POWDER COATING EQUIPMENT USER'S MANUAL

E-FEED+3 INJ

SERIES

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electron.com.tr + info@electron.com.tr

Electron

10010 St. No: 10
35470
ITOB Menderes
Izmir/TURKEY

Electron

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1. Safety Regulations

This section sets out the fundamental safety regulations that must be followed by the user and third parties using the E-FEED +3 INJ.

These safety regulations must be read and understood before the E-FEED V3 is used.

1.1. Safety Symbols

The following warnings with their meanings can be found in the Sistem Teknik Makina operating instructions. The general safety precautions must also be followed as well as the regulations in the operating instructions.

DANGER!
Electrical and moving parts pose a hazard.
Possible Consequences: Death or serious injury.

WARNING!
Improper use will damage the device or cause malfunction. Possible consequences: Minor injuries or damage to equipment.

NOTE!
Useful tips and other information.

1.2. Conformity Of Use

E-CONTROL, Control Cabinet of devices is built to the latest specification and conforms to the recognized technical safety regulations. It is designed for the regular application of powder coating.

1. Any other use is considered as non-conform. The manufacturer is not responsible for damage resulting from im-proper use of this equipment; the end-user alone is responsible. If the E-FEED+3 INJ is to be used for other purposes or other substances outside of our guidelines then Sistem Teknik Makina A.Ş. should be consulted.
2. Observance of the operating, service and maintenance instructions specified by the manufacturer is also part of conformity of use. E-FEED+3 INJ should only be used, maintained and started up by trained personnel, who are informed about and are familiar with the possible hazards involved.
3. Observance of the operating, service and maintenance instructions by the manufacturer is also part of conformity of use. The E-COAT+3 Master should only be used, maintained and started up by trained personnel, who are informed about and are familiar with the possible hazards involved.
4. Start-up is forbidden until it has been established that the E-FEED+3 INJ has been set up according to the guideli-nes for machinery EN 60204-1 (machine safety) must also be observed.
5. Unauthorized modifications to E-FEED+3 INJ exempt the manufacturer from any liability of resulting damage.
6. Relevant accident prevention regulations, as well as other generally recognized safety regulations, occupational health and structural regulations are to be observed.
7. In addition to above, country-specific safety regulations must be observed.

1.3. Technical Safety Regulations for Stationary Electrostatic Powder Spraying Equipment

1.3.1. General Information

The powder spraying equipment of Sistem Teknik Makina (Electron) is designed for safe use and to the latest technological specs. Electrostatic powder equipment could create dangerous situations unless it's used properly. In addition to that, there might be a danger to life and limb of the user or third party, a danger of damage to the equipment and other machinery that belongs to the user and hazards to the proper operation of equipment.

1. The powder spraying equipment should only be started up and used once the operating instructions have been carefully read. Apart from any usage from the user manual, there lies a danger of damaging the equipment and loss of control of the equipment.
2. Operational safety has to be observed before every start-up. Regular Servicing is the essence of working safely.
3. Local legislation should be considered for the safety.
4. The plug has to be disconnected before the machine is opened for repair.
5. The plug and socket connections between spraying equipment should only be taken out when the power is off.
6. The connection cables have to be installed in a manner that they wouldn't interfere or damage the normal machine operation. Also the local legislation should be observed for the installation.
7. Only original Electron spare parts should be used, because only the original products will guarantee the equipment's explosion protection. Any damage caused by other used parts is not covered by the guarantee.
8. If Electron powder spraying equipment is going to be used with other devices/machinery from other manufacturers, their safety regulations should be also considered.
9. Be cautious while working in a powder/air mixture area. In the right concentration the mixture would be flammable, thus smoking is forbidden in the entire plant area.
10. Rule of thumb says that any person who uses a pacemaker should NEVER enter a high voltage area or places with electromagnetic fields. Note that people with pacemakers ALSO SHOULDN'T work in powder spraying installations.

WARNING!
Only the customer itself is responsible for the safe usage of the equipment.
Sistem Teknik is not responsible for any damage resulted from the usage.

1.3.2. Consciously Working Safe

Every other individual who will be working for the assembly, start-up, operation, service and repair of powder spraying equipment must have read and understood the operating instructions and the "Safety Regulations". Operators have to be appropriately trained via Sistem Teknik assembly personnel and made aware of the possible danger of powder spraying equipment and the environment.

Powder spraying equipment must only be used by trained and authorized personnel. This also applies for any kind of modification to the electrical equipment, which only should be carried out by a specialist. It is essential that the operating instructions are understood before any kind of work is done with the equipment. All the procedures have to be done according to the instructions. Powder spraying equipment can be turned off via the main power switch or the emergency shut down procedure.

1.3.3. Safety Regulations for the Operating Firm and/or Personnel

1. First of all, anything which would influence the equipment negatively should be avoided for the technical safety.
2. The machine user should be well informed about no other people than trained personnel would use the machine.
3. The employer has to provide an operating instruction manual for specifying the dangers for humans and the environment by handling dangerous materials, as well as all preventive measures and workplace behaviors. This "document" must be well written in an understandable form in the language that the person employed for the equipment.
4. The operator is obliged to check the equipment for external damage once every shift changed at the very least. The operation characteristic changes should also be reported.
5. Users should conform the satisfactory working conditions else the equipment should not be used.
6. The operating firm must ensure that the users wear protective clothing like facemasks and working suits.
7. The firm also guarantees the cleanliness of the workplace and proper checks for the powder spraying equipment.
8. Safety devices should be always on the equipment at all costs unless the equipment is going to be maintained or cleaned. After the maintenance all the devices should be put on the equipment. The users must be trained well for this purpose.
9. Powder fluidization or high voltage spray gun checks have to be done when the equipment is switched on.

1.3.4. Special Types of Hazard

1. ***Power*:** All the high voltage equipment should be unplugged before opened. This is a huge life risk thus it has to be taken under great care.
2. ***Powder:*** Powder/air mixtures could be ignited by sparks. Sufficient ventilation is a must while using powder spraying equipment. Powder, which is not swept from the floor creates risky environment.
3. ***Static Charges:*** These could result in the following: Charges to people, electric shocks, sparks. Charging of objects has to be avoided.
4. ***Grounding:*** All electricity conducting parts and machinery in the workplace must be earthed 1.5 mt on either side and 2.5 mt around each booth opening. The grounding resistance must amount to a maximum of 1 MOhm resistance has to be tested regularly. The appropriate devices must be kept in the workplace for regular grounding checks.
5. ***Compressed Air*:** Compressed air could be created after long pauses of the equipment and this creates risk of pneumatic hose damage or uncontrolled release and improper use of compressed air. Compressed air should be drained properly.
6. ***Crushing and Cutting:*** There might be moving parts while operation (e.g. Conveyor Belt, Reciprocator). The operator must be trained to maintain the area safety and local security regulations.
7. ***Exceptional Circumstances:*** Local conditions must be met at all costs. Additional measures such as barriers can be used to prevent unauthorized access.
8. ***Conversions and Modifications to the Equipment:*** All conversions and must be asked to Sistem Teknik prior to the process and no process should be done without Sistem Teknik's permission. This is essential for the equipment safety and conformity. Powder coating equipment should never be used if damaged; these parts should be changed immediately with the original Sistem Teknik replacement. Other replacements then Sistem Teknik original equipment does not conform the guarantee, thus the guarantee will no longer be valid. Equipment repairs must be done only by specialist or at Sistem Teknik verified shops.

1.3.5. Safety Requirements for Electrostatic Powder Coating

1. All the equipment used for powder coating is dangerous unless the instructions are not conformed.
2. Every electrostatic conductive part must be earthed w ithin the 5 meter radius from the equipment.
3. The floor of the coating area should conduct electricity (Concrete is generally a conductive surface, check with your building project for more info)
4. The users should wear electricity conducting footwear.
5. The guns are earthed thus you must use them with your bear hands. If gloves are going to be used, make sure that they conduct electricity.
6. Grounding cable must be connected to the grounding screw of the electrostatic powder spraying hand appliance. It should have a good connection with the booth, hopper and conveyor chain (if used).
7. E-CONTROL must be switched off while the it is being cleaned.
8. The grounding must be checked every week. Remember that the grounding resistance must be 1 MOhm at a maximum.
9. Only use spare parts / attachments and accessories from Sistem Teknik's original parts page. This ensures the safety of the equipment and conformity of use.
10. Cleaning agents creates the risk of hazardous fumes. Please check the manufacturer's manual about more information about the cleaning agents if they are used in the site.
11. If there is any damage on the powder coating equipment or the spray gun, operators should stop using it.
12. Especially make sure that the environmental regulations and the manufacturer's instructions are being conformed while disposing the powder lacquer and cleaning agents.
13. Repairs have to be carried out via specialists of Sistem Teknik trained personnel and never to be done in the operating area under any circumstance.
14. Dangerous dust concentration levels should be avoided in powder spraying areas. There must be sufficient technical ventilation available (e.g. booth ventilation) to prevent a dust concentration of more than %50 of the lower explosion limit (UEG = max. permissible powder/air concentration). If the UEG is not known then a value of 10g/m3 should be used.

2. Product Description

2.1. Usaga Area

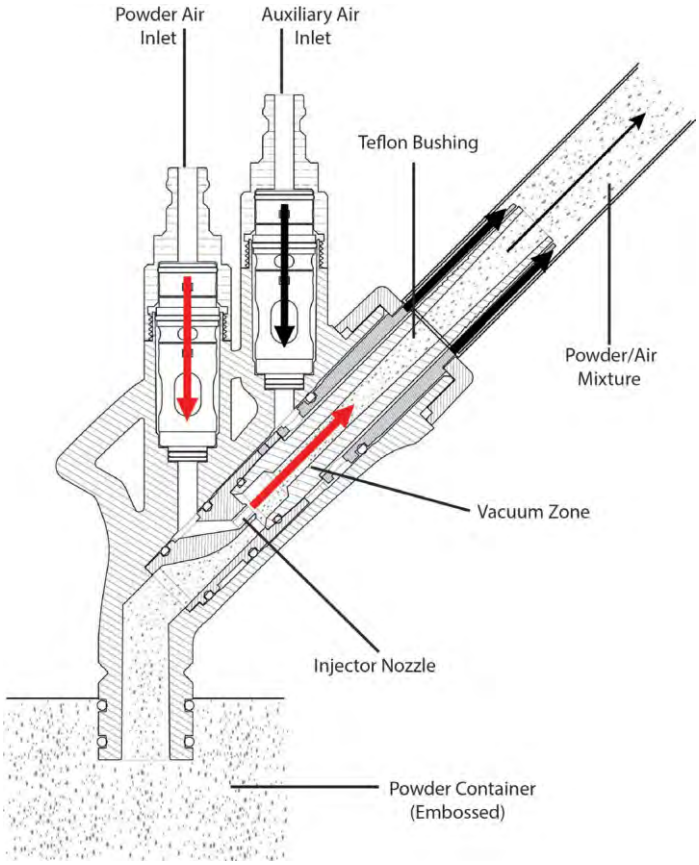
The E-FEED V3 Injector is used for conveying the organic type of powder paint used in the industry from any paint hopper to the spray gun where the application is made. E-FEED V3 powder paint injector is supplied ready to use together with special PTFE material made of Teflon bushing and sintered inlet filters.

Explosion Protection	Zone
CE Ex II 3 D	22

NOTE: The explosion protection class mentioned above is only valid if the E-FEED V2 Powder Coating injector is used with "Anti-Static with Discharge Line"type powder paint hoses and the electrical resistance from the injector body to the application field is below 1 Mohm.

2.2. Injector Structure and Powder Coat Transfer Principle

As a result of aerodynamic rules, the air exiting a nozzle creates a vacuum at the recess inlet, which is proportional to the fluid velocity when it is directed from the suction line to a narrower recess as shown in the picture below. This vacuum allows the powder paint to be suc-ked into the recess through the chamber where the fluid velocity is low and rapidly enters into the line leading to the gun. This physical condition, also known as the venturi effect, allows the powder coating to be dispensed from a desired reservoir to the application gun.



As can be seen in the picture above, the powder caoting / air mixture is sucked from the powder coating hopper and carried to the paint hose and then to the powder paint application gun. The paint density of the powder coating / air mixture coming out of the gun tip is adjusted with the “Auxiliary Air” and “Paint Air” settings, and the paint quality, injector teflon bushing abrasion rate, hose metering, hose curl and turn number, hose diameter, gun outlet nozzle type and height varies between the injector and the gun. As a general rule, the Teflon bushing, which has the highest effect on the powder output rates, should be specifically monitored and repla-ced as a consumable material.

Pneumatic conveying of very thin solid materials such as powder coating in the hose is achieved by ensuring the correct air flow rates in the hose and the optimum levels of these flow rates vary according to the hose diameters. According to the experimental data in powder coating applications, this air flow rate is approximately 67 lt/min (4 m^3/s) in a Ø11 mm hose. “Paint Air” is used to adjust the powder coating / air mixture coming out of the gun tip and it is requested to make paint. Reducing the paint air will result in a 67 l/min flow rate in the air filter coming out of the hose, which may result in intermittent paint and vomiting in the paint, as the optimum flow will deteriorate. In such an environment increasing the “Auxiliary Air” flow, the optimum fluid can be increased to at least 67 l/min again. This setting is fully automatic for E-COAT+3 Master Type electrostatic powder coating applicators.

3. Powder and Mixture Value Tables

3.1. E-FEED+3 INJ General Usage Value

The amount of air flowing through the hose and the paint ratio must be adjusted correctly to ensure correct paint output patterns in powder coating application guns. This flow rate is approximately 65-85 lt/min (4-5 m³/s) in a Ø11mm paint hose, while it is approximately 50-85 lt / min (3-5 m³/s) in a Ø10mm hose. In general, the lowest air flow quantities and paint output levels can be achieved by using a Ø10mm type hose in powder coating applications and a Ø12mm type hose should be used when high amount of paint output is desired. As a general rule, irregular paint output and vomiting at the paint output indicate insufficient hose air flow and the flow level should be increased.

E-FEED+3 INJ General Usage and Test Conditions	
Powder Paint Type	Polyester/Epoxy
Auxiliry Air Nozzle Ø (mm)	1,5
Powder Air Nozzle Ø (mm)	1,5
Powder Hose Ø (mm)	11
Powder Hose L (m)	7

3.2. Use of E-COAT+3 Series Devices with E-FEED+3 INJ

E-COAT Series devices are divided into 3 different control units. These are called E-COAT Pro V2, E-COAT Master and E-COAT Master P in increasing order according to the option levels. While the E-COAT Master is able to keep the total air flow in the powder hose between the E-FEED V2 powder coating injector and the powder spray gun fully automatic at the total air volume set on the screen, this setting can be set on the E-COAT Pro V2. It must be made by the user through the manometer regulators located on the front panel of this device.

3.2.1 Use with E-COAT+3 Pro Control Unit

The appearance of the manometer regulators on the front panels of the E-COAT Pro V2 device enables the adjustment of “Paint Air” and “Auxiliary Air” settings as follows. The user must make adjustments using the following manometer regulators in order to achieve the correct flow rate in the powder hose. According to the inlet air pressures of the E-FEED+3 INJ injector, the air flowing out of the nozzles and reaching the powder paint hose is given in the tables below.

According to the settings, the flow rate in the powder coating hose can be calculated as the sum of the flow rate of these two air (“Paint Air” and “Auxiliary Air”) and the flow rate for the correct hose can be obtained.

E-FEED V2 Paint Air (Red Inlet) pressure dependent flow rate and paint transfer rate generated under test conditions can be examined in the table below. The Paint Air Flow column in the table represents the air flow rate from the injector nozzle in the injector to the teflon bushing recess and from there into the powder coating hose.

The powder coating should be included in the calculation of the total air flowing through the hose. It should be noted that the air flow rate in the powder coating hose is the sum of the values of “Paint Air“ and “Auxiliary Air”.

Paint Air Pressure [Bar]	Paint Air Flow [lt/min]	Paint Transfer [gr/min]
0,6	20	20
0,9	29	56
1,5	39	127
1,9	47	175
2,9	66	255
3,8	82	313
4,5	94	340
4,8	100	348

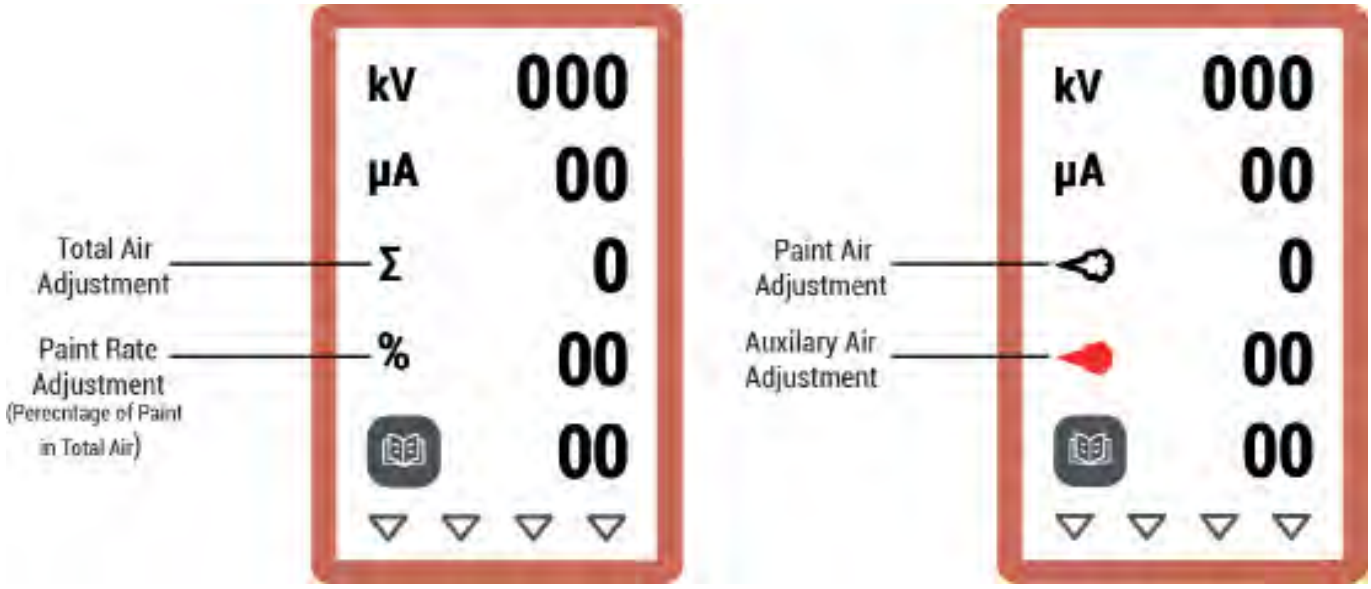
The flow rate depending on the E-FEED V3 Auxiliary Air (Blue Inlet) pressure can be exa-mined in the table below. The Auxiliary Air Flow column in the table represents the air flow rate from around the Teflon bushing in the injector into the powder paint hose. It should be included in the calculation of the total air flowing through the powder coating hose. It should be noted that the air flow rate in the powder coating hose is the sum of the “Paint Air” and “Auxiliary Air” values.

Auxiliary Air Pressure [Bar]	Auxiliary Air Flow [lt/min]
0,6	31
1	43
1,5	63
2	86
2,5	102

3.2.2. Use with E-COAT+3 Master Series Control Units

For making the “Paint Air” and “Auxiliary Air” settings in E-COAT Master devices front panel the digital screenshots are as follows.

E-COAT+3 Master type devices allow the user to operate in a mode where both Auxiliary and Dye Air are adjusted independently and the total air flow in the Powder Coating hose and the paint ratio in this flow are adjusted automatically by the device at the desired levels. When the total air is set to fully automatic mode, the E-COAT Master keeps the total air quantity ente-red on the screen constant by automatically adjusting the auxiliary air even if the paint ratio is changed. When the air settings are set to stand-alone mode, the E-COAT Master device works in the same way as the Pro V2 device type, allowing both air to be set independently.



E-COAT+3 Master Pneumatic Control Interface
Total Air Autotune Configuration (Left), Independent Air Setting Configuration (Right)

The configuration of the E-COAT +3 Master type devices, the total air and paint ratios according to the total air and paint ratios set when the total air is in fully automatic mode are given in the table below.

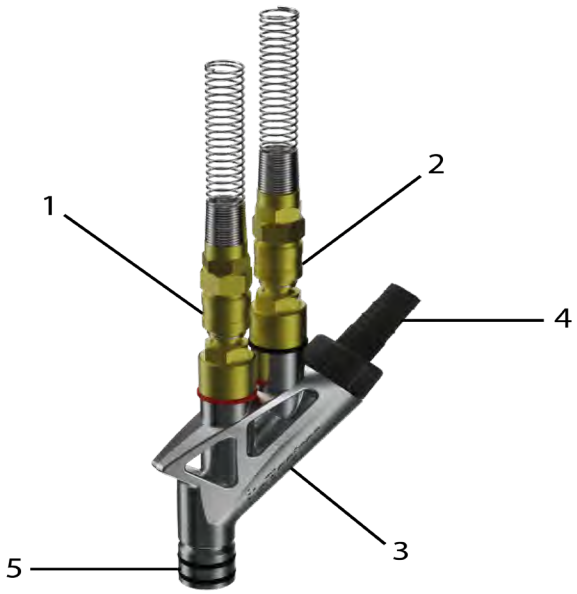
E-FEED+3 INJ Powder Output Quantities according to Total Air / Powder Percentage Settings

Hose internal diameter (mm)	Ø 11			
Hose length (m)	6		18	
Total Air Volume (Nm³/h)	4	6.6	4	6.6
Paint Percentage (%)	Powder Coat Output (g/min)			
20				
40				
60				
80				
100				

Note: All values in these tables are guide values for new injectors. It may vary depending on the control unit used, different environmental conditions, wear and different powder coating types.

4. Clenaing and Maintenance

4.1. Injector Cleaning

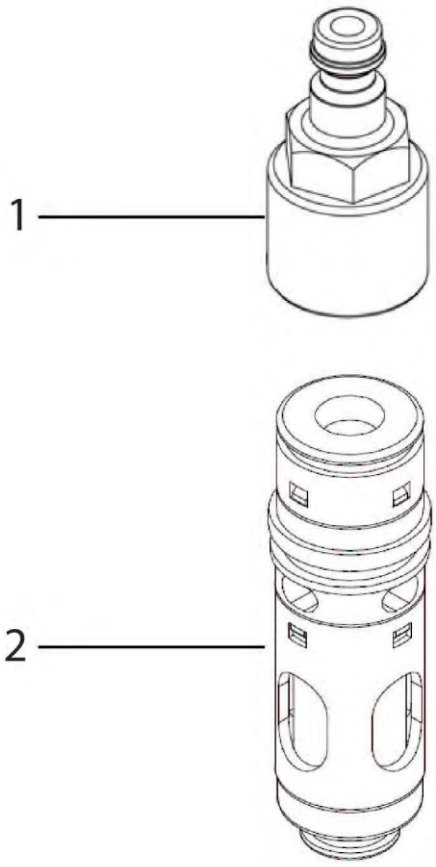


1. Powder Air Filter Module
2. Auxiliary Air Filter Module
3. Injector Body
4. Conductive Hose Connection
5. Powder Inlet / Hopper Connection

E-FEED+3 INJ injector surface cleaning procedure is as follows.

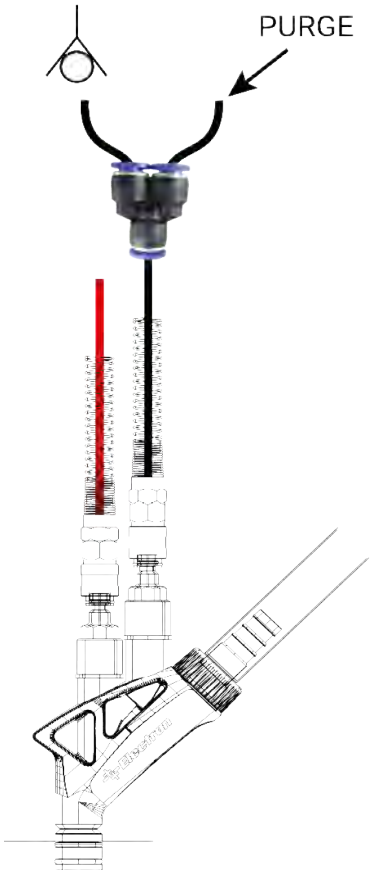
1. Disconnect the injector from the Hopper.
2. Remove the powder coating hose from the Conductive Hose Connector (4).
3. Clean the Hose Connection with oil and water-free compressed air.
4. Thoroughly clean the injector body (3) with oil and water-free compressed air, including the interior of the Paint Inlet / Hopper Connection (5). When pressurized air is applied to the Pow-der Inlet Area (5), Check to it will exit from the Hose Connection (4).
5. Install the syringe in place on the reservoir and insert the powder coating hose into the Hose Connector (4).

Note: If the injector contains heavily molded paint and the surface cleaning is insufficient, the E-FEED+3 INJ must be completely disassembled and throughly cleaned.
Disassemble all parts using the correct wrenches.
Rinse all parts with compressed air. Do not scrape off air-clean and stereotyped remnants. Cellulosic thinner can be used for cleaning these parts if neccesary.
Do not use aceton, do not scrape solidified residues. Never expose the Filter Modules and the white solid filters contained in them to any liquid or solvent. Clean only with air. Replace if neccesary.



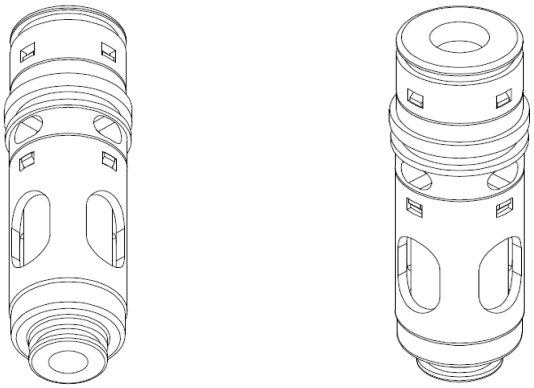
1. Filter Module Quick Connect Hose Adapter
2. Filter Module

4.2. Cleaning Module



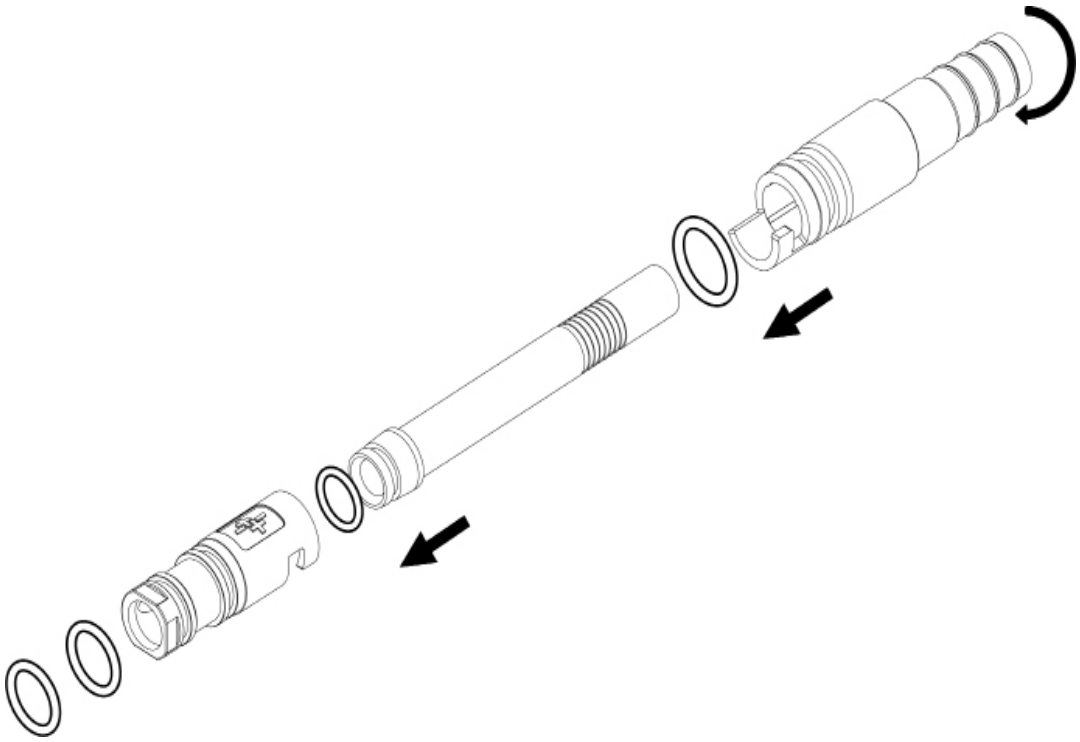
When the purge module used in the new injector system is installed on the injector, it delivers high pressure air to the injector through the auxiliary air duct and cleans the system. The check valve used in the system prevents the delivered air from returning to the device.

4.3. Filter Module



The new filter system has a design that allows air to pass through the microporous part, but filters the powder paint, and also controls the direction of the air in the injector with a flexible gasket that provides unidirectional air conduction. Thus, the dust barrier developed prevents the coating dust from entering the air supply path in a direction opposite to the air flow direction and allows rapid color change during the cleaning process without the need to disassemble any parts.

4.4. Teflon Bushing Module



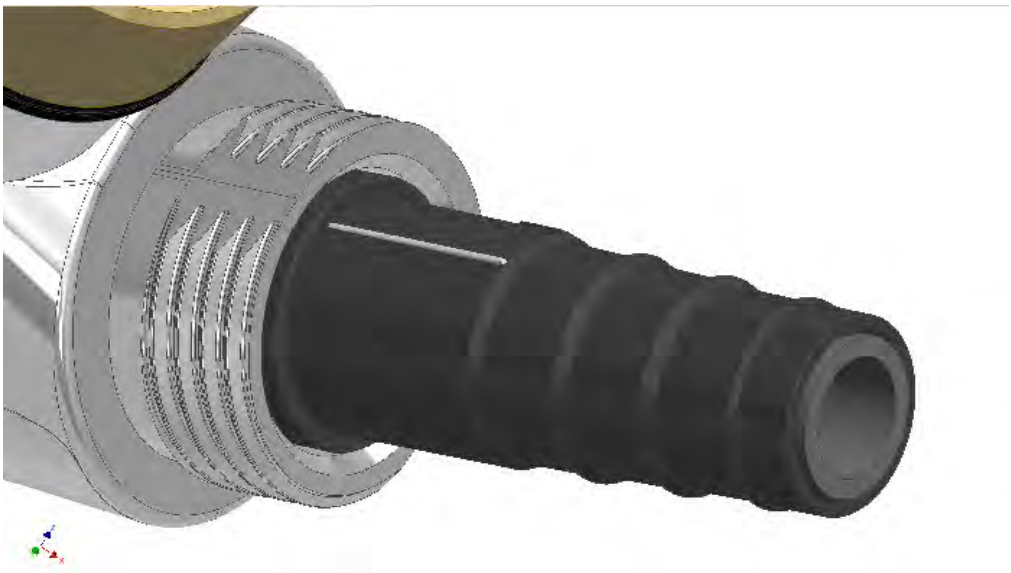
E-FEED+3 INJ Teflon Bushing Assembly

The teflon bushing must be rotated and attached to the injector nozzle

4.5. Injector Nozzle Assembly Module

The injector nozzle assembly can be removed and installed in two simple movements.

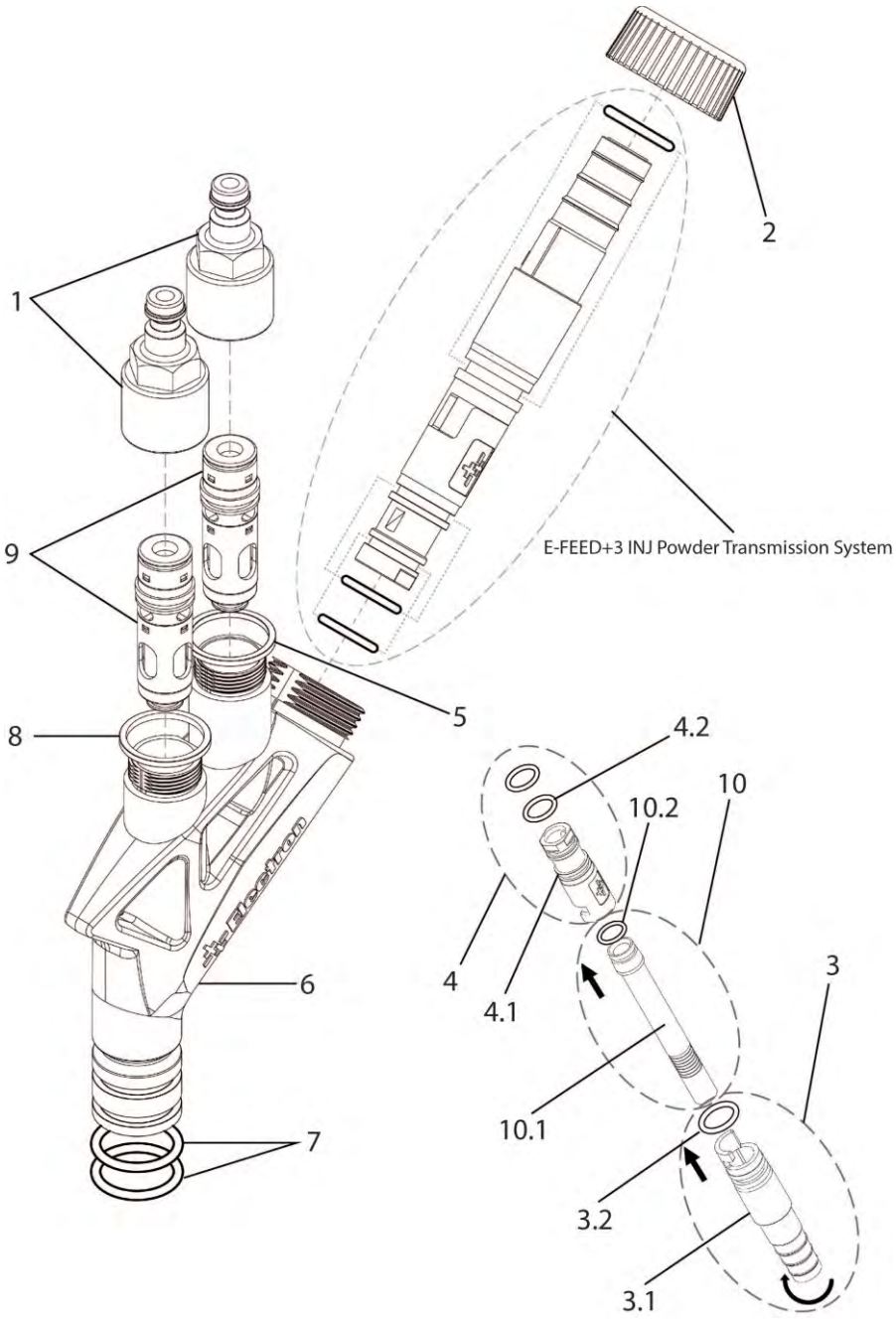
As seen in the first image, the hose coupling, injector nozzle and teflon bushing set can be removed one by one when the assembly is in the unlocked position when rotated.



As seen in the second image, when the lock line of the assembly is aligned with the injector line, the assembly is in the locked position and the entire injector nozzle, teflon bushing and hose coupling set can be removed.

5. Spare Parts

Part No	Part Name	Order Code
*	E-FEED+3 INJ	B07FEED+3



Part #	Order Code	Part Name	Wearing Part	RECOMMENDED STOCK PARTS
1	TRTM05035	E-FEED+3 FEMALE QUICK CONNECTION ADAPTER	N/A	N/A
2	B10540005	E-FEED+3 INJECTOR NUT	N/A	✓
3	B07610032	E-FEED+3 INJECTOR HOSE CONNECT COUPLING W/O-RING	✓	✓
3.1	B10640034	E-FEED+3 INJECTOR HOSE CONNECT COUPLING	✓	✓
3.2	IZOR01051	O-RING Ø13X2	✓	✓
4	B07610031	E-FEED+3 INJECTOR NOZZLE W/O-RING	✓	✓
4.1	B10640033	E-FEED+3 INJECTOR NOZZLE	✓	✓
4.2	IZOR01028	O-RING Ø11-1,1X1,6	✓	✓
5	TRTM05037	E-FEED+3 HOSE COUPLING WASHER Ø19 T1.5 (BLACK)	N/A	N/A
6	ENEM03005	E-FEED+3 INJECTOR BODY	N/A	N/A
7	IZOR01006	O-RING Ø16X2	✓	✓
8	TRTM05036	E-FEED+3 HOSE COUPLING WASHER Ø19 T1.5 (RED)	N/A	N/A
9	B07ENJ135	E-FEED+3 INJECTOR FILTER - COMPLETE	✓	✓
10	B07610030	E-FEED+3 TEFLON BUSHING W/O-RING	✓	✓
10.1	B07610000	E-FEED+3 TEFLON BUSHING	✓	✓
10.2	IZOR01003	O-RING Ø7X1,5	✓	✓

6. Possible Failure and Soluions

The Paint Air and Auxiliary Air are supplied by the Powder Coating device, while the powder does not come out of the spray gun, the injector and the paint line between the injec-tor with gun must be checked for blockages.

Failure	Possible Cause	Solution
The powder coat comes out very little from the gun tip.	1. Inlet pressure of powder air is too low. 2. There is a blockage in the hose between the injector and the Gun . 3. There is blockage in the injector.	1. Increase the powder air value via the powder coating device. 2. If there is a break in the hose, straighten it, remove the blockage inside the hose. . 3. Clean the inside of the injector as described in the Cleaning Section.
Although the above possible causes have been remedied, the powder coating output is still insufficient.	1. Teflon bushing has reached the end of its service life and its inner diameter has been expanded and cannot provide sufficient suction power.	1. Replace the Teflon bushing with a new one.
Teflon bushing has completed its life in less time than usual.	1. Current usage rates are higher than usual paint output rates in the past os paint type has been changed. 2. The injector nozzle has reached the end of its life or is contaminated with a layer like residue. .	1. The more paint is discarded, the teflon bushing as soon as it melts. The newly used paint may be of a more abrasive type. For example; Metallic Paint. 2. Clean the Injector Nozzle or replace if necessary.

WARNING:
Faults must only be corrected by trained personnel!

7. Service and Maintenance Table

DATE	MAINT.TYPE -Weekly -Yearly -Service	MAINT. OR SERVICE PERSONNEL	PROCEDURE CHANGED PARTS NOTES	CONTROL SUPERVISOR

8. PRODUCT LIFE AND WARRANTY

8.1. Product Life

- The economic life of the injector is approximately 10 years.
- This product life is highly dependent on the periodic maintenance and spare part changes in a timely manner. Improper maintenance will lead to lower product life.
- SİSTEM TEKNİK A.Ş. warrants supplying the needed service and the spare parts for the entire product life.

8.2. Warranty and Warranty Conditions

- The injector is warranted for production and parts failure for 2 (two) years.
- Spare parts that are changed from the warranty are free-of-charge.
- SThe parts that are supplied in the system which are not produced by SİSTEM TEKNİK A.Ş. are warranted with their own manufacturers and their own conditions.
- SİSTEM TEKNİK A.Ş. will not be held responsible for the improper usage of the machine or any unauthorized usage. These are not in the warranty.

8.3. Operating Conditions

- Coating product SYSTEM TEKNIK A.Ş. designed by; is produced in accordance with the required safety and quality standards.
- Installation of Coating Device SYSTEM TEKNİK A.Ş. personnel, necessary tests and controls have been made operational.
- Sistem Teknik A.Ş. if deemed necessary; can make changes to achieve better results.
- User's manual has been prepared by; The information and projects contained there in may not be reproduced, in whole or in part, and may not be given to third parties or companies other than the authority of the company where the facility is established.

Electron

Merkez Ofis

PERPA Tic. Mer. B-Blok Kat:2 No:65
34385, Okmeydanı – İSTANBUL/TÜRKİYE

Telefon: +90 (212) 222 23 45
Mail: info@electron.com.tr

Fabrika

İTOB Org. San. Bölgesi 10010 Sk. No:10
35470, Menderes – İZMİR/TÜRKİYE

Telefon: +90 (232) 799 02 32
Fax: +90 (232) 799 02 42