

## Spray Dryer

**ADL311-A/311S-A**

Evaporated water Max. 1,300 mL/h	Temp. adjustment range 40 to 220deg.C
Sample flow Variable up to 26 mL/min.	Spray nozzle (selectable) For liquid/gas

### Easily grinds sample into fine powder with the spray drying system



#### **ADL311-A:**

Model dedicated for water soluble sample

#### **ADL311S-A:**

Model supporting water soluble and organic solvents\*

(\*When organic solvent is used, a GAS410 type organic solvent recovery unit will be necessary.)

- Because this product applies heat on fine grain sample instantly and does not apply high temperature on dry fine powder sample itself, samples unstable to heat can be reliably changed into even fine powder.
- Prepared fine powder will not be oxidized and contains minimum water and is contamination-free.
- Drying is made directly from solution or suspension liquid sample into fine powder, which

does not need pre- or post processes such as filtration, separation, or pulverization necessary in the conventional drying method and can be used without concern of contamination during a series of operations.

- Model ADL311S-A is available to support organic solvent by connecting ADL311-A dedicated for water soluble samples and GAS410 solvent recovery unit to the standard model ADL.
- Employment of a one-touch detachable mechanism in the drying chamber and the cyclone further improves ease of operation.
- An arm jack is equipped as standard for useful installation and removal of attachments.
- A service outlet (max.2A) and a sample stand are equipped as standard for connecting a magnetic mixer for stirring suspended liquid sample.
- Employment of a unique peristaltic pump, nozzle cooling mechanism, pulse jet mechanism, and a nozzle knocker realize stable spray drying.
- Global product lineup with multi-language multiple power supply and touch panels in Japanese, English, and Chinese. .

## ■ Specifications

Product code		212737	212738
Model		ADL311-A	ADL311S-A
Supported samples		Water soluble samples	Water soluble and organic solvent
Performance	Evaporated water amount	Max. 1300 mL/h	
	Temp. adjusting unit setting range	40 to 220deg.C (inlet temperature), 0 to 60deg.C (outlet temperature)	
	Temperature adjusting accuracy	Inlet temperature±1deg.C	
	Drying air amount adjusting range	0 to 0.7 m3/min	
	Spray air pressure adjusting range	0 to 0.3 MPa	
	Liquid sending pump flow rate range	0 to 26 mL/min	
Configuration	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 temp. control is conditional.)	
	Temperature sensor	K-thermocouple	
	Heater	2.0 kW (at 200V) to 2.88 kW (at 240V)	
	Liquid sending pump	Fixed amount peristaltic pump	
	Spraying air pump	Spraying air compressor (sold separately) is used.	Spraying air compressor (sold separately) is used. GAS410 integrated compressor is used when GAS410 is connected.
	Service outlet	For stirrer: AC100V, MAX2A	
	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.:φ10.5 mm	
	Spray air connection diameter	Nipple diameter:φ7 mm	
	Spray air pressure	Bourdon tube: 0.3 MPa	
Exhaust connecting diameter	φ50 mm		
Safety function		Inlet/outlet temperature overheat, sample feed reverse rotation mechanism, over current electric leakage breaker, nozzle connection error	
Standards	External size	W580 x D420 x H1,125 mm	
	Weight	80 kg	
	Power supply (50/60 Hz) rated current	AC200V 16A (20A)(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, "Tetron" braided tube hose 5m (with two hose bands)	

### ■ Control panel



### ■ Example of installation



ALD311S-A + GAS410 +  
stand with caster wheels  
(optional)

### ■ Piping

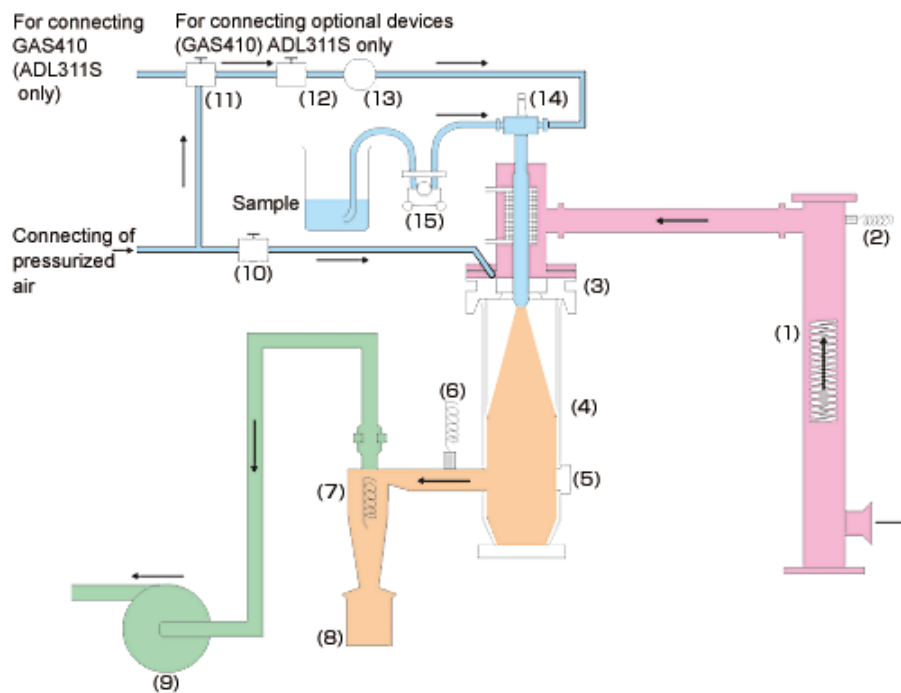


ALD311S-A+GAS410

### ■ Applications

- Food and medicinal products Powder milk, egg yolk, soy sauce, coffee, starch, protein, hormone, serum, antibiotics, enzymes, fragrant materials, essences, etc.
- Organic chemistry Wax, die, cleaning agent, surface acting agent, agricultural chemical, antiseptic agent, synthesized resin, pigments, etc.
- Inorganic chemistry Ferrite, ceramics, photocopy toner, magnetic tape materials, photosensitive materials, various industrial chemicals, waste fluid of samples, etc.

### ■ System diagram

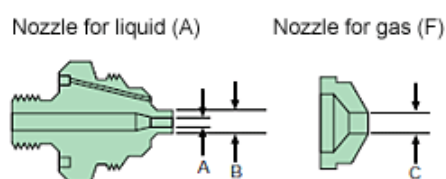


No.	Part name	No.	Part name
(1)	Heater	(9)	Blower
(2)	Inlet temperature sensor	(10)	Solenoid valve
(3)	Distributor	(11)	3-way solenoid valve (ADL311S only)
(4)	Drying chamber	(12)	Needle valve
(5)	Cap	(13)	Pressure meter
(6)	Outlet temperature sensor	(14)	Spray nozzle
(7)	Cyclone	(15)	Liquid sending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

## ■ Spray nozzle



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



Product code	Model	Nozzle No.	Size (μm)
281297	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

## ■ Example of installation (spray dryer ADL311-A)

Sample name	Composition (%)	Inlet temp. (deg.C)	Outlet temp. (deg.C)	Dry air amount (m3/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. (deg.C)	Outlet temp. (deg.C)	Dry air amount (m3/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	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

### ■ Optional parts

Product name	Product code
* Caster stand	212783
Fine powder recovery cyclone	212780
Safety cover	212784
* Dry air flow meter (voltage system)	212793
* Inlet/outlet temperature recorder (3-dot)	212792
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
Regulator	212789
Supply air filter box (for 0.3 micro meter collection)	212790

Note : The item marked " \* " in the column of "Remark" shall be ordered together with the main unit.

- The pressurizing unit for the unit shall be a unit with a pressure reducing valve of blow air amount of 25 L/min or more and be stable at a discharge pressure of 0 to <sup>L</sup> 294 kPa (3 kg/cm<sup>2</sup>).  
Recommended product: Hitachi silent air compressor SC-820 (pressure reducing valve included).