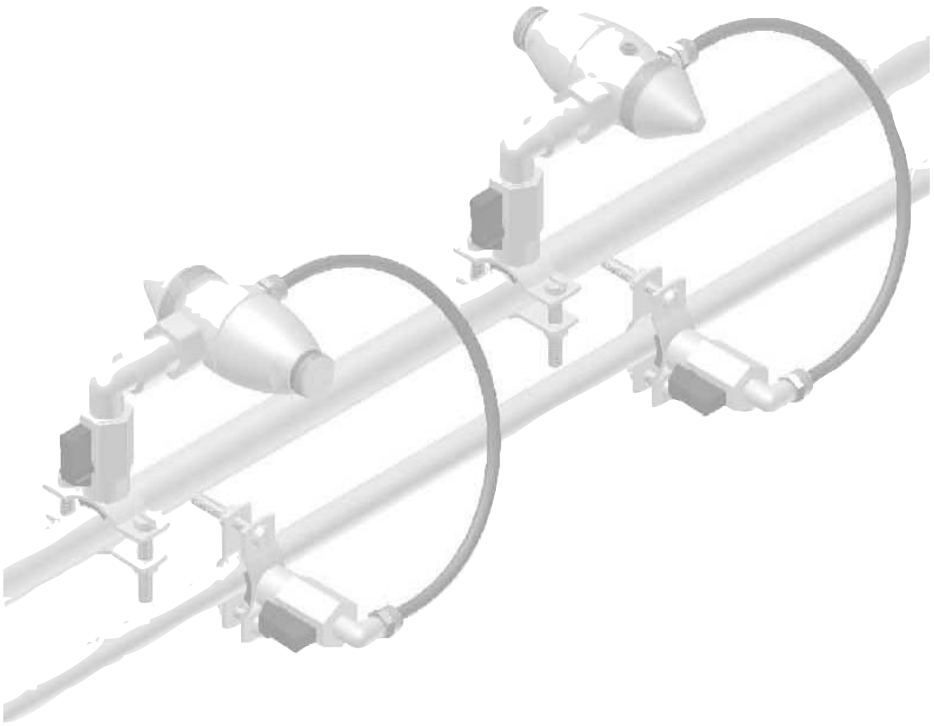
JS JetSpray Atomising Nozzle System
Humidifier Manual

Installation, Commisioning, Operation and Maintenance

JS60 / JS600 / JS600DS / JS600M
Version 1.20 (UK) 13/12/07



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FOREWORD:
This manual has been written to ensure the safe use, performance and longevity of the equipment and is intended for use by engineers and properly trained technical personnel.

Please read this manual thoroughly before specifying, designing or installing a JS JetSpray system. Retain for reference.

JS Humidifiers plc policy is one of continuous research and development. JS Humidifiers plc reserves the right to amend, without notice, the specifications provided in this document.

JS Humidifiers plc does not guarantee, or accept liability for, the accuracy of information in this document.

HEALTH AND SAFETY:
Installation, maintenance, repair work or de-commissioning should only be carried out by appropriately qualified and properly trained technical personnel. It is the customers responsibility to ensure their suitability. The customer is responsible for ensuring that the installation of the equipment complies with all local regulations.

Any risks or hazards relating to the system, including during installation and maintenance, should be identified by a competent Health & Safety representative who shall be responsible for introducing effective control measures as necessary.

WARNING: Always isolate all supplies to the system before commencing any maintenance or repair.

COSHH and Personal Protective Equipment:
Refer to HSE for information on the Control Of Substances Hazardous to Health and recommendations with regard to Personal Protective Equipment including Respiratory Protective Equipment.

HYGIENE:
Your attention is drawn to the local Health & Safety Executive's technical guidance on the control of Legionellosis in water systems. If inadequately maintained, water systems, of which any humidifier is a part, can support the growth of micro-organisms, including the bacterium that causes Legionnaires' disease. JS Humidifiers plc has considered all aspects of this equipment to reduce as far as possible the risk of Legionnaires' disease and other similar conditions, but it is important that users are aware of their responsibilities under the ACoP in reducing the risk of Legionellosis.

To prevent the growth of Legionella, users are required to:

1. Carry out a risk assessment of the water system using a competent person, and implement an appropriate monitoring and control regime.
2. Avoid water temperatures which favour the growth of Legionella.
3. Avoid water stagnation.
4. Clean and disinfect the system in accordance with the Health & Safety Executives technical guidance and instructions in this manual.
5. The JetSpray humidification system MUST be connected to a clean, potable mains water supply. It is the responsibility of the user to ensure that the water system complies with local regulations and bylaws, particularly those for the control of Legionella bacteria (such as the HSE ACoP L8, The control of Legionella bacteria in water systems). The use of mains water fed tanks and reservoirs is only permitted as part of a managed water treatment system..

WARNING: This humidifier must be installed, operated and maintained in accordance with this manual. Failure to do so could result in contamination that might cause Legionnaires' disease, which can be fatal.

CORRECT USE:
The JetSpray humidification system is intended for adiabatic humidification and cooling. Any other, or further, application is not considered use for the intended purpose. JS Humidifiers plc cannot be made liable for any damage or injury attributable to inattentive, inappropriate, negligent or incorrect operation of the equipment whether or not caused deliberately.

Caution: To prevent water stagnation and bacterial contamination, this humidifier should be left switched on continuously. If the system is switched off for prolonged periods, the pipework should be disinfected as per instructions and a full risk assessment undertaken to ensure safe operation.

WARRANTY:
JetSpray parts are warranteed for 1 year from invoice date with the exception of replacement items listed in the routine maintenance section. Failure to observe the manufacturers installation and maintenance recommendations and instructions will invalidate the warranty. JS Humidifiers plc cannot be made liable for damage or injury attributable to failure to observe the manufacturers installation and maintenance recommendations and instructions.

Contents

Guide to symbols used within this manual


Instructions relating to safety.


Instructions relating to the correct operation of the unit.

Product Accreditation

CE Declaration

Directive(s) Applied:	EN60204-1:2006 EN61000-6-1:2001 EN61000-6-3:2001 EN13779:2007
Standard to which conformity is declared:	Electromagnetic Compatibility Directive 89/336/EEC Low Voltage Directive 73/23/EEC Ventilation for non-residential buildings. Performance requirements for ventilation and room conditioning systems EN13779:2007
Named Individual:	Stephen Verney
Position:	Managing Director
Address:	JS Humidifiers plc Artex Avenue, Rustington Littlehampton, West Sussex. BN16 3LN. (UK)
Product Description:	JetSpray™ Humidification System
Model Designation:	JS60 / JS600 / JS600DS / JS600M
Signature:	
Date:	December 2007

Water Regulations Advisory Scheme (WRAS):

The WRAS Approval scheme ensures that the JetSpray™ humidification systems comply with water regulations to prevent the contamination, mis-use, excess consumption or wastage of the mains water supply.

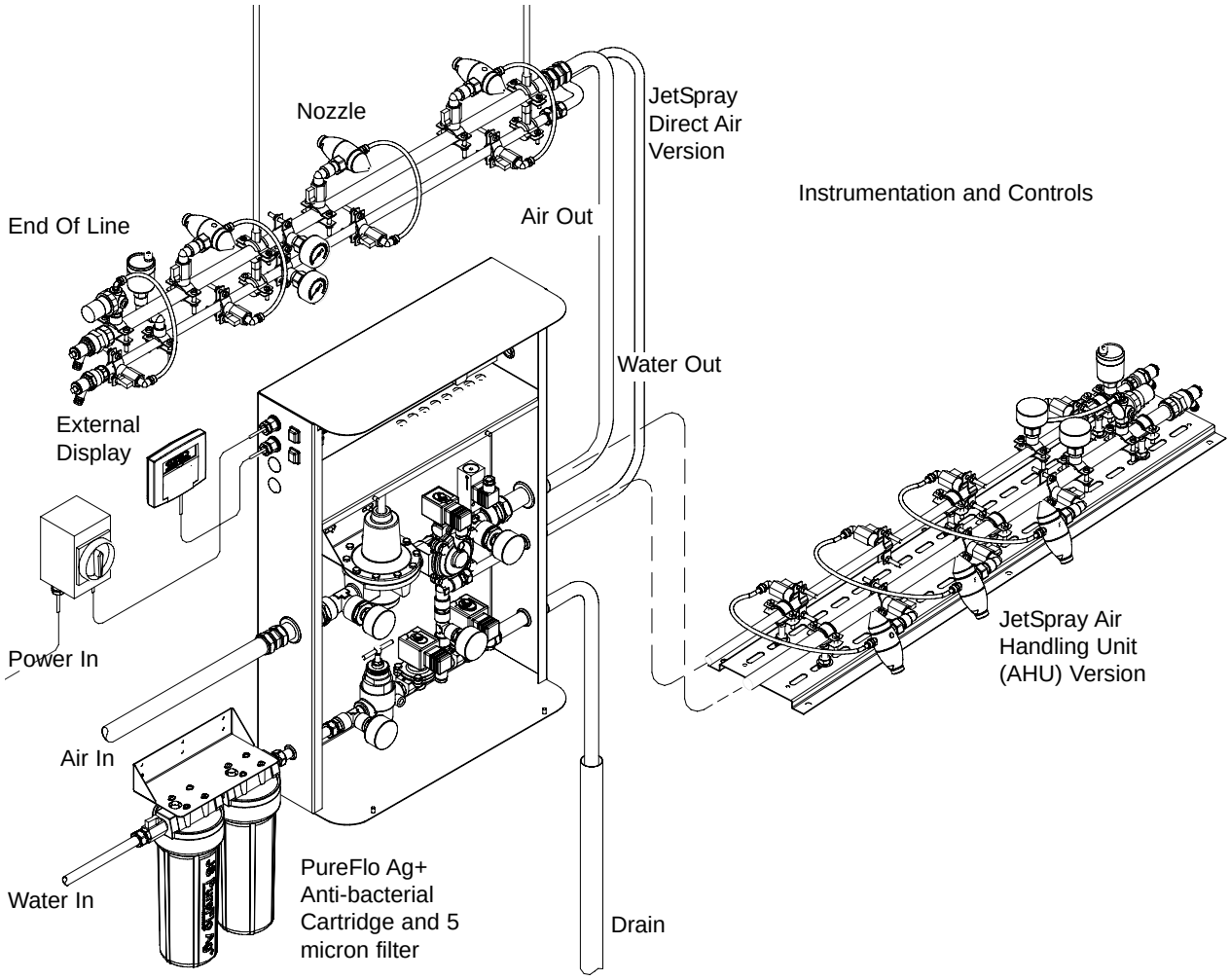
Approval Number:	0706073
Expiry Date:	13th June 2012

VDI6022 Institute For Hygiene:

The VDI Approval scheme ensures that JetSpray™ humidification systems comply with the following standards to ensure the hygiene of air handling system equipment.

Directive(s) Applied:	VDI6022 Part 1	- HVAC System Hygiene
	VDI3803	- HVAC System Hygiene
	DIN EN13779	- European Norm: HVAC System Hygiene
	DIN1946 Tiel 4	- European Norm: HVAC System Hygiene
	ONORM H602	- HVAC System Hygiene
	ONORM H6020-1	- HVAC System Hygiene
	SWKI VA104-01	- HVAC System Hygiene
	SWKI 99-3	- HVAC System Hygiene
Expiry Date:	November 2010	

Typical System Overview



Specification

	JS60	JS600	JS600DS	JS600M
Output Range	0-60l/h	0-600l/h	0-600l/h	0-600l/h
Control Tolerance	+/-4%rH	+/-4%rH	+/-3%rH	+/-2%rH
Microprocessor & Remote Interface	No	No	Yes	Yes
Modulating Control	No	No	No	Yes
Sensor / Analogue Control (0-10V, 2-10V)	No	No	Yes	Yes
On/Off Control	Yes	Yes	Yes	Yes
Service Interval Counter	No	No	Yes	Yes
Dimensions (Width x Height x Depth) mm	380 x 535 x 160	520 x 750 x 200	520 x 750 x 200	520 x 750 x 200
Weight	15kg	30kg	30kg	30kg

Nozzle Output (l/hr)	**2.5**	**3.5**	**4.5**	**5.5**	**6.5**	**9.0**	**12.0**	**15.0**
Air Consumption per nozzle SCFM	0.32	0.44	0.57	0.69	0.82	1.13	1.51	1.89
Air Consumption per nozzle CFM Free Air Delivery	0.8	1.1	1.4	1.7	2.0	2.7	3.6	4.6
Air Consumption per Nozzle m^3/h	0.55	0.75	0.97	1.18	1.40	1.92	2.57	3.21

All JetSpray control panels are rated to IP54 (External Display IP44). For outdoor use, an appropriate weatherproof rated enclosure is required. Contact JS Humidifiers for details.
Humidity tolerance is subject to temperature control.
All JetSpray systems incorporate the PureFlo Ag+ anti bacterial silver dosing system.

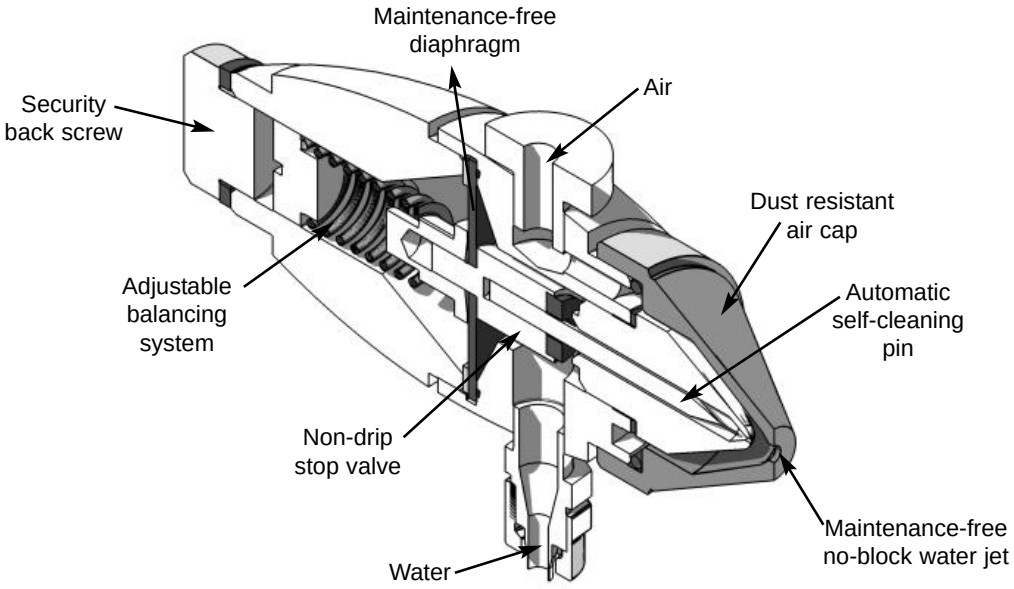
JS60 / JS600 / JS600DS / JS600M Principle of Operation.

The JS JetSpray™ Humidification System consists of the required number of JetSpray atomising nozzles of appropriate output, together with a JetSpray control panel. The system is designed for direct air, or in-duct humidification in industrial applications; being installed by the manufacturer or distributor, or supplied in a form suitable for installation by in-house technical staff or contractors. Each system is pre-commissioned at the factory and every control panel includes PureFlo Ag+ with Argentosan™ for hygienic humidification.

All systems use air and water under pressure to produce finely atomised sprays which rapidly evaporate to raise the relative humidity to the desired level. Pressure and flow regulation is via the control panel which also incorporates fail safe devices. Operation is fully automatic and regulated by a humidity sensor, humidistat or external controls.

The system is designed for use with potable mains or treated water and is completely sealed and with no open tanks, ensuring freedom from contamination and a healthy working environment. Other water sources may be used, including a de-mineralised water supply. If using demineralised water purer than 60 ppm, then stainless steel pipes and nozzles should be used. Demineralised water quality should not exceed 2 meg ohm.

JetSpray atomising nozzles are fabricated in nickel plated brass, incorporating a stainless steel cleaning pin and diaphragm, with water seal. Air and water under pressure do not mix until they reach the nozzle where they mix at the nozzle tip and atomise to produce a finely atomised spray.



When the relative humidity drops below the set level, the air solenoid valve within the control panel opens in response to a humidity demand. When air pressure is at a sufficient level to cause atomisation, a pressure switch activates the water solenoid valve, allowing water to flow to the nozzles. Water cannot flow, therefore, without adequate air pressure. Air and water valves close when the desired level of relative humidity has been achieved, preventing air and water flow to the nozzles. Whenever the system switches off, pressure within the water line is immediately relieved via the drain line while compressed air continues to flow through the nozzle. This allows the water valves in the nozzles to shut off cleanly, preventing drips. After the air run-on period, a stainless steel cleaning pin is pushed through the orifice of the water jet, removing any mineral deposits.

The JS600M includes a modulating valve and flow sensor which monitor and control the output of the system. The JS600M modulates its output up to a preset limit in the software to achieve close control.

During prolonged periods where humidity is not required the humidifier will use periodic purge and nozzle flush cycles to prevent water stagnation and inhibit any bacterial growth. The control panel MUST be left powered on at all times for these safety features to function.

The control panel is supplied with a PureFlo Ag+ silver cartridge which must be installed in the water line prior to the control panel. PureFlo Ag+ with Argentosan^{TM} has been developed to inhibit the growth of bacteria, moulds and fungi in concentrations normally found in potable water supplies. Argentosan is not a disinfectant and will not kill all microbes in contaminated water. It is therefore important that the quality of the water supplying the humidifier is monitored and controlled regularly according to the risk assessment for your building.

The cleaning cycle is the periodic function of relieving the water pressure in the nozzle to allow the cleaning pin to push forward and clear any foreign matter or scale from the water jet. The frequency of the cleaning cycles is set dependent upon the quality of the incoming water supply.

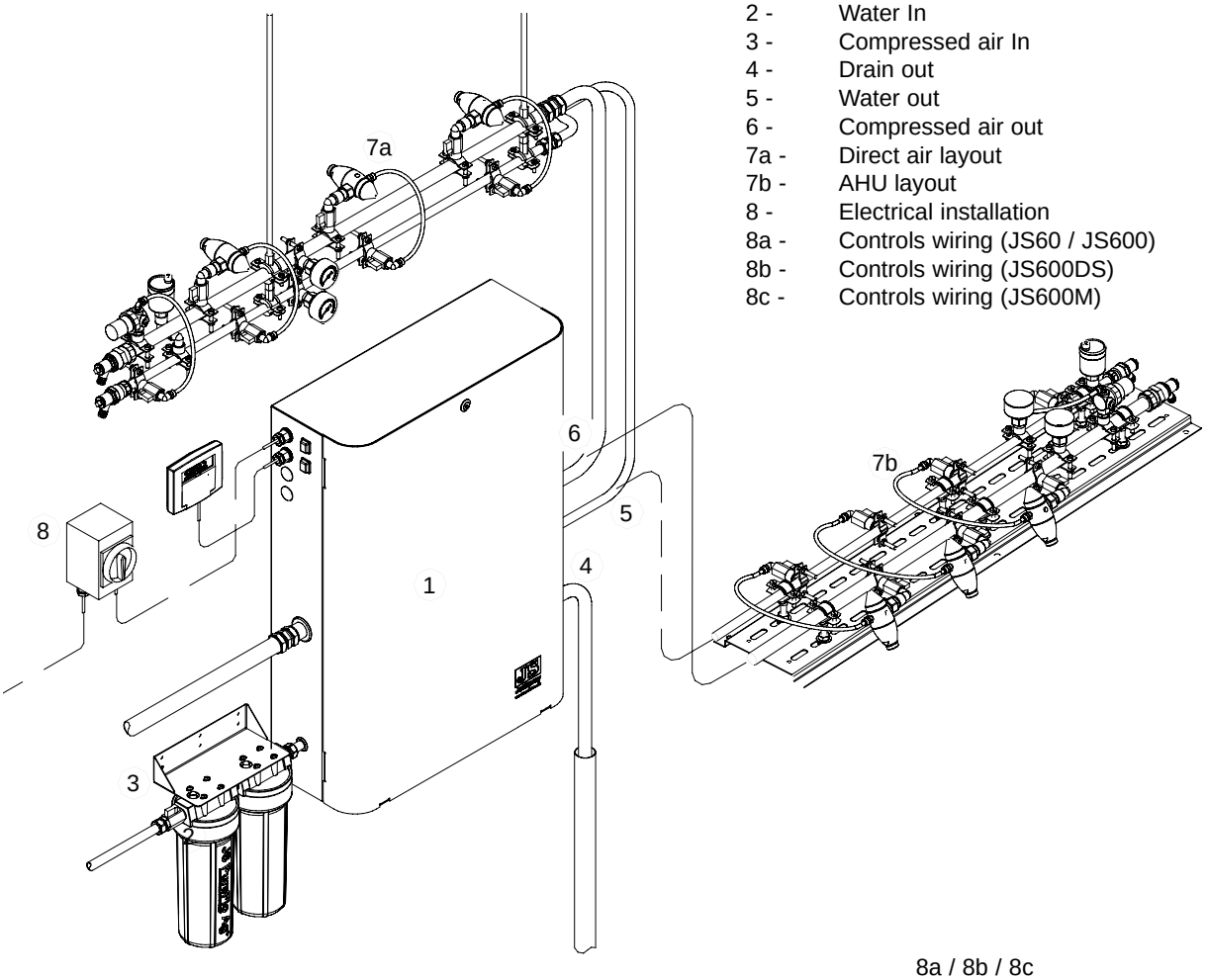
The air run on cycle ensures the nozzles do not drip or expel water when the JetSpray system switches off. This is achieved by leaving the air on to the nozzles until the water line has been completely relieved of water pressure. The duration should be set depending upon the length of the water nozzle line.

During periods of low humidity demand the Nozzle flush cycle will periodically initiate a humidity demand to bring the system on and keep the JetSpray clear of any possible water stagnation. The default frequency is set at every 4 hours the duration is set at 5 mins. This frequency must not be changed without consultation with JS Humidifiers. During commissioning it must be checked that this is sufficient time to fill the system pipework and spray through the nozzle for 2 minutes or more. If necessary increase this time accordingly as per the programming instructions in this manual.

Periodically the humidifier will purge water to drain to ensure the feed water supply is kept fresh and clear of any water stagnation. The duration of this purge should be set dependent upon the length of supply water pipe-work as described in the commissioning section of the manual.

Installation Overview

1 - Positioning the unit
2 - Water In
3 - Compressed air In
4 - Drain out
5 - Water out
6 - Compressed air out
7a - Direct air layout
7b - AHU layout
8 - Electrical installation
8a - Controls wiring (JS60 / JS600)
8b - Controls wiring (JS600DS)
8c - Controls wiring (JS600M)



8a / 8b / 8c

Installation Service:

JS Humidifiers plc offers an installation and commissioning service.

Services available include:

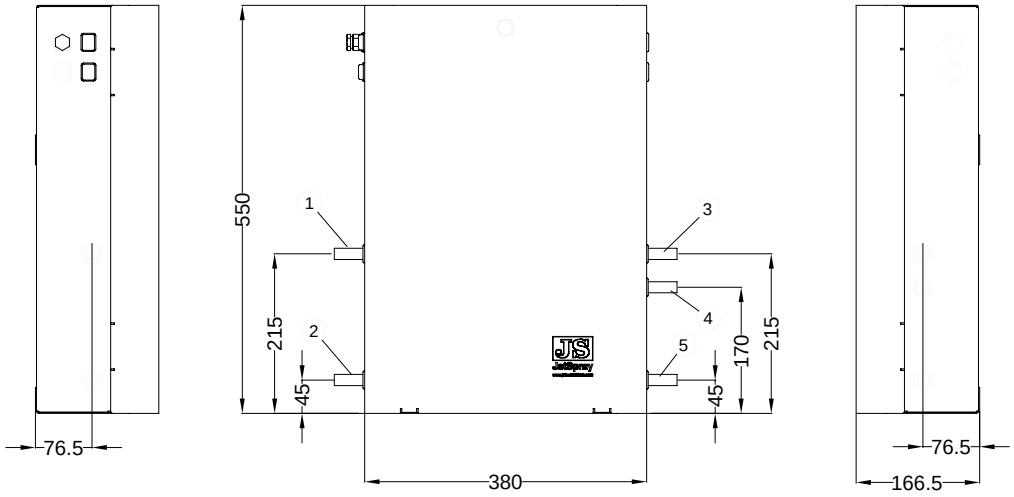
- Site surveys.
- Turnkey packages.
- Contract management.
- Management of site health & safety.
- Risk management.
- Preparation of operation & maintenance documentation & drawings.
- Client demonstration and hand over.

In accordance with the Health & Safety at Work Act 1974 and subsidiary regulations, only trained operatives meeting the health and safety standards dictated by Construction Skills Certification Scheme (CSCS) are used on JS Contracts.

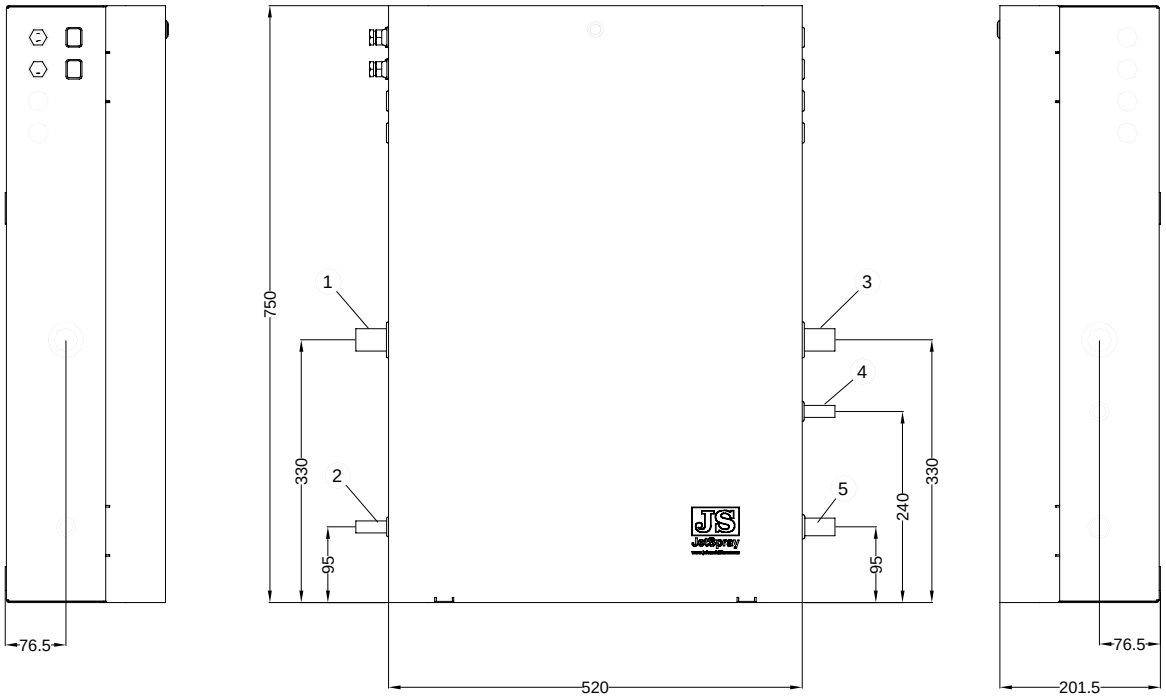
JS Humidifiers are compliant with the government's "Contractors Health & Safety Assessment Scheme" (CHAS), and meet the requirements of "SAFE", the contractor accreditation scheme for business.

For further information, please contact your local areas sales manager or JS Head Office on **+44(0)1903 850 200**

JS60 Overall Dimensions and Pipe Positions

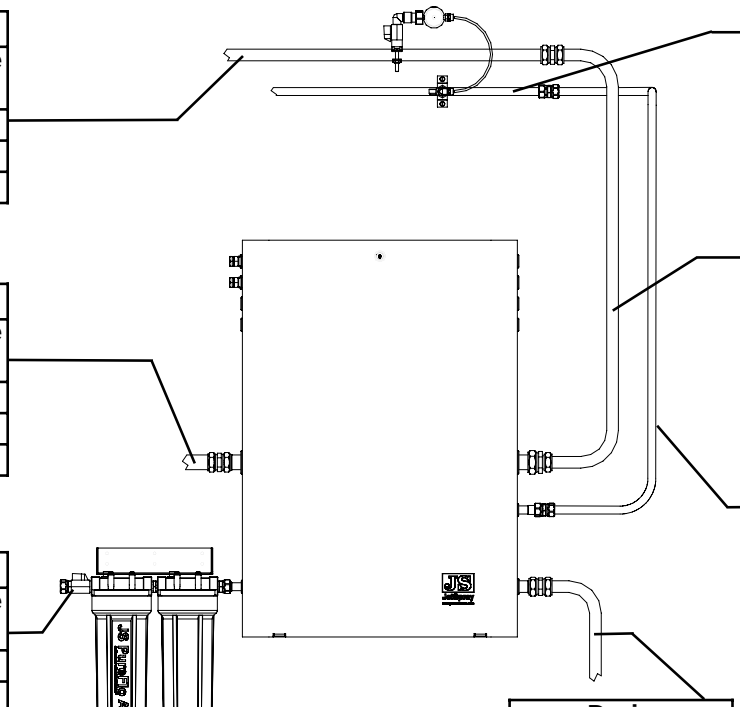


JS600 / JS600DS / JS600M Over All Sizes and Pipe Positions



	1 - Air Inlet	2 - Water Inlet	3 - Air Outlet	4 - Water Outlet	5 -Drain
JS60	15mm	15mm	15mm	15mm	15mm
JS600 / JS600DS / JS600M	28mm	15mm	28mm	15mm	22mm

Pipe Sizes



Air Nozzle Line	
Output l/hr	Pipe size mm
0 - 60	15
60 - 300	22
300 - 600	22

Water Nozzle Line	
Output l/hr	Pipe size mm
0 - 60	15
60 - 300	15
300 - 600	15

Air Feed Line	
Output l/hr	Pipe size mm
0 - 60	15
60 - 300	22
300 - 600	28

Air Riser Line	
Output l/hr	Pipe size mm
0 - 60	15
60 - 300	22
300 - 600	28

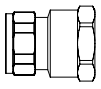
Water Feed Line	
Output l/hr	Pipe size mm
0 - 60	15
60 - 300	15
300 - 600	15

Water Riser Line	
Output l/hr	Pipe size mm
0 - 60	15
60 - 300	15
300 - 600	15

Drain	
Output l/hr	Pipe size mm
0 - 60	15
60 - 300	22
300 - 600	22

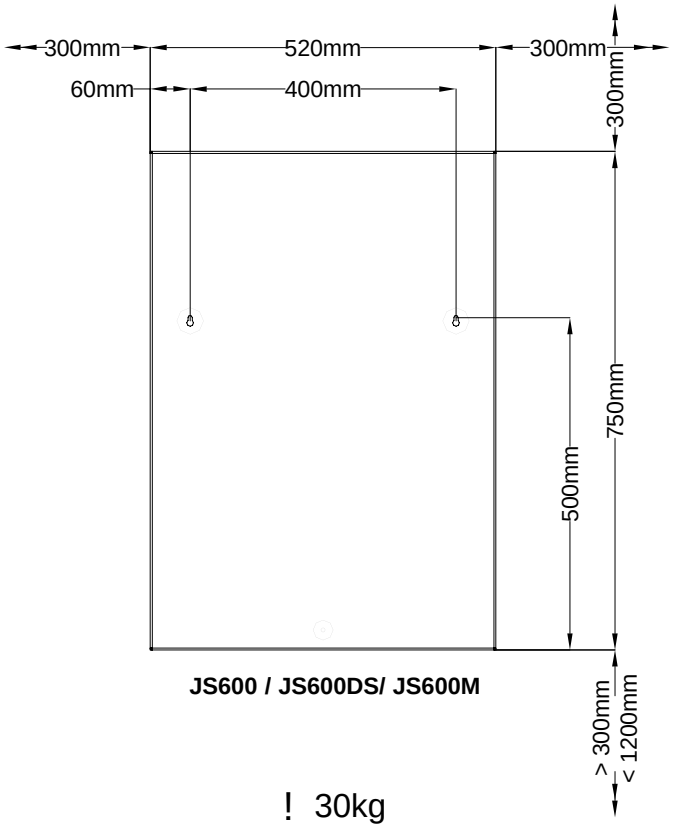
Image indicates recommended UK pipe sizes. EU and US pipework adaptors (available from JS Humidifiers) may be required if installing overseas. Please see table below.

Installation Kits (Option)

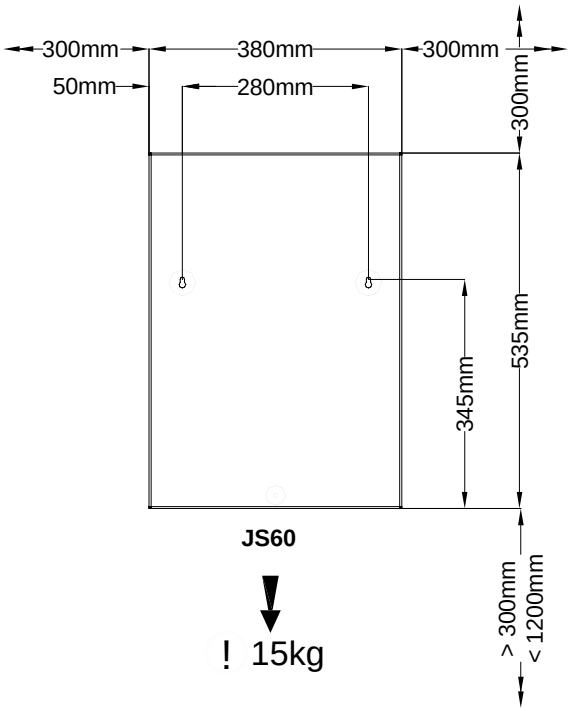
Kit Number	Image	Description	Quantity
OPTION60EU		15mm - 16mm Adaptor.	5
OPTION60US		15mm - 1/2" BSP Adaptor.	5
OPTION600EU		15mm - 16mm Adaptor.	2
OPTION600US		15mm - 1/2" BSP Adaptor.	2
		28mm - 1" BSP Adaptor.	2
		22mm - 3/4" BSP Adaptor.	1

NB: Connection points are pipe spigots unless adaptor kits for EU / US are purchased separately.

1 - Positioning the Unit



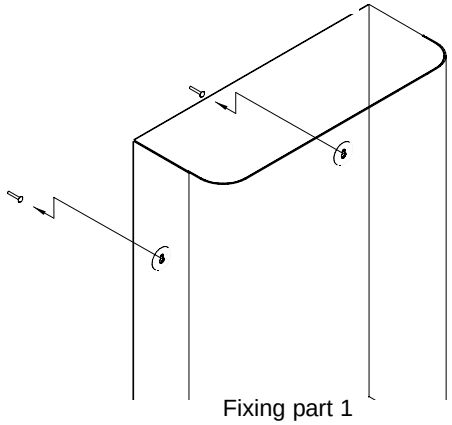
JS600 / JS600DS/ JS600M



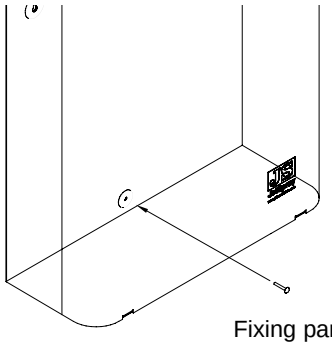
JS60

! 15kg

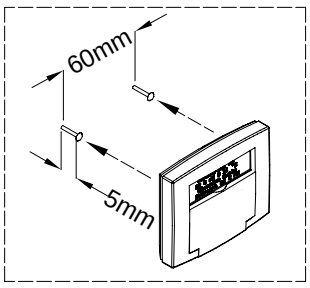
! 30kg



Fixing part 1



Fixing part 2



JS600DS / JS600M

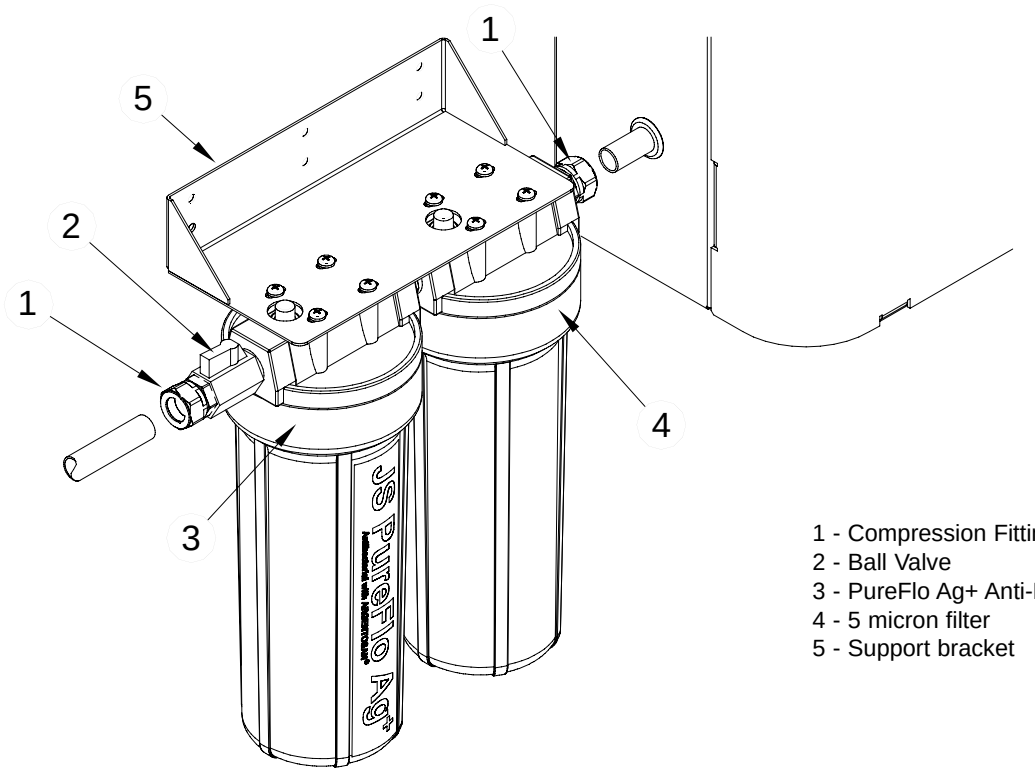
Caution: Ambient Conditions:

Temperature	5-45 °C
Humidity	< 85% rH

NB: Ensure that the JetSpray system is accessible for maintenance.

The JetSpray system should not be installed where it will be subjected to continuous vibration.

2- Incoming Water Supply



1 - Compression Fitting
2 - Ball Valve
3 - PureFlo Ag+ Anti-Bacterial Cartridge
4 - 5 micron filter
5 - Support bracket

Connection Size

JS60			**JS600 / JS600DS / JS600M**		
Standard	**EU** (OPTION60EU)	**US** (OPTION60US)	**Standard**	**EU** (OPTION600EU)	**US** (OPTION600US)
15mm	16mm	1/2” BSP F	15mm	16mm	1/2” BSP F

NB: Connection points are pipe spigots unless adaptor kits for EU / US are purchased separately.

Caution: 1. Before connecting the water line to the control panel purge the line to ensure any flux or foreign matter left over from the installation is removed. Failure to do so could cause component failure or result in water damage.

2. The JS PureFlo Ag+ is an anti-bacterial cartridge which uses silver to inhibit bacterial growth. To ensure the hygiene of the JetSpray system, The JS PureFlo Ag+ must be fitted and maintained in accordance with this manual.

Warning: Please note: Argentosan has been developed to inhibit the growth of bacteria, moulds and fungi in concentrations normally found in potable water supplies. Argentosan is not a disinfectant and will not kill all microbes in contaminated water. It is therefore important that the quality of the water supplying the humidifier is monitored and controlled regularly according to the risk assessment for your building. The JetSpray MUST be connected to a clean, potable mains water supply. The use of mains fed tanks or reservoirs is only permittedas part of a managed water treatment system.

3. A WRAS approved double check valve (OPTION) must be installed on the water inlet to comply with WRAS guidelines in the United Kingdom.

4. It is recommended that an additional isolator and tee point is fitted before the JetSpray panel to allow the water supply line to be flushed, or for routine water sampling and cleaning / disinfection.

Supply Water Requirements

Pressure (Min/Max): 4 - 7 Bar (58 - 102 PSI) without significant fluctuation.

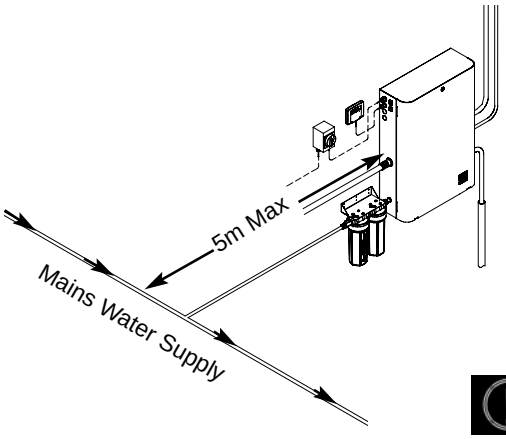
Water Supply: The JetSpray humidification system MUST be connected to a clean, potable mains water supply. It is the responsibility of the user to ensure that the water system complies with local regulations and bylaws, particularly those for the control of Legionella bacteria (such as the HSE ACoP L8, The control of Legionella bacteria in water systems). The use of mains water fed tanks and reservoirs is only permitted as part of a managed water treatment system.

Purity: Reverse osmosis/demineralised water must have maximum resistivity of 2 megohm-cm.

Temperature: Water supply must run at 20 Degrees Centigrade or less within 2 minutes of switch ing on the supply.

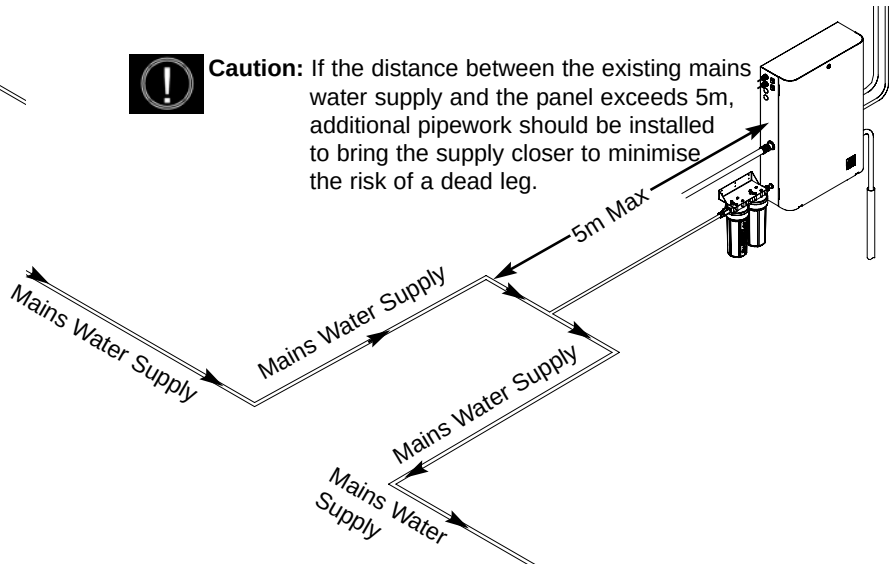
Turbidity: Less than 2 NTU (Additional filtration will be required if turbidity exceeds this level).

Pipe-work Materials: Copper is the preferred material for the JetSpray system. PVC-U plastic or stainless steel are suitable alternatives. NB: When using reverse osmosis or demineralised water with purity better than or equal to 60ppm, stainless steel pipes must be used. DO NOT USE IRON, STEEL OR GALVANISED PIPE as they are susceptible to scaling, flaking and corrosion. They also provide an excellent habitat that will support microbiological growth. Materials such as natural rubber, hemp, linseed oil based jointing compounds and fibre washers should not be used. Materials and fittings acceptable for use in water systems are listed in the directory published by the Water Research Centre.

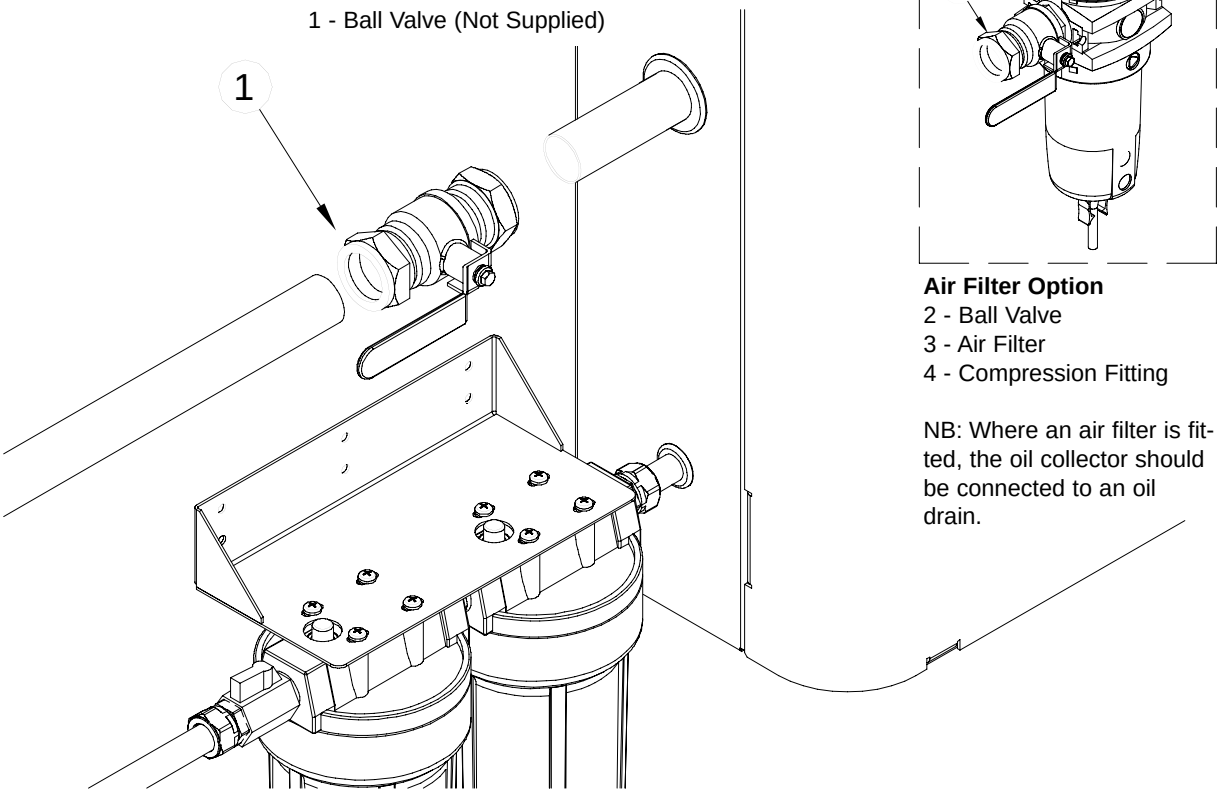


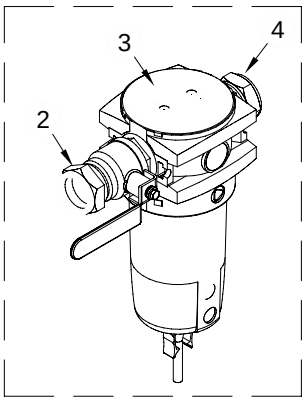
Warning: To minimise the risk of dead leg, ensure that the distance between the existing water supply and the panel does not exceed 5m. Ensure the water system is so designed and constructed that it will be safe and without risks to heath when used.

Caution: If the distance between the existing mains water supply and the panel exceeds 5m, additional pipework should be installed to bring the supply closer to minimise the risk of a dead leg.



3 - Incoming Compressed Air Supply





Air Filter Option
2 - Ball Valve
3 - Air Filter
4 - Compression Fitting

NB: Where an air filter is fitted, the oil collector should be connected to an oil drain.

Caution: Before connecting the air line to the control panel, purge the line to ensure any flux or foreign matter left over form the installation is removed. Failure to do so could cause component failure.

Connection Sizes

JS60			**JS600 / JS600DS / JS600M**		
Standard	**EU** (OPTION60EU)	**US** (OPTION60US)	**Standard**	**EU**	**US** (OPTION600US)
15mm	16mm	1/2” BSP F	28mm	28mm	1” BSP F

NB: Connection points are pipe spigots unless adaptor kits for EU / US are purchased separately.

Supply Air Requirements

Pressure (Min/Max): 4.5 - 10 Bar (65 - 145 PSI)

Purity: Air supply should be clean, dry and free from oil. If this cannot be guaranteed an air filter and oil separator should be used. Where an air filter is fitted, the oil collector should be connected to an oil drain.

Pipe-work Materials: To prevent bacterial growth, pipework must be non-corrosive and any jointing material used must be free of nutrients that could cause microbial growth.

Air Consumption: 0.1254 scfm/litre
0.29cfm/litre
6scfm/100lbs
0.213m^3/h

Nozzle Output (l/hr)	2.5	3.5	4.5	5.5	6.5	9.0	12.0	15.0
Air Consumption per nozzle SCFM	0.32	0.44	0.57	0.69	0.82	1.13	1.51	1.89
Air Consumption per nozzle CFM Free Air Delivery	0.8	1.1	1.4	1.7	2.0	2.7	3.6	4.6
Air Consumption per Nozzle m^3/h	0.55	0.75	0.97	1.18	1.40	1.92	2.57	3.21

Attention should be paid to BCAS (British Compressed Air Society) guide to selection and installation of compressed air systems.

Particular attention should be paid to compressor location, air intake location, noise considerations, and discharge considerations. Notice should be taken of condensate piping requirements and discharge considerations to ground or sewers.

(1) It is important that the air supply to the control panel is clean and dry. Oil must also be removed from the compressed air through the use of oil removal filters.

(2) All air compressors will produce moisture. Excessive amounts of water in the air lines will reduce nozzle performance, and in extreme cases will prevent the nozzle from producing any mist. A receiver is recommended which must be drained daily to ensure moist air does not enter the humidification system. As this condensate may be dirty or even oily, it is important to consider its effect on the environment, including Legionnaires' disease.

(3) Current legislation places responsibility on the user to ensure that condensate passing into the drainage system is as clean as possible. Suitable treatment equipment is available from JS. JS Humidifiers plc recommend the use of filters both after the receiver and before the humidifier (OPTION).

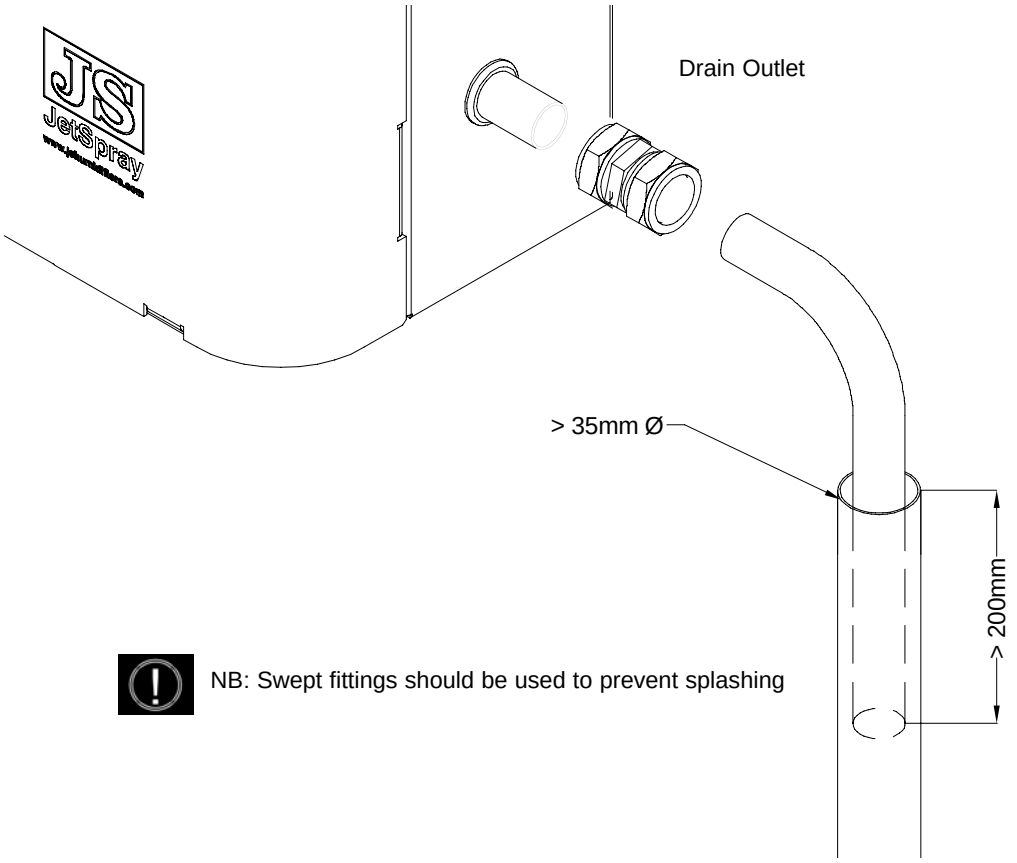
(4) When sizing a compressor it is suggested that a safety margin of 20% is added.

(5) Most good quality screw compressors incorporate an after-cooler. If not fitted, however, one should be used when the air consumption exceeds 85m^3/hr (50cfm), or if it is recommended by the air compressor manufacturer. All air consumption figures quoted relate to ISO1217, the free air delivery.

(6) A dryer is not usually necessary. However, where there is a high risk that condensation might form in the pipework, (for example, in an un-insulated pipe run outside a building or in low temperature environments), a dryer may be needed. If a desiccant dryer is used, this can reduce effective air supply by up to 20%. (Check with your supplier).

(7) Air pressure loss can be managed by reduction in the air pipe length, elimination of unnecessary elbows, valves and any flow restrictions, increasing the diameter of the primary delivery pipe to the zones and elimination of leaks.

4- Drain Water Outlet



Warning: An air gap must be incorporated to prevent any back contamination of the JetSpray system.

Caution: **1.** Observe water regulations

2. A minimum of 200mm up-stand is recommended to prevent any splashing when draining.

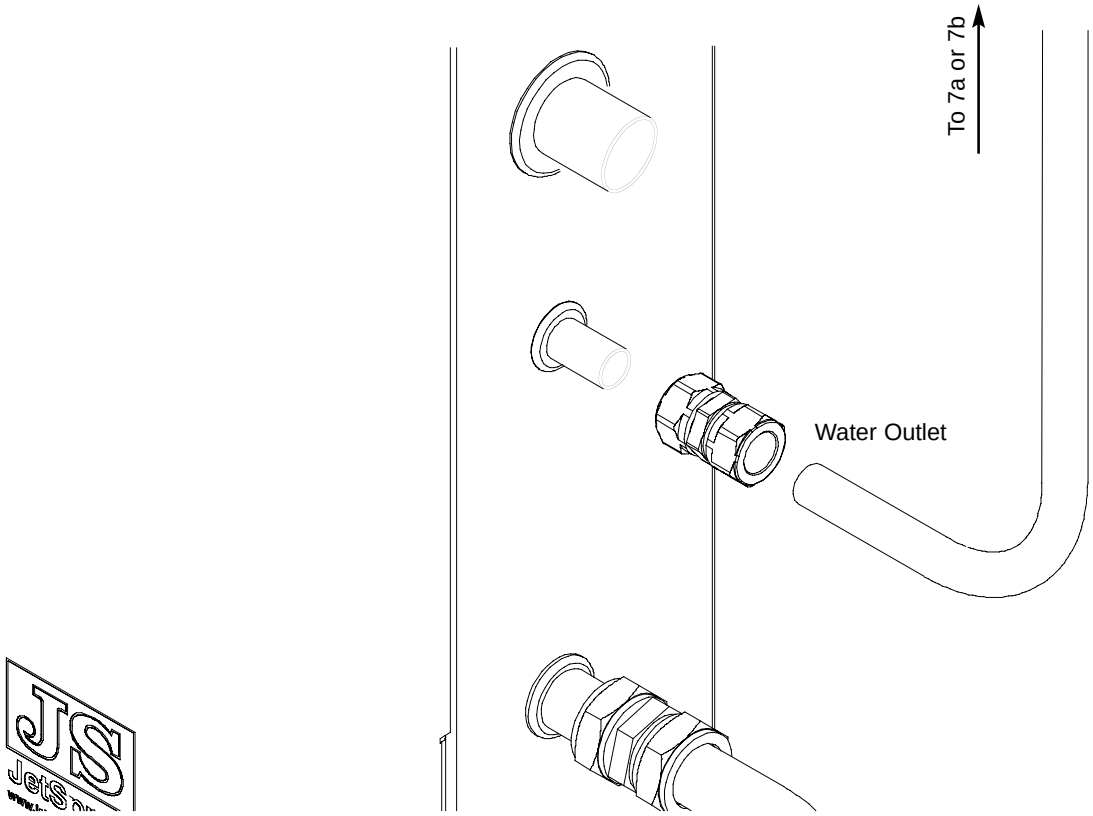
3. Where a gravity drain cannot be ensured (e.g. if the nozzle line is lower than the panel) an EOL BLOWDOWN must be fitted. This is a compressed air assisted drain via a pressure relief valve fitted at the end of the nozzle water line.

Connection Sizes

JS60			**JS600 / JS600DS / JS600M**		
Standard	**EU** (OPTION60EU)	**US** (OPTION60US)	**Standard**	**EU**	**US** (OPTION600US)
15mm	16mm	1/2” BSP F	22mm	22mm	3/4 BSP F

NB: Connection points are pipe spigots unless adaptor kits for EU / US are purchased separately.

5- Water Outlet

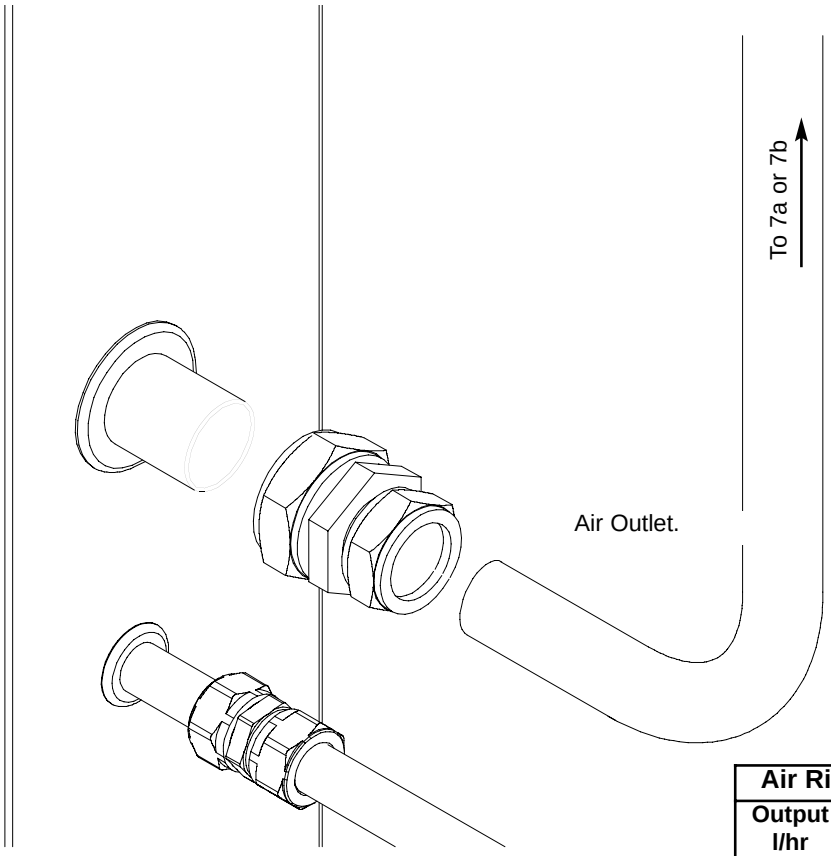


Connection Sizes

JS60			**JS600 / JS600DS / JS600M**		
Standard	**EU** (OPTION60EU)	**US** (OPTION60US)	**Standard**	**EU** (OPTION600EU)	**US** (OPTION600US)
15mm	16mm	1/2” BSP F	15mm	16mm	1/2” BSP F

NB: Connection points are pipe spigots unless adaptor kits for EU / US are purchased separately.

6- Compressed Air Outlet



Air Riser Line	
Output l/hr	**Pipe size mm**
0 - 60	15
60 - 300	22
300 - 600	28

Connection Sizes

JS60 Output 0-60 l/hr			**JS600 / JS600DS / JS600M**		
Standard	**EU** (OPTION60EU)	**US** (OPTION60US)	**Standard**	**EU**	**US** (OPTION600US)
15mm	16mm	1/2” BSP F	28mm	28mm	1” BSP F

NB: Connection points are pipe spigots unless adaptor kits for EU / US are purchased separately.

Nozzle Line assembly

The number of nozzles required will have been calculated by JS Humidifiers and the system designed to maintain the desired level of relative humidity. Each system is custom designed to suit each application, always consult JS Humidifiers for details of nozzle layout. Although minor changes (e.g. moving a nozzle assembly a little to avoid the spray hitting an obstruction) are tolerated by the system, complete changes of the layout could result in an unbalanced system that will not perform correctly. Ensure that all parts supplied are used in their correct order and direction of flow. Do not leave out any parts as they have a definite function in the operation of the system.

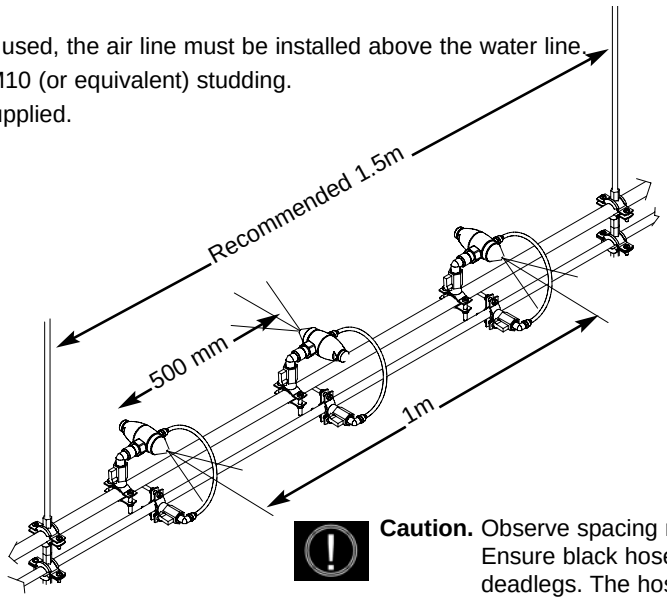
Installation

1. Copper is the preferred material for the JetSpray system. If using demineralised water purer than 60ppm, PVC- U plastic or stainless steel are suitable alternatives. DO NOT USE IRON, STEEL OR GALVANISED PIPE as they are susceptible to scaling, flaking and corrosion. They also provide an excellent habitat that will support microbiological growth. Materials such as natural rubber, hemp, linseed oil based jointing compounds and fibre washers MUST not be used. Materials and fittings acceptable for use in water systems are listed in the directory published by the Water Research Advisory Scheme.

2. All nozzles supplied by a single control panel MUST be installed at the same height otherwise unequal spray will be produced. The nozzle line pipework should be horizontal and straight. Pipework from the control panel to the nozzle line should be below the level of the nozzles. Avoid bends in pipework.

3. All nozzles must be installed above the control panel and at the same height to allow water to gravity drain.

4. Where JS pipe clips are used, the air line must be installed above the water line.
The JS pipe clips require M10 (or equivalent) studding.
The M10 studding is not supplied.



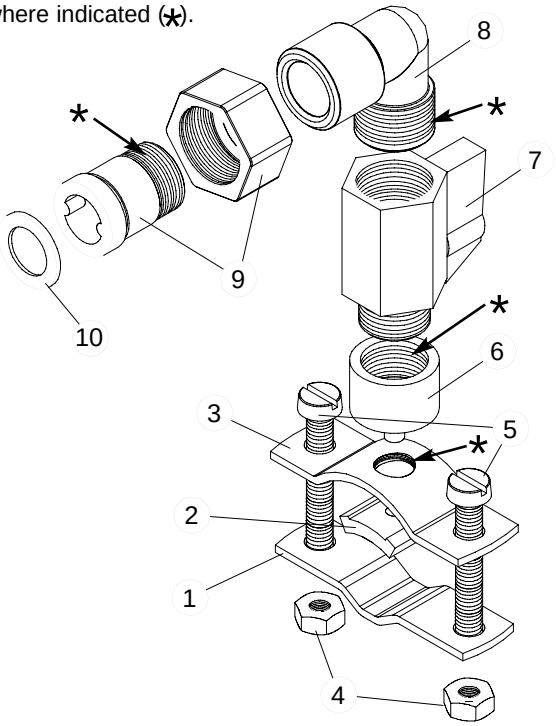
Caution. Observe spacing recommendations. Ensure black hoses are fitted without any deadlegs. The hose must have a continual fall to drain.

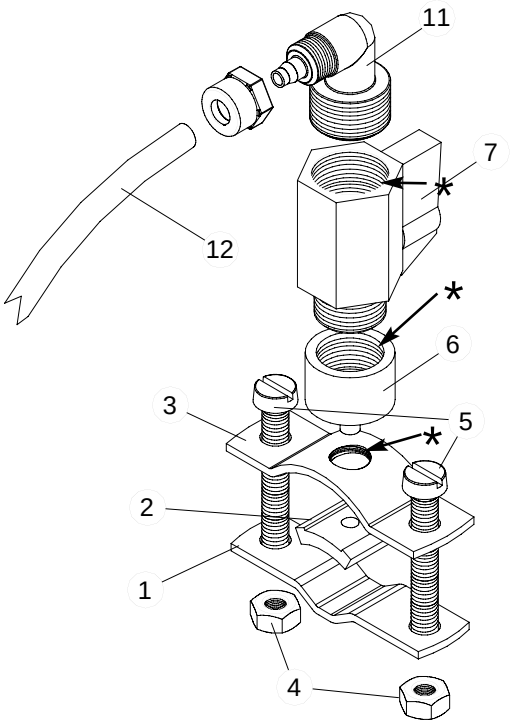
5. Do not mix nozzles of differing output capacities on the same nozzle line otherwise uneven and heavy sprays will result.

6. End of line valves should be installed at the ends of the air and water lines immediately after the final nozzles, (to avoid long dead legs), for purging during commissioning. Also included are pressure gauges for the air and water pipes to be installed at the same level as the nozzles. Pressures can then be monitored accurately as they will differ from those at the control panel. See “End of line detail”

Type G Fitting Assembly Details

7. Where using JS Type G (FITG) pipe fittings, air and water pipes should be drilled to 4.5mm (3/16") on the upper surface of the air pipe and side of the water pipe at the point where the nozzles are to be installed. Ensure that the hole is clean and free of burrs. Type G fittings are supplied in component form and should be assembled only using JS liquid pipe thread sealant (consult JS Humidifiers). Do not use jointing pastes and PTFE tape as fragments can break off and block nozzles. Do not over tighten the clamp assembly when fitting. Liquid pipe thread sealant should be used where indicated (*).





Item	Stock Code	Description	Item	Stock Code	Description
1	01590	Bottom Bracket	7	01348	3/8” Ball Valve
2	01590	Seal	8	01363	3/8” M/F Elbow
3	01590	Top Bracket	9	01366	Swivel Union
4	01590	Nuts	10	01369	Nozzle Side Washer
5	01590	Bolt	11	01345	3/8”-6mm M/F Tube Elbow
6	01073	Adaptor	12	HOSEID	6mm x 250mm Water Hose

Directions

Ensure components are clean and dry.
Apply sealant to the first two threads of the male fitting.
Connect the fittings together, a nimimum of hand tight plus half a turn with a tool.
Do not over tighten.
Do not make adjustments more than five minutes after making the connection.
Allow curing time of one hour before pressurising the system.

Safety

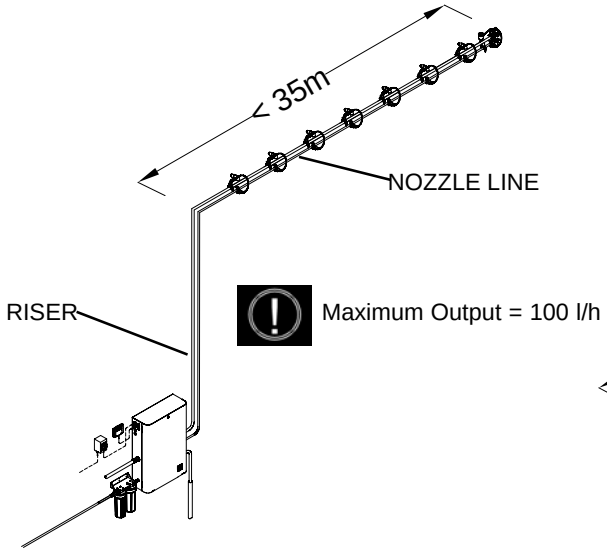
Permabond A131 is not considered hazardous by EEC standards, however, skin and eye contacts should be avoided.
In case contact is made, the following firs aid measures should be observed.

Eyes: Wash with clean water.
Skin: Wash with souap and water.
Inhalation: Remove to fresh air.
Ingestion: DO NOT induce vomiting. Drink milk or water to dilure stomach contents, seek prompt medical attention.

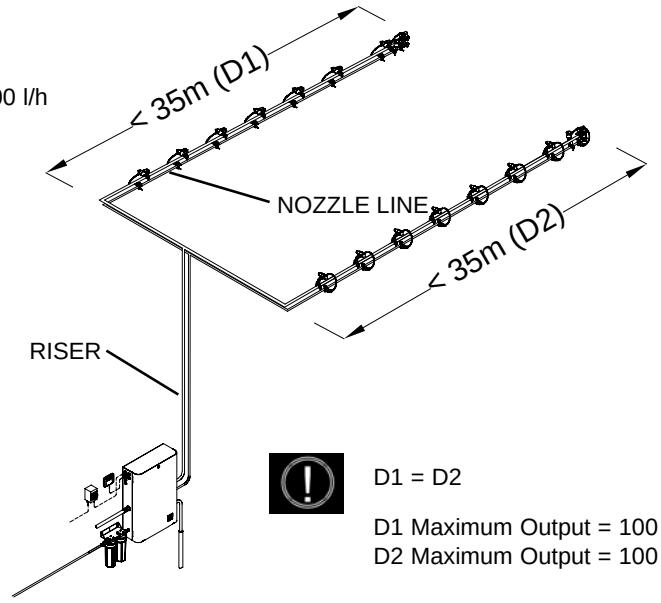
7a- Direct Air Layout

The following diagrams show different nozzle line configurations. Recommended maximum nozzle line lengths and nozzle outputs are included. NB: Please contact JS Humidifiers plc or your local distributor to assist in the design of a suitable line layout if your application cannot be accommodated by the examples shown.

Refer to the tables of pipe sizes to correctly size riser and nozzle line pipe diameters.

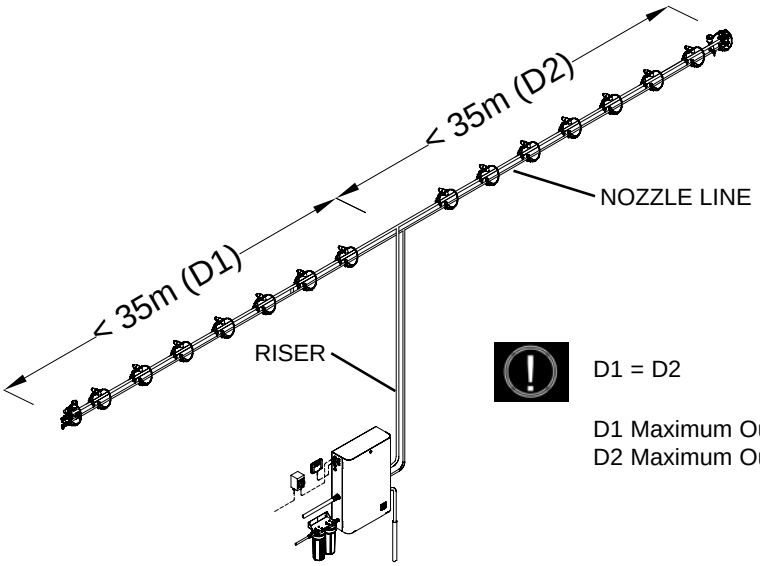


Maximum Output = 100 l/h



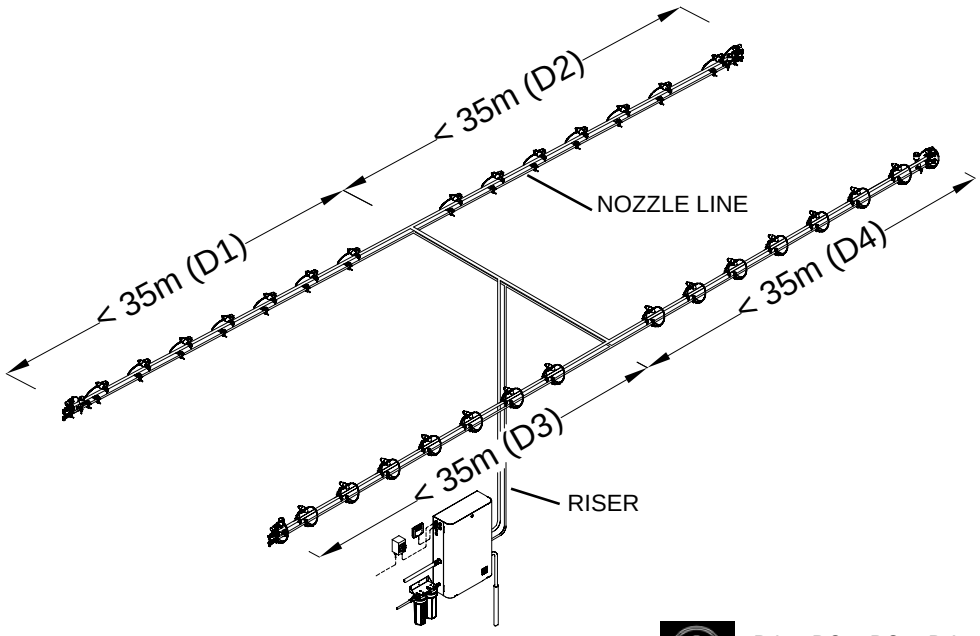
D1 = D2

D1 Maximum Output = 100 l/h
D2 Maximum Output = 100 l/h



D1 = D2

D1 Maximum Output = 100 l/h
D2 Maximum Output = 100 l/h



D1 = D2 = D3 = D4

D1 Maximum output = 100 l/h
D2 Maximum output = 100 l/h
D3 Maximum output = 100 l/h
D4 Maximum output = 100 l/h

Typically any obstructions in front of the nozzles should be a minimum distance of 5m away to avoid wetting. For applications where low temperature or high ambient conditions may occur, increase distance according to the table below.

Access to the nozzles must be provided to allow cleaning and disinfection.

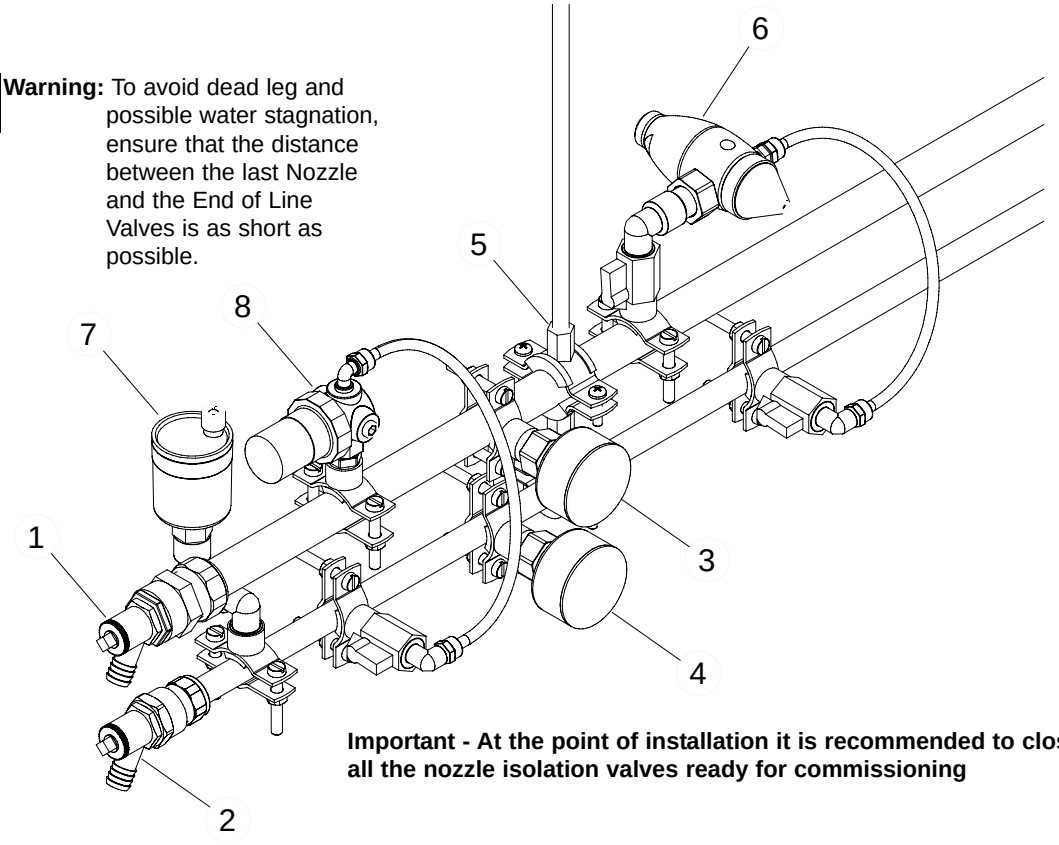
Nozzle size	**2.5**	**3.5**	**4.5**	**5.5**	**6.5**	**9.0**	**12.0**	**15.0**
Recommended installed height (m)	3.1	3.6	4.2	4.8	5.4	6.8	8.6	10.3
Maximum spray diameter (m)	0.6	0.8	0.9	1.0	1.2	1.6	2.0	2.4
Typical spray length (20-24°C @ <45%rH) (m)	2.8	3.0	3.3	3.6	3.9	4.6	5.5	6.4
Typical spray length (20-24°C @ 45-60%rH) (m)	3.5	3.9	4.3	4.6	5.0	6.0	7.1	8.3
Typical spray length (20-24°C @ >60%rH) (m)	4.2	4.7	5.2	5.7	6.2	7.3	8.8	10.2

JS Humidifiers plc recommend that 9.0, 12.0, and 15.0 l/hr nozzles are not used where temperatures are below 21°C.

NB: Please contact JS Humidifiers plc or your local distributor to assist in the design of a suitable nozzle line layout if your application cannot be accommodated by the above examples.

End Of Line Detail

Warning: To avoid dead leg and possible water stagnation, ensure that the distance between the last Nozzle and the End of Line Valves is as short as possible.



Important - At the point of installation it is recommended to close all the nozzle isolation valves ready for commissioning

EOL1515 (Used on JS60) - Parts List

Item	Stock Code	Description
1	01389	Drain Cock
2	01389	Drain Cock
3	01045	Pressure Gauge C/W 15mm Clamp Assembly
4	01045	Pressure Gauge C/W 15mm Clamp Assembly

JS60 End Of Line Component Identification

Item	Stock Code	Description
5	CLIP1515	Air and Water Clamp Assembly
6	NOZ*** + FITG	Nozzle and Bracket Assembly

EOL1522 (Used on JS600 / JS600DS / JS600M) - Parts List

Item	Stock Code	Description
1	01389	Drain Cock
2	01389 + 01390	Drain Cock
3	01045	Pressure Gauge C/W 15mm Clamp Assembly
4	01045	Pressure Gauge C/W 22mm Clamp Assembly

JS600 / JS600DS / JS600M End Of Line Component Identification

Item	Stock Code	Description
5	CLIP1522	Air and Water Clamp Assembly
6	NOZ*** + FITG	Nozzle and Bracket Assembly

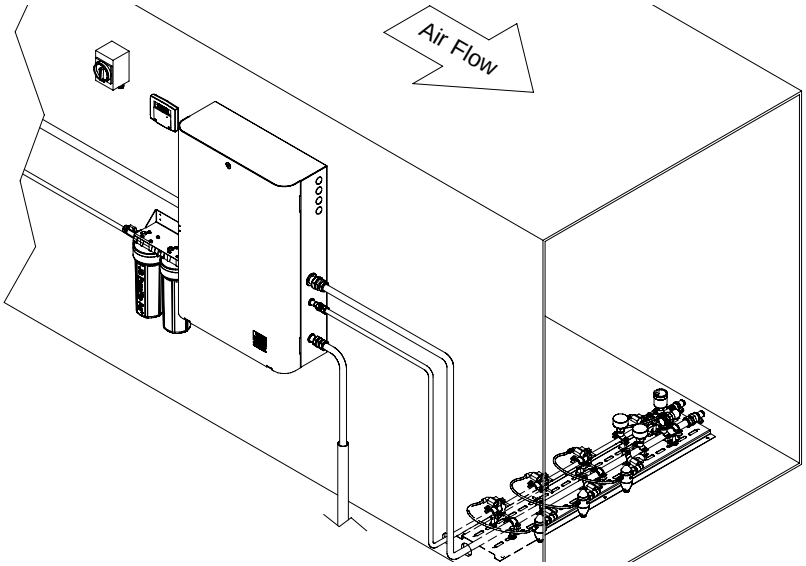
EOLFastfill (Optional)

Item	Stock Code	Description
7	EOLFASTFILL	End of Line Automatic Air Vent

EOL Blowdown (Optional)

Item	Stock Code	Description
8	EOLBLOWDOWN	End of Line Air Assisted Drain Valve

7b- AHU Layout



AHU & Duct Requirements

1. **Caution:** A drain pan with provision for running water to waste should be installed within the humidification section to allow for wetting that might occur during installation, commissioning, operation or servicing. Ideally, this should be equal to the visible spray length from the nozzle and any item which might suffer wetting, such as baffle or separator, should drain into it. Where drain pans are required to drain under gravity, ensure that the drains are trapped and primed and have enough head to overcome the pressure of the system and for hygiene reasons completely drain down. On commissioning the system, drainage of the humidification section should be tested. The drain pan MUST drain fully and should be accessible for cleaning and disinfection as part of routine maintenance of the system.

2. **Caution:** A The JS Droplet Separator must be installed a minimum of 1m downstream from the nozzle manifold. The droplet separator should be installed in such a way to ensure that water will drain away from the separator. Typically water losses are 5% at 1m. The area surrounding the JS Separator should be blanked off to prevent air bypass. The structure supporting it MUST be of sufficient rigidity to support it when the fans are running, and when the JS Separator is wet.

3. A perforated plate 60/40 is recommended before the nozzles, (allow at least 300mm before the nozzles), if the air flow is uneven.

4. An access door or panel with viewing window should be fitted to the side of the air handling unit or duct to allow maintenance of the nozzle manifold and to allow observation during operation.

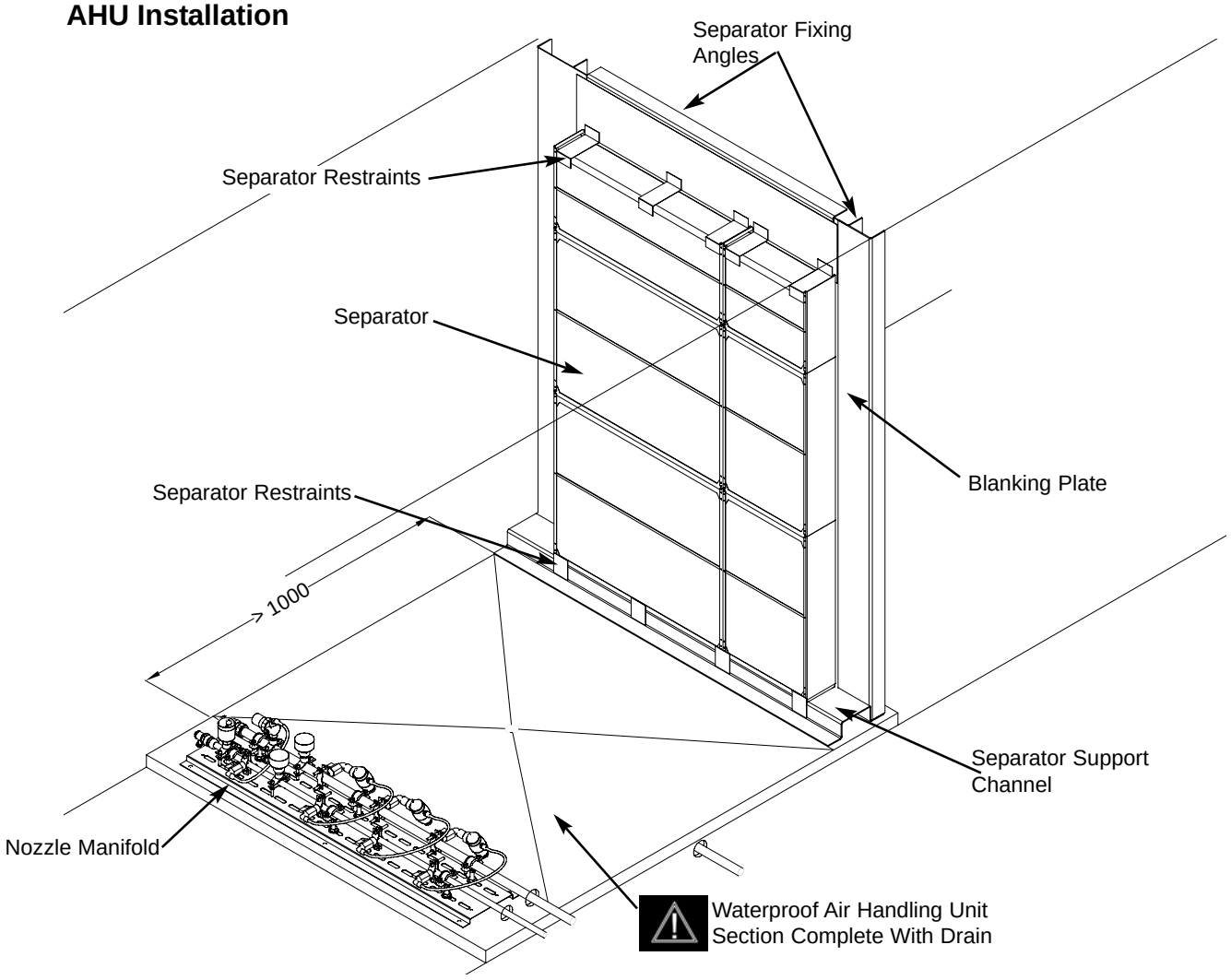
5. Where demineralised or RO water is used, consideration should be given to the selection of materials used and particularly any coils that the spray may impinge onto, because of the aggressive nature of RO water.

6. Ensure no frames, sensors etc. are positioned in the path of the spray.

7. Duct air temperature must not exceed 50°C.

8. The duct should be illuminated using an exterior grade light.

AHU Installation



JS600M Manifold

1. Ensure that the nozzle manifold(s) are located in the correct position within the air handling unit/duct. Consult project drawings to determine exact position and orientation. IF IN ANY DOUBT CONSULT JS.

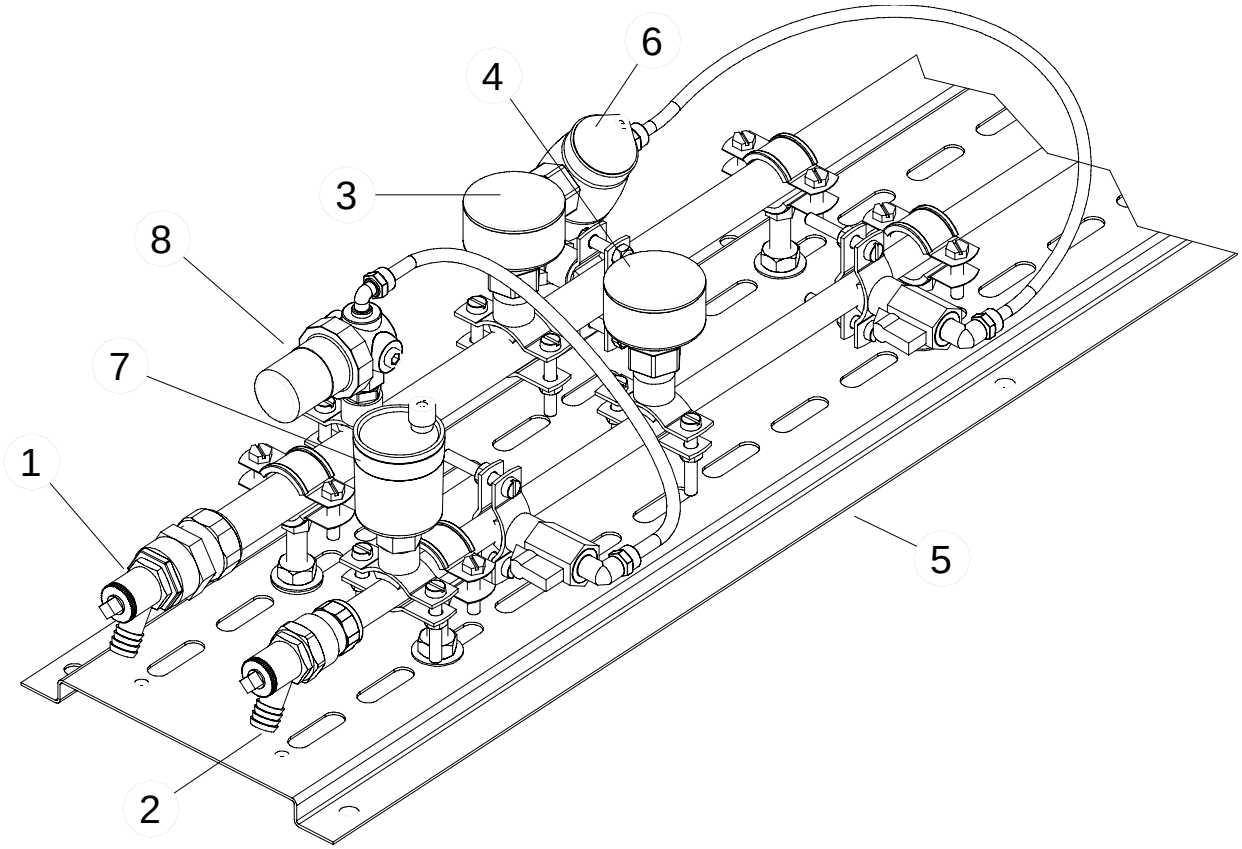
2. Where the nozzle system is installed on both the top and bottom of the duct, a JS NOZBALANCE air regulator balancing kit should be installed in the interconnecting manifold airline. This will balance the air pressure which compensates for the difference in water pressure caused by the difference in height of the nozzles. During commissioning, the pressure regulator should be adjusted to ensure that the spray pattern is balanced between the upper and lower nozzle manifold.

2. Where the nozzle manifold is installed after a heating coil or filter bank, allow sufficient space (min 500mm) for access to the nozzle for commissioning/service.

3. The final connection of the air and water to the manifold should always be a “union” type connection, to allow easy removal and adjustment of the manifold.

4. The nozzle line can be rotated through an arc of up to 90 degrees to give the optimum spray pattern. As standard the angle is 30 degrees.

Manifold End Of Line Detail



JS600M Manifold Identification and EOL1522P Standard Parts List

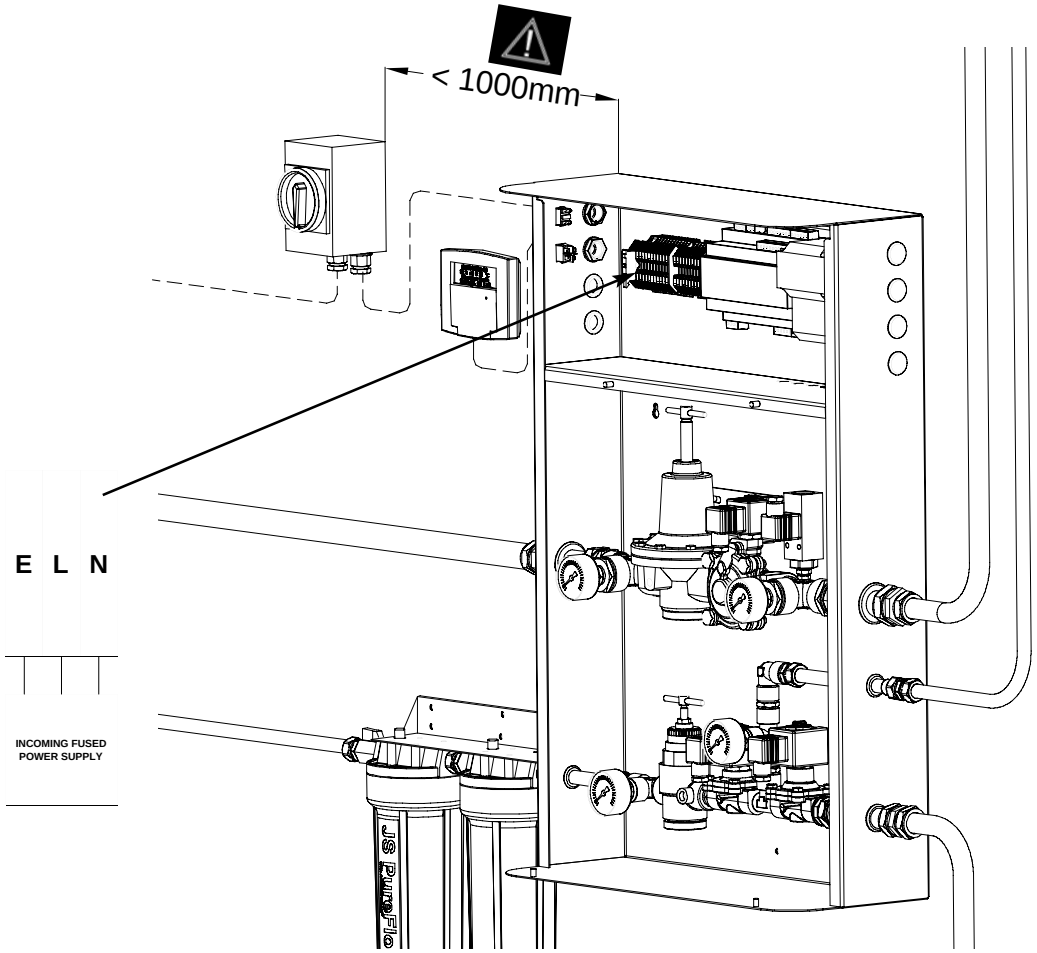
Item	Stock Code	Description
1	01389	Drain Cock
2	01389 + 01390	Drain Cock
3	01045	Pressure Gauge C/W 15mm Clamp Assembly
4	01045	Pressure Gauge C/W 22mm Clamp Assembly
5	MAN***	Manifold Plate C/W Nuts, Bolts and Washers
6	NOZ*** + BRACKET	Nozzle and Bracket Assembly

EOLFastfill

EOL Blowdown

Item	Stock Code	Description	Item	Stock Code	Description
7	EOLFASTFILL	End of Line Automatic Air Vent	8	EOLBLOWDOWN	End of Line Air Assisted Drain Valve

8 - Electrical Installation



230V Version (Check CE Label)

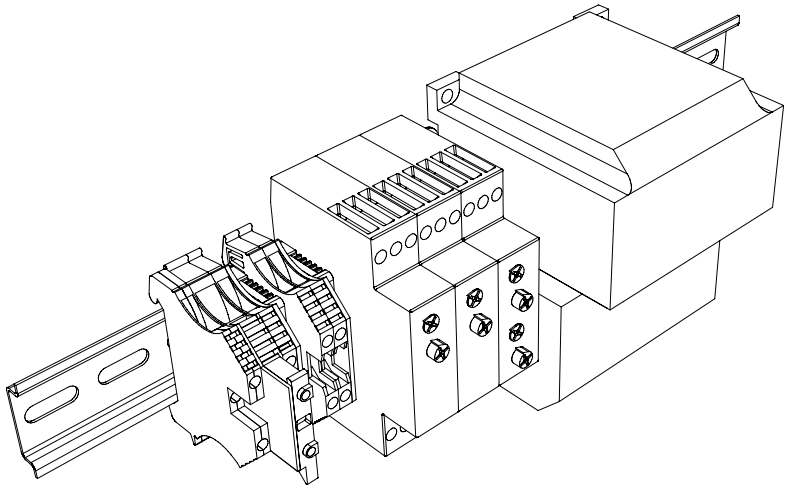
	JS60	JS600	JS600DS	JS600M
Power Supply	230V/50Hz	230V/50Hz	230V/50Hz	230V/50Hz
Power Consumption	0.17kW	0.19kW	0.2kW	0.21kW
Fuse Rating	2A	2A	2A	2A
Recommended Conductor Size	>0.75mm	>0.75mm	>0.75mm	>0.75mm

110V Version (Check CE Label)

	JS60	JS600	JS600DS	JS600M
Power Supply	110V/60Hz	110V/60Hz	110V/60Hz	110V/60Hz
Power Consumption	0.17kW	0.19kW	0.2kW	0.21kW
Fuse Rating	4A	4A	4A	4A
Recommended Conductor Size	>0.75mm	>0.75mm	>0.75mm	>0.75mm

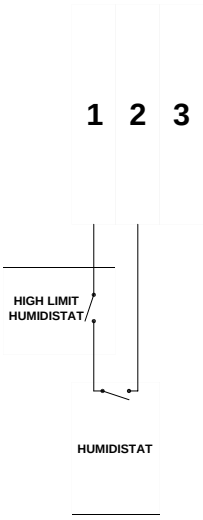
WARNING: All work concerned with electrical installation must only be performed by skilled and qualified technical personnel (e.g. electrician or technicians with appropriate training). The customer must be responsible for ensuring their suitability. Please observe the local regulations concerning the provision of electrical installations..

8a - Controls Wiring - JS60 / JS600

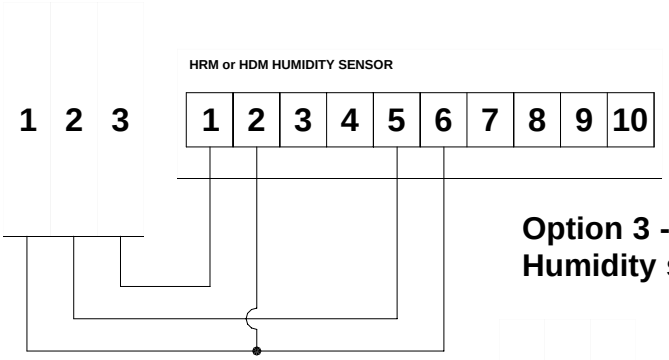


Option 1 - Humidistat

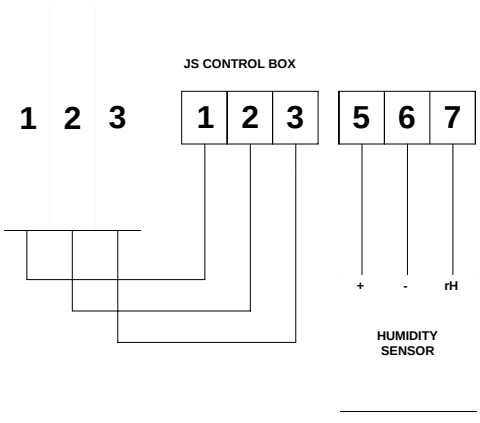
Caution: It is recommended that a high-limit humidistat is installed as shown to prevent water damage in the event of humidistat failure.



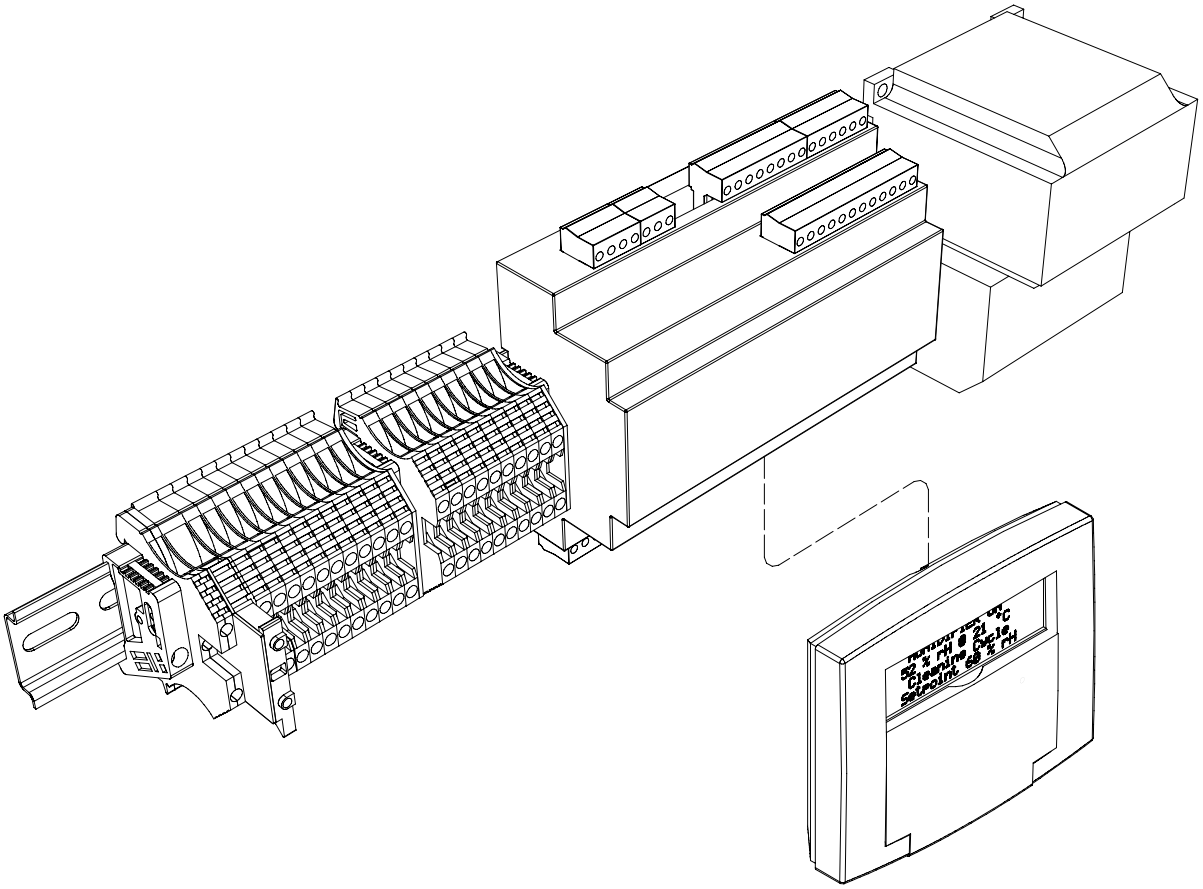
Option 2 - HRM/HDM Sensor control



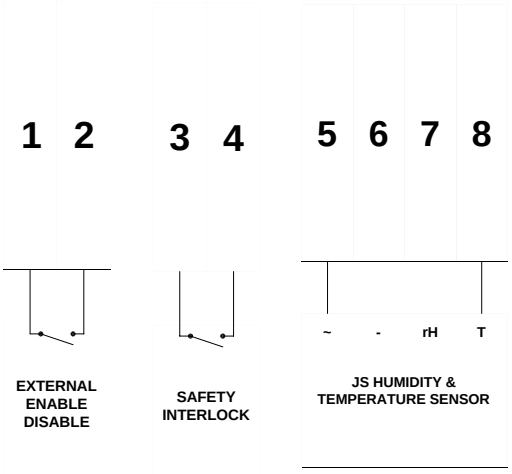
Option 3 - Control Box / Humidity sensor



8b - Controls Wiring - JS600DS

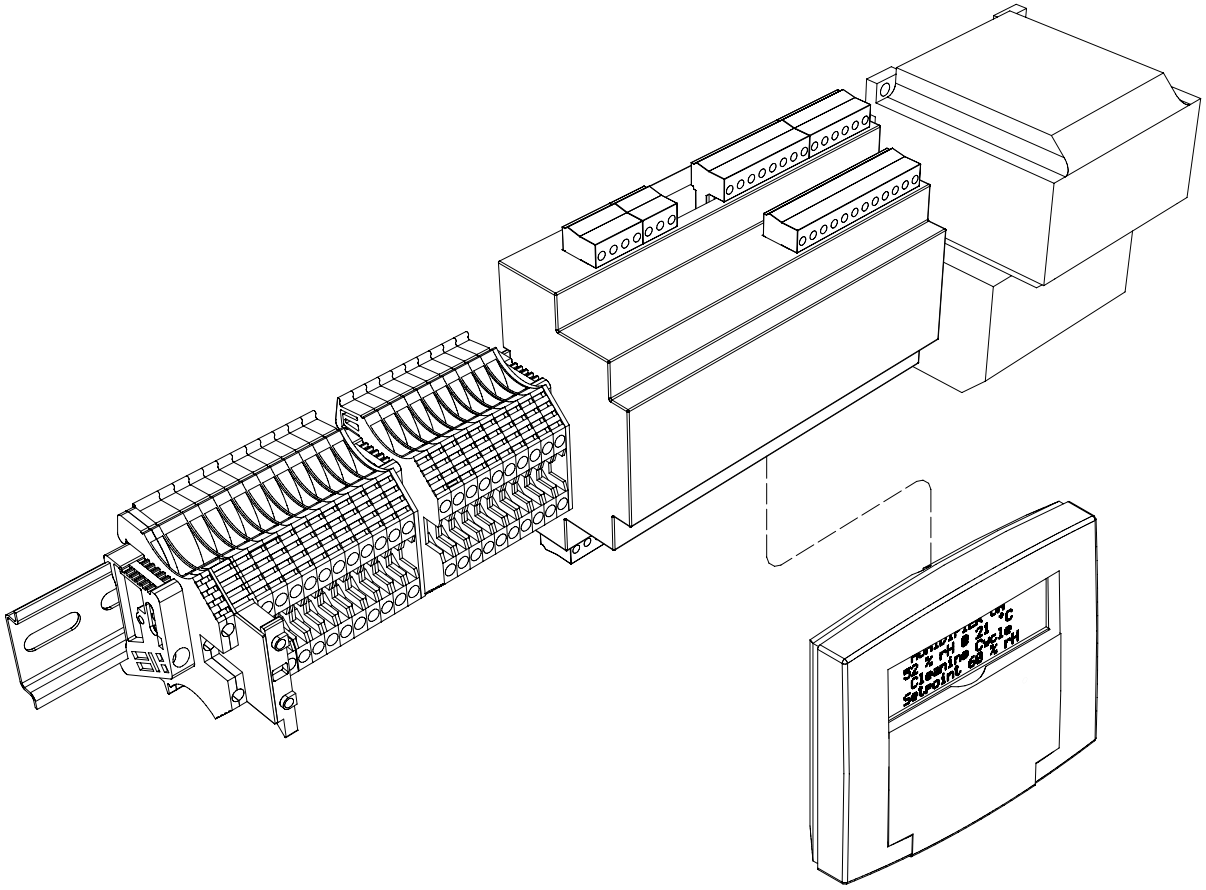


JS Humidity Sensor Control

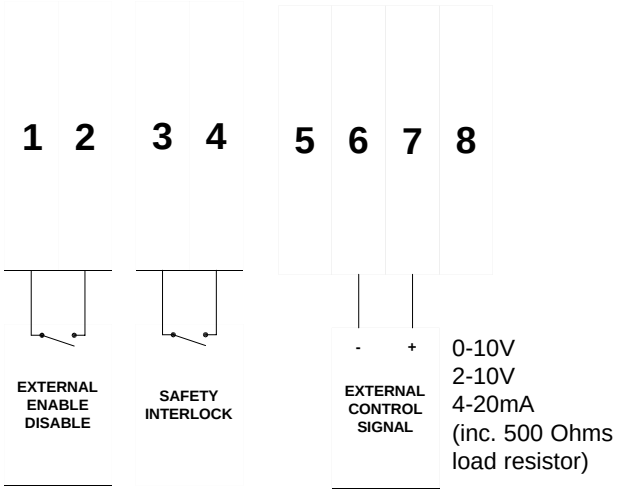


Caution: It is recommended that a high-limit humidistat is installed using the safety interlock terminals to prevent water damage in the event of sensor failure.

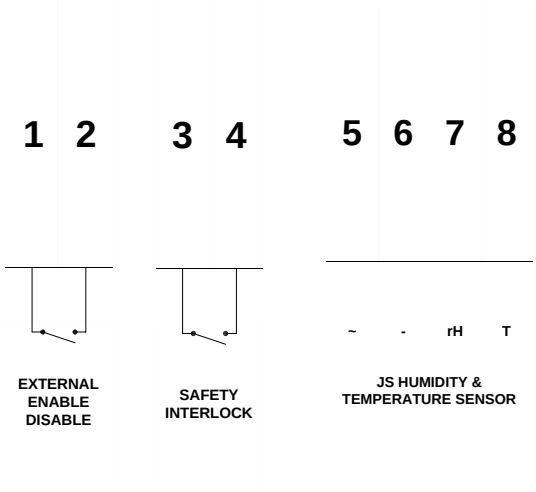
8c - Controls Wiring - JS600M



External Signal Control



JS Humidity Sensor Control



Caution: It is recommended that a high-limit humidistat is installed using the safety interlock terminals to prevent water damage in the event of sensor failure.

JS60 / JS600 / JS600DS Sensor Positioning

The following positioning instructions apply to either humidity sensors or humidistats:

1. Mount the sensor where there is free air circulation preferably in the centre of the controlled area but out of the direct path of the nozzle spray.

2. Do not mount the sensor in a position where it is exposed to direct sunlight.

3. Do not mount the sensor in a position where it is exposed to heat from radiators, motor cooling fans, spotlights etc

4. Mount the sensor on a plate with the minimum of thermal mass suspended in free air.

5. Do not mount sensors directly to a wall surface or building support column as this will cause an error in readings due to temperature effects of the wall structure.

6. Do not mount the sensor in a position where it is exposed to draughts.

7. Wire the sensors with multi-core screened cable, with the screen wire grounded at one end only. This will minimise any induced voltages in the signal wires.

8. DO NOT run sensor cable adjacent to any 3 phase or high voltage cables.

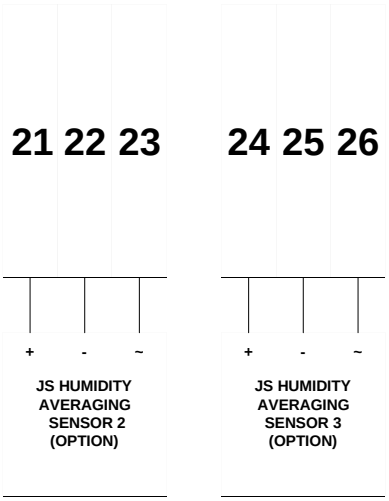
JS600DS Averaging Sensor

It is recommended that in large areas or where there can be temperature variations across the floor area, that averaging humidity sensors are installed, and the averaging function of the controller must be enabled. This will then allow control on an average value of the whole production facility. Up to three humidity sensors can be installed.

NB: The averaging sensor capability must be enabled within the software. Refer to the programming section for details.

Averaging sensors should be wired as per the following diagram. (See programming section to enable averaging.)

NB: The averaging capability is available for the humidity reading only. Temperature display will be from sensor 1. As a result, the temperature terminal of the averaging sensors should not be wired.



JS600DS / JS600M Remote Interface Extension Cable Option

As standard, the JS600DS and JS600M systems are supplied with a 10m cable for connecting the remote interface and display.

In certain applications it may be necessary to mount the remote interface further from the JetSpray control panel.

In these cases an extension kit is available from JS. This amplifies the control signal, allowing the interface to be mounted up to 100m from the control panel.

The kit includes 100m of cable.

Refer to the instruction sheet supplied with the cable extension kit for wiring instructions.

JS60 / JS600 / JS600DS / JS600M Pre-Commissioning Checks

1. Ensure the water system in the building has been subject to a Risk Assessment. The JetSpray humidification system MUST be connected to a clean, potable mains water supply. It is the responsibility of the user to ensure that the water system complies with local regulations and bylaws, particularly those for the control of Legionella bacteria (such as the HSE ACoP L8, The control of Legionella bacteria in water systems). The use of mains water fed tanks and reservoirs is only permitted as part of a managed water treatment system.

2. Ensure the water supply has been completely flushed prior to connection to the control panel as per the installation instructions. The water supply must be flushed to prevent water stagnation and to clear any flux or foreign matter. This must be done carefully without creating splashing or aerosols.

3. Ensure the air supply has been completely flushed of any flux or foreign matter before connection to the humidifier as per the installation instructions.

4. Ensure that the power supply is compatible with the CE label and is both fused and isolated within 1 meter of the control panel. Check wiring connections are secure.

5. Check the water pressure is between 4.0 - 7.0 Bar (58 - 102 PSI), without significant fluctuation.

6. Check the air pressure is between 4.5 - 10 Bar (65 - 145 PSI), without significant fluctuation.

7. Check that the relevant controls connections have been made.

8. Ensure safe access is available to the nozzle line.

9. Before putting the system into operation, disinfection must be carried out. Ensure that the relevant chemicals, equipment and Personal Protective Equipment are available to carry out disinfection as per the method statement in the cleaning and disinfection section of this manual.

JS60 / JS600 / JS600DS / JS600M Commissioning

The commissioning of the JetSpray humidifier requires appropriately trained technical personnel. Please pay attention to local regulations regarding working at heights and electrical work. Part of this commissioning process is a full disinfection of the control panel and nozzle line. Please refer to the commissioning section of the manual in full before commencing any work.

1. Isolate the air supply to the control panel. Isolate the water supply to the control panel.

2. Each nozzle has its own individual isolation valve for air and for water. All the nozzle isolation valves must be isolated.

3. Switch on the power to the humidifier.

4. Create a demand for humidity by either adjusting the set-point or overriding the humidity controls.

5. Flush the air line by opening the end of line air isolation valve. Temporarily connect this to a drain point. Open the air supply isolation valve to the control panel. Adjust the air regulation valve to sufficiently flush the entire air line of any foreign matter.

6. Pressure test the air line by closing the end of line air valve and adjust the air regulator to pressure test the air line up to 4.5 bar. Pressure test for 5 minutes. Check for air leaks and repair if necessary. When complete, set the air pressure at 2.2bar at the end of the nozzle line, by adjusting the air regulator in the control panel.

7. Flush the water line by opening the end of line water valve and connect a temporary hose to drain. Open the water supply isolation valve to the control panel. Adjust the water regulator to sufficiently flush the entire water line of any foreign matter.

8. Pressure test the water line by closing the end of line water valve and adjust the water regulator to pressure test the water line at 4 bar. Pressure test for 15 minutes. Check for water leaks and repair if necessary.

JS60/JS600/JS600DS/JS600M Commissioning *continued*

8. IMPORTANT. Carry out a full disinfection of the JetSpray system as laid out in the cleaning and disinfection method statement in this manual.

9. Once the disinfection process is complete, switch on the system. Starting with the nozzle furthest away from the control panel, open the air isolation valve then the water isolation valve to the nozzle. Adjust angle of spray if necessary. As each nozzle is switched on the pressures at the control panel may vary. The air regulator should be adjusted if necessary to give a pressure of 2.2bar at the end of the nozzle line. The water pressure should be adjusted to achieve a satisfactory spray using the nozzle pressures as a guide.

10. Make final adjustments. Spray length varies with nozzle capacity, ambient temperature and relative humidity. Visible spray is also affected by background colour and lighting. If it is difficult to regulate spray visually, water pressure should be increased up to the point where fine droplets are noticed, and then reduced until no more fall. As a general principle, nozzle spray can be increased by increasing water pressure or decreasing air pressure. The spray can be reduced by reducing water pressure or increasing air pressure.

Nozzle output (l/h)	**2.5**	**3.5**	**4.5**	**5.5**	**6.5**	**9.0**	**12.0**	**15.0**
Guideline air pressure (bar)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Guideline water pressure (bar)	2.4	2.55	2.65	2.75	2.9	2.0	2.1	2.3

NB: Quoted pressures refer to the reading at the end of the nozzle line and not in the control panel.

11. If the spray pattern of a particular nozzle is either particularly heavy or light it maybe necessary to adjust the balance ing screw at the back of the nozzle. This can be done by removing the back nut and turning the screw clock wise to decrease the spray or by turning the screw anti-clockwise to increase the spray. As a default, the back screw will be set at 9mm from the back edge of the nozzle body. It should not be necessary to adjust the back screw by more than one or two turns in either direction.

12. The humidifier should be switched on and off a minimum of 10 times using the humidity setpoint or humidity controls. This is to check and adjust if necessary the consistency of the nozzle spray pattern.

Note. A new system may require some re-adjustment of both the air and water regulators during the running-in period until all parts are properly seated. This period may last about two weeks, but after that further adjustments should not be required. Typically a quarter turn should be sufficient.

13. Set humidity setpoint at the required level. Re-connect any humidity controls that have disconnected during commissioning. If a sensor is used then check the calibration of this sensor.

14. Set up the “Air Run On” duration as per the table.
Refer to the relevant programming instructions for JS600DS / JS600M in this manual.
Refer to the relevant timer adjustment instructions for the JS60 / JS600 in this manual.

Water riser and nozzle line total length	**Duration (secs)**
1-20m	120 **(Default value)**
20m+	300

15. JS600DS/JS600M only. Set up the “Cleaning Cycle” duration and frequency as per the tables below.
Refer to relevant programming instructions in this manual.

Water quality (ppm)	**Recommended Frequency**
1000	1hr
800	2hr
600	3hr **(Default value)**
400	4hr
200	8hr
0	24hr

Water line total length	**Duration (secs)**
1-20m	20 **(Default value)**
20+	30

JS60 / JS600 / JS600DS / JS600M Commissioning *continued*

16. Check the purge to drain interval is set to 12 hours and duration to 10secs. These may be increased during periods of low use or if the temperature of the supply water has a tendency to rise above 20°C.

WARNING: The purge to drain is an essential function to prevent stagnation of the water in the lines occurring. NEVER completely disable these. Failure to do so could result in contamination that might cause Legionnaires' disease, which can be fatal.

17. Check, and adjust if necessary, the duration of the "Nozzle Flush Cycle". The Nozzle Flush Cycle duration must be long enough for all the nozzles to spray. The default nozzle flush duration is 5 minutes at 6hr intervals (i.e. 4 flushes per 24hr period of inactivity). Do this as follows:

a. Adjust the humidity setpoint to a low setting and wait for the humidifier to drain fully. This ensures that the panel starts from a fully empty condition.

b. Adjust the humidity setpoint to create a humidity demand. Time how long is needed from the moment the control panel switches on until all the nozzles are spraying. This is the minimum duration that will be required to ensure that water flows through all the nozzles, to prevent stagnation of any residual water in the pipework. It is recommended that the duration is set 2 mins higher than the time witnessed to ensure that all nozzles are flushed.

c. Repeat this procedure several times to ensure that the duration is sufficient for all nozzles to spray. Adjust the Nozzle Flush Cycle duration if necessary by referring to relevant programming instructions in this manual.

WARNING: The nozzle flush cycle is an essential function and should not be adjusted by anyone other than a fully trained technician. Always consult with JS Humidifiers if unsure.

18. Additional commissioning procedure for JS600M with NOZBALANCE option.

1. Override the humidity demand signal to 100%. Adjust the NOZBALANCE air regulator and ensure the spray pattern on both the upper and lower nozzle manifolds are equal.

2. Override the humidity demand signal to 10%. Adjust the NOZBALANCE air regulator and ensure the spray pattern on both the upper and lower nozzle manifolds are still equal. Repeat procedure to fine tune settings.

19. Additional commissioning procedure for the EOLBLOWDOWN option.

1. Set the "Air Run On" duration to 60 seconds. Create a humidity demand by either increasing the humidity setpoint or overriding the external demand.

2. Initiate an "Air Run On" cycle by ending the demand for humidity.

3. Adjust the "EOLBLOWDOWN" regulator until air starts to flow through the valve and into the water line. This air flow can be detected on the water outlet pressure gauge. Ensure the pressure is no more than 0.5 bar. Adjust the regulator again if necessary.

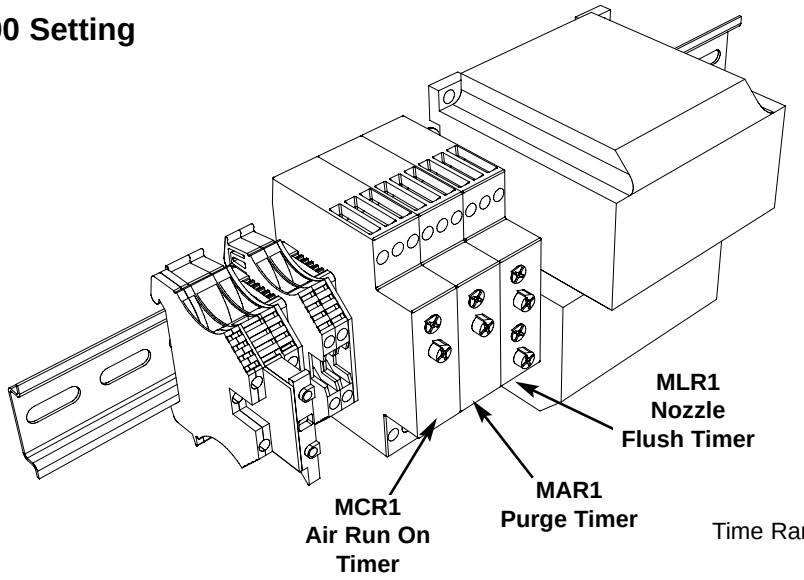
4. Return the "Air Run On" duration and the humidity controls to their previous settings.

1 month and 6 monthly commissioning review

It is strongly recommended that 1 month after commissioning, and 6 months after commissioning, an inspection and review of the system is made by a suitably qualified engineer. This is necessary in order to check that the unit is functioning correctly and to make any minor adjustments that maybe required. These checks will also enable you to work out how often servicing will be required.

CALL JS HUMIDIFIERS ON **+44(0)1903 858649** TO ARRANGE FOR A FREE 1 MONTH SERVICE AND INSPECTION. (UK Only, subject to terms and conditions)

JS60 / JS600 Setting



Time Range 0.1s - 100 h

Air Run On.

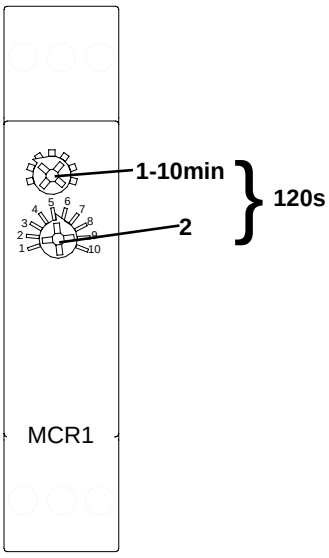
When the humidifier switches off the air will remain on for a period of time to ensure the water pressure is relieved and the nozzles do not drip.
This period of time is factory set at **120 seconds.**
This can be adjusted if necessary on the timer marked MCR1 -

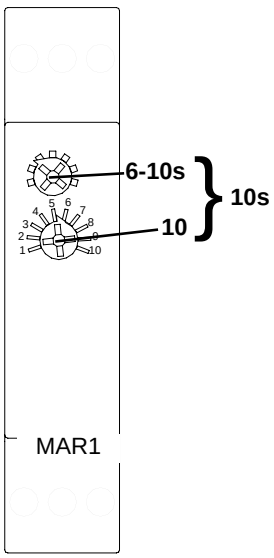
Purge.

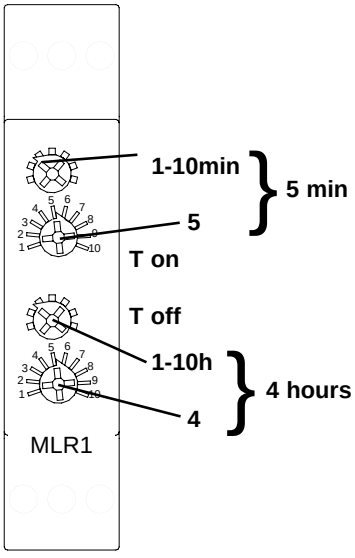
When the humidifier switches on it will purge water to drain for a period of time. This is to send any possible stagnant water to drain before starting humidification.
This period is factory set at **10 seconds**.
This can be adjusted if necessary on the timer MAR1

Nozzle Flush Timer

During periods of low humidity demand the humidifier will automatically switch on irrespective of humidity demand to ensure the system is kept clean and free of any water stagnation.
The frequency of this nozzle flush is factory set at **4 hours** (T-off).
The duration of the nozzle flush is factory set at **5 minutes** (T-on).
This can be adjusted if necessary on the timer MLR1



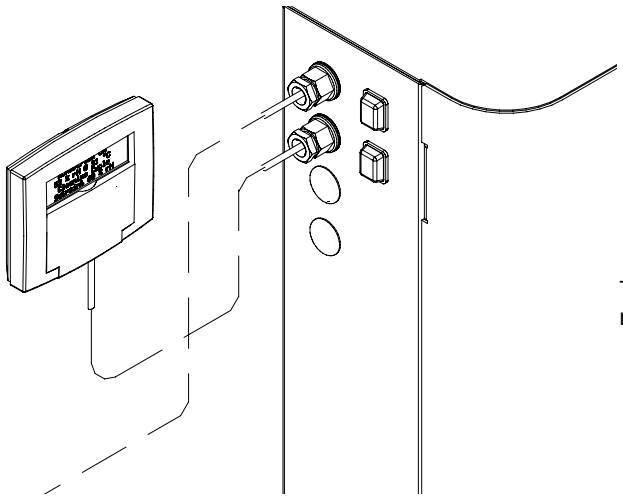




CAUTION: Only adjust these timers if you have had training on the operation of the JetSpray system. If in doubt, always contact JS Humidifiers on 01903 858649 for advice on adjustment.

WARNING; The flush and purge cycles are essential functions to prevent stagnation of the water in the lines occurring. NEVER completely disable these. Failure to do so could result in contamination that might cause Legionnaires' disease, which can be fatal

JS600DS / JS600M - Programming



The JS600DS and JS600M JetSpray systems include a microprocessor with an intuitive programme structure.

Principle of Navigation

```
HUMIDIFIER OFF
55% rH @ 21ºC
Panel Switch Open
Flush Cycle
```

The display will default to the status page.
If no button is pressed for 60 seconds, or if left arrow key is pressed at any time, the display will return to the default status page.

▲
▼

Use the up/down arrow keys to scroll through pages .

OK

To change a value, press the “OK” button and use the up/down arrow keys to scroll between the options or to cycle through numbers.

When the required value is selected, press the “OK” button to enter the value. The next available digit/variable will automatically flash ready to be adjusted. This process is repeated until all variables on the page have been entered.

◀

Pressing the left arrow key at any time during changes will return the controller to the default status page and changes will be disregarded.

▶

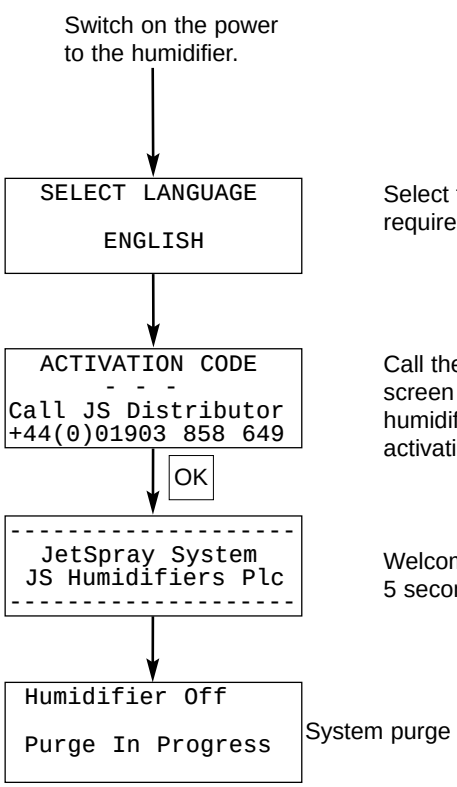
To reset counters, press the right arrow key for 10 seconds. It is not possible to reset the total hours run value.

At any time, pressing a button other than those specified to navigate will have no effect.

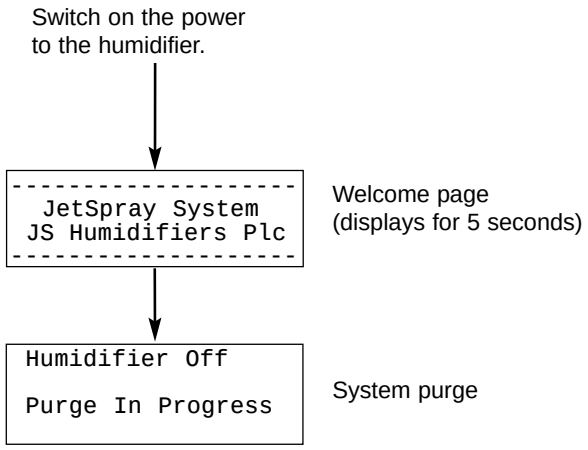
●

By pressing the red button, the controller will display the fault page showing active faults and the time at which they were detected.

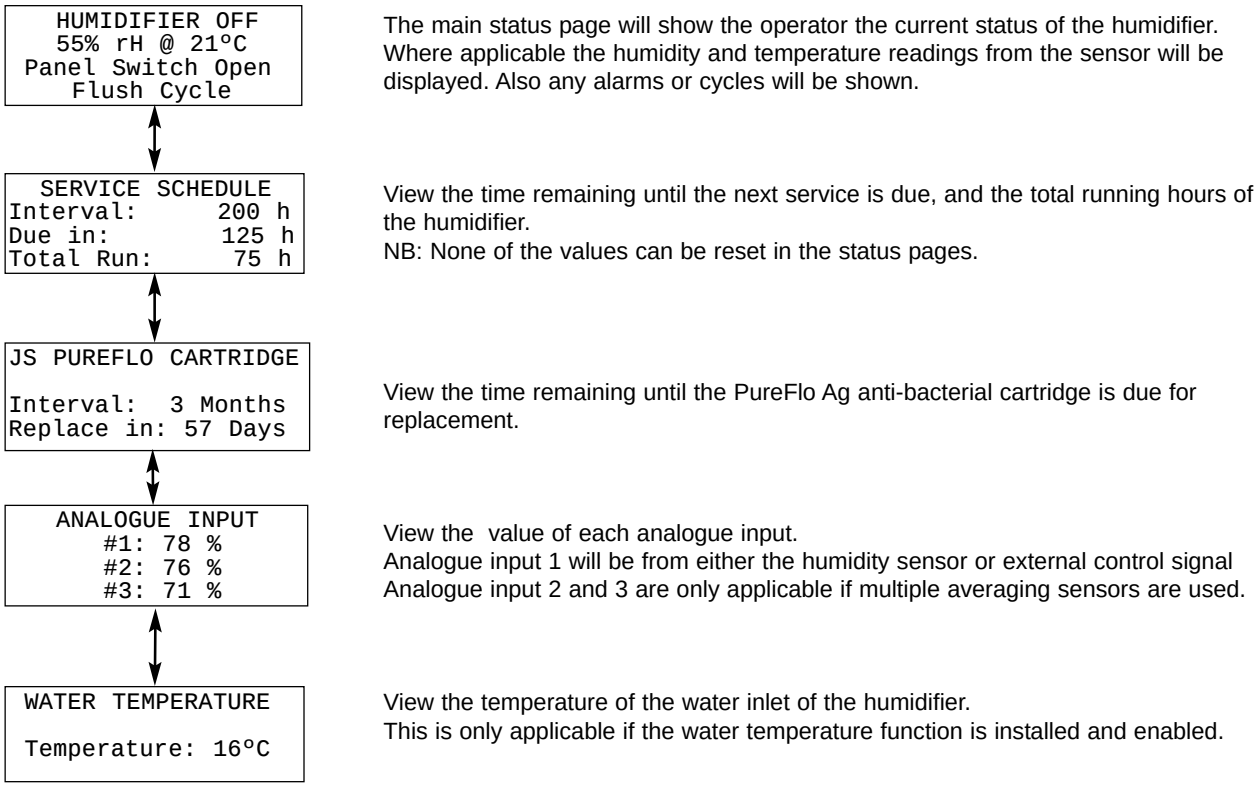
Initial Power Up



Subsequent Power Up



JS600DS/JS600M - Status Page



JS600DS / JS600M - Programming

The controller is pre-set to the most commonly used parameters, however, each JetSpray application is different and may require parameters to be adjusted. The following section shows the default settings and the method used to adjust them.

```
   HUMIDIFIER OFF
   55% rH @ 21ºC
Panel Switch Open
    Flush Cycle
```

Press arrow right

```
SOFTWARE VERSION 1.6
 Enter Access Code
       - - -
```

Enter access code 234 to view and edit the programming section.

1. JS600DS / JS600M - Programming - Humidifier Control

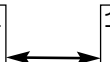
```
1:HUMIDIFIER CONTROL

        ON/OFF
```

Select the required method of humidifier control. Check selected method of control is as per control wiring in sections 8b and 8c.
In ON/OFF mode, the humidifier is switched on and off by the external enable, the panel switch or the integrated occupancy timer.

1a. JS600DS - Programming - Humidifier Control - (Default Humidity Sensor)

```
1:HUMIDIFIER CONTROL
 Humidity Sensor ->
```



```
1:HUMIDIFIER CONTROL
<-     1 Sensor    ->
```

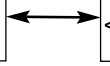
```
1:CONTROL PARAMETERS

<- SetPoint:    50 %
   Hysteresis:  2 %
```

In Humidity Sensor mode, the humidifier will switch on if the rH is below the set point and it will switch off if the rH is above the setpoint. To avoid switching too often the Hysteresis is adjusted (e.g. SetPoint 50%, Hysteresis 2%, the humidifier will switch off at 51% rH and switch back on at 49% rH).

1b. JS600M - Programming - Humidifier Control - (Default External Signal)

```
1:HUMIDIFIER CONTROL
 Humidity Sensor ->
```



```
1:HUMIDIFIER CONTROL
<-     1 Sensor    ->
```

```
1:CONTROL PARAMETERS

<- SetPoint:    50 %
   PropBand:    10 %
```

In Humidity Sensor mode, the humidifier modulates the water output depending on the rH read by the sensor. At low humidity level the humidifier will have full output. As the humidity approaches SetPoint, the output will be reduced. (e.g. SetPoint 50%, PropBand 10%, full output below 40% rH proportionally decreased between 40% rH and 50% rH and no output above 50% rH).

```
1:HUMIDIFIER CONTROL
 External Signal ->
```

```
1:EXTERNAL SIGNAL

<-    0-10 V DC
```

In External Signal mode, the output of the system will be directly proportional to the external signal
(e.g. 0-10V 0V No output 10V Max output
2-10V <2V No output 10V Max output
4-20mA configured in 2-10V with a 500 Ohm load resistor.

2. JS600DS / JS600M - Programming - Pressure Faults

```
2:PRESSURE FAULT

Low Air:     10 sec
Low Water:    5 min
```

Select the time-out before low air or or low water pressure is alarmed.
Note: Low water alarm only applicable if the water pressure switch option is used.
Default values are shown.

3. JS600DS / JS600M - Programming - Air Run On

```
3: Air Run On

Duration:    30 sec
```

Select the period of time the air will continue to run after the humidifier switches off. This is to allow the water pressure to be relieved without the nozzles dripping.
Default value is shown.

4. JS600M - Programming - No Demand Delay

```
4: NO DEMAND DELAY

Duration:    2 min
```

Select the period of time before the humidifier drain down is activated when there is no demand for humidity to maintain close control.
JS600M default value - 2 mins.
Although this page is visible on the JS600DS it is only a function on the JS600M.

5. JS600DS / JS600M - Programming - Cleaning Cycle

```
5: CLEANING CYCLE

Interval:     2 h
Duration:    10 sec
```

During continuous operation the humidifier will periodically relieve the pressure in the water line to push the cleaning pin through the water jet to remove any scale or deposits.
The default values are shown.

6. JS600DS / JS600M - Programming - Nozzle Flush Cycle

```
6:NOZZLE FLUSH CYCLE

Interval:     4 h
Duration:     5 min
```

Periodically the humidifier will switch on irrespective of any humidity demand. This is for the purposes of hygiene
The default value (as shown), will mean the humidifier will spray every 4 hours for 5 minutes.

WARNING: The nozzle flush cycle is an essential function and should not be adjusted by anyone other than a fully trained technician. Always consult with JS Humidifiers if unsure.

7. JS600DS / JS600M - Programming - Purge to drain

```
7.PURGE TO DRAIN

Interval:    12 h
Duration:    10 sec
```

Periodically the humidifier will purge water in the supply pipework to drain for hygiene purposes and to reduce the risk of water inlet stagnation.
The default values are shown.

WARNING: The purge to drain is an essential function to prevent stagnation of the water in the lines occurring. NEVER completely disable these. Failure to do so could result in contamination that might cause Legionnaires' disease, which can be fatal.

8. JS600DS / JS600M - Programming - Service Schedule

```
8.SERVICE SCHEDULE
Interval:     200 h
Due In:       181 h
Total Run:   7519 h
```

The humidifier will monitor and record the hours of operating time and and raise a soft alarm when a service is due.
The default service interval is shown.
To reset the "Due In" counter after a service, depress the right arrow key for 10 secs.

9. JS600DS / JS600M Programming - PureFlo Ag Cartridge Replacement Schedule

```
9.PUREFLO CARTRIDGE

Interval:    3 Mths
Replace In: 21 Days
```

The humidifier will monitor and record the hours of operating time of the PureFlo Ag silver dosing cartridge and raise an alarm when a replacement is due.

Default Value for <100 l/h system - Replace every 2 years
Default Value for 100-300 l/h system - Replace every 1 year
Default Value for >300 l/h system - Replace every 6 months

Once replaced, press arrow right for 10 seconds to reset the counter.

10. JS600DS / JS600M - Programming - To reset the time, date and day

```
10.TIME DATE AND DAY
YY:MM:DD  07:12:15
HH:MM:     12:15
           FRIDAY
```

Change as necessary the time date and day.
Note that the format of the date is YY:MM:DD (i.e. 15th December, 2007 would be entered as 07:12:15).

11. JS600DS / JS600M - Programming - Occupancy

```
11.OCCUPANCY

Mode: Always On
```

Select periods of occupancy of the application to be humidified.
Choose between Always On, Every Day, Weekdays or Weekends.
When a mode is selected, use the right arrow to specify the switch on/off times. **Default value is Always On**

```
11.OCCUPANCY

Mode: Every Day  ->
```



```
11.OCCUPANCY

<- Switch On:  09:00
   Switch Off: 17:00
```

12. JS600DS / JS600M - Programming - Modulating Valve operating range

```
12.RESTORE DEFAULTS

          NO
```

To restore all default values select Yes.

JS60 / JS600 / JS600DS / JS600M Maintenance schedule

WARNING: This humidifier must be installed, operated and maintained in accordance with this manual. Failure to do so could result in contamination that might cause Legionnaires' disease which can be fatal.

Although the JS JetSpray Humidification System requires very little maintenance, it does require servicing. The procedure for this is outlined in this maintenance section and service schedule tables. Maintenance of the compressed air and water treatment systems should be carried out as per the instructions supplied with that equipment.

Comprehensive maintenance contracts are available from JS Humidifiers plc. Services include:

- **Planned maintenance contracts**
- **Breakdown response**
- **Technical advice and back up**
- **Product training**
- **Spares on demand**

Contact the customer service department for more information.

Customer Service Hotline: +44(0) 1903 858649
Spares Hotline: +44(0) 1903 858610

Service Schedule (JS600DS/JS600M Only)

The service schedule should be determined at commissioning. This will depend on the application, the water quality and the system usage. The default is 200 hrs operation. The programming section contains details of how to adjust the service schedule to suit the applications.

Refer to the software overview section for details on how to access this page.

The "Interval" is the required frequency of service.
The "Due in" is the time left until the next service is due.
The "Total run" is the total hours run of the humidifier.

After the humidifier has been serviced the "Due in" hours can be reset by pressing and holding the right arrow button for 10 seconds.

WARNING: The JetSpray system should not be electrically isolated for periods exceeding 24hrs as automatic flush and purge cycles will be disabled.

If the JetSpray system is turned off for prolonged periods, water stagnation might occur and bacterial contamination result, so the system, including any storage tanks or vessels should be drained and left dry. Before putting the system back into service, a full risk assessment should be undertaken to ensure safe operation, with particular attention paid to water supply quality.

The water pipe-work supplying the JetSpray should be purged carefully, avoiding the creation of aerosols by splashing, and a water sample should be taken to ensure cleanliness. In the event that the humidifier contains any residual water or has remained damp, and the temperature exceeded 20°C, the JetSpray should be cleaned and disinfected. Refer to the cleaning, disinfection and descaling instructions in this manual.

Always call JS Humidifiers plc on +44 (0)1903 858649 for advice on water sampling and analysis, disinfection of systems, service and maintenance contracts.

JS60 / JS600 / JS600DS / JS600M Routine water sampling and testing

On commissioning and at regular intervals thereafter, test for possible water contamination using Dipslides. Take samples from the water supply to the JetSpray control panel and the from the end of the nozzle line. (If access to the end of the nozzle line is difficult, the sample should be taken at some point between the control panel and the nozzle line).

The Dipslides should be incubated for 2 days at 30°C.

1. If the microbial count from the nozzle line exceeds 10^3cfu/ml, the system should be turned off and disinfected using a 50 ppm chlorine solution for one hour before being put back into use.

2. If the microbial count in the water supply to the control panel exceeds 10^3 cfu/ml, this suggests contamination of the water system within the building. The system should be turned off and you should seek specialist advice on cleaning your water supply.

3. If the water temperature anywhere in the system regularly exceeds 20°C, increase the frequency of water sampling. The frequency may be reduced if successive tests show a consistent level below 10^3 cfu/ml.

HEALTH AND SAFETY REQUIREMENTS
Every 6 months, users are required by the Health & Safety Executive, Approved Code of Practice (ACoP) to take samples for Legionnella analysis. Samples should be taken from the same places as described above, and the analysis carried out by a UKAS accredited laboratory which is part of the Legionnella AQS Scheme. In the event that the Legionnella content exceeds 10^2 cfu/l, the humidifier should be switched off and specialist advice sought regarding its disinfection.

1. If biofilm (a slimy or gel-like deposit when wet, which might be dry and crisp in a dry system) is found during any inspection of the humidifier or water system, the humidifier MUST be switched off and not put back into operation until the system has been thoroughly cleaned with a suitable biocide with biofilm penetrating qualities such as 50mg/l chlorine dioxide solution. This work should only be carried out by fully trained specialist organisations or individuals.

2. The JetSpray Humidifier must be left powered on. If the JetSpray system is powered off for prolonged periods, water stagnation might occur and contamination result, so the system, including any storage tanks or vessels should be drained and left dry. Before putting the system back into service, the water pipework supplying the JetSpray control panel should be purged carefully, avoiding the creation of aerosols by splashing, and a water sample should be taken to ensure cleanliness. In the event that the humidifier pipework contains any residual water or has remained damp, and the temperature exceeded 20°C, the JetSpray control panel and nozzle lines should be chlorinated using 50 ppm chlorine solution for 1 hour.

Call JS Humidifiers plc on +44 1903 850200 for advice on water sampling and analysis, disinfection of systems, service and maintenance contracts.

JS60 / JS600 / JS600DS / JS600M Routine Maintenance

Please note that the information given below is only to act as a guide and the frequency of maintenance may depend upon the unit's age, usage and water quality. Correct maintenance is vital to ensure optimum output and reliability.

All humidifiers will form part of your hot and cold water system and as such require you to undertake certain duties with regards to "The control of Legionella bacteria in water systems" (L8). Your water sampling/ testing and disinfection regime must be based on details in this manual and from results of a site specific risk assessment.
For this type of atomising humidifier, JS recommend that disinfection is undertaken at least twice a year.

If any further assistance is required or you are interested in a planned maintenance quote, please contact JS Customer Services on +44(0)1903 858649

JS60 / JS600

Component	Operations	1 Month	3 Month	6 Month	Annual	2 Yearly
AIRLINE						
01041	Visually inspect and clean air pressure regulator Minimum pressure: 4.5 Bar (65 PSI) Maximum pressure: 10.0 Bar (145 PSI)				√	
R11	Replace air pressure regulator kit					√
01035	Visually inspect and clean air solenoid valve				√	
01035	Visually inspect and clean air solenoid valve coil				√	√
03002	Visually inspect air pressure switch			√	√	√
01044	Visually inspect air outlet pressure gauge	√	√	√	√	√
WATERLINE						
01042	Visually inspect and clean water pressure regulator Minimum pressure: 4.0 Bar (58 PSI) Maximum pressure: 7.0 Bar (102 PSI)			√		
RO6WATER	Replace water pressure regulator kit				√	√
01035	Visually inspect and clean water solenoid valve			√		
01035	Visually inspect and clean water solenoid valve coil				√	√
01044	Visually inspect water outlet pressure gauge	√	√	√	√	√
02091	Visually inspect and clean water solenoid valve			√		
01069	Visually inspect and clean water solenoid valve coil				√	√
NOZZLELINE						
NOZX.X	Clean nozzle air cap(s)			√	√	√
EOL1522	Flush end of line valves				√	√
N/A	Visually inspect spray pattern	√	√	√	√	√
N/A	Balance nozzle spray (if required)			√	√	√
N/A	Visually inspect installation for leaks and damage	√	√	√	√	√
N/A	Visually inspect and clean control stat / sensor			√	√	√
N/A	Check air run on duration			√	√	√
N/A	Check nozzle flush duration	√	√	√	√	√
N/A	Check water supply pipework duration			√	√	√
N/A	Check water flow rates			√	√	√
N/A	Visually inspect electrical connections		√	√	√	√
N/A	Check stat / sensor calibration			√	√	√
N/A	Check rH set-point	√	√	√	√	√
N/A	Record air and water pressure gauge readings		√	√	√	√
N/A	Update Service Log Book	√	√	√	√	√
HYGIENE						
	Collect and test water sample at nozzle line for bacteria levels NB: Frequency may vary according to individual site water maintenance program		√	√	√	√
	Clean and Disinfect the system inc. nozzle line			√	√	√
	Replace PureFlo Ag+ cartridge		√*	√*	√*	√*
	Replace 5 micron sediment filter		√	√	√	√
OPTIONFILTER60	**Air Filter Option**					
	Clean air filter housing		√	√	√	√
	Clean air filter element		√			
	Replace air filter element (recommended 6 months)			√	√	√
	Clean air auto-drain		√	√		
	Replace air auto drain (recommended 12 months)				√	√
EOLBLOWDOWN	**Forced Drain Option**					
	Check operation of End of Line blow down valve			√	√	
	Replace End of Line blow down valve					√
EOLFASTFILL	**Fast Nozzle Line Fill Option**					
	Check operation of End of Line fast fill valve			√	√	
	Replace End of Line fast fill valve					√

PureFlo Ag+ replacement Intervals: <100l/h = 2yrs, 100-300l/h = 1yr, >300l/h = 6 months

JS60 / JS600 / JS600DS / JS600M Routine Maintenance *continued*

JS600DS

Component	Operations	1 Month	3 Month	6 Month	Annual	2 Yearly
AIRLINE						
01043	Visually inspect inlet air pressure gauge Minimum pressure: 4.5 Bar (65 PSI) Maximum pressure: 10.0 Bar (145 PSI)	√	√	√	√	√
01067	Visually inspect and clean air pressure regulator				√	
20AG3/4000	Replace air pressure regulator kit					√
01065	Visually inspect and clean air solenoid valve				√	
2WAY4000	Replace air solenoid valve kit					√
01065	Visually inspect 2-way solenoid coil				√	√
03002	Visually inspect air pressure switch			√	√	√
01044	Visually inspect outlet air pressure gauge	√	√	√	√	√
WATERLINE						
01043	Visually inspect inlet water pressure gauge Minimum pressure: 4.0 Bar (58 PSI) Maximum pressure: 7.0 Bar (102 PSI)	√	√	√	√	√
01042	Visually inspect and clean water pressure regulator			√		
R43	Replace water pressure regulator kit				√	√
01033	Visually inspect and clean inlet water solenoid valve			√		
2WAY	Replace inlet water solenoid valve kit				√	√
01033	Visually inspect water inlet solenoid valve coil				√	√
01044	Visually inspect water outlet pressure gauge	√	√	√	√	√
01069	Visually inspect and clean water drain solenoid valve			√		
2WAYD	Replace water drain solenoid kit				√	√
01069	Visually inspect drain water solenoid valve coil				√	√
NOZZLELINE						
NOZX.X	Clean nozzle air cap(s)			√	√	√
EOL1522	Flush end of line valves				√	√
N/A	Visually inspect spray pattern	√	√	√	√	√
N/A	Balance nozzle spray (if required)			√	√	√
N/A	Visually inspect installation for leaks and damage	√	√	√	√	√
N/A	Visually inspect and clean control stat / sensor			√	√	√
N/A	Check air run on duration			√	√	√
N/A	Check nozzle flush duration	√	√	√	√	√
N/A	Check water supply pipework duration			√	√	√
N/A	Check water flow rates			√	√	√
N/A	Visually inspect electrical connections		√	√	√	√
N/A	Check stat / sensor calibration			√	√	√
N/A	Check rH set-point	√	√	√	√	√
N/A	Record air and water pressure gauge readings		√	√	√	√
N/A	Update Service Log Book	√	√	√	√	√
HYGIENE						
	Collect and test water sample at nozzle line for bacteria levels NB: Frequency may vary according to individual site water maintenance program		√	√	√	√
	Clean and Disinfect the system inc. nozzle line			√	√	√
	Replace PureFlo Ag+ cartridge		√*	√*	√*	√*
	Replace 5 micron sediment filter		√	√	√	√
OPTIONFILTER600	**Air Filter Option**					
	Clean air filter housing		√	√	√	√
	Clean air filter element		√			
	Replace air filter element (recommended 6 months)			√	√	√
	Clean air auto-drain		√	√		
	Replace air auto drain (recommended 12 months)				√	√
NOZBALANCE	**In Duct Nozzle Balance System Option**					
	Visually inspect and clean manifold balancing air pressure regulator				√	
	Replace manifold balancing air pressure regulator					√
EOLBLOWDOWN	**Forced Drain Option**					
	Check operation of End of Line blow down valve			√	√	
	Replace End of Line blow down valve					√
EOLFASTFILL	**Fast Nozzle Line Fill Option**					
	Check operation of End of Line fast fill valve			√	√	
	Replace End of Line fast fill valve					√

PureFlo Ag+ replacement Intervals: <100l/h = 2yrs, 100-300l/h = 1yr, >300l/h = 6 months

JS60 / JS600 / JS600DS / JS600M Routine Maintenance *continued*

JS600M

Component	Operations	1 Month	3 Month	6 Month	Annual	2 Yearly
AIRLINE						
01043	Visually inspect inlet air pressure gauge Minimum pressure: 4.5 Bar (65 PSI) Maximum pressure: 10.0 Bar (145 PSI)	√	√	√	√	√
01067	Visually inspect and clean air pressure regulator				√	
20AG3/4000	Replace air pressure regulator kit					√
01065	Visually inspect and clean air solenoid valve				√	
2WAY4000	Replace air solenoid valve kit					√
01065	Visually inspect 2-way solenoid coil				√	√
03002	Visually inspect air pressure switch			√	√	√
01044	Visually inspect outlet air pressure gauge	√	√	√	√	√
WATERLINE						
01043	Visually inspect inlet water pressure gauge Minimum pressure: 4.0 Bar (58 PSI) Maximum pressure: 7.0 Bar (102 PSI)	√	√	√	√	√
01033	Visually inspect and clean inlet water solenoid valve			√		
2WAY	Replace inlet water solenoid valve kit				√	√
01033	Visually inspect water inlet solenoid valve coil				√	√
01044	Water outlet pressure gauge checked	√	√	√	√	√
01069	Visually inspect and clean water drain solenoid valve			√		
2WAYD	Replace water drain solenoid kit				√	√
01069	Visually inspect drain water solenoid valve coil				√	√
03004	Visually inspect and clean water modulating valve/ actuator			√	√	√
03012	Replace water modulating valve kit					√
DPM1150	Check and verify flow sensor readings			√	√	√
NOZZLELINE						
NOZX.X	Clean nozzle air cap(s)			√	√	√
EOL1522	Flush end of line valves				√	√
N/A	Visually inspect spray pattern	√	√	√	√	√
N/A	Balance nozzle spray (if required)			√	√	√
N/A	Visually inspect installation for leaks and damage	√	√	√	√	√
N/A	Visually inspect and clean control stat / sensor			√	√	√
N/A	Check air run on duration			√	√	√
N/A	Check nozzle flush duration	√	√	√	√	√
N/A	Check water supply pipework duration			√	√	√
N/A	Check water flow rates			√	√	√
N/A	Visually inspect electrical connections		√	√	√	√
N/A	Check stat / sensor calibration			√	√	√
N/A	Check rH set-point	√	√	√	√	√
N/A	Record air and water pressure gauge readings		√	√	√	√
N/A	Update Service Log Book	√	√	√	√	√
HYGIENE						
	Collect and test water sample at nozzle line for bacteria levels NB: Frequency may vary according to individual site water maintenance program		√	√	√	√
	Clean and Disinfect the system inc. nozzle line			√	√	√
	Replace PureFlo Ag+ cartridge		√*	√*	√*	√*
	Replace 5 micron sediment filter		√	√	√	√
OPTIONFILTER600	**Air Filter Option**					
	Clean air filter housing		√	√	√	√
	Clean air filter element		√			
	Replace air filter element (recommended 6 months)			√	√	√
	Clean air auto-drain		√	√		
	Replace air auto drain (recommended 12 months)				√	√
NOZBALANCE	**In Duct Nozzle Balance System Option**					
	Visually inspect and clean manifold balancing air pressure regulator				√	
	Replace manifold balancing air pressure regulator					√
EOLBLOWDOWN	**Forced Drain Option**					
	Check operation of End of Line blow down valve			√	√	
	Replace End of Line blow down valve					√
EOLFASTFILL	**Fast Nozzle Line Fill Option**					
	Check operation of End of Line fast fill valve			√	√	
	Replace End of Line fast fill valve					√

PureFlo Ag+ replacement Intervals: <100l/h = 2yrs, 100-300l/h = 1yr, >300l/h = 6 months

JS60 / JS600 / JS600DS / JS600M Recommended spares list

Please note that the information provided should be used as a guide. Additional parts may be required periodically subject to equipment age, patterns of use and water quality.

Failure to correctly maintain equipment, including the replacement of consumable spares, could result in contamination that might cause Legionnaires Disease, which can be fatal.

Failure to correctly maintain equipment, including the replacement of consumable spares, may reduce reliability and performance and invalidate product warranty.

To ensure the correct spare parts are supplied, please provide the model and serial number for your product.

Recommended Spares List

JS Recommended Spares Guide

JetSpray Adiabatic Atomising Nozzle Humidifier: Consumable Spares

Item Code	Description	Quantity Required JetSpray System Model			
		JS60	JS600	JS600DS	JS600M
RO6WATER	1/4" Water Regulator	1			
R11	1/4" Air Regulator Kit	1			
PUREFLOAG	PureFlo Ag+ Silver Dosing Cartridge	2	2	2	2
1555014-44	5 Micron Sediment Filter	1	1	1	1
R43	Water Regulator Kit	1			
2WAY	Water Solenoid Valve Kit		1	1	1
2WAYD	Drain Solenoid Valve Kit		1	1	1
20AG3/4000	Air Regulator Kit		1	1	1
03012	Modulating Valve Actuator				1
03013	Modulating Valve Kit				1
2WAY4000	Air Solenoid Valve Kit		1	1	1
ELEMENT1500	Air Filter Element for OPTIONFILTER60	1			
DRAIN1500	Air Filter Auto-Drain and Bowl for OPTIONFILTER60	1			
ELEMENT600	Air Filter Element for OPTIONFILTER600		1	1	1
AUTODRAIN600	Air Filter Auto-Drain and Bowl for OPTIONFILTER600		1	1	1

JetSpray Adiabatic Atomising Nozzle Humidifier: Critical Application Additional Spares

Item Code	Description	Quantity Required JetSpray System Model			
		JS60	JS600	JS600DS	JS600M
JETSPRAYMC	JetSpray Microprocessor			1	1
JETSPRAYMCDISP	JetSpray Microprocessor Remote Display			1	1
01044	0-4 Bar Glycerine Pressure Gauge	1	1	1	
01035	JS60 Solenoid Valve (N/C)	1			
02091	JS60 Solenoid Valve (N/O)	1			
03002	Air Pressure Switch	1	1	1	1
01043	0-10 Bar Glycerine Pressure Gauge		1	1	1
03004	Water Modulating Valve				1
3-051-084020	Transformer 105VA	1	1	1	1
88826115	Purge Timer	1	1		
88826135	Air Run On Timer	1	1		
88826155	Nozzle Flush Timer	1	1		
DPM1150	Water Flow Sensor (0 to 300 ltr/hr)				1
DFT1116	Water Flow Sensor (300 to 600 ltr/hr)				

JS60 / JS600 / JS600DS / JS600M Trouble shooting

Inoperative nozzles (no air and water)
All nozzles
1. The system has been switched off by the control system (i.e. the desired level of relative humidity has been reached).
2. Electricity supply has been cut-off to control panel. Check that the power supply is switched on and that wiring is correct and secure.
3. The fuse has blown. Isolate system and check fuse in main control panel.
4. Compressed air is not reaching the control panel. Check that the compressor is running and that there is free air flow from the compressor to the control panel.
Individual nozzles
1. Ensure that the water and air ball valves to the nozzle are fully open.

Nozzles discharging air only
All nozzles
1. There might be insufficient water pressure to the control panel. There should be a minimum differential of 1 bar (14.5 psi) between the water supply and that required at the nozzles.
2. The water pressure to the nozzle line might be too low. Check that the water pressure regulator in the control panel is adjusted to the correct setting. See commissioning section for details.
3. The air pressure might be too high. Check that the air pressure regulator in the control panel is adjusted to the correct setting. See commissioning section for details.
4. The air pressure might be too low, preventing the air pressure switch from operating. The water solenoid valve opens when the air pressure reaches 2.0 bar.
Individual nozzles
1. Check that the water ball valve to the nozzle is open.
2. Check that both the water jet and the water inlet port are not blocked.
3. Check that the spray balancing screw is correctly adjusted.

Nozzles discharging water only
All nozzles
1. If this occurs when the nozzle system turns off, the drain valve has either failed or has become blocked.
2. Check for faulty air pressure switch.
Individual nozzles
1. Check that the air ball valve to the nozzle is open.
2. Check that the air inlet port is not blocked.

Heavy spray/droplets too large
All nozzles
1. This is caused by the air pressure being too low relative to the water pressure. Increase the air pressure very slightly. The air pressure should never exceed water pressure. Alternatively, the water pressure might be reduced.
Individual nozzles
1. Foreign matter may be clogging the air caps or air passage within the nozzle.
2. The ball valve on the air inlet side of the nozzle may be partially closed, restricting the air flow.
3. The layout of the nozzle line is poor (see 10.6.1 page 24), causing an air pressure drop in some sections.

Light spray and spluttering nozzles
All nozzles
This is caused by air pressure being too high relative to water pressure or water pressure too low. Decrease air pressure very slightly or increase water pressure. See Commissioning section for guideline pressure settings.

Light spray and spluttering nozzles
Individual nozzles
1. The ball valve on the water inlet side of the nozzle may be partially closed, restricting the flow.
2. Foreign matter may be restricting water flow in the water jet.
3. The final balancing is not correct. Refer to the commissioning section for balancing details.

JS60 / JS600 / JS600DS / JS600M Trouble shooting

Humidity level too low

1. Check that the air and water pressure are correct.
2. Ensure that the humidity controller/ humidistat is set correctly.
3. Confirm the calibration of the humidity controller and any humidity instrumentation.
4. The humidity sensor/humidistat might be situated in an unrepresentative position.
5. Air flow through the humidified area might be higher than the design condition due, for example, to doors being left open.
6. The temperature of the air in the area being humidified may be higher than that for which the system was designed. This might be due, for example, to the introduction of new machinery. If so, and if this changed temperature is to be maintained, additional humidification equipment will be required.
7. Extraction, make-up air or cooling equipment may have been added to the area since the system was designed. These add to the maximum demand load and additional humidification equipment will now be required.

Humidity level too high

1. Ensure that the humidity controller/humidistat is set correctly.
2. Confirm the calibration of the humidity controller and any humidity instrumentation.
3. The humidity sensor/humidistat might be situated in an unrepresentative position.

High compressed air consumption

1. Correctly adjusted, the maximum air consumption of the JS JetSpray humidifier is 0.29cfm/litre. The points below should be considered if air consumption is significantly greater.
2. Leaks in the compressed air system up to the control panel and/or in the system.
3. The compressor may not be delivering the rated capacity (maintenance of the compressor might be required).
4. Air operated equipment may have been added to the existing plant causing the total air consumption to exceed the capacity of the air compressor.

Fluctuations in supply water pressure

1. In areas where the supply water pressure varies significantly, it might be difficult to achieve a consistent spray. In this case, a JS water pumpset is recommended.
2. In areas where supply water pressure varies violently, or where there is water hammer, damage might be caused to the water pressure gauges in the JS JetSpray™ control panel. Ensure that all supply pipework is secure and, if necessary, consult your supplier about the JS water treatment range.

Cleaning, Disinfection and Descaling Introduction

Cleaning and Disinfection.

Atomising humidifiers must be regularly cleaned and maintained, to prevent contamination especially in industrial environments.

All surfaces requiring disinfection or cleaning must be in contact with the appropriate concentration of disinfection solution for at least one hour. The method statement for disinfection may need to be adapted depending on the layout of the humidifier pipe-work, for example, where system pipe-work splits into 'H or U' shape, ensure that disinfection solution reaches all pipe-work end-of-lines. Additional procedures will be required for supply water system pipe-work or water treatment systems prior to the humidifier.

JS Humidifiers recommend that routine disinfection should take place in the following situations:

(a) At initial commissioning.
(b) Where routine monitoring and control regime or risk assessment shows it to be necessary.
(c) At six monthly intervals.
(d) If the system or part of it has been shutdown and/or substantially altered creating a risk of contamination.
(e) During or following an outbreak or suspected outbreak of Legionellosis.

This recommendation is in accordance with the HSE's Approved Code of Practice (ACoP) L8.

Ideally the routine disinfection should be carried out using a disinfection pumpset with a reservoir, connected in-line before the control panel.

Droplets are prevented from being sprayed from the nozzles by increasing the air pressure to a minimum of 4 bar, thereby causing a back pressure within the Nozzles and preventing chemicals from being sprayed.

Descaling.

Atomising humidifiers may use water where a high level of mineral content causes deposits to form on the Nozzle Air cap. Unless they are regularly cleaned and maintained, deposits of scale and other airborne particles may result, especially in industrial environments.

It is therefore recommended that the nozzle air caps are unscrewed, removed, de-scaled and rinsed with clean water. **Do not use metal objects to clean the air cap.** This should be done 3 months after commissioning and then annually thereafter.

Recommended Disinfection Equipment

1 Disinfection solution in accordance with manufacturers guidelines
2 Disinfection neutraliser (only if necessary)
3 Disinfection solution test kit (to measure strength)
4 Dosing pump set
5 Bucket of fresh water
6 Braided hose (for flushing at end of line
7 Measuring container / Syringe
8 Clean Cloths
9 Mixing vessel
10 Risk assessment / Test Record Sheets
11 Standard Tools

Recommended Descaling Equipment

1 Suitable descaler (DS-3)
2 Descaler neutraliser
3 Mixing vessel

Before Commencing Disinfection and Descaling:

1. **Risk assess the situation.** This should include but is not limited to observance of COSHH, L8 and the use of PPE, working from heights and ensuring a full understanding of the JetSpray System.
2. Coordinate with relevant responsible persons.
3. Check records (i.e sample results of microbiological control) for system history.
4. If possible, disinfection should be carried out when the building is unoccupied.

Cleaning and Disinfection Method Statement

Step 1 - Refer to the Risk Assessment.

- Refer to the Manufacturers instructions and safety advice
- Ensure the area is well ventilated.
- Ensure the Jetspray system is OFF and isolated from external controls.

Step 2 - **Mix Disinfection Solution**

- disinfection solution following the manufacturers instructions. L8 recommends 50ppm Chlorine solution used for 1 hour
- Calculate the total water volume of the system (15mm pipe = 0.18 Ltrs per Meter - 22mm pipe = 0.33 Ltrs) and allow for additional water purged from the end of line.

Note: - Solution loses strength over time

Step 3 - Pipe-work adaptions

- Flush water to drain
- Isolate and disconnect the water supply to the control panel before the PufeFlo Ag+.
- Ensure all Nozzle lines are fully drained.
- Connect dosing pump supply pipe to the PufeFlo Ag+ connection point.

Step 4 - **Panel adjustment -**

- Increase Nozzle Flush by 5 hrs
- Note the humidification sensor set-point setting and set the humidification sensor set-point to maximum value to keep the system operating and avoid automatic drain down.
- **Important !** Set air pressure to maximum by turning air regulator adjustment handle fully clockwise. Air pressure should be greater then 4 bar/ 58 psi gauge to prevent chlorinated water from spraying through the nozzles through air back pressure.

Step 5 - Panel enable

- Switch on control panel to open the air solenoid ensuring that the air pressure is 4bar minimum in pipe-work.

Step 6 - Add disinfection solution -

- Pump disinfection solution into the Jetspray system water line ensuring that no water is sprayed from the nozzle, then carefully bleed from the end line water valve until air is fully purged. (A braided hose connected to the EOL is recommended).
- Measure the strength of the disinfection solution at each end of line valve and check it is the correct strength in accordance with manufacturers guidelines.
- Note the strengths of the disinfection solution at 15 minute intervals and record on a *Record of Cleaning & Disinfection* sheet for future reference. Adjust solution strength as required.

Step 7 - Pressurise disinfection solution within system

- Allow to remain at pressure for a period of time in accordance with the manufacturers guidelines. Humidifier power and air supply must remain on and stable.

Step 8 - Drain unit

- After the time period has elapsed, drain system fully, into appropriate container and neutralise if necessary before disposing into appropriate drain.
- Calculate the required strength of neutraliser required from the manufacturers information sheet.
- Disconnect pump and re-connect fresh water supply. Ensure fresh water supply is clean.

Step 9 - Flush pipe-work

- Flush pipe work with fresh cold water as per commissioning procedure without producing a spray, and test until chlorine is completely flushed.

Step 10 - Descale if required or on completion of the work:

- Maintain unit if required.
- Reset panel as per normal operation specification including all drain Nozzle flush, clean and bleed cycles
- Return control to automatic condition
- Test spray to ensure that there are no traces of disinfection solution.
- Always leave work area clean, dry and tidy

De-Scaling Method Statement

Step 1 - Refer to the Risk Assessment
- Refer the the Manufacturers instructions and safety advice
- Ensure the Jetspray system is OFF and the area well ventilated

Step 2 - Mix de-scaling solution
- Fill work container with fresh water to the required depth.
- Calculate the required de-scaling strength.
- Use of warm water for an improved result if possible.
- From the manufacturers information sheet calculate the required strength of de-scaling solution.
- Mix the crystals with fresh water.

Step 3 - Submerge components
- Remove Aircaps from nozzles. Without scratching the Aircap, try to remove as much scale as possible before submerging components.
- Repeat the process for the water jet if required. Pay attention not to damage the cleaning pin.
- Submerge components in the de-scaling solution.
- Keep components submerged for a minimum of 1 hour with regular checks
- If a large number of components are required to be cleaned over a period of time, additional de-scaling chemicals may need to be added as the strength deteriorates over time.

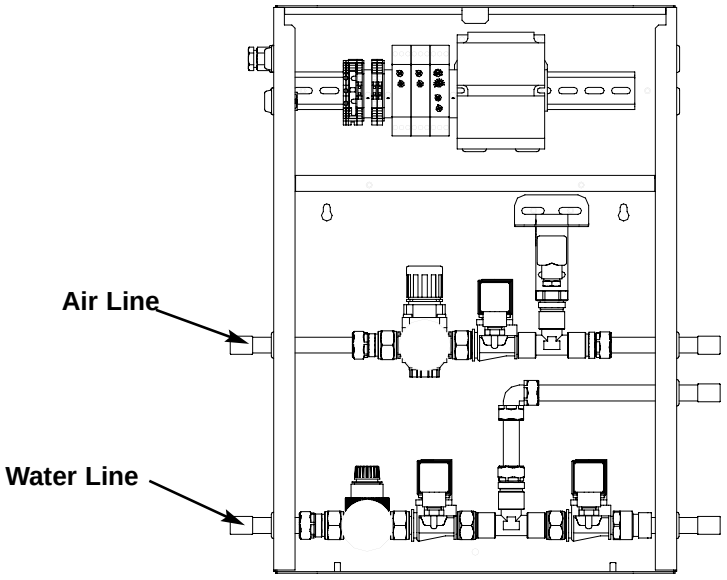
Step 4 - Remove components
- When scale build up is removed, extract components from the solution
- Soak the nozzles or flush clean with fresh water
- Add additional de-scaling solution if further de-scaling is required.

Step 5 - Neutralise the de-scaling solution
- The de-scaling solution may require neutralising before disposal
- Calculate the required strength of neutraliser required from the manufacturers information sheet

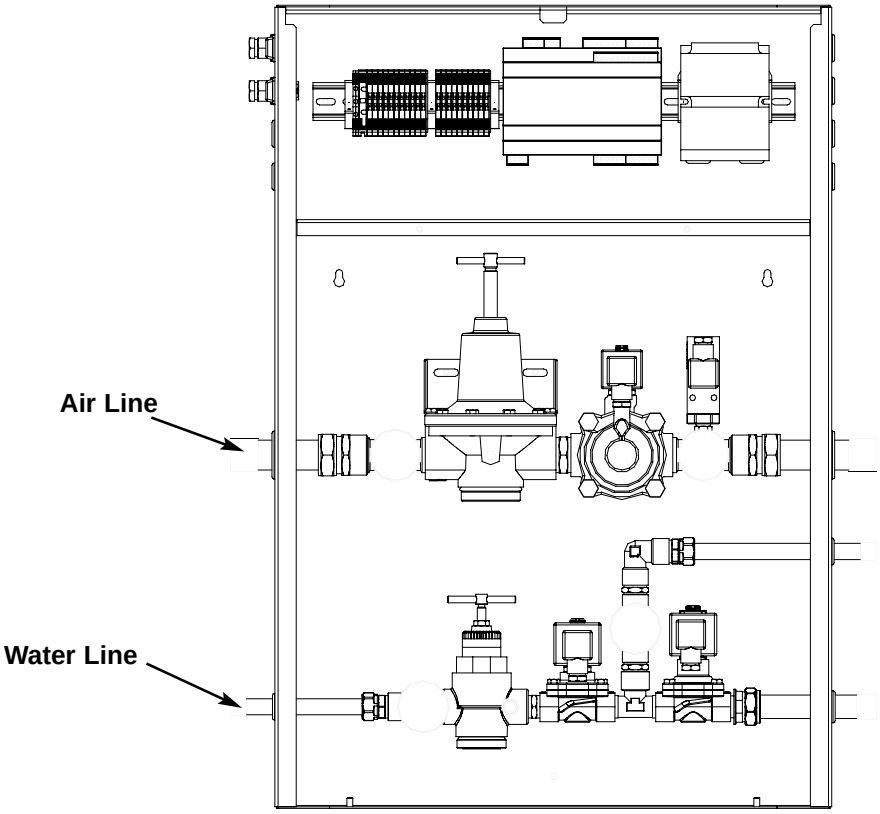
Step 6 - Dispose of neutralised solution
- Dispose of neutralised solution into appropriate drain
- Put unit back into operation if required

Step 6 - On completion of the work:
- Maintain unit if required.
- Reset all drain, flush, clean & bleed cycles
- Return control to automatic condition
- Always leave work area clean, dry and tidy

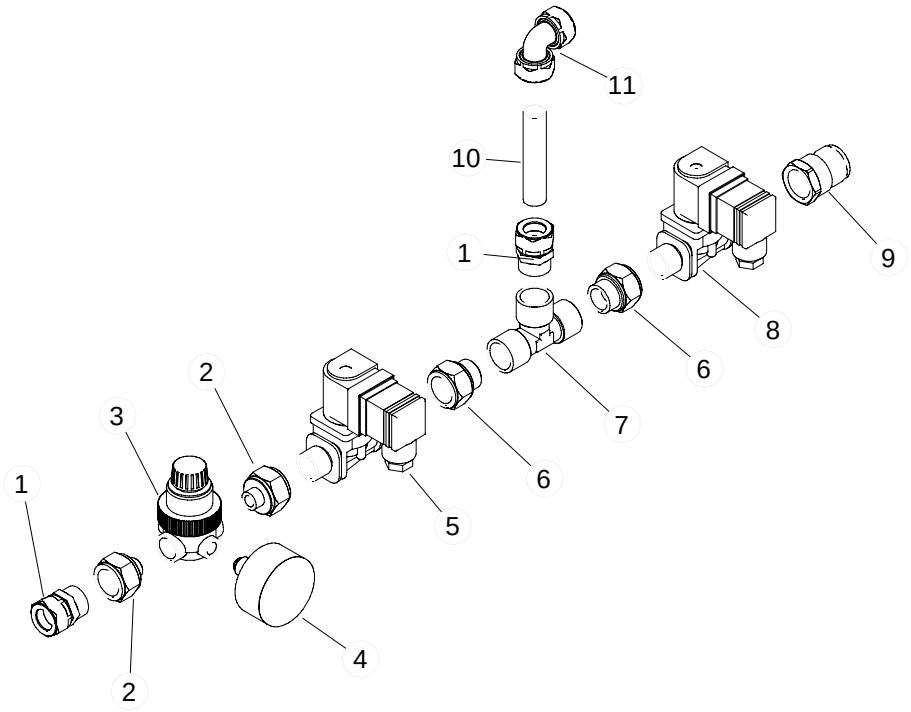
JS60 Line Identification



JS600 Line Identification



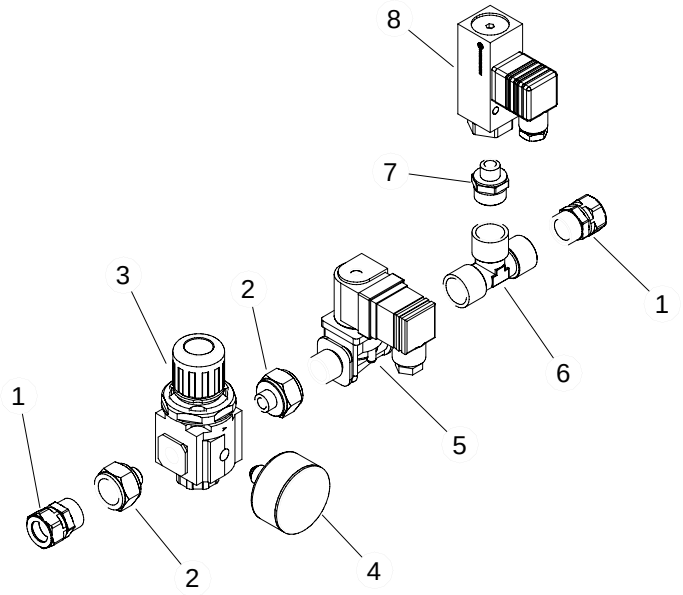
JS60 Water Line



Standard Parts List

Item	Stock Code	Description	Item	Stock Code	Description
1	01327	1/2” Male - 15mm Compression Fitting	7	01133	1/2” F/F/F Tee
2	05012	1/4” Male - 1/2” Female adaptor	8	02091	1/2” 2 Way Valve N/O
3	R06WATER	1/4” Water Regulator	9	01334	1/2” Female - 15mm Compression Fitting
4	01044	0-4 Bar Glycerine Gauge	10	N/A	15mm Stainless Steel Pipe
5	01035	1/2” 2 Way Valve N/C	11	01332	15mm Compression Elbow
6	50030	1/2” M/F Adaptor			

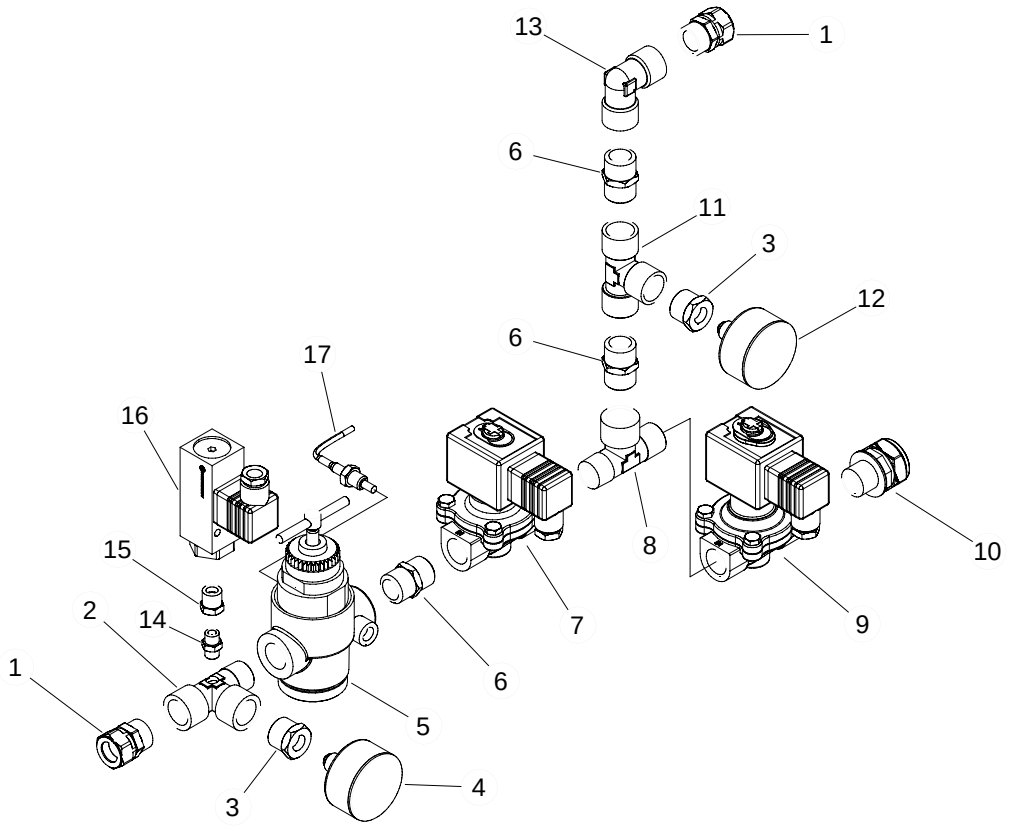
JS60 Air Line



Standard Parts List

Item	Stock Code	Description	Item	Stock Code	Description
1	01337	1/2” Male - 15mm Compression Fitting	5	01035	1/2” 2 Way Valve N/C
2	05012	1/4” Male - 1/2” Female Adaptor	6	01133	1/2” F/F/F Tee
3	01041	1/4” Air Regulator	7	01136	1/2” - 1/4” Hex Nipple
4	01044	0 - 4 bar Glycerine Gauge	8	03002	Air Pressure Switch

JS600 / JS600DS Water Line



Standard Parts List

Item	Stock Code	Description	Item	Stock Code	Description
1	01327	1/2” Male - 15mm Compression Fitting	7	01033	1/2” 2 Way Valve N/C
2	50039	1/2” M/F/F Tee (tapped 1/8” for options)	8	01138	1/2” M/M/F Tee
3	02093	1/2” - 1/8” Bush	9	01069	1/2” 2 Way Valve N/O
4	01043	0 - 10 bar Glycerine Gauge	10	01337	1/2” Male - 22mm Compression Fitting
5	01042	1/2” Water Regulator	11	01133	1/2” F/F/F Tee
6	01115	1/2” Hex Nipple	12	01044	0 - 4 bar Glycerine Gauge
			13	01127	1/2” F/F Elbow

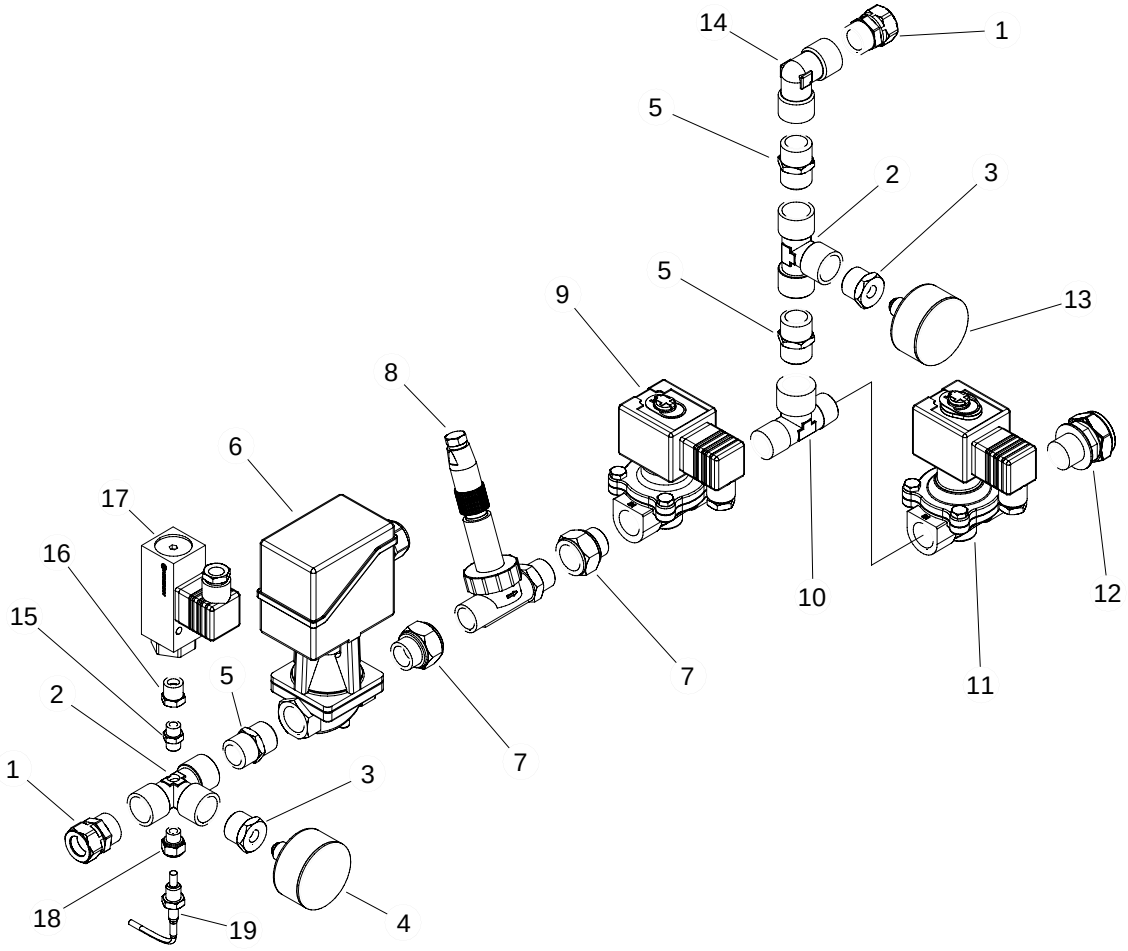
JS600PRES

Item	Stock Code	Description
14	01198	1/8” Hex Nipple
15	01199	1/4” - 1/8” Bush
16	03002	Water Pressure Switch

JS600TEMP

Item	Stock Code	Description
17	tba	Water Temperature Sensor

JS600M Water Line



Standard Parts List

Item	Stock Code	Description	Item	Stock Code	Description
1	01327	1/2” Male - 15mm Compression Fitting	8	DPL1P2	Flow Sensor 24 - 720 l/hr
2	01133	1/2” F/F/F Tee (tapped 1/8” for options)	9	01033	1/2” 2 Way Valve N/C
3	02093	1/2” - 1/8” Bush	10	01138	1/2” M/M/F Tee
4	01043	0 - 10 bar Glycerine Gauge	11	01069	1/2” 2 Way Valve N/O
5	01115	1/2” Hex Nipple	12	01337	1/2” Male - 22mm Compression Fitting
6	03004	1/2“ Modulating Valve	13	01044	0 - 4 bar Glycerine Gauge
7	50030	1/2” M/F Adaptor	14	01127	1/2” F/F Elbow

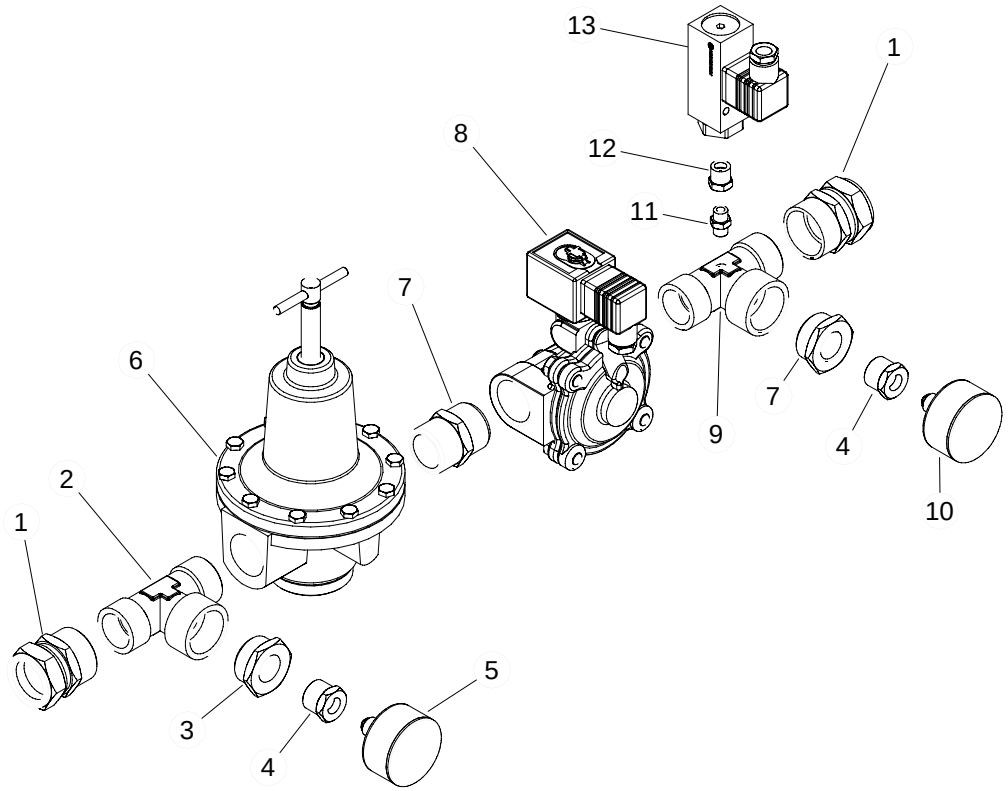
JS600PRES

Item	Stock Code	Description
15	01198	1/8” Hex Nipple
16	01199	1/4” - 1/8” Bush
17	03002	Water Pressure Switch

JS600TEMP

Item	Stock Code	Description
18	01184	M/F Adaptor
19	tba	Water Temperature Sensor

JS600 / JS600DS / JS600M Air Line

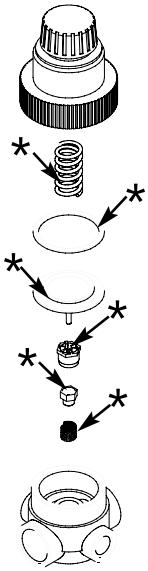


Standard Parts List

Item	Stock Code	Description	Item	Stock Code	Description
1	01336	28mm - 1” Female Compression Fitting	7	01050	1” Hex Nipple
2	02085	1” M/M/F Tee	8	01065	1” 2 Way Valve N/C
3	01339	1/2” - 1” Bush (Plated)	9	02085	1” M/M/F Tee (Tapped 1/8”)
4	02093	1/2” - 1/8” Bush	10	10144	0 - 4 bar Glycerine Gauge
5	01043	0-10 bar Glycerine Gauge	11	01198	1/8” Hex Nipple
6	01067	1” Air Regulator	12	01199	1/4” - 1/8 Bush
			13	03002	Air Pressure Switch

JS60 Water Line Components Serviceable Components

R06WATER (1/4” Water Regulator) Service Kit R06



Maintenance

(1) Open regulator by unscrewing the top.

(2) Visually inspect for damage, debris or wear.

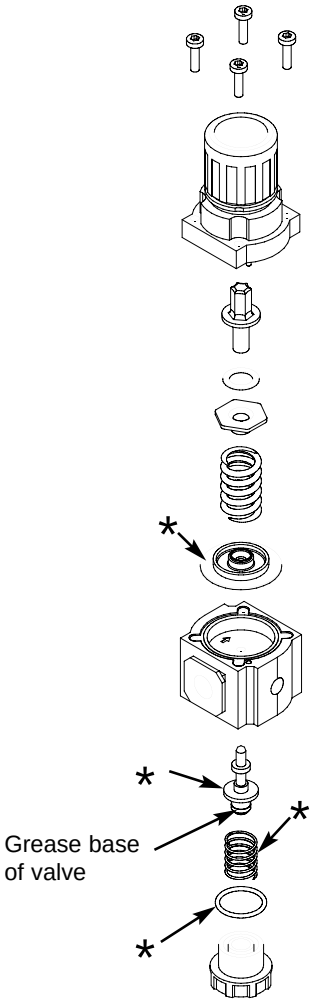
(3) Carefully clean the regulator housing and parts.

(4) If fitting service kit R06, replace parts identified with (*)

(5) Reassemble parts and housing as shown.

JS60 Air Line Components Serviceable Components

01041 (1/4” Air Regulator) Service Kit R11



Maintenance (diaphragm)

(1) Open regulator by releasing the 4 screws.

(2) Visually inspect diaphragm for damage, debris or wear.

(3) Carefully clean the regulator housing and parts.

(4) If fitting service kit R11, replace parts identified with (*)

(5) Reassemble parts and housing as shown.

Maintenance (Valve and Seat)

(1) Open regulator by unscrewing bottom cap.

(2) Visually inspect for damage, debris or wear.

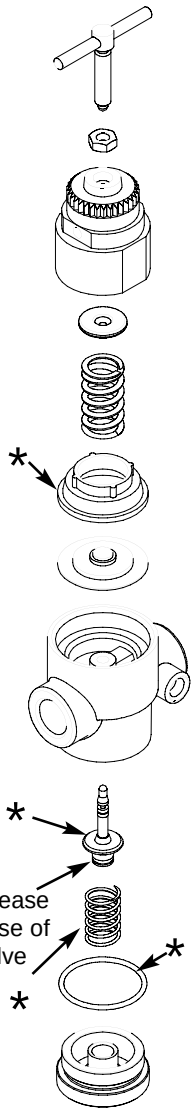
(3) Carefully clean the regulator housing and parts.

(4) If fitting service kit R11, replace parts identified with (*)

(5) Reassemble parts and housing as shown.

JS600 / JS600DS Water Line Serviceable Components

01042 (1/2” Water Regulator) Service Kit R43



Maintenance (diaphragm)

(1) Open regulator by unscrewing bonnet.

(2) Visually inspect diaphragm for damage, debris or wear.

(3) Carefully clean the regulator housing and parts.

(4) If fitting service kit R43, replace parts identified with (*)

(5) Reassemble parts and housing as shown.

Maintenance (Valve and Seat)

(1) Open regulator by unscrewing bottom cap.

(2) Visually inspect for damage, debris or wear.

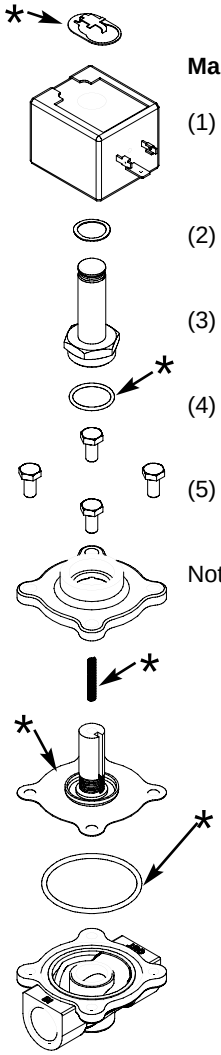
(3) Carefully clean the regulator housing and parts.

(4) If fitting service kit R43, replace parts identified with (*)

(5) Reassemble parts and housing as shown.

JS600 / JS600DS / JS600M Water Line Serviceable Components

01033 (1/2” 2 Way Valve NC) Service Kit 2WAY



Maintenance

(1) Disassemble Valve by removing retaining clip and releasing the 4 screws.

(2) Visually inspect parts for damage, debris or wear.

(3) Carefully clean the regulator housing and parts.

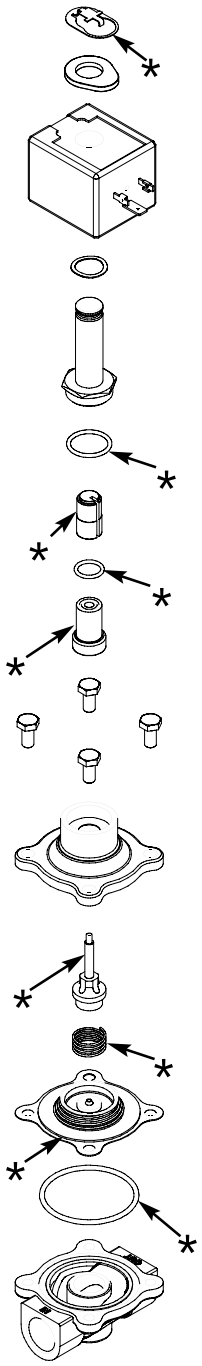
(4) If fitting service kit 2WAY, replace parts identified with (*)

(5) Reassemble parts and housing as shown.

Note: Ensure small hole in diaphragm is positioned on the outward side of the valve

JS600 / JS600DS / JS600M Water Line Serviceable Components

01069 (1/2” 2 Way Valve NO) Service Kit 2WAYD



Maintenance

(1) Disassemble valve by removing retaining clip and releasing the 4 screws.

(2) Visually inspect parts for damage, debris or wear.

(3) Carefully clean the regulator housing and parts.

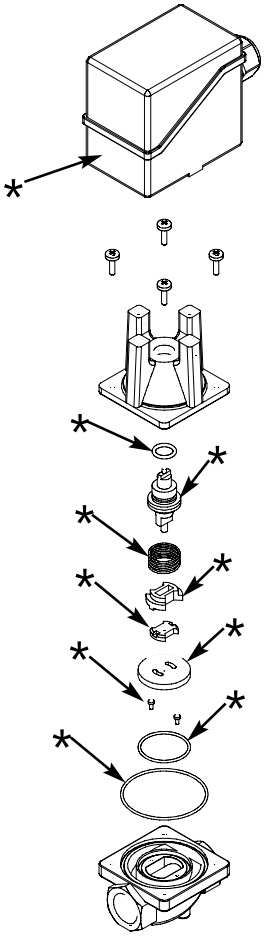
(4) If fitting service kit 2WAYD, replace parts identified with (*)

(5) Reassemble parts and housing as shown.

Note: Ensure small hole in diaphragm is positioned on the outward side of the valve

JS600M Water Line Serviceable Components

Modulating Valve Service Kit 03012



Maintenance

(1) Remove actuator lid and unwire.

(2) Remove actuator body by releasing screws located on its underside.

(3) Open valve body by releasing the 4 screws.

(4) Visually inspect parts for damage, debris or wear.

(5) Carefully clean the valve housing and parts.

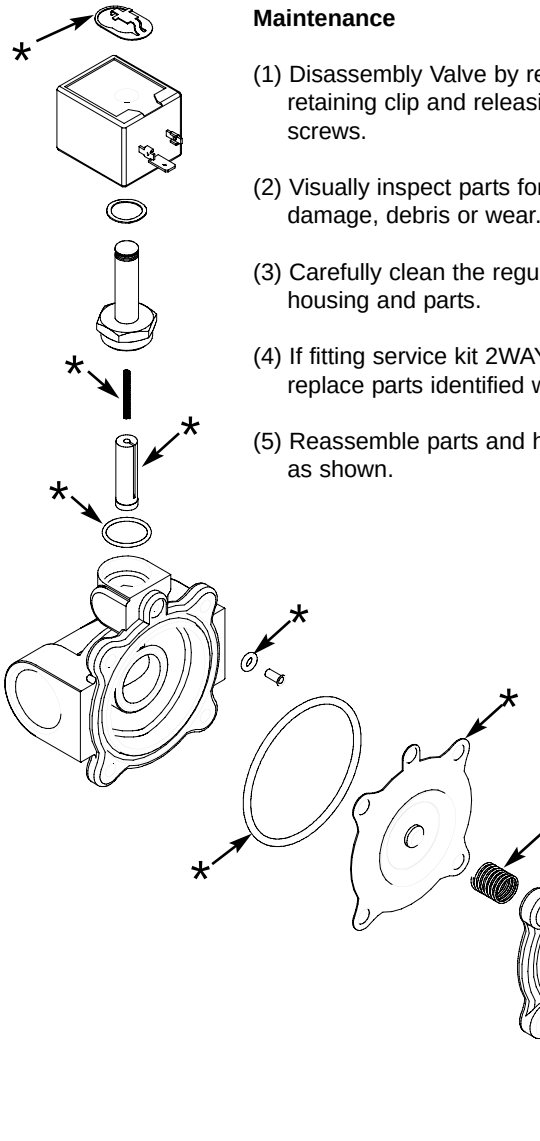
(6) If fitting service kit 03012, replace parts identified with (*)

(7) Reassemble parts and housing as shown.

(8) Fit new actuator and wire in.

JS600 / JS600DS /JS600M Air Line Serviceable Components

01065 (1" 2 Way Valve N/C) Service Kit 2Way4000



Maintenance

(1) Disassembly Valve by removing retaining clip and releasing the 4 screws.

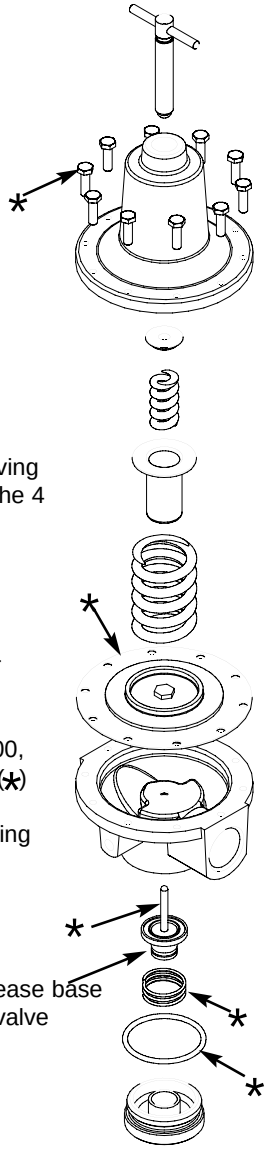
(2) Visually inspect parts for damage, debris or wear.

(3) Carefully clean the regulator housing and parts.

(4) If fitting service kit 2WAY4000, replace parts identified with (*)

(5) Reassemble parts and housing as shown.

01067 (1" Air Regulator) Service Kit 20AG3/4000



Maintenance (diaphragm)

(1) Open regulator by releasing the 10 screws.

(2) Visually inspect diaphragm for damage, debris or wear.

(3) Carefully clean the regulator housing and parts.

(4) If fitting service kit 20AG3/4000, replace parts identified with (*)

(5) Reassemble parts and housing as shown.

Maintenance (Valve and Seat)

(1) Open regulator by unscrewing bottom cap.

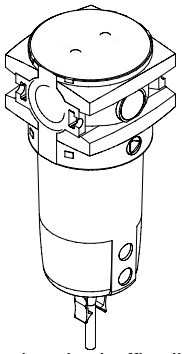
(2) Visually inspect for damage, debris or wear.

(3) Carefully clean the regulator housing and parts.

(4) If fitting service kit 20AG3/4000, replace parts identified with (*)

(5) Reassemble parts and housing as shown.

Air Filter
Service Kit:
ELEMENT600/AUTODRAIN600



1 Filter element
2 Bowl gasket
3 Auto-drain 1/8” Female BSP
4 Bowl
5 Circlip

Maintenance

(1) Shut off the air supply to the control panel and relieve the pressure.
(2) Carefully unscrew the bowl and remove the air filter element by unscrewing the baffle disc. Replace the element and element gasket.
(3) To clean the auto-drain assembly, first remove it from the bowl. Un-clip the cap from the strainer and remove the float and drain assembly. The strainer can be cleaned using compressed air and the bowl washed in soapy water. The float and drain assembly are unserviceable items and should be replaced.
(4) Re-assemble the filter, ensuring that gaskets are correctly seated.

PureFlo Ag+ Silver Cartridge with Argentosan

PureFlo Ag+ with Argentosan™ has been developed to inhibit the growth of bacteria, moulds and fungi in concentrations normally found in potable water supplies. Argentosan is not a disinfectant and will not kill all microbes in heavily contaminated water. It is therefore important that the quality of the water supplying the humidifier is monitored and controlled regularly according to the risk assessment for your building.

Refer to instruction sheet supplied with replacement cartridge.

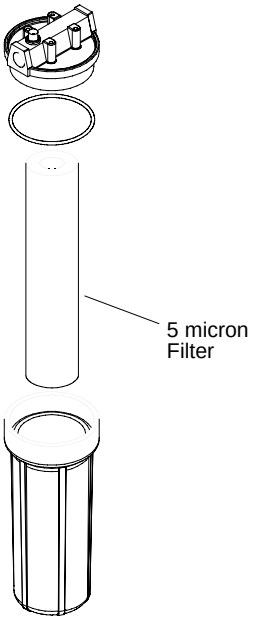
PureFlo Ag+ replacement Intervals:

<100l/h = 2yrs
100-300l/h = 1yr
>300l/hr = 6 months

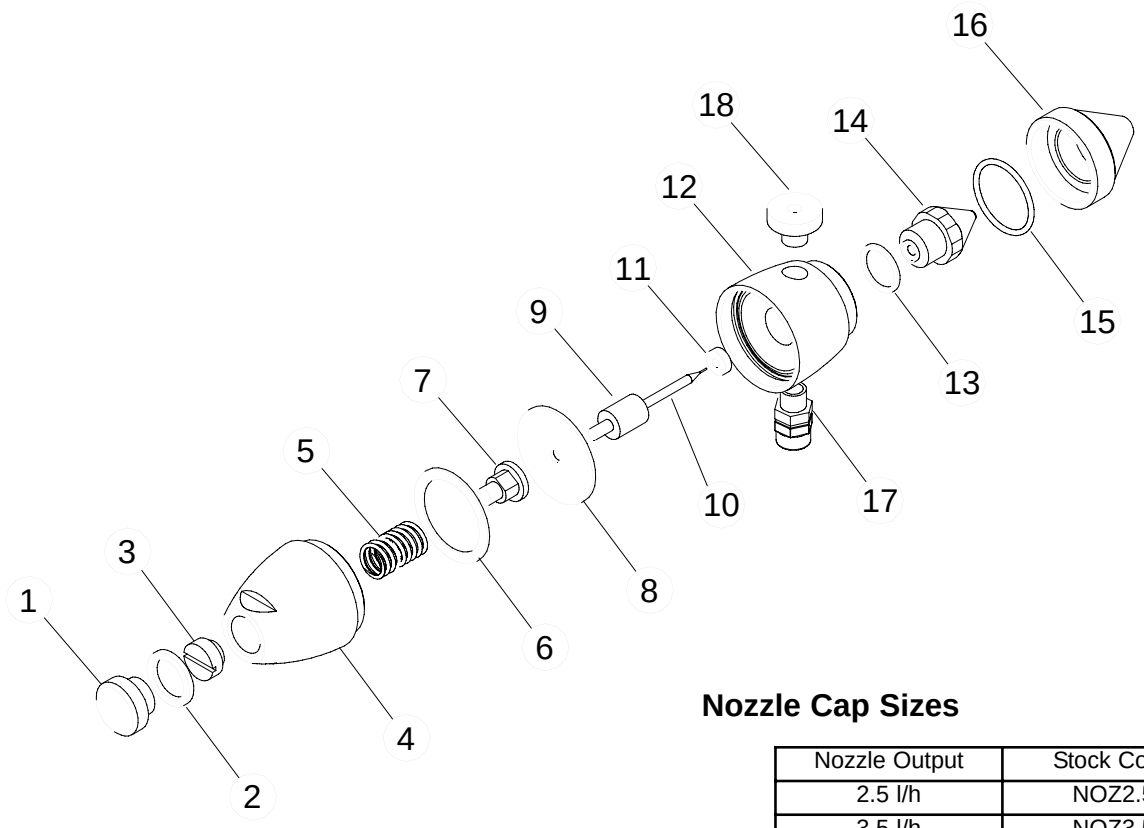
5 Micron Filter

PureFlo Ag+ replacement Intervals:

3 months or more frequently if required



JetSpray Nozzle



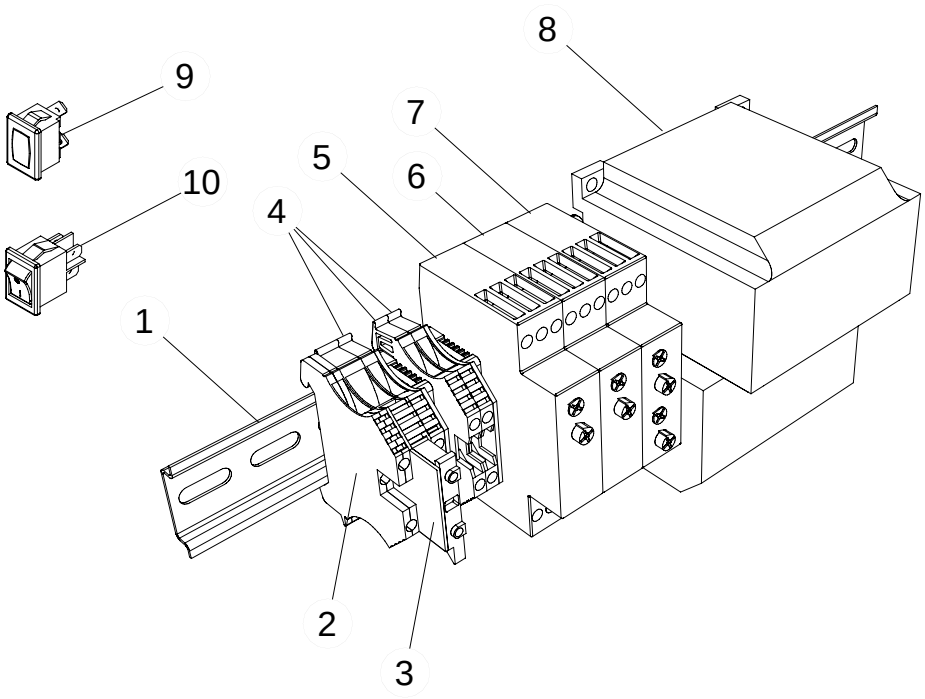
Nozzle Cap Sizes

Nozzle Output	Stock Code
2.5 l/h	NOZ2.5
3.5 l/h	NOZ3.5
4.5 l/h	NOZ4.5
5.5 l/h	NOZ5.5
6.5 l/h	NOZ6.5
9.0 l/h	NOZ9.0
12.0 l/h	NOZ12.0
15.0 l/h	NOZ19.0

Standard Parts List

Item	Stock Code	Description	Item	Stock Code	Description
1	01318	Nozzle Back Nut	11	01303	Nozzle Cleaning Pin Seal
2	01321	Nozzle Back Nut Washer	12	01282	Nozzle Body Front
3	01312	Nozzle Balancing Screw	13	01291	Nozzle Water Jet Washer
4	01285	Nozzle Body Rear	14	01288	Nozzle Water Jet (2.5-5.5 l/h)
5	01315	Compression Spring		01289	Nozzle Water Jet (9.0-15.0 l/h)
6	01309	Nozzle Diaphragm Washer	15	01294	Nozzle Air Cap O Ring
7	01300	Nozzle Cleaning Pin Nut	16	See Table	Nozzle Air Cap
8	01306	Nozzle Diaphragm	17	01192	1/8 x 6mm Push Fit
9	01297	Nozzle Cleaning Pin Body	18	01324	Air Inlet Side Nipple
10	01297	Nozzle Cleaning Pin			

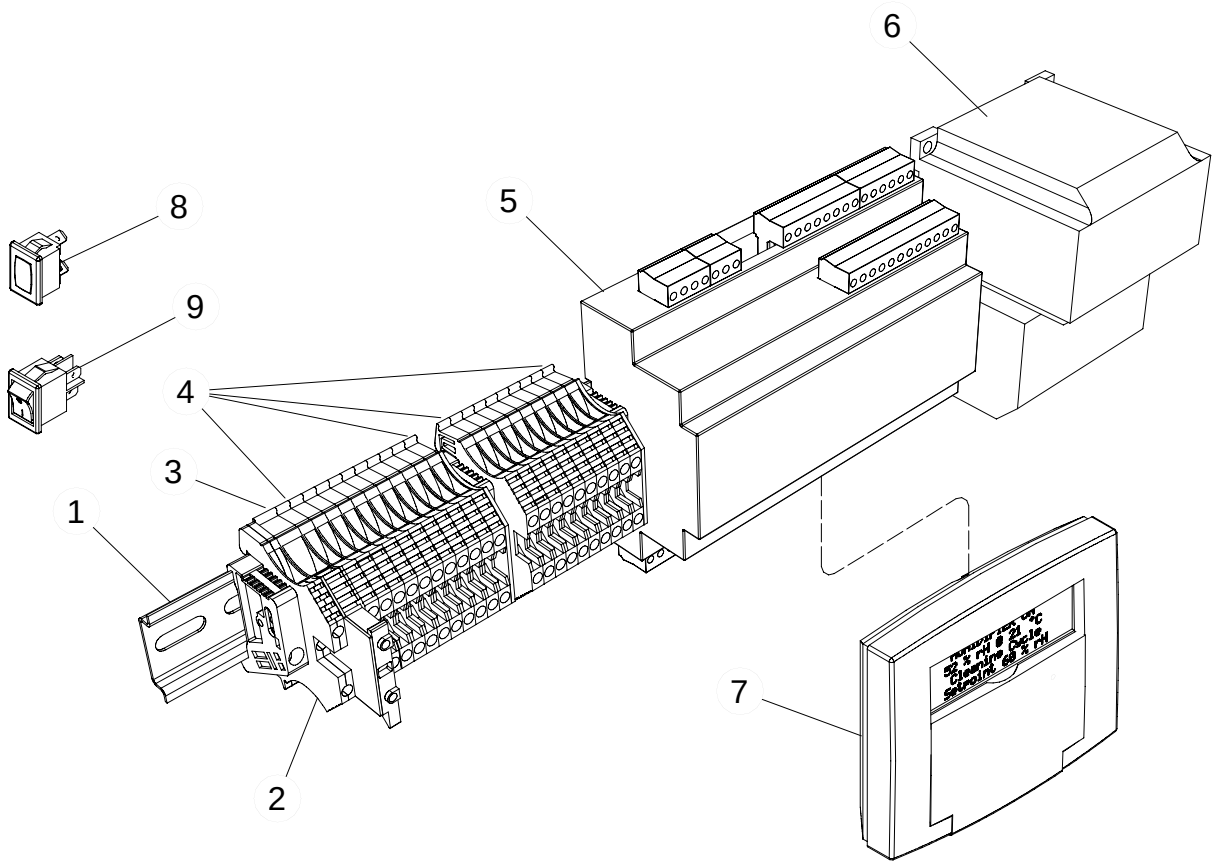
JS60 / JS600 Timer Loom



Standard Parts List

Item	Stock Code	Description	Item	Stock Code	Description
1	01204	Din Rail 6mm Slot	6	88826115	Purge Timer
2	01210	Earth Terminal	7	88826155	Nozzle Flush Timer
3	01212	Fuse Terminal	8	TRAF075S	Transformer 75VA
4	01207	Plain Terminal	9	01257	Power Light
5	88826135	Air Run On Timer	10	01256	Power Switch

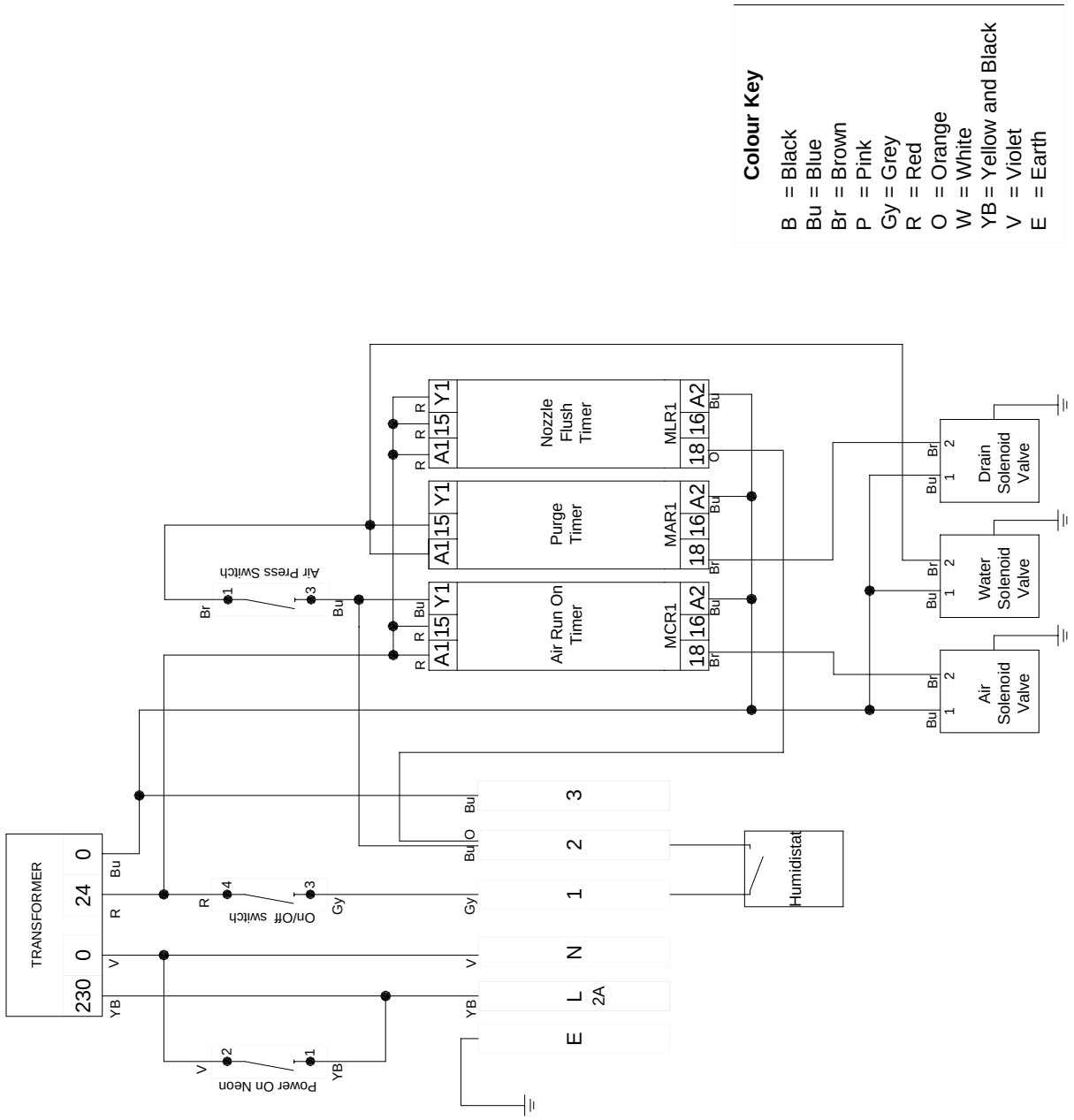
JS600DS / JS600M Microprocessor Loom



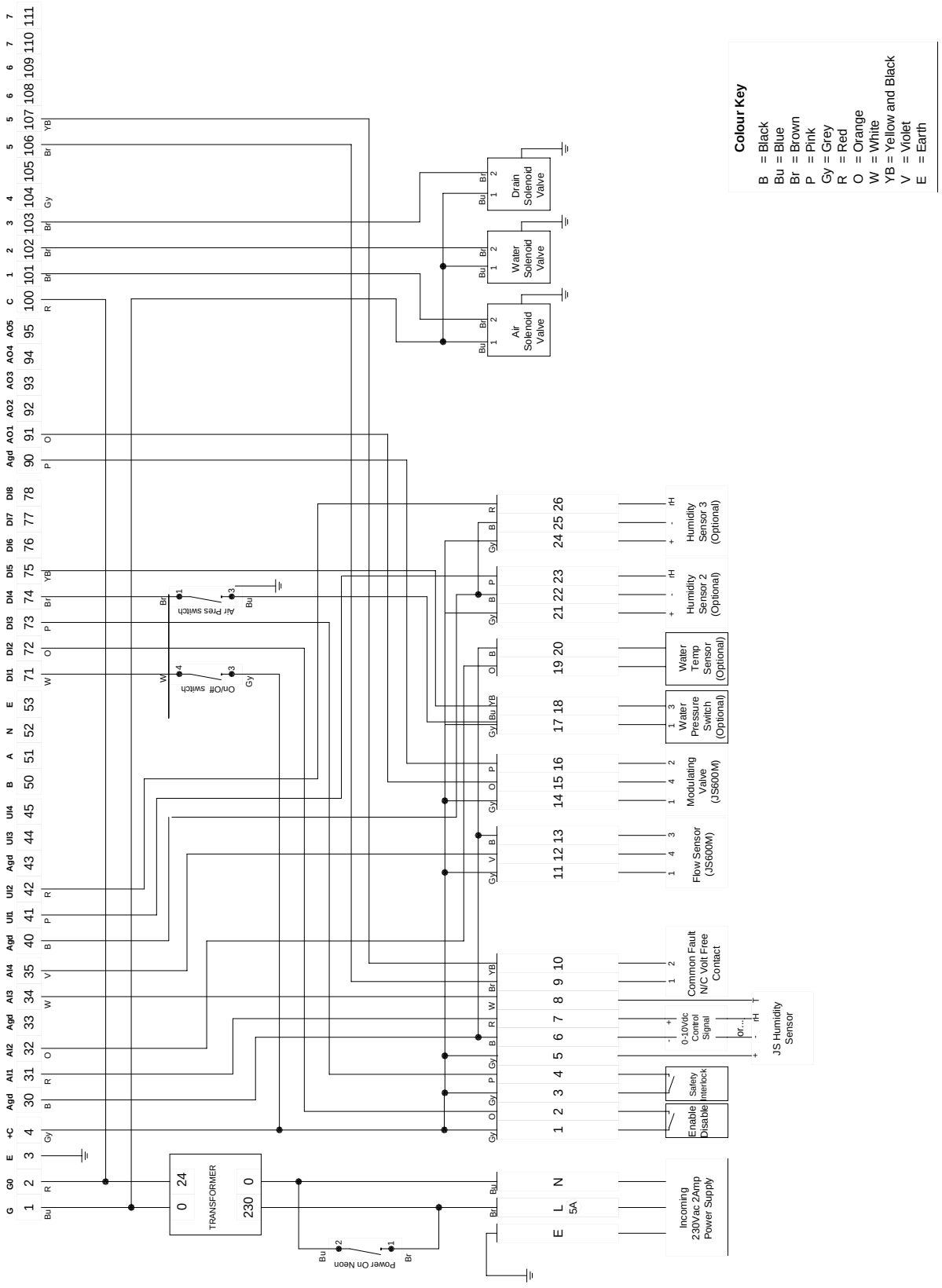
Standard Parts List

Item	Stock Code	Description	Item	Stock Code	Description
1	01204	Din Rail 6mm Slot	6	TRAF075S	Transformer 75VA
2	01210	Earth Terminal	7	JETSPRAYMCDISP	JetSpray Display + 10M Cable
3	01212	Fuse Terminal	8	01257	Power Light
4	01207	Plain Terminal	9	01256	Power Switch
5	JETSPRAYMC	JetSpray MC Controller			

JS60 / JS600 With Timer Wiring Diagram



JS600DS / JS600M With Programmer Wiring Diagram



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