

Sprint 3000 Conveyorized Spray Etch or Developing Machine

Translation of the original instructions



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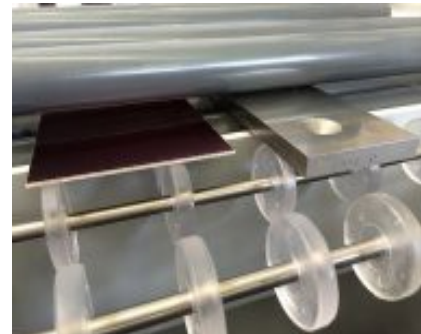
Brochure Sprint



Sprint 3000 with additional suction hood (Option)



Titanium cooling coil (Option)



Various thicknesses of substrates possible (Option)

Sprint - that is an innovative and modular system of horizontal, conveyORIZED spray etching. Suitable for all acid and alkaline etchants.

New! The Sprint (3000/4500/6000) series is made for double sided PCBs with line resolution down to better than 0,1 mm. Machine is available as table top or floor standing version.

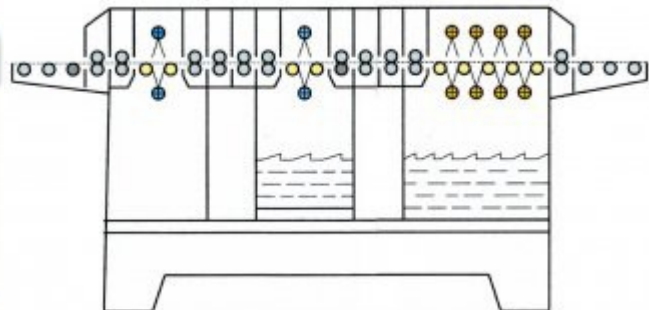
With this range of products complete production lines are possible covering developing, etching and rinsing including waste water treatment.

Outstanding feature is the transport unit, which is fully removable for cleaning purposes and may be extended or shortened almost arbitrarily, and thus allows customer changes or special machine designs.

Standard machine has a width of 300mm (SPRINT3000) but wider machines are available (450mm=Sprint4500 / 600mm =Sprint6000).



Sprint4500 with working width 450 mm



Construction details

Technical high lights

- Small footprint, easy handling, control panel front
- Service friendliness: All nozzles with self-adjusting bayonet lock: no readjustment!
- Transport: The maintenance-free bevel gear (titanium-PP) with vertical made as a complete transportation unit can be easily taken from the machine for cleaning
- transport speed finely variable from 0-2m/min
- Short etching time and high etching precision due to high end spray nozzles arranged in nozzle bar
- machine equipped with filter for etchant
- titanium heater, controlled by digital thermostat with function control
- integral closed loop rinse plus fresh water rinse, upon request also with inductive proximity switch detector
- clean emptying of all tanks via cock valves
- Security features: cover switch and emergency stop

Specification for Sprint 3000

- **Overall size:** 1100 mm x 750 mm x 750 mm (LxWxH)
- **Working width:** 300 mm
- **Power supply:** 230V,50Hz, 1.5kW
- **Tank capacity:** 20 Litre (etchant), 15 Litre (close loop rinse)
- **Weight:** +- 95 kg
- **pump output:** +- .80 litre/min
- **spray pressure:** +- 1 bar
- **working temperature:** 0 – 45 °C

Possible options/modules

- Working width: 450mm / 600mm for Sprint 4500/6000
 - Sensor control for fresh water rinse (motion control)
 - additional suction hood, swiveling hinge
 - upper / lower pressure adjustable via cog valve
 - additional rinsing sections possible
 - etching zone can be enlarged to 2x / 3x / 4x length
 - high pressure pump for rinsing
 - titanium cooling coil, electrically controlled to reduce bath temperature in case of danger of exothermic reaction
 - run dry protection (double security for heater elements)
 - rack with or without security tray
 - transmitting height up to 10mm (e.g. for pad printing clichés)
 - can be supplied with waste water treatment unit
- Oscillation module possible

Technical details are subject to change without notice



Transport



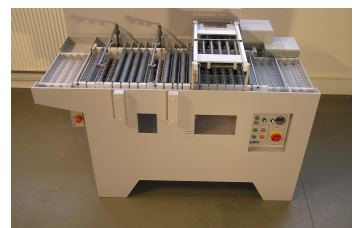
Nozzle bar



Floor standing with waste water treatment (option)



Connection SPRINT3000 long



Customized machine with oscillation

EG-Declaration of Conformity



EG-Konformitätserklärung/Declaration of Conformity

Hersteller / Supplier:	Bungard Elektronik GmbH & Co. KG Rilkestraße 1 51570 Windeck Germany
Bevollmächtigte Person für die Zusammenstellung der technischen Unterlagen: Person in charge	Jürgen Bungard, Geschäftsführer /general director Rilkestraße 1 51570 Windeck Germany
Produkt:	Durchlaufätz- und -entwickleranlage Sprint 3000 Conveyorized Etching and Developing Unit Sprint 3000

Hiermit erklären wir, dass die oben beschriebenen Maschinen allen einschlägigen Bestimmungen der Maschinenrichtlinie 2006/42/EG entspricht.

Die oben genannte Maschine erfüllt die Anforderungen der nachfolgend genannten Richtlinien und Normen:

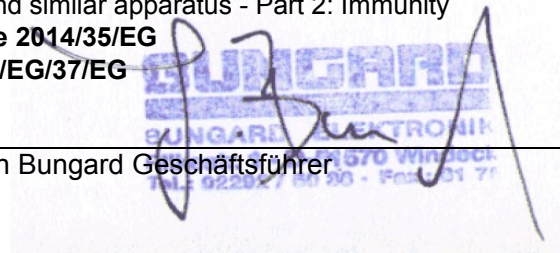
We hereby declare that the machines described above complies with all relevant provisions of the Machinery Directive 2006/42/EC.

The above machine meets the requirements of the following guidelines and standards:

- **Maschinenrichtlinie 2006/42/EG / Machinery Directive 2006/42/EC**
- **EMV-Richtlinie 2014/30/EG / EMC Directive 2014/10830EC**
- **Niederspannungsrichtlinie 2014/35/EG / Low Voltage Directive 2014/35/EC**
- **DIN EN 60204-1** Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen / Safety of machinery - Electrical equipment of machines - Part 1: General requirements
- **DIN EN ISO 14121-1** Sicherheit von Maschinen - Risikobeurteilung - Teil 1: Leitsätze / Safety of machinery - Risk assessment - Part 1: Principles
- **DIN EN ISO 12100-1** Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze, Risikobeurteilung und Risikominderung / Safety of machinery - Basic concepts, risk assessment and risk reduction
- **DIN EN 55014-1 2012-05** Elektromagnetische Verträglichkeit, Anforderungen an Haushaltsgeräte, Elektrowerkzeuge und ähnliche Elektrogeräte, Teil 1: Störaussendung / Electromagnetic compatibility Requirements for household appliances, electric tools and similar electrical appliances Part 1: Emission
- **DIN EN 55014-2-2009-06** Elektromagnetische Verträglichkeit - Anforderungen an Haushaltgeräte, Elektrowerkzeuge und ähnliche Geräte - Teil 2: Störfestigkeit - / Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity
- **Niederspannungsrichtlinie / Low Voltage Directive 2014/35/EG**
- **Maschinenrichtlinie / Machinery Directive 2006/42/EG/37/EG**

Windeck, 10.1.2018

Jürgen Bungard Geschäftsführer



Intended Use of Machine

Aqueous-alkaline or acid etching of printed circuit boards or plates.

Developing of positive or negative-working, aqueous-alkaline processable photoresists or laminates (add defoamers if needed).

Alkaline resist stripping (additional filtration unit required).

All other applications require our written consent, or are performed completely on the operator's own risk.

Technical Data Sprint 3000

Electrical connection:	220 V~, 50 Hz, approx. 1500 W
Dimensions:	LxBxH 1100 x 750 x 750 mm ³ (1500mm with underframe)
Weight:	85 kg
Materials:	PVC, PP, Titanium
Etching format:	300 mm x endless
Etching Tank Capacity:	approx. 20 l etching agent
Etching length	250 mm, 6 top/bottom nozzles in 2 x 4 rows 2-1-2-1; 3,15 l/min per nozzle at 0,5 bar = 37 l/min
Pump:	1 magnetic drive centrifugal pump with 80l, approx. 0,5 bar
Closed-Loop-Rinse:	Approx. 15l tank, 1 nozzle row top/bottom with 2 nozzles each, approx. 12,6l/min, 1 magnetic pump with 40l/min throughput, approx. 0.5 bar
Fresh water rinse:	via magnetic valve
Transport:	step-less adjustable from 0 - 2 m/min, 50mm roller distance
Heater:	1 x 800W Titanium heaters, limited to 45°C

Safety instructions

General

Please read the following instructions carefully and pay particular attention to information on operating safety and set up.

Keep these instructions at a safe place. It contains information which also refer for later maintenance and cleaning.

The machines are intended for chemical-physical treatment of printed circuit boards.

The machines are not designed to be embedded or interconnected with other machines or systems. They may only be used in specially equipped rooms and be operated only by qualified staff. Children and pets are to be kept away!

Transport

Only use suitable lifting and transport equipment such as forklifts or pallet lifts. Secure the machine against sliding / tilting.

Place of installation

The machine must be standing level and around the machine there has to be sufficient space for operation and maintenance work (approx 1m on all sides). To prevent the penetration of chemicals into the ground, set up the machine either in a room with solid, waterproof and chemical resistant floor (no tiles nor concrete!) or in a chemical resistant waterproof collection tray which can take the whole filling volume (safety tray available as an option).

Electricity

The machine is made from certified parts according to standard practice for electrical safety. This does not relieve the user of his duty of care when handling electrically powered devices.

The yellow-red main switch disconnects the machine from the power supply. We presuppose that the safety fuses of the circuit and the residual current circuit are provided by the building's power supply.

After completion of the work, the main switch should always be turned off.

Before all maintenance work on the machine (filling, emptying, cleaning, etc.) turn off machine and pull the plug.

The chemicals used in the machines often have a high electrical conductivity. Any contact of the liquid with live parts therefore constitutes a serious threat to electrical safety. In such a case, the machine must be immediately disconnected from the mains and the defect must be eliminated immediately and professionally. This applies correspondingly with leaked or spilled etchant.

Water connection

After work or prolonged interruption close the cock valve of the building water supply to prevent water damage from a possible leak in the hose.

Personal protection equipment

When handling corrosive chemicals make sure to wear protective clothing, gloves and face protection. Observe the safety instructions of the manufacturer or the supplier.

Temperature

Switch on machine only when tanks are filled! The heater must always be sufficiently covered with liquid! Uncovered heaters can cause damage of machine!

The electronic thermostat is protected against breakage and short circuit of the cable to the thermal sensor. This does not relieve the operator from the obligation, to monitor the temperature of the liquid. Exothermic chemical reactions may under certain circumstances, which we cannot influence, cause overheating of the etchant. The maximum operating temperature of the machine is 45 °C.

If the etchant is prepared by dissolving salts or mixing liquids, do that in any event outside of the machine! Observe the safety instructions of the chemical supplier.

If you want to use liquids which may react exothermic, take additional measures to prevent overheating. If, despite all precautions, overheating of the etchant occurs, the heater must be switched off first. The pump however must remain switched on, so that the etchant is cooled by the circulation.

Before draining the tanks, let the heater cool down for approx. 10 min, so the heaters will not get damaged.

Working safety

The machine has a lid safety switch which stops the pump circuit when opening the cover. Please check the function regularly of the position switch.

Exhaust

An exhaust of air in the area above the machine body is recommended with regard to possible etching fumes. The need for extraction will depend on the liquid used.

Environmental protection

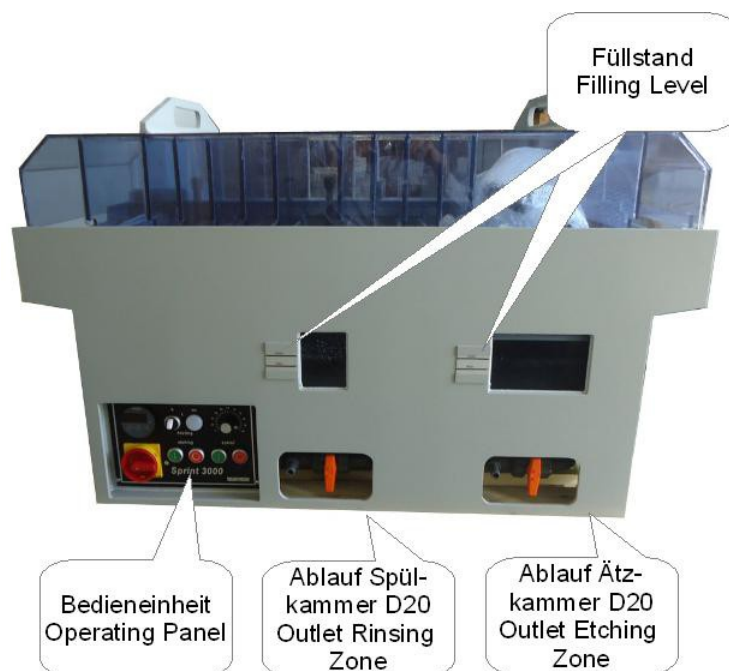
Dispose used etchant according to your local regulations. Pay heed to the material safety data sheet (MSDS) of your chemicals.

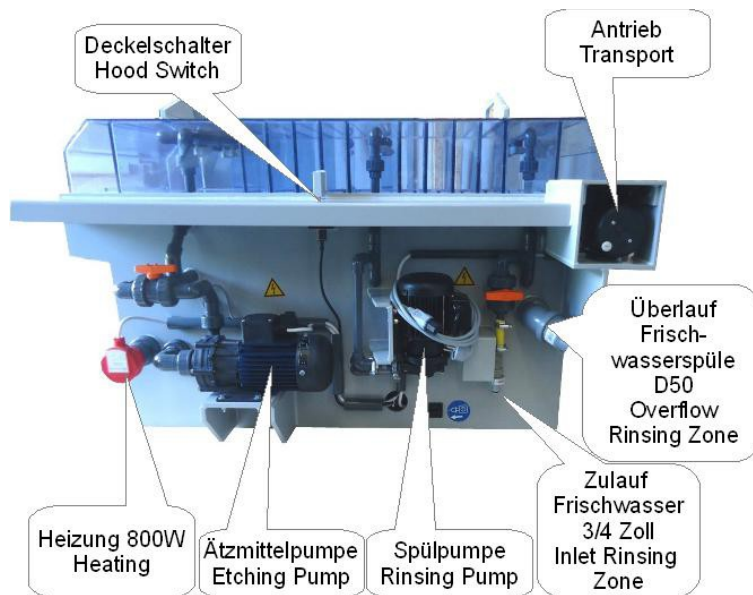
Rinsing water

The legislation generally prohibits to exceed certain maximum concentrations and quantities of copper (and other heavy metals) in the waste water (usually 0.5 mg copper / liter of water). After etching the boards should not be rinsed under running water and do not dispose used rinsing water into the sewer! Operate the rinsing water only either in a closed loop rinse or treat the rinse water with a ion exchanger. If you do not have an in-house water treatment for the rinse water, we recommend our waste water treatment plant IONEX or AquaPur for this task.

We recommend to use the water in the closed loop rinsing zone(s) as long as possible.

Collect used rinsing water and reuse for set up new etchant. Dispose the surplus together with the used etchant. Neutralization of the rinsing water or even the etchant can and should be left to a specialist!

Composition



Commissioning

After receiving and unpacking, check the machine for possible transport damages. In case of transport damage, please inform your insurance, the transport company and the manufacturer / supplier.

Transport to the place of installation

Only use suitable lifting and transport equipment such as forklifts or pallet lifts. Secure the machine against sliding / tilting.

Place of installation

The machine must be standing level and around the machine there has to be sufficient space for operation and maintenance work (approx 1m on all sides). To prevent the penetration of chemicals into the ground, set up the machine either in a room with solid, waterproof and chemical resistant floor (no tiles or concrete!) or in a chemical resistant waterproof collection tray which can take the whole filling volume (safety tray available as an option).

Connections

Connect the overflow of freshwater rinse (PVC pipe D50) with your rinse water treatment. Make a connection to the fresh water inlet (spout D16). Connect inlet and outlet of the cooling (spout D16), depending on the chemical join suction of the lid (D75 / 63) to your exhaust system. Finally connect the machine to the mains (220V / 50Hz). We presuppose an on site fuse protection of the electric circuit.



Test run

To check for leaks and function, first run the machine with **water** only. Fill in the etching chamber either via the inlet ball valve or from above by opening the exhaust hood and remove the cover. Fill the close loop rinse from above. In both tanks do not exceed the minimum and maximum level, otherwise the heater or pump may get damaged. The level mark **min - max** is located on the transparent front side of the machine.

Note: The level and temperature must always be monitored by the operator.

Turn on the main power switch. The white indicator light should light up.

Turn on the transport and adjust the speed.

Check the function of etching and rinsing pump by pressing the green button below **pump**. The spray pressure for etching zone, rinsing zone and freshwater tank can be set by ball valves.

Turn on the heater.

Warning: The heater may be switched on only with filled tanks. If no front panel key is pressed, the display shows the actual value of the thermostats. With increasing heating time, the display must increase.

If you press the SET-button the target value is displayed in the screen. If you additionally press the "UP" or "DOWN" button, the set point is increased or decreased. By default, the heater is set to the target value 45 °C.

Drive a test board through the machine and check the function of the proximity switch.

Open the hood - the pump must switch off (safety lid switch).

Empty the machine again via the ball drain valves.

Initial filling

Before initial filling, make sure all ball valves are closed again !! Fill the etching zone as in the test run, but this time with the desired chemical. If necessary, use a drum pump or similar. Observe the safety instructions and Material Safety Data Sheet of the chemical. Set up chemicals outside of the machine!

**Operating****Board transport:**

If you look at the machine from the front, insert the boards from the right side of the machine.

For this they are placed on the first conveyor roller and advanced to the first pair of rollers.

If there is no outlet table at the rear of the machine, you need to take the boards from the machine manually, otherwise they will fall to the ground.

Temperature:

The temperature to be set depends on the etchant used. When etching with sodium it should be about 40 °C, with copper chloride or sulfate about 30 °C and with ferric chloride up to 45 °C.

Operating temperatures above 50 °C must be avoided. Please note that some etchant react exothermically particularly at high throughput, so the etchant seems to heat itself. In this case, set the temperature accordingly to a lower value. If necessary wait for cooling down of the etchant (at no-load-operation) before you continue.

After work or prolonged interruption close the cock valve of the building to prevent water damage from a possible leak in the hose.

After completion of the work, the main switch should always be turned off.

Cleaning and Maintenance:

Caution:

For service, cleaning or repair work, always unplug the power cord!

Before draining the tanks, let the heater cool down for approx. 10 min, so the heaters will not get damaged.

Attach a short piece of hose to the ball valve of the etching tank, and put the other end into a provided suitable container. Open the drain valve. In order to resolve any muddy residues, rinse with some extra water through the inlet of the etching tank.

Disassembly:

1. Open the exhaustion hood.
2. Remove the cover.
3. Open the nozzle bar screw thread and remove the nozzle bar. The nozzles themselves can be easily removed by rotating the bayonet lock. The nozzles are hold into position by the nozzle nuts and cannot move, so no need for readjustment when assembling again.
4. The drive units can be easily removed completely. First remove the upper squeeze rollers. Lift the transport unit at the outlet side and shortly advance towards the outlet, the transport unit can be easily taken from the machine.



Cleaning:

All parts beside the transparent hood can be cleaned with a mild abrasive liquid detergent. The hood should not be treated with abrasive materials as it will lose its transparency. When using ferric chloride as an etchant you will have good cleaning results using our stain remover RX3. The removal of dirt and etching agent residues needs to be followed by a thorough cleaning with clean water.

Remove all sludge deposits mechanically and dispose together with the used etchant.

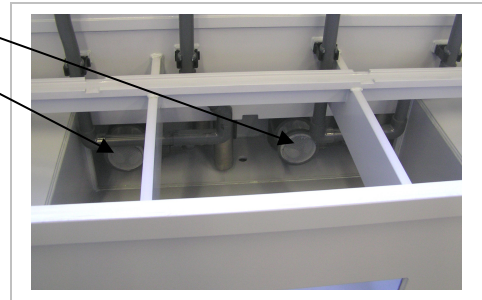
When you use ferric-(III)-chloride persistent dirt can also be chemically removed or at least resolved. For this, the machine is operated instead of etchant with a 10-15% solution of hydrochloric acid or alternatively with our stain remover RX3. For more information we provide you with a separate instruction.

Rinsing the prepurified machine can also be done with a high pressure cleaner. In this case, however, necessarily all electrical parts (console, cables, motors, etc.) must be protected against splashing water. Attention! Etching residues and any sludge deposits must not enter the drain.

To clean the nozzles remove nozzle bars and transport system as described above.

The nozzle can be removed from the nozzle bar by turning the nut. They may only be rinsed and / or blown out with compressed air, but not mechanically cleaned.

The filter in the etching zone must be cleaned at regular intervals (every time you change the etchant).



Disposal

The disposal of the etching medium must be negotiated with the chemical supplier.

The machine is mainly constructed from recyclable materials and has to be disposed in a proper and environmentally friendly manner.

Spare part list:

Part number	Name
E3000/1	Magnetic valve
E3000/2	Conveyor gear motor.H
E3000/2/1	Control unit for gear motor H.
E3000/3	Push button red / green M.
E3000/4	Digital thermostat St.
E3000/4/1	Sensor tube for Thermostat
E3000/4/2	Sensor for thermostat St.
E3000/6	Switch for heating M.
E3000/7	Main switch M.
E3000/8	Drain cock tank rinsing zone DN16
E3000/9	pump filter
E3000/10	Electric Connector for Pump
E3000/11	Magnetic pump Etching Zone
E3000/12	Magnetic pump Rinsing Zone
E3000/13-1	Viton O-ring for titanium heating
E3000/13	Titan Heating Ma. 1250
E3000/14	Flat nozzle L.
E3000/14/1	Nozzle nut with bayonet lock
E3000/14/2	Seal for flat nozzle
E3000/15	Bevel gear for Roller
E3000/15/1	Bevel gear for master shaft
E3000/16	Titanium pin
E3000/19	Upper Viton squeeze roll
E3000/19/1	Lower Viton squeeze roll
E3000/20	transport roller
E3000/20/1	Transport disc

Guarantee

All machines are submitted before distribution to examination on function and continuous operation firmness. On the machine we grant a work warranty of 12 months to our customers starting from purchase date on accuracy in material and processing. We warrant at our choice by exchange of incorrect parts or by repair of the machine in our house. Old parts change into our possession.

Disclaimer of Warranty

Bungard GmbH & Co. KG reserves the right to change or enhance its machines or machine specifications according to its judgement, if necessary. Bungard cannot be held responsible to implement aforesaid changes into machines sold already.

Bungard products and services are liable to the current prices and conditions, which are subject to change.

The instructions and definitions in this document are also subject to change and mark no assurance on the part of Bungard.

This manual contains informations of the Bungard Sprint and is the translated English version.

Please regard the "Sales terms and delivery conditions". These are available after fulfilment of the contract. We don't furnish a guarantee or warranty in cause of damages at material or hurts of people because of

Incorrect use of the machine

Wrong setup, installing and operating of the machine or incapable service

Use of the machine with defective safety equipment

Non-observance of the service manual in regard to transport, stocking, setup, installation and service of the machine

Unlicensed modifications at the machine

Incorrect or incomplete repairs

Destructive force effect at the machine in cause of foreign objects or external use of force

Use of non-original spare parts

normal wear parts.

We cannot accept subsequent claims from damage or destruction of work pieces worked on in the machine, because we have no knowledge or control over the operating conditions at your site. This is valid in a general manner also for requirements from damage to articles, buildings and persons as well as the environment.

We do not warrant that the function of the machine will meet the customer's requirements or that the operation of the machine will to this regard be error free.

In no event will we be liable to the customer for any incidental, consequential, or indirect damages of any kind, including loss of profit and prosecution for environmental pollution, even if we could have been aware of the possibility of such damages.

All information was arranged with great care. We reserve ourselves however mistake and technical changes without previous announcement.

Running the machine in corroding, humid, dusty, extremely hot or explosive atmosphere happens at the operator's own risk and responsibility.

We explicitly exclude any warranty for damages resulting from running the machine in in corroding, humid, dusty, extremely hot or explosive atmosphere.

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