

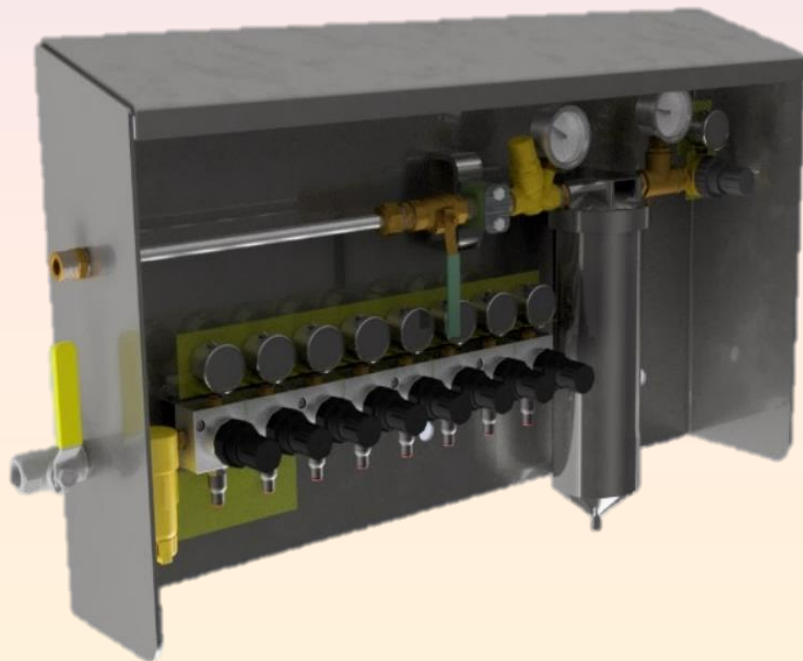


ENGINEERING SERVICES & SUPPLIES PTY LTD

Ph: 1800 074 446 www.esseng.com.au

Air Atomising Spray System

Installation, Operation & Maintenance Manual





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WARRANTY

ESS WARRANTS The ESS Air Atomising Spray System to be free of defects both in materials and workmanship for a period of 12 months from the date of despatch of the product from the **ESS** factory. The warranty given by **ESS** in this regard will extend only to replacing or repairing product shown to be defective.

The warranty also is subject to the following restrictions:

- (a) Installation of the product contrary to the instructions contained in the supplied manual will void such warranty absolutely;
- (b) The warranty will not extend to any liability for injuries incurred and which result from the use of the product contrary to the instructions in the manual;
- (c) Save as prescribed by law, **ESS** will not be liable for any damage sustained by a purchaser or a third party by way of consequential loss arising out of defects in the product.

You are asked to note that **ESS** offers purchasers a service whereby either:

- (a) It will install the product and certify the correctness of such installation, or
- (b) Certify the correctness or otherwise of the installation of the product by third parties.

This certification service is designed to ensure that you obtain the full benefit of the **ESS** warranty hereby provided. If you would like to take advantage of the installation certification service provided, please contact **ESS** regarding the service.

Refer to the Final Checklist at the back of this manual.

Visit the **ESS** website www.esseng.com.au to register your product warranty.

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Information contained herein is for use in the operation of **The ESS Air Atomising Spray System**, purchased from **ESS** and cannot be passed on to any other party without express permission, in writing, from **ESS**.



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1.0 SAFETY

The ESS Atomising spray is designed to be easily and safely installed and maintained by qualified personnel.

However, it is essential that good safe working practices be employed at all times.

Equipment should only be installed and maintained by qualified and trained personnel who have carried out all appropriate safety analyses before commencing the work.

All potential safety hazards must be identified, and steps taken to neutralise the hazard.

All energy sources should be isolated, and energy drained before commencing work.

Always follow all site and statutory safety regulations.



1.1. SAFETY LABELS

Pictograph labels are used to show graphically where potential safety hazards exist around this product. These labels do not represent every possible hazard. They are not intended to be a substitute for safe work practices and good judgment. These labels and *ESS* technical manuals use specific words to identify the severity of the hazard. They are described below. Take time to read and understand the meaning of these words and symbols.



Danger labels call attention to imminently hazardous situations that will result in serious personal injury or death if not avoided. Injury from these hazards is immediate in nature and has a high probability of resulting in a serious or fatal accident if proper precautions are not followed.



Warning labels call attention to potentially hazardous situations that could result in serious personal injury or death if not avoided. Injury from these hazards is usually serious in nature, and a severe or fatal accident can occur if proper precautions are not followed.



Caution labels call attention to potentially hazardous situations that may result in minor or moderate personal injury if not avoided. Injury from these hazards is normally less serious than those from Danger or Warning hazards. However, there is still the potential for an accident resulting in serious injury if proper precautions are not followed.



2.0 INTRODUCTION

This manual will assist in the installation and operation of ESS' Air Atomising spray systems. Please read the entire manual to assure proper installation, operation, and maintenance of this equipment.

What is an Air Atomising spray system?

The ESS Air Atomising Spray System is a water-based misting system that utilises compressed gas (usually air) to break up water into droplets. It is designed to greatly reduce the dust emissions generated as part of materials handling processes.

The system is specifically designed for application on conveyor transfer enclosures but may also be applied at other points of dust generation such as crushers, storage silos and the like.

As with most dust control measures, it is essential to contain the dust laden air before applying dust suppression. Ensure that conveyor enclosures are effectively sealed against leakage, and that airflow through the enclosure is controlled.

The ESS Air Atomising Spray System utilises very fine atomised water droplets under 100 microns in diameter to bind with dust particles to form larger agglomerations that will drop out of suspension in the air. Liquid-only spray nozzles are typically only capable of producing droplet sizes 300 microns in diameter or larger.

If air flow through the enclosure is excessive, both the dust and the water droplets will be carried out of the conveyor exit before bonding can take place. If excessive air flows are present (air velocity greater than 1 m/sec), contact ESS for advice on air control measures.

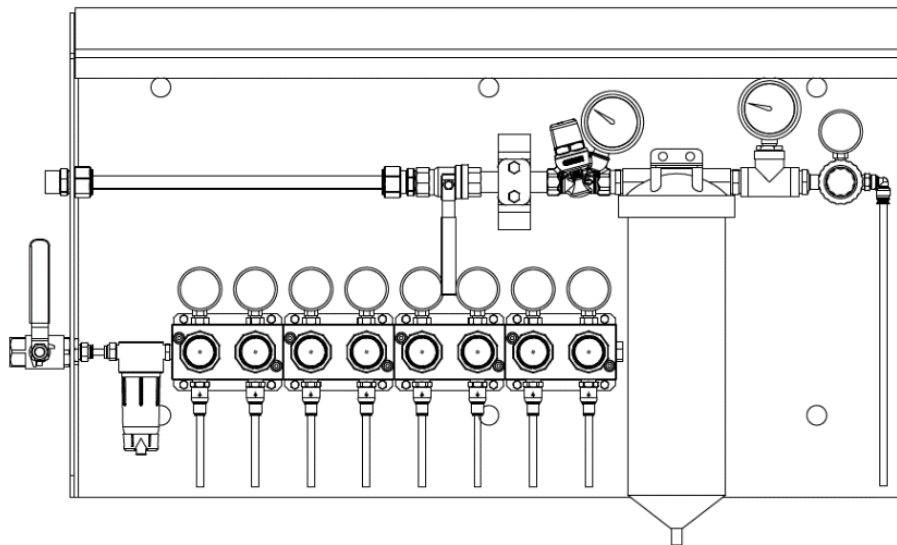


Figure 1 - Air Atomising Spray System



3.0 PREPARATION FOR INSTALLATION

1. CHECK INSTALLATION DRAWINGS

Ensure that you have the correct drawings and equipment for your conveyor(s).

2. PRE-ASSEMBLE THE AIR ATOMISING SYSTEM COMPONENTS

Do this in your workshop or similar free area, rather than at the Conveyor. This will enable you to:

- Verify all required equipment is present.
- Familiarise yourself with the system assembly.
- Plan the installation, reducing installation time.

3. ASSEMBLE THE NECESSARY TOOLS & SAFETY EQUIPMENT REQUIRED FOR THE INSTALLATION



4.0 MODE OF OPERATION

The ESS Air Atomising system operates in the following manner:

- Pressurised air and water enter the unit via the respective ball valves.
- Air passes through the filter, which removes grit and water from the air that may cause damage or affect operation of components.
- Air supply is directed to the regulator bank - one regulator for each nozzle. The outlet utilises a check valve to prevent backflow in case of failure of the air supply which prevents any fluid flowing back through the air regulators/supply.
- The water initially passes through a pressure-reducing valve to reach a desired pressure setting.
- The water then passes through a cartridge filter (or filters) followed by a secondary pressure regulator.
- Water then exits the control box via 6mm tube and continues through to the water inlet of the nozzle. Multiple nozzles share the one water supply via daisy-chained connections.



5.0 INSTALLATION

5.1. DESCRIPTION OF EQUIPMENT

The **ESS** Air Atomising Spray System is generally supplied in a kit form, consisting of 1-8 **ESS** Air Atomising nozzles, plus Tee fittings (used for multiple nozzles) and 6 metres of plastic tube and push fittings per nozzle.

Swaged hoses are available if accurate lengths can be determined.

Each nozzle is supplied with a mounting bracket for easy installation onto the enclosure.

Each nozzle consumes a maximum of 1.2 litres per minute of water and 378 litres per minute of air. The nozzles are suitable for use over a range of pressures from 0.7 to 4 bar (10 – 58 psi) for liquid and 0.6 to 4.9 bar (9 – 71 psi) for air.

In addition to the above kit, **ESS** recommends that a suitable filter and valve assembly should be installed in the supply lines to control the water and air supply and ensure suitable quality.

ESS also recommends the use of suitable weld-on hose clamp brackets to ensure hoses are installed in a safe and tidy manner.

5.2. DETERMINE INSTALLATION POSITION

Before proceeding with the installation, first determine the best positions for the **ESS** Atomising nozzles.

The Atomising nozzle is a misting or fogging type of nozzle that produces a very fine droplet and consumes only a small volume of water. For this reason, the nozzle is not suitable for wetting material to prevent dust generation. The system is designed to suppress airborne dust within an enclosure. The nozzles should be located to mist the void areas around the material stream, rather than aimed at the material stream itself.

The nozzle needs approximately 450mm to form the full spray pattern and generate the water mist. The nozzle should be positioned to provide adequate clearance from the material or any solid surface to allow full generation of the water mist. If a conveyor skirt enclosure is too low to allow this clearance, locate the nozzles in the sides of the enclosure, staggering the positions from side to side. Alternatively, increase the height of the covers and locate the nozzle in the top. This will have the added advantage of slowing the air flow in the skirt enclosure.

Nozzles should not be positioned too close to each other in any direction, as spray pattern interference may occur. Locate adjacent nozzles at least 750 mm apart, and stagger nozzles that are directed at each other from opposite walls.



Position nozzles to take advantage of residual air flows, rather than trying to work against the air flow. For example, nozzles located in the chute enclosure above the head pulley will use the incoming air flow to carry the water mist through the chute.

The following figure shows some recommended nozzle positions in a typical conveyor transfer chute.

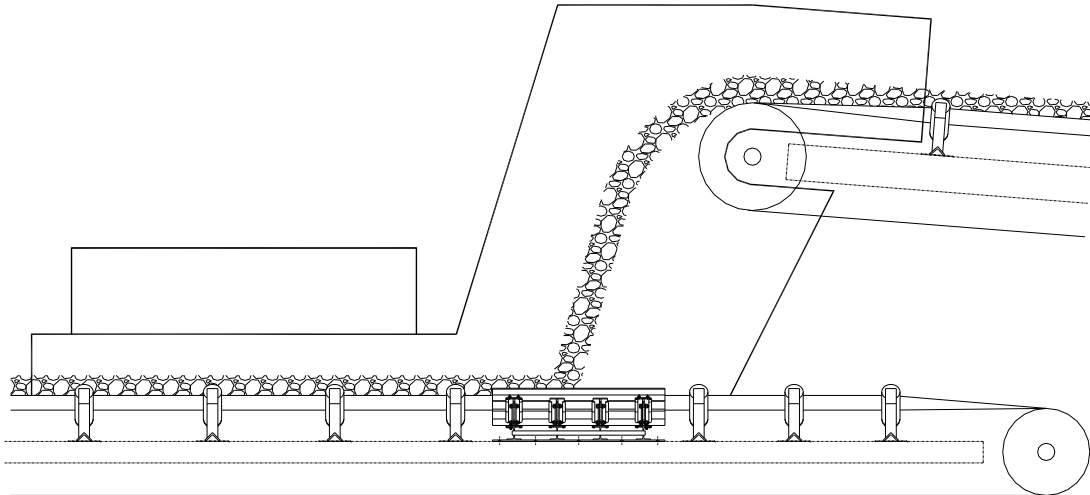


Figure 2 - Recommended Nozzle Positions



5.3. INSTALLATION OF ESS ATOMISING NOZZLES

The *ESS* Atomising nozzles are easily installed to any chute, by following the simple installation procedure.

Step 1

At the selected installation position, draw a set of cross hairs using chalk or marker.



Step 2

Using the crosshairs as the centre, drill or cut a hole 50mm diameter in the chute wall.



Step 3

Position the Air Atomising Mounting Bracket over the hole, aligning the notches in the bracket with the cross hairs. Weld the bracket to the chute wall at each notch.



Step 4

Fit the Atomising Nozzle to the mounting bracket, and secure with the stainless-steel backing bracket nuts supplied.





5.4. HOSE INSTALLATION

The kit has an allowance for 6 metres of hose per nozzle for both air and water supply.

Plan the hose runs from the control panel to the individual nozzles. The hose run should be as direct as possible and minimise bends. The hoses must be protected from damage, and must not interfere with walkways or access, or form trip hazards for personnel.

Where multiple hoses share a route, they may be bundled together using cable ties, and secured to available structure. The use of weld-on hose clamps (Stauff or Behringer types) is recommended where support structure is not available.

Where plastic tube is used, simply push one end of the tube into the push fitting on the nozzle. Run the tube as pre-planned, then cut the tube to length and fit the other end to the push fitting as required.

Where swaged hoses are to be used, accurate lengths need to be supplied, which means that pre-planning of hose runs is essential. Once hoses have been manufactured and supplied, simply fit one end of the hose to the nozzle or manifold, run and secure the hose as described, and fit the other end to the appropriate point.

There will be direct runs to each nozzle from their respective regulated manifold on the control panel. The water supply line was designed to be daisy chained from the control panel to each nozzle. Due to low pressures, this is the most optimised method of install.

5.5. CONNECTION TO WATER SUPPLY

The **ESS** Air Atomising Spray System utilises a filter for the water and air supply. This is to ensure protection against nozzle blockages and maintain peak performance.

The outlet from the water supply or water filter assembly should be connected to the water supply hose, using either plastic tube or swaged hose as required. The supply hose should be of a size that will not restrict the water flow to the nozzles.

5.6. CHECK OPERATION OF NOZZLES

The **ESS** Atomising Nozzle is easily removed and checked whilst in service, but only if the nozzle position is safely accessible. Ensure that all site and statutory safety guidelines are followed. Do not access nozzles that are behind guards or located at heights, and do not reach over or into moving equipment. Isolate all energy sources and comply with all site access rules.

With the water and airflow turned on, remove the two nuts securing the nozzle to the enclosure, taking care not to lose the washers. Lift off the nozzle and direct the water spray away from personnel. The spray pattern should be a hollow cone for approximately 300 mm, and then break into a fine mist.

If the pattern is not as described, or is non-existent, check that water flow is available. Once flow is confirmed, refer to the maintenance section following for nozzle servicing details. If flow is not available, check cause of no-flow condition and rectify. Repeat this inspection for all nozzles.



5.7. FILTERS, HOSES AND CONTROLS

With the system operating, check hoses and fittings for leaks. Rectify any detected leaks. See section 6 for maintenance procedure.

5.8. ADJUSTMENT

The following steps should be followed to set-up and adjust the ESS Air Atomising Spray System.

Step 1

From the pressure settings table at the back of this manual choose the pressures for the desired output of the nozzles.

Step 2

Release the handle lock and turn the adjusting handle on the pressure regulators fully outwards to the off position. Ensure the rubber nipples on the fluid filled gauges are cut off as described on the gauge housing.

Turn the shut-off valve, located on the outside of the control panel, to direct fluid to the nozzles. Adjust the regulators 10psi above the desired pressures.

Adjust the regulators to the final settings desired.

Step 4

Once the correct pressure has been achieved and has stabilized, pull the regulator knob to lock in position.

Step 5

For a multiple regulator box, each nozzle may require different air pressure settings for optimal performance. Repeat above steps for other nozzles, ensuring that the pressure setting is correct for each nozzle.

The Air Atomising Spray System is adjusted and is ready for service.



6.0 OPERATION AND MAINTENANCE

Ensure that all site and statutory safety regulations as well as good safe working practices are always followed.

Ensure that all energy sources are isolated and drained before proceeding with maintenance work. Do not attempt to dismantle any pressurised pipework or equipment.

Do not access nozzles that are behind guards or located at heights, and do not reach over or into moving equipment. Isolate all energy sources and comply with all site access rules.

6.1. SCHEDULED MAINTENANCE PROCEDURES

The following regular maintenance should be carried out on the **ESS** Atomising Spray System components.

Monthly Inspection

- Visually inspect nozzle spray patterns during operation to determine blockages or partial blockages. With the water flow turned on, remove the two nuts securing the nozzle to the enclosure, taking care not to lose the washers. Lift off the nozzle and direct the water spray away from personnel. The spray pattern should be a hollow cone for approximately 300 mm, and then break into a fine mist.
- If affected spray patterns are observed, rectify using the service procedure following.
- At the control panel, check for:
 - Visible water leaks at the fittings.
 - Any variation in the gauge pressures on the supply lines.
- Check the water and air supply lines, along with brackets and fittings, between the control panel and nozzles.

6-monthly inspection

- Replace water cartridge filter(s)

6.2. SERVICE PROCEDURES

Nozzles

Isolate the water/air supply at the manual valves on the Filter Assembly or water supply, taking precautions to prevent operation of the valves during servicing.

Remove the 2 x M10 nuts on the affected nozzle, taking care not to lose the washers. Lift the nozzle off the enclosure and inspect. Using a 16 mm socket or ring spanner, remove the nozzle cap. Clean and inspect the insert and the nozzle body. If damaged or worn, replace the complete nozzle assembly.

Refit the insert to the nozzle. If plant is operational, turn the water/air on via their respective ball valves and inspect the spray pattern. If not, schedule a nozzle inspection during next operation period.

Reinstall the nozzle assembly onto the chute enclosure and secure. Ensure that the ball valve is returned to the open position.



Control Panel

Turn the manual valves to the closed position and take precautions to prevent operation of the valve during servicing.

Disassemble, check, and thoroughly clean the filters. If damaged, replace the filter element or cartridge (Water supply).

Reassemble the filters and return the manual valves to the open position.

Check the pressure reading on the gauges against the pre-set pressure. Small fluctuations are normal. If the pressure varies substantially, reset the pressure as described in the Adjustment section. If the pressure cannot be maintained, replace the regulator.

6.3. TROUBLESHOOTING

Table 1 - Troubleshooting

Problem	Possible Cause	Action
No pressure reading on gauges	Incorrect connections	Check and reconnect to manual instructions
	Filter blocked	Remove and clean
	Incorrect pressure setting	Readjust pressure
	Shut-off Valve Closed	Open Valve
Pressure fluctuates	Foreign matter in regulator	Clean regulator and filter
	Faulty regulator	Replace regulator
Abnormal Spray pattern/No spray output.	Blocked/broken hose lines	Find and replace
	Blocked Nozzle	Clean nozzle. See maintenance section
	Wrong pressure settings	Adjust to listed pressure settings



6.4. PRESSURE SETTINGS

Table 2 - Pressure Settings

Liquid Capacity (L/Hr) and Air Capacity (L/min)														
Liquid Press. (bar)														
0.7			1.5			2			3			4		
Air Press. (bar)	Liquid (L/Hr)	Air (L/min)	Air Press. (bar)	Liquid (L/Hr)	Air (L/min)	Air Press. (bar)	Liquid (L/Hr)	Air (L/min)	Air Press. (bar)	Liquid (L/Hr)	Air (L/min)	Air Press. (bar)	Liquid (L/Hr)	Air (L/min)
0.60	5.3	10.2	1.1	8.1	13.3	1.5	8.1	16.4	2.4	8.9	22	3.1	10.5	24
0.70	4.3	12.2	1.3	7.0	15.0	1.8	6.6	21	2.7	8.1	26	3.4	9.7	28
0.85	3.0	14.2	1.4	6.4	17.0	2.1	4.9	25	3.0	6.4	30	3.9	7.8	36
1.0	1.7	17.0	1.5	5.5	19.0	2.4	3.2	29	3.2	4.9	34	4.2	6.1	42
-	-	-	1.7	4.5	22	-	-	-	3.4	4.2	37	4.6	4.4	47
-	-	-	1.8	3.5	24	-	-	-	3.5	3.4	40	4.9	2.8	54

Table 3 - Spray Dimensions

Spray Dimensions					
Air (bar)	Liquid (bar)	A (cm)	B (cm)	C (cm)	D (m)
0.70	0.70	14	18	23	1.5
1.4	1.5	15	19	24	1.8
1.8	2.0	16	20	25	2.1
3.0	3.0	16	20	26	2.7
3.9	4.0	19	23	30	4.0

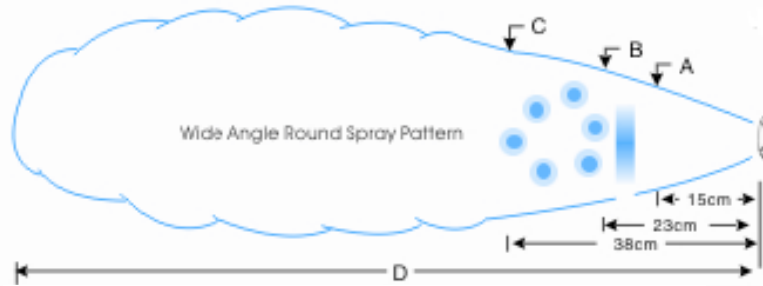


Figure 3 - Wide Angle Round Spray Pattern



7.0 RECOMMENDED SPARE PARTS NOZZLE

7.1. SPARE PARTS

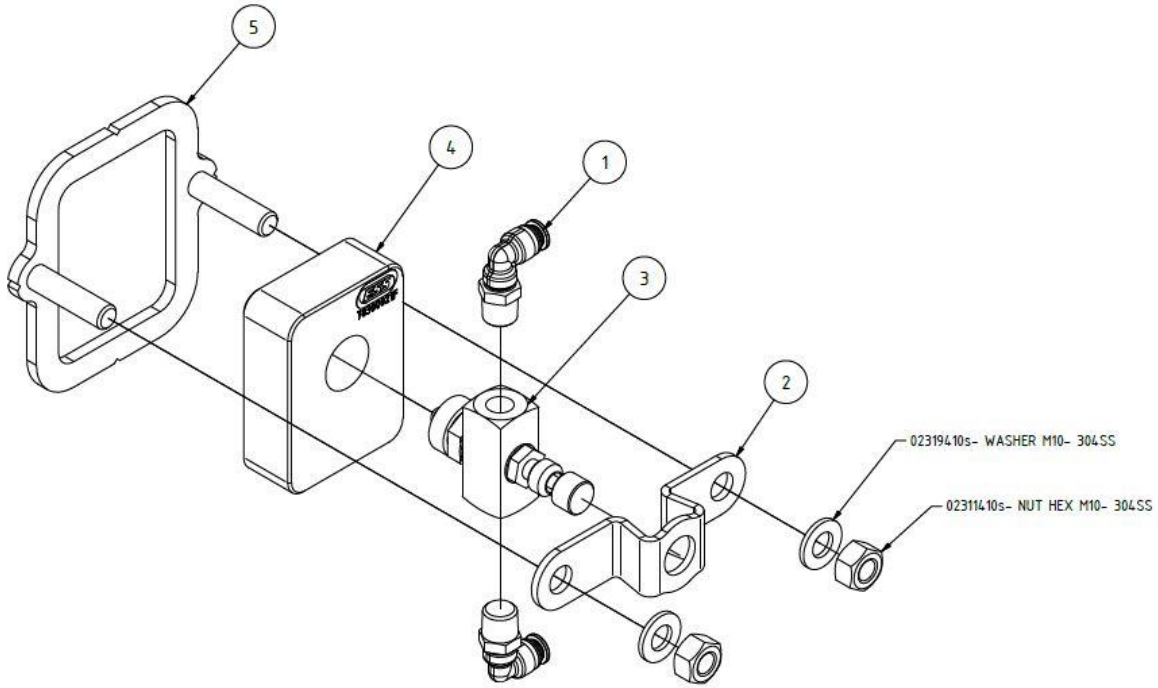


Table 4 - Spare Parts

Item	Description	ESS Part Number
1	ELBOW 1/4M-6MM TUBE P/FIT BRASS	02370115B
2	QUICKFIT ATOMISING NOZZLE CLAMP BRKT S/S	03782093SLC
3	NOZZLE AIR ATOMIZING 1/4 0.08LPM	74103064
4	QUICKFIT ATOMISING SPRAY PU BLOCK FRAS-M	78300021F
5	QUICKFIT MOUNT BRACKET C/W FASTENERS	78300030s



7.2. CONTROL PANEL

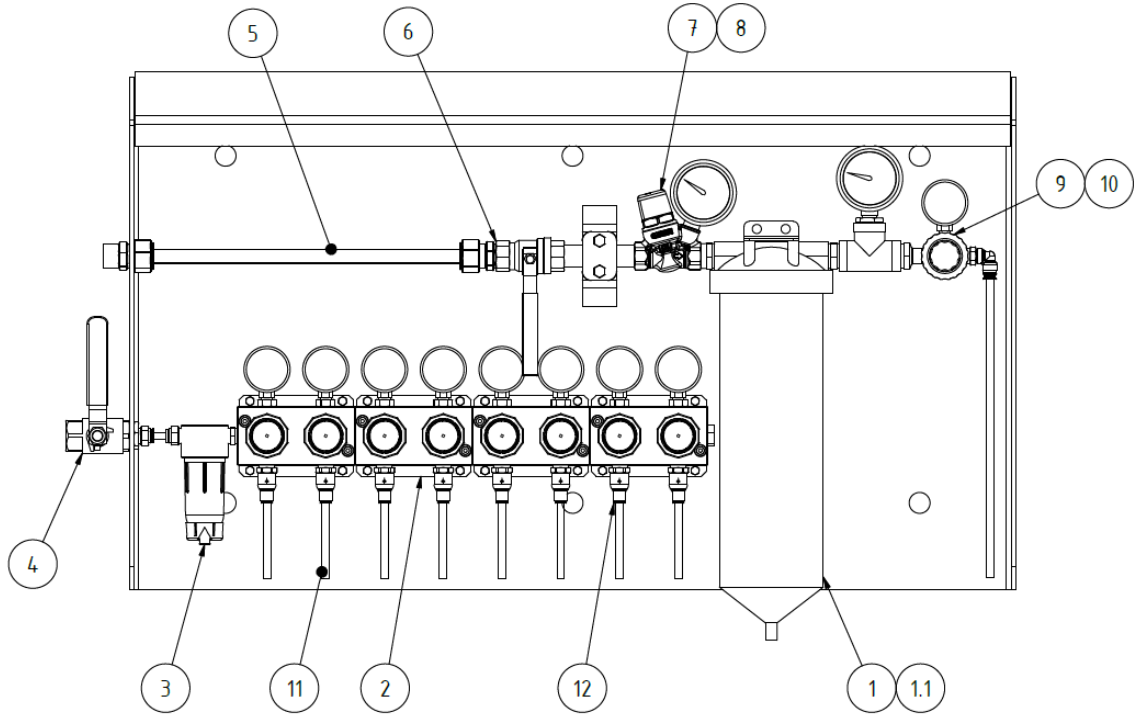


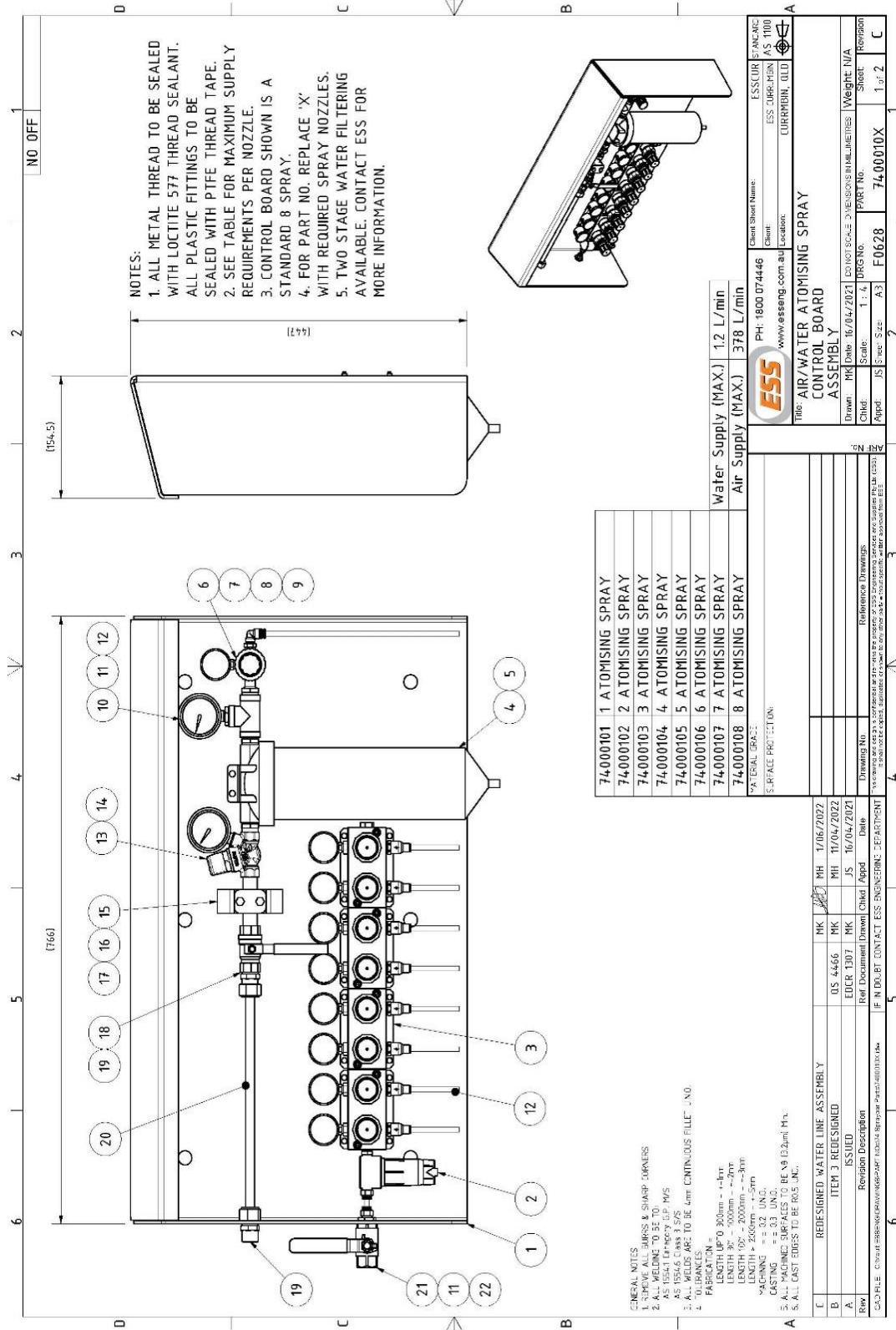
Table 5 - Control Panel Part Numbers

Item	Description	ESS Part Number
1	FILTER HSG 1/2" SS115S-NO CARTRIDGE	02350390S
1.1	FILTER SEDIMENT CARTRIDGE WD1501	02350394
2	REGULATOR BANK C/W GAUGES	7400020X
3	FILTER 1/4 AUTO DRAIN FD50-2W	02350190
4	VALVE 1/2 BALL VENTED	02820306
5	TUBE 304 S/S ANNEALED 1/2 X 1.6 WT POLISHED	01802050
6	VALVE 1/2" BALL F/F FULL BORE BRASS	02820305
7	VALVE 1/2 PRESSURE REDUCING CALEFFI	02820310
8	GAUGE PRES 1/4" L/F 63MMX1000KPA B/E SS	02550130S
9	REGULATOR 1/4" WATER PISTON	02352140
10	GAUGE PRES 1/8" 40MMX1000KPA B/E SS	02550012S
11	TUBE 6MM ANTI-STATIC NYLON UV	02570105P_UV
12	VALVE CHECK 1/4BSPT-6MM P/FIT	02820093P

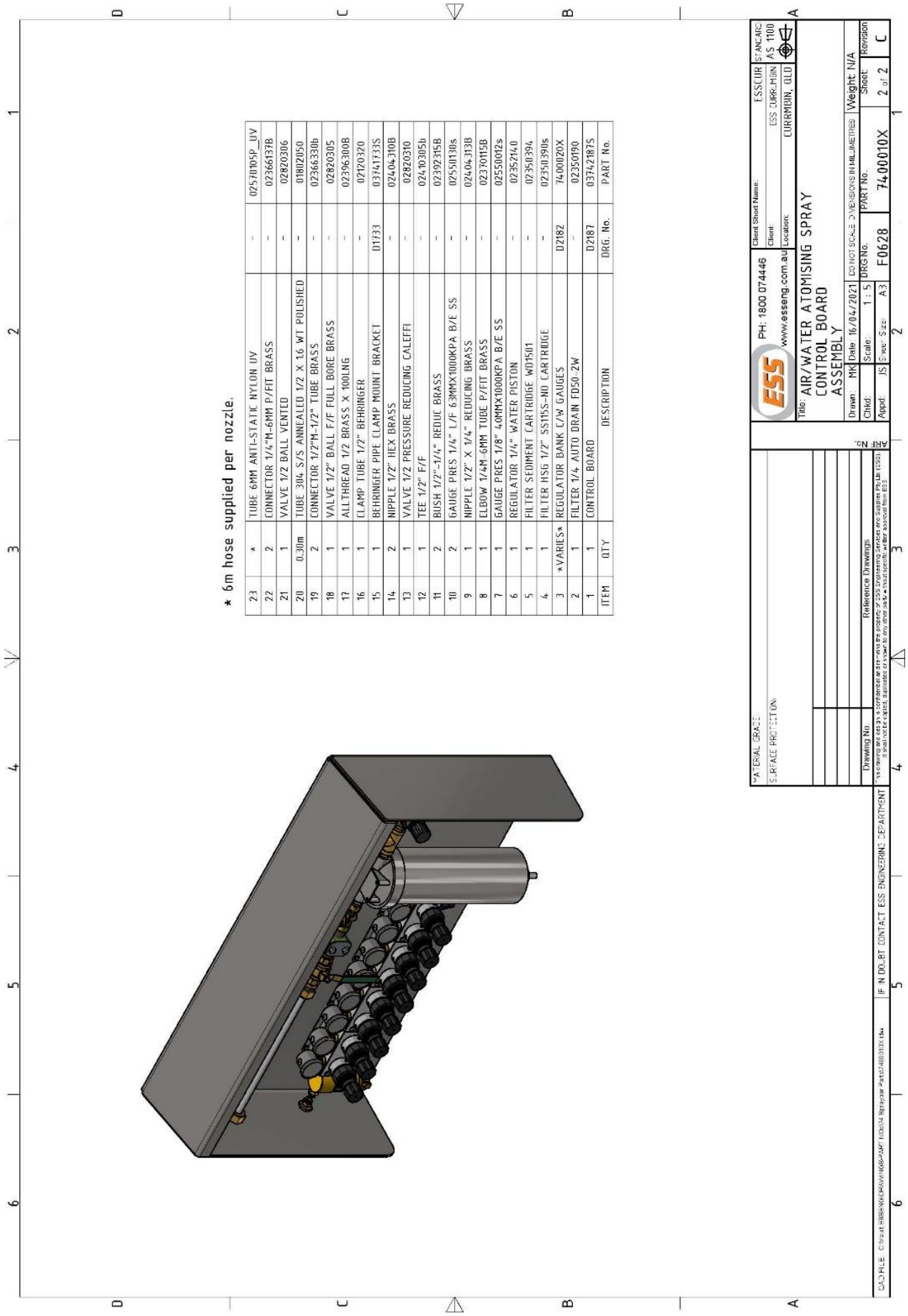


8.0 ASSEMBLY DRAWINGS

F0628 – AIR / WATER ATOMISING SPRAY CONTROL BOARD ASSEMBLY



F0628 CONTROL BOARD



* 6m hose supplied per nozzle.

ITEM	QTY	DESCRIPTION	DRG. No.	PART No.
23	*	TUBE 6MM ANTI-STATIC NYLON UV	-	0257005P_UV
22	2	CONNECTOR 1/4" M-6MM P/FIT BRASS	-	02366137B
21	1	VALVE 1/2 BALL VENTED	-	02820306
20	0.30m	TUBE 306 S/S ANNEALED 1/2 X 1.6 WT POLISHED	-	01802050
19	2	CONNECTOR 1/2" M-1/2" TUBE BRASS	-	02366330b
18	1	VALVE 1/2" BALL F/F FULL BORE BRASS	-	02820305
17	1	ALLTHREAD 1/2 BRASS X 100LNG	-	02396300B
16	1	CLAMP TUBE 1/2" BEHRINGER	-	02170320
15	1	BEHRINGER PIPE CLAMP MOUNT BRACKET	01133	03741735
14	2	NIPPLE 1/2" HEX BRASS	-	02404300B
13	1	VALVE 1/2 PRESSURE REDUCING CALEFFI	-	02820310
12	1	TEE 1/2" F/F	-	02410305b
11	2	BUSH 1/2" -1/4" REDUC BRASS	-	0239215B
10	2	GAUGE PRES 1/4" L/F 63MMX100KPA B/E SS	-	02530730S
9	1	NIPPLE 1/2" X 1/4" REDUCING BRASS	-	02404313B
8	1	ELBOW 1/4M-6MM TUBE P/FIT BRASS	-	0237015B
7	1	GAUGE PRES 1/8" 40MMX100KPA B/E SS	-	02550012S
6	1	REGULATOR 1/4" WATER PISTON	-	02352160
5	1	FILTER SEDIMENT CARTRIDGE WD1501	-	02350394
4	1	FILTER HSB 1/2" SST155-ND CARTRIDGE	-	02350390S
3	*VARIES*	REGULATOR BANK C/W GAUGES	02182	7400020X
2	1	FILTER 1/4" AUTO DRAIN FDS0-2W	-	02350490
1	1	CONTROL BOARD	02187	03742187S

		Client Short Name: ESS CUR Client: ESS CURR-MIN AS 1100 Location: CURRMIN, QLD
PH: 1800 074446 www.esseng.com.au		Title: AIR/WATER ATOMISING SPRAY CONTROL BOARD ASSEMBLY
Drawn: MK Date: 16/04/2021 Scale: 1:1.5 Appd: JS Size: A3	DO NOT SCALE DIMENSIONS IN MILLIMETRES DRG No: F0628 Part No: 74-00010X	Weight: N/A Sheet: 2 of 2 Revision: C
Drawing No: _____ Reference Drawings: _____ N/A	IF IN DOUBT CONTACT ESS ENGINEERING DEPARTMENT ESS ENGINEERING DEPARTMENT	



9.0 FINAL CHECKLIST

Site: _____ Number: _____ Date: _____

Site Equipment No./Location: _____ Site Contact: _____

Completed By: _____ (Circle Yes or No Below)

1. Was equipment to ESS Specification? _____ Yes/No

Drawing No. Ref: _____ Attached? Yes/No

If No, WHY _____

Will this affect performance? Yes/No,

If Yes, WHY _____

2. Was this a standard service inspection installation? Yes/No

If No, WHY _____

3. Was work carried out as per procedure and JSA? Yes/No

If No, WHY _____

4. Is equipment fit for commissioning? Yes/No

If No, WHY _____

5. Was a final inspection carried out while plant was running? Yes/No

If No, WHY _____

6. Has anything changed from previous service / inspection / installation? Yes/No

If Yes, WHAT _____

7. Is equipment performance to Client expectations? Yes/No

If No, WHY _____

ESS Signature: _____ Client Signature: _____

