



## MENTIS ENGINEERING

On-site Nitrogen (N<sub>2</sub>) gas generation solutions

# S-PSA-3-N2

## Nitrogen Generator Datasheet

MODEL  
**S-PSA 3**

MODEL FLOW / MODEL PURITY  
**17.3 Nm<sup>3</sup>/hr @ %99.9**

REVISION  
**ME-TK-2607**

DATE  
**2026-07-02**

### S-PSA Nitrogen Generators

S-PSA Nitrogen Generators use Pressure Swing Adsorption technology to separate nitrogen molecules from the other molecules in compressed air. As a result, high-purity nitrogen gas is produced at the generator outlet.

### How Do PSA Generators Work?

Air consists of approximately 21% oxygen, 78% nitrogen, 0.9% argon and trace gases. PSA nitrogen systems separate nitrogen from compressed air through Carbon Molecular Sieve adsorption cycles.

### Mentis's Unique S-PSA Technology

Mentis Engineering's Serial-PSA technology improves conventional PSA architecture with a two-stage process structure. In the first stage, compressed air is purified from moisture, particles, oil vapor and unwanted components that may affect process performance. In the second stage, nitrogen is separated from other gases through the CMS adsorption cycle. This architecture is designed for lossless and efficient air preparation, more stable purity, extended adsorbent lifetime and high-purity nitrogen generation.

### Nitrogen Gas Applications

#### Laser Cutting

High-purity assist gas for stable cutting and reduced oxidation risk.

#### Food Packaging

Inert atmosphere for MAP applications supporting extended shelf life.

#### Electronics Manufacturing

Controlled nitrogen atmosphere for soldering, PCB production and testing.

#### Chemical & Process

Continuous nitrogen supply for reactors, tanks and line inerting.

#### Heat Treatment

Controlled process atmosphere to help reduce oxidation risk.

#### Fire Prevention

Inerting systems designed to reduce oxygen concentration.

#### Pharma & Medical Packaging

Protective atmosphere applications to reduce moisture and oxygen exposure.

#### Metallurgy & Welding

Stable nitrogen generation for shielding gas and blanketing applications.

#### Oil & Gas

Line purging, pipeline sweeping and tank blanketing applications.

#### Plastics & Injection

Nitrogen usage for process stability and oxidation control.

#### Tire Inflation

Nitrogen filling applications for pressure stability and moisture control.

#### Laboratory & Analysis

On-site nitrogen for analytical instruments and controlled atmospheres.

### Technical Summary

#### PSA + CMS Technology

Oxygen, CO<sub>2</sub> and moisture are adsorbed by CMS; nitrogen gas is obtained on the product side.

#### Twin-Column Cycle

One column produces while the other regenerates; this cycle ensures continuous generation.

#### Integrated Desiccant Dryer

The average 15% air loss that may occur with external desiccant dryers is reduced to 0% through the integrated design.

#### Pressure Range

Standard generator outlet pressure can be configured between 1 - 10 bar(g).

#### Feed Air

ISO Class 1.4.1 compressed air quality and maximum +3°C dew point are required for stable

#### Control & Monitoring

PLC/HMI, purity measurement, digital flowmeter, consumption graphs and Modbus / RTU enable





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### Technical Specifications

|                            |                            |
|----------------------------|----------------------------|
| Model                      | S-PSA-3-N2                 |
| Model purity               | %99.9                      |
| Model flow                 | 17.3 Nm <sup>3</sup> /hr   |
| Nitrogen Pressure          | 1.0 - 10.0 bar(g)          |
| Nitrogen Dew Point         | -40 °C                     |
| Air / N <sub>2</sub> Ratio | 3.212                      |
| Required Compressed Air    | 55.7 Nm <sup>3</sup> /hr   |
| Power options              | 110-240V AC 50/60 Hz 150 W |
| PLC / HMI:                 | 7"                         |

### Requirements

|                              |                        |
|------------------------------|------------------------|
| Required feed air pressure   | 6.0 - 11.0 bar(g)      |
| Pressure drop                | 1.2 bar(g)             |
| Minimum nitrogen tank volume | 400 L                  |
| Maximum Feed Air Dew Point   | +3°C                   |
| Air Quality                  | ISO 8573-1 Class 1.4.1 |
| Ambient Temperature Range    | -5 / +50°C             |

### Reference Conditions

|                               |                        |
|-------------------------------|------------------------|
| Ambient pressure              | 1013 mBar              |
| Ambient temperature           | 20°C                   |
| Compressed air inlet pressure | 7.5 bar                |
| Compressed air inlet quality  | ISO 8573-1 Class 1.4.1 |

### Advantages

#### Low Gas Generating Cost

On-site generation helps reduce cylinder, liquid tank, filling and logistics costs.

#### Plug & Play Single Skid Design

Integrated dryer, filtration, PLC/HMI, analyzer and flowmeter infrastructure provide a compact ready-to-install system architecture.

#### Product Gas Quality

Nitrogen purity and process data can be continuously monitored, recorded and verified.

#### Easy Installation

Fast commissioning is supported with only suitable compressed air quality and electrical supply.

#### Heavy Duty Construction

Skid frame and durable process components are used for industrial site conditions.

#### Low dBa Levels

Exhaust silencing muffler and optimized valve venting are designed for low sound levels.

#### Low Energy Consumption

Properly selected S-PSA capacity and optimized air consumption support efficient operation.

#### Fully Automatic Unattended Operation

PLC-controlled operation, alarm management and automatic standby reduce operator intervention.

#### Highly Reliable

High cycle life valves, premium adsorbent media and industrial design provide stable production.

#### Low Maintenance

Simple process architecture, smart maintenance alarms and service infrastructure reduce maintenance effort.

#### No Hazardous Storage

On-site production reduces the need for high-volume cylinder or cryogenic storage.

#### Digital Traceability

PLC/HMI and sensor infrastructure allow process values to be monitored and reported easily on site.

### Nitrogen Purity / Nitrogen Flow Chart - S-PSA-3-N2

#### Nitrogen flow

|          |      |
|----------|------|
| %95      | 46.8 |
| %96      | 43.3 |
| %97      | 39.5 |
| %98      | 34.7 |
| %99      | 27.9 |
| %99.5    | 23.5 |
| %99.9    | 17.3 |
| %99.95   | 13.2 |
| %99.99   | 10.1 |
| %99.999  | 6.6  |
| %99.9995 | 6.0  |

#### Compressed air requirement

|          |      |
|----------|------|
| %95      | 86.6 |
| %96      | 83.4 |
| %97      | 80.3 |
| %98      | 75.8 |
| %99      | 67.5 |
| %99.5    | 61.6 |
| %99.9    | 55.7 |
| %99.95   | 45.4 |
| %99.99   | 43.3 |
| %99.999  | 36.4 |
| %99.9995 | 37.5 |



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### Mechanical and Dimensional Data

|                                        |                   |
|----------------------------------------|-------------------|
| Adsorber diameter                      | 323 mm            |
| Adsorber body height                   | 850 mm            |
| Generator vessel volume                | 69.6 L            |
| W x L x H (mm)                         | 1400 x 900 x 1715 |
| Inlet connection                       | 1"                |
| Outlet connection                      | 3/4"              |
| Product gas outlet for selected purity | 1/2"              |
| DN size                                | DN15              |

### Integrated Desiccant Dryer Details

|                               |                     |
|-------------------------------|---------------------|
| Dryer vessel volume           | 6.67 L x2 = 13.34 L |
| Adsorbent type                | Activated Alumina   |
| Total active alumina quantity | 9.34 kg             |
| Dryer body height             | 850 mm              |
| Dryer maximum pipe size       | 1"                  |
| Dryer diameter                | 4" / 114.3 mm       |
| Dryer inner pipe size         | 1"                  |

### PSA Adsorber Vessel Details

|                            |                           |
|----------------------------|---------------------------|
| Adsorber diameter          | 323 mm                    |
| Dished-end thickness       | 6 mm                      |
| Adsorber body height       | 850 mm                    |
| Shell thickness            | 6 mm                      |
| Dished-end volume          | 6.5 L                     |
| Shell volume               | 64.6 L                    |
| Single-column total volume | 77.5 L                    |
| Twin-column total volume   | 155.1 L                   |
| CMS quantity               | 97.7 kg                   |
| CMS brand / origin / model | Kuraray / Japan / GN-UC-H |

### Standard Features

- Continuous and stable nitrogen generation with N<sub>2</sub> S-PSA technology.
- Two-stage Serial-PSA process architecture: pre-treatment + nitrogen separation cycle.
- Integrated self-desiccant air dryer system.
- Integrated 0.1 and 0.01 micron line filtration.
- Automatic shutdown / startup / standby operating mode.
- High cycle life pneumatic / electric actuated process valves.
- O<sub>2</sub> / N<sub>2</sub> analyzer with calibration kit.
- Pressure safety valve and nitrogen pressure regulator.
- PLC control system and 7" color touch HMI.
- Integrated volumetric nitrogen flow display via digital flowmeter.
- 24/7 pressure, purity, consumption and trend recording infrastructure.
- Smart maintenance and service alarm system.
- LAN / Ethernet connection infrastructure.
- Carbon steel skid construction.
- Exhaust silencing muffler for reduced vent noise.
- Highest performance adsorbent media / CMS filling.
- Stainless construction for all valves and process connections.
- 2-year warranty; service and spare parts support.

### Optional Features

- Dew point sensor.
- Inlet cyclone filter.
- Inlet carbon filter.
- Outlet sterile / bacterium filter.
- Nitrogen buffer tank.
- Remote monitoring and control via Ethernet connection.
- Containerized or single-skid turnkey system.
- 650W UPS uninterruptible power supply.

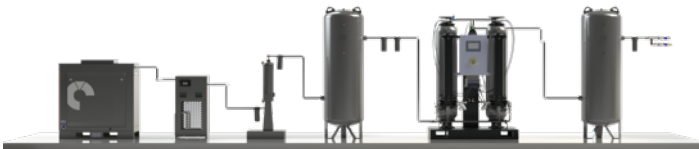


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### Installation View

The installation image below represents the general process layout between compressor, dryer, filtration, air receiver, PSA generator and product gas receiver.



### Standards Compliance

- CE Conformity (Machinery Directive 2006/42/EC)
- EMC Directive 2014/30/EU
- LVD Directive 2014/35/EU
- PED 2014/68/EU - pressure equipment conformity
- EN ISO 12100 - machinery safety risk assessment
- EN 60204-1 - machine electrical safety
- ISO 8573-1 Class 1.4.1 - feed air quality
- ISO 9001:2015 quality management system
- Optional: ASME, UL, EAC and project/country-specific certifications

### Energy / CO<sub>2</sub> Emission Savings by Nitrogen Purity

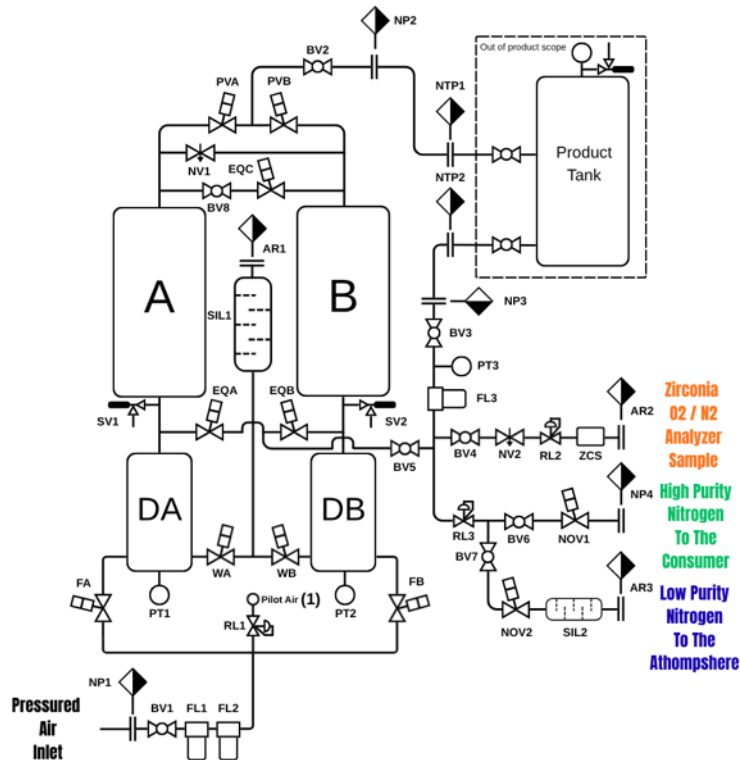
| Nitrogen Purity | Energy / CO <sub>2</sub> Emission Savings |
|-----------------|-------------------------------------------|
| 95%             | 76%                                       |
| 98%             | 70%                                       |
| 99%             | 66%                                       |
| 99.5%           | 60%                                       |
| 99.9%           | 51%                                       |
| 99.99%          | 27%                                       |
| 99.995%         | 3%                                        |

### Automation and Mentis S-PSA Software

- Monitoring screen infrastructure for nitrogen pressure, nitrogen purity, instantaneous consumption flow and outlet dew point.
- Recording and analysis of pressure, purity, consumption and historical process data.
- 24/7 continuous purity measurement and alarm tracking.
- Instantaneous and total consumption monitoring via digital flowmeter.
- Consumption charts, trend analysis and historical data records.
- Smart scheduled maintenance alerts designed to reduce unforeseen service costs.
- HMI language interface options in English, Turkish, Russian, Arabic and Spanish.
- Modbus / RTU and LAN / Ethernet communication infrastructure.

## P&ID Page

The reference process and instrumentation diagram for the selected product family is shown below.



## Model

|                   |                                  |
|-------------------|----------------------------------|
| Model             | S-PSA-3-N2                       |
| Model purity      | %99.9                            |
| Model flow        | 17.3 Nm <sup>3</sup> /hr @ %99.9 |
| Nitrogen Pressure | 1.0 - 10.0 bar(g)                |
| Air Quality       | ISO 8573-1 Class 1.4.1           |

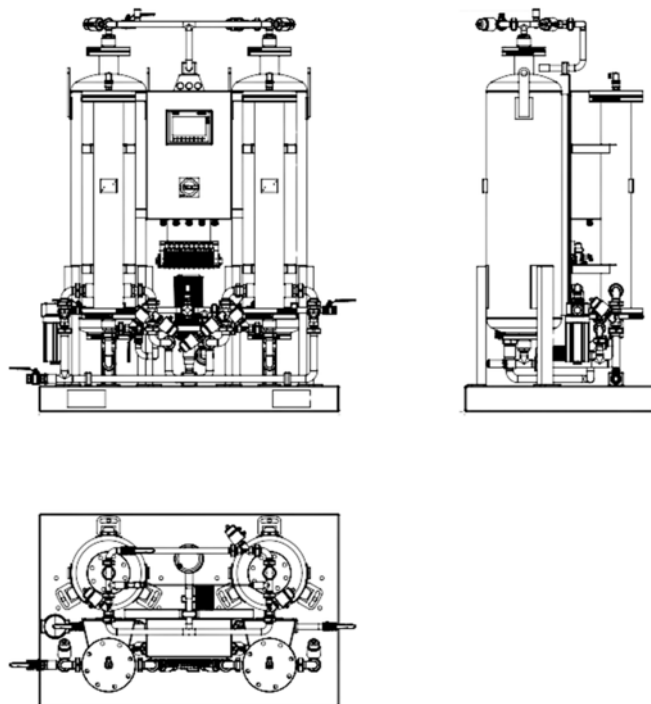


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### General Arrangement and Dimension Drawing

The drawing below shows the common mechanical design reference for all generators. All dimensions are in mm.



### Dimension and Connection Summary

|                            |                        |
|----------------------------|------------------------|
| Model                      | S-PSA-3-N <sub>2</sub> |
| W x L x H (mm)             | 1400 x 900 x 1715 mm   |
| Inlet connection diameter  | 1"                     |
| Outlet connection diameter | 3/4"                   |

The drawing is schematic for general arrangement purposes; final manufacturing dimensions shall be verified with the approved project drawing. Drawings may vary by +/- 5% depending on the project.

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N<sub>2</sub> S-PSA

### Mentis Engineering Contact Information

Please contact us for further information, quotation support, site evaluation and technical assistance.

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