

# High Performance Muffle Furnace



## FP Series

Operating temp. range	100~1150°C	Temp. control accuracy	±1.0°C	Internal capacity	1.5L (FP103)	7.5L (FP303/313)	11.3L (FP413)
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- High accuracy controller for better operability and visibility
- Excellent heat tightness with a firmly sealed chamber door
- High temperature accuracy at ±1.0°C
- Upgraded with long life R-thermocouple sensors
- High quality alumina porcelain hot plate where heater is not exposed to the inner chamber preventing contamination of samples
- Program operation of maximum 99 steps, 99 patterns, with repeat operation function
- Safety features include self-diagnostic functions, calibration off-set, key lock function, auto recovery after power failure, earth leakage breaker, automatic overheat prevention device and independent overheat prevention device
- Optional items include exhaust system, N<sub>2</sub> gas loading device (with flow meter), temperature output terminal, time-up output terminal, sample tray, event output terminal, operation signal output terminal and furnace floor plate



1.5L  
FP103



7.5L  
FP313

### Specifications

Model	FP103	FP303	FP313	FP413
Operating temp. range	100~1150°C			
Temp. control accuracy	±1.0°C (at 1150°C)			
Temp. fluctuation	±1.0°C (at 1150°C)			
Temp. distribution accuracy	±4.0°C (at 1150°C)			
Temp. gradient	14°C (at 1150°C)			
Max. temp. reaching time	~90 min.			~80 min.
Exterior material	Cold rolled steel plate with baked-on melamine resin finish			
Interior material	Alumina fiber			
Sensor	R-thermocouple			
Heater	Iron-chrome wire			
	1.1kW	2.4kW		3.25kW
Exhaust port	ø20mm (top)			
Cooling fan	19/16W (50/60Hz)			
Temp. controller	PID control by microprocessor			
Temp. and timer setting	Digital setting by ▲/▼ keys			
Temp. display	Setting temperature: Orange 5-digit LED digital display (resolution: 1°C) Temperature display: Green 4-digit LED digital display (resolution: 1°C)			
Timer	1 min. to 99 Hrs. 59 min., timer resolution 1 min. or 1 hr.			
Operation function	Fixed temperature, Quick auto stop, Auto start, Auto stop, Program (maximum 99 steps, 99 patterns, repeat operation)			
Additional function	Power on / operation time accumulation (up to 65535 hr.), calendar (timer 24 hr.), clock (24 hr. display), calibration off-set, display of power consumption, CO <sub>2</sub> emissions and heater operation, power failure recovery options, user setting storage and recall			
Heater circuit control	Triac with zero cross control			
Safety device	Self diagnostic functions (sensor error, heater disconnection, triac short circuit, main relay failure disconnection, automatic overheat prevention), Key lock function, Independent overheat prevention, Electric leakage breaker			
Internal dimensions (mm)	W100 x D150 x H100	W200 x D250 x H150		W300 x D250 x H150
External dimensions (mm)*	W376 x D404 x H515	W446 x D504 x H565		W506 x D504 x H625
Internal capacity	1.5L	7.5L		11.3L
Power source (50/60Hz)	AC115V 10A with plug	AC115V 21.5A no plug, round terminal	AC220V 13.5A no plug, round terminal	AC220V 18A no plug, round terminal
Weight	~32kg	~43kg		~51kg
Included accessories	Exhaust port cap, fuse, furnace floor plate			

\* Protrusions excluded.

- Length of power cord outside the unit is about 2m

- Performance have been measured at the rated source voltage, single phase 115V or 220V±5%, room temperature of 23°C±5°C, humidity of 65%RH±20°C, voltage of 86 kPa~106kPa, no load.

- Measurement conditions FP103 is at 3 points in the bath, FP303, 313 and 413 are compliant with JIS.



11.3L  
FP413

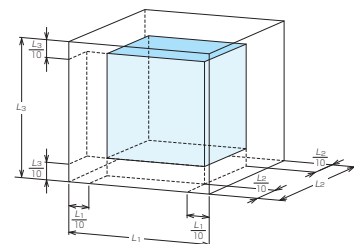
## Control Panel



## 9 Point Temperature Distribution (no load)

	Upper back right	Upper back left	Upper front right	Upper front left	Lower back right	Lower back left	Lower front right	Lower front left	Center
FP13	1150.0	1150.4	1147.0	1147.6	1145.2	1146.2	1144.4	1145.7	1146.6

1. Above 9 measurement points were taken from the effective internal capacity down-scale by 10% (as the image on the right)
2. Room Temp. 23°C, AC220V, 50Hz.  
Average temperature during stable setting temp. set at 1150°C
3. No load



## Optional items

Description	Product code
Exhaust unit, 115V	214160
Exhaust unit, 220V	214161
*N <sub>2</sub> gas inlet system (with flow meter) for FP103	214162
for FP303/313	214163
for FP413	214164
Sample tray	281310
Alumina hearth plate for FP103, 90 x 145mm x 5pcs.	214157
Alumina hearth plate for FP303/313, 190 x 245mm x 5pcs.	214158
Alumina hearth plate for FP413, 290 x 245mm x 5pcs.	214159
*Temp. output terminal (4-20mA)	214166
*External alarm output terminal	214167
*Time up output terminal	214168
*Operation signal output terminal	214169
*Event output terminal	214170

\* Please specify when ordering main unit. Installation not possible after delivery.

## Interior



Heater is not exposed.  
Adoption of optimal insulation structure increased heat insulation performance and temperature distribution accuracy.  
Unit shown with optional front flow meter

## Exhaust Unit

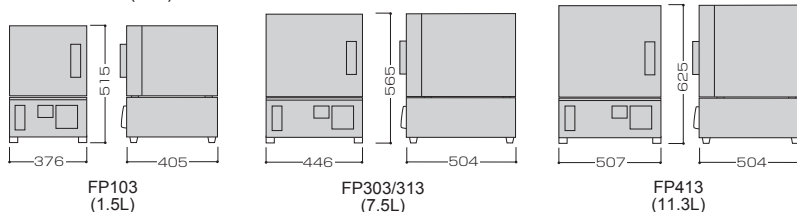


Gas generated with increasing temperature in the furnace can be efficiently exhausted.

Power source of exhaust device :  
AC115V 0.27A  
Single phase AC220V 0.15A

Aluminum flexible duct (not included)  
Length 1.5m / Diameter 50mm

## Dimensions (mm)



## Sample Tray

