Electrostatic Cable Coater
ECC 701

Manual P/N 7146059_06
- English -

Edition 08/16

NORDSON ENGINEERING GMBH • LÜNEBURG • GERMANY

Note
This document applies to the entire series.

Order number
P/N = Order number for Nordson articles

Note

- Translation of original manual -

Trademarks

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Section 1
Safety Instructions

Introduction

Read and follow these safety instructions. Warnings, precautions and instructions regarding specific equipment and tasks can be found in the respective documentation.

Ensure that everyone operating the equipment or performing maintenance has access to the entire documentation, including the safety instructions.

Qualified Personnel

The unit operators are responsible for ensuring that Nordson equipment is installed, operated and maintained only by qualified personnel. Qualified personnel are employees or representatives who have been trained in the safe and proper performance of the tasks assigned to them. They are familiar with all relevant occupational safety and accident prevention regulations, and they are physically capable of performing the tasks assigned to them.

Intended Use

Personal injury or property damage can occur when Nordson equipment is used in any way other than those described in the documentation included in the delivery of the equipment.

Examples of Unintended Use:

- Use of incompatible materials
- Performance of unauthorized changes
- Removal or bridging of protective devices or locks
- Use of incompatible or damaged parts
- Use of unapproved auxiliary devices
- Operation of the equipment outside the range of permitted nominal values

Regulations and Certifications

Ensure that all of the equipment is designed and certified for use in the environment in which it is to be operated. Certification obtained for Nordson equipment loses its validity when the instructions regarding installation, operation and maintenance are not followed.

All pertinent regulations must be complied with during the entire installation process.

Personal Protection

The following instructions must be followed to prevent injury:

- Only qualified personnel may operate the equipment or perform maintenance.
- The equipment may be operated only when protective devices, doors and covers are in order and automatic locks work properly. Protective devices may not be bridged or shut down / deactivated.
- Maintain safety clearance to moving devices. Before adjusting or performing maintenance on moving units, stop the voltage supply and wait until the unit comes to a complete standstill. Secure to prevent voltage from being switched on again and secure the unit from unintended motion.
- Relieve hydraulic or pneumatic pressure (bleed) before adjusting or performing maintenance on pressurized systems and components. Before performing maintenance on electrical equipment, trigger the isolating switch, secure to prevent it from being switched on and label it.
- Obtain and read the safety data sheets for all of the materials used. Follow the manufacturer's instructions regarding safe handling and use of materials, and wear the recommended personal protective equipment.
- To prevent injury, be aware of potential risks in the workplace that often cannot be completely prevented, e.g. hot surfaces, sharp edges, live circuits or moving parts that cannot be covered or cannot be otherwise protected for practical reasons.

Fire Protection

Follow these instructions to avoid fire and explosions:

- Do not smoke, weld, grind or use open flames in areas in which easily flammable material is used.
- Ensure proper ventilation to prevent hazardous concentrations of volatile particles or fumes. Use local regulations or the safety data sheets of the materials as guidelines.
- Do not temporarily interrupt live circuits when working with easily flammable materials. Turn off the voltage with an isolation switch first to prevent sparks.

- Become familiar with the location and position of EMERGENCY OFF buttons, shut-off valves and fire extinguishers. If fire breaks out in a spray booth, immediately switch off the spray system and the exhaust fan.
- Clean, inspect and repair the equipment and perform maintenance according to the respective equipment documentation.
- Use only replacement parts that are designed for use with the original equipment. Please contact your Nordson representative for advice and information on parts.

Grounding

ATTENTION: Using defective electrostatic devices is dangerous. It can cause fatal electrical shock, fire or explosion. Resistance testing should be included in the periodic maintenance program. All electrical or electrostatic devices should immediately be switched off in the event of sparking, flash-over or even a slight electrical shock. The unit may not be started up again until the problem has been identified and corrected.

All work performed inside of the spray booth or less than 1 m (3 ft) away from the booth openings are considered to be work in a potentially explosive room, class 2, area 1 or 2; the most recent edition of the regulations pursuant to NFPA 33, NFPA 70 (NEC article 500, 502 and 516) and NFPA 77 must be complied with.

- All electrically conducting objects in the spray areas must be grounded; the resistance may not exceed one megaohm, measured with an instrument that applies at least 500 V to the circuit to be tested.
- The objects to be grounded include the floor of the spray area, operator's platforms, hoppers, photo cell brackets and blow-out nozzles. Persons working in the spray area must be grounded.
- An electrically charged human body poses an ignition hazard. Persons standing on a painted surface or on an operator's platform, and persons wearing nonconducting shoes are not grounded. All persons working with or near electrostatic equipment must wear shoes with conducting soles or a grounding wrist strap to be properly grounded.
- The skin on the operator's hand must have direct contact to the handle of the gun to prevent electrical shock when working with electrostatic hand spray guns. If gloves have to be worn, the palm or fingers of the glove should be cut open, electrically conducting gloves worn or a grounding wrist strap worn that is connected to the gun handle or to some other true ground.
- Before adjusting or cleaning powder spray guns, switch off the electrostatic voltage supply and ground the gun electrodes.
- When equipment maintenance is completed, connect all of the disconnected units, grounding cable and lines again.

Behavior in Emergency Situations

If the system or a unit component malfunctions, immediately switch off the system and do the following:

- Switch off the voltage supply and secure it to prevent it from being switched on again. Close the pneumatic isolation valve and relieve pressure.
- Determine the cause of malfunction and remedy before starting the system again.

Disposal

Equipment and materials used during operation and maintenance should be disposed of properly according to local regulations.

Safety Labels and Tags

The illustrations show where on the equipment the safety signs and labels are affixed.

The table indicates what the labels and symbols mean.

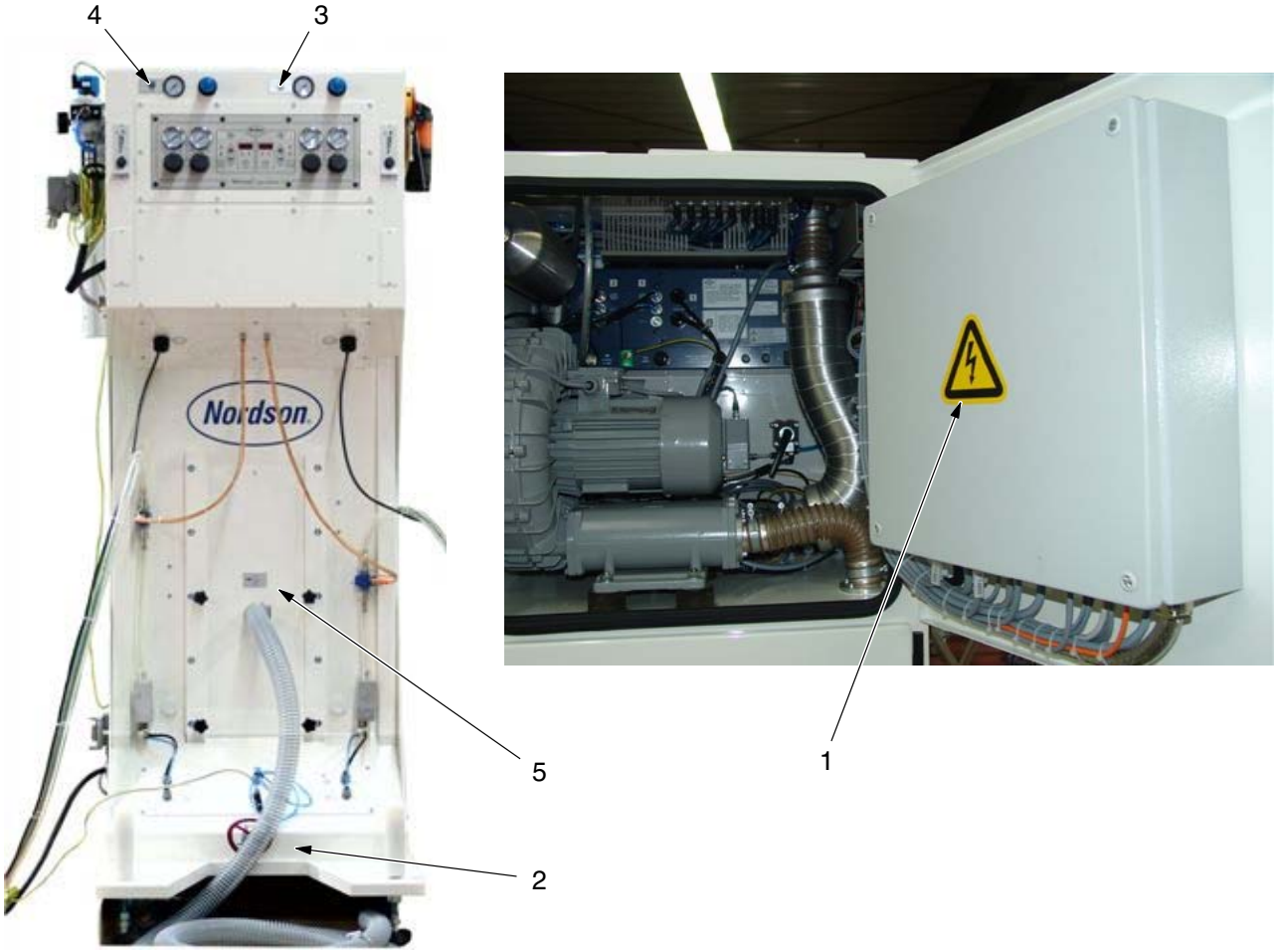


Fig. 1-1

Position	P/N	Description	
1	260176		**ATTENTION:** Risk of electrical shock. Failure to observe may result in personal injury, death, or equipment damage.
2	7144253		**CAUTION:** Risk of tipping! Do not lift the equipment with a fork lift from this side.
Back of system	7148904		Lift the equipment with a fork lift from this side.

Continued...

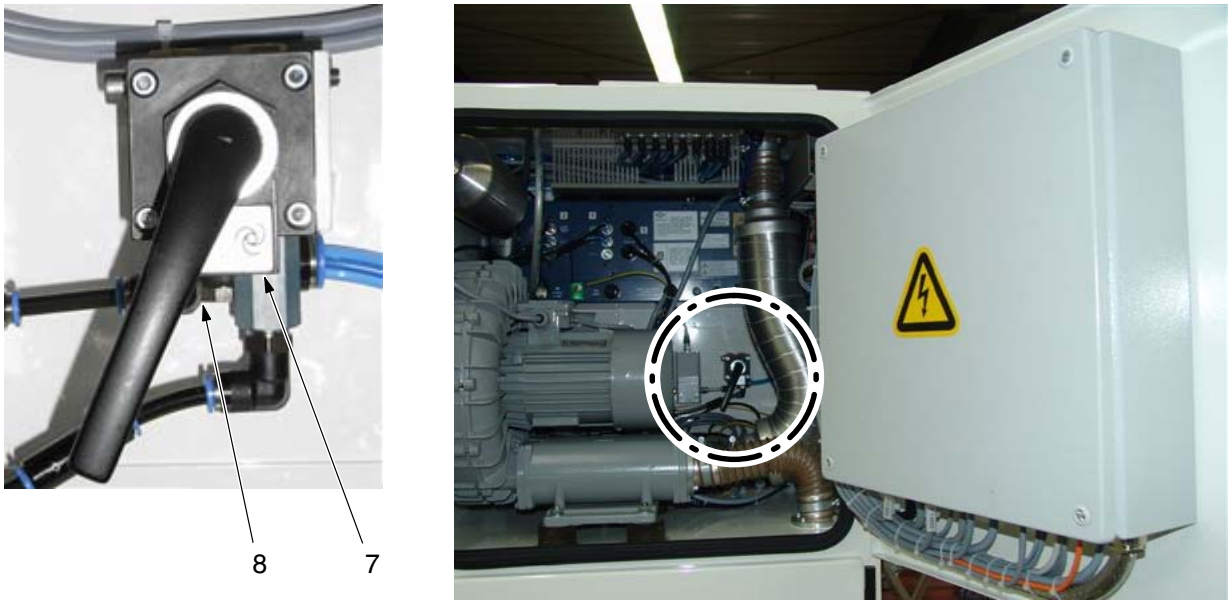
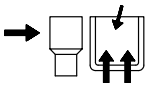


Fig. 1-2 Hand lever

Position	P/N	Description	
3	7141619		**With the option attached spray chamber** Pressure regulator *Material recirculation*
4	7141620		Pressure regulator *Hopper*
5	7141622		**With the option remote spray chamber** Powder hose connection
6	7141621		**With the option remote spray chamber (with recirculation pump)** Pressure regulator *Powder recirculation pump*
7	*Upon request*		**With the option *Key-to-line* (hand lever)** Key-to-line mode
8			Manual mode

Section 2
Introduction

Intended Use

Cable coaters in the series *ECC 701* - hereafter also referred to as *system* - may be used only to coat cables or similar substrates.

- ECC701-**VE**: *Versa-Spray* model for non-abrasive materials.
- ECC701-**CE**: *Ceramic* model for abrasive materials at line speeds $>$ 100 m/min
- ECC701-**SC**: *Sure Coat* model for non-abrasive materials with fine powder application

Any other use is considered to be unintended. Nordson will not be liable for personal injury and/or property damage resulting from unintended use.

Intended use includes the observance of Nordson safety instructions. Nordson recommends obtaining detailed information on the materials to be used.

Area of Use (EMC)

The system is designed for use in industrial areas.

Operating Restrictions

When using in residential, business or industrial areas, the system may cause interference with other units, e.g. radios.

Unintended Use - Examples -

The system may not be used under the following conditions:

- To apply unsuitable materials, particularly flammable substances
- In defective condition
- When changes or modifications have been made by the customer
- In an atmosphere in which the maximum ppm concentration permitted is exceeded
- In a potentially explosive atmosphere
- When the values stated under *Technical Data* are not complied with.

Residual Risks

In the design of the unit, every measure was taken to protect personnel from potential danger. However, some residual risks cannot be avoided:

- Emission of material particles into the atmosphere when filling the hopper, disconnecting pneumatic lines and material hoses and opening the spray chamber.
- Inhalation of potentially hazardous material particles.

Special Model Tribomatic

Tribomatic powder spray gun

ECC701-**TR**: *Tribomatic* model for e.g. abrasive materials at line speeds < 100 m/min and fine powder application.

Special features are described in a separate document.

The general information about *Tribomatic* contained in this manual is intended only to point out the differences between the various models.

Please contact Nordson for more information.

Note on Manual

This manual is valid only in conjunction with all other parts of the system documentation.

The information and values included in this manual may deviate from the information and values contained in the separate system component manuals, because the system component manuals also apply to other applications.

The optimum values for a specific customer application must be determined by trial and error. Begin by using the values indicated in this manual as a guide.

The PFC control unit has been renamed PFM - powder flow display.

Definition of Term(s)

General Alarm

This term refers to all of the faults at interface XS2 that pose an acute risk to powder application:

- Low powder level (level sensor)
- Insufficient powder (PFM)

Functioning

The system functions on the principle of electrostatic charging of powdery materials. The charged powder particles seek the closest and best ground - the substrate itself. Cable is usually coated.

The powder pump (7) feeds the powder out of the hopper (4) to the powder spray gun (8). The cable passes through the spray chamber (5), where it is coated.

A side channel blower (fan, 1) generates a vacuum to suction excess powder from the spray chamber (5). The powder is returned via the two material recirculation fluidization units (6) to the hopper (4).

The suction flow goes through two main filter cassettes (3) and the fine preliminary filter (2). The filters prevent the powder from entering the side channel blower and escaping from the system.

The powder that sticks in the filter cassettes is automatically knocked off and falls back into the hopper.

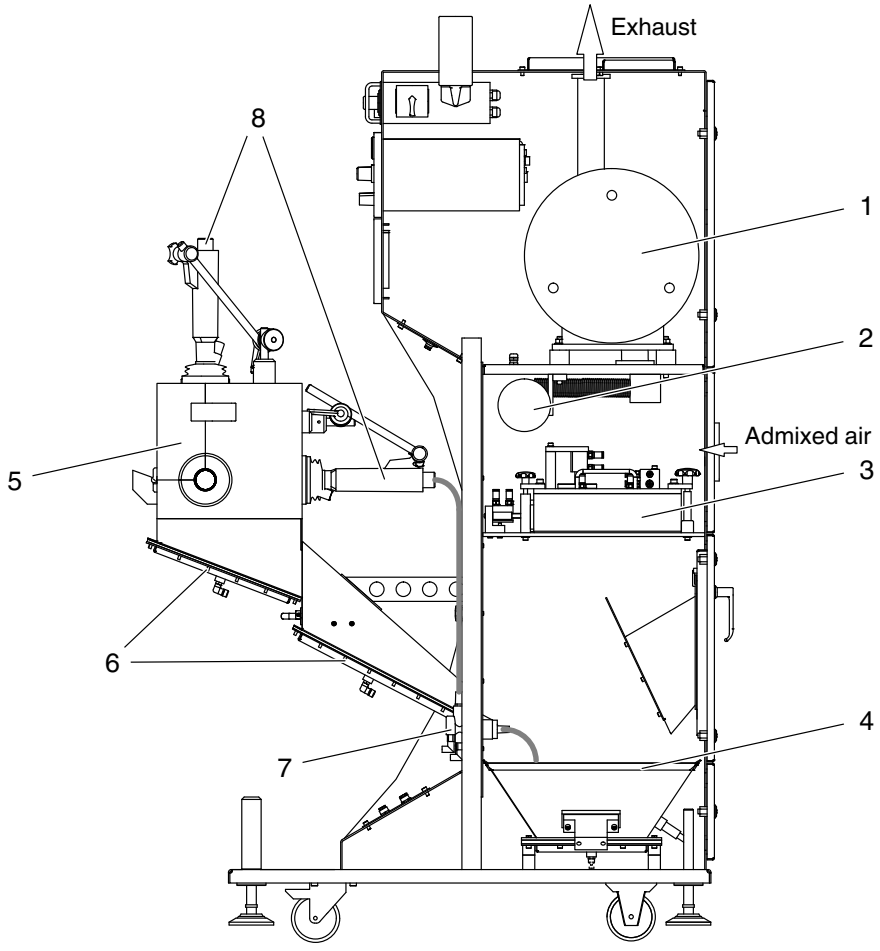
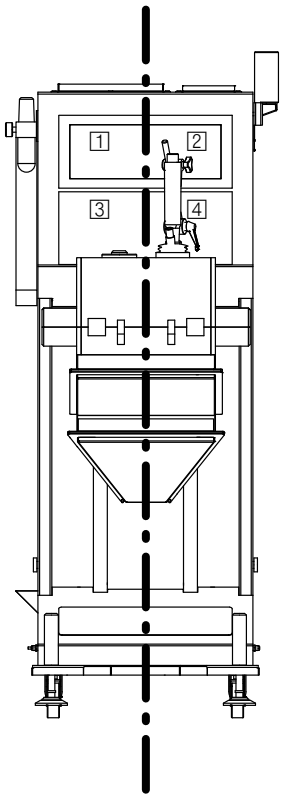


Fig. 2-1 Option attached spray chamber

System Components

CAUTION: The Vantage control unit is used in many different devices all around the world. The following assignment applies to the ECC

Definition (System Component Numbering)



On this side	On this side
Components designated with *1*, e.g. powder pump 1 for spray gun 1	Components designated with *2*, e.g. powder pump 2 for spray gun 2
Plug assignment -XS2:4 *Trigger gun 1*	Plug assignment -XS2:5 *Trigger gun 2*
Wiring on slide-in chassis 1 plug -J1:2 *Gun 1*	Wiring on slide-in chassis 1 plug -J1:1 *Gun 2*
Special features:	**Special features:**
Components designated with *3*, e.g. powder pump 3 for spray gun 3	Components designated with *4*, e.g. powder pump 4 for spray gun 4
Plug assignment -XS2:9 *Trigger gun 3*	Plug assignment -XS2:10 *Trigger gun 4*
Wiring on slide-in chassis 2 plug -J1:2 *Gun 3*	Wiring on slide-in chassis 2 plug -J1:1 *Gun 4*

Standard assignment/wiring beginning in late 2010

Overview

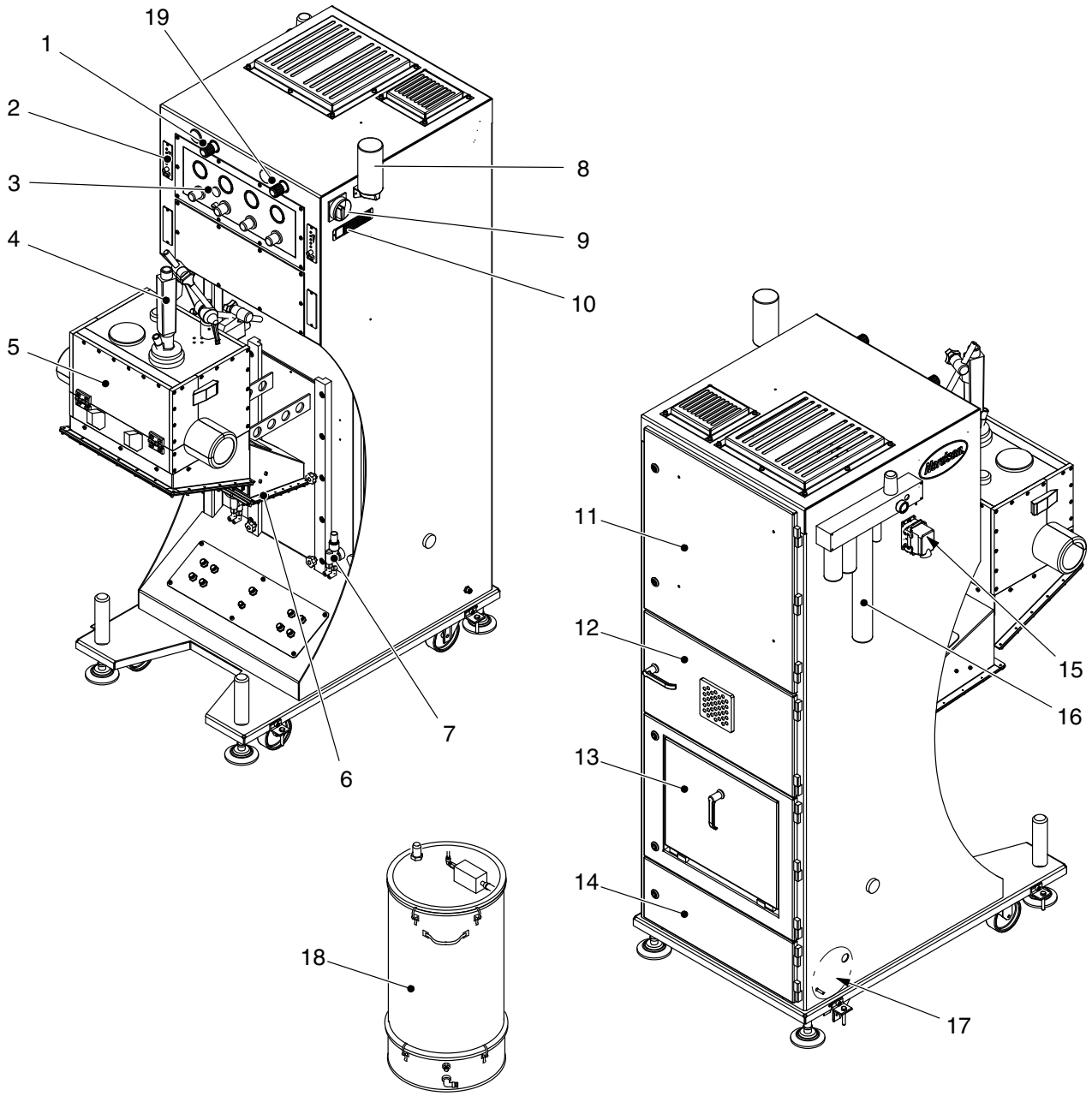


Fig. 2-2 Model *Versa-Spray* with attached spray chamber and refill hopper (example)

1 Pressure regulator *Hopper*
2 Powder flow display (option)
3 *Vantage** controller
4 Powder spray gun*
5 Spray chamber
6 Material recirculation
7 Powder pump*
8 Light tower
9 Main switch
10 ID plate
11 Door to pressure regulators, electronics and fan
12 Door for filter cleaning
13 Flap to hopper
14 Door to level sensor
15 Interface *XS2*
16 Membrane compressed air dryer
17 Ground and power supply
18 Refill hopper with powder transfer pump* (accessory)
19 Pressure regulator *Material recirculation*

Note: There are separate manuals available for components marked with an asterisk (*).

Main Switch

If the system is switched off by way of the main switch, the solenoid valve (2, Fig. 2-3) on the membrane compressed air dryer closes, switching off the compressed air. All of electrical components following the main switch are de-energized.

Membrane Compressed Air Dryer

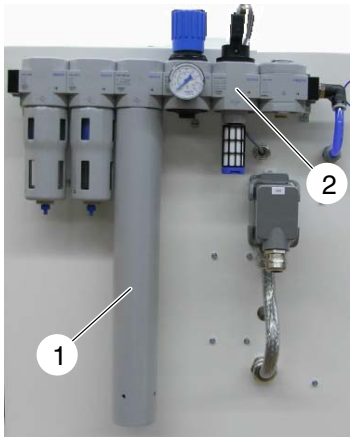


Fig. 2-3

For applying powder, dry, non-lubricated and clean compressed air is imperative. The system is equipped with a membrane compressed air dryer for this purpose.

Purging Dryer

To prevent moisture that has collected in the dryer from penetrating the system, the dryer must be purged with compressed air. The purge air exits at the bottom, from the air dryer (1).

Fig. 2-4 Previous model

The previous model is available with and without a solenoid valve in the compressed air supply.

Light Tower

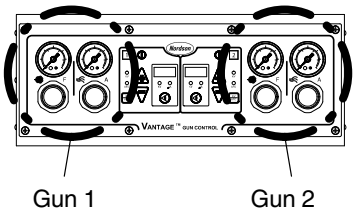
Fig. 2-5 Level sensor

The orange light flashes to indicate that the powder level is low, meaning that no powder was added within the *Delay time alarm* time set on the PLC. Also refer to the section *Troubleshooting*.

When the optional *PFM* powder display is used, flashing also indicates insufficient powder quantities; the PFM setting determines when flashing begins. Also refer to the section *Operation*.

If desired, an audible warning signal can be emitted. The audible warning can be switched on and off with the switch on the light tower.

Vantage Controller



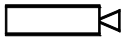
A control unit for no more than two guns. It

- Controls the flow rate air and atomizing air pressure to the powder pump of the gun
- Supplies direct voltage to the gun voltage amplifier and controls the electrostatic output
- Monitors the voltage output and current output of the gun.

Description of Symbols

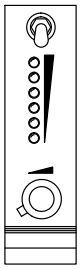
F Flow rate air

A Atomizing air



Connection for gun air with *Sure Coat* guns (on the back of the control unit)

Powder Flow Display PFM (Option)



One PFM (evaluator and sensor) per gun.

The PFM is used to monitor the powder flow to the gun. The powder is passed through a sensor on the way to the gun; the signal from the sensor is evaluated and then displayed by the LEDs.

The light tower flashes to indicate insufficient powder, thus signaling potential clogging of the powder gun. The indication *Insufficient powder* can be adjusted by the customer.

Pressure Regulator Hopper

The compressed air for the system's vibrator and hopper fluidization unit is set on this pressure controller.

The fluidizing air for the hopper can also be reduced with the throttle. The one-way restrictor valve is located on the vibrator.

NOTE: In order to make the powder capable of being conveyed, it is fluidized. The fluidized air is introduced from underneath, penetrating a plate that is air permeable but not solid permeable.

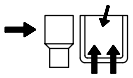
The powder is properly fluidized when little bubbles rise slowly and uniformly to the surface, as if the powder were boiling. In this state, the powder has the properties of a fluid and can be easily fed through the powder pump to the spray gun.

Pressure Regulator Material Recirculation

Option *Attached spray chamber*: The compressed air for the two material recirculation (path between the spray chamber and the hopper) fluidization units is set on this pressure regulator. Excess powder passes through the coarse sieve and fluidization units hen back into the hopper; from there it is once again fed to the spray guns (Fig. 2-1).

Option *Without spray chamber*: If the customer provides the spray chamber, the pressure regulator is still present, but it has no function.

Pressure Regulator Powder Recirculation Pump



Options *Remote spray chamber*: There is an additional pressure controller, labeled with this symbol, for the optional recirculation pump.

Symbol *Powder hose connection*: Excess powder passes from the remote spray chamber through a powder hose then back into the system, where it can once again be used for coating.

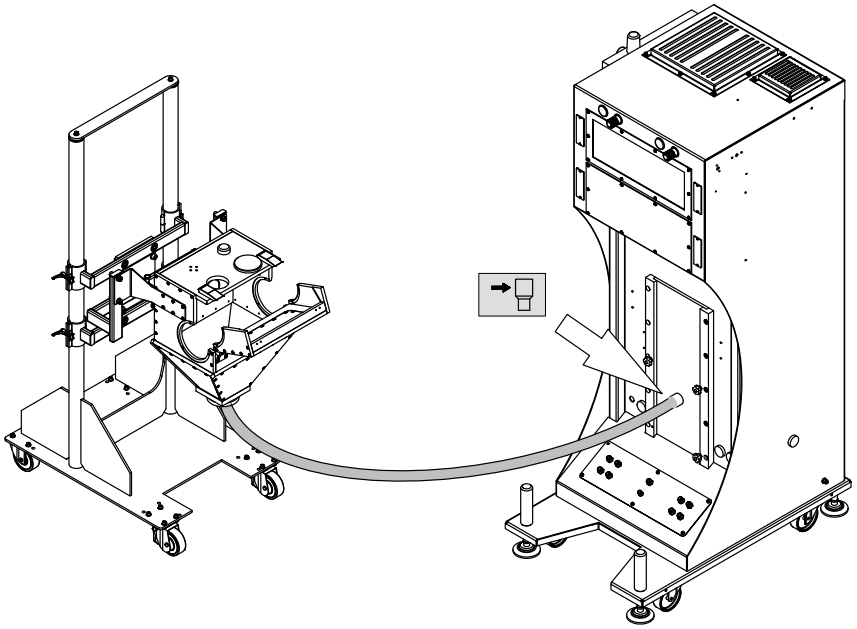


Fig. 2-6 Option remote spray chamber

Control Unit Pressure Regulator

The inlet pressure for the *Vantage* controller that supplies the guns with the powder pumps is set on this pressure regulator (2, Fig. 2-7).

Filter Cleaning Pressure Regulator

The inlet pressure for the pressure accumulator (1) and the nozzle that blows the compressed air onto the main filter cassette fleece is set on this pressure controller (3, Fig. 2-7).

Pressure Accumulator

The pressure accumulator minimizes fluctuations in the pressure of the atomizing air that result from automatic filter cleaning.

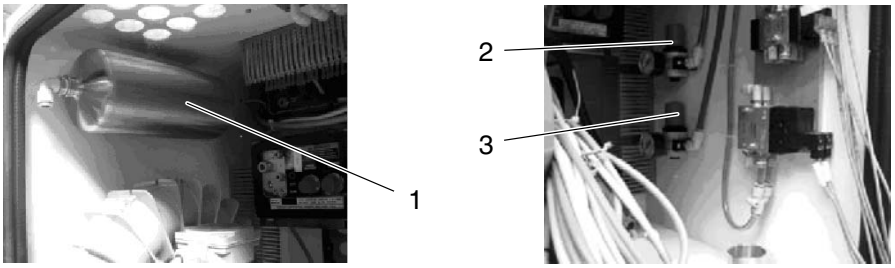


Fig. 2-7

Coarse Sieve

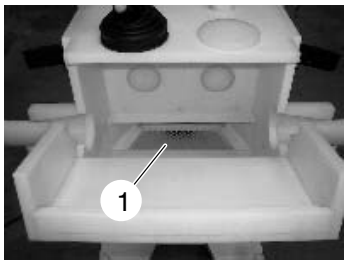


Fig. 2-8 View of the open spray chamber

A coarse sieve (1, Fig. 2-8) is used to return excess powder from the spray chamber to the hopper. The coarse sieve prevents foreign objects from entering the system and disrupting the powder flow to the pumps.

Because the side channel blower creates a vacuum, hardly any excess powder can escape, even if the spray chamber is open.

Powder Pump / Powder Transfer Pump / Powder Recirculation Pump

The powder is conveyed with pumps working on the Venturi principle.

The type of pump, material and size of the Venturi throat depend on the customer's specific application (e.g. line speed) and the type of powder.

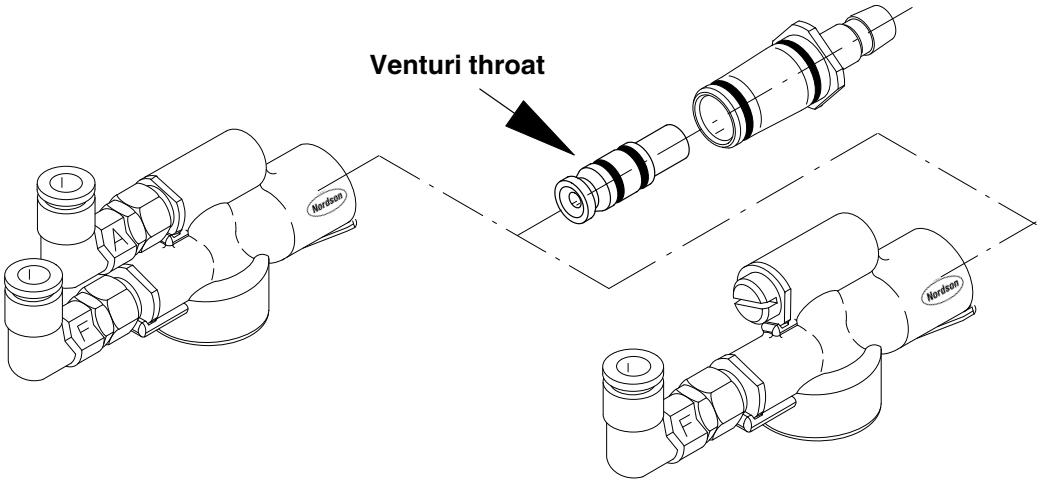
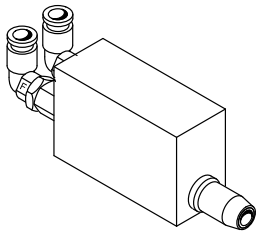


Fig. 2-9 Modular models (used until 11/2008)

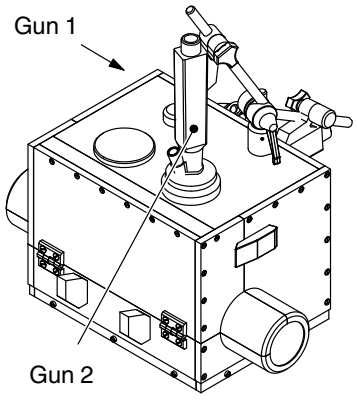


The powder pumps have different names, depending on their functions:

- The *Powder pump* feeds the powder from the system's hopper to the spray gun.
- The *Powder transfer pump* feeds the powder from the refill hopper to the system's hopper. It is attached to the refill hopper.
- The *Powder recirculation pump* feeds the excess powder from a remote spray chamber back to the system's hopper.

Fig. 2-10 Standard powder pump (used beginning 11/2008)

Spray Chamber



Several different options can be selected. Important for all spray chambers:

CAUTION: No more than two guns per (single) spray chamber. Stagger the positions of the guns to prevent the electrical fields by the nozzles from interfering with one another.
Do not operate the guns outside of the spray chamber.

Powder Spray Guns

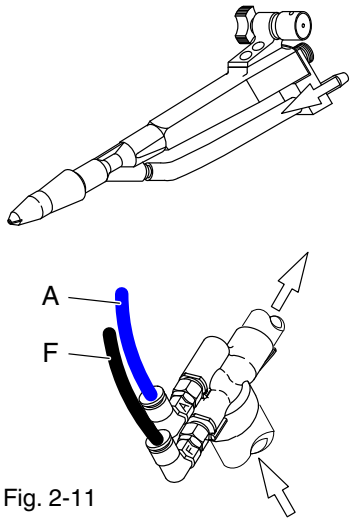


Fig. 2-11

Models Versa-Spray, Ceramic and Sure Coat

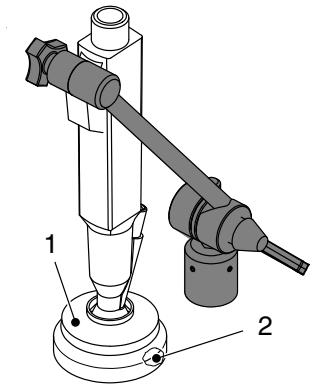
The powder pump (Fig. 2-11) feeds the powder out of the hopper to the gun.

The pump has two connections for compressed air: flow rate air (F) and atomizing air (A). The pressure of the flow rate air determines the quantity of powder sucked in. The powder/air mixture generated by the atomizing air is conveyed to the gun and charged there by a high voltage electrode. The charged powder particles find the grounded substrate and stick to it.

This procedure is referred to as the *Corona* procedure in Nordson literature.

A Sure Coat gun has additional gun air to prevent powder from collecting on the electrode.

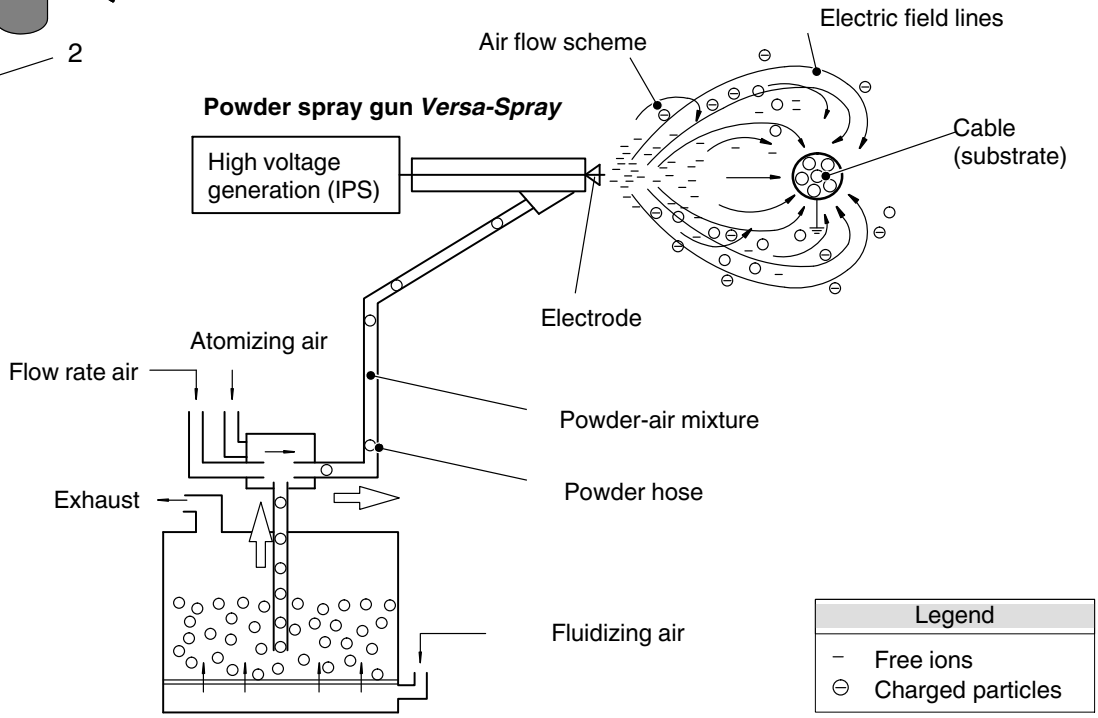
The mode of application and how the gun is equipped (e.g. type of nozzle) depend on the customer's specific application (e.g. line speed) and the type of powder.



Connecting Gun to Spray Chamber

1: collar; 2: distance ring
Working from the inside, fasten the bracket to the spray chamber with four screws. Using mild force, press the spray gun through the collar to the point at which it widens. Insert the bracket pin in the receptacle on the spray gun and secure with two setscrews.

Principle Drawing Versa-Spray



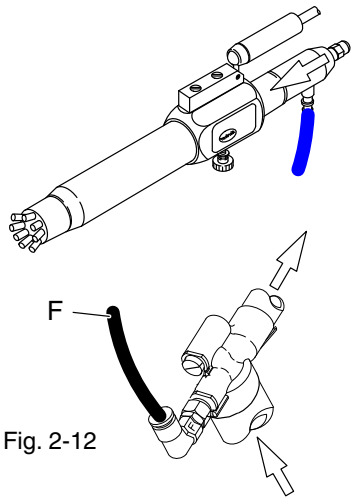
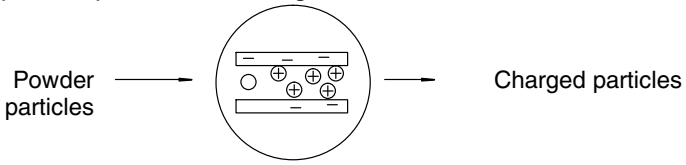


Fig. 2-12

Model Tribomatic

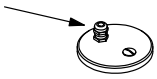
The powder pump (Fig. 2-12) feeds the powder out of the hopper to the gun.

The pump has a compressed air connection for the flow rate air (F). The pressure of the flow rate air determines the quantity of powder sucked in. The diffuser air and the powder come together at the inlet of the powder gun. The powder particles are charged by friction in the gun charge module. The charged powder particles find the grounded substrate and stick to it.



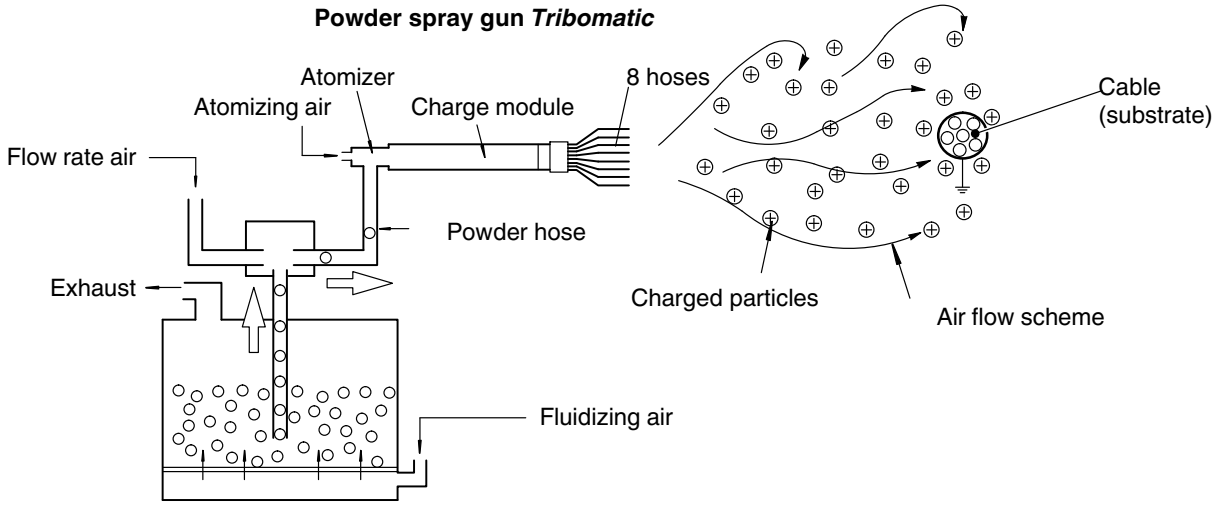
How the gun is equipped (e.g. number of hoses) depends on the customer's specific application (e.g. line speed) and the type of powder.

Connecting Gun to Spray Chamber



Guide the spray hoses from the gun's spray nozzle through the cable fitting (arrow) on the port plug and attach the nozzles to the ends of the hoses.

Principle drawing



Meaning of Air Hose Colors

Pneumatic connection	*(Engl.)*	Label	Hose color
Flow rate air	*Flow rate air*	F	Black
Atomizing air	*Atomizing air*	A	blue

System Features

When uncertain of the meanings, refer to the wiring diagram supplied with the equipment in question.

Safety Features Lockout and Conveyor Interlock (Standard Beginning 01/2010)

The control unit display will indicate whether locking was triggered by an external signal or by the system's safety switch.

Controller Display	Meaning
	The control unit is locked by an external signal via the interface XS2. Guns cannot be triggered locally or externally, e.g. during cleaning. The high voltage and the air supply to the guns are switched off.
	The control unit is locked by the safety switch on the spray chamber; the spray chamber was opened. Guns cannot be triggered locally or externally, e.g. during cleaning. The high voltage and the air supply to the guns are switched off.

Refer to the separate control unit manual for additional displays.

Safety Features Lockout and Conveyor Interlock (Standard Until 12/2009)

Controller Display	Meaning
	The control unit is locked by the safety switch on the spray chamber; the spray chamber was opened. Guns cannot be triggered locally or externally, e.g. during cleaning. The high voltage and the air supply to the guns are switched off.
	The control unit is locked by an external signal via the interface XS2. Guns cannot be triggered locally or externally, e.g. during cleaning. The high voltage and the air supply to the guns are switched off.

Safety Feature Lockout

The control unit can be locked by an external signal via the interface XS2. Or it can be locked automatically when the spray chamber is opened, if a safety switch is installed. *Loc* appears in the control unit display for both locking methods.

Automatic Filter Cleaning

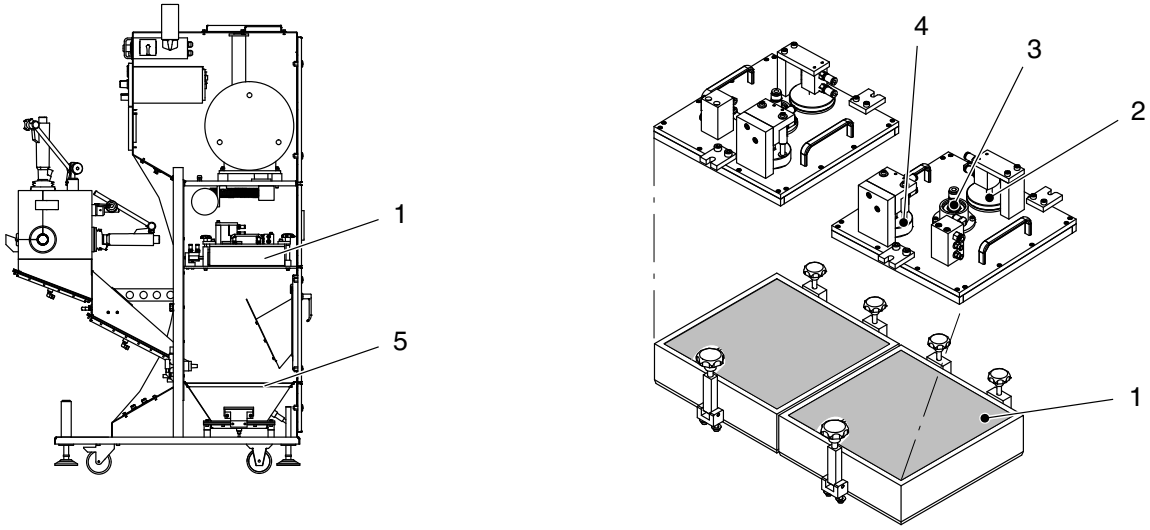


Fig. 2-13

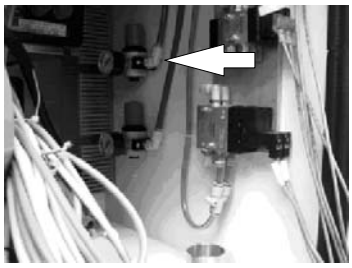
Automatic cleaning occurs as follows:

1. A main filter cassette (1, Fig. 2-13) is separated from the vacuum by its blocking flap (2) (flap closed)..
2. A nozzle rotates above the main filter cassette, blowing compressed air onto the main filter cassette fleece.

   The compressed air is set on the pressure regulator *Filter cleaning*.
3. A pneumatic cylinder (4) knocks powder from the filter, and the powder falls back into the hopper (5).

The two main filter cassettes are cleaned alternately; cleaning is controlled by a PLC. Refer to page 3-10, *Setting PLC Parameters for Automatic Filter Cleaning*.

Option Key-to-Line



A hand lever valve (optionally a solenoid valve) and a proportional valve are located behind the pressure controller for the inlet pressure (arrow) for the control unit.

Fig. 2-14 Principle drawing with hand lever valve

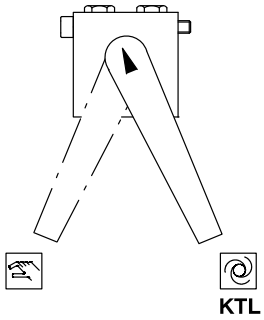


Fig. 2-15 Hand lever settings

In *Key-to-line (KTL)* mode the inlet pressure is controlled proportionally to the speed of the parent machine (in this case: cable speed).

The mounting plate (Fig. 2-14) is inside of the system, below the control unit. The hand lever valve is accessible from the back of the system (upper door).

The hand lever valve or solenoid valve is used to switch from key-to-line to manual mode. In manual, mode, the inlet pressure is set with the *Control unit* pressure regulator (2, Fig. 2-7).

Model with solenoid valve: The proportional valve is bypassed in rest position (manual mode).

For additional information, refer to the section *Installation / Option Key-to-line: Calibration*.

ID Plate

Fig. 2-16

Information	Description	Unit
Code	System designation and configuration code	-
P/N	Part number	-
Ser.	Serial number	-
U	Operating voltage	Volt
I	Fuse rating	Ampère
f	Line voltage frequency	Hertz
P	Power consumption of system	Watt
P_{max}	Power consumption of system and connected accessories	Watt

Refill Hopper (Accessory)

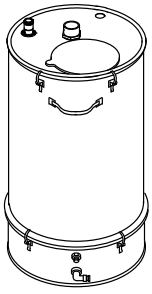


Fig. 2-17

The refill hopper is an additional, external hopper (also called a *Feed hopper*).

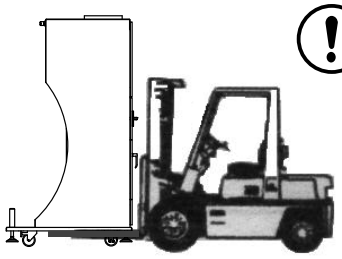
The refill hopper supplies the system's hopper with the aid of a powder transfer pump.

Example: Because it is hygroscopic (retains moisture), SAP powder requires extremely dry surroundings. Humidity makes it difficult to prevent the powder from clumping in containers that have been opened. A refill hopper is the ideal solution to this problem: A whole container can be poured into the hopper at one time, and the packaging can be disposed of.

Section 3
Installation

ATTENTION: Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.

Transport



CAUTION: When transporting with a forklift, lift only from the door side. Otherwise the unit can tip!

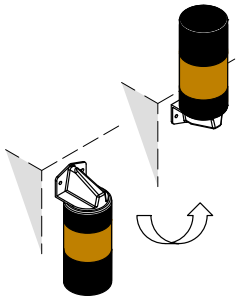
Refer to page 9-1, *Technical Data* or consignment note for weight. Lift only with a suitable floor conveyor (lift truck or fork lift).

Fig. 3-1

Unpacking

Carefully unpack cable coater and components. Keep packaging material to reuse it, or dispose of properly according to local regulations.

Mounting



- Set up only in an environment that corresponds to the stated degree of protection (Refer to page 9-1, *Technical Data*). Do not set up in a potentially explosive atmosphere!
- Ensure sufficient clearance to fill powder and for installation and maintenance work.
- Lock the wheels AND place the system on the feet.
- Unscrew the light tower, turn it 180 degrees, then screw it on again (illustration).

Conditioning Compressed Air

Any compressed air supplied to the system that does not pass through the membrane compressed air dryer (e.g. accessories) must be clean, dry and non-lubricated.

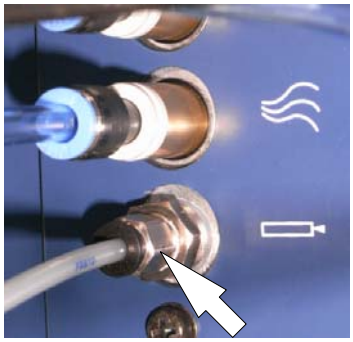
Effect of Settings on the Spray Pattern

Setting	Task	Effect
Flow rate air	Conveys the powder from the hopper to the spray gun	Increase to make the powder coating thicker Decrease to reduce overspray, powder bouncing off of cable and impact fusion in the spray gun and hoses **Note:** The emitted powder quantity is a factor of the set pressure. Since increasing the pressure for the powder quantity also increases the speed of the powder leaving the gun, the amount of powder flying by the cable is also greater. This can be compensated for by using a different nozzle, e.g. a nozzle with a larger opening.
Atomizing air	Increases powder swirling, breaks down powder clumps in the hoses and helps to shape the spray pattern	Increase when low flow rate air pressure is used or when the powder comes out of the spray gun unevenly Decrease to reduce overspray, powder bouncing off of cable and impact fusion in the spray gun and hoses
Fluidizing air	Causes the powder in the hopper to behave like a fluid, enabling it to be conveyed	Small bubbles should rise slowly and uniformly in the hopper Increase when powder flow is sluggish or uneven Decrease when the powder comes out of the spray gun unevenly or in bursts

Setting	Task	Effect
kV	Charges the powder so that it sticks to the grounded cable	Increase when a flat substrate is to be coated with a large space between the gun and the substrate Decrease when substrate has corners and indentations **Note:** Increasing the high voltage increases the powder charge, making it adhere better to the cable. Since an increase can also cause the powder to stick more in the coating system, this setting should be adjusted only when the powder is difficult to charge and it is not adhering properly to the cable.
AFC (Automatic Feedback Current)	Limits the current outlet value and prevents overcharging of the powder (overcharge)	Increase to improve application to smooth surfaces Decrease to improve application into indentations and holes
Nozzle	Shapes the spray pattern as the powder leaves the spray gun	Refer to separate *Parts List*

Throttle on Sure Coat Systems

P/N 400193



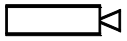
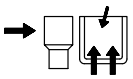
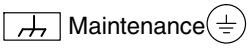
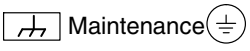
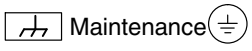
P/N 288822

Fig. 3-2 Old and new throttle

Back of control unit: The gun air is decreased with a throttle (P/N 288822) to approx. 0.3 bar.

NOTE: Until approx. November 2009 the throttle P/N 400193 was used temporarily. Nordson default: 0,3 bar.

Overview of Required Connections

Connection	Systems with option		
	Attached spray chamber	**Remote spray chamber**	**Customer provides spray chamber**
Powder hose			
From spray chamber ∅ From recirculation pump ∅	-	To system: 	To system: 
From refill hopper ∅	To system: *Hopper*	To system: *Hopper*	To system: *Hopper*
From spray gun	*Available*	Powder pump	Powder pump
Pneumatic			
From customer's compressed air supply ∅	To membrane compressed air dryer	To membrane compressed air dryer	To membrane compressed air dryer
From spray gun (Sure Coat)	*Available*	On control unit: 	On control unit: 
From recirculation pump ∅	-	To pressure regulator: 	-
Refill hopper: From Powder transfer pump ∅ Fluidization unit ∅	To system	To system	To system
Electrical			
To customer's voltage supply	Power cable	Power cable	Power cable
To ground (e.g. water pipe)	System (ground clamp): 	System (ground clamp): 	System (ground clamp): 
From spray chamber (safety switch)	*Available*	System XS3	System XS3
From spray gun	*Available*	Control unit GUN OUTPUT	Control unit GUN OUTPUT
ESD (electrostatic discharge)	*Available*	System ESD collection point 	System ESD collection point 

Cable Ducts and Connections (Front)

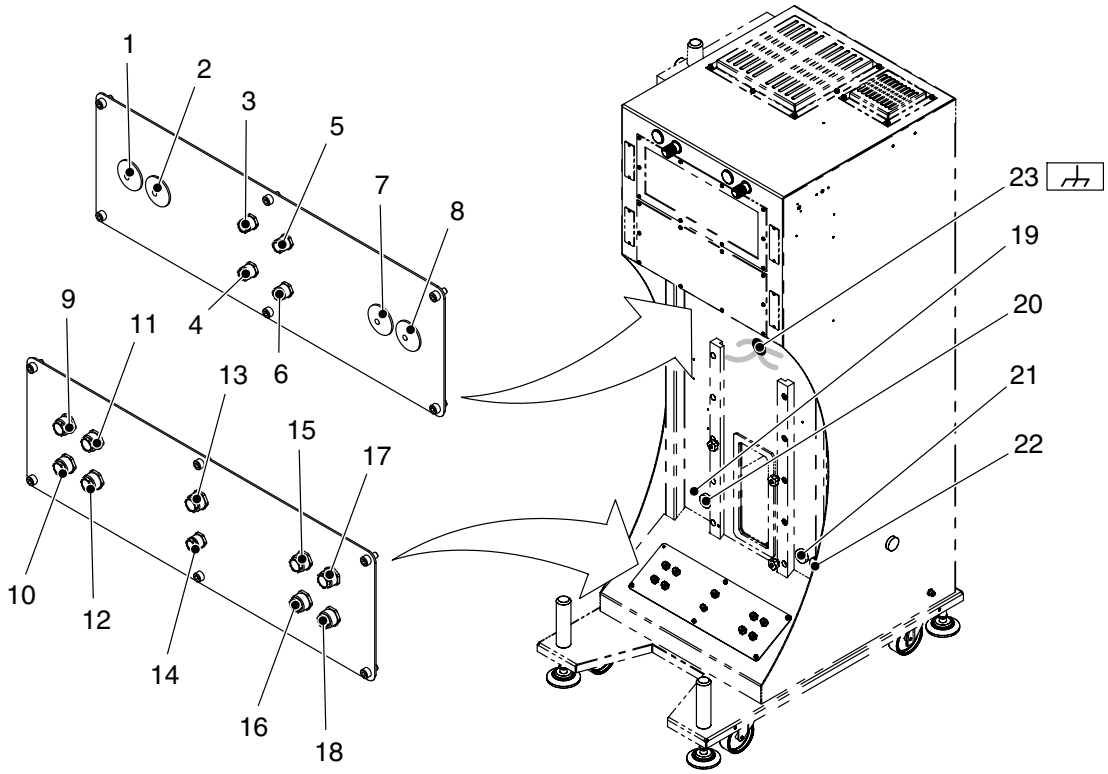


Fig. 3-3

1 Gun cable, gun/atomizing air and ground conductor *1*
2 Gun cable, gun/atomizing air and ground conductor *3*
3 Sensor cable / ground conductor *PFC 1*
4 Sensor cable / ground conductor *PFC 3*
5 Sensor cable / ground conductor *PFC 2*
6 Sensor cable / ground conductor *PFC 4*
7 Gun cable, gun/atomizing air and ground conductor *4*
8 Gun cable, gun/atomizing air and ground conductor *2*
9 Flow rate air *Powder pump 1*
10 Atomizing air *Powder pump 1*
11 Flow rate air *Powder pump 3*
12 Atomizing air *Powder pump 3*
13 Fluidization air *Recirculated material*
14 Ground conductor for peripheral equipment[1)]
15 Flow rate air *Powder pump 4*
16 Atomizing air *Powder pump 4*
17 Flow rate air *Powder pump 2*
18 Atomizing air *Powder pump 2*
19 Powder pump 1
20 Powder pump 3
21 Powder pump 4
22 Powder pump 2
23 ESD collection point (with newer systems)

Note: All positions *3* and *4* are options.

Note: [1)] Periphery: e.g. spray chamber, spray gun, ...

Cable Ducts and Connections (Left Side)

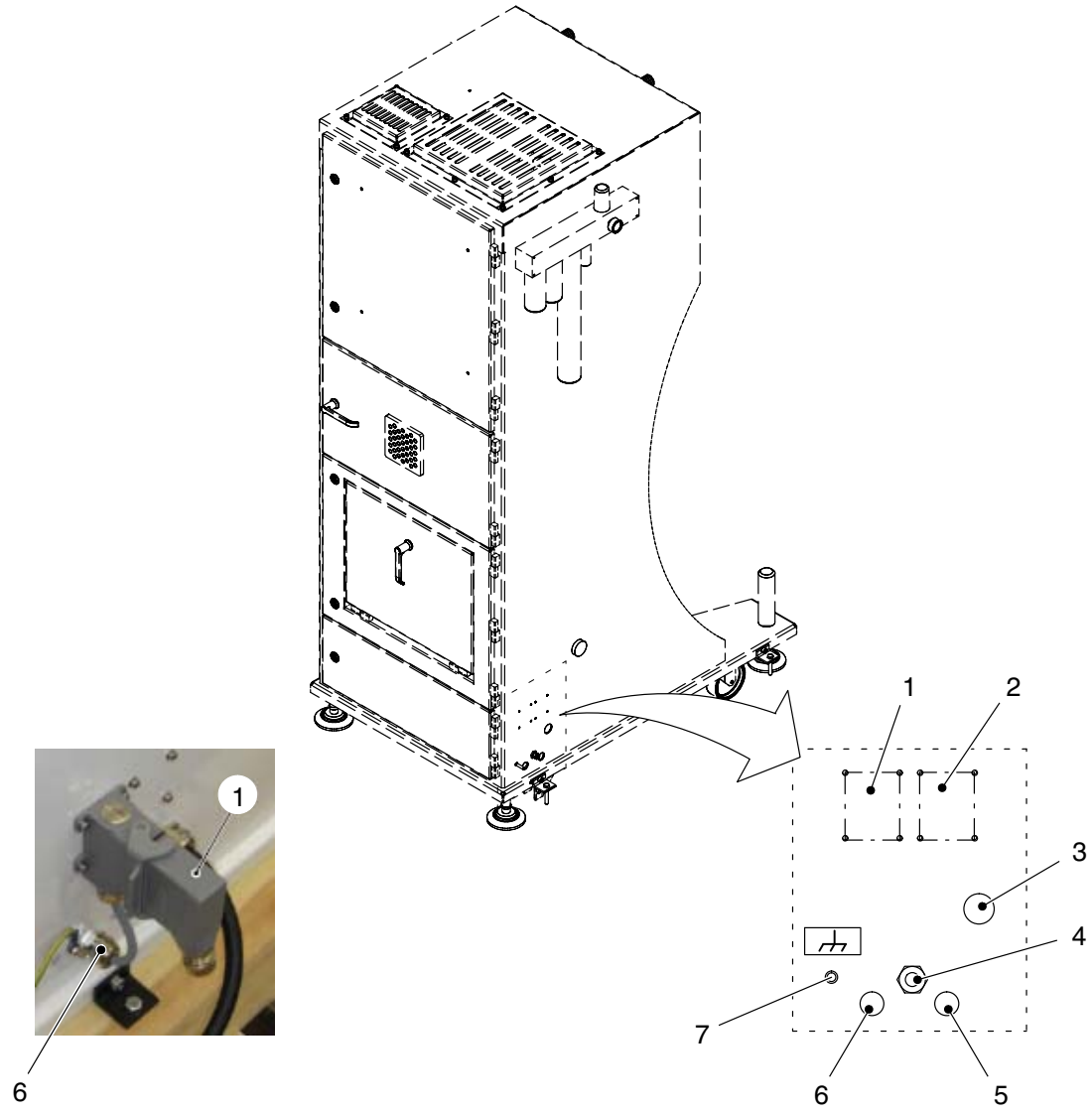
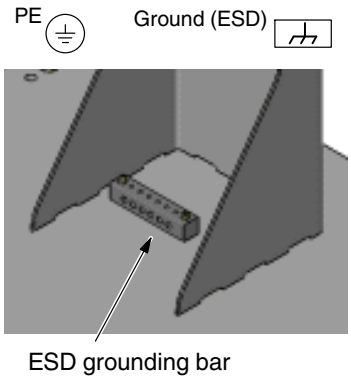


Fig. 3-4

1 Interface XS3 (for spray chamber 1 safety switch)
2 Interface XS4 (optional)
3 Power supply connection
4 Compressed air supply *Refill hopper*
5 *Reserved for XS4*
6 Duct, connecting cable XS3
7 System ground (ground clamp)

Powder Coating System Grounding



The green-yellow electrostatic ground lines have been replaced with *ESD* braided ribbon cables. The ESD cables are gathered together in a star shape on the front of the system.

When there are separate spray chambers, their ESD lines are connected on the ESD grounding bar. Connect an ESD line there and link it to the system (7, Fig. 3-4 or 23 , Fig. 3-3).

NOTE: Ground conductors that provide protective ground are still green-yellow.

Refer to Appendix A and *Safety Instructions* for more information on *Grounding*.

Electrical Connections

ATTENTION: Risk of electrical shock. Failure to observe may result in personal injury, death, or equipment damage.

Line Voltage

ATTENTION: Operate only with the line voltage stated on the ID plate.

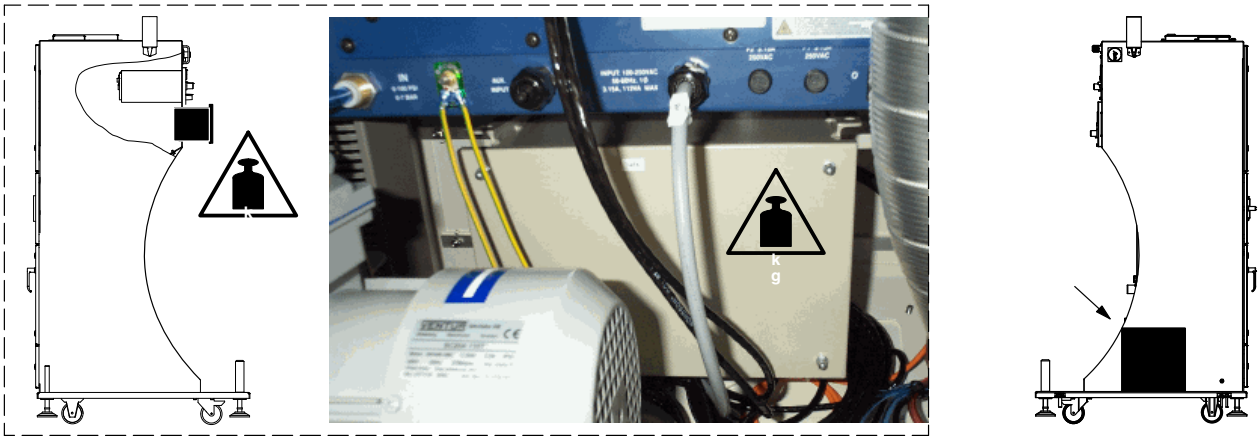
NOTE: Permitted deviation from nominal voltage is ± 10%.

NOTE: The power connection cable must have a cross-section matching the power consumption specified on the ID plate.

Systems with Transformer (”C”: 3x400 V Δ)

When there is one controller, the transformer is installed on the front plate below the controller, and when there are two controllers it is installed in a box (arrow) outside of the system.

CAUTION: The transformer is heavy. If the front plate is to be detached, secure it with the help of a second person.



Laying Cable

ATTENTION: In the working area around the unit, lay cables such that they do not pose a risk of stumbling and such that they cannot be damaged. Do not pinch cables and check regularly for damage. Replace damaged cables immediately!

Power Cable

Connect the system to the customer's power supply with the power cable.

System Grounding

Attach the ground clamp to certified ground, e.g. a water pipe.

Fig. 3-5

Interface Assignment

Interface XS2

The system has an interface to a higher-order machine control unit. Refer to wiring diagram for pin assignment.

Example of Inputs

- Analog input for gun (key-to-line)
- Lock the *Vantage* controller

Outputs

The following messages are intended to help quality assurance:

- Collective fault (error)

  Low powder level (level sensor) and/or insufficient powder (PFM1 / PFM2)
- Error: Low powder level (level sensor)
- Switching state of main switch: ON or OFF
- Switching state of side channel blower motor circuit breaker switch: ON or OFF

Fig. 3-6

Compressed Air Supply

1. Connect compressed air supply (1, Fig. 3-7).
2. Set the air pressure to 6 bar (87 psi) (2, Fig. 3-7).

NOTE: When the main switch is off, the compressed air is also switched off (with systems that have a solenoid valve on the membrane compressed air dryer).

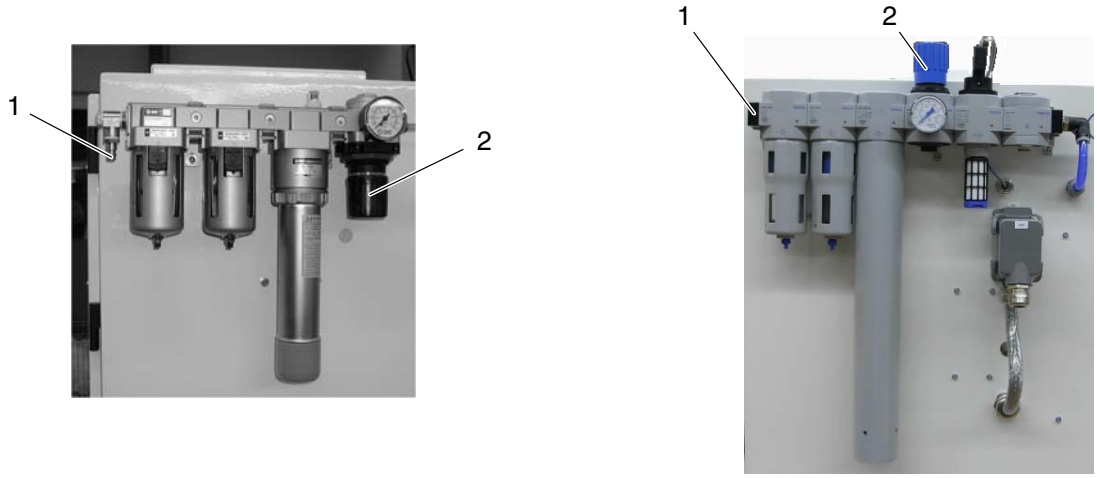


Fig. 3-7 Membrane compressed air dryer models

Basic Settings

When setting air pressures, the principle "working from the bottom up" should be followed.

If, for example, the air gauge shows 5 bar but only 3.5 bar is to be set, a value significantly below 3.5 should be used as the starting point (e.g. 1 bar). Then the pressure can be increased slowly from this low value up to the desired value of 3.5 bar.

Function	Maximum value	Minimum value	Default	Refer to
Compressed air supply	6.0 bar / 87 psi	5.0 bar / 72.5 psi	**6.0 bar / 87 psi**	Page 3-9
Control unit inlet pressure	6.0 bar / 87 psi (7.0 bar / 100 psi)	5.0 bar / 72.5 psi	**5.0 bar / 72.5 psi**	Page 2-9
Filter cleaning	4.0 bar / 58 psi	3.0 bar / 43.5 psi	**4.0 bar / 58 psi**	Page 2-9
Hopper System's vibrator and fluidization unit, supplied via a throttle	2.5 bar / 36 psi	1.0 bar / 14.5 psi	**1.0 bar / 14.5 psi**	Page 2-7
Material recirculation	2.5 bar / 36 psi	1.0 bar / 14.5 psi	**1.0 bar / 14.5 psi**	Page 2-8
Flow rate air (powder feeding quantity)	2.5 bar / 36 psi	1.0 bar / 14.5 psi	**1.0 bar / 14.5 psi**	Separate manual for *Vantage* controller
Atomizing air	1.2 bar / 17.5 psi	1.0 bar / 14.5 psi	**1.0 bar / 14.5 psi**	
Gun air (not adjustable)	-	-	**~ 0.3 bar / ~ 4.4 psi**	Fig. 3-2

Setting PLC Parameters for Automatic Filter Cleaning

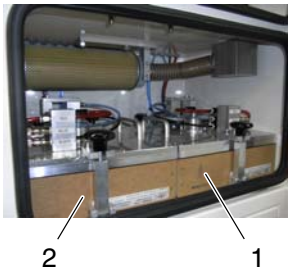


Fig. 3-8 Filter 1 + 2

CAUTION: Operate the system initially with the default settings. Then, if necessary, change the parameters in small steps to approach the optimal values.

Optimized values can save a substantial amount of air.

The control relay -5A5 is located on the mounting plate in the electrical cabinet (Refer to Fig. 3-9).

Code name Default	**PLC parameter**
T1 2 min	**Delay time alarm** When the level sensor has detected a lack of material in the hopper, the delay time begins. If after expiration of the delay time there is still not sufficient material, an alarm is indicated and the light tower flashes. The delay time prevents false alarms when a refill hopper performs automatic refilling.
T2 1.5 min	**Follow-up time *Refill hopper*** When the level sensor has detected a lack of material in the hopper, the refill hopper is switched on. When the level sensor detects material, the follow-up time begins. The refill hopper is switched off when this time has expired. The follow-up time ensures that enough material is provided. The longer the time, the more material is added.
T3 6 s	**Lead time *Nozzle*** The nozzle prepares for cleaning (blocking flap closes, a slight vacuum is generated at four nozzles). When the lead time has expired, the pneumatic cylinder begins knocking out the filter. The lead time should not be adjusted.
T4 10 ms	**Pulse frequency** The pulse frequency determines the vibrator speed. The shorter the time, the better the cleaning. The pulse frequency should not be adjusted.
T5 **T7** 12 s	**Operating time filter 1** **Operating time filter 2** The operating time determines the length of the entire cleaning process for each filter, including the lead time of the nozzle. Example: If operating time filter = 12 s and lead time nozzle = 6 s, the vibrator time is 6 s. **NOTE:** Set the same operating time for both filters.
T6 **T8** 25 s	**Pause time filter 1** **Pause time filter 2** The pause time is the rest time between operating times. The shorter the pause time, the better the cleaning. **NOTE:** Set the same pause time for both filters.

Choosing Settings

ATTENTION: System remains energized.

Fig. 3-9 Control relay

1. On control relay: Press OK to access setup mode.
2. Use the cursor key to select the menu item `Parameters`, then confirm with OK.
3. Use the cursor key to select the code name of the PLC parameter, then confirm with OK.
4. Use the cursor key to select and set the individual numerals and to change the value.
5. Confirm value with OK.
6. Press OK again to return to display mode.

Optimizing Parameters for Filter Cleaning

Cycle = operating time + pause time

Notes

- Brand new filters should be used briefly (5 - 10 cycles) before settings are changed. The filter fleece must reach a certain degree of saturation before the actual cleaning that is required becomes apparent.
- Operating times (T5/T7) and pause times (T6/T8) must be set such that filter cleaning is adequate for the degree of pollution resulting from each cycle. Otherwise the filters will eventually become clogged.
- The cleaning capacity can be increased substantially (Refer to example). To keep the air consumption to a minimum, only the cleaning capacity actually needed should be set.

Example

T3 (lead time *nozzle)* = 3 s
T5 / T7 (run times) = 8 s
T6 / T8 (pause times) = 45 s

- Extend operating time T5/T7 from 8 s to 16 s.

  The vibrator time is extended from 5 to 13 seconds, meaning cleaning capacity is increased 160%.

- Shorten pause times T6/T8 from 45 s to 25 s.

  The time between cleaning procedures is cut almost in half, meaning cleaning capacity is increased nearly 100%.

If the two measures are combined, the cleaning capacity is approx. five times that of the original setting.

Option Key-to-Line: Performing Calibration

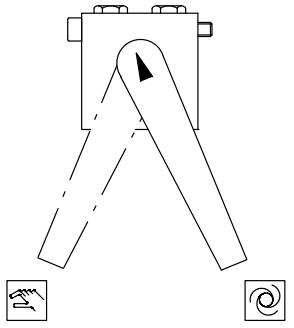


Fig. 3-10 Hand lever settings

NOTE: Settings should be made only by trained personnel.

1. Connect the parent machine. The analog input for key-to-line is located at interface XS2. Refer to the wiring diagram SLP *Option Proportional Valve* for pin assignment.
2. Set up the system in manual mode.
   a. Set the hand lever to manual mode or the solenoid valve to the rest position.
   b. Set the *Control unit* pressure regulator to 5 bar.
   c. Set the cable speed and optimize coating. Refer to the system manual, sections *Installation* and *Operation*.
3. Set the hand lever to key-to-line or trigger the solenoid valve.

   A signal of 10 V_{DC} is supplied under production conditions.

   10 V_{DC} corresponds to an inlet pressure of 5 bar and to the pressures set for flow rate air and atomizing air (1, Fig. 3-11) on the controller.

   NOTE: Minimum powder pump pressure: 1 bar.

   If the cable speed is then reduced, the inlet pressure decreases proportionally and the air pressures for the powder pump are reduced automatically.

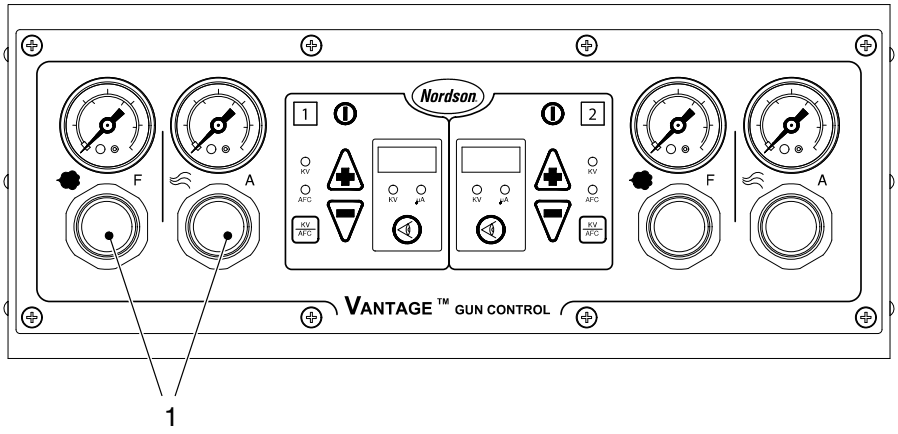


Fig. 3-11 Control unit

Difference Between Refill Hopper NHR - HR

The difference between the two models can be easily recognized by the different refilling lids.

- NHR: The refilling lid is black, round and made of rubber.
- HR: The refilling lid is blue, square and made of plastic.

Connecting Refill Hopper NHR (Accessory)

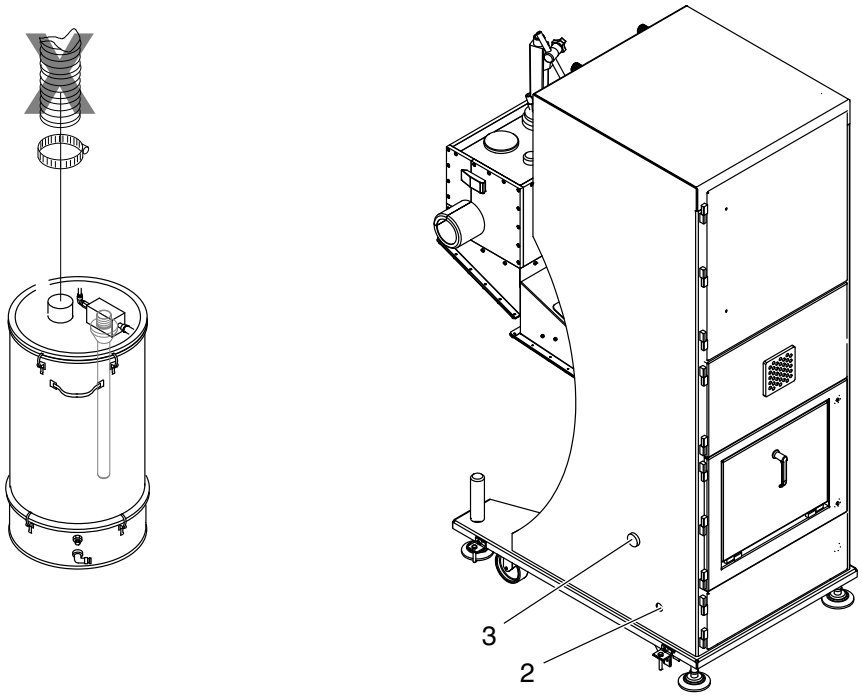


Fig. 3-12

Cap P/N 1001810
Transfer pump P/N 165633
Insert (Tivar®) P/N 226713
Reducer P/N 1001966
T-piece P/N 972313
Throttle P/N 1001965

TIVAR® is a registered trademark of Quadrant Engineering Plastic Products

For this application, the following are not needed:

Adapter P/N 638661
Spiral hose

Connection is possible on either side of the system.

1. Put the cap (1, Fig. 3-13) on the opening in the center of the refill hopper lid. The spiral hose is not needed.
2. Remove the metal bracket with the throat from the powder transfer pump. Detach one of the O-rings from the bracket and put it on the single-part insert made of Tivar® (P/N 226713), included in the kit.
3. Place the insert (P/N 226713) in the powder transfer pump and attach the pump to the refill hopper.
4. Connect the powder hose (6, Fig. 3-13) to the powder transfer pump.

Fig. 3-13

5. Replace the blind fitting *Hopper* (2, Fig. 3-12) with the bulkhead gland found in a bag in the lower part of the system. Screw the bulkhead gland onto the system wall such that the smaller diameter points into the system.

Fig. 3-14 System outside - System inside

6. Fig. 3-14: From the inside, connect the air hose (6x4, blue) to the bulkhead gland (arrow); from the outside, connect the air hose (8x6, black) from the kit to the bulkhead gland.

   The system's membrane compressed air dryer supplies air for the powder transfer pump and for the refill hopper fluidization.

7. Remove the blind fitting (3, Fig. 3-12) and save it for later use. The nut will be needed later.

   Screw the connecting piece found in the bag (came with the system) onto the system wall with the nut from the blind fitting.

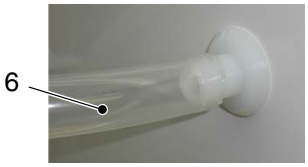


Fig. 3-15

8. Attach the refill hopper powder hose (6) to the connecting piece. To keep the powder hose as short as possible, the refill hopper should be set up as close to the system as the surroundings permit.

9. Fig. 3-16: Connect the transfer pump and the refill hopper fluidization using the black 8 mm air hose (1), the reducer 10/8 mm (2), the T-piece (3) and the throttle (needle valve, 4).

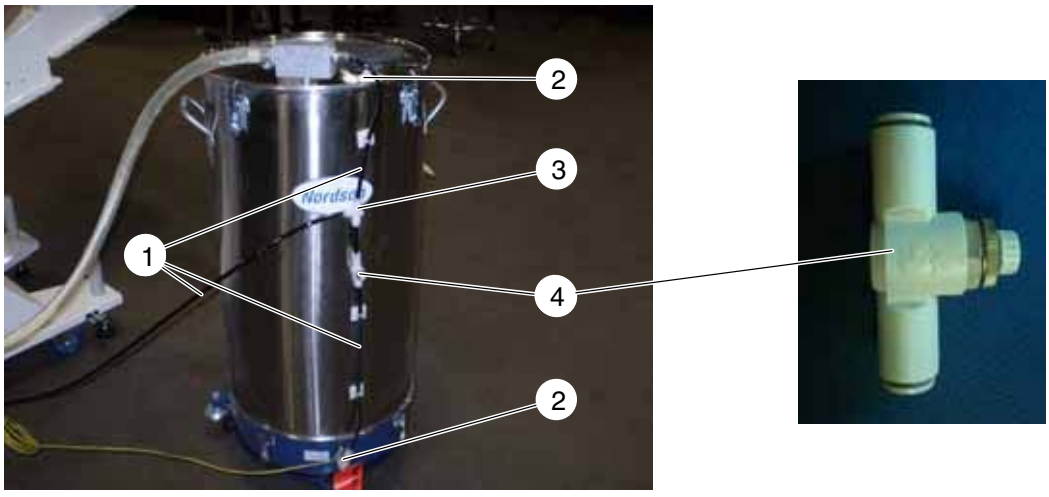


Fig. 3-16

10. Ground the refill hopper. Ground connection (5, Fig. 3-17).

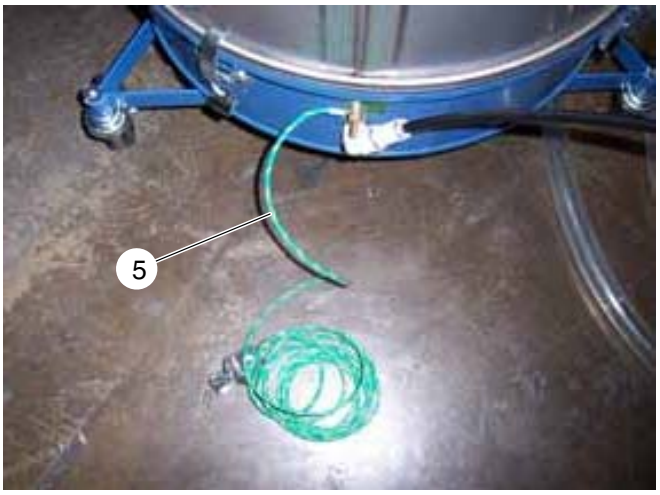


Fig. 3-17

The pressure for the transfer pump is the pressure set on the membrane compressed air dryer.

The fluidization pressure is throttled. Observe arrow in the throttle:

- Large arrowhead = high pressure (increase)
- Small arrowhead = throttled pressure (decrease)

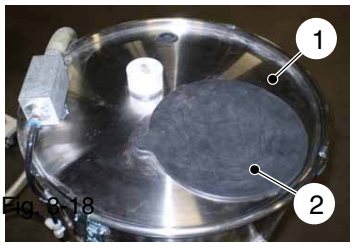


Fig. 3-18

11. Close the throttle, then open it three revolutions. This setting ensures that the pressure does not become excessive during fluidization.

    NOTE: If powder escapes from under the lid (1, Fig. 3-18) or the refilling lid (2), the throttle must be closed some more.

12. Fill the refill hopper with powder.

    A typical powder container weighs 22.5 kg (50 lb.). The refill hopper is intended to accommodate 36 kg (80 lb.). This means that there is sufficient space for the powder to expand, even during fluidization.

Connecting Refill Hopper HR (Accessory)

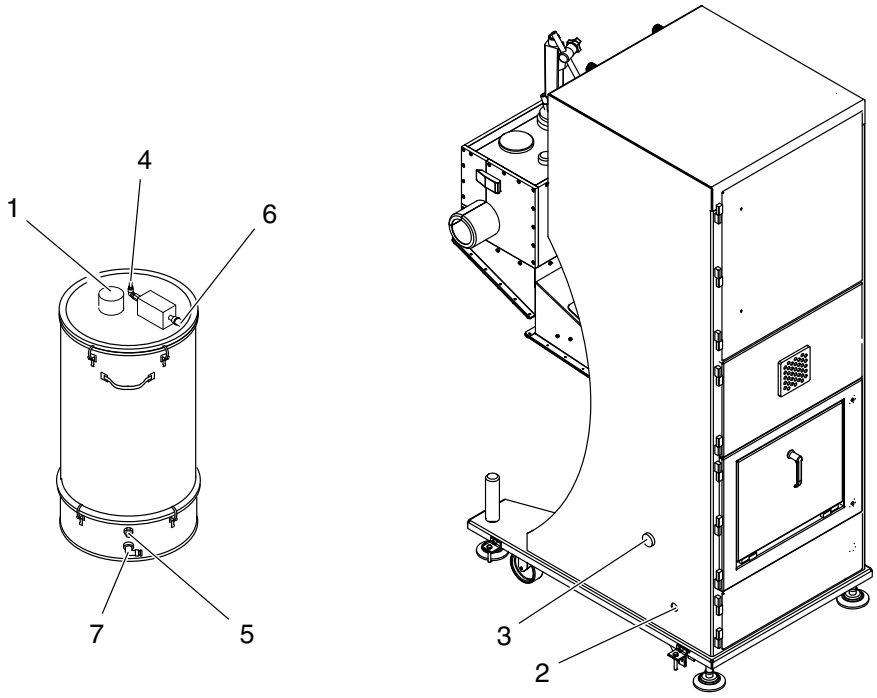


Fig. 3-19

Connection is possible on either side of the system.

1. Put the cap (1, Fig. 3-19 and Fig. 3-20) on the refill hopper.
2. Attach the powder transfer pump to the refill hopper.

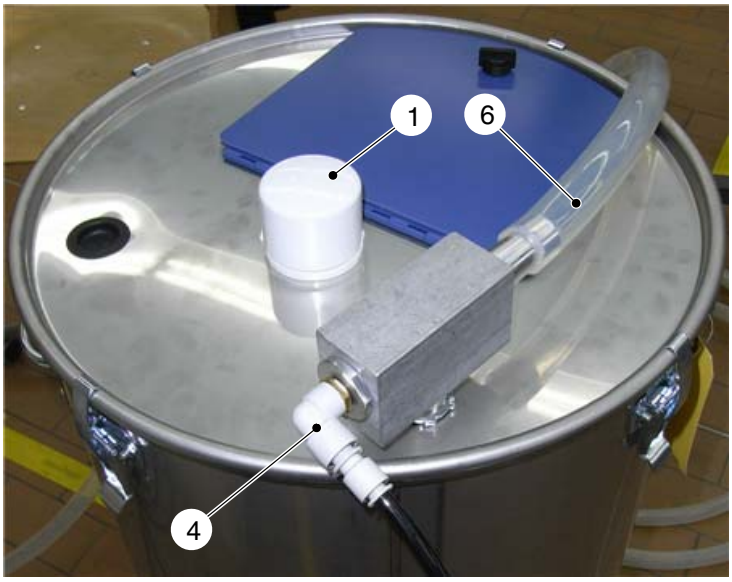


Fig. 3-20

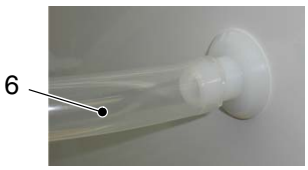
3. Replace the blind fitting *Hopper* (2, Fig. 3-19) with the bulkhead gland found in the bag included with delivery of the system. Screw the bulkhead gland onto the system wall.

   Connect the system's air hose (6x4, blue) and the powder transfer pump (4, Fig. 3-19) air hose.

   The pressure for the powder transfer pump is the air pressure set on the membrane compressed air dryer. If necessary, open the hose and insert a throttle.

   Observe arrow in the throttle: Large arrow tip = high pressure
   Small arrow tip = throttled pressure

Fig. 3-21



4. Remove the blind fitting (3, Fig. 3-19). The nut will be needed later.

   Screw the connecting piece found in the bag (came with the system) onto the system wall with the nut from the blind fitting.

   Attach the refill hopper powder hose (6).

5. Ground the refill hopper. Ground connection (5, Fig. 3-19 and Fig. 3-22).

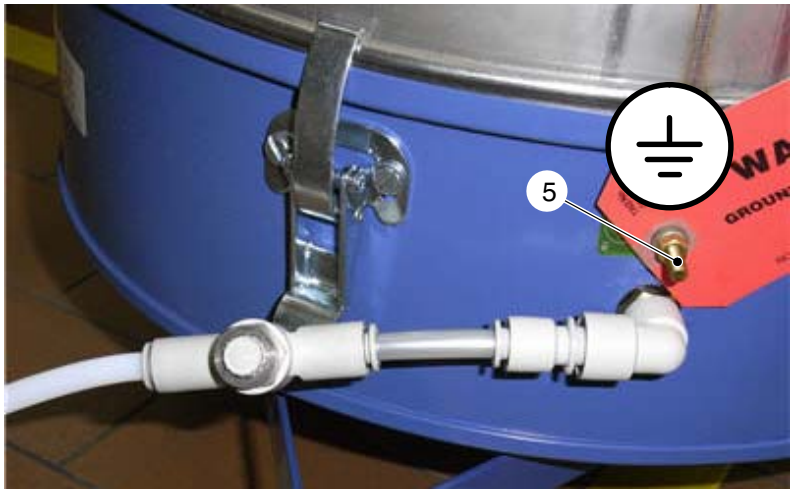


Fig. 3-22

Connecting Fluidization Air

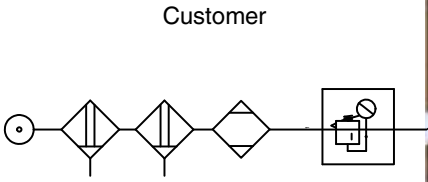
The refill hopper fluidizer is not supplied via the system's membrane compressed air dryer, because the dryer is not intended to accommodate any accessories that may be connected.

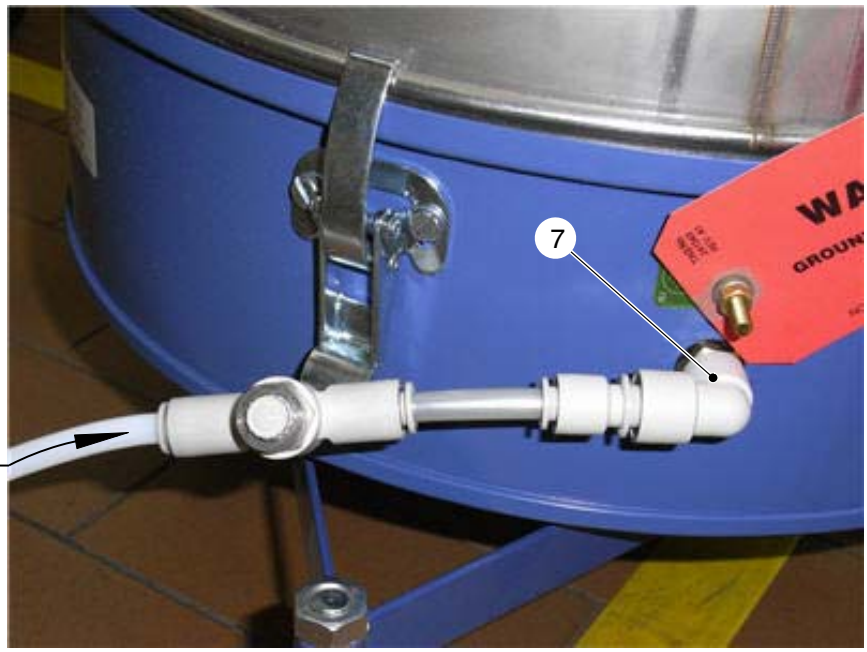
CAUTION: Dry, non-lubricated and clean compressed air is needed for the fluidization unit.

Air Quality

The air used must be clean and dry. Use a dehumidifier with regenerating drying agent or a cold air dryer that cannot exceed a dewpoint of 38 °F (3.4 °C) at 100 psi (6.89 bar). Also use a filter system with preliminary filter and coalescence filter that can remove oil, water and dirt in a submicroscopic range.

6. Connect the fluidizing air (7) to the customer's compressed air dryer.
   Max. inlet pressure (refill hopper): 3 bar
   Fluidization pressure (refill hopper): 1 to 2.7 bar (15 to 40 psi)



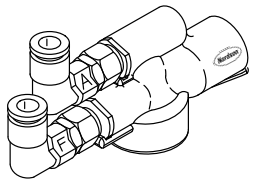


7. Fill the refill hopper halfway with powder, allowing room for powder expansion when fluidization begins.

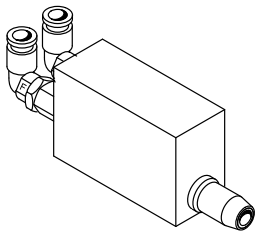
When New Pumps are to be Installed in Older Systems

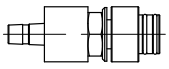
There are retrofitting kits (7168072, 7168073) available for all ECC 200 to ECC 701. The retrofitting kit is used to replace a pump that is no longer available with a newer model. Adjacent components (pump adapter) may also need to be replaced.

P/N 224713 Replaced with P/N 7168072

224713 Pump, modular, 6 mm	**Contents of 7168072**		
	P/N 327742	1x PUMP, STD-FLOW, 8MM	
	P/N 114219	1x THROAT, VENTURI, TIVAR®, LO-FLO	Separate
	P/N 114223	1x THROAT, VENTURI, STAINLESS STEEL	Installed
	P/N 1064256	1x THROAT,VENTURI, STANDARD FLOW, SMART	Separate
	P/N 7149160	2x Plug-type fitting QS-8H-6 (Fig. -23)	
	P/N 7114984	1x Adapter, pump low flow cpl. (Fig. -24)	

P/N 165636 Replaced with P/N 7168073

165636 Pump, metric, 6 mm	**Contents of 7168073**		
	P/N 327742	1x PUMP, STD-FLOW, 8MM	
	P/N 114219	1x THROAT, VENTURI, TIVAR®, LO-FLO	Separate
	P/N 114223	1x THROAT, VENTURI, STAINLESS STEEL	Installed
	P/N 1064256	1x THROAT,VENTURI, STANDARD FLOW, SMART	Separate
	P/N 7149160	2x Plug-type fitting QS-8H-6 (Fig. -23)	

	P/N 7114984*	1x Adapter, pump low flow cpl. (Fig. -24)	Accessories
*** NOTE:** P/N 7114984 must also be ordered if the existing pump adapter is made of plastic.			

Retrofitting

8. Empty the system.
9. Production line: Stop cable feeding and take measures to prevent unintentional startup.
10. Switch off as described in the coater manual.

ATTENTION: Disconnect the system from the line voltage.

11. Clean the hopper.
12. Select a Venturi throat that is suitable for the application (Refer to table *Installed/separate*) and insert it.
13. Attach the reducers (air hoses) to the new pump. Refer to *Attaching Reducers P/N 7149160.*
14. Attach the pump adapter made of aluminum. Refer to *Attaching Pump Adapter P/N 7114984.*
    d. Fasten the adapter piece (2b, Fig. 3-24) to the coater wall with a washer and a nut, working from the inside of the coater. Screw together the two adapter pieces.
    e. Connect the suction hose (1, Fig. 3-24) to the adapter piece (2a).
    f. From the inside, slide the pump (3) onto the adapter, turning the pump slightly.
    g. Attach the air hoses (A and F) and the powder hose again.

Attaching Reducers P/N 7149160

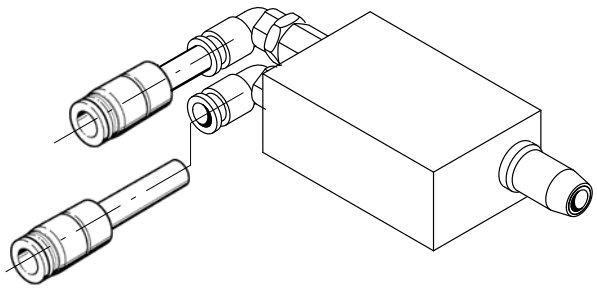


Fig. 3-23

Attaching Pump Adapter P/N 7114984

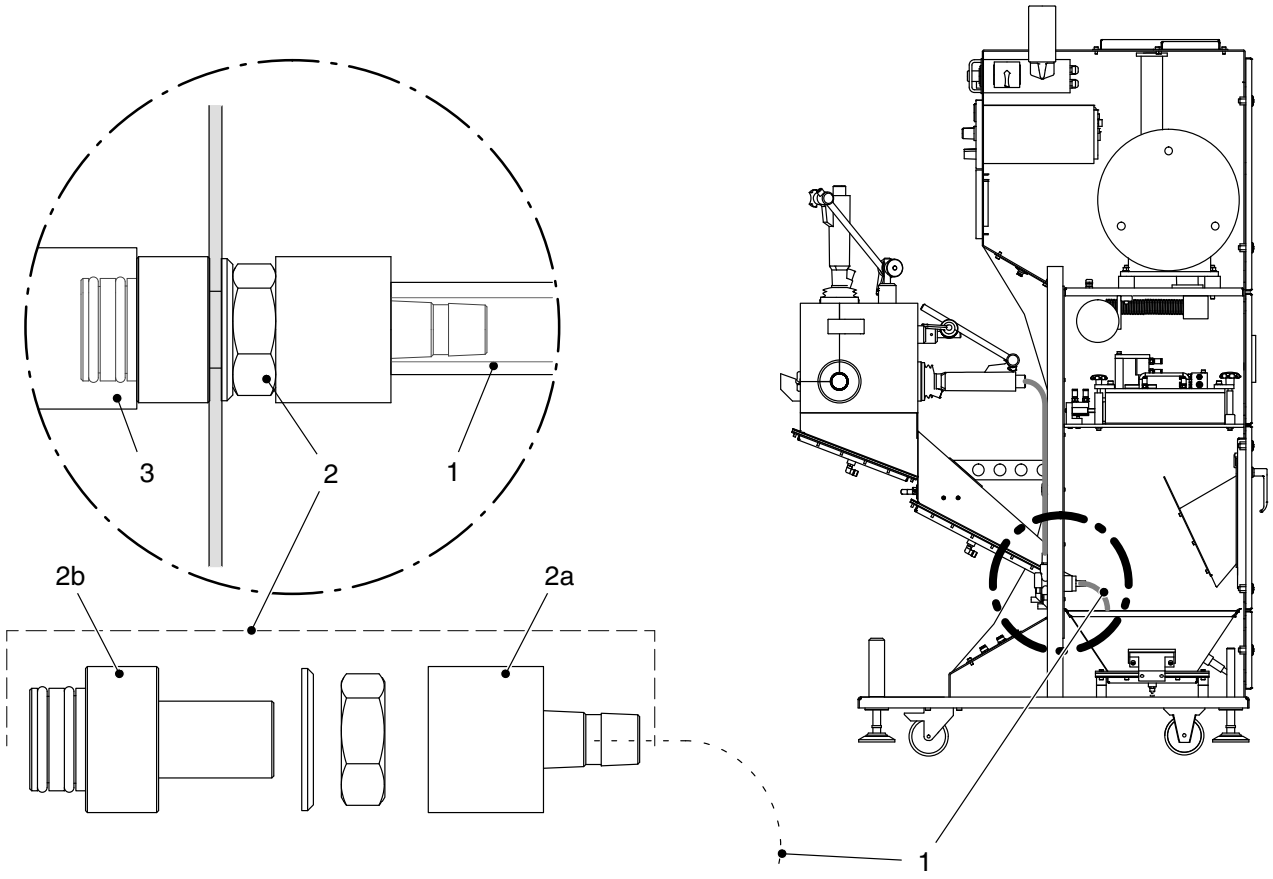


Fig. 3-24 Attaching pump adapter made of aluminum

1 Suction hose *Hopper* 2 Pump adapter 3 Pump

Section 4
Operation

ATTENTION: Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.

ATTENTION: High voltage at powder gun nozzles. Reaching into the spray chamber during operation can cause flashover voltage. Flashover voltage can pose a hazard to sensitive persons!

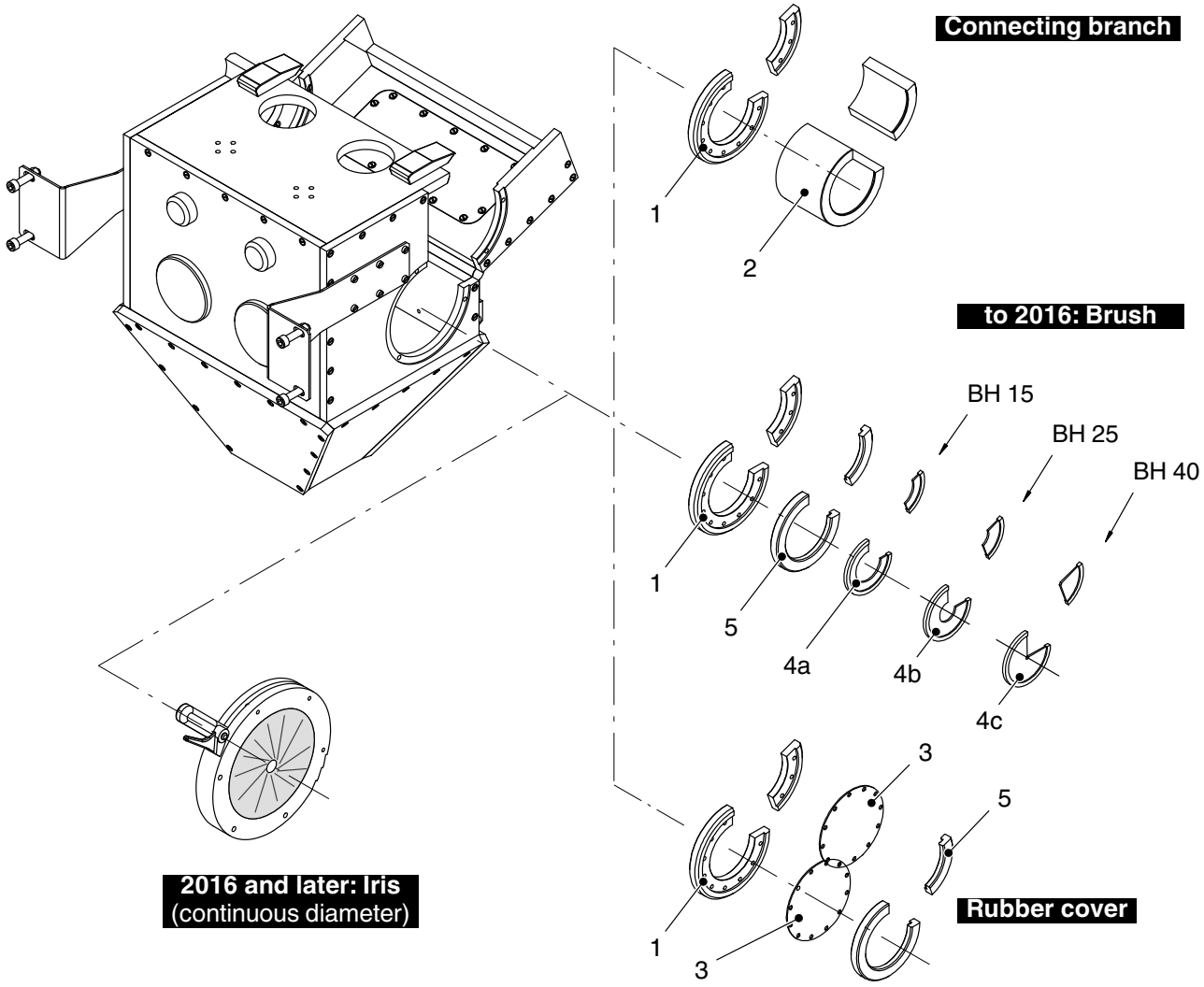


Fig. 4-1

Machine Properties

Cable Runs Smoothly

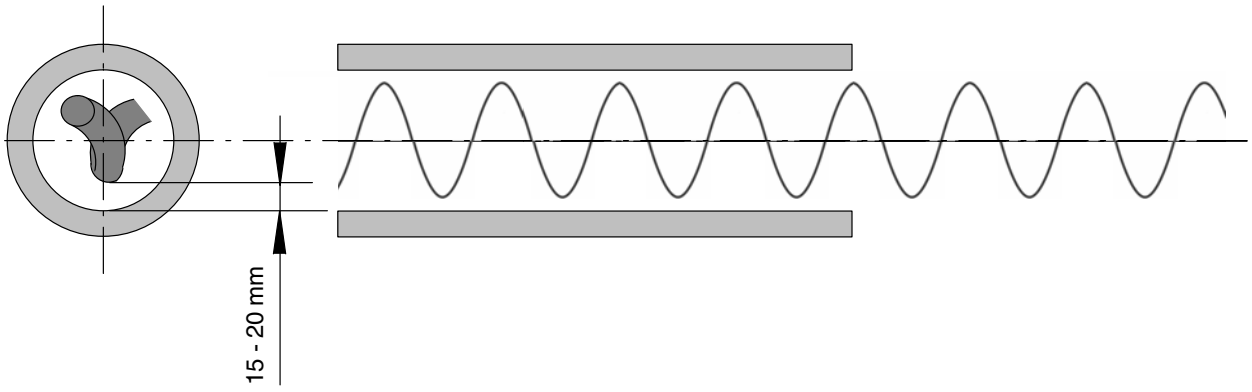
Hole size = outer cable diameter + 30 (up to 40) mm.

NOTE: The value 15 - 20 mm is a general guideline. The smaller the hole diameter is in relation to the cable, the higher the vacuum is that is created in the spray chamber by the side channel blower.

Cable Vibrates

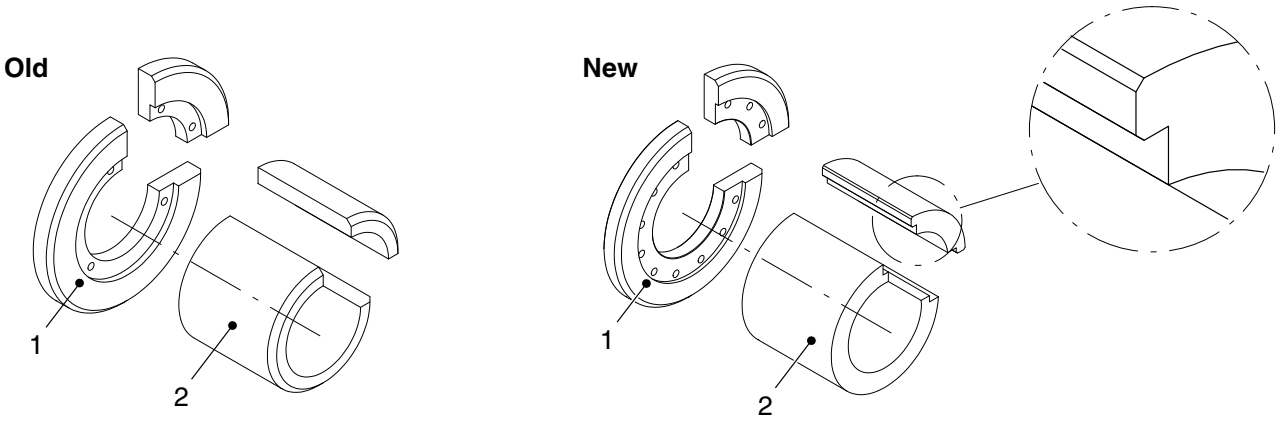
This is to be expected during startup and production when thick cables are used.

The hole size should be as close as possible to the outer cable diameter, whereby vibration must be taken into consideration.



Preparing Spray Chamber

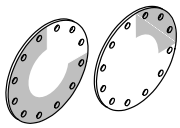
Connecting Branch



A. Size D80 and D100: Screw the connecting branch (2, Fig. 4-1) onto the adapter (1). Screw the assembly onto the spray chamber.

B. Size D125: Screw the connecting branch (2, Fig. 4-1) directly onto the spray chamber.

Rubber Cover



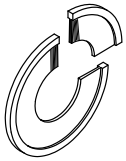
NOTE: The hole size should be as close as possible to the outer cable diameter.

Punch or cut hole in both rubber lids (3, Fig. 4-1). Cut one to 3/4 circumference and the other to 1/4 circumference.

A. Size D80 and D100: Fasten the rubber lids between the adapter and the clamping ring (1 and 5). Screw the assembly onto the spray chamber.

B. Size D125: Screw the rubber lids with the clamp ring (5) directly onto the spray chamber.

Brush (Through 2016)

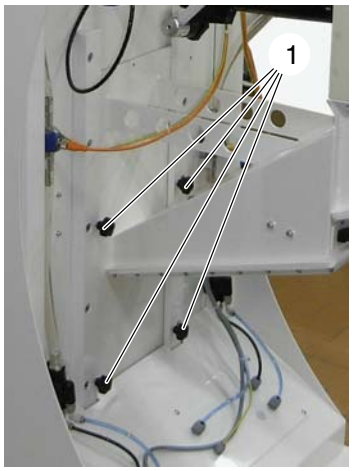


NOTE: The brushes are available with different bristle lengths (BH 40: 40 mm, BH 25: 25 mm, BH 15: 15 mm, Fig. 4-1).

Cut off the required brush length from the roll and place in the clamp ring groove.

A. Size D80 and D100: Screw the clamp ring (5) with the brush (4) onto the adapter. Screw the assembly onto the spray chamber.

B. Size D125: Screw the clamp ring (5) with the brush (4) directly onto the spray chamber.

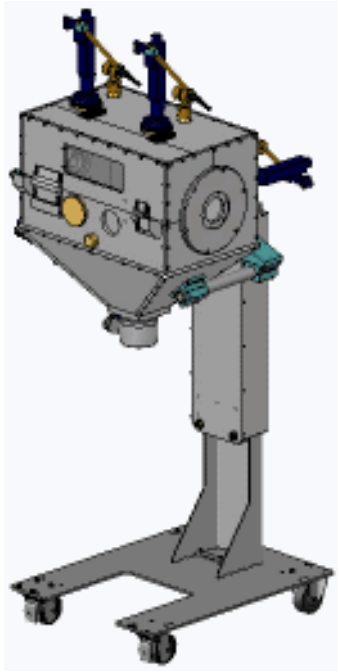


The spray chamber is heavy. Set the height of the spray chamber such that the cable to be coated runs through the center of the chamber inlet and outlet. Two people will be needed for this task.

- Option *Attached spray chamber*: Release the four star grips (1), adjust the spray chamber height and then tighten again.

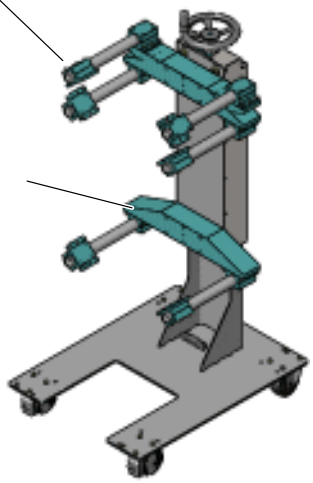
- Option *Remote spray chamber*: Release the clamp lever on the frame or adjust with the handwheel, depending on the configuration.

  NOTE: The new trolley model allows multiple max./min. spray chamber positions by moving and/or turning the crossbar. The range between the positions can be continuously adjusted with the handwheel.



After turning the crossbar, release the clamp and turn the holder as shown in the lower position.

Crossbar



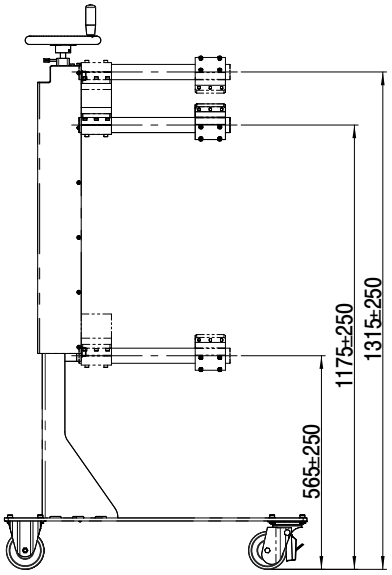


Fig. 4-2 Trolley model 2016 and later

If necessary, run the cable over supporting rolls before it enters the chamber and after it exits the chamber to keep it from sagging.

Startup / Switching On

NOTE: Some of the following tasks are described in detail in the subsequent text.

1. Effectively ground the end of the cable at the unwinder.

   Good electrostatic powder coating can occur only when - in addition to independent, sufficient grounding of the system - the substrate to be coated is effectively grounded.

2. Start compressed air supply.
3. Set the air pressure to 6 bar (87 psi) and allow the air dryer to be purged with compressed air for approx. 10 minutes.
4. After 10 minutes, switch the system on with the main switch.

   The side channel blower (fan) is switched on.

   The system is pressurized.

5. Add powder and allow the powder supply in the system to fluidize for several minutes (approx. 5 to 10 min.).

   If the system is operated with a refill hopper, open the compressed air supply to the refill hopper's fluidizer and allow the powder supply in the system to fluidize for several minutes (approx. 5 to 10 min.).

6. Check the control unit displays. After booting, the control unit setting is the same as it was before switching off.

Fig. 4-3

Continued ...

Display indicates Loc or Con. The control unit is locked. Close the spray chamber or enable the control unit via the interface XS2.

OR

Check the trigger keys (1, Fig. 4-3).

- Display OFF: The gun is switched off. Switch off the side not is use during single gun operation.

OR

- Depending on configuration, value in kV or µA: The gun is switched on.

ATTENTION: Never operate the powder spray guns outside of the spray chamber.

7. Start cable production line.
8. When using Versa-Spray/Ceramic and Sure Coat guns, initiate production with maximum charging voltage.
   - Versa-Spray/Ceramic: Max. 100 kV (bandwidth 33 to 100 kV)
   - Sure Coat: Max. 95 kV (bandwidth 25 to 95 kV)

   NOTE: Only the output current (µA) is indicated for Tribomatic guns.
9. With VersaSpray/Ceramic, adjust the nozzle position to the cable diameter. Refer to page 4-9, *Nozzle Setting*.
10. Visually check the quality of the powder coating during production. If necessary, adjust pressure to optimize quality. Refer to page 4-8, *Optimizing Coating - Guidelines*.
11. If available, set the powder flow display. Refer to *Setting Powder Flow Display PFM*.

    Reset the display when the powder is changed.

Filling Powder

ATTENTION: When the hopper is filled and the chamber is opened, material particles are emitted into the atmosphere. Keep emission to a minimum by handling package carefully. Wear respiratory protection.

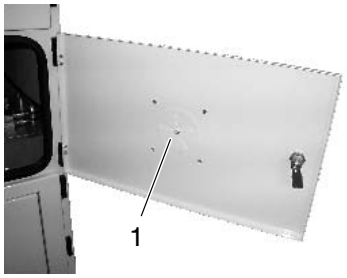
Powder can be added at any time - even during operation.

Fig. 4-4

1. Back of system: Open hopper.
2. Carefully open powder container.
3. Fill the hopper very carefully.
4. Close the hopper.
5. Store opened powder container in a dry place.

NOTE: Because it is hygroscopic (retains moisture), SAP powder requires extremely dry surroundings. Humidity makes it difficult to prevent the powder from clumping in containers that have been opened. A refill hopper is the ideal solution to this problem: A whole container can be poured into the hopper at one time, and the packaging can be disposed of.

Optimizing Coating - Guidelines



NOTE: When beginning optimization, close the admixed air opening (1) completely to achieve the maximum vacuum in the spray chamber. Always keep the door closed during operation. When optimization is complete, open the admixed air opening just far enough that no powder can escape from the spray chamber during operation.

There are no set rules for optimizing coating quality. Production parameters such as line speed (retention time of a section of cable in the spray chamber), material properties of cable surface and powder, ambient conditions, quality of grounding, etc. can vary significantly from customer to customer. But the following guidelines can generally be applied:

- Set the lowest possible powder output quantity, without impairing charge level, to avoid overspray
- Set diffuser air as low as possible without impairing the powder/air mixture

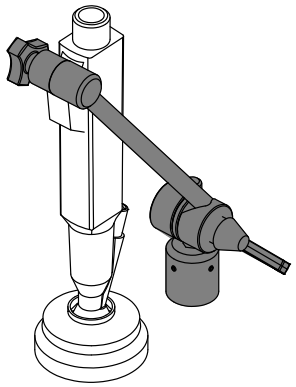
The first two points have an effect on the system's air consumption. "As much (air) as necessary - as little as possible."

- Set the charging voltage to 50% of the possible bandwidth.
  - Versa-Spray/Ceramic: 66 kV (bandwidth 33 to 100 kV)
  - Sure Coat: 60 kV (bandwidth 25 to 95 kV)
- Always check the system when an alarm (light tower or interface outputs) occurs. If the coating is insufficient and increasing the powder output quantity does not cause improvement, the powder pump as well as the Venturi throat, the powder hoses and the powder guns must be thoroughly cleaned
- Keep air current speed in the spray chamber low with smallest possible spray chamber openings.

NOTE: When optimizing the coating quality, only one setting should be changed at a time - e.g. powder output quantity - leaving the others unchanged. This way changes in results can be better interpreted. The Settings Record Form can be used for this purpose.

NOTE: In order to be able to reproduce at any time the optimal settings determined for production, the Settings Record Form should be used.

Nozzle Setting



The adjustable gun holders enable the gun to be adjusted.

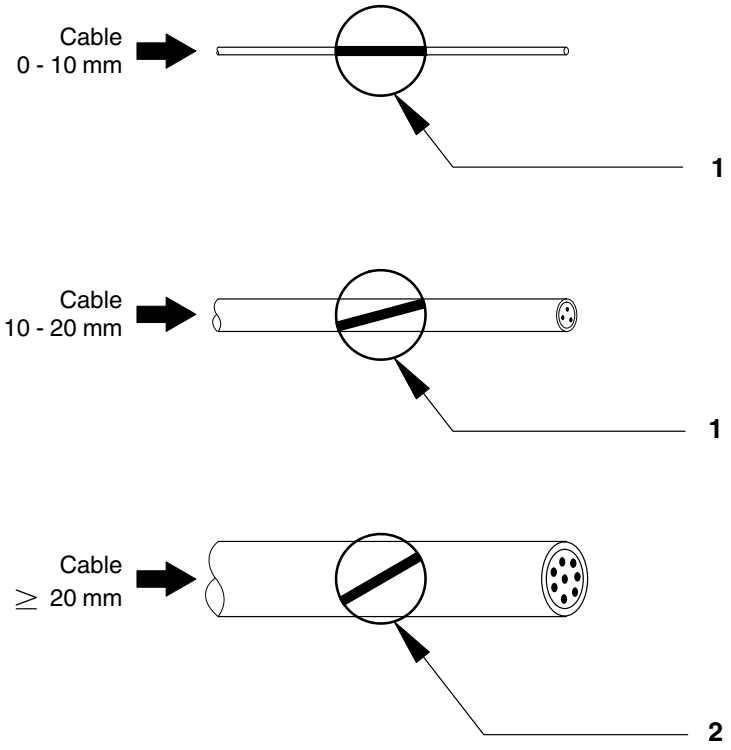


Fig. 4-5 Example of Versa-Spray nozzle with slot

1 2,5 mm slot

2 2.5 mm slot; alternative: 4 mm slot

Setting Powder Flow Display PFM

The optional powder flow display is also available as an accessory. There is a standard model and an SAP optimized model.

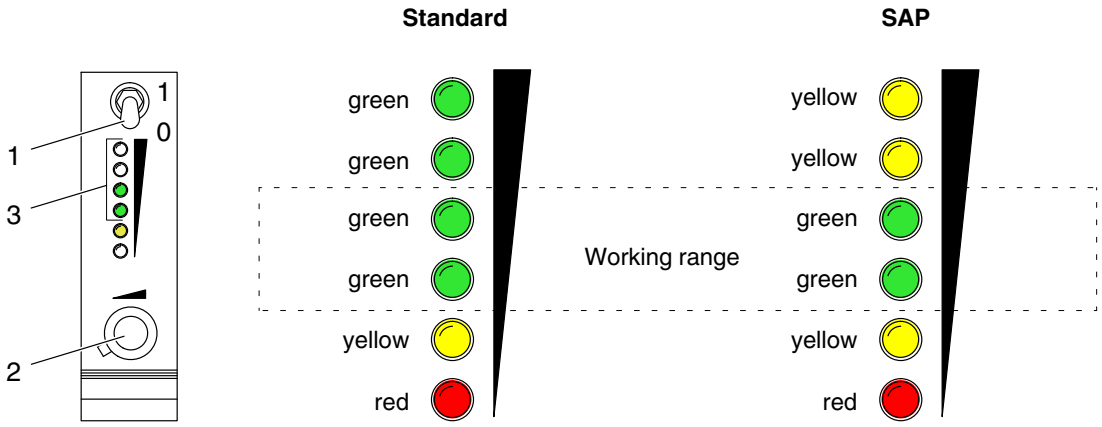


Fig. 4-6

1. Ensure that the coating is optimized.
2. Switch off the PFMs of any guns not in use with the toggle switch (1).
3. During operation:

   CAUTION: The potentiometer has no limit stop, so there is no upper limit.

   Standard: Turn the potentiometer (2) until two of the four green LEDs (3) light up. The more powder that flows through the sensor, the more green LEDs that light up.

   If the working range of the electronics is set such that four green LEDs light up instead of two when coating is optimal, the electronics may evaluate incorrectly when powder stops; then *Insufficient powder* is not indicated.

   SAP: Turn the potentiometer until the two green LEDs light up.

   If more powder flows through the sensor than is optimal, the upper yellow LEDs light up, indicating by their color that correction is needed.

After about five minutes of production, the working range should be adjusted again.

Only the lower yellow LED is illuminated when the powder is low.

The lower red LED is illuminated when there is insufficient powder. The light tower flashes. A signal is also emitted to a potential-free contact on the XS2 interface.

Opening the Spray Chamber

Newer systems are equipped with a safety switch before they leave the factory.

NOTE: The safety switch is factory set and cannot be modified.

When the spray chamber (10, Fig. 1) is opened during operation, the safety switch on the spray chamber causes the powder flow to stop and the high voltage supply to the powder gun to be interrupted.

When the spray chamber is closed, the system automatically returns to the original operating state.

Shutdown for Short Period of Time

- Switch off the gun(s) with the controller trigger key(s).

OR

- Lock the controller.

Daily Shutdown

When the system is shut down for extended periods of time (e.g. weekend), pump out the powder before switching off to prevent clumping.

1. Stop cable production line.
2. Lock the controller.
3. Allow system to run for 5 to 10 minutes to self-clean.
4. Switch system off with main switch.
5. Ground the spray gun electrode to discharge any residual voltage.
6. Perform daily maintenance. Inspect all compressed air and powder hoses as well as electrical connections. Tighten loose connections and replace damaged parts.

Emergency Shutdown

ATTENTION: Immediately switch off the system in any emergency situation.

1. Set the system's main switch to *0* (Off).
2. Stop cable production line.
3. After standstill and before switching the system back on, have the fault remedied by qualified personnel.

Settings Record

Production:					
Cable type					
Cable ∅					
Machine					
Parameter	**Default**	**Test/ production set 1**	**Test/ production set 2**	**Test/ production set 3**	**Test/ production set 4**
Line speed	**-**				
Powder type	**-**				
Compressed air supply	**6.0 bar**				
Hopper	**1.0 bar**				
Material recircula-tion	**1.0 bar**				
Flow rate air (powder feeding quantity)	**1.0 bar**				
Atomizing air	**1.0 bar**				
Filter cleaning	**4.0 bar**				
Control unit input	**5.0 bar**				
Model Handgun type	**-**				
Charge in kV (recommended)	66 kV (Versa/Ceramic) 60 kV (Sure Coat)				
Powder pump type	**-**				
Alarm level					

Notes:

Section 5
Maintenance

ATTENTION: Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.

Important Notes

ATTENTION: Before doing any maintenance work, switch the system off completely (Refer to *Operation, Daily Shutdown*) and secure such that it cannot be unintentionally switched on.

ATTENTION: When damaged parts endanger the operating safety and/or the safety of personnel, switch off the system and have the damaged parts replaced by qualified personnel. Use only original Nordson spare parts.

Maintenance of the cable coating system is usually limited to cleaning. It is important that cleaning is thorough, because system functioning and coating quality are very much dependent on the cleanliness of all parts that come into contact with powder and compressed air.

- Remove all system components that can be detached for cleaning, e.g. powder guns, powder hoses, pumps and filters.
- If possible clean in a separate, closed room with an exhaust system.

- Do not use compressed air to clean the equipment. Clean all parts by knocking out, or use a brush, lint-free rag and vacuum cleaner.
- Never use sharp objects. Scratches on the surface can cause powder to collect, resulting in blockage.
- Do not replace conductive O-rings with O-rings made of non-conductive material. Conductive O-rings provide the required grounding. Failure to observe can result in injury, fire or explosion.

Regular Maintenance

The stated maintenance intervals are only general values based on experience. Depending on production conditions - particularly with multiple shifts - other maintenance intervals may prove necessary.

Check the geometric shape and the material thickness of wearing parts. If parts wear unevenly, they should be replaced.

System part	Activity	Interval	Refer to
Complete system, external	Wipe with soft cloth Inspect for damage	Daily	-
Main filter cassettes	Clean manually	With SAP, check daily	5-4
	Replace	When dirt or clogging is persistent	5-4
	Check the star grips and tighten, if necessary	Weekly	5-4
	If powder has escaped, remove it to prevent blockage of the fine preliminary filter		
Fine preliminary filter	Disassemble and knock out	When replacing main filter cassettes When the vacuum in the spray chamber decreases noticeably (powder escapes through cable inlets)	5-6
Exhaust and admixed air filters	Replace	When dirt or clogging is persistent	5-7
Spray chamber	Vacuum	Weekly	-
Hopper	Vacuum	Weekly	-
Powder pump Powder transfer pump Powder recirculation pump	Check the Venturi throat for wear; replace if necessary.	Weekly	5-11
Powder hoses	Clean	Weekly	-
Coarse sieve	Check for foreign objects, clean if necessary	Weekly	5-7
Air dryer pre-filter	Drain condensate	Weekly	5-8f
	Replace filter element	When the pressure drop through the single pre-filter reaches 1 bar (14.5 psi); at least every two years	
Air dryer	Replace control module	Every four years	5-8f
Vibrator	Tighten fixing screw with 25 Nm	Every 500 hours of operation	5-9
Powder gun	Check nozzle/electrode (antenna) for wear	Weekly	Manuals for powder guns
Side channel blower	Replace filter when clogged	If the fine preliminary filter was defective: When overheated If the motor protector has tripped	5-8

Note on Tension Levers

The model with tension levers replaces that model with star grips.

The clamping system has the advantage of always applying even, predefined pressure. Vibrations cannot cause unlocking. Thus the maintenance step *Check the star grips and tighten, if necessary* is no longer needed.

To tense, fold up the front bracket (2), move the lever (3) over and press down the tension lever (4).

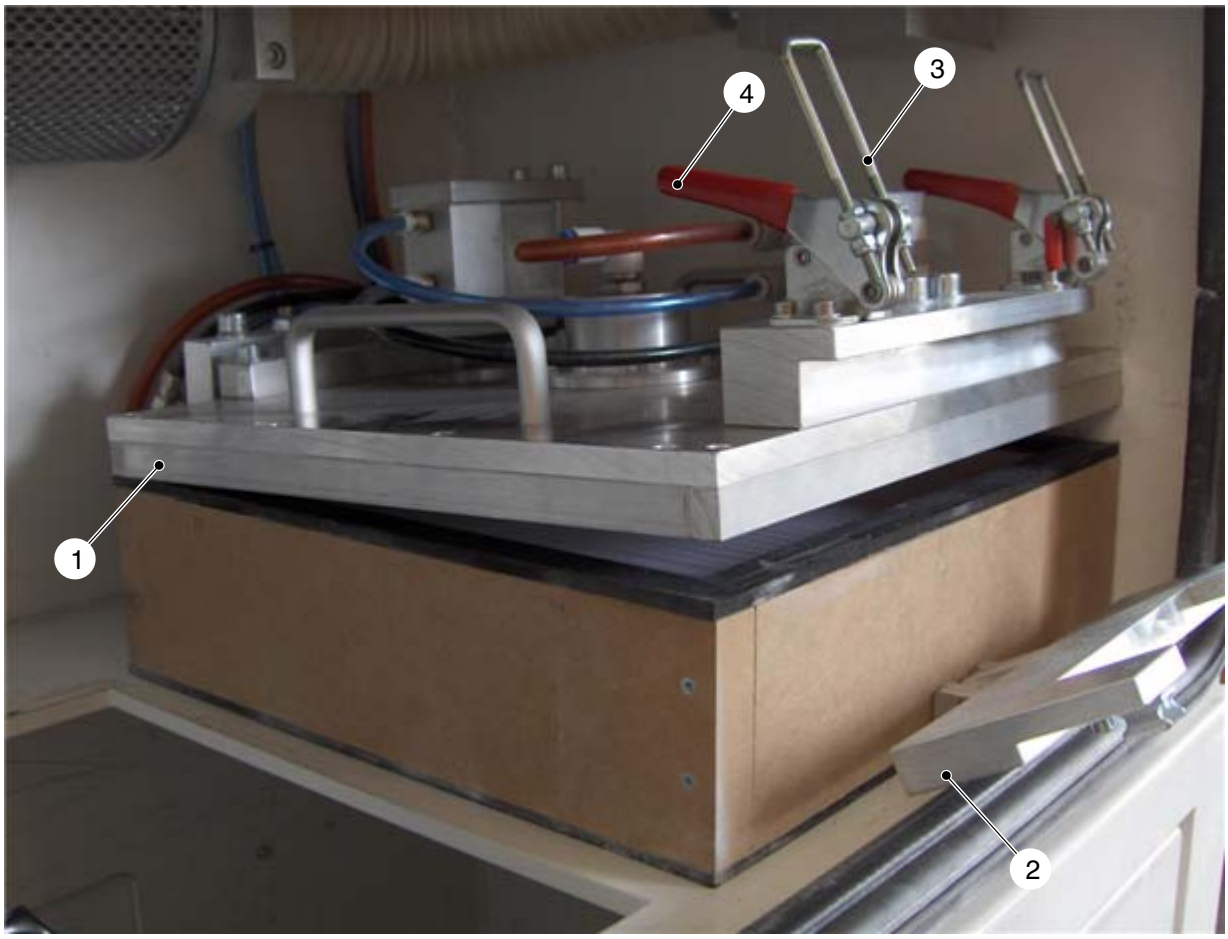


Fig. 5-1

Replacing Star Grips

Older systems with star grips can be retrofitted with the kit 7170791. The cover (1, Fig. 5-1) is used again.

Main Filter Cassettes

Fig. 5-2

NOTE: A spare parts kit with four seals (4, Fig. 5-3) can be ordered if the main filter cassette seals have detached (Fig. 5-2) (Refer to separate parts list).

The two main filter cassettes have a very long operational lifetime due to the highly effective filter cleaning process during operation. Additional manual cleaning is usually only needed with SAP powder

Manual Cleaning

Remove the main filter cassette as described under *Replacing Main Filter Cassettes or Seals* and brush powder residue off of the filter fleece.

Replacing Main Filter Cassettes or Seals

The main filter cassettes must be replaced when they remain polluted or clogged.

NOTE: If the main filter cassettes become clogged after only brief operation, the filter cleaning parameters must be optimized. Refer to page 3-10, *Setting PLC Parameters for Automatic Filter Cleaning*.

1. Switch system off with main switch.
2. For systems without a solenoid valve in the compressed air supply line: Disconnect the system from the compressed air supply.
3. Back of system: Open filter chamber door.

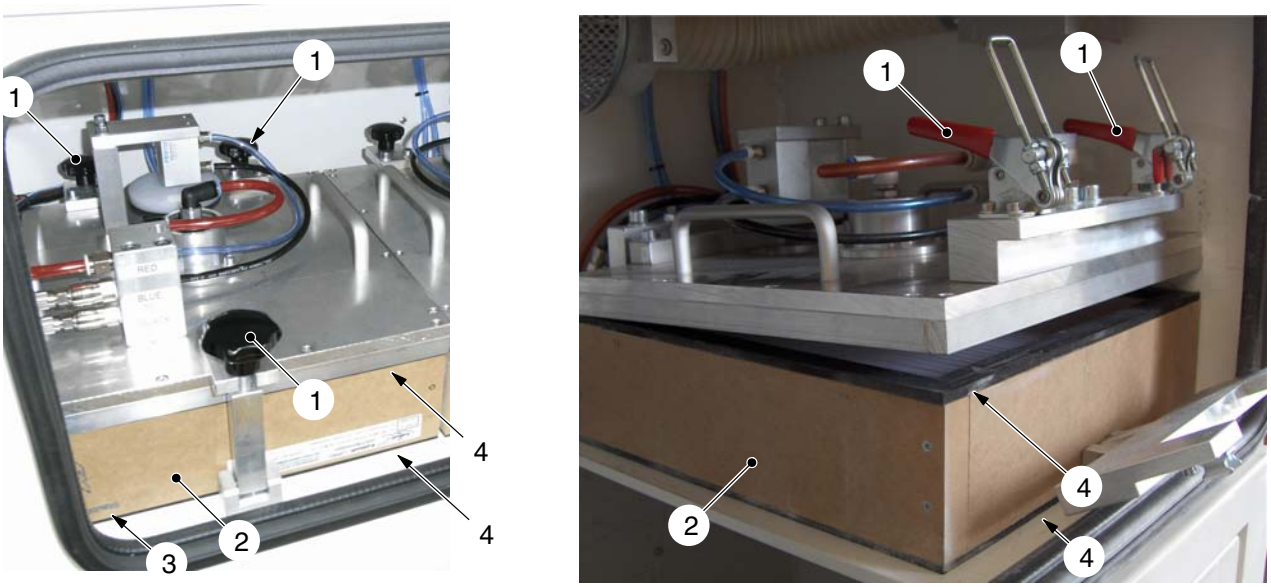


Fig. 5-3 View into the filter chamber (model with star grip (li) - model with tension lever (re))

1 Lock
2 Main filter cassette
3 Label *Staubluftseite* (air intake)
4 Seal

4. Release all of the locks (1); fold back the front one.

If the filter cartridges have been exposed to pressure from the clamping system for a long time, excessive force will be needed to detach the filter cartridges from the system.

5. Lift the complete cover and extract the main filter cassette (2).

Perform steps 6. to 11. when only the seals are to be replaced.

6. Wipe or brush the powder off of the main filter cassette.
7. If the old seal is not completely detached yet, pull it off and sand off any residue or wipe it off with a soft spatula (wooden or plastic).

   CAUTION: Be careful to prevent scratches near the seal; otherwise the seal will not adhere properly and even a new seal will not suffice. Then replace the entire main filter cassette.

The kit consists of four seals.

8. Wipe off the main filter cassette around the seal with a lint-free cloth so that the surfaces are free of dust.

   Pull the paper off of the spare seal and align the seal with the edges of the cassette.

9. Repeat step 8. on the other side of the main filter cassette.

Continued ...

10. Clean the filter chamber from top to bottom and wipe all surfaces with a damp cloth until no powder remains.
11. Wipe off all surfaces around the main filter cassettes with a damp cloth to ensure that there is no powder or other pollutants on the surfaces.
12. Insert the main filter cassette again.

    NOTE: The word *Staubluftseite* (air intake) (3) must be at the bottom. The arrow indicates the direction of airflow.

13. Lock the main filter cassette into place again.
14. When reconnecting, observe the colors of the air hoses:
    - Red to RED (nozzle air)
    - Blue to BLUE
    - Black to BLACK
15. On models with star grips: Tighten the star grips again after five minutes.
16. If the compressed air supply was stopped under 2., restart it.
17. Switch system on with main switch.

Fine Preliminary Filter

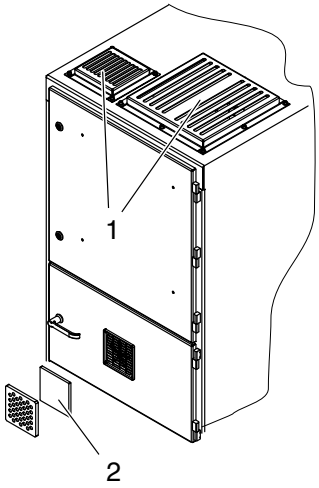
1. Switch system off with main switch.
2. For systems without a solenoid valve in the compressed air supply line: Disconnect the system from the compressed air supply.
3. Extract the fine preliminary filter (1).

Fig. 5-4

Continued...

4. Wipe off all surfaces around the fine preliminary filter with a damp cloth to ensure that there is no powder or other pollutants on the surfaces.
5. Screw the new preliminary fine filter into place.
6. Tighten again after five minutes. Repeat this step until the seal (2) can not be compressed anymore.
7. If the compressed air supply was stopped under 2., restart it.
8. Switch system on with main switch.

Exhaust and Admixed Air Filters

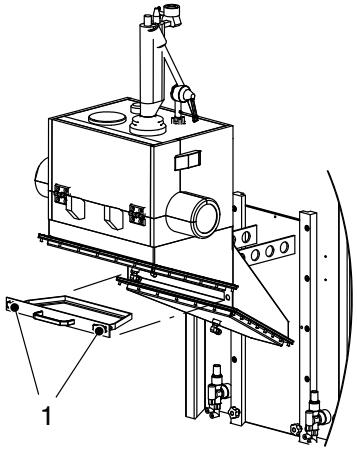


Exhaust filter (1)

Admixed air filter (2)

Fig. 5-5

Coarse Sieve



1. Switch system off with main switch.
2. Release the locks (1) and pull on the handle to extract the coarse sieve.
3. Inspect coarse sieve, and clean as necessary.
4. Slide the coarse sieve back in again and lock.

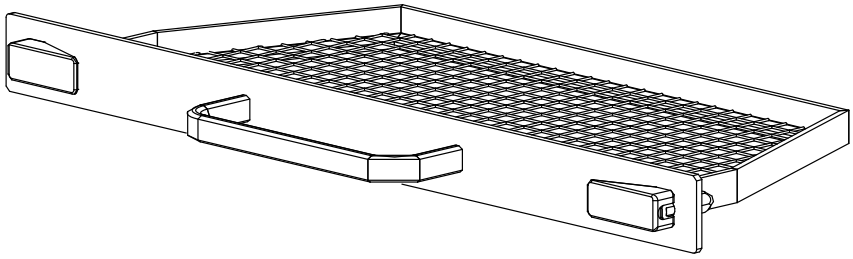


Fig. 5-6

Membrane Compressed Air Dryer (Festo)

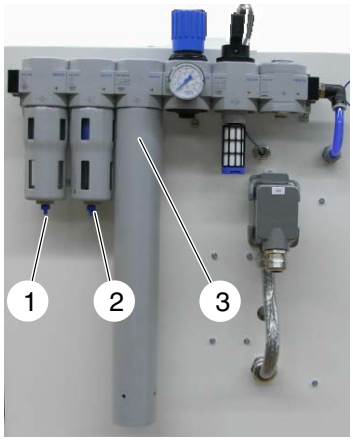


Fig. 5-7

Draining Condensate

Open the drain valve on the fine filter and the ultra fine filter (1 and 2, Fig. 5-7). Also refer to *Membrane Compressed Air Dryer: Condensate Disposal*.

Changing Filter Elements

1. Switch system off with main switch.
2. Disconnect the system from the compressed air supply.
3. Unscrew the condensate collector (18, Fig. 5-8).
4. Replace the filter element (14) and screw the condensate collector back on.

Replacing Air Dryer

1. Switch system off with main switch.
2. Disconnect the system from the compressed air supply.
3. Unscrew the air dryer (3, Fig. 5-7) and replace completely.

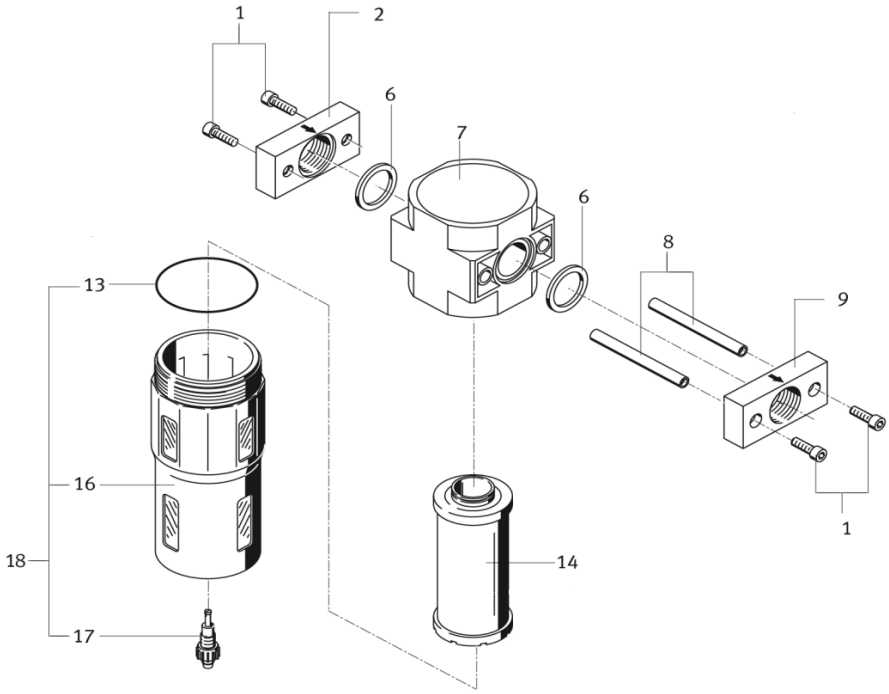


Fig. 5-8 *From the manufacturer's manual*

Membrane Compressed Air Dryer: Condensate Disposal

Condensate consists mostly of the water eliminated during compression. The water does, however, contain hazardous substances and must be disposed of properly. Hazardous substances can be, e.g.

- Mineral oil aerosols from the compressor air intake
- Dust and dirt particles from the compressor air intake
- Soluble and lubricating oil from the compressor
- Rust and abraded particles from the supply network.

Membrane Compressed Air Dryer (SMC)

Draining Condensate

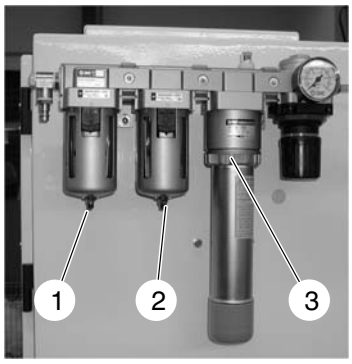


Fig. 5-9

On the fine filter (1) and the ultra fine filter (2): Press button on side of drain valve. Also refer to *Membrane Compressed Air Dryer: Condensate Disposal*.

Changing Filter Elements

1. Switch system off with main switch.
2. Disconnect the system from the compressed air supply.
3. On the fine filter (1) and the ultra fine filter (2): Unscrew condensate collector.

   NOTE: Depending on model: Release bayonet lock to unscrew condensate reservoir.
4. Replace filter element and screw condensate reservoir back on.

Replacing Dryer Module on Air Dryer

1. Switch system off with main switch.
2. Disconnect the system from the compressed air supply.
3. Release tube nut (3) and detach container from underneath.
4. Extract dryer module from reservoir and replace.
5. Screw holder with tube nut back on again.

Vibrator

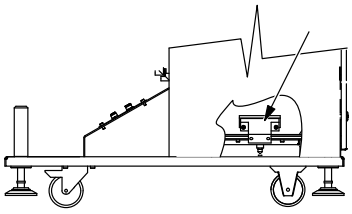


Fig. 5-10

Tighten fixing screws with 25 Nm every 500 hours of operation.

Side Channel Blower Filter (Fan)

In rare cases the filter (7 and 8, Fig. 5-11) can become clogged. This assembly must then be replaced.

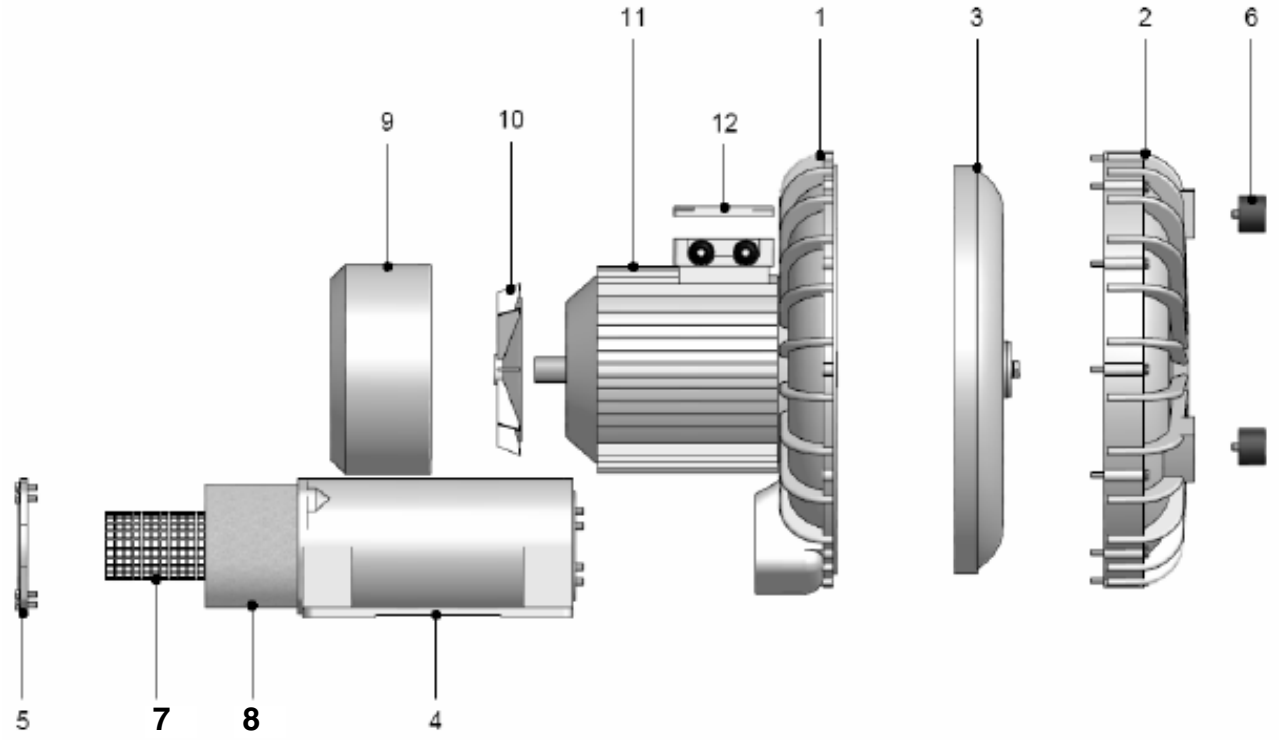


Fig. 5-11 Detailed illustration (extract from the manual)

Replacing Venturi Throat

This description generally applies to all powder pumps.

1. Detach the air hoses from the pump (Fig. 5-12).

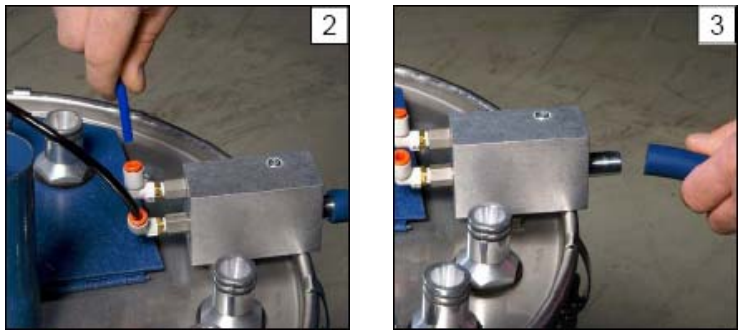


Fig. 5-12

2. Remove the powder hose (Fig. 5-12).
3. Extract the pump.

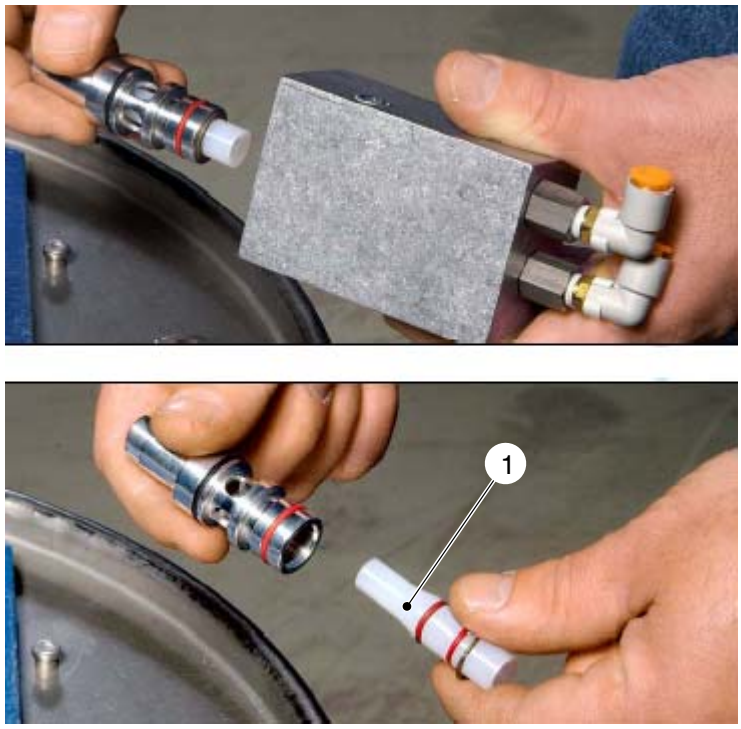


Fig. 5-13

4. Extract the holder from the pump (Fig. 5-13).
5. Extract the Venturi throat from the holder (1, Fig. 5-13).

NOTE: *Smart* ™ Venturi throats are colored (red: Low-Flow; blue: Middle/High-Flow) and require no O-rings or holders.

Replacing Venturi Throat *(contd.)*

Fig. 5-14 O-rings on the Venturi nozzle

6. Replace damaged O-rings.

Observe When Replacing O-rings

All O-rings are electrically conductive and must be replaced with electrically conductive O-rings.

7. Reassemble the parts in the reverse order.
8. Use a hose clamp to fasten the powder hose.
9. Take care not to interchange the connections when attaching the air hoses:
   - Black to F
   - Blue to A

Retrofitting Pump for a Different Line Speed

1. Disassemble as described under *Replacing Venturi Throat*.

Fig. 5-15

2. Depending on the type of pump, extract either the wear tube or the hose connector - low flow from the holder.
3. Attach the parts from the kit.
   - Replace the Venturi throat
   - Insert the hose connector in place of the wear tube or vice versa.

Maintenance Record

System part	Date / name	Date / name	Date / name
Complete system			
Main filter cassettes and fine preliminary filter			
Exhaust and admixed air filters			
Spray chamber			
Hopper			
Powder pump / powder transfer pump			
Powder hoses			
Coarse sieve			
Membrane compressed air dryer			

Continued...

System part	Date / name	Date / name	Date / name
Vibrator			
Powder guns			
Side channel blower			

Section 6
Troubleshooting

ATTENTION: Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.

When the system is used as intended, problems do not usually occur. Experience has shown that malfunctions are generally caused by neglected cleaning or by foreign objects that land unintentionally in the hopper when powder is added.

General Checking

Before other troubleshooting, check the following:

- Are the pneumatic and electrical operating values set correctly?
- Are all pneumatic connections and powder hoses intact?
- Do all electrical plug connections have correct contact?
- Have circuit breakers tripped?

Definition

Faults occurring in the system are indicated to the operator as alarms (visible or audible).

- **Warning:** The operator must decide whether the situation is critical for the powder application and action is required. The system remains ready for operation.

  Example: PFM indicates *Low powder*.

- **Error:** The operator must act promptly to prevent proper powder application from being interrupted. The system remains ready for operation.

  Example: PFM indicates *Insufficient powder*.

Note on Troubleshooting Table

This troubleshooting table contains the problems that most commonly occur. Other and more specific problems are described in the separate system component manuals.

Troubleshooting Table

Problem	Possible cause	Corrective action	Refer to
Powder comes out unevenly	Powder level in hopper too low	Fill powder	Page 4-7
	Powder is clogged in the Venturi throat of the pump	Clean powder pump	Page 5-11
	The conical powder inlet of the Venturi throat is worn	Replace the Venturi throat	Page 5-11
Powder is not fluidized in the hopper	Compressed air is damp	Check pre-filter of air filter; drain condensate	Page 5-8
	Compressed air atomized with oil	Ensure that only non-lubricated air is used	-
	Air pressure for fluidization too low	Increase air pressure	Page 3-9
Powder comes out irregularly or not at all	Nozzles clogged	Clean nozzles	Separate gun manual
Incorrect powder level indications	Level sensor set incorrectly	Calibrate or check switching distance	Page 7-6
Poor coating	Impact fusion	Use wearing parts made of a different material	Page 6-4

Additionally for Tribomatic

Problem	Possible cause	Corrective action	Refer to
Different amounts of powder come out of the spray nozzles	Individual charge tubes or nozzles clogged	Clean charge tubes / nozzles	Separate gun manual
No powder comes out of the spray nozzles	Blockage at Venturi pump, atomizer or in charge tubes due to damp compressed air or air atomized with oil	Check pre-filter of air dryer, drain condensate, ensure that only clean, dry and non-lubricated compressed air is used	Page 5-8
No charge, or charge value too low (microampère display)	Insufficient ground	Check plug connections for good contact, especially ground	Appendix A
	Is the processed powder suitable for Tribomatic use (electrostatic charging capacity)?	Consult powder manufacturer (or material safety data sheet)	-
	Microampère display defective	Consult Nordson	-

Light Tower Flashing

Problem	Possible cause	Corrective action	Refer to
Low powder level (in system container)	No powder was added within the *Delay time alarm* time set on the PLC	If a refill hopper is connected, check the level in the hopper and add powder if necessary Calibrate the system#s level sensor again	 *Repair*
Insufficient or no powder (when using the optional powder flow display)	Powder gun clogged	Clean as described in the separate gun manual	
	Low powder level in system container	Refer to *Problem* above **NOTE:** The level sensor also indicates an empty hopper by flashing of the light tower, but it is emitted to a different contact on the XS2 interface.	

PFM LEDs

LEDs that light up	Meaning
1 to 2 green and the lower yellow	Powder quantity within desired range
Lower yellow	**Warning *Low powder*** Indication only on PFM
1 red	**Fault *Insufficient powder*** Indication on PFM Light tower Interface XS2

Only the lower yellow LED is illuminated when the powder is low.

The lower red LED is illuminated when there is insufficient powder. The light tower flashes and, if activated, an audible warning sounds. A signal is also emitted to a potential-free contact on the XS2 interface. Refer to the wiring diagram.

Level Sensor LEDs (Only P/N 398056)

Refer to separate level sensor manual.

Nozzle Rotating Over Wrong Main Filter Cassette During Automatic Filter Cleaning

The nozzle of the blocking flap just closed for cleaning should rotate. The compressed air for the rotating nozzle is switched via the solenoid valves. Exchange the red solenoid valve air hoses -17Y4 and -17Y7.

Selecting Material for Wearing Parts

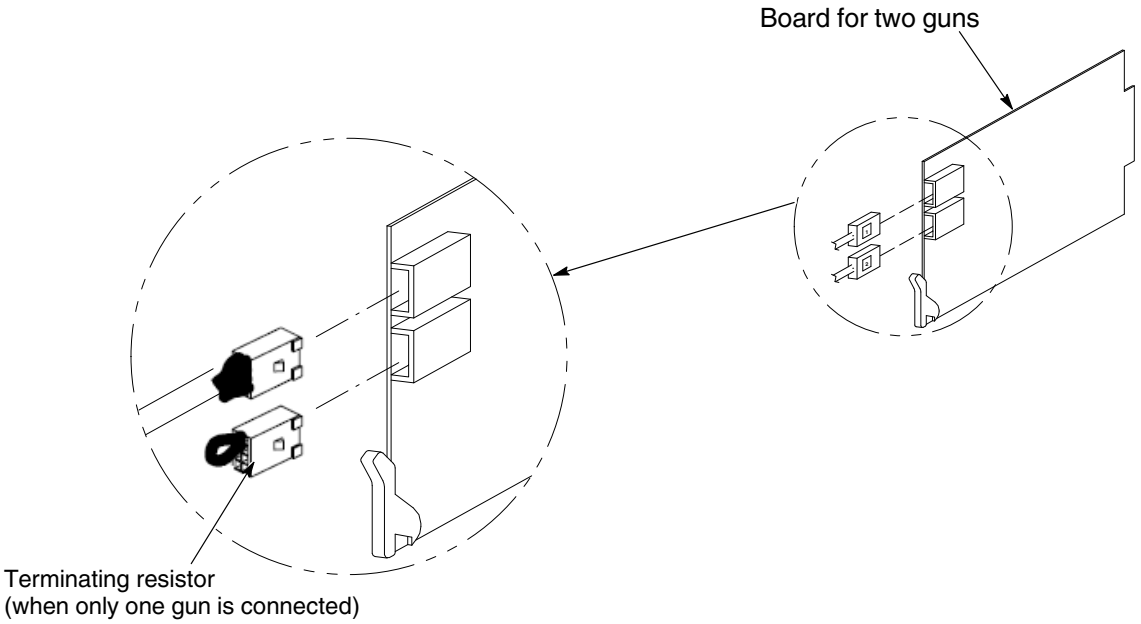
With certain types of powder, better coating quality may be achieved when a Venturi throat made of a different material is used.

Material	Advantage	Disadvantage
Tivar Gray, translucent white TIVAR® is a registered trademark of Quadrant Engineering Plastic Products	Wears less quickly than inner tubes made of PTFE	More inclined to impact fusion than with a throat made of PTFE
Stainless steel	Much longer serviceable life without impact fusion when working with powders such as SAP, talcum and mica.	Not intended to be used with organic powders; the inner pipes in the pump could be clogged due to impact fusion
PTFE White (opaque)	Less inclined to impact fusion than with a throat made of Tivar	Wears more quickly than inner tubes made of Tivar
Fiberglass-reinforced PTFE	Wears less quickly than inner tubes made of pure PTFE Less inclined to impact fusion than with a throat made of Tivar	
Nylon Yellow-white	To be used to spray on PTFE powders	Most organic powders will impact fuse onto nylon

Fault Indications of the Vantage Controller and the Gun Board LEDs

Also refer to the supplement P/N 7179003 (English) or online to
http://emanuals.nordson.com/finishing/iControlTrblsht/index.htm
Tab *Dual Gun Controller Card Troubleshooting*

The error LED lights up when the terminating resistor is not connected for 1-gun or 3-gun operation.



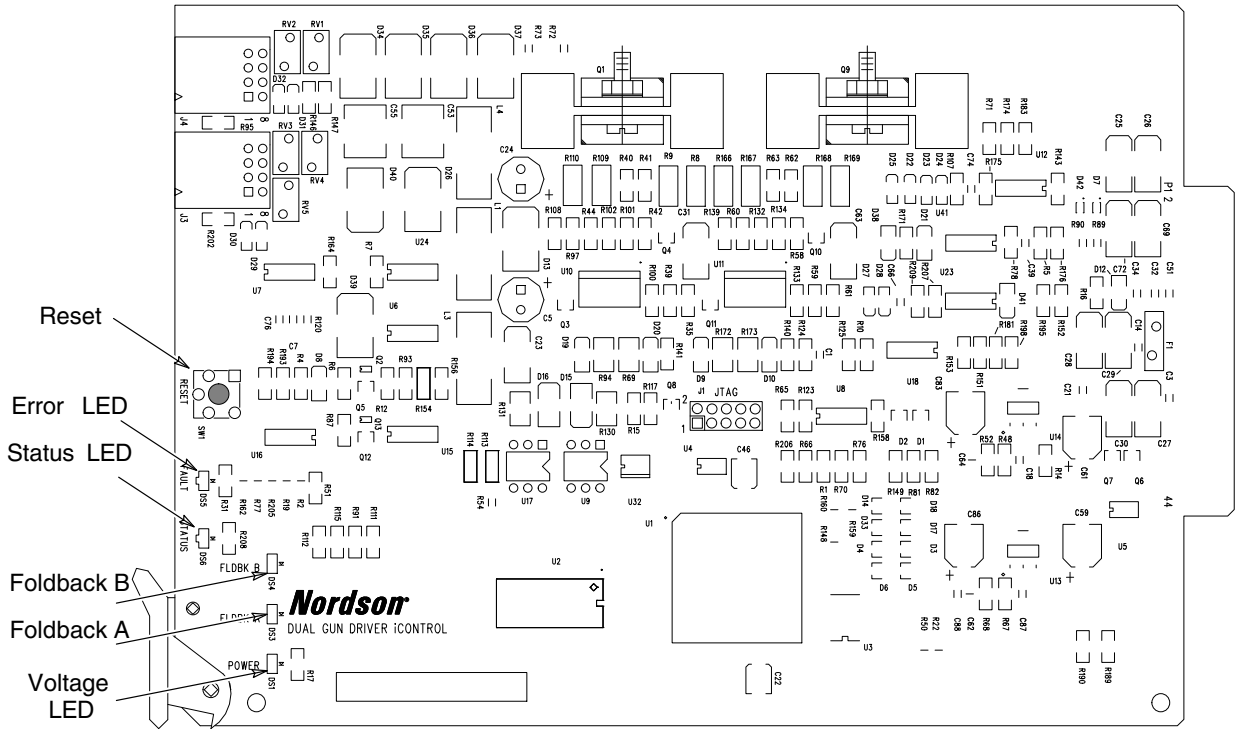


Fig. 6-1 Gun board

Section 7
Repair

ATTENTION: Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.

If the Vantage Controller is to be Detached for Repairs

ATTENTION: Risk of electrical shock. Failure to observe may result in personal injury, death, or equipment damage.

1. Switch off the cable coater and disconnect from the voltage supply.
2. Open the back of the system (upper door) and disconnect only the ground cable from the control unit. The other cables are long enough that the slide-in chassis can be placed on a table.
3. Release the screws from the front of the slide-in chassis and carefully extract out the front.

   Nordson recommends having a second person at the back of the system to ensure that no cables are damaged or displaced as the slide-in chassis is pulled out.

Upon completion of repairs

4. Screw the chassis tightly back into place.
5. Connect the ground cable again.
6. Close the system door.

Powder Flow Display PFM

The power flow display PFM consists of the evaluator and the sensnor.

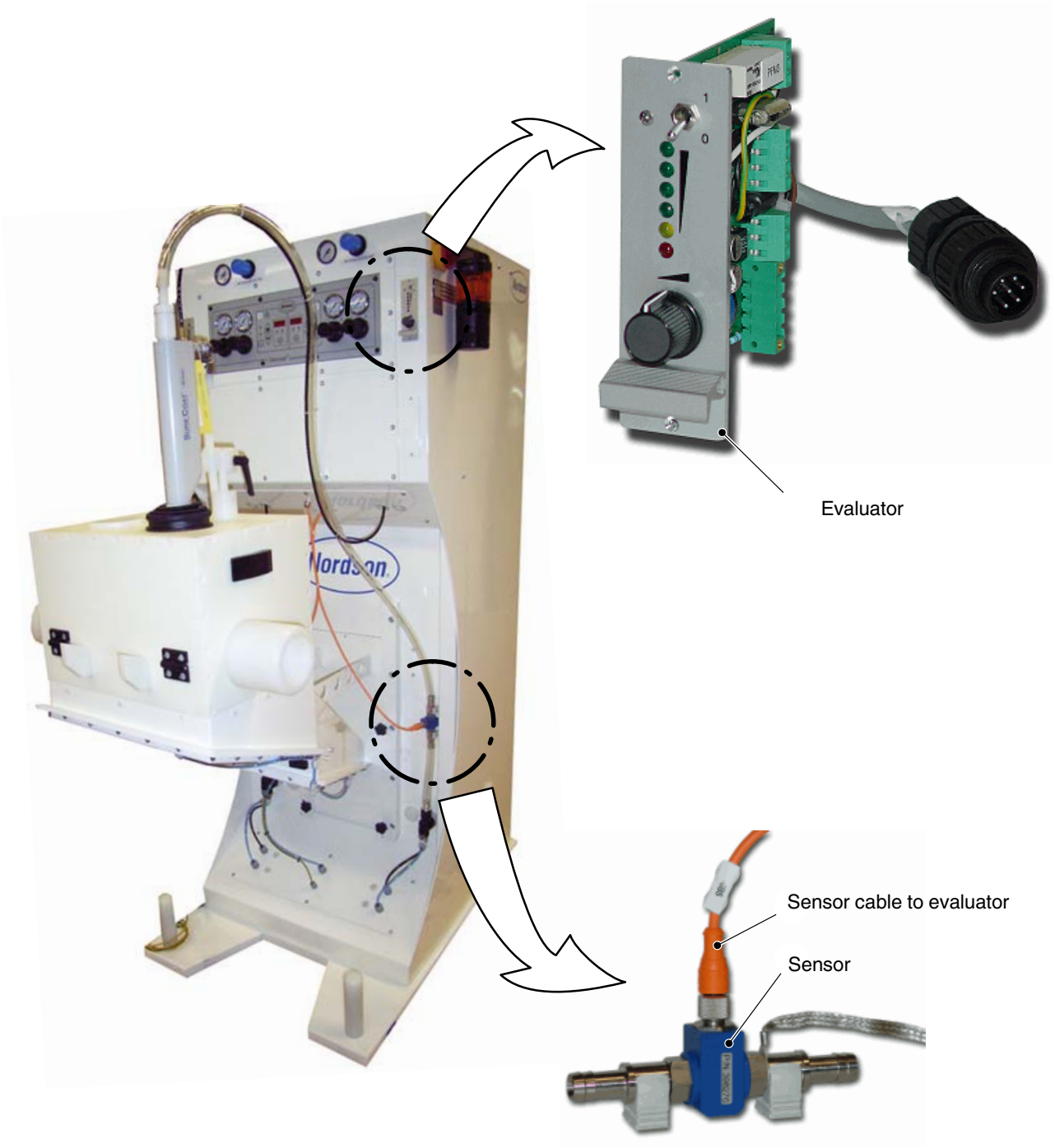


Fig. 7-1

Replacing Evaluator

ATTENTION: Risk of electrical shock. Failure to observe may result in personal injury, death, or equipment damage.

1. Switch off the cable coater and disconnect from the voltage supply.
2. Remove the cover plate (arrow, Fig. 7-2).
3. Release the plug connections on the old evaluator (1, Fig. 7-2)).
   - Round plug (voltage supply and more)
   - Plug connectors with orange sensor cables
4. Unscrew the old evaluator and extract.
5. Slide in the new evaluator and screw into place.
6. Reattach the plugs disconnected under 3..
7. Screw the cover plate back on.
8. Proceed with *Setting Powder Flow Display*.

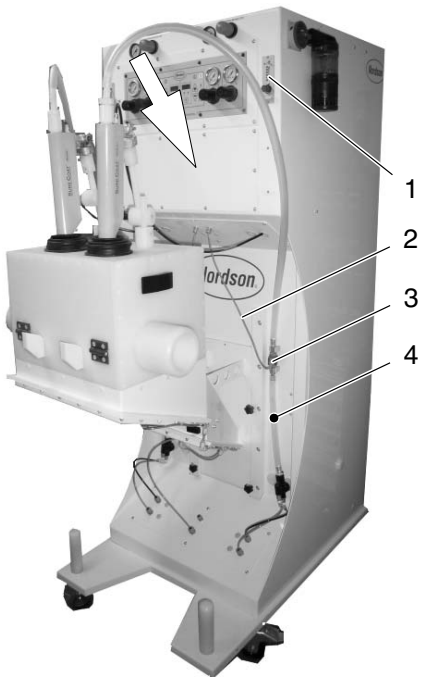


Fig. 7-2

Setting Powder Flow Display (Standard)

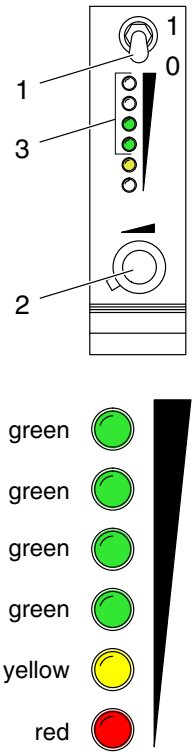


Fig. 7-3 Standard

After restarting system:

1. Ensure that the coating is optimized.
2. Switch off the PFMs of any guns not in use with the toggle switch (1).
3. During operation: Turn the potentiometer (2) until two of the four green LEDs (3) light up. The more powder that flows through the sensor, the more LEDs that light up.

CAUTION: The potentiometer has no limit stop, so there is no upper limit.

If the working range of the electronics is set such that four green LEDs light up instead of two when coating is optimal, the electronics may evaluate incorrectly when powder stops; then *Insufficient powder* is not indicated.

After about five minutes of production, the working range should be adjusted again.

Setting Powder Flow Display (SAP)

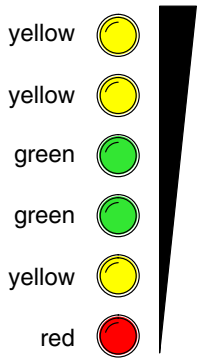


Fig. 7-4 SAP

The evaluator P/N 7161539 is a model that has been optimized for SAP application.

1. Ensure that the coating is optimized.
2. Switch off the PFMs of any guns not in use with the toggle switch.
3. During operation: Turn the potentiometer until the two green LEDs light up.

After about five minutes of production, the working range should be adjusted again.

If more powder flows through the sensor than is optimal, the upper yellow LEDs light up, indicating by their color that correction is needed.

Replacing PFM Sensor

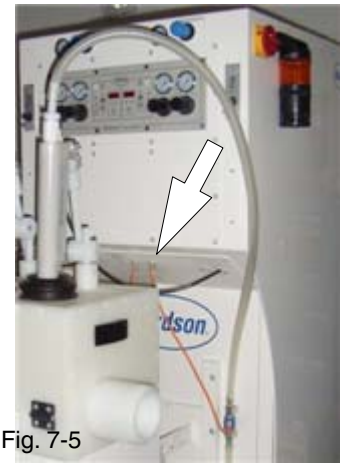


Fig. 7-5

1. Switch off the cable coater and disconnect from the voltage supply.
2. Remove the old sensor cable (2, Fig. 7-2):
   a. Remove the cover plate (arrow, Fig. 7-2).
   b. Release the plug connectors with orange sensor cables on the evaluator.
   c. Remove the plug connectors and pull the cable through the cable fitting (arrow, Fig. 7-5).
3. Remove the old sensor (3, Fig. 7-2) from the powder hose (4, Fig. 7-2).

Fig. 7-6

4. Allow the new sensor to snap into the cable clamps.
5. Plug the ends of the powder hose back into the sensor.
6. Plug the sensor cable into the sensor and guide the loose end through the cable fitting (arrow, Fig. 7-5).
7. Attach plug connectors to the sensor cables again. Refer to the wiring diagram for *Line - pin* assignment.
8. Attach the plug connectors to the evaluator board.
9. Screw the cover plate back on.
10. Connect the braided ribbon cable *ESD* (1, Fig. 7-6).

Replacing Level Sensor

NOTE: Beginning around 04/2008, the level sensor P/N 398056 (distinguishing feature: 3 LEDs) was replaced by P/N 7114427 (1 LED). The two models are compatible.

1. Empty the hopper.
2. Lock the controller but do not turn off the system.
3. Disconnect the sensor plug.
4. Unscrew the old sensor.

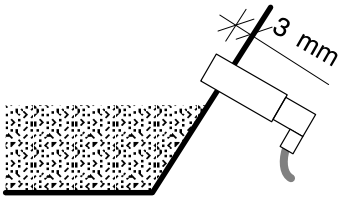


Fig. 7-7 P/N 398056

5. **P/N 398056**: Screw the new sensor into the empty hopper such that it protrudes approx. 3 mm into the hopper, then secure with the nut. Reattach the plug.

   NOTE: Refer to *Calibrating Level Sensor P/N 398056* below.

Fig. 7-8 P/N 7114427

P/N 7114427: When the hopper is empty, insert the new sensor such that it protrudes approx. 8 to 10 mm (the LEDs should just have gone off) into the hopper and secure it with the nut.

NOTE: Fixed switching distance 8 mm. Calibration unnecessary.

Calibrating Level Sensor P/N 398056

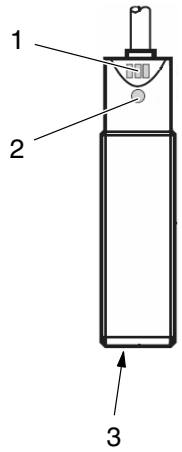


Fig. 7-9 P/N 398056

1. When the hopper is **empty**: Hold down the button (2, Fig. 7-9) with a dull object for no longer than 5 s. As soon as the green LED (1, Fig. 7-9) begins to flash, the level sensor is in calibration mode.
2. Release the button. The green LED remains lit, indicating that calibration has occurred and the level sensor has returned to operating mode.

For improved switching, also conduct complete calibration.

3. When the hopper is **full**: Hold down the button (2, Fig. 7-9) with a dull object for approx. 5 to 10 s. As soon as the green LED flashes slowly (1 Hz) for 5 s then more quickly (2 Hz), the level sensor is in calibration mode.
4. Release the button. The green LED remains lit, indicating that calibration has occurred and the level sensor has returned to operating mode.

If the system is not filled within a pre-set time (Refer to page 3-10, *Setting PLC Parameters for Automatic Filter Cleaning*), the light tower flashes.

Section 8
Parts

How to Use Illustrated Parts List

The parts lists in the separate document *Parts List* are divided into the following columns:

Item Identifies the parts shown, available from Nordson.

Part Nordson spare part number for each available part shown in the illustration. A series of hyphens (- - - - -) in the Parts column means that the part cannot be ordered separately.

Description This column contains the name of the part and, when appropriate, the dimensions and other properties. The dots in the *Description* column illustrate the relationship between assemblies, subassemblies and individual parts.

Quantity The quantity required per unit, assembly or subassembly. The abbreviation AR (as required) is used to designate that items are stated in drum sizes or that the quantity required per assembly is a factor of the product version or the model.

NOTE: The texts are available only in English. Refer to the separate document *Parts List* with the P/N 7135883 (in progress) or to drawings and parts lists for special models.

Component Designation

The electrical components are labeled in compliance with DIN 40719, Part 2.

Section 9
Technical Data

Permissible ambient temperature range May be limited by type of powder	0 to 40 °C	32 to 104 °F	
Material processing capacity per gun May be limited by type of powder	Talcum: Approx. 40 to 300 g/min SAP: Approx. 40 to 100 g/min (up to 250 g/min)		
Voltage supply	Refer to ID plate		
Power consumption	Refer to ID plate		
Compressed air supply	600 kPa	6 bar	87 psi
Air consumption (when operating with two *Versa-Spray/Ceramic* guns and a refill hopper)	Approx. 500 l/min		
Air consumption *Refill hopper*	Approx. 100 l/min		
Degree of protection	IP 54		
Weight Basic unit Spray chamber Separate frame (without spray chamber)	Without packaging Approx. 415 kg Approx. 10 to 20 kg - depending on size Approx. 350 kg		
Noise emission Audible warning by light tower (switchable)	81.3 dB(A)  At 80 dB (A) ear protection is recommended; at 85 dB (A) and higher it is mandatory (EU noise ordinance). 97 dB(A)		
Filling volume *System*	20 l		

Dimensions

All dimensions in mm

System with Option Attached Spray Chamber

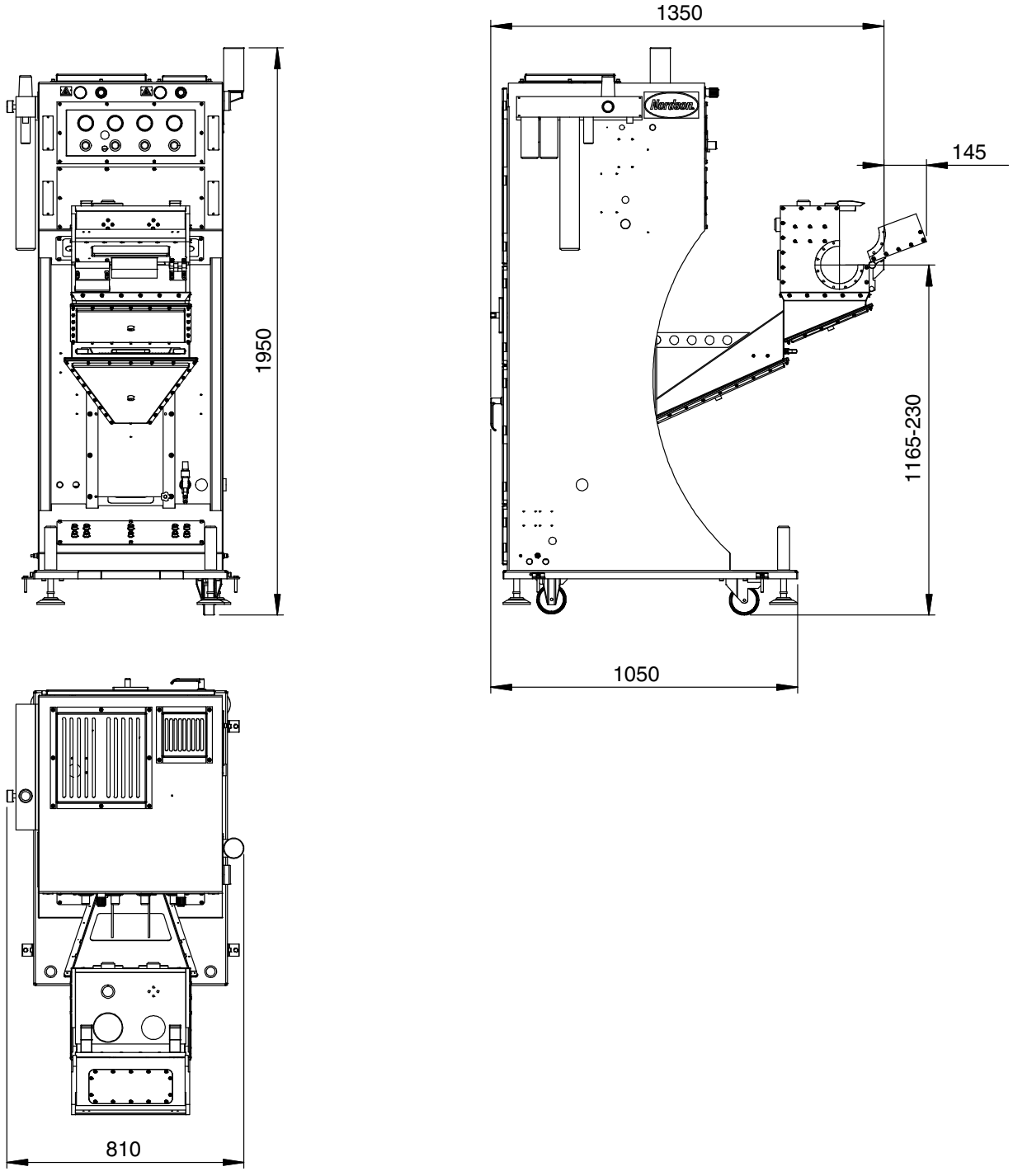


Fig. 9-1

Option Remote Spray Chamber (New Trolley Beginning in 2016)

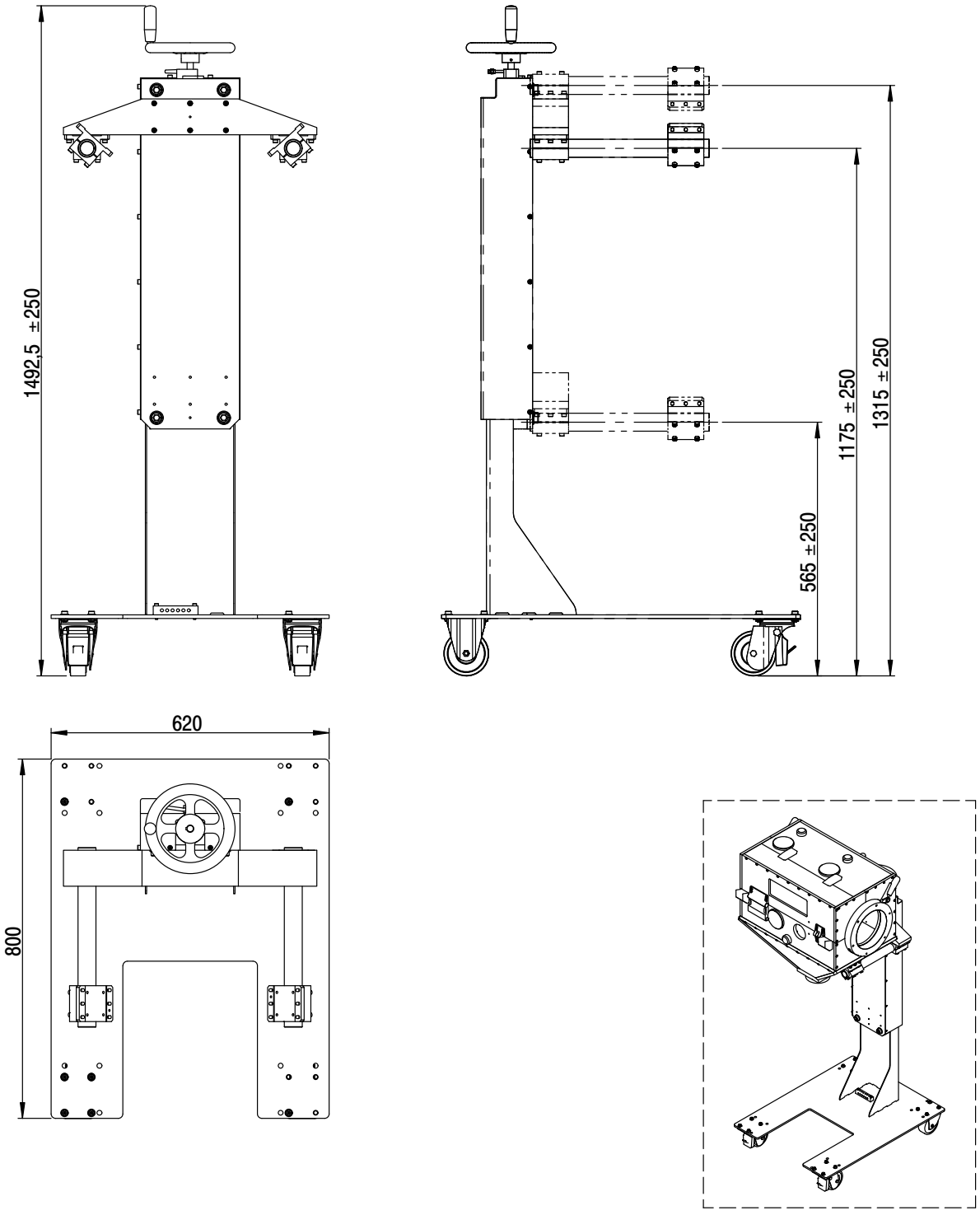


Fig. 9-2 P/N 7191519

Options Remote Spray Chamber (bis 2015)

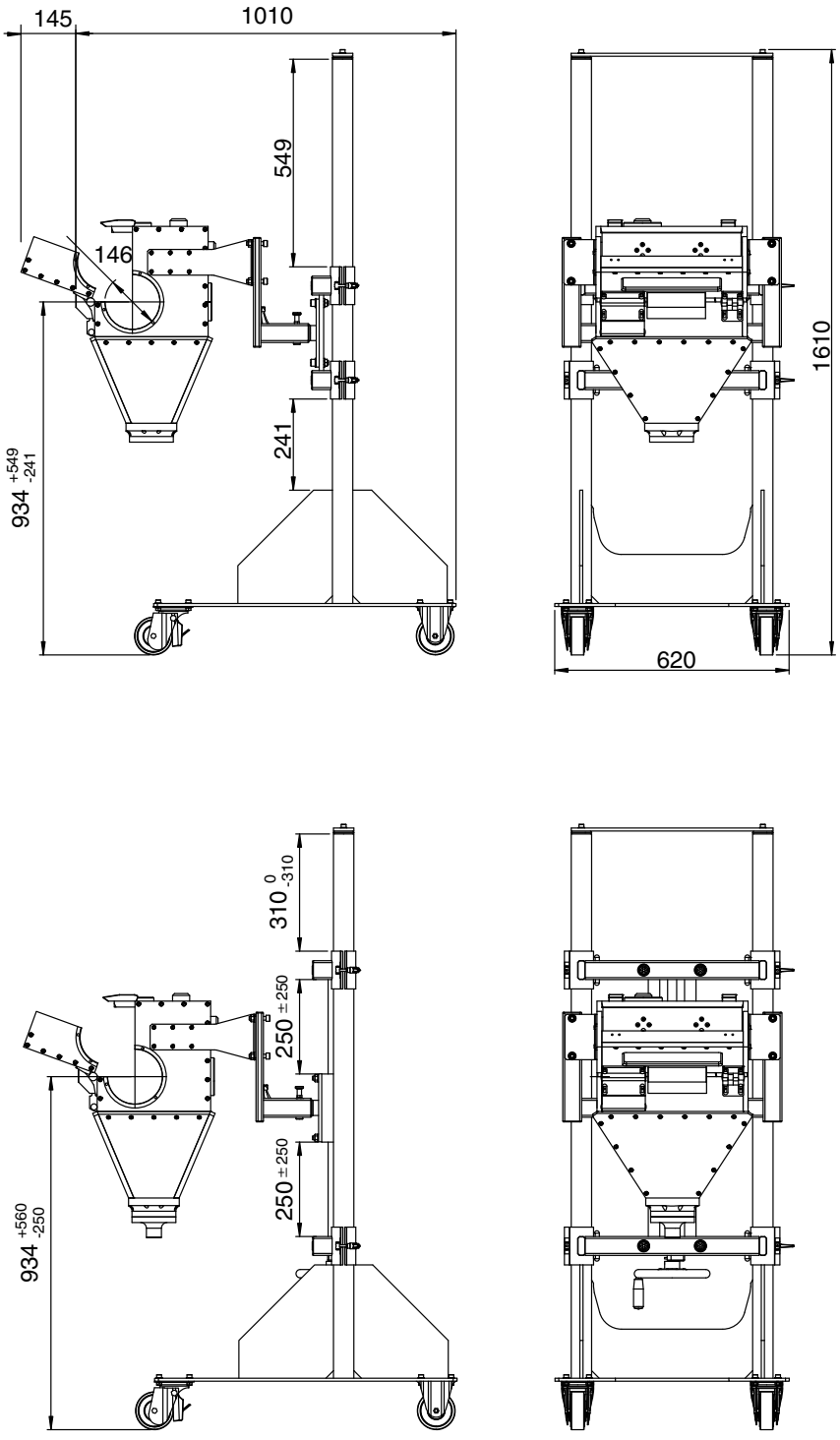


Fig. 9-3 Model with clamp lever (top) and handwheel (bottom)

Solenoid Valve Seat

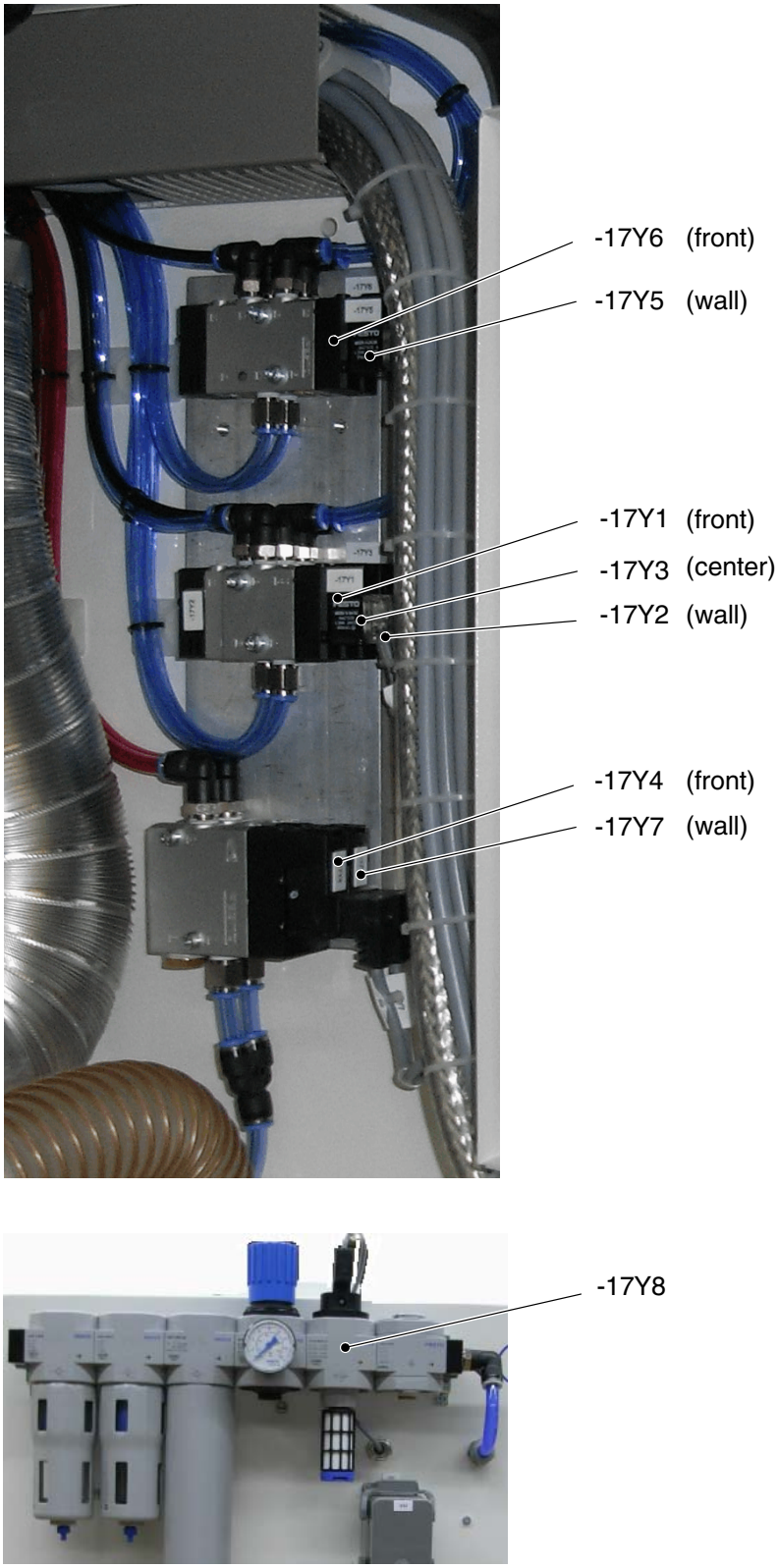
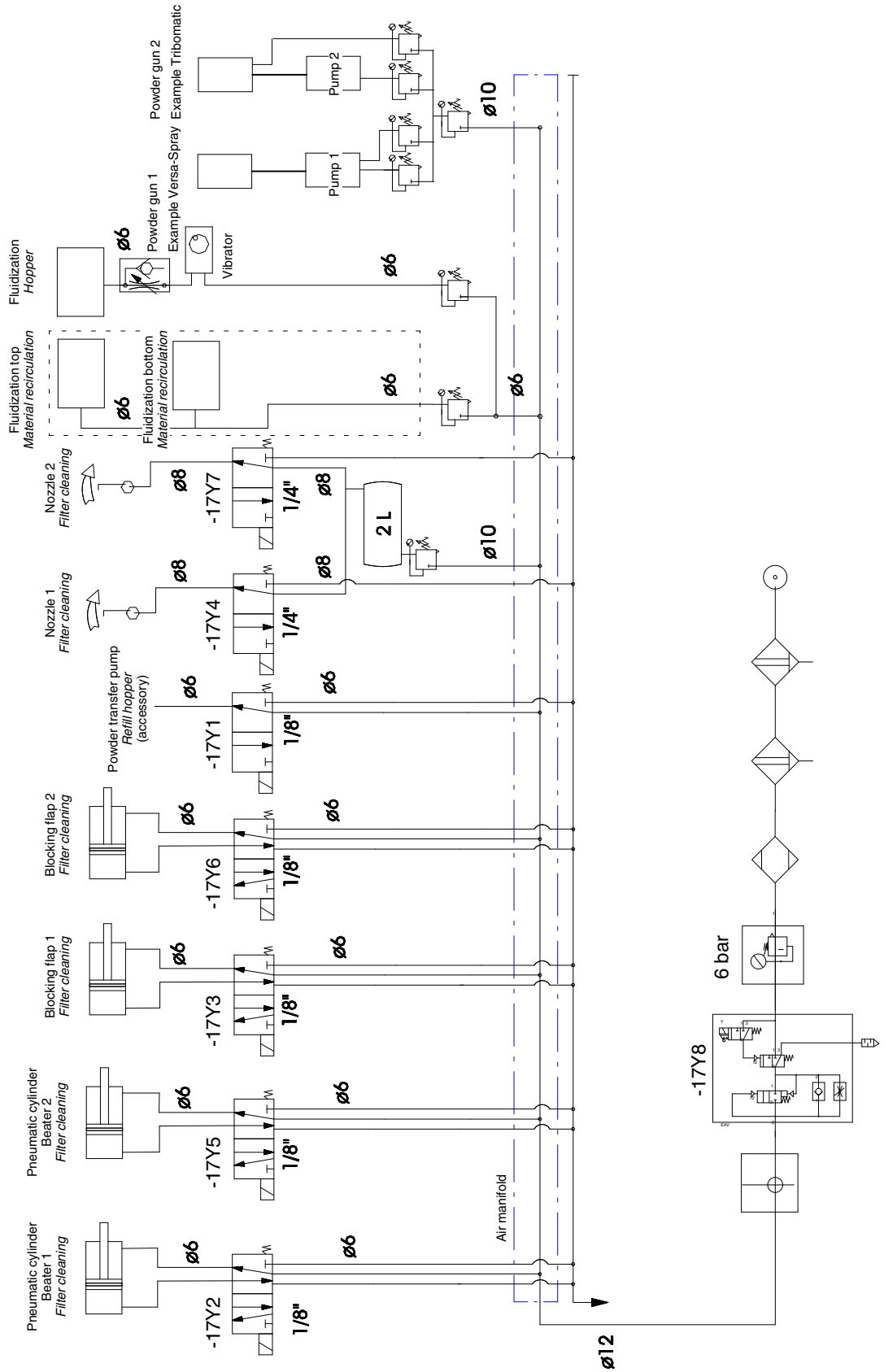


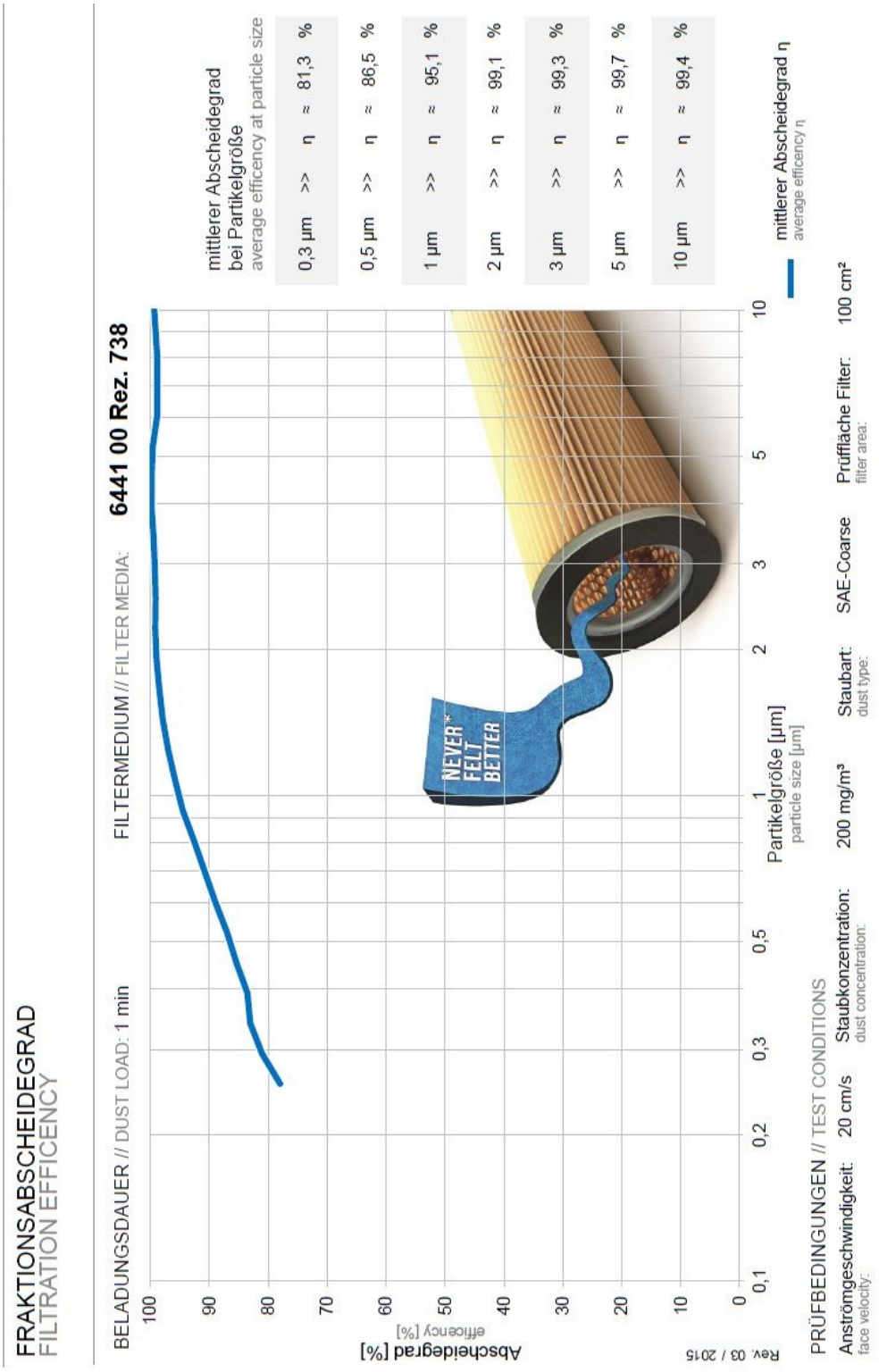
Fig. 9-4

Pneumatics Diagram



Separation Rate of Filter Paper (Valid Beginning April 2015)

In data sheets, powders are stated by grain size. Grain sizes >10 µm are not a problem.
CAUTION: With grain sizes <2 µm, the areas around the filter chamber, in the side channel blower and above the system are contaminated.



Section 10

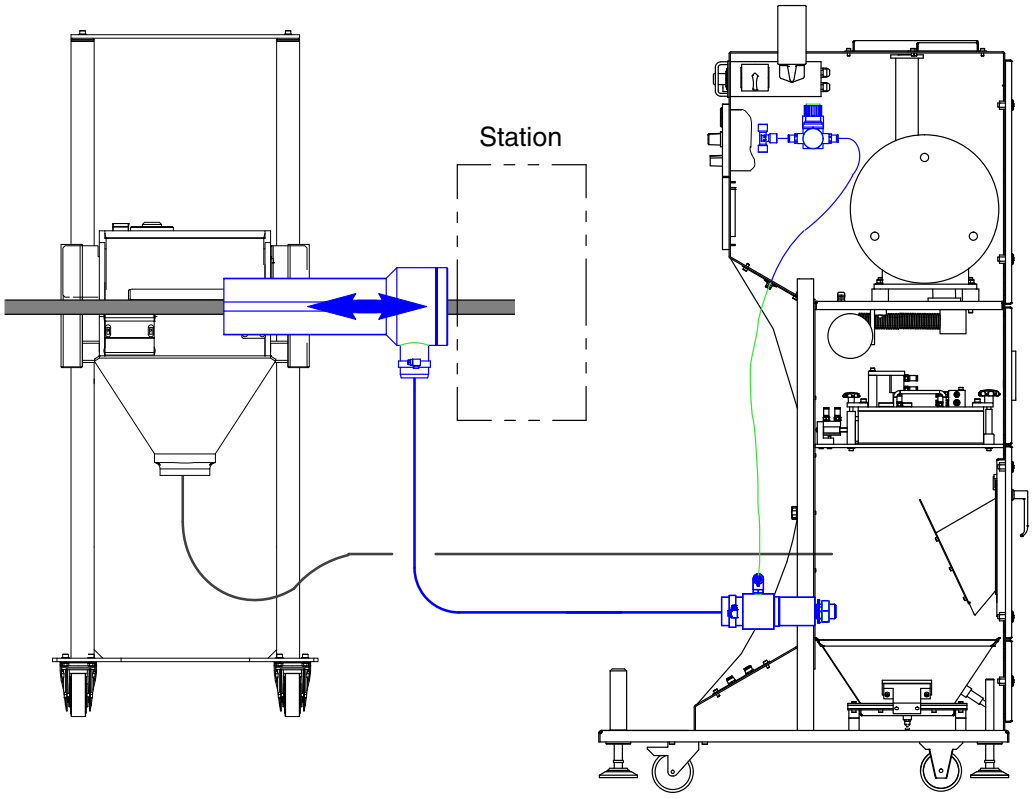
Options and Accessories

ATTENTION: Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.

Suction Pipe

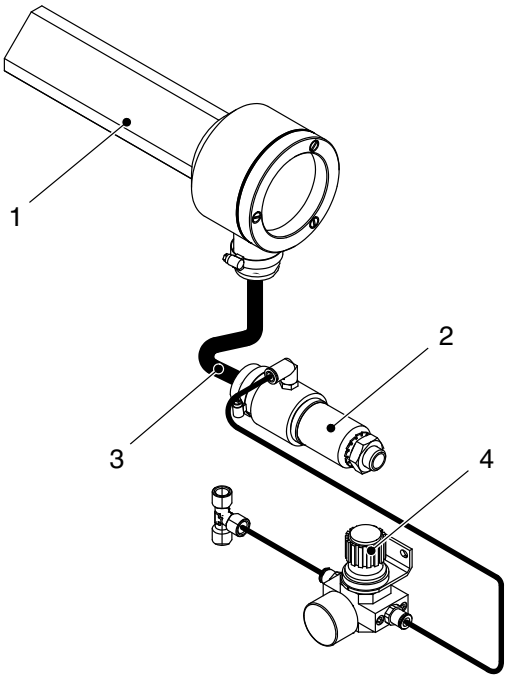
A suction pipe at the spray chamber outlet of the cable coater prevents powder from falling down between the spray chamber and the subsequent powder station, which could occur due to the jerky rotations of the cable.

The collected powder is returned to the hopper.



Suction Pipe *(contd.)*

Old:



New:

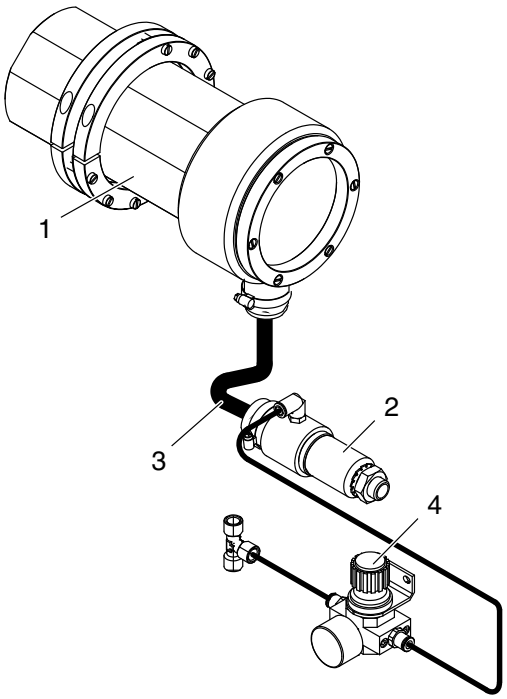


Fig. 10-1 Old model (left) - new model (right)

1 Suction Pipe
2 Recirculation pump
3 Recirculation hose
4 Pressure control valve

There are retrofitting kits available to modify an old model to become a new model. Refer to separate parts list, revision _04 and higher.

Powder Contact Reducer

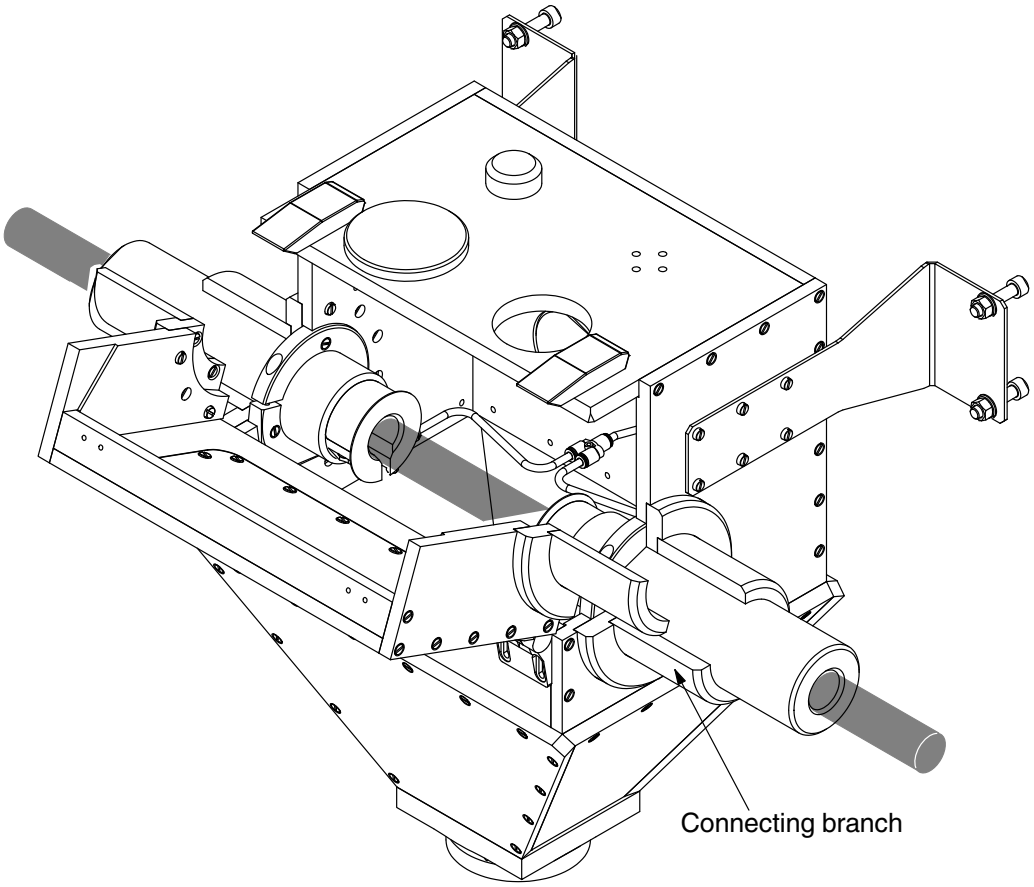
With some applications, there may be excess powder deposits on the cable despite optimal compressed air settings. As the cable enters the next station, the powder is sheared off, which causes uneven running and powder loss.

The powder contact reducer shortens the distance in which the cable is normally coated. It also blows off powder deposits from the device such that the powder does not fall onto the cable. The required compressed air is e.g. branched off from the powder recirculation fluidizer.

Continued ...

Comparison: Old Model with Connecting Branch - New Model with Second Clamping Ring

Old:



New:

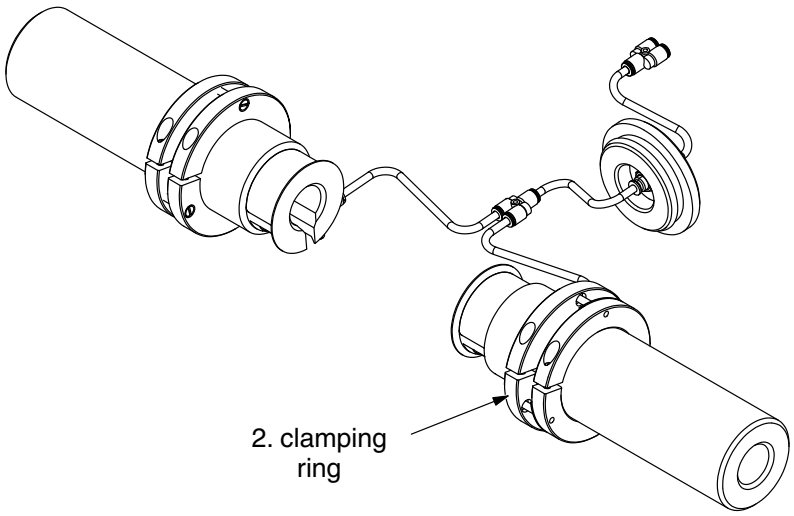


Fig. 10-2 To be able to install the new model, the spray chamber connecting branches have to be removed.

Safety Switch (Spray Chamber)

The safety switch has been a standard feature since 11/2008. However, older systems can be retrofitted.

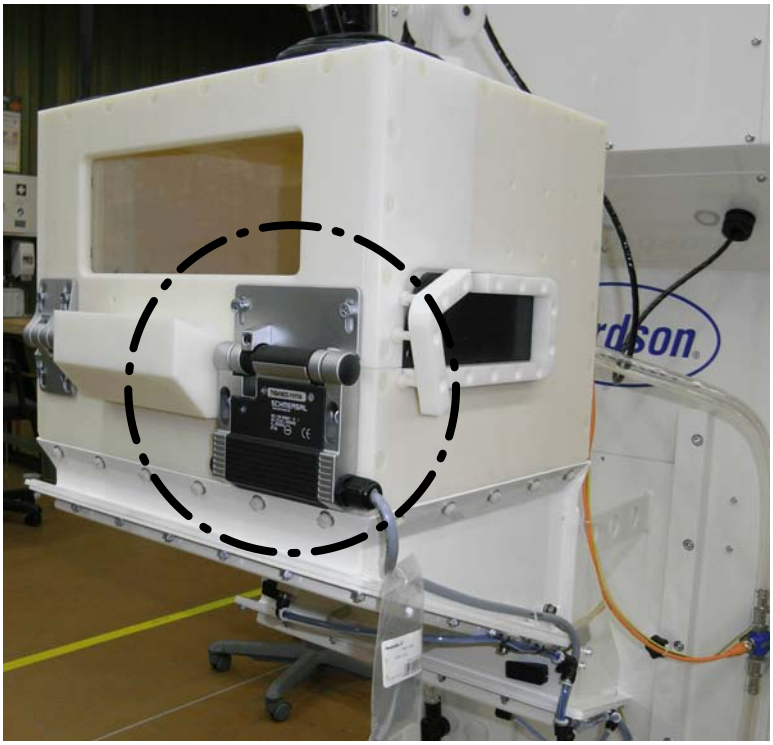


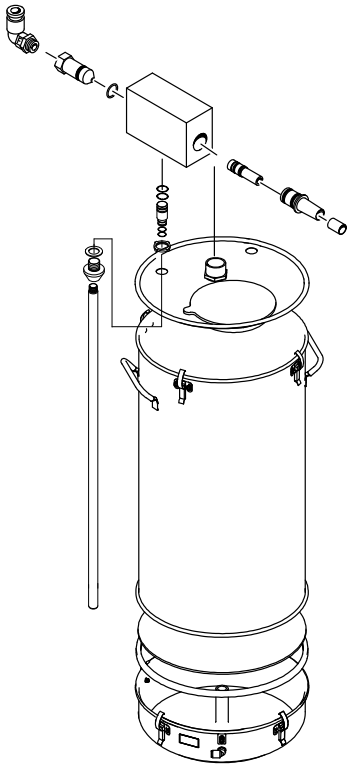
Fig. 10-3 Example of a spray chamber with safety switch

Function of Safety Switch

The controller locks when the spray chamber opens. Guns cannot be triggered.

When the spray chamber is closed, the system automatically returns to the original operating state.

Refill Hopper



An additional external hopper that supplies the system's hopper with the aid of a powder transfer pump.

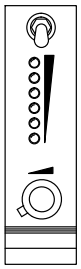
Delivery includes a cart with three wheels, the powder transfer pump, throttle, air and powder hose and fastening devices.

Fig. 10-4 Refill hopper

Adding Second Powder Spray Gun

The configuration of the system determines what the kit contains.

Adding Powder Flow Display PFM

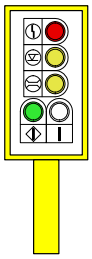


One PFM (evaluator and sensor) per gun.

The PFM is used to monitor the powder flow to the gun. The powder is passed through a sensor on the way to the gun; the signal from the sensor is evaluated and then displayed by the LEDs.

Fig. 10-5

Remote Control

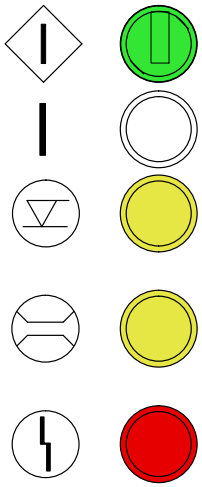


There is a remote control that can lock or unlock the controllers. Locking by the remote control is indicated on the controller by *Loc*

NOTE: When they are locked, the guns cannot be triggered locally or externally, e.g. during cleaning. The high voltage and the air supply to the guns are switched off.

There is a magnet on the back of the remote control, so it will stick to metal, e.g. to the spray chamber frame.

These states are indicated on the remote control by lamps.



- Green lamp on switch = controllers unlocked.
- White lamp = main switch ON (system switched on)
- Yellow lamp = low powder level (level sensor) - Illuminated along with the collective fault
- Yellow lamp = insufficient powder (PFM) - Illuminated along with the collective fault
- Red lamp = collective fault *Low powder level and/or insufficient powder*

The remote control is connected to the XS2 interface.

Appendix A

Grounding Powder Coaters

The system grounding is an extremely important and complex part of a powder coater. Many of the parts are linked not only physically to one another but also electrically. Together they form the complete system. There are two different reasons for electrical grounding of a powder coater: To protect from electrical shock and to protect from electrostatic discharges.

Protective Ground (Ground Conductor)

All electrical casings in the system made of conductive metal must be grounded so that they remain safe even when faults occur. If an electrical conductor comes into contact with an electrical casing (if the insulation fails), the current must be safely conducted by the ground so that no one is exposed to the risk of an electrical shock. When a fault occurs, the ground conductor conducts all fault current directly to the ground and short circuits the input voltage until the overtemperature fuse or the circuit breaker interrupts the current. The circuit breaker, along with the ground conductor, protects the operator from a dangerous electrical shock.

Electrostatic Ground

Electrostatic ground serves to protect sensitive equipment (electronics) from damage. Electrical components can be easily damaged by electrostatic discharge. Such components are so sensitive that they can even be damaged by a slight electrical static discharge from a person - so slight that the person does not notice.

It is imperative that electrostatic powder coaters are sufficiently grounded electrostatically. Powder spray guns generate substantial voltage up to 100 kV. Thus it does not take long for components that are not grounded to build up an electrical charge. If the ungrounded components have charged sufficiently, hazardous electrical discharge can occur.

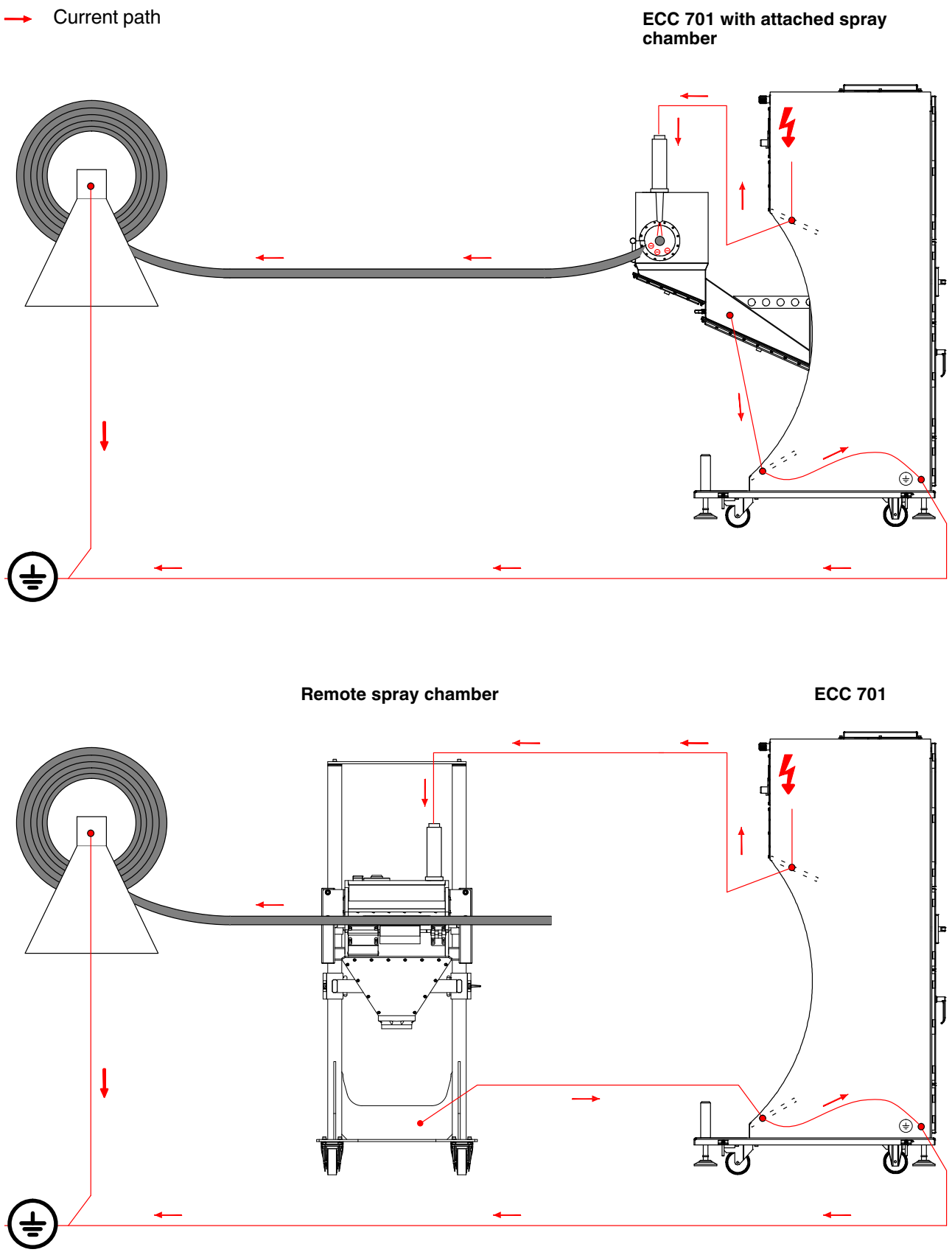
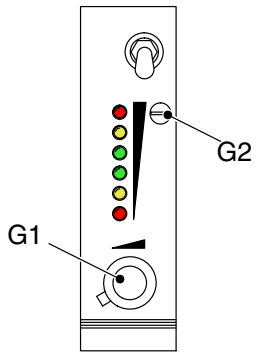


Fig. A-1 System grounding - principal drawing -

Appendix B

Powder Flow Display with Two Potentiometers (Special Feature)

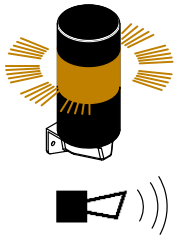
Use



The evaluator P/N 7163905 has two potentiometers (10- or 20-speed), used to set the limits *G1* and *G2*.

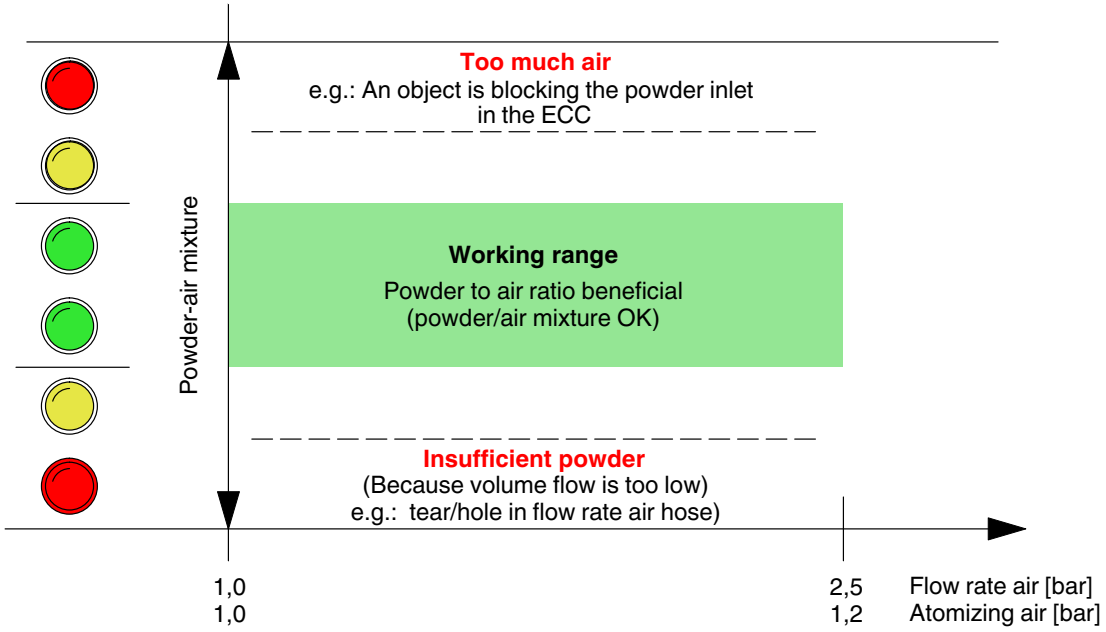
The 20-speed potentiometer for the limit *G2* is located behind the front plate of the evaluator. Remove the screw plug from the front plate to adjust.

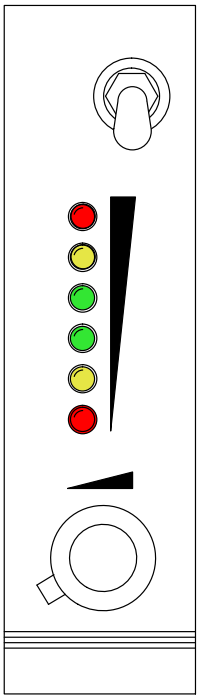
Light Tower



According to how the PFM is set, the orange lamp on the light tower flashes when an error occurs (upper or lower red LED lights up). If desired, an audible warning signal can be emitted. The audible warning can be switched on and off with the switch on the light tower.

Operation





LEDs that light up	Meaning
Upper red	**Fault *Too much air (in powder/air mixture)*** Limit G2 exceeded Switching output closed
Upper yellow	**Warning *Elevated air quantity (in powder/air mixture)*** Limit G2 reached Switching output open
1 - 2 green	**Powder quantity within desired range** Switching output open
Lower yellow	**Warning *Low powder*** Limit G1 reached Switching output open
Lower red	**Fault *Insufficient powder*** Value below limit G1 Switching output closed

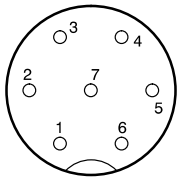
Setting Working Range

During operation, set the desired powder quantity: Then turn the potentiometer for the limit G1 until the lower green LED lights up.

Increase the air quantity during operation such that the powder-air mixture is just barely still acceptable: Then turn the potentiometer for the limit G2 until the upper yellow LED lights up.

After about five minutes of production, the working range should be adjusted again.

Technical Data



1: + UB
2: -
3: Relay
4: Relay
5: NC
6: NC
7: GN/YE

Operating voltage	24 V_{DC} ± 15%
Ambient temperature	-20 °C to 60 °C -4 °F to 140 °F
Switching output G1 Switching output G2	Relay (break contact)

Parts

PFM w/ two potentiometers	P/N 7163905
PF sensor	P/N 398276
Connection cable (sensor to monitoring)	P/N 398277

Appendix C

Ramp Function (Special Function)

When is the Ramp Function Used?

Problem

If the production speed, cable diameter and number of guns are not properly attuned to one another and too much talcum is applied, the powder clogs the system and brings it to a standstill.

Solution

Prerequisite Option *Key-to-line* available

The ramp function, in conjunction with key-to-line, allows spray guns to be added or removed as needed.

When spare parts are ordered, the switch setting on the Vantage controller must be changed from the default to *External initiator*. Refer to the separate manual for the controller, section *Installation / Initiator Configuration*.

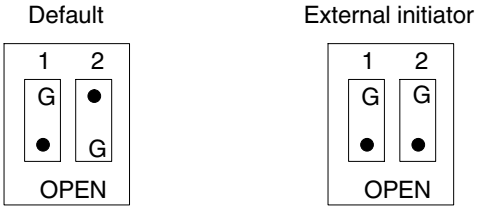


Fig. C-1 Interface indicator circuit board; switch S2 (G = pressed)

External Initiator The initiator button on the front panel activates (ON) or deactivates (OFF) the initiator. Set to OFF to prevent the gun from being switching on externally.

If the display is empty, the external initiator is activated, but there is no initiator signal present (gun is off).

Calibration

Note: Settings should be made only by trained personnel.

Control Box

Max. inlet pressure: 6 bar (needed for the *Ramp* feature)

Min. inlet pressure: 3 bar

1. When parent machine is connected: Set up the system in manual mode.
   a. Solenoid valve in rest position (= manual mode).
   b. Set the *Control unit* pressure regulator to 5 bar.
   c. Set the cable speed and optimize coating. Refer to the system manual, sections *Installation* and *Operation*.
2. Trigger solenoid valve (= key-to-line)

   A signal of 10 V_{DC} is supplied under production conditions.

   10 V_{DC} corresponds to an inlet pressure of 5 bar and to the pressures set for flow rate air and atomizing air on the controller.

   Note: Minimum powder pump pressure: 1 bar.

   If the cable speed is then reduced, the inlet pressure decreases proportionally and the air pressures for the powder pump are reduced automatically.

Example

Refer to the system's wiring diagram for information on assignment of interface XS2.

Prerequisite

Change the inlet pressure for the control unit from 5 bar (default) to 6 bar.

The customer specifies the diameter of the cable to be coated, e.g. ∅10 mm.

With this diameter and one (1) spray gun, web speeds up to 120 m/min are possible. A second gun is needed for adequate coating at speeds of 120 - 300 m/min Up to four guns can be used with one system.

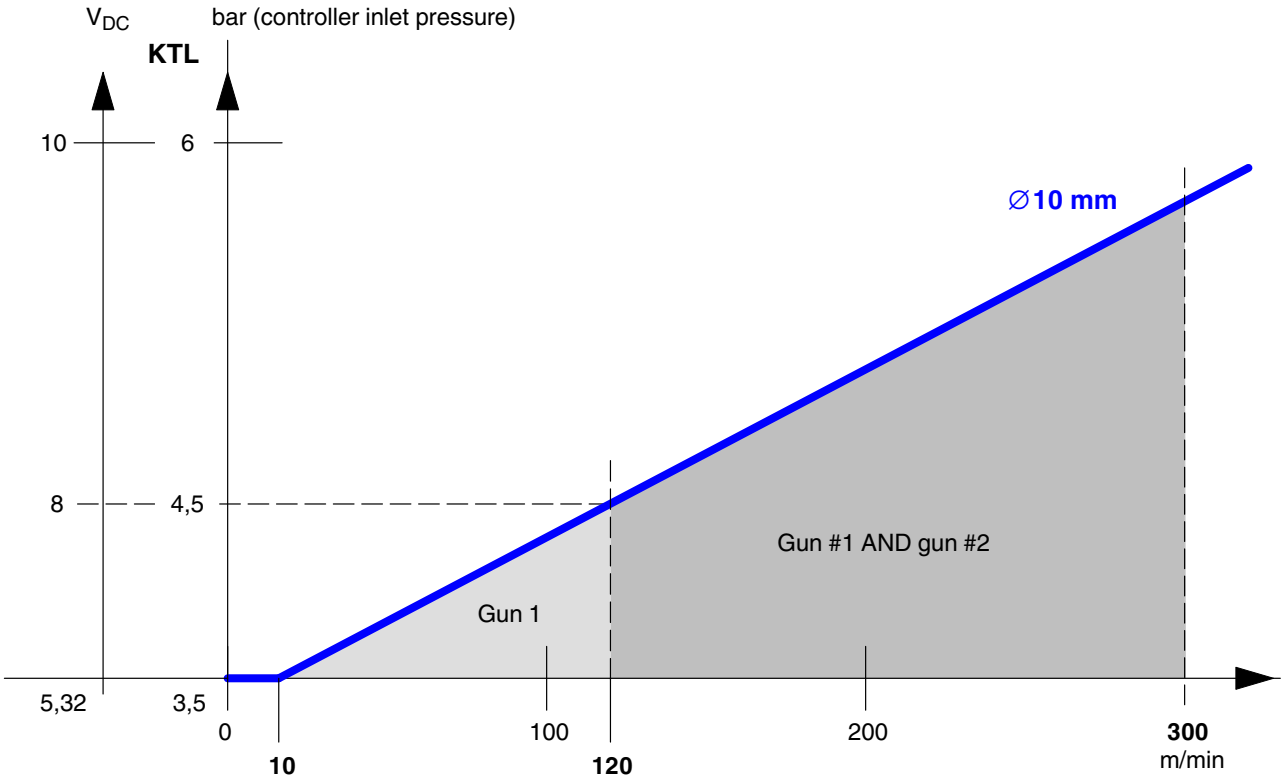


Fig. C-2 Relationship between production speed / KTL / powder quantity

Appendix D

Capacity to Shut Off Powder Recirculation Hose (Special Feature)

Example with Two Spray Chambers

Excess powder from the spray chambers is returned to the system's hopper with the aid of recirculation pumps that convey it through the recirculation hoses.

The compressed air for the recirculation pump is set on the pressure regulator with this symbol (Fig. D-1). The pressure controllers are located behind the top door (back of system).

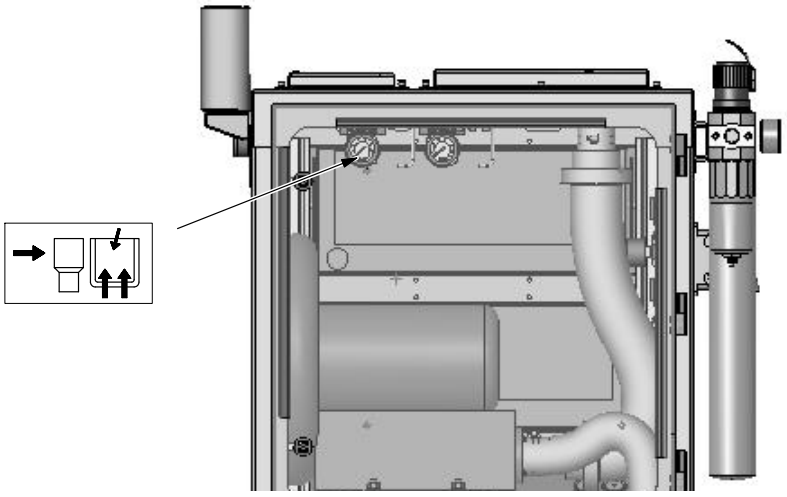
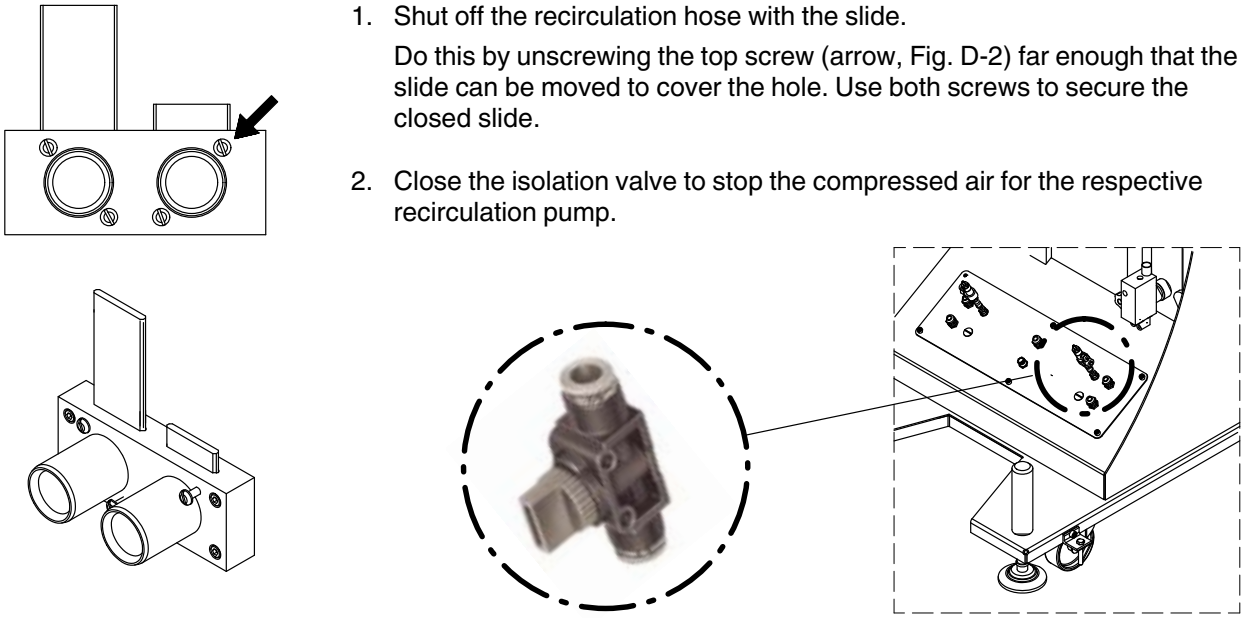


Fig. D-1

The air connection for the recirculation pump is located on the front of the system on the tank isolation valve (circle, Fig. D-2).

Continued ...

If Only One of the Two Spray Chambers is Operated



1. Shut off the recirculation hose with the slide.

   Do this by unscrewing the top screw (arrow, Fig. D-2) far enough that the slide can be moved to cover the hole. Use both screws to secure the closed slide.

2. Close the isolation valve to stop the compressed air for the respective recirculation pump.

Fig. D-2 Slide and isolation valve

The reason the hoses are shut off is to prevent powder from continuing to flow uncontrollably due to the vacuum created in the system.