# Spray Dryer

Compact & Economical

## ADL311-A/311S-A

Evaporated water: Max. 1,300mL/h | Temp. control range: 40°C~ 220°C | Sample flow: Variable up to 26mL/min | Spray nozzle (selectable): Tow-way nozzle | Display language: Japanese, English, Chinese

## Easily micronize liquid samples with a spray dryer.

**ADL311-A : For aqueous soluble samples**
**ADL311S-A: For aqueous soluble samples and orgnic solvent***

* (When organic solvent is used, a GAS410 organic solvent recovery unit is required.)

- Easy setup, easy operation
- Suitable for heat sensitive samples. High heat is not directly applied to dry, fine powder
- Obtain contaminant free fine powder which is not oxidized and contains minimal moisture
- Direct drying of solution or solution liquid into fine powder. No pre- or post processes such as filtration, separation, or pulverization required
- Safe and explosion free working is guaranteed in combination with GAS410 due to oxygen & pressure control (ADL311S-A only)
- Organic solvents are recovered in a closed loop to protect the environment to enable minimized pollution
- Easy operation with one-touch detachable mechanism for drying chamber and cyclone
- An arm jack is equipped as standard for easy installation and removal of glassware attachments
- A service outlet (max.2A) and a sample stand are equipped as standard for connecting a magnetic mixer for stirring suspended liquid samples
- Unique peristaltic pump, nozzle cooling mechanism, pulse jet mechanism and a nozzle knocker for stable spray drying
- ADL311SA is highly mobile on wheels, or usable with shorter height as a bench top unit by removing the movable caster

## Control Panel

Inlet temperature, outlet temperature, and drying air amount are digitally displayed. Setting is made on the touch panel that allows operation settings, operation status displayas well as error display, and settings of various operation conditions. as well as error display, and settings of various operation conditions.

The length of the power cord is about 2m outside the unit.
*1 External dimensions do not include projections.

- The air compressor used in this system must have a pressure regulator with air flow of 20 L/min or more and discharge pressure of 0 to 294kPa (3kg/cm$^2$).
- Please note that this equipment is not explosion-proof for use with flammable or explosive substances.

### Specifications

| Product code | 212737 | 212738 |
|---|---|---|
| **Model** | **ADL311-A** 〈ADL311+GF300〉 | **ADL311S-A** 〈ADL311S+GF300〉 |
| Supported samples | Water soluble samples | Water soluble samples and orgnic solvent samples |
| Evaporated water amount | Max. 1300mL/h | |
| Spraying system | Two-way nozzle, Nozzle No. 1A as standard (0.4mm) | |
| Temp. adjusting range | 40 to 220°C (inlet temperature), 0 to 60°C (Outlet temperature) | |
| Temperature adjusting accuracy | Inlet temperature±1°C | |
| Drying air amount adjusting range | 0 to 0.7m$^3$/min | |
| Spray air pressure adjusting range | 0 to 0.3MPa | |
| Liquid sending pump flow rate range | 0 to 26 mL/min | |
| Spray air line washing function | Spraying at the nozzle tip, Manual pulse jet system | |
| External output | Inlet temperature, Outlet temperature, Temperature outlet (4-20 mA) | |
| Temperature adjusting device | PID digital temperature adjusting device | |
| Touch panel | Blower, Heater, Liquid sending pump, Pulse jet switch, error display | |
| Control select switch | Inlet temperature, Outlet temperature control switch (Outlet temperature control is conditional) | |
| Temperature sensor | K-thermocouple | |
| Heater | 2.0kW (at200V) to 2.88kW (at240V) | |
| Liquid sending pump | Fixed amount peristaltic pump | |
| Spraying air pump | For water soluble samples air compressor is used (sold separately). | For organic solvent samples the integrated compressor in GAS410 is used (No separate air compressor required). |
| Service outlet | For stirrer: AC100V, MAX. 2A | |
| Suction blower | Bypass blower | |
| Filter | Suction filter, Exhaust filter | |
| Recovery of solvent | – | Solvent recovery unit GAS410 (Sold separately) is used |
| Spray nozzle cooling mechanism | Connector: nipple×2, O.D.: ø10.5mm | |
| Spray air connection diameter | Nipple diameter: ø7mm | |
| Spray air pressure | Bourdon tube: 0.3 MPa | |
| Exhaust connecting diameter | ø50mm | |
| Safety function | Inlet / Outlet temperature overheat, Sample feed reverse rotation mechanism, Over current electric leakage breaker, Nozzle connection error | |
| External dimensions*1 | W580×D420×H1,125 mm | |
| Weight | 80kg | |
| Power supply (50/60 Hz) rated current | AC220V 17A, AC240V 18A switching of terminals necessary | |
| Accessories | Silicon tubes (with a stopper)×2, Exhaust duct (with one hose band)×1, Outlet temperature sensor, Spray air tube, Sample box, Static electricity removal earth, "Tetron" braided tube hose 5m (with two hose bands) | |
| Necessary utility | 28L/min. air volume and 0~294kPa(3kg/cm$^2$) compressed air is required | |

Example of installation:
ADL311S-A + Stand with casters (option) + GAS410

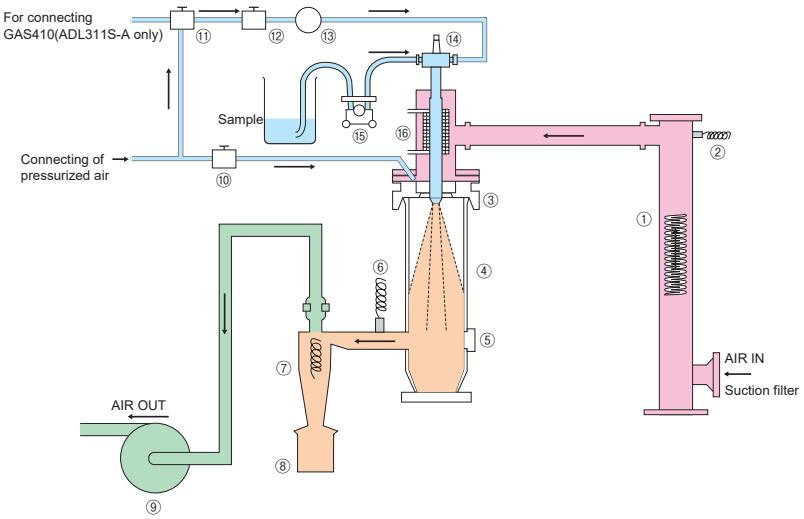
## Example of implementation (spray dryer ADL311-A)

| Sample name | Composition (%) | Inlet temp. (°C) | Outlet temp. (°C) | Dry air amount ($m^3$/min) | Spray air pressure (MPa) | Sent amount of sample liquid (g/min) | Sample recovery rate (%) |
|---|---|---|---|---|---|---|---|
| Dextrin (solution) | 10 | 150 | 80 | 0.4 | 0.1 | 6.1 | 66 |
| Dextrin (emulsion) | 40 | 150 | 80 | 0.4 | 0.1 | 5.1 | 63 |
| Oxidized titanium (suspended liquid) | 10 | 150 | 85 | 0.42 | 0.1 | 5.3 | 50 |
| Soy sauce | 50 | 130 | 75 | 0.36 | 0.1 | 5.1 | 60 |
| Salt | 10 | 145 | 85 | 0.38 | 0.1 | 5.3 | 52 |

## Repeatability of spray drying test (spray dryer ADL311-A)

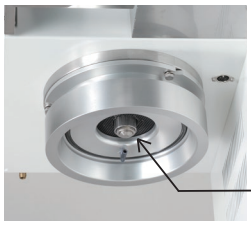
| Test No. | Sample name | Sample density (%) | Drying conditions | | | | | | | Yield (g) | Recovery rate (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Inlet temp. (°C) | Outlet temp. (°C) | Dry air amount ($m^3$/min) | Spray air pressure (MPa) | Test sample amount (g/min) | Sent amount of sample liquid (g/min) | Test time (min) | | |
| 1 | Coffee solution | 5.00 | 150 | 75 | 0.45 | 0.15 | 93.1 | 3.1 | 30 | 4.3 | 92.4 |
| 2 | | 5.00 | 150 | 75 | 0.45 | 0.15 | 93 | 3.1 | 30 | 4 | 86 |
| 3 | | 5.00 | 150 | 75 | 0.45 | 0.15 | 91.4 | 2 | 30 | 4 | 87.5 |
| 4 | | 5.00 | 150 | 75 | 0.45 | 0.15 | 84.9 | 2.8 | 30 | 3.7 | 87.2 |
| 5 | | 5.00 | 150 | 75 | 0.45 | 0.15 | 83.8 | 2.8 | 30 | 3.7 | 88.3 |

# Diagram




| No. | Part name | No. | Part name |
|---|---|---|---|
| ① | Heater | ⑨ | Blower, exhaust filter |
| ② | Inlet temperature sensor | ⑩ | Solenoid valve |
| ③ | Distributor | ⑪ | 3-way solenoid valve (ADL311S-A only) |
| ④ | Drying chamber | ⑫ | Needle valve |
| ⑤ | Cap (outside air inlet) | ⑬ | Pressure meter |
| ⑥ | Outlet temperature sensor | ⑭ | Spray nozzle |
| ⑦ | Cyclone | ⑮ | Liquid sending pump |
| ⑧ | Product collecting container | ⑯ | Nozzle cooling mechanism connecting port |

# Spraying Nozzle

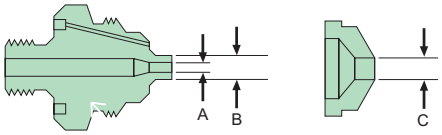


The tip of the nozzle comprises of a nozzle for liquid and a nozzle for gas.

Two-way nozzle system

Nozzle for liquid(F)

Nozzle for gas(A)




| Product code | Model | Nozzle No. | Size (μm) |
|---|---|---|---|
| 000K1A | 1A (Standard) | (F) 1650 | A 406 B 1270 |
| | | (A) 64 | C 1626 |
| 281298 | 1 | (F) 2050 | A 508 B 1270 |
| | | (A) 64 | C 1626 |
| 281290 | 2A | (F) 2050 | A 508 B 1270 |
| | | (A) 70 | C 1778 |
| 281291 | 2 | (F) 2850 | A 711 B 1270 |
| | | (A) 70 | C 1778 |
| 281292 | 3 | (F) 2850 | A 711 B 1270 |
| | | (A) 64 | C 1626 |

Particle sizes may vary on samples used and parameter settings.

# Piping

ADL311S-A + Stand with casters (option)+GAS410

# Applications

- Food and medicinal products
  Powdered milk, egg yolks, soy sauce, coffee, starches, proteins, hormones, serums, antibiotics, enzymes, fragrances, essences, etc.
- Organic chemistry
  Waxes, dies, cleaning agents, surface acting agents, agricultural chemicals, antiseptic agents, synthesized resins, pigments, etc.
- Inorganic chemistry
  Ferrites, ceramics, photocopy toners, magnetic tapes materials, photosensitive materials, various industrial chemicals, waste fluid samples, etc.

## Optional items

| No. | Product Name | Product Code |
|---|---|---|
| ① | *Stand with caster*1 | 212783 |
| ② | Fine powder recovery cyclone | 212780 |
| ③ | Safety cover | 212784 |
| ④ | *Dry air flow meter (voltage type) | 212793 |
| ⑤ | Static removal brush set | 212788 |
| ⑥ | *Inlet/outlet temperature recorder (3-dot) | 212792 |
| ⑦ | Viton packing for cyclone inlet/outlet (1 set of 2 types) | 212781 |
| ⑧ | Teflon packing for cyclone inlet/outlet (1 set of 2 types) | 212782 |
| ⑨ | Regulator | 212789 |
| ⑩ | Supply air filter box (for 0.3 micro meter collection) | 212790 |

*Please specify when ordering main unit
*1 When connecting the organic solvent recovery unit to ADL311-A, the stand with caster is required.


Sintech Scientific (S.E.A.) Pte Ltd
No. 194 Pandan Loop #04-11
Pantech Business Hub
Singapore 128383
Tel : 65-67790007
Fax : 63520877, 63520885
Email :sales@sintechscientific.com
Website : www.sintechscientific.com