Delta® Booth
Porcelain Enamel
Powder Coating System

Customer Product Manual
Part 7093467-01
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For parts and technical support, call the Industrial Coating Systems Customer Support Center at (800) 433-9319 or contact your local Nordson representative.

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Contact Us

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Change Record

Revision	Date	Change

Safety

Read and follow these safety instructions. Task- and equipment-specific warnings, cautions, and instructions are included in equipment documentation where appropriate.

Make sure all equipment documentation, including these instructions, is accessible to all persons operating or servicing equipment.

Qualified Personnel

Equipment owners are responsible for making sure that Nordson equipment is installed, operated, and serviced by qualified personnel. Qualified personnel are those employees or contractors who are trained to safely perform their assigned tasks. They are familiar with all relevant safety rules and regulations and are physically capable of performing their assigned tasks.

Intended Use

CAUTION: Use of Nordson equipment in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to property.

Some examples of unintended use of equipment include

- using incompatible materials
- making unauthorized modifications
- removing or bypassing safety guards or interlocks
- using incompatible or damaged parts
- using unapproved auxiliary equipment
- operating equipment in excess of maximum ratings

Regulations and Approvals

WARNING: Make sure all equipment is rated and approved for the environment in which it is used. Any approvals obtained for Nordson equipment will be voided if instructions for installation, operation, and service are not followed.

All phases of equipment installation must comply with all local codes.

Personal Safety

To prevent injury, follow these instructions.

- Do not operate or service equipment unless you are qualified.
- Do not operate equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Keep clear of moving equipment. Before adjusting or servicing any moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.
- Relieve (bleed off) pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- Obtain and read Safety Data Sheets (SDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.
- Do not use the air blow gun to clean your body. Compressed air can pierce the skin and if directed towards the face it could cause a severe eye injury.

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Provide adequate ventilation to prevent dangerous concentrations of volatile materials or vapors. Refer to local codes or your material SDS for guidance.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

Grounding

WARNING: Operating faulty electrostatic equipment is hazardous and can cause electrocution, fire, or explosion. Make resistance checks part of your periodic maintenance program. If you receive even a slight electrical shock or notice static sparking or arcing, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.

Grounding inside and around the booth openings must comply with EN50050-2, EN50177, EN16985, latest conditions.

- All electrically conductive objects in the spray areas shall be electrically connected to ground with a resistance of not more than 1 ohm when measured with an appropriate instrument.
- Equipment to be grounded includes, but is not limited to, the floor of the spray area, operator working area platforms, hoppers, photoeye supports, and blow-off nozzles. Personnel working in the spray area must be grounded.
- There is a possible ignition potential from the charged human body. Personnel standing on a painted surface, such as an operator platform, or wearing non-conductive shoes, are not grounded. Personnel must wear shoes with conductive soles or use a ground strap to maintain a connection to ground when working with or around electrostatic equipment.
- Operators must maintain skin-to-handle contact between their hand and the gun handle to prevent shocks while operating manual electrostatic spray guns. If gloves must be worn, cut away the palm or fingers, wear electrically conductive gloves, or wear a grounding strap connected to the gun handle or other true earth ground.
- After servicing equipment, reconnect all disconnected equipment, ground cables and wires.

Action in the Event of a Malfunction

If a system or any equipment in a system malfunctions, shut off the system immediately and perform the following steps:

- Disconnect and lock out electrical power. Close pneumatic shutoff valves and relieve pressures.
- Identify the reason for the malfunction and correct it before restarting the equipment.

Disposal

Dispose of equipment and materials used in operation and servicing according to local codes.

Description

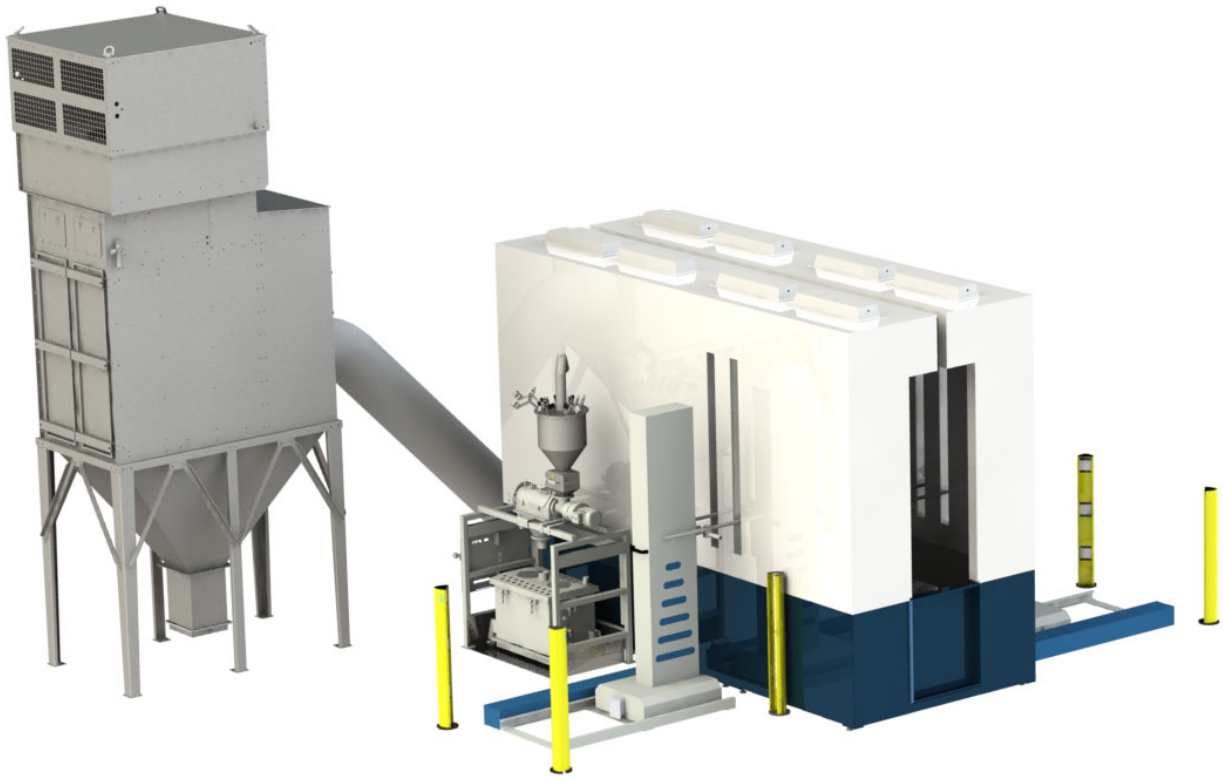

Figure 1 Delta Booth Typical Layout

This manual covers the Nordson Delta powder coating booth systems. It includes a description of the major system components and their operation, basic daily operation, general troubleshooting, booth maintenance and part numbers for normal wear & strategic parts. Because powder coating systems are customised to meet customer requirements, your system may have controls and equipment not described in this manual or located in different positions. Your Nordson representative can provide you with additional information and training to supplement this manual.

The Nordson Delta Booth system offers a solution for coatings using PE (Porcelain Enamel) powders. It is engineered to the end user requirements whilst maintaining the standard Nordson technology and design. Using an Aerodeck system in the extract channel, airflow is balanced and regulated for optimal air flow in the booth.

Powder coating systems are engineered for the specific application. Nordson provides separate manuals for each component or sub-system, such as the rotary sieve & hopper, automatic guns, automatic gun controllers, manual spray systems, powder pumps and gun movers. Refer to the associated manuals for them for more information on the operation and maintenance of these components. The booth canopy is made up of stainless steel or a combination of stainless steel and PVC, depending on design requirements, which allows the powder to be blown and wiped away easily with a non-abrasive material.

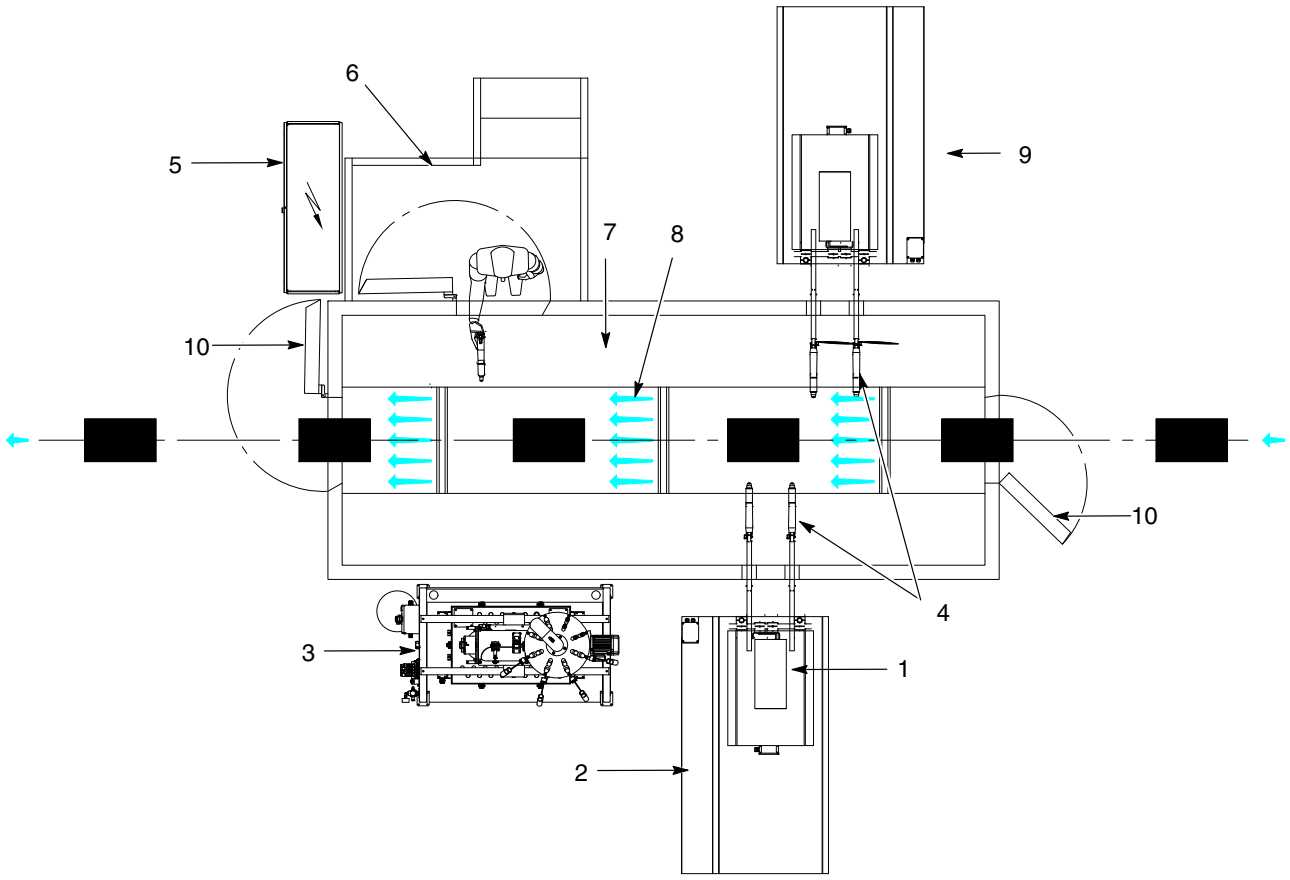

Figure 2 Delta Booth Identification Layout

Item	Component	Function
1	Reciprocators	Reciprocates the spray guns vertically, in repetitive or variable patterns for thorough part coverage
2	Z-Axis	Moves the reciprocators carrying the spray guns, horizontally, into or out of the booth canopy for optimal application distance from the product
3	Rotary Sieve	Sieves reclaimed powder and transfers to the hopper for reuse
4	Guns	Powder application spray guns
5	System Control Panel	Controls all system components
6	Operator Platform (optional)	Optional platform on which the operator stands to manually coat products
7	Booth Floor with Aerowash™	Booth floor fitted with an automatic air wash cleaning system to minimise powder build up
8	Central Extract Slot	Booth extraction point where the residual powder is extracted and reclaimed via the Twin Cyclone
9	Reciprocator shown or can be a Robot (optional)	If supplied with a robot, an automatic robot gun would be mounted, can be used to coat more intricate products
10	Hinged Door	The hinged door acts as a wall during production then is closed during clean down and colour change

See Figure 2

Powder Flow Process Diagram

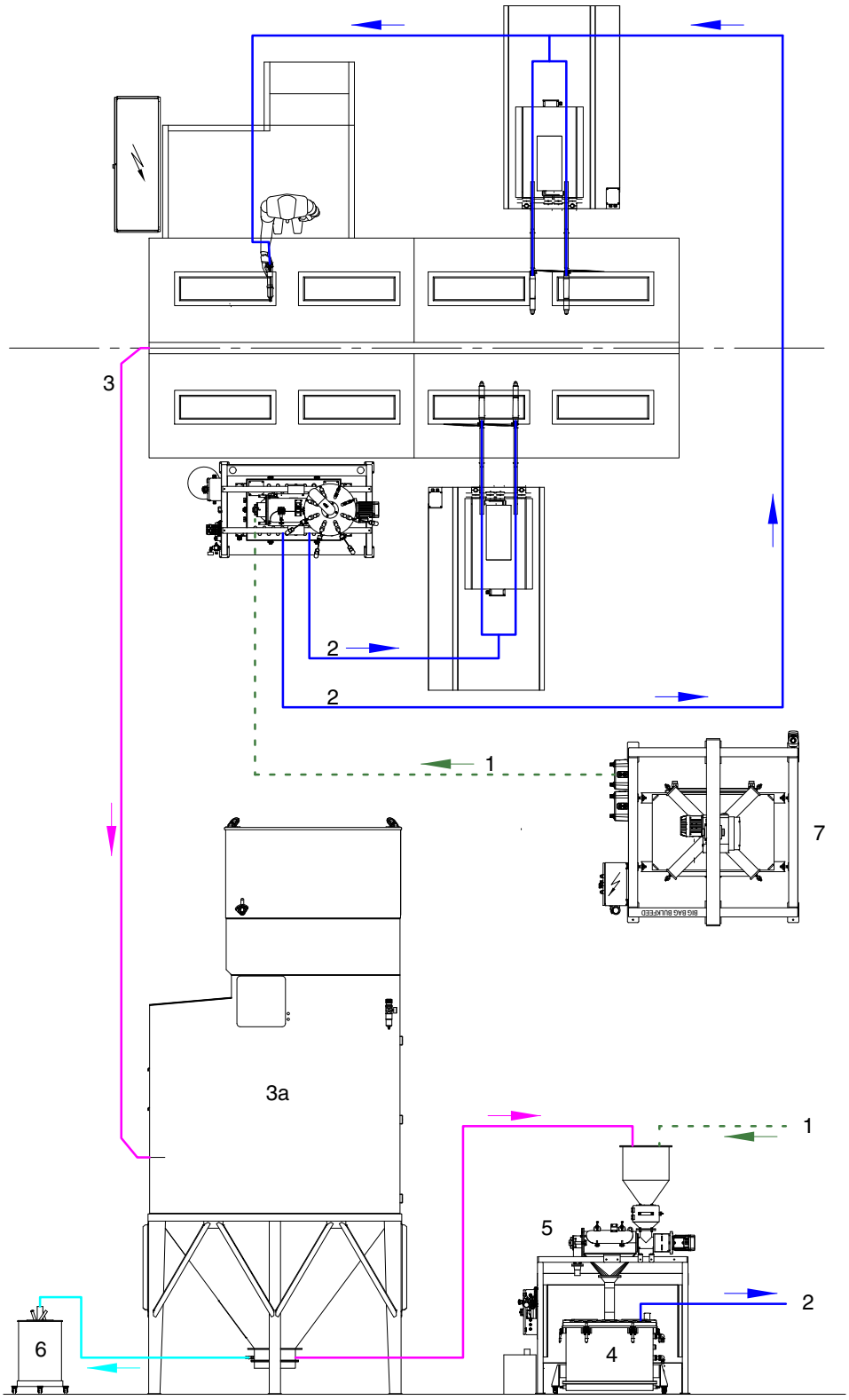

Figure 3 Powder Flow Diagram

Powder Flow Process Description

See Figure 3

The Powder Flow Diagram shows how the system is connected for optimum powder application and recovery. Fresh powder (1) is transferred from the bulk feed system (7) to the sieving station (5) and into the powder feed hopper (4).

Powder is fed from the powder feed hopper (4) to each of the automatic and manual application spray guns (2).

Residual powder is reclaimed from the coating process via the booth extraction slot (3) into the extract filter system (3a).

The filters inside the extract filter system (3a) are pulse cleaned automatically, during this process the powder falls into the hopper at the bottom.

This reclaimed powder is then transferred to the sieving station (5), mixed with fresh powder and ready to be used again. Alternatively, as an additional option, this powder can be transferred to a waste powder collector (6)

The powder feed hopper (4) is fitted with level sensors that detect the current powder level and signal the bulk feed system to transfer more fresh powder when required.

Installation

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

NOTE: Pneumatic (including pressure and quality) and electrical supplies must be in accordance with the system drawings supplied by Nordson.

Transport

Transport the unit so as to avoid damage. Use suitable packaging materials. Protect the unit from humidity, large temperature fluctuations (condensation), dust and vibrations.

Unpacking

Unpack the unit carefully to avoid damage. Inspect for any damage caused during transport. Save packing materials for possible later use, or otherwise dispose of properly according to local regulations.

Storage

Use suitable packaging materials. Protect the unit from humidity, large temperature fluctuations (condensation), dust and vibrations.

Preparing for Installation

NOTE: Booths are generally delivered flat pack for on-site assembly. Installation of the booth should not be undertaken without the presence of a Nordson representative or a suitably qualified person.

1. Choose a level site on which to install the Delta Booth, away from drafts or any other airborne contaminates.
2. Seal concrete floors with a suitable material to avoid dust. Other floor surfaces should be of a type that is easy to keep clean.

System Setup Values

NOTE: The default values may need to be adjusted per application and can vary from system to system

Item	Booth Base	Default Value
1	Airknife pulse duration	0.8 seconds
2	Airknife time between pulses	10 seconds
3	Airknife total cycle time	32.4 seconds
4	Booth cleaning lance air pressure (5.5 - 6.5 bar Maximum)	5.5 bar
5	Airknife tank pressure (1 - 3.5 bar Maximum)	2 bar
6	External gun blow off - left side (4.5 - 5.5 bar Maximum)	5 bar
7	External gun blow off - right side (4.5 - 5.5 bar Maximum)	5 bar
8	Jig or Flight Bar cleaning nozzle (if fitted) (1 - 3.5 bar Maximum)	3 bar

Operation

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

Daily Operation

In order to successfully colour change the booth and application system, refer to Appendix A.

WARNING: Do NOT step on the Aerodeck at any time during colour change, maintenance or inspection.

Start Up Procedure

NOTE: For information on the PPHD (Powder Pilot HD - main system controls) can be found at: *http://emanuals.nordson.com/finishing/* under the folder Powder-Europe. Part number 7156953.

1. Load fresh powder into the bulk feed station as required.
2. On the booth control panel, turn the isolator on and press the control reset button. After approximately 5 seconds, the Extract System controller will be initialised.
3. Start booth extraction by pressing the start button on the touch screen of the PPHD.
4. Ensure the fresh powder feed pump button is selected as enabled on the PPHD screen.
5. Allow the hopper to fill until the fresh powder pump automatically stops. The display will indicate that the powder is now at the mid level.
6. Start the gun movers on the PPHD.
7. Enable the recycle mode by ensuring the reclaim pump button is selected as enabled on the PPHD screen.
8. Start spraying powder and run production.

Maintenance

WARNING: Breathing in certain airborne dusts (including finishing powders) may be hazardous to health. Ask the powder manufacturer for a Material Safety Data Sheet (MSDS) for information. Use appropriate respiratory protection.

CAUTION: It is important to follow the specific maintenance instructions of each product.

NOTE: OP = Operator / TT = Trained Technician

Location	Maintenance Task	Resp.	Interval (h)	Procedure / Result	Tools/Material
Booth Canopy	Clean the booth internal and external walls, roof, all attached equipment and area	OP	8	No powder left	Atex Vacuum Cleaner - Clean cloth - Air blow lance
Sieve Venting	Ensure vent hoses are not damaged and connected correctly, without blockages	OP	8	No blockages, sharp bends or leaks, vented air can freely move to extract system	Visual inspection
Airflow Sensor (optional)	Inspect the LED Status	OP	24	Check for minimum three green LED above orange LED operation	Visual inspection
Air supply	Inspect the compressed air supply gauge	OP	24	Pressure min. 6 bar and max. 7 bar (dynamic)	Visual inspection
Airflow Sensor	Check the sensor tip for powder impact fusion	OP	600	Sensor needs to be completely clean	Cloth (No pressured air)
External gun cleaning	Inspect the complete assembly for air leaks	OP	2000	No noise and no leakage	Visual inspection Acoustic inspection
Booth Walls	Booth Conditioning and Cleaning Procedure	OP	2000	Follow Booth Conditioning and Cleaning Procedure (160h interval for first year operation, then 600h)	Solvent - Distilled Water - Sponge
Booth	Inspect the welding and sealing areas	TT	4000	No damage, cracks or tears. No noise (due to resonance)	Visual inspection Acoustic inspection
Booth Openings	Measure air flow in the booth openings	TT	4000	Air flow at openings, average 0,4 m/s Extraction slot: between 20-25 m/s	Airflow meter (e.g. Testo 405i) Airflow measurement protocol
Cables & Hoses	Inspect all external cables and hoses for damage	TT	4000	No damage, cracks or tears	Visual inspection
Air cleaning lance	Inspect the complete assembly for air leaks	TT	4000	No noise	Visual inspection Acoustic inspection
Booth Grounding Points	Measure point to point grounding of whole system	TT	4000	<1Ω, Point to Point	Multimeter (Eg BEHA ProInstall100; SN4225110)Booth grounding protocol

Booth lights	Inspect the lights	TT	4000	On/off function working. Measure the light intensity: > 700 Lux	Visual inspection Luxmeter Booth light measurement protocol
Electrical connections	Inspect all terminal blocks and junction boxes for loose wires	TT	4000	The testing should be performed in accordance with the requirements for electrical safety at workplaces.	
ESD Grounding	Check all ESD ground cables	TT	4000	All cables tightened and existing per ESD grounding instruction	Visual inspection
Air knife	Check air knife settings	TT	4000	Tank pressure (1,0 - 3,5 bar) Airknives sequence and pairing	Visual inspection
Booth doors	Inspect functionality of the booth doors	TT	4000	The signal is available on the control, when the door is closed. For automatic closing doors on/off function is working	Visual inspection

Troubleshooting

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

NOTE: A fault can occur for several reasons. It is advisable to check all possible causes for a given fault. Obvious causes of malfunction such as broken wires, missing fasteners etc., should be noted during visual inspections and corrected immediately. These troubleshooting procedures cover only the most common problems. If you cannot solve a problem, contact your Nordson representative.

Problem	Possible Cause	Corrective Action
1. Powder leakage from booth	**In Normal Operation**	
	Filter elements blocked, exhaust fan suction insufficient to retain powder within booth enclosure	Refer to the extract system manual for instructions on how to replace
	Filter pulse cleaning system malfunctioning	Refer to extract system manual for instructions on how to fault find and repair
	Excessive internal or external draft	Close all factory doors or erect barrier to eliminate draft
	Parts are entering the booth too hot	Increase cool down time from dry off oven (if preheated)
	Workpieces too large for booth	Contact your Nordson representative
	Air leaks in ducts, duct extensions, or duct seals	Inspect duct joints, extensions, and seals for air leaks. Repair and seal all leaks
	On Colour Change	
	Check booth doors are fully closed	Close doors if open
	Auto guns positioned too far into booth	Position guns so nozzles are level with the booth internal wall
2. Contamination on colour change	Inadequate cleaning	Fully re-clean system
	Insufficient or no spray to waste on start up with new colour	Check recycled powder for contamination, collect a small amount on aluminium foil and cure
	Booth retains powder	Clean and condition booth as per set up procedure
	Sieve screen damaged	Replace sieve screen (refer to rotary sieve manual)

Problem	Possible Cause	Corrective Action
3. System efficiency low	**<u>High percentage over-spray</u>**	
	Poor product hangers	Replace with new hangers
	Poor gun triggering	Contact Nordson to rectify
	Low gun Kv or wrong setting	See application manuals
4. System shuts down or will not start	Filter elements blocked, exhaust fan suction insufficient	Refer to extract system manual for instructions on how to replace
	Airflow sensor switch failed	Replace the airflow sensor
	Fuse(s) blown	Check the fuses in the system control panel. Replace the blown fuse(s). If the fuses continue to blow, fix the electrical problem
	Electrical failure	Trace the circuits and correct the problem
5. Spray guns are surging or spitting; powder flow is inadequate or intermittent	Refer to the appropriate technical manual for the spray guns	Refer to the appropriate technical manual for the spray guns
6. Problems with coating uniformity, edge coverage, film build, wrap, or penetration into recesses	Refer to the appropriate technical manual for the spray guns	Refer to the appropriate technical manual for the spray guns

Parts

To order parts, call the Nordson Industrial Coating Systems Customer Support Center at (800) 433-9319 or contact your local Nordson representative.

NOTE: For spares parts of other equipment on the system, refer to the associated technical manual https://emanuals.nordson.com/finishing

See Figure 4 - page 16

Item	Part	Description	Quantity	Note
1	7035272	LIGHT ASSEMBLY, ECOMAX	AR	
2	736154	VALVE,S/NOID,1",24VDC,FULL IMMERSION,PFC	AR	C
NS	736856	MEMBRANE,PILOT VALVE 1"IMMERSION	AR	A,C
NS	7035270	HOSE, 1" I.D., BLACK RUBBER	Per meter	
3	7035265	HOSE REEL, BLOW LANCE, RETRACTABLE	1	
4	7032368	KIT, BLOW GUN W/SPIRAL TUBE	1	
5	7035266	LANCE,CLEANING,1M_PVC	1	
5	7035267	LANCE,CLEANING,1.5M_PVC	1	
5	7035268	LANCE,CLEANING,2M_PVC	1	
NS	393410	CLEANING SPONGES	1	

NOTE A: Diaphragm kit for solenoid valve 736154
B: Optional
C: For external gun cleaning and booth air knives
AR: As Required
NS: Not Shown

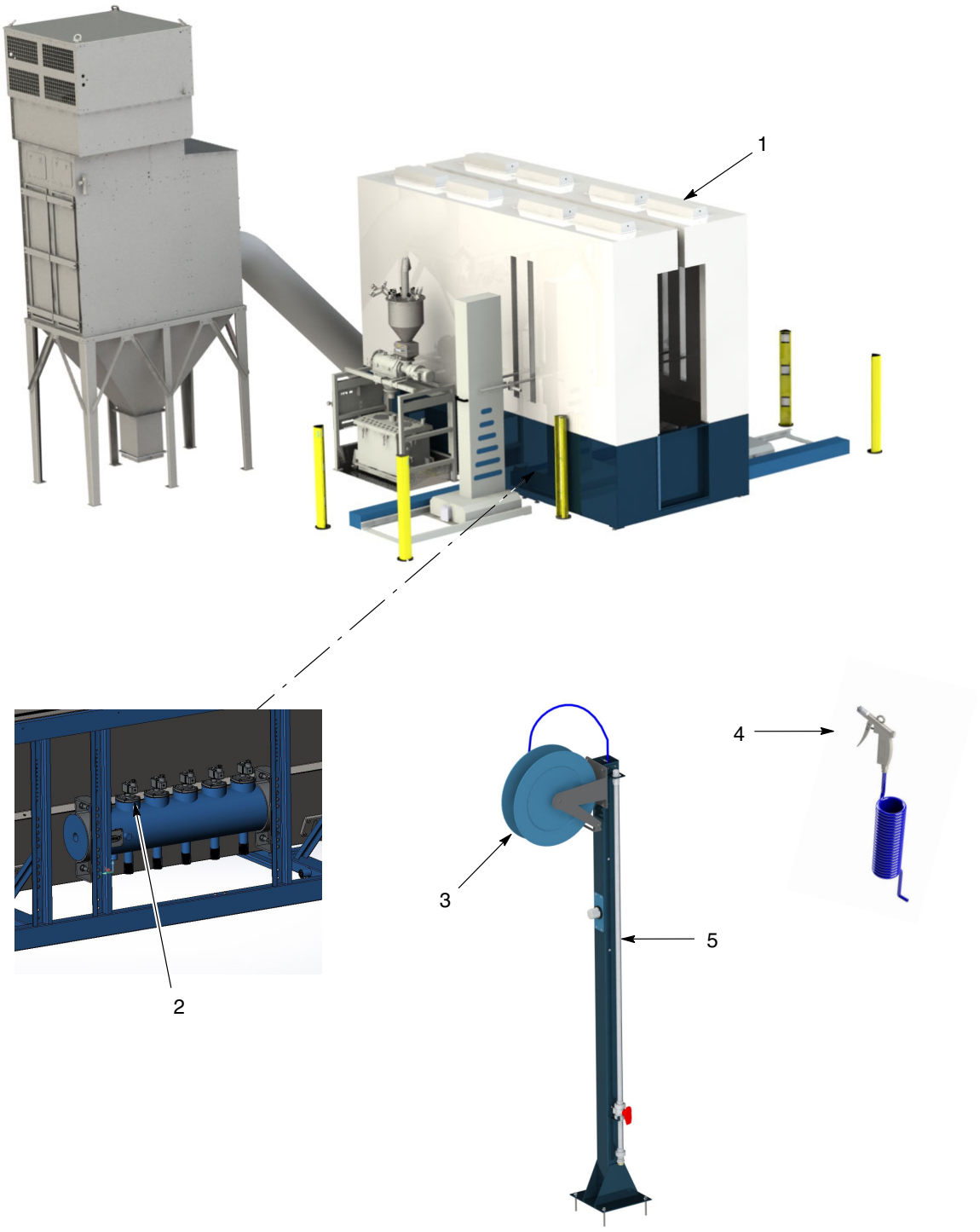

Figure 4 Spare Parts Identification Images

Specifications

Refer to the Services drawing supplied with the system for exact specifications. Multiple connection points may be required. Below, you can see the typical values.

Description	Values
Factory ambient temperature	5°C - 35°C
Electrical connection	50Hz - 3 phase 380v (N+E) - 1 phase 230v
Pneumatic connection	1.5” BSP
Maximum air pressure	7 bar
Minimum air pressure	6 bar
Air quality	2°C or less dewpoint - oil free - filtered to 5µ or less
Typical air consumption (booth only)	In production 36 m^3/hour - During colour change 85 m^3/hour
Noise	80 dB Maximum during production. Levels can be higher for 5 - 10 minutes during colour change.