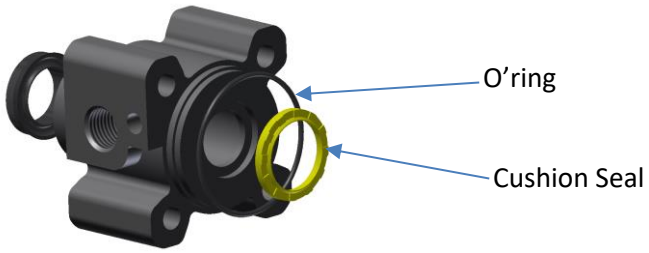


Figure 19

- Fit the Shaft Seal taking care to orientate correctly. See Figure 20.

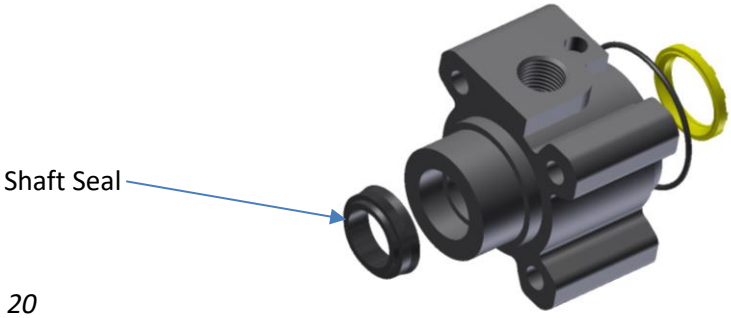


Figure 20

- Refit the cylinder tube to the Tail End piece, use grease on the O'ring.
- Smear grease on the piston and insert into the cylinder tube.
- Smear grease on the threads of the shaft before fitting the Nose End piece, this reduces the chance of damaging the nose seal as it is fitted over the threads.
- Fit Nose End piece and the nuts to the tie rods. Tighten the nuts sequentially.
- Check the cushions are set correctly. See Figure 11.

Pole Controls Cabinet.

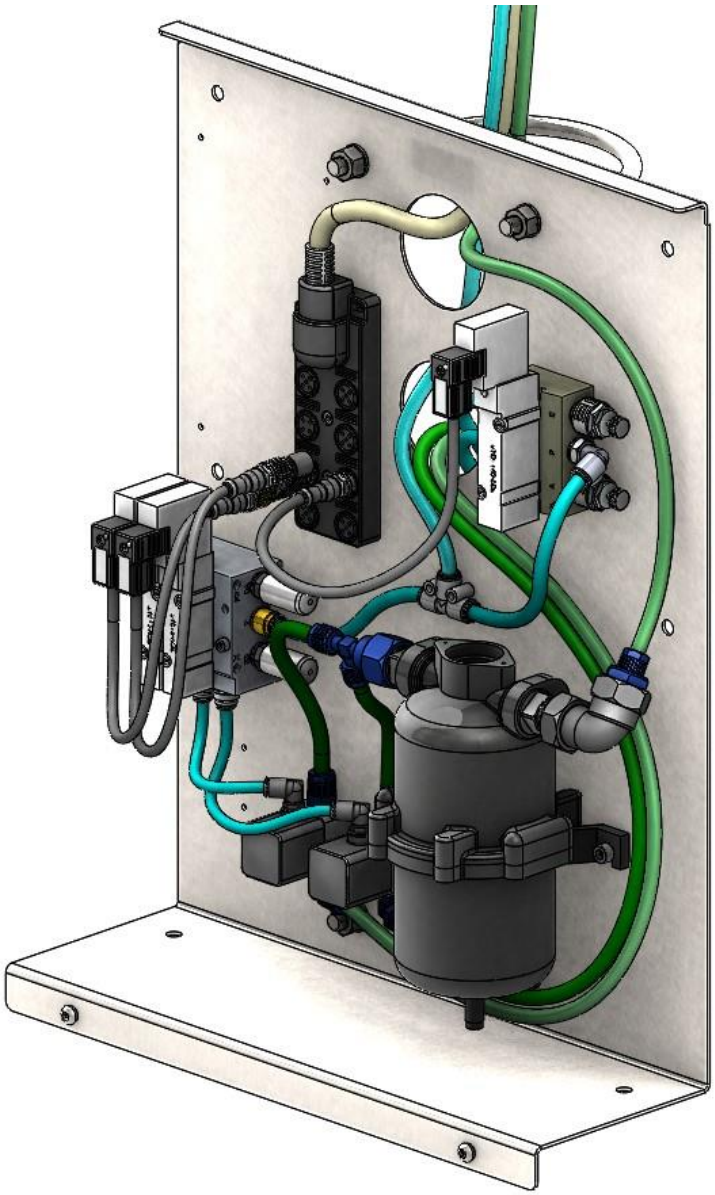


Figure 21

The Pole Controls Cabinet is located above the Teatwand mounted on the Pole. The Pole Controls Cabinet is where input and output connections, compressed air and Teat Spray are managed. 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 22 shows outputs connected for a single system, air and Teat Spray connections.

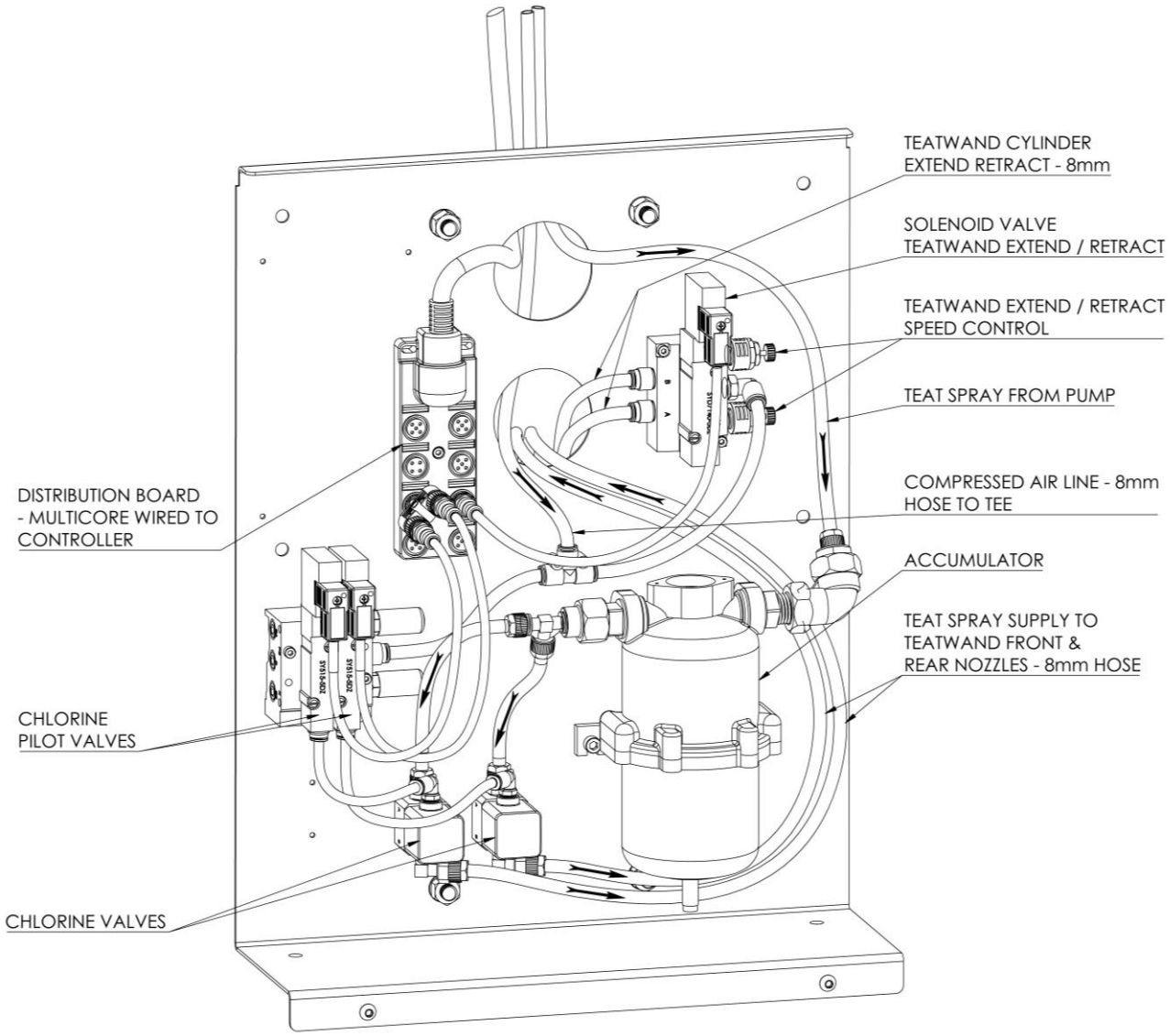


Figure 22

Regular Service Checks and Maintenance Actions.

Check for leaks.

- Remove cover (not shown).
- Check all fittings and hoses for air and Teat Spray leaks.

Check electrical terminations.

- Check the solenoid plugs are tight.
- Check the plugs in the Distribution Board are tight.

Check operation.

- Using the Manual Page on the Touchscreen manually operate the Teatwand Extend and both Forward and Backward spray nozzles.

Replacing Solenoid Valves and Chlorine Valves.

- **Before undertaking any Service work or Maintenance disable the system by pressing the Stop button on the Home Screen at the Controller and turn the compressed air off at the Air Service Unit. This will exhaust residual air pressure from the system.**
- Refer to the Predictive Maintenance Schedule for the Dairy. Large herd dairies will require the replacement of these valves more frequently.
- Refer to Appendix B - Teatwand Pole Controls Assembly exploded view drawing.
- Take care with the rubber gasket on the solenoid valves.
- Take care not to overtighten elbow fittings on Chlorine Valves.

Air Service Unit.

Located above the Controls Cabinet mounted on the Pole the Air Service Unit comprises of an on/off Dump Valve, Pressure Regulator, Water Trap and a Filter. The filter has a replaceable element. The pressure is to be set at 90psi. The filter element is to be replaced in accordance with the Predictive Maintenance Schedule or when the element becomes discoloured.

Replacing the Filter Element.

- Turn off air supply at the Dump Valve
- Remove the Filter Bowl.
- Replace the Filter Element.
- Refit filter bowl and turn on air supply.

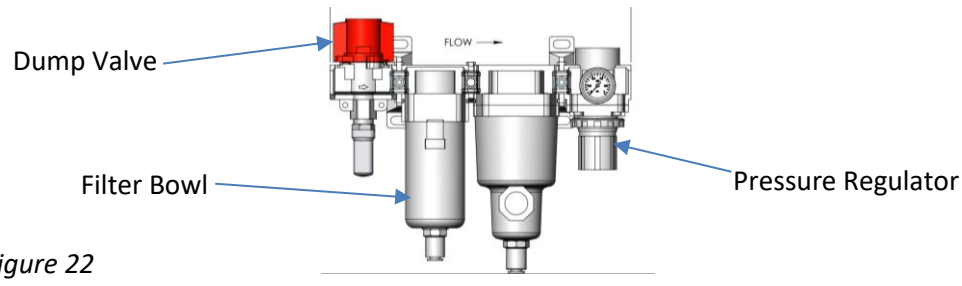


Figure 22

The Sensors.

Each Teatwand Exact System has a Stall Sensor Assembly a Cow Sensor and a Cow Position Sensor and in some cases a Cluster/Cup Sensor. These sensors are the 'eyes' of the device, they contribute to the intelligence of the system.

Take time to understand how these sensors work, what they tell you, why they are there, what their function is, how to adjust them and the best way to set them up.

The Stall Sensors.

These sensors are photoeyes and will detect anything up to 8'' 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.
There is an LED at the plug end of the sensor to indicate when the sensor is detecting an object.

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.
- 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.

Teatwand recommend fitting the Stall Sensors in the basement. 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. The Stall Sensor Assembly will be fitted to allow for adjustment.

Pre-Stall and Stall Sensor Assembly.

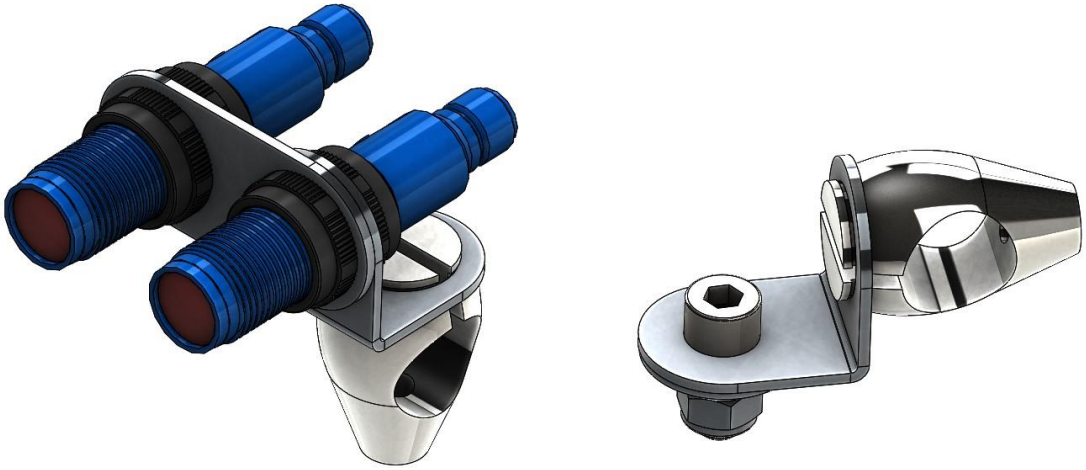


Figure 23

See Appendix C – Exploded view.

Cow Sensor.

This is a Digital Laser sensor that emits a red laser dot.
It has an Adjusting Screw to set a maximum distance it will sense. Mounted on the Controls Cabinet above to 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. There are LED’s on the top face of the sensor. A green LED indicates there is power to the sensor, Yellow LED’s illuminate when the sensor is detecting an object.

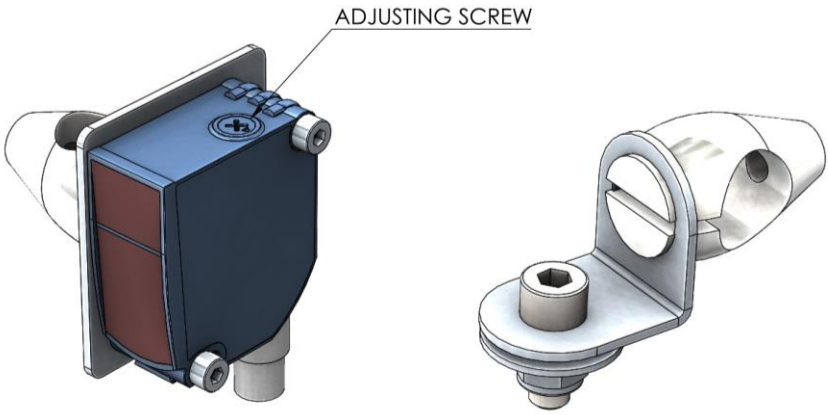


Figure 24

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 provides data to the PLC regarding the cow's position in the stall. This information is used to select the spray pattern that is best suited, either Cow Near, Cow Mid or Cow Far.

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. See Page 35 Figure 34.

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.

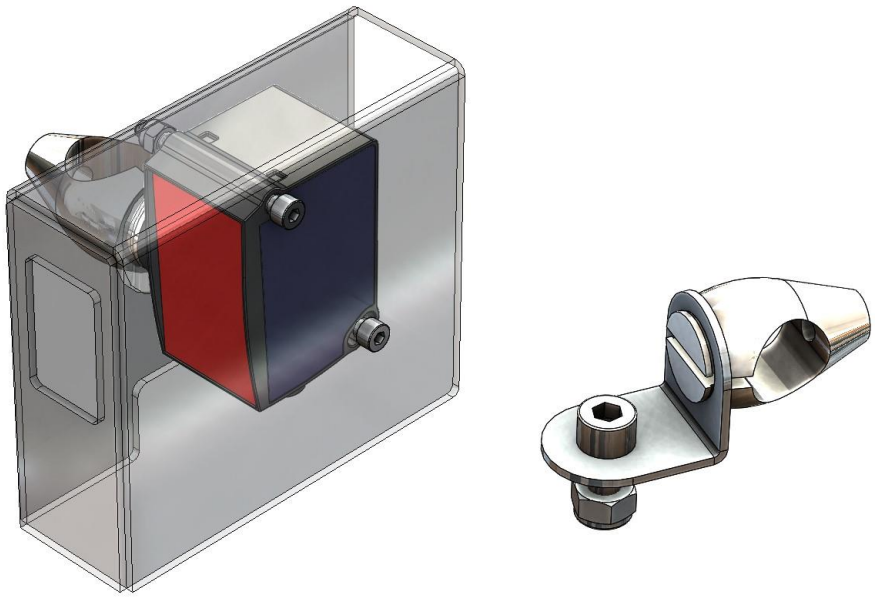


Figure 25

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 the cluster is still attached. Most rotaries in the USA 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. See Page 38 Figure 35.

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 26

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

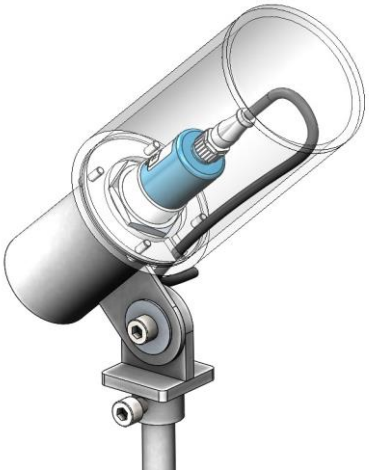


Figure 27

Servicing the Teat Spray Pump.

Installed above or close to the bulk teat spray vessel the pump will draw teat spray vertically from a maximum of 15ft. For standard Nozzles pressure will be set between 35-65 PSI.

- Check the Teat Spray filter is clean. The filter can be seen through the clear bowl.
- To remove the filter, set the air pressure to zero and unscrew the filter bowl by hand.
- Clean the filter and filter bowl with warm soapy water and refit.
- Replace the pump in accordance with the Maintenance Schedule for the dairy.

NOTE: Air locks can occur. From new or if the pump has run out of Teat Spray an air lock may occur, the pump will run with no Teat Spray being pumped. To remedy this, adjust the pressure regulator to zero pressure, remove the Teat Spray Outlet fitting from the pump, turn the pressure up to 40psi. Teat Spray will discharge from the outlet, turn the pressure to zero, refit the Teat Spray Outlet fitting into the pump. Reset the pressure to the required level.

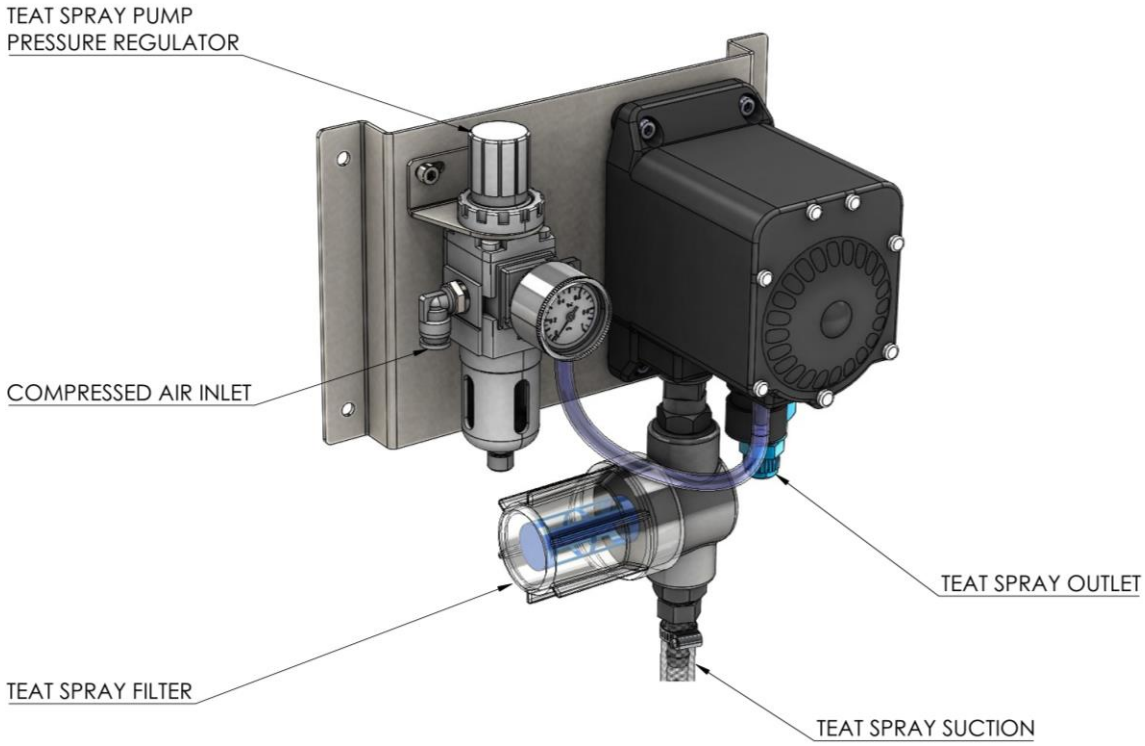


Figure 28

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.**

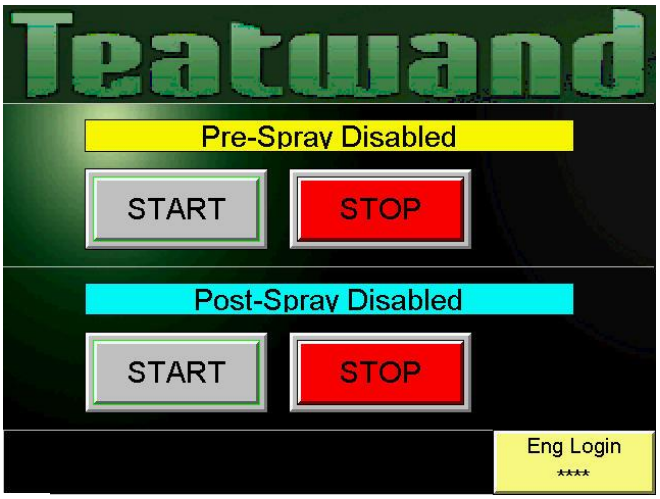


Figure 29

Main Screen with Settings

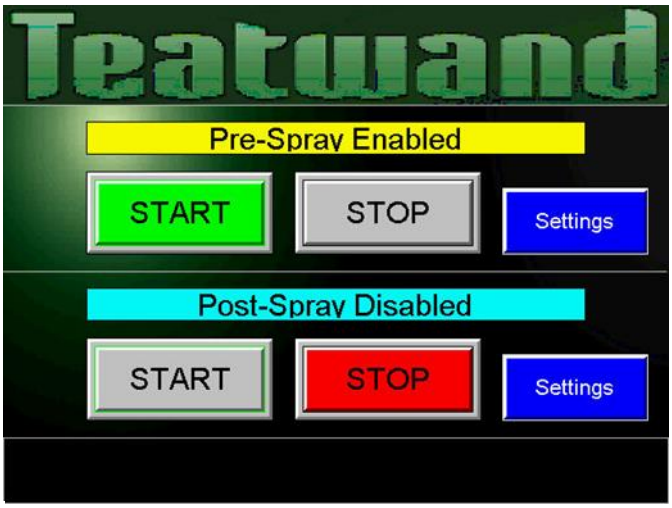


Figure 30

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.

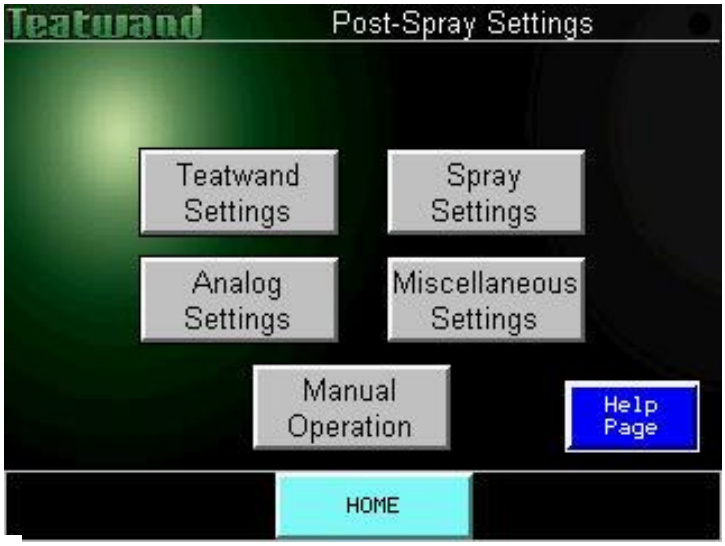


Figure 31

Teatwand™ Settings Page

The Teatwand™ Settings page allows for adjustment of the Stall Timing (how fast the stalls are moving past the Teatwand™) and the Teatwand™ Extend Time (how long the Teatwand™ stays extended for).

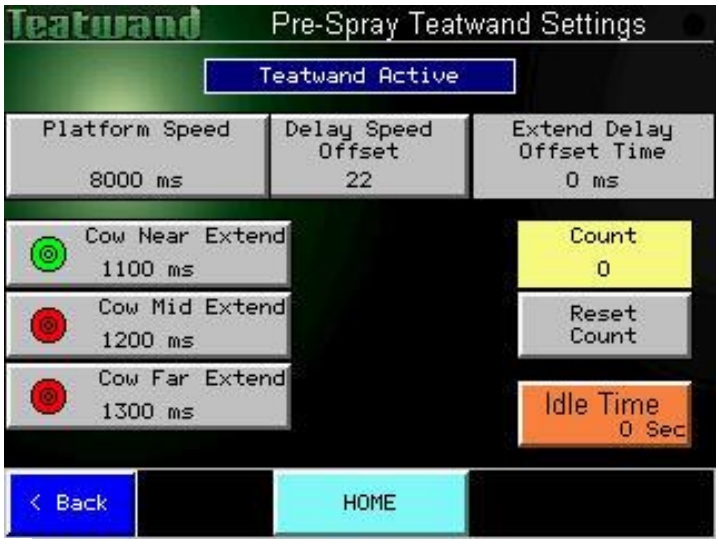


Figure 32

Setting the Stall Timing on the Teatwand Settings page.

The Teatwand™ automatically calculates an **Extend Delay Offset Time** for slow speed milking. This delays the spray sequence from the stall sensor pulse. This is a calculated value, it is not adjustable.

To set the stall timing, set the **Platform Speed** value to the slowest milking speed in milliseconds per stall.

The **Delay Speed Offset** is then adjusted to get the right balance between fast and slow milking speeds.

When set correctly at fast milking speed the Teatwand™ should extend down the leading ridge of the leg spreader and retract down the trailing ridge of the leg spreader avoiding the cows legs.

If the Teatwand™ is missing the leading set of teats at slow milking speeds, gradually **decrease** the **Delay Speed Offset** until the Teatwand™ gives an even coverage of both sets of teats. This will mean the Teatwand™ will travel more down the centre of the leg spreaders at slow milking speeds.

If the Teatwand™ is hitting the trailing legs of the cow, gradually **increase** the **Delay Speed Offset**.

- Extend Time

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. The green dot shows the last spray profile used.

Spray Settings Page.

- 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 Settings pages.

- **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 Seq** button will start a spray sequence. Ensure Teatwand can extend safely before using this function.

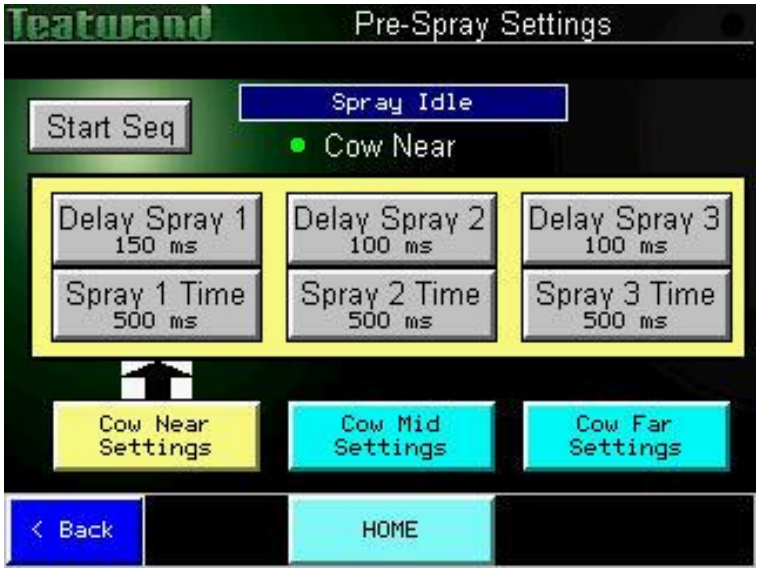


Figure 33

The Teatwand™ will spray in the mode shown on screen, ignoring the Cow Position Sensor. When Cow Near Settings is highlighted the Teatwand™ will only spray using the Cow Near spray profile.

Analog 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 Cow
Near, Mid or Far spray patterns.

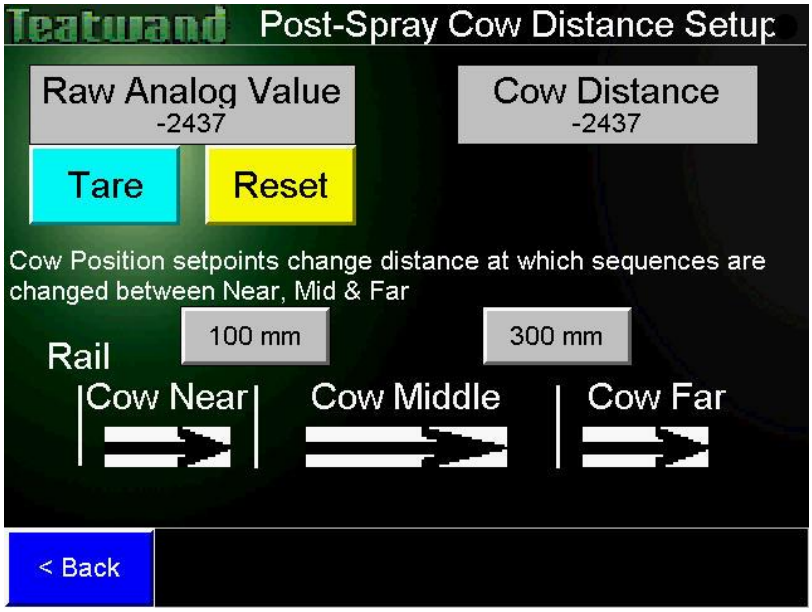


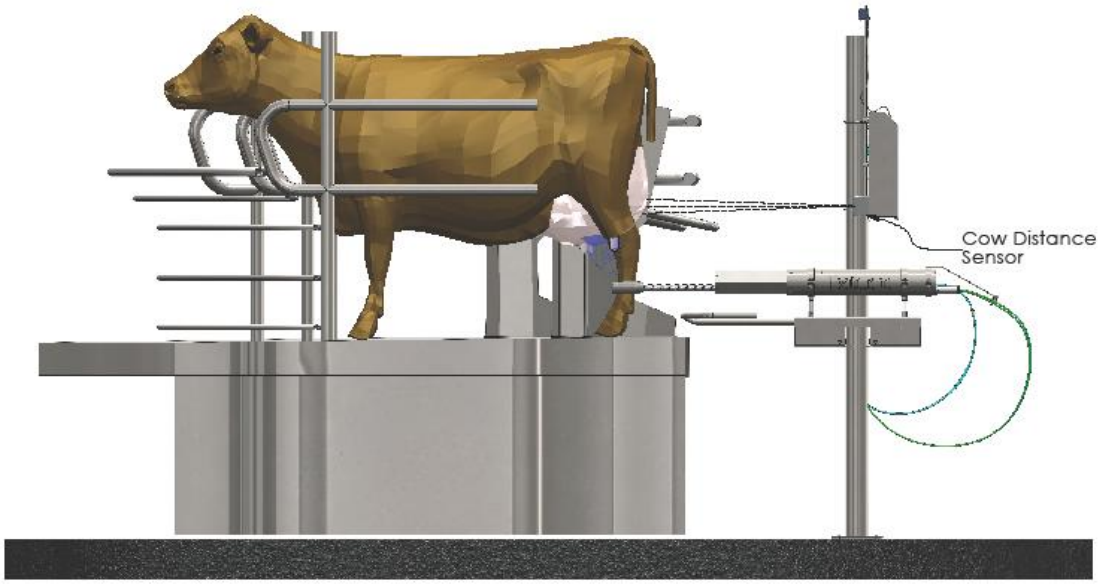
Figure 34

With the laser directed at the rump rail directly behind the cow press the **Tare** button to zero the sensor. The **Raw 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.

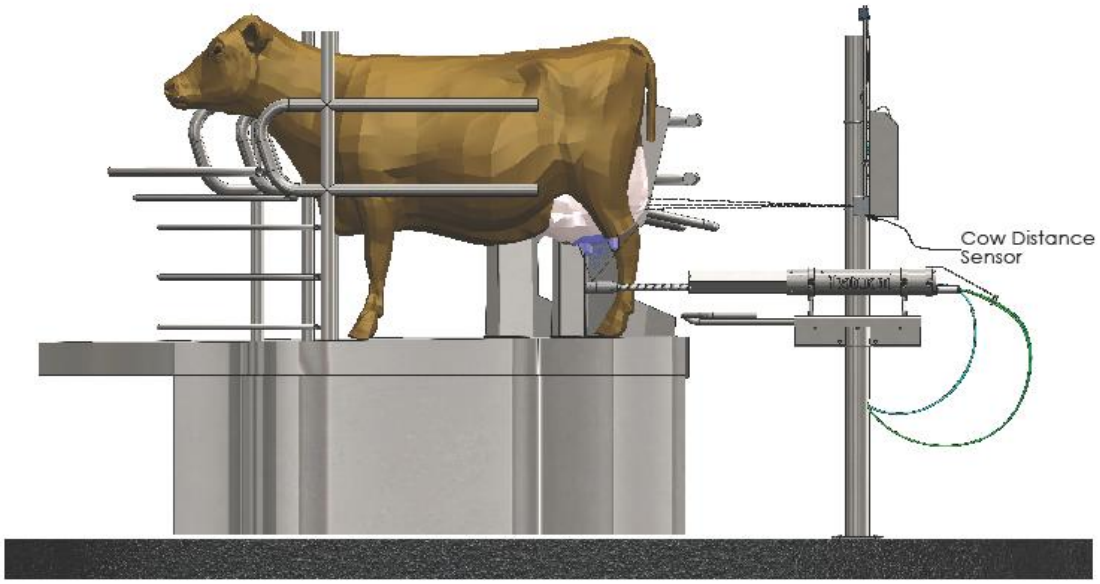
The 2 grey buttons indicate the points where the spray pattern will change from one cow position to the next. 100mm and 300mm are the default settings for this page. These are adjustable. By pressing either button a touchpad will appear where a new value can be entered. In cases where there are many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

The following graphics show the Far Cow and Near Cow spray patterns.

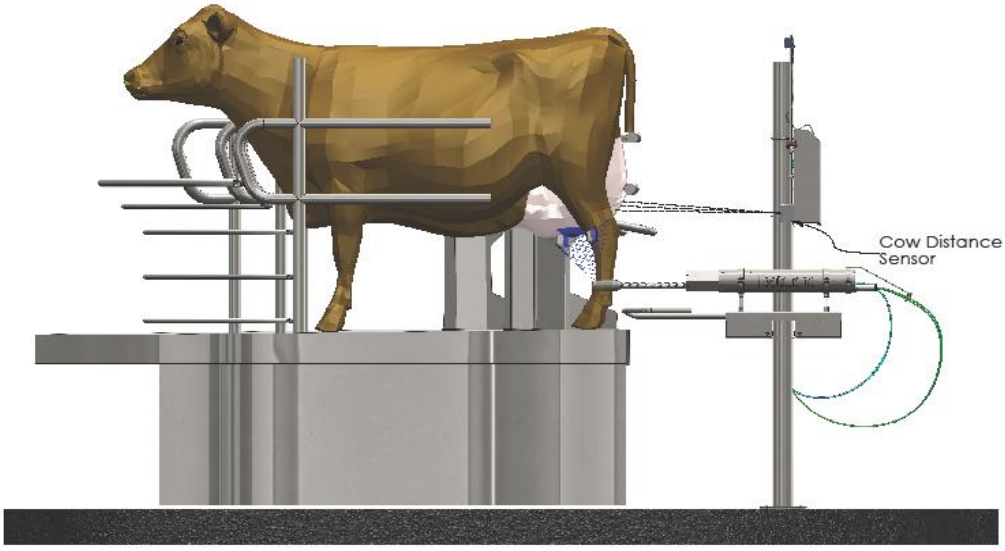
FAR COW - FRONT SPRAY



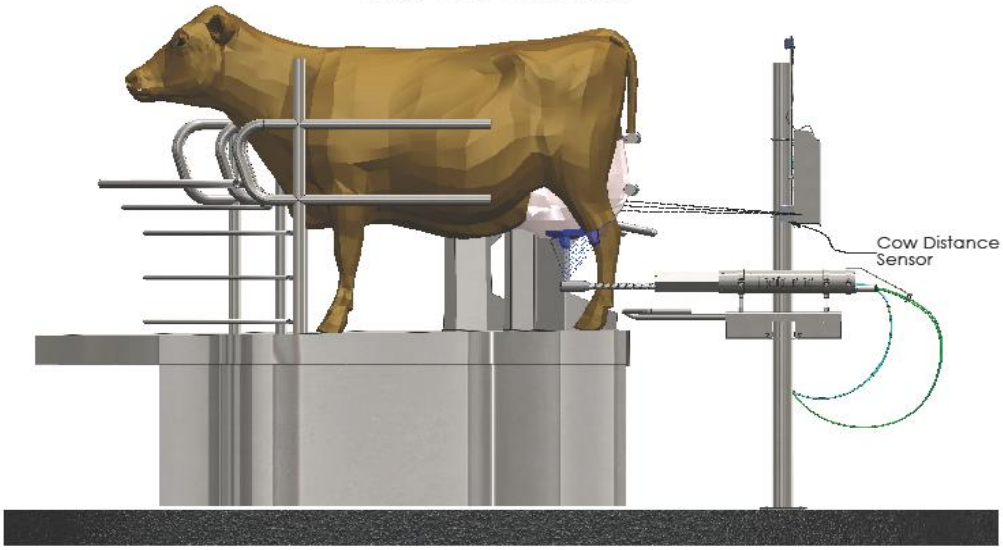
FAR COW - REAR SPRAY



NEAR COW - FRONT SPRAY



NEAR COW - REAR SPRAY



Manual Controls page.

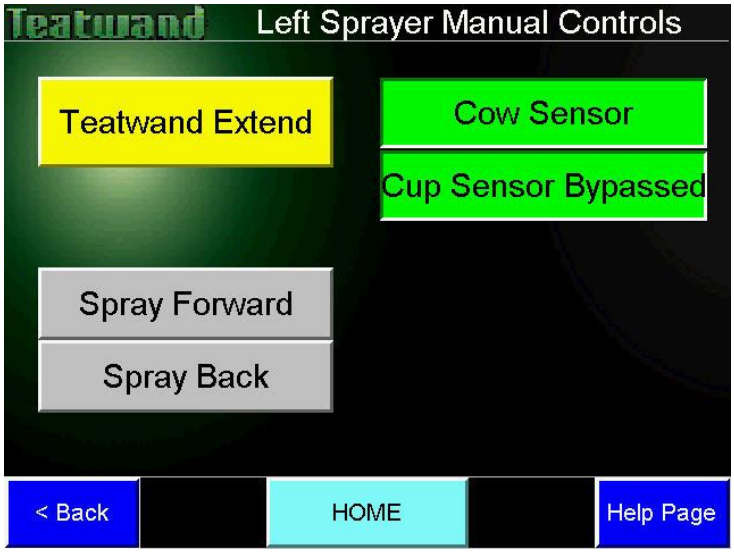


Figure 35

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 remain 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.

Sensor Bypass

This feature is useful 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 is bypassed all the time. If there is no Cup sensor and the Cup senor is not bypassed the Teatwand will not operate.

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

Help Page

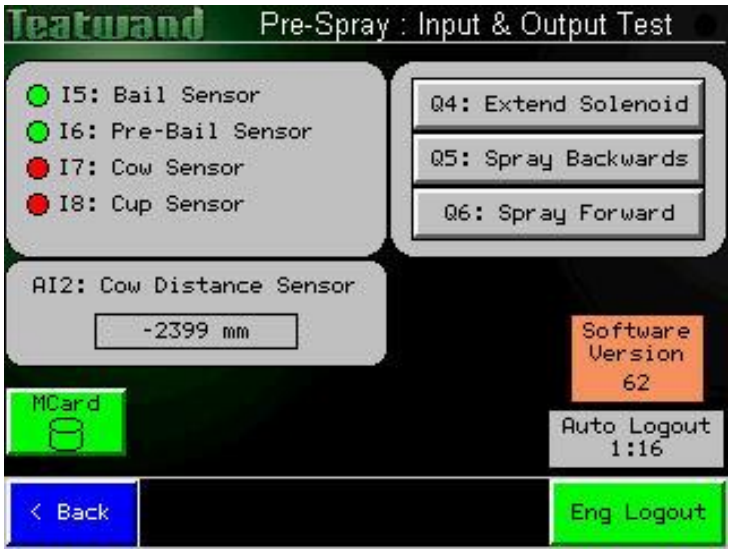


Figure 36

The help page shows the status of Teatwand™ Sensors (inputs). 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

Miscellaneous Settings

These settings should only be adjusted when guided to do so by Onfarm Solutions. The following screen capture shows the default values for this page.

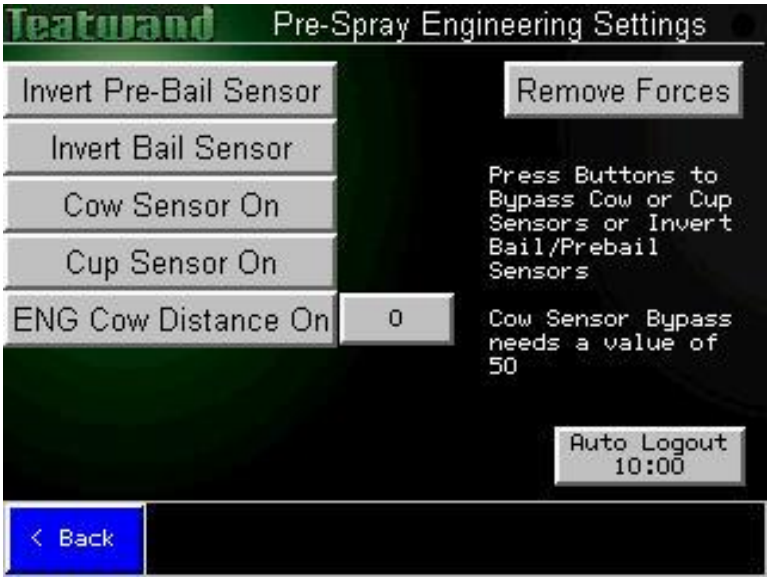


Figure 37

Fault Finding and Troubleshooting.

TIPS.

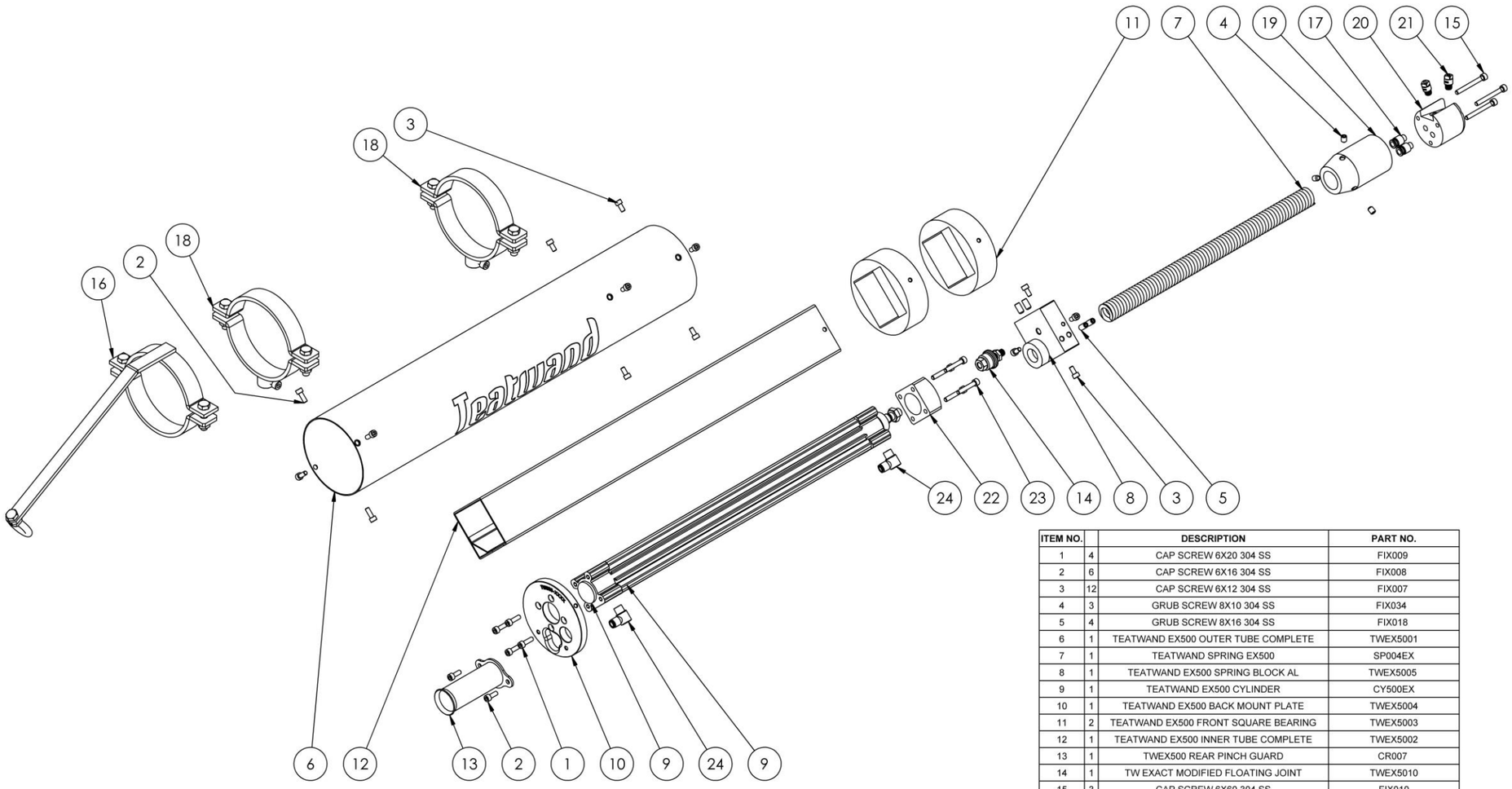
To initiate a spray sequence the Cow Sensor and the Cup/Cluster Sensor (if fitted) must be detecting a cow and the cluster when the Stall Sensor detects a tag. If the Cup/Cluster Sensor is not fitted it **must** be bypassed or the Teatwand will not operate.

Use the Help Page to check inputs and outputs. Use the Spray History Page to identify why the Teatwand may have missed a cow and check the past 100 operations for problems.

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.

FAULT	CAUSE	REMEDY
Teatwand is missing the same stalls every rotation	The tag the Stall Sensors are detecting is not aligned.	Identify the problem stalls and adjust the tag/sensors
Teatwand is missing cows.	The cow sensor and or the cluster sensor are not detecting the cow or cluster at all or at the correct time.	Use the Spray History Page on the touchscreen to determine which sensor is not reading. Adjust the sensor.
Teatwand is hitting cows legs.	The timing of the start of the spray sequence is too early or too late.	Adjust Stall Sensors to detect the tag earlier or later.
Air bubbles in Teat Spray hoses	Air is being drawn into the pressurized Teat Spray circuit.	Check the fittings on the suction side of the pump. Check all Teat Spray hose connections.
Teat Spray pump operating but not pumping Teat Spray.	The pump has an airlock.	See Page 25. Servicing the Teat Spray Pump.
Cow Position Sensor giving false readings.	Dirt on the face of the sensor or set up incorrectly	Clean the face of the sensor with a damp cloth. See Page 23. Cow Position Sensor for correct set up.
Not Enough Teat Spray on teats.	Air pressure at pump too low.	Reset air pressure at pump, recommended setting is between 35 and 65psi

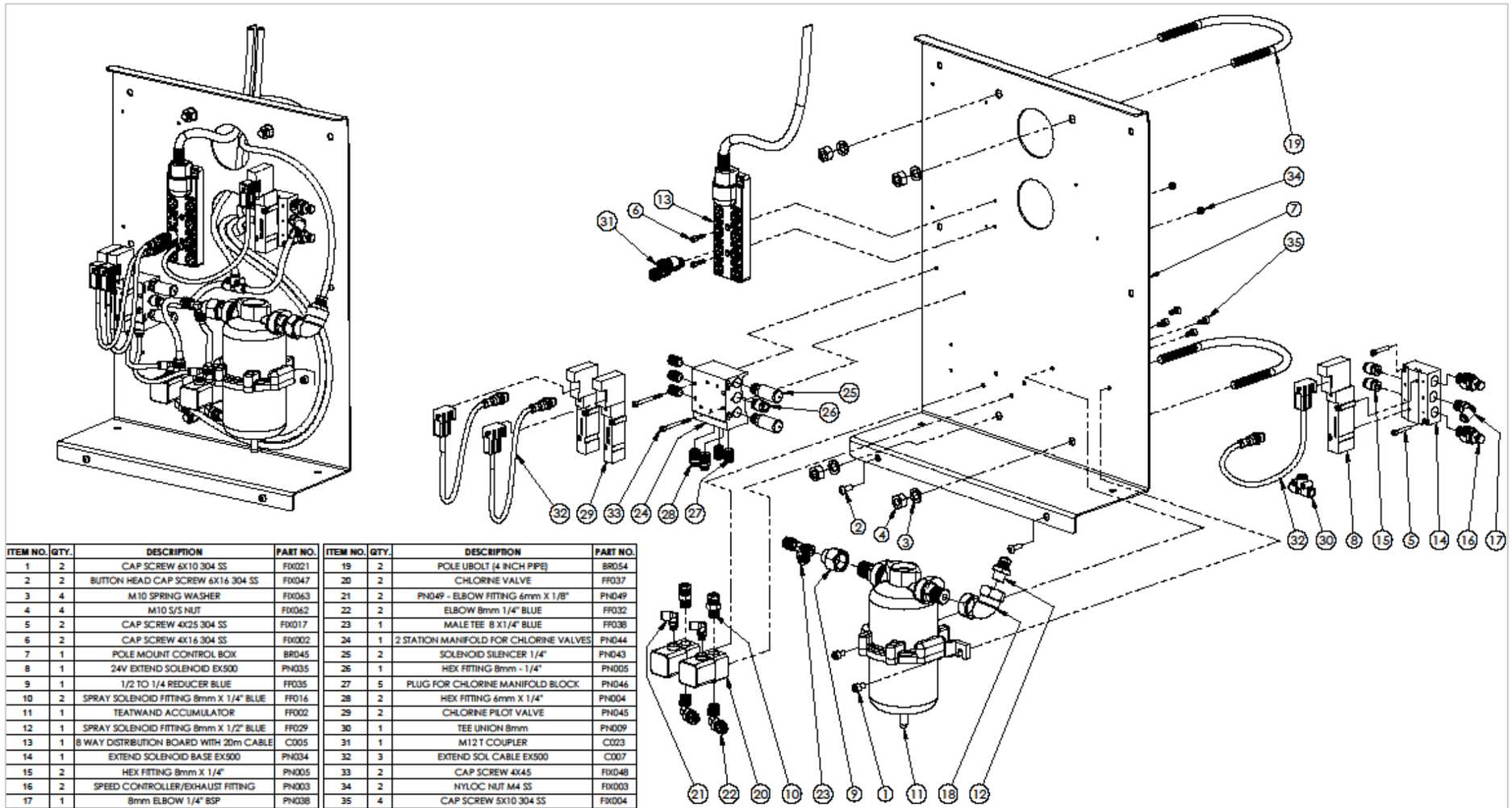
FAULT	CAUSE	REMEDY
Air leak at the Teatwand	Cylinder seals, pneumatic fitting/s leaking or damaged pneumatic hoses.	Replace Cylinder seals or fittings or hoses.
No spray or not spraying properly.	Blocked or partially blocked nozzle.	Remove nozzle from nozzle holder. Manually operate a spray on the touchscreen to check there is teat spray at the nozzle. Clean nozzle with compressed air. Check it sprays properly, if not, replace nozzle.
No teat spray at the nozzle.	Damaged spray hose or spray solenoid faulty.	Check spray outputs are working on the Help Page. Check Chlorine Pilot vales are working by pressing the blue button on the valve. Replace Chlorine valve.
Teatwand is spraying empty stalls	Dirty sensor face or sensor set up is wrong	Use Help page to check sensors are switching, clean the face of the sensors, check sensors are set up correctly.



ITEM NO.		DESCRIPTION	PART NO.
1	4	CAP SCREW 6X20 304 SS	FIX009
2	6	CAP SCREW 6X16 304 SS	FIX008
3	12	CAP SCREW 6X12 304 SS	FIX007
4	3	GRUB SCREW 8X10 304 SS	FIX034
5	4	GRUB SCREW 8X16 304 SS	FIX018
6	1	TEATWAND EX500 OUTER TUBE COMPLETE	TWEX5001
7	1	TEATWAND SPRING EX500	SP004EX
8	1	TEATWAND EX500 SPRING BLOCK AL	TWEX5005
9	1	TEATWAND EX500 CYLINDER	CY500EX
10	1	TEATWAND EX500 BACK MOUNT PLATE	TWEX5004
11	2	TEATWAND EX500 FRONT SQUARE BEARING	TWEX5003
12	1	TEATWAND EX500 INNER TUBE COMPLETE	TWEX5002
13	1	TWEX500 REAR PINCH GUARD	CR007
14	1	TW EXACT MODIFIED FLOATING JOINT	TWEX5010
15	3	CAP SCREW 6X60 304 SS	FIX010
16	1	EXACT HOSE GUIDE ASSEMBLY	TW500_HOSE_GUIDE_ASS
17	2	HEX FITTING 8mm 1/8 SS INT HEX	PN036
18	2	PIPE HANGER FOR TWEX500	BR028
19	1	TEATWAND EX500 NOZZLE END SPRING HOLDER	TWEX5006
20	1	TEATWAND EX500 TWIN NOZZLE HOLDER	TWEX5007
21	2	TEATWAND SPRAY NOZZLE	FF003
22	1	TWEX PNEUMATIC CYLINDER BUSH	TWEX5009
23	4	M6 X 35 CAP SCREW	FIX055
24	2	8mm ELBOW FOR CY500EX	PN033

Appendix A.

Appendix B.



ITEM NO.	QTY.	DESCRIPTION	PART NO.
1	2	CAP SCREW 6X10 304 SS	FIX021
2	2	BUTTON HEAD CAP SCREW 6X16 304 SS	FIX047
3	4	M10 SPRING WASHER	FIX063
4	4	M10 S/S NUT	FIX062
5	2	CAP SCREW 4X25 304 SS	FIX017
6	2	CAP SCREW 4X16 304 SS	FIX002
7	1	POLE MOUNT CONTROL BOX	BR045
8	1	24V EXTEND SOLENOID EX500	PN035
9	1	1/2 TO 1/4 REDUCER BLUE	FF035
10	2	SPRAY SOLENOID FITTING 8mm X 1/4" BLUE	FF016
11	1	TEATWAND ACCUMULATOR	FF002
12	1	SPRAY SOLENOID FITTING 8mm X 1/2" BLUE	FF029
13	1	8 WAY DISTRIBUTION BOARD WITH 20m CABLE	C005
14	1	EXTEND SOLENOID BASE EX500	PN034
15	2	HEX FITTING 8mm X 1/4"	PN005
16	2	SPEED CONTROLLER/EXHAUST FITTING	PN003
17	1	8mm ELBOW 1/4" BSP	PN038
18	1	ELBOW FEMALE-FEMALE 15mm PVC	FF034

ITEM NO.	QTY.	DESCRIPTION	PART NO.
19	2	POLE UBOLT (4 INCH PIPE)	BR054
20	2	CHLORINE VALVE	FF037
21	2	PN049 - ELBOW FITTING 6mm X 1/8"	PN049
22	2	ELBOW 8mm 1/4" BLUE	FF032
23	1	MALE TEE 8 X1/4" BLUE	FF038
24	1	2 STATION MANIFOLD FOR CHLORINE VALVES	PN044
25	2	SOLENOID SILENCER 1/4"	PN043
26	1	HEX FITTING 8mm - 1/4"	PN005
27	5	PLUG FOR CHLORINE MANIFOLD BLOCK	PN046
28	2	HEX FITTING 6mm X 1/4"	PN004
29	2	CHLORINE PILOT VALVE	PN045
30	1	TEE UNION 8mm	PN009
31	1	M12 T COUPLER	C023
32	3	EXTEND SOL CABLE EX500	C007
33	2	CAP SCREW 4X45	FIX048
34	2	NYLOC NUT M4 SS	FIX003
35	4	CAP SCREW 5X10 304 SS	FIX004

-
-

REFERENCE DRAWINGS

-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

REV	NAME	DATE	DESCRIPTION

FABRICATION TOLERANCES WHERE NOT STATED

ABOVE	INCL.	TOL +/-
0	100	0.5mm
100	500	1.0mm
>500		3.0mm

MACHINING SURFACE FINISHES

6.3	ROUGH
3.2	SMOOTH
1.6	GROUND

MACHINING TOLERANCES WHERE NOT STATED

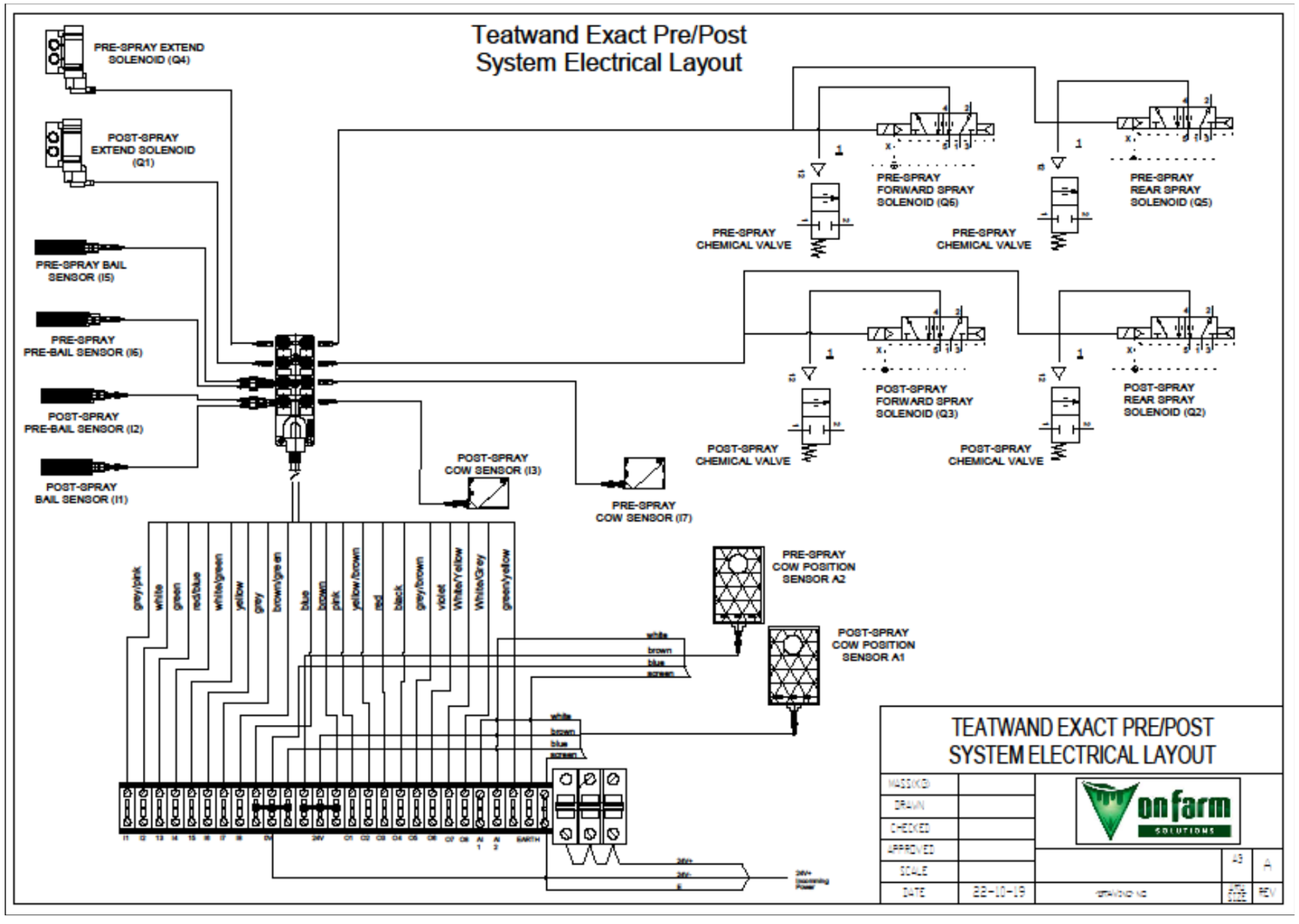
OPEN DIMS : +/- 0.3 mm
DEC DIMS : +/- 0.1 mm

TEATWAND POLE
CONTROLS ASSEMBLY

MASS(KG)	.
DRAWN	G.C
CHECKED	.
APPROVED	.
SCALE	1:1
DATE	31-03-20

DRAWING NO.	DRG SIZE	REV
TWEXPOLE_ASS	A3	A

Appendix C.


Teatwand Exact Pre/Post
System Electrical Layout
PRE-SPRAY EXTEND SOLENOID (Q4)
POST-SPRAY EXTEND SOLENOID (Q1)
PRE-SPRAY BAIL SENSOR (I5)
PRE-SPRAY PRE-BAIL SENSOR (I6)
POST-SPRAY PRE-BAIL SENSOR (I2)
POST-SPRAY BAIL SENSOR (I1)
POST-SPRAY COW SENSOR (I3)
PRE-SPRAY COW SENSOR (I7)
PRE-SPRAY FORWARD SPRAY SOLENOID (Q6)
PRE-SPRAY REAR SPRAY SOLENOID (Q5)
PRE-SPRAY CHEMICAL VALVE
PRE-SPRAY CHEMICAL VALVE
POST-SPRAY FORWARD SPRAY SOLENOID (Q3)
POST-SPRAY REAR SPRAY SOLENOID (Q2)
POST-SPRAY CHEMICAL VALVE
POST-SPRAY CHEMICAL VALVE
PRE-SPRAY COW POSITION SENSOR A2
POST-SPRAY COW POSITION SENSOR A1
grey/pink
white
green
red/blue
white/green
yellow
grey
brown/green
blue
brown
pink
yellow/brown
red
black
grey/brown
violet
White/Yellow
White/Grey
green/yellow
white
brown
blue
screen
white
brown
blue
screen
TEATWAND EXACT PRE/POST
SYSTEM ELECTRICAL LAYOUT
DRAWN
CHECKED
APPROVED
SCALE
DATE
22-10-19
A3
A

Appendix D.

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

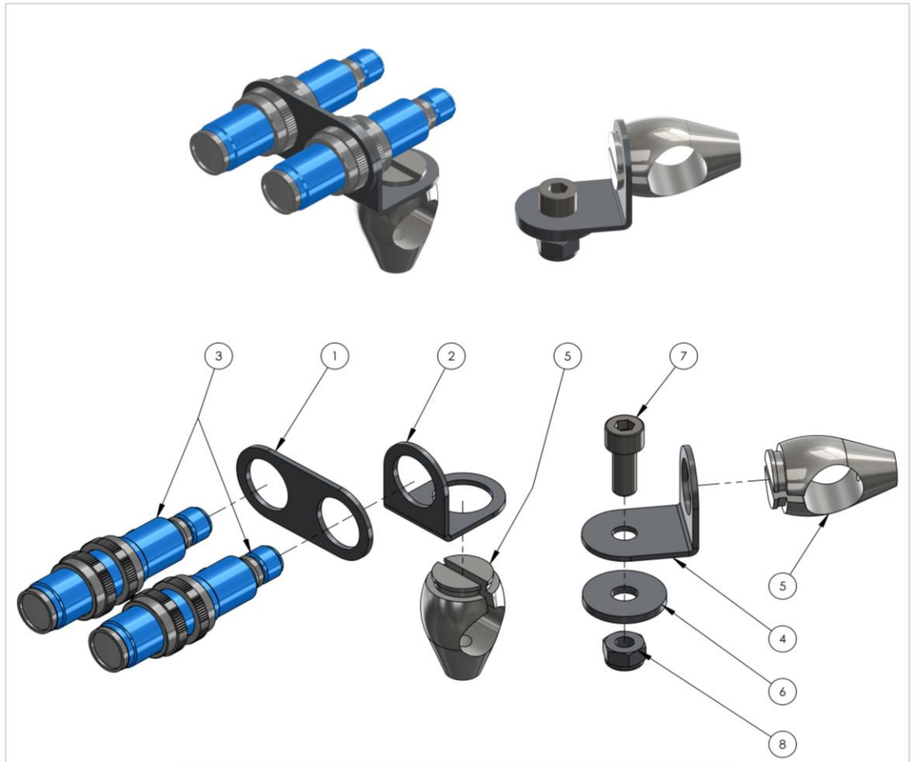
Far Spray Timing		
Extend Time: 1200 ms		
Spray 1 Delay: 400 ms	Spray 2 Delay: 50 ms	Spray 3 Delay: 50 ms
Spray 1 Time: 500 ms	Spray 2 Time: 500 ms	Spray 3 Time: 300 ms

Extend Delay Setting
Slow Platform Extend Delay Time: 500 ms

Bail Timing
Fast Speed: 8000 ms
Slow Speed: 11000 ms

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

Appendix E.



ITEM NO.	QTY.	DESCRIPTION	PART NO.	MATERIAL
1	1	TW DOUBLE BAIL SENSOR MOUNT	BR007/2	STAILNLESS STEEL 304
2	1	TW BAIL SENSOR MOUNT SMALL	BR007	STAILNLESS STEEL 304
3	2	TEATWAND BAIL SENSOR	S002	
4	1	TW SENSOR MOUNT 8.5mm HOLE	BR007/1	STAILNLESS STEEL 304
5	2	TW UNIVERSAL BAR CLAMP	BR015	
6	1	PENNY WASHER 8mm	FIX042	STAILNLESS STEEL 304
7	1	CAP SCREW M8X20	FIX013	AISI 304
8	1	NYLOC NUT M8 SS	FIX015	A2 302/304

REFERENCE DRAWINGS

REV	NAME	DATE	DESCRIPTION

MACHINING SURFACE FINISHES
6.3 ROUGH
3.2 SMOOTH
1.6 GROUND

MACHINING TOLERANCES WHERE NOT STATED
OPEN DIMS : +/- 0.3 mm
DEC DIMS : +/- 0.1 mm

DRAWN	G.C
APPROVED	.
SCALE	1:1
DATE	11-07-19

TWEX500
BAIL SENSOR ASSEMBLY

TWEXBAILSEN — DRAWING NO.

A4 — DRG SIZE

A — REV