

Spray Dryer

Compact & Economical

ADL311SA

Water evaporation rate Max. 1300mL/h

Temp. control range 40~220°C

Sample flow Max. 26mL/min.

Spray nozzle (selectable) Nozzle for liquid Nozzle for gas

Customer benefit Low cost & economical

Easily micronize liquid samples with a spray dryer.



ADL311SA: For aqueous soluble samples
(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
- 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

Specifications

Model	ADL311SA
Supported samples	Water soluble samples
Evaporated water amount	Max. 1300mL/h
Spraying system	Two-way nozzle, Nozzle No. 1A as standard (0.4mm)
Temp. adjusting unit setting range	40 to 220°C (inlet temperature), 0 to 98°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: AC115V, 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 x 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 size	W580 x D420 x H1125 mm
Weight	80kg
Power supply (50/60 Hz) rated current	AC220V 17A, AC240V 18A switching of terminals necessary
Accessories	Silicon tubes (with a stopper) x 3, exhaust duct (with one hose band) x 1, outlet temperature sensor, spray air tube, sample box, static electricity removal earth, "Teflon" braided tube hose 5m (with two hose bands)

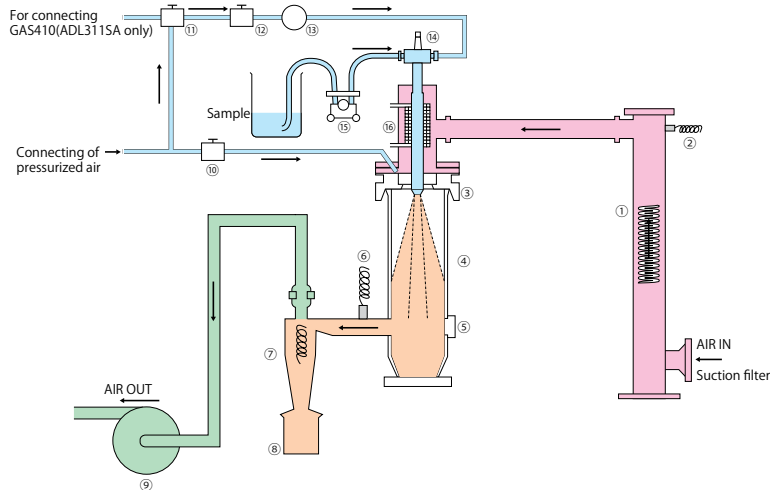


Example of installation: ADL311SA + GAS410

Control Panel



Diagram



No.	Part name	No.	Part name
(1)	Heater	(9)	Blower
(2)	Inlet temperature sensor	(10)	Solenoid valve
(3)	Distributor	(11)	3-way solenoid valve (ADL311SA only)
(4)	Drying chamber	(12)	Needle valve
(5)	Cap	(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.

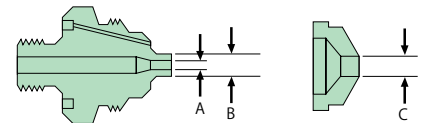
Two-way nozzle system



Easy to take apart for cleaning to prevent contamination

Nozzle for liquid(F)

Nozzle for gas(A)



Model	Nozzle No.	Size (μm)
1A (Standard)	(F)1650	A 406 B 1270
	(A)64	C 1626
	(F)2050	A 508 B 1270
1	(A)64	C 1626
	(F)2050	A 508 B 1270
2A	(A)70	C 1778
	(F)2850	A 711 B 1270
2	(A)70	C 1778
	(F)2850	A 711 B 1270
3	(A)64	C 1626
	(F)2850	A 711 B 1270

Particle sizes may vary on samples used and parameter settings.

Piping



ADL311SA+GAS410

Optional items

Product Name	Product Code
Fine powder recovery cyclone	212780
Safety cover	212784
Static removal brush set	212788
Viton packing for cyclone inlet/outlet (1 set of 2 types)	212781
Teflon packing for cyclone inlet/outlet (1 set of 2 types)	212782
Airfilter + Mist separator + Regulator set	212789
Supply air filter box (for 0.3 micro meter collection)	212790
Air compressor	SL100-8

Example of implementation (spray dryer ADL311SA)

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 ADL311SA)

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

Applications

- Food and medicinal products
Powdered milk, egg yolks, soy sauce, coffee, starches, proteins, hormones, serums, antibiotics, enzymes, fragrances, essences, etc.
- Organic chemistry
Waxes, dyes, 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.