Spray Dryer, Versatile Type

CE Certification CE

GB211C-A

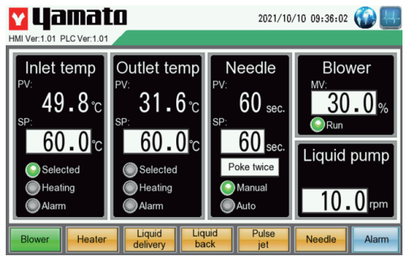
Water evaporation	Max. 1,500mL/h
Temp. adjustment range	40~220°C(Inlet) 0~100°C(Outlet)
Spray air flow adjustment range	0~30L/min
Spray nozzle (selectable)	Tow-way nozzle
Power supply	AC 200~230V
Display language	Japanese, English, Chinese

The new intelligent spray dryer with rich functions and easy operation.

Features

- Instantaneous heating of granular samples ensures that even thermally stable samples are not uniformly finely powdered.
- The sprayed micro-powder is low in moisture, non-oxidizing and non-contaminating.
- Since the sample is dried directly from the solvent and suspension into a micronized powder, there are fewer pre-treatment and post-treatment operations, such as filtration, separation and pulverization, that are traditionally associated with powder production, and contamination during these operations is avoided.
- By connecting the organic solvent recovery unit GAS411C, samples containing organic solvents can be handled professionally and safely.
- The GF200 pelletizing unit, available separately, can be used as a flow-through dry pelletizer.
- The machine is equipped with a motorized lift for easy installation and dismantling of the ancillary equipment.
- The machine is equipped with a power outlet (2A) for supplying power to the stirrer.
- The machine is equipped with a power outlet (2A) to supply power to the stirrer to facilitate sample feeding while stirring the suspension.
- The unique peristaltic pump, nozzle cooling mechanism, pulsed nozzle cleaning mechanism, and anti-clogging stabbing needle are used to achieve a wide variety of spray conditions and stability.

Operation Screen



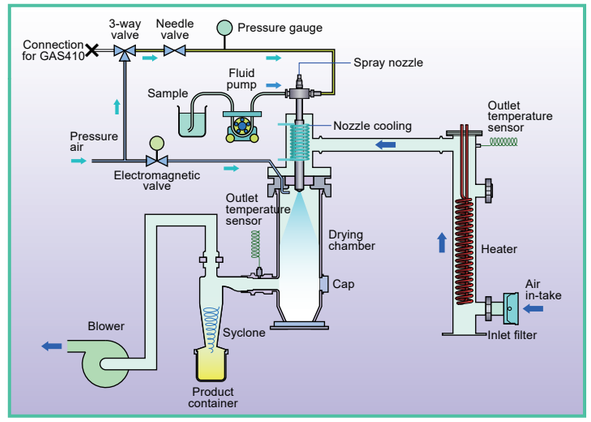
- The new 7-inch touch screen control panel is available in Chinese, Japanese and English for easy operation.
- Both fluid nozzles and tri-fluid nozzles can be used.
- Experimental data recording and storage. (optional)
- Both two-fluid and three-fluid nozzles are available.
- Remote control is available.
- High power heater greatly improves the temperature arrival time, and the temperature setting range is wider to meet more sample experiments.
- Widely used in food, pharmaceutical, new material research and development and sample coating.

Specifications

Model		GB211C-A
Corresponding sample		Water soluble & organic solvents (when GAS411C is connected)
Performance	Water evaporation	Max.1,500mL/h
	Temperature adjustment range	40～240℃ (Inlet temp.), 0～100℃ (Outlet temp.)
	Temperature accuracy	±1℃
	Adjusting range for drying air	0～1.0m³/min
	Spray air flow adjustment range	0～30L/min
	Nozzle air pressure adjustment range	0～0.6MPa (Adjustable)
Configuration	Nozzle washing function	Auto clean out needle, pulse jet cleaning
	Temperature output	Inlet temp., Outlet temp. (4～20mA)
	Temperature control	Multi-stage PID control
	Touch screen	PID digital temperature adjusting device
	Touch panel	Temperature adjustment, blower, heater, liquid feed pump, switch for pulse jet, automatic needle poking, alarm display, operation
	Control select switch	Select inlet temperature, outlet temperature control switching
	Temperature sensor	PT100
	Heater	3.2KW
	Sample feed pump	One touch pedestal type
	Spraying from Nozzle	Use air compressor for spraying (sold separately) or use GAS411C built-in compressor (N_2) when connected to organic solvent recovery device GAS411C (sold separately)
	Service outlet	For stiller etc. : AC220V, 2A
	Blower	Tube blowers (Can be switched to suction or push-out)
	Filter	Suction filter, exhaust filter
	Solvent recovery	Use of solvent recovery unit GAS411C (sold separately)
	Spray nozzle cooling structure	Fitting×2, outer diameter ϕ10.5mm (optional cooling water circulation device CF312L-B)
	Air connection for spraying	Outside diameter of connector, ϕ7mm
	Spraying air pressure	0.3MPa
	Exhaust connection	Diameter ϕ50mm
Safety function		Inlet and outlet temperature overheating, Pump reversal function, Overcurrent leakage protection switch, Nozzle connection abnormality (when connected to GAS411C)
Standards	External dimensions	W760×D420×H1,350mm
	Weight	110kg
	Power supply	AC200～230V 50/60Hz, 16～18A
Accessories		2 fluid supply hoses, 1 exhaust hose (with 1 hose tie), Exhaust adapter, Outlet temperature sensor, fuse (250V 2A), De-static cable, Inlet hose 5m (with 2 hose ties), Nozzle adapter bushing, Stand assembly, Protective cover (COV30)
Option device		GWS410 (exhaust gas cleaning equipment), External filter, Dehumidification equipment, USB data storage, Various nozzle sizes

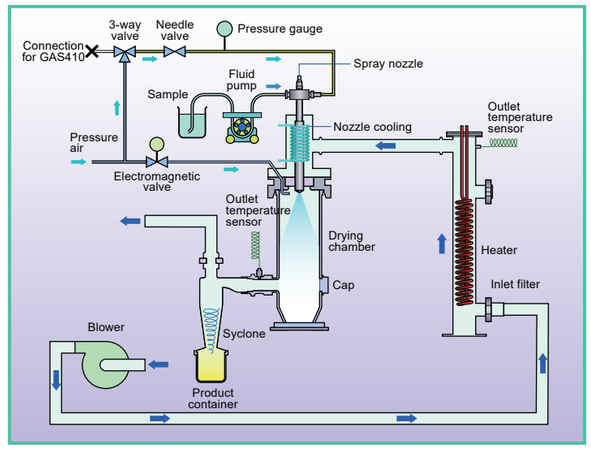
System Diagram

Suction method



Push-Out method

Method can easy to change



Fluid Nozzle

New 2 Fluid Nozzle

New 3 Fluid Nozzle (Option)

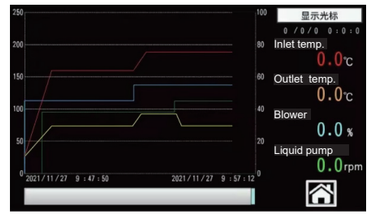
Setting Example

GB211C-A+GAS411C
Organic solvent recovery unit system

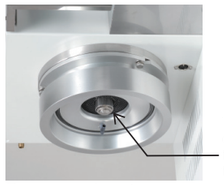
Operability

The disassembly and cleaning of the drying chamber, cyclone separator, and product trap container is done in a quick-insertion way, which can be easily done.

Operation Curve Data



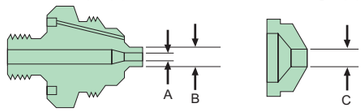
Spraying Nozzle



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)
281297	1A	(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 (Standard)	(F) 2850	A 711 B 1270
		(A) 64	C 1626

External Filter Unit (Option)

with air blow mechanism

- When installed in the exhaust, it can effectively filter the sample body that is not fully recovered, and achieve the secondary recovery purpose.
- When installed in the air inlet, it can effectively filter.
- When installed in the air inlet, it can effectively filter the impurity particles in the inhaled air to prevent contamination of the sprayed sample.

Granulator, Versatile Type

CE Certification CE

GB211C-B

Water evaporation	Max. 1,500mL/h
Temp. adjustment range	40~220°C(Inlet) 0~100°C(Outlet)
Spray air flow adjustment range	0~30L/min
Spray nozzle (selectable)	Tow-way nozzle
Power supply	AC 200~230V
Display language	Japanese, English, Chinese

Spray dryer for powder granulation and wet powder drying, multi-purpose and effective space saving.

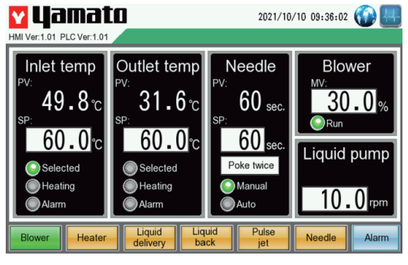
Features

- This unit utilizes a flowing layer to granulate powders and dry wet powders.
- It is a combination of the main unit GB211C and the accessory GF200, a flow layer drying and granulation unit.
- The drying chamber is made of ultra-hard glass, which allows observation of the flow layer status and spray status.
- In addition, it is easy to verify the data of flow meter, spray pressure gauge, inlet temperature and outlet temperature.
- With the GF301 spraying accessory, both spraying and fluid bed granulation can be used, which is very expandable and multi-purpose.
- 7-inch large touch screen, Chinese / Japanese / English language options, simple and convenient operation.
- Automatic lifting function makes the installation and removal of drying chamber more convenient.
- Experimental data can be recorded and stored (optional function).
- Temperature zoning control for faster and more stable temperature rise.
- High power heater greatly improves the temperature arrival time, and the temperature setting range is wider, which can meet more sample experiments.
- Widely used in the research and development of food, pharmaceuticals, new materials and sample coating.

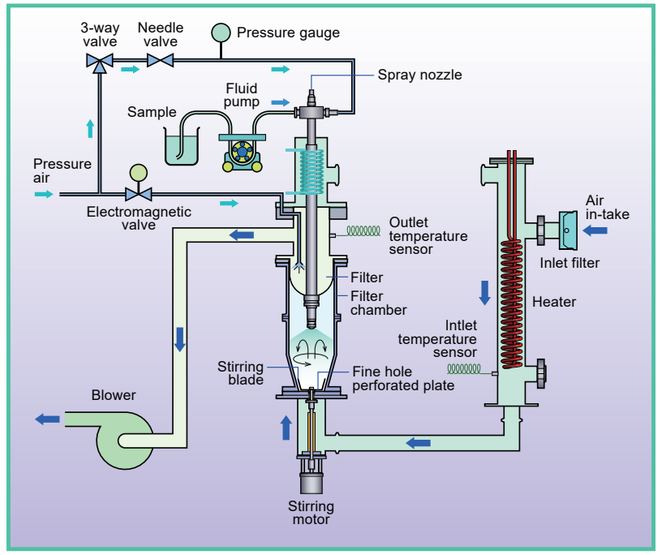
Specifications

Model		GB211C-B
Performance	Water evaporation	Max.1,500mL/h
	Temperature adjustment range	40～240℃ (Inlet temp.), 0～100℃ (Outlet temp.)
	Temperature accuracy	±1℃
	Adjusting range for drying air	0～1.0m³/min
	Spray air flow adjustment range	0～30L/min
	Nozzle air pressure adjustment range	0～0.6MPa (Adjustable)
Configuration	Nozzle washing function	Pulse jet cleaning
	Temperature output	Inlet temp., Outlet temp. (4～20mA)
	Temperature control	Multi-stage PID control
	Touch screen	PID digital temperature adjusting device
	Touch panel	Temperature adjustment, blower, heater, liquid feed pump, switch for pulse jet, automatic needle poking, alarm display, operation
	Control select switch	Select inlet temperature, outlet temperature control switching
	Temperature sensor	PT100
	Heater	3.2KW
	Sample feed pump	One touch pedestal type
	Spraying from Nozzle	Use air compressor for spraying (sold separately)
	Service outlet	For stiller etc. : AC220V, 2A
	Blower	Tube blowers
	Filter	Suction filter, exhaust filter
	Air connection for spraying	Outside diameter of connector, ϕ7mm
	Spraying air pressure	0.3MPa
	Exhaust connection	Diameter ϕ50mm
Safety function		Inlet and outlet temperature overheating, Pump reversal function, Overcurrent leakage protection switch
Standards	External dimensions	W760×D420×H1,350mm
	Weight	110kg
	Power supply	AC200～230V 50/60Hz, 16～18A
Accessories		2 fluid supply hoses, 1 exhaust hose (with 1 hose tie), Exhaust adapter, Outlet temperature sensor, Fuse (250V 2A), De-static cable, Inlet hose 5m (with 2 hose ties), nozzle, Adapter bushing, Stand assembly, Protective cover (COV30)
Option device		External Filter, Dehumidification equipment, USB data storage, Various nozzle sizes

Operation Screen



System Diagram



GB211C-B Granulation fluid bed system with glassware GF200

Glass Attachment (GF200)

Processing Capacity 50g to 300g

Photo of GF200 glass Attachment assembled

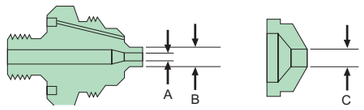
Fluid Chamber

The upper and lower sections are divided to allow easy insertion of Sample compounds.

Spraying Nozzle

Nozzle for liquid(F)

Nozzle for gas(A)



Product code	Model	Nozzle No.	Size (μm)
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		(A) 64	C 1626
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		(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 (Standard)	(F) 2850	A 711 B 1270
		(A) 64	C 1626

Cases

No.	Sample			Adhesive			Measurement conditions						Results	
	Name	Size	Weight (g)	Name	Concentration (%)	Spray volume	Inlet temp. (°C)	Volume (g/min)	Pressure (Mpa)	Volume (g/time)	Frequency	Nozzle height (cm)	Particle size Average	1400~125μm Recovery
1	Lead titanate-zirconate titanate	10	280	PVA	10	42	150	5	0.4	6	8	25	180	75
2	Sodium fluoride		200	PVA+EDTA	24	165	150	5	0.5	15	11	28	320	97
3	Diamond+ metal powder		538	PVA	10	108	170	6	0.4	5	22	30	260	80
4	Drug		200	Dextrin	5	171	150	5	0.5	8～10	21	27	310	85
5	Spice		300	Dextrin	5	60	150	5	0.4	8	12	30	330	98
6	Lactose		200	Sorbitol	10	70	100	14	1.0	17	25	25	390	80

Spray Dryer

CE Certification CE

ADL312SC

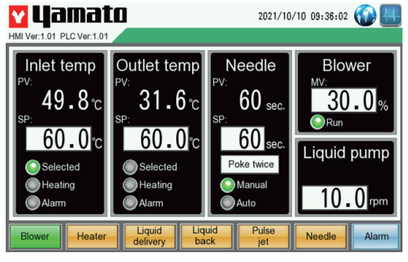
Water evaporation: Max. 1,500mL/h | Temp. adjustment range: 40~220°C(Inlet) 0~100°C(Outlet) | Spray air flow adjustment range: 0~30L/min | Spray nozzle (selectable): Tow-way nozzle | Power supply: AC 200~230V | Display language: Japanese, English, Chinese

The new intelligent spray dryer with rich functions and easy operation.

Features

- Instantaneous heating of the microparticle sample ensures that even heat-stable samples are not oxidized and that a uniform fine powder is obtained.
- The sprayed micro-powders are low in moisture, non-oxidizing and non-contaminating.
- The product is dried directly from the solution or suspension sample into a fine powder without the pre-treatment and post-treatment operations of filtration, separation, and grinding associated with conventional drying methods, and eliminates the contamination problems caused by these operations.
- It can be connected to the GAS411C organic solvent recovery unit to handle organic solvents.
- The drying chamber, cyclone, etc. are of quick-assembly construction, further enhancing operability.
- A lifting platform is provided as standard for attaching and detaching accessories.
- The machine is equipped with an outlet for stirrer power (2A) to facilitate stirring of suspensions while feeding samples.
- The unique peristaltic feed pump, nozzle cooling mechanism, pulsed nozzle cleaning mechanism, and anti-clogging stabbing needle provide a wide variety of spray conditions and stability.

Operation Screen



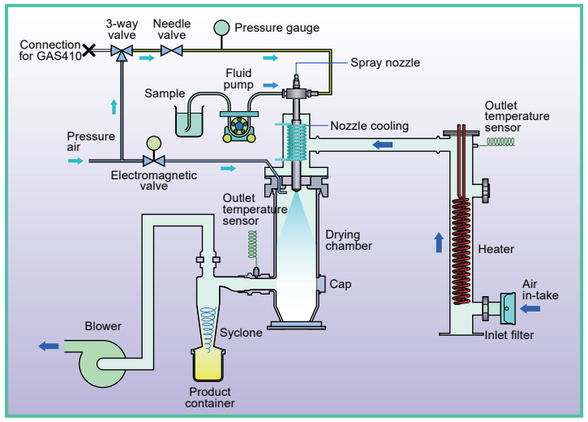
- The new 7" large touch screen control panel is available in Chinese/Japanese/English for easy and convenient operation.
- High power heater greatly improves the temperature arrival time, and the temperature setting range is wider to meet more sample experiments.
- Switchable hot-air intake and push-out hot-air circulation systems.
- Both two-fluid and three-fluid nozzles are available.
- New automatic nozzle with cooling mechanism (optional).
- Remote control is available.
- Experimental data can be recorded and stored. (optional)

Specifications

Model		ADL312SC
Corresponding sample		Water soluble & organic solvents (when GAS411C is connected)
	Water evaporation	Max.1,500mL/h
	Temperature adjustment range	40～240℃ (Inlet temp.), 0～100℃ (Outlet temp.)
	Temperature accuracy	±1℃
	Adjusting range for drying air	0～1.0m³/min
	Spray air flow adjustment range	0～30L/min
	Nozzle air pressure adjustment range	0～0.6MPa (Adjustable)
	Nozzle washing function	Auto clean out needle, pulse jet cleaning
	Temperature output	Inlet temp., Outlet temp. (4～20mA)
	Temperature control	Multi-stage PID control
	Touch screen	PID digital temperature adjusting device
	Touch panel	Temperature adjustment, blower, heater, liquid feed pump, switch for pulse jet, automatic needle poking, alarm display, operation
	Control select switch	Select inlet temperature, outlet temperature control switching
	Temperature sensor	PT100
	Heater	3.2KW
	Sample feed pump	One touch pedestal type
	Spraying from Nozzle	Use air compressor for spraying (sold separately) or use GAS411C built-in compressor (N_2) when connected to organic solvent recovery device GAS411C (sold separately)
	Service outlet	For stiller etc. : AC220V, 2A
	Blower	Tube blowers (Can be switched to suction or push-out)
	Filter	Suction filter, exhaust filter
	Solvent recovery	Use of solvent recovery unit GAS411C (sold separately)
	Spray nozzle cooling structure	Fitting×2, outer diameter ϕ10.5mm (optional cooling water circulation device CF312L-B)
	Air connection for spraying	Outside diameter of connector, ϕ7mm
	Spraying air pressure	0.3MPa
	Exhaust connection	Diameter ϕ50mm
Safety function		Inlet and outlet temperature overheating, pump reversal function, Overcurrent leakage protection switch, Nozzle connection abnormality (when connected to GAS411C)
	External dimensions	W580×D420×H1,150mm
	Weight	80kg
	Power supply	AC200～230V 50/60Hz, 16～18A
Accessories		2 fluid supply hoses, 1 exhaust hose (with 1 hose tie), Exhaust adapter, Outlet temperature sensor, Fuse (250V 2A), De-static cable, Inlet hose 5m (with 2 hose ties), Nozzle adapter bushing, Stand assembly, Protective cover (COV20)
Option device		GWS410 (exhaust gas cleaning equipment), External filter, Dehumidification equipment, USB data storage, Various nozzle sizes

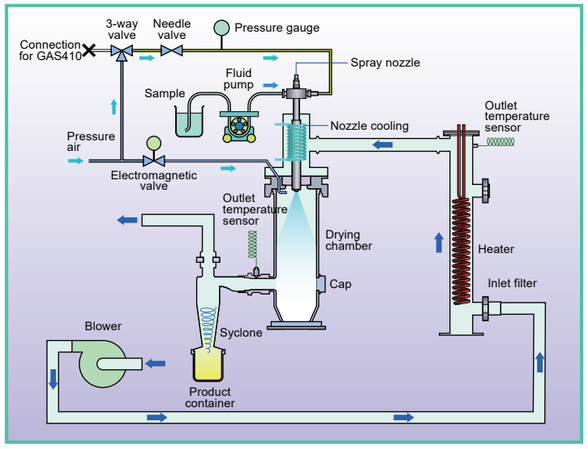
System Diagram

Suction method



Method can easy to change

Push-Out method



Fluid Nozzle

New 2 Fluid Nozzle

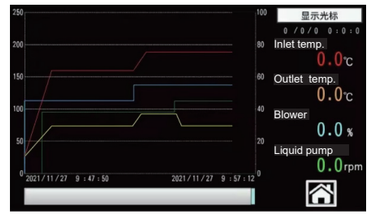
New 3 Fluid Nozzle (Option)

Setting Example

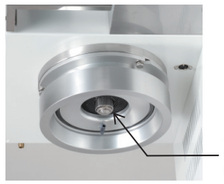
ADL312SC+GAS411C
Organic solvent recovery unit system

Hot air Push or Suction connection line (Easy can change)

Operation Curve Data



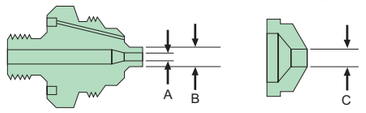
Spraying Nozzle



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)
281297	1A	(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 (Standard)	(F) 2850	A 711 B 1270
		(A) 64	C 1626

External Filter Unit (Option)

with air blow mechanism

- When installed in the exhaust, it can effectively filter the sample body that is not fully recovered, and achieve the secondary recovery purpose.
- When installed in the air inlet, it can effectively filter.
- When installed in the air inlet, it can effectively filter the impurity particles in the inhaled air to prevent contamination of the sprayed sample.

Solvent Recovery Unit, N_2 closed loop

CE Certification CE

GAS411C

Circulating air volume 0.12～0.65m³/min

Recovery capacity 2L flask (with anti-dislodging flask clamp)

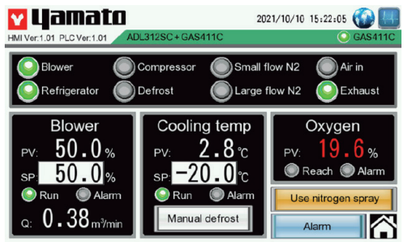
Newly upgraded organic solvent recovery cycle system.

Organic solvent recovery device used in spray dryers ADL312SC, GB211C-A, DL411C when organic solvents are used in order not to be discharged to the outside.

Features

- Combination of nitrogen containment cycle and solvent recovery by chiller and condenser enables processing of flammable and toxic solvents.
- Oxidizable substances can be dried.
- Since low temperature drying is possible, it is also possible to dry substances that are susceptible to thermal deformation.
- We can recover products and solvents by spray drying under strict safety measures.

Operation Screen



- New 7-inch large touch screen control panel.
- Chinese/Japanese/English language options, simple and convenient operation.
- Interoperable with the control panel of the spray dryer.
- Spray air source can be selected automatically.
- Can be controlled remotely.
- Status indication is provided for each component operation.
- Circulating air volume can be displayed (optional)

Main functions

① Closed system (nitrogen closed cycle type)
② Oxygen concentration control function
③ Combustible gas detection function
④ Inlet temperature over rise detection function
⑤ Over rise detection function of outlet temperature
⑥ Other self-diagnostic functions (temperature sensor disconnection detection/overheating prevention/nozzle pull-out detection) In case of abnormalities, the alarm will sound and the heater will be stopped.

Specifications

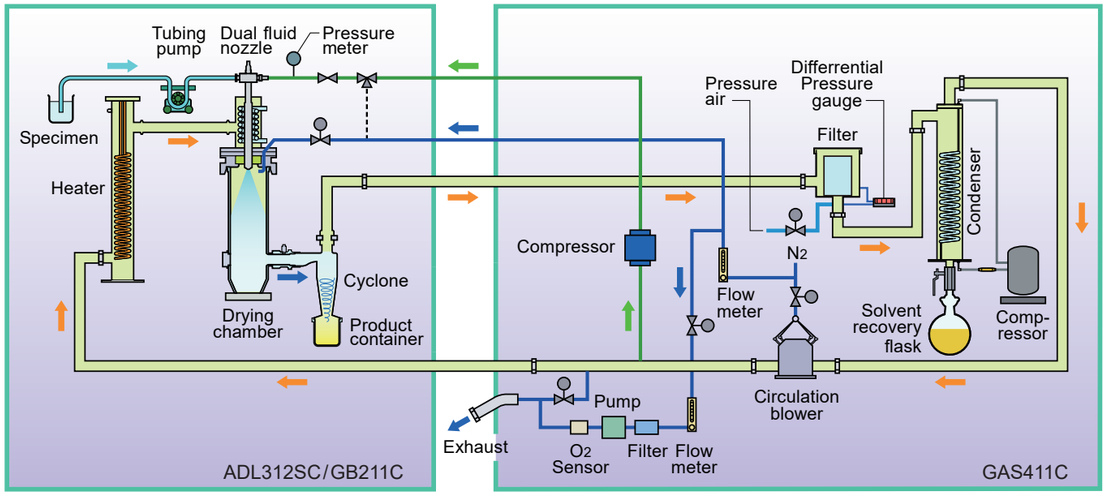
		Model	GAS411C
Solvent recovery method			Condenser+freezer
Performance		Circulating gas	Nitrogen replacement+closed loop
		Condensation temperature	Setting range -20～30℃
		Circulating air volume	0.12～0.65m³/min
Configuration		Air compressor (for spraying)	Linear reciprocating air compressor
		Circulation fan	Roots blower
		Solvent recovery	2L flask (with anti-dislodging flask clamp)
		Refrigerator	Air-cooled fully sealed refrigeration unit, 400W R404A
		Solution recovery vessel	Condenser cooling structure
		Filter	Class 100 high-efficiency filter (corrosion-resistant type)
	Operation panel		Condensing temperature control
			Display blower airflow control
			Display real-time oxygen concentration
			Display spray air source switching
		Oxygen concentration meter	Diffusion type 0.01～25% VOL
		Micro Pump	Pumped oxygen sensor monitoring
Safety function			Oxygen concentration limit alarm, Gas alarm, Over-current protection switch, Nitrogen forced introduction (when oxygen concentration rises)
Standards		External dimensions	W710×D950×H1,450mm
		Weight	130kg
		Power supply	AC200～230V 50Hz 5～6A
Accessories			Liquid delivery hose (2 each of silicone and viton), 2 stainless steel corrugated hoses, PVC exhaust pipe, Connecting pipe, Rcovery flask (2L)
Option device			Small type external filter, Floor-standing filter unit, Circulation airflow monitoring meter

Setting Example

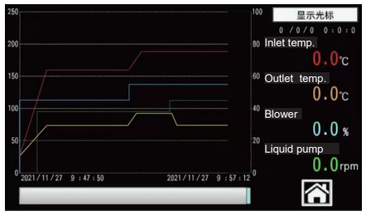
ADL312SC+GAS411C

DL411C+GAS411C

System Diagram

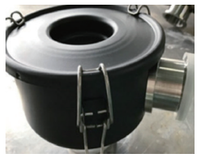


Operation Curve Data



External Small Filter (option)

Between GAS411C and ADL/GB/DL



Circulation Airflow Monitoring Meter (option)

Usage Examples

- Non-oxide-related ceramics
- Polymer materials related
- Superconducting materials related
- Pharmaceuticals related
- Food related

Applicable organic solvent reference

Choice of fluid delivery hose

Silicone hose : ethanol, IPA, methanol, acetone, ethyl acetate
Viton hose : xylene, toluene, benzene, ethane

Limiting oxygen concentration table

Organic solvent	Boiling point (℃)	Melting point (℃)	Limiting oxygen concentration (%)
Xylene	144	-25	10.5
IPA	82.3	-88	9.0
Benzene	80.1	5.5	10.5
Ethanol	78.4	-114.3	9.9
Ethyl acetate	77.1	-83.6	10.0
Ethane	67.7	-95.3	11.4
Methanol	64.6	-97.4	9.7
Trichloromethane	61.2	-63.5	Non-combustible
Acetone	56.2	-94.6	10.4
Dichloromethane	40.0	-97.7	23.9

Spray Dryer, High efficiency recovery of 100μm micro particles

CE Certification CE

DL411C

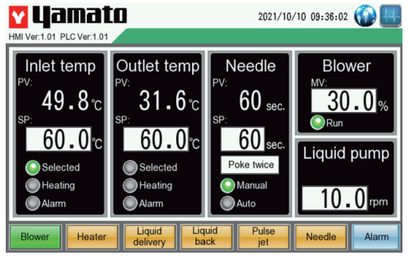
Water evaporation	Max. 3,000mL/h
Temp. adjustment range	40~300°C
Spray air flow adjustment range	0~30L/min
Spray nozzle (selectable)	Tow-way nozzle
Power supply	AC 200~230V
Display language	Japanese, English, Chinese

A new upgraded large spray dryer for efficient recovery of microparticles.

Features

- This device is capable of obtaining micro-particles in the range of 40 to 100μm, which are considered very difficult to obtain in laboratory spray dryer devices.
- The device can be used for production preparation experiments, high-value sample experiments, research on the application of encapsulated spray drying methods, and as a substitute for conventional drying methods in general research laboratories.
- The DL411C can be used in production preparation experiments, high-value sample experiments, spray drying application studies for encapsulation, and as an alternative to conventional drying methods in general research laboratories.
- The DL411C uses a highly efficient two-fluid nozzle spraying method and a large drying chamber, which allows for less sample attachment than other products, and a special cold air inlet on the drying chamber to prevent upward flutter and attachment of spray particles.
- The nozzle head can be pulsed cleaned regularly by an automatic mechanism.
- The hot air inlet temperature can be set in a wide range, which increases the processing capacity and experimental efficiency.
- The large size of the drying chamber provides sufficient time for drying fine particles, so that particles of 40 to 100 μm can be obtained similar to those produced by production equipment in fields such as ceramics and other molding powders, as well as pharmaceuticals and foods.
- The 7-inch large touch screen with Chinese/ Japanese/ English language options makes operation easy and convenient.
- Easy cleaning of the drying chamber thanks to the liftable and rotatable lid.
- Equipped with new automatic nozzle with cooling mechanism.
- Two-fluid nozzle and three-fluid nozzle can be used.
- Experimental data can be recorded and stored. (optional function)
- Remote control is available.
- Temperature zoning control for faster and more stable temperature rise.
- Equipped with a service socket for easy power supply of the stirrer.

Operation Screen

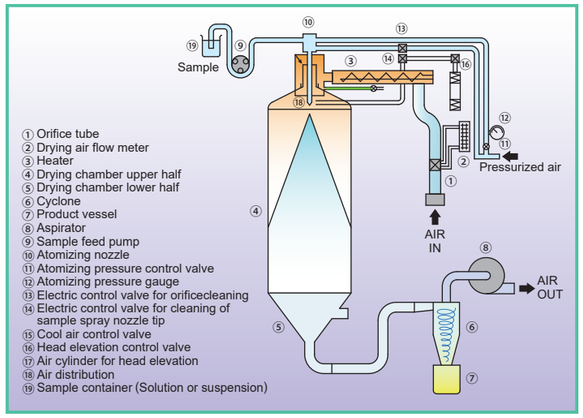


Specifications

Model			DL411C
Corresponding sample			Water soluble & organic solvents (when GAS411C is connected)
Performance	Water evaporation		Max.3,000mL/h
	Spraying method		Two-fluid nozzle method, three-fluid nozzle method (Optional)
	Spray, hot air contact method		Vertical downward spray and flow method
	Liquid feed pump rate		0～70mL/min
	Temperature adjustment range		40～300℃
	Temperature accuracy		±1℃
	Adjusting range for drying air		0～1.0 m³/min
	Spray air flow adjustment range		0～30L/min
Configuration	Chamber	Size	Inner diameter ϕ457×hight 975mm (glass part)
		Materials	The drying chamber, cyclone section, and product container are made of super hard glass, and other piping materials are stainless steel and silica gel.
	External output		Inlet temperature, outlet temperature output (4 to 20mA)
	Temp. control		Multi-stage PID control
	Touch screen		Temperature regulation, blower, heater, liquid feed pump, switch for pulse jet, automatic needle poking
	Control switching switch		Select Inlet temperature, outlet temperature control switching
	Temp. sensor		PT100
	Heater		2.0kW×2
	Spraying from Nozzle		Use air compressor for spraying (sold separately) or use GAS411C built-in compressor (N_2) when connected to organic solvent recovery device GAS411C (sold separately)
	Service socket		For stiller etc. : AC220V, 2A
	Blower		Tube blowers (Can be switched to suction or push-out)
	Filter		Suction filter, exhaust filter
	Solvent recovery		Use of solvent recovery unit GAS411C (sold separately)
	Spray nozzle cooling structure		Fitting×2, outer diameter ϕ10.5mm (optional cooling water circulation device CF312L-B)
	Air connection for spraying		Outside diameter of connector, ϕ7mm
	Spraying air pressure		0.3MPa
	Exhaust connection		Diameter ϕ50mm
Safety function			Inlet and outlet temperature overheating, Liquid feed pump reversal function, Over-current leakage protection switch, Independent over-lift prevention device on the outside of the heater
Standards	External dimensions		W1060×D880×H1,770mm
	Weight		180kg
	Power supply		AC200～230V 50/60Hz, 22～25A
Accessories			1 silicone fluid feeding hose (O.D. 6.4×I.D. 3.2×2m), Exhaust hose (with 1 hose tie) 1, Outlet temperature sensor, De-static brush, Potective cover, air inlet hose 5m (with 2 hose ties)
Option device			GWS410 (exhaust gas cleaning equipment), External filter, Dhumidification equipment, USB data storage, Vrious nozzle sizes

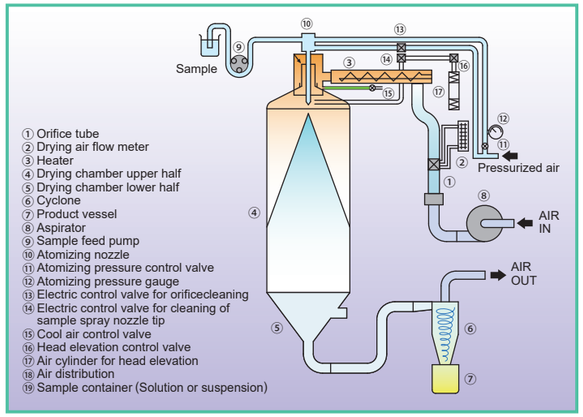
System Diagram

■ Suction method



Method can easy to change

■ Push-Out method



Fluid Nozzle

New 2 Fluid Nozzle

New 3 Fluid Nozzle (Option)

Setting Example

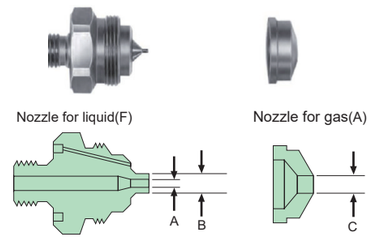
DL411C+GAS411C
Organic solvent recovery unit system

Cyclone Separation Section

Cyclone separation section is equipped with burn prevention safety cover and the static removal brush.

Operation Curve Data

Spraying Nozzle



Model	Nozzle No.	Size (μm)	Particle size
3	(F) 2850	A 711 B 1270	up to 50μm
	(A) 64.5	C 1638	
4	(F) 60100	A 1530 B 2550	40~100μm
	(A) 120	C 3060	
5	(F) 100150	A 2550 B 3825	40~200μm
	(A) 130	C 4530	

Large Sample Container (Option)

Large containers to secure large quantities of powder

5L Sample Container

1.5L Sample Container

External Filter Unit (Option)

with air blow mechanism

- When installed in the exhaust, it can effectively filter the sample body that is not fully recovered, and achieve the secondary recovery purpose.
- When installed in the air inlet, it can effectively filter.
- When installed in the air inlet, it can effectively filter the impurity particles in the inhaled air to prevent contamination of the sprayed sample.

Spray Dryer Option

Option Equipment & Parts

We have a wide variety of equipment such as filter units for collecting fine powder, atomizing nozzles of various sizes, 3-fluid nozzles, antistatic sets, and USB connection for measurement data.
We also have external equipment for spraying strong acidic and alkaline solvents and samples, dehumidifiers, and heat exchangers to handle sample tests under all kinds of environmental conditions.


Entrance & Exit filter


Filter unit for gas


Particulate recirculation cyclone


Static removal brush


Airflow meter


USB data storage function


Automatic triple fluid nozzle


Nozzle selection


Molecular sieve filter


Large capacity sample conteiner

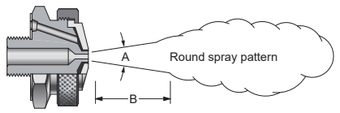

Air compressor


Pressure regulator

Nozzle Tip Selection

The nozzle tip is available in various orifice diameters. The choice depends on the particle size of the powder.
Air atomizing nozzles require spray set-ups.
Each set-up consists of an air cap and fluid cap.
Liquid and air streams are mixed outside of the nozzle.

- Air and liquid flow can be controlled independently.
- Effective for higher viscosity liquids and abrasive suspensions.



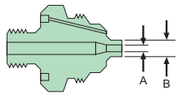

Fluid cap

Air cap

The table below shows the nozzle tips that can be used with ADL312SC & GB211C.

Nozzle size (μm)

Model		1A	1	2A	2	3
Nozzle No.		1650	2050	2050	2850	2850
	A	406	508	508	711	711
	B	1270	1270	1270	1270	1270
Nozzle No.		64	64	70	70	64
	C	1626	1626	1778	1778	1626



The table below shows the nozzle tips that can be used with DL411C

Nozzle size (μm)

Model		3	4	5
Nozzle No.		2850	60100	100150
	A	711	1530	2550
	B	1270	2550	3825
Nozzle No.		64.5	120	130
	C	1638	3060	4530

Note : Nozzles made of highly corrosion-resistant materials are also available.

2 and 3-fluid Nozzle

New 2-fluid Nozzle

Functions and Benefits

1. Automatic clean out needle mechanism

   Automatic cleaning of the spray port on the tip of the nozzle by needle. (In the current product, the nozzle is manually pushed and cleaned, so the user cannot leave the device)
   The new type allows the user to freely set the intermittent time and number of pushes on the touch panel. This will improve the clogging of nozzle tip.

2. Cooling mechanism (direct cooling to sample)

   This reduces the temperature of the sample flowing through the nozzle and prevents it from drying out inside the nozzle.
   Since the temperature inside the nozzle is as high as the inlet temperature, the sample dries up inside and becomes more viscous, making it easier for the nozzle to clog at the tip. (This will improve the flow of sample and prevent clogging)

New 3-fluid Nozzle

Functions and Benefits

- It can be equipped with a 3-fluid nozzle, which will be widely used in the development of new materials in the future.
- By replacing some parts of the new 2-fluid nozzle, it can easily become a 3-fluid nozzle. (3-fluid nozzle kit)

Note : The automatic clean out needle mechanism cannot be used when a 3-fluid nozzle is used.

Water Circulation System for Nozzle Cooling

MODEL : CF312
Circulation type : Closed circulation / tap water, anti-freeze solution (below 10°C)
Operating ambient temp. Range : 5 to 35°C
Temp. setting range : −20°C～30°C (no heating function)
Temp. control accuracy : ±1.0°C (≥ 0°C)　±1.5 °C (< 0°C)
Temp. fluctuation : 3.0°C (≥ 0°C)　4.0°C (< 0°C)
Cooling capacity (Liquid temp) : ～420W at 10°C　～280W at −10°C
Max. flow rate : ～10L/min.
Max. head : ～5.7m
Temperature control : Refrigerator on/off control
Temperature sensor : Pt100Ω
Controller : White LED digital display, Key entry, Minimum digit of 1°C
Refrigeration system / Rated performance : Air cooling, 450W
Refrigerant : R404A
Cooling coil : Copper / Nickel plating
External circulation connection port : Rear top panel, single line one touch connector (swivel type, L type)
Safety device : Overcurrent ELCB, Temp. sensor failure, Temp. upper / lower limit alert, Temp. upper / Lower limit error, Refrigerator high pressure cut off switch fan motor protection, Circulation pump protection, Delay timer for refrigerator protection
Water bath material : Stainless steel
Water bath capacity : ～3.9L (Liquid volume 3.5L)
Power source (50/60Hz) : AC220V 4A, No plug, Round terminal

Organic Solvent Washing Unit

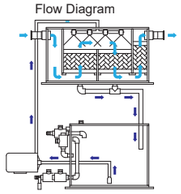
GWS410 traps contaminants in solvents by using tap water or alkaline solution at atmospheric pressure and room temperature.

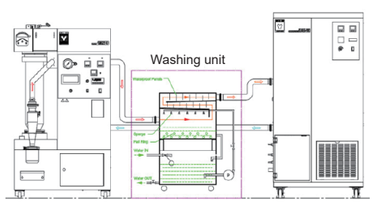
GWS410 is designed with a washing tank --- when solvent vapor enters the tank, sprayed water adheres, cleans and neutralizes solvent particles, before returning to the bottom of the chamber.

Features

- Uses water or alkaline solution.
- Eliminates harsh solvents.
- Minimizes equipment rust and corrosion.
- Simple operation.
- Easy maintenance --- only requires monitoring of water's pH level in the storage tank and condition of molecular sieves.

Flow Diagram





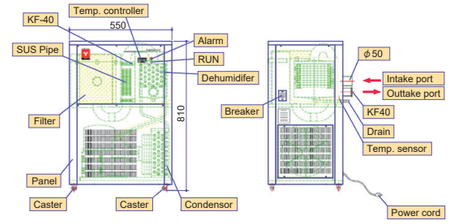
MODEL : GWS410
Method : Spraying circulation
Circulating liquid : Water
Circulating pump : Small magnetic force circulating pump
Max. flow : 15L / min
Max. head : 8m
pH meter & Intermittent cleaning atomizing timer
Harmful gas washing method : Pall ring filling + water spray washing
Water storage tank capacity : 35L
Safety device : Earth leakage breaker
Power source : AC200～230V 0.35A
Exterior dimension (W×D×H) : 800×500×1,230mm

Dehumidifiers Unit

Dehumidifier (under development) Scheduled to go on sale later this year.

The hot air that dries the sprayed particles has a significant effect on the state of the powder.

1. When air with high humidity is heated, a large amount of moisture is already contained in the hot air (close to saturation). As a result, the amount of water absorbed from the sprayed sample is small. Therefore, the amount of water contained in the mixture increases and a sticky feeling is produced.
2. By using a dehumidifier, moisture can be removed (dehumidified) from the air entering the spray dryer in advance and dry air can be supplied. As a result, the ability to remove water from the sprayed sample is improved and a silky powder can be obtained.(It is possible to perform stable tests and to collect materials in spring, summer, autumn and winter. It is also suitable for use in high temperature and high humidity areas.)
3. When used in connection with new GAS, even if the solvent contains a large amount of water or is 100% water, a stable mixture can be obtained by connecting between spray dryer and new GAS411C. It can also be used by connecting this dehumidifier to the air intake of the ADL/GB/DL main unit.



MODEL : Dehumidifier Unit
Method : Condenser + Refrigerator
Temperature controller : LED electronic controller
Temperature control method : Refrigeration ON/OFF control
Temperature setting method : Set by ▲▼.
Temperature display method : 4-digit LED numerical display
Temperature operation method : Fixed-point operation
Sensor : K thermocouple
Power supply : Single phase 220V 2A
Safety device : Refrigeration unit overload protection, pressure overload protection, Breaker
External dimensions : W550 x D400 x H810mm

Heat Exchangers Unit

Dehumidifier (under development) Scheduled to go on sale later this year.

When using a spray dryer connected to a GAS (organic solvent recovery unit), the inlet temperature of the spray dryer cannot be set to a high temperature (200°C or higher).
The reason for this is that the trap temperature of the chiller on the GAS side will rise, possibly causing an alarm, and trap capacity for solvent recovery is reduced. As a result, N_2-containing solvent will flow to the main unit side, adversely affecting the Blower and heater.
By installing a heat exchanger to lower the temperature of the N_2 & solvent entering the GAS, it is possible to test at a higher inlet temperature setting (200°C or higher). Conversely, the N2 returning from the GAS to the spray dryer itself will be warmed by the heat exchange, making it more efficient.
In recent years, high-temperature testing of organic solvents has increased due to the development of new materials.
Samples are often tested at high temperatures, and the inlet temperature must be set higher. For this purpose, the use of a heat exchange device enables efficient Sample test. (Energy-saving effects can also be expected)

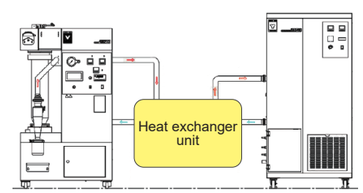


Figure is for reference

Operation Screen, ADL312SC/GB211C/DL411C

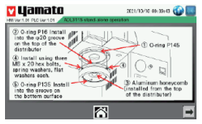
Spray Dryer Touch panel screen description

7-inch color display allows for a large amount of information to be displayed, making the Spray Dryer easy to use with excellent operability.
Each data, which is an important element in the sample test, can be recorded at any time and displayed in graph form, allowing feedback judgment in case of any abnormality.
In addition, with the USB option, each of the data can be saved to a USB memory device and transferred to a PC.

First initial screen

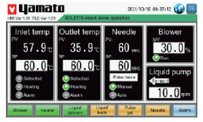
Language selection

Installation guide



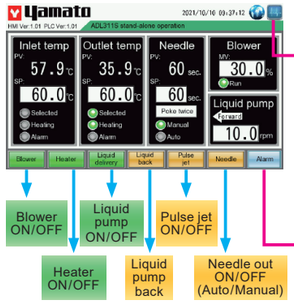
It is useful to confirm the glass attachment installation & operation procedure.

Operation screen



Operation Screen (1)

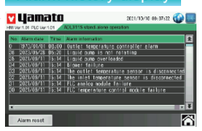
Even if operator is far away, data is recorded in the graph, so you can immediately see the data of the previous hour.



Graph data Display

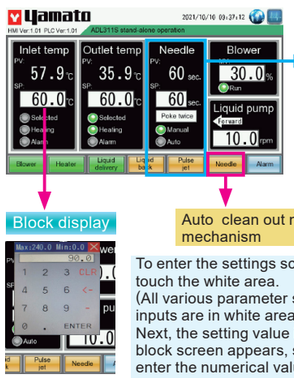
Inlet temp./ Outlet temp.
Blower/ Liquid pump

Alarm history display



Record the alarm content that has occurred so far

Operation Screen (2)



Alarm history display

This white area is the setting for Needle's intermittent time operation.
(can be set from 5 to 999 seconds)

Block display

Auto clean out needle mechanism

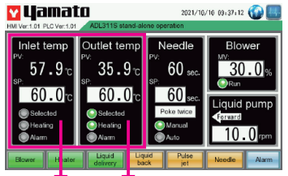
This thin white area is the setting for the number of consecutive Needle Push out times.
There are three settings: once, twice, and three times.

To enter the settings screen, touch the white area.
(All various parameter setting inputs are in white areas.)
Next, the setting value input block screen appears, so enter the numerical values.

Operation Screen (3)

Normally, Spray Dryer is controlled by Inlet Temp. but Yamato New Spray Dryer can also be controlled by Outlet Temp.

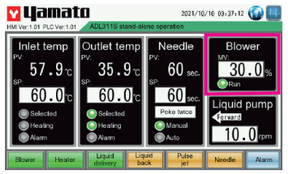
Control of outlet temperature is important when spraying heat-sensitive Samples.
To make this easy to control and manage, a switch function is provided to enable setting by outlet temperature.
The operation can be switched by simply touching the touch panel.



The Inlet Temp. or Outlet Temp. can be switched by simply touching the black area.

Operation Screen (4)

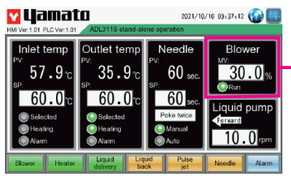
ADL312SC



The Blower setting of ADL312SC is a percentage setting of the output.
The conversion table between percent output and airflow is shown in the conversion table in the Operation Manual.

GB211C/DL411C

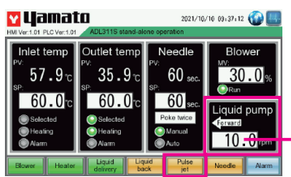
For GB211C and DL411C,
The air flow rate value is displayed by touching the black portion of the Blower display.



The airflow value is displayed.

Operation Screen (5)

The speed setting for Sample solution pumping is a revolution speed (RPM) setting.
The conversion table between RPM and pumped liquid volume is shown in the conversion table in the instruction manual.



Pump Speed setting

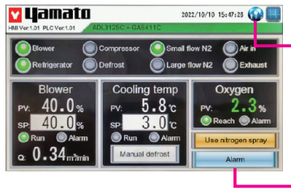
Pulse jetting is a function that uses compressed air to blow away sample clumps adhering to the tip of the nozzle.
When used in combination with the Clean Out Needle function, the nozzle is prevented from clogging and stable atomization is possible.

Operation Screen, GAS411C (Organic solvent recovery unit)

Spray Dryer Touch panel screen description

7-inch color display is used for the first time in the GAS411C (Organic solvent recovery unit), enabling the display of a large amount of information.
This enables easy operation and continuous recording of each parameter data, which is useful for research on new materials (new drugs, etc.).
In addition, each data, which is an important element of the sample test, is recorded at any time and displayed on a graph, allowing feedback judgment in case of abnormality.
Besides, with the USB option, each data can be saved in a USB memory and transferred to a PC.

Operation Screen



Language selection

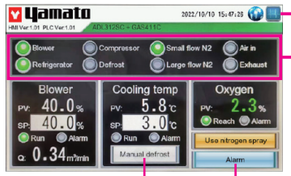
Alarm History Display

Record the Alarm content that has occurred so far

Operation Screen (1)

Even if operator is far away, data is recorded in the graph, so you can immediately see the data of the previous hour.

Operation Screen



Manual Refrigerator Defrost SW

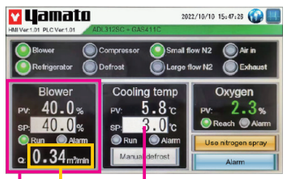
Alarm history

Graph data Display

Inlet temp./ Outlet temp.
Blower/ Liquid pump

You can see the operation status of each item.
(Blower, chiller, internal compressor, defrost, N_2 introduction status, air intake, exhaust)

Operation Screen (2)



The output can also be displayed digitally by attaching an optional air flow rate device.

Trap temperature setting of refrigerators.

Block display

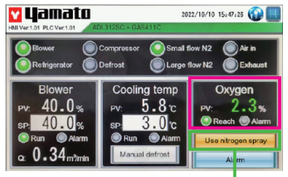
The output input of blower is a percentage input.
The airflow rate is checked with a differential pressure gauge attached to the unit.

To enter the settings screen, touch the white area.
(All various parameter setting inputs are in white areas)
Next, the setting value input block screen appears, so enter the numerical values.

Operation Screen (3)

Oxygen concentration

Displays the oxygen concentration inside the chamber.
N_2 gas flows through two solenoid valves until the oxygen concentration falls below 3.5%, after which it is automatically switched to one solenoid valve for control to maintain the low oxygen concentration.
Sample tests can be safely performed with organic solvents.



Use nitrogen spray SW

The GAS411C Unit has a built-in small compressor, but its atomizing pressure is 0.1Mpa max.
If atomizing pressure higher than 0.1Mpa is required, the pressure of the connected N_2 cylinder can be used as the atomizing pressure using the switch on the touch panel.