



Yamato Muffle Furnaces

Contents

Muffle Furnace Overview	Page 2
Standard	
FO Series	Page 3
High Performance	
FP Series	Page 7



MUFFLE FURNACE OVERVIEW

Common Features

- Operating Temp. Range 100~1150°C
- Excellent heat tightness with a firmly sealed chamber door
- Upgraded with long life R-thermocouple sensors
- Safety features include self-diagnostic functions, calibration off-set, key lock function, auto recovery after power failure, earth leakage breaker and automatic overheat prevention device

Unique Features

	FO Series Standard Muffle Furnace 	FP Series High Performance Muffle Furnace 
Controller	Easy to use controller	High accuracy controller for better operability and visibility
Temp. control accuracy	±2.0°C (at 1150°C)	±1.0°C (at 1150°C)
Max. temp. reaching time	60~80 mins (depending on the model)	80~90 mins (depending on the model)
Program operation	maximum of 6 patterns: 30 steps x 1 pattern, 15 steps x 2 patterns or 10 steps x 3 patterns	maximum 99 steps, 99 patterns, repeat operation
Capacity	Wider selection to choose from (11 models) with inner capacity of 1.5L to 30L	Four models to choose from with inner capacity of 1.5L to 11.3L
Chamber	High quality alumina porcelain hot plate where heater is exposed to the inner chamber (heater must not be exposed to halogen elements to avoid heater corrosion)	High quality alumina porcelain hot plate where heater is not exposed to the inner chamber (preventing contamination of samples)
Other features	Designed with communication port (for CR models)	Additional safety feature: independent overheat prevention device. Additional functions: power on and operation time integrating function (up to 65,535 hours); calendar timer (24 hrs.); power consumption, total CO ₂ emission, and heater operating output; and save and access of operator's setting information.
Interior		
Control panel		

Standard Muffle Furnace



FO100CR/110CR/200CR/210CR/300CR/310CR/410CR/510CR/610CR/710CR/810CR

Operating temp. range	100~1150°C	Temp. control accuracy	±2°C (at 1150°C)	Internal capacity	1.5L (FO100CR/110CR)	3.75L (FO200CR/210CR)	7.5L (FO300CR/310CR)	9L (FO410CR)	11.3L (FO510CR)	17.5L (FO610CR)	23.6L (FO710CR)	30L (FO810CR)
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- Wide selection of space-saving compact units with maximum inner capacity
- Easy to use controller
- Excellent heat tightness with a firmly sealed chamber door
- High temperature accuracy at ±2.0°C
- Program operation of maximum of 6 patterns: 30 steps x 1 pattern, 15 steps x 2 patterns or 10 steps x 3 patterns
- Safety features include self-diagnostic functions, calibration off-set, lock function, auto-recovery after power failure, earth leakage breaker and automatic overheat prevention device
- Selectable options include exhaust system unit, N₂ gas loading device (with flow meter), temperature output terminal, time up / alarm output terminal and sample tray
- Upgraded with long life R-thermocouple sensors
- Designed with communication port



1.5L
FO100CR



7.5L
FO310CR



17.5L
FO610CR



30L
FO810CR

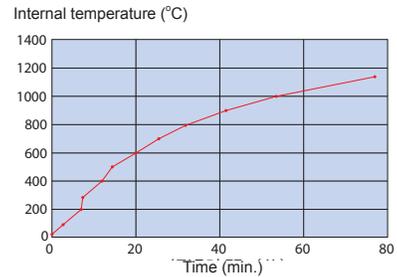
Specifications

Model	FO100CR/110CR	FO200CR/210CR	FO300CR/310CR	FO410CR	FO510CR	FO610CR	FO710CR	FO810CR
Operating temp. range	100~1150°C							
Temp. control accuracy	±2°C (at 1150°C)							
Max. temp. reaching time	~60min.		~70min.		~80min.			
Exterior material	Cold rolled steel plate with baked-on melamine resin finish							
Interior material	Ceramic fiber							
Sensor	R-thermocouple							
Heater	Iron-chrome wire							
	1kW	1.5kW	2kW	2.2kW	2.5kW	3kW	3.5kW	4kW
Exhaust port	ø20mm (top)							
Cooling Fan Type	Axial fan motor							
Temp. controller	PID control by microprocessor							
Temp. setting/display method	Digital setting by ▲/▼ keys / Digital display							
Operation function	Fixed temperature, quick auto stop, auto stop, auto start, program (maximum 6 patterns: 30 steps x 1 pattern, 15 steps x 2 patterns or 10 steps x 3 patterns)							
Additional function	Calibration offset, power failure compensation, key lock							
Timer	1 min. to 99 Hrs. 59 min. and 100 Hrs. to 999 Hrs.							
Safety Device	Self diagnostic (memory error, heater disconnection, sensor error, SSR short circuit), Electric leakage breaker, Overheat prevention device							
Internal dimensions(WxDxHmm)	100×150×100	100×250×150	200×250×150	200×300×150	250×300×150	250×350×200	270×350×250	300×400×250
External dimensions(WxDxHmm)	346×405×517	346×505×567	446×505×567	446×554×567	507×504×627	507×604×677	507×605×727	507×655×727
Internal capacity	1.5L	3.75L	7.5L	9L	11.3L	17.5L	23.6L	30L
Power source (50/60Hz)	AC115V / 220V			AC220V single phase				
	10A / 5A	14.5A / 7.5A	19A / 9.5A	10.5A	12A	15A	18A	20A
	no plug, round terminal	no plug, round terminal	no plug, round terminal	no plug, round terminal	no plug, round terminal	no plug, round terminal	no plug, round terminal	no plug, round terminal
Weight	~24kg	~30kg	~37kg	~38kg	~44kg	~52kg	~58kg	~62kg

Control Panel



Temperature Rising Curve (FO300CR)



Optional items

Product code	Description
*214096	Exhaust unit, 115V
*214097	Exhaust unit, 220V
*281301	Time up output terminal
*Contact Customer Service for part number 281310	N ₂ gas inlet system w/ flow meter
	Sample tray

* Please specify when ordering main unit.

Interior



Adoption of reasonable insulation structure increased thermal insulation characteristics and temperature distribution accuracy

Sample tray



Exhaust unit



Gas generated due to the increase of temperature in the furnace will be quickly exhausted.

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

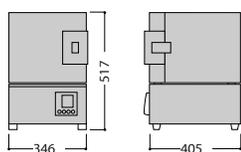
Aluminum flexible duct
Length 1.5m / Diameter 50mm

Temperature Output Terminal

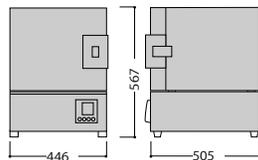


- Record and monitor internal temperature
- Temperature output: 4-20mA
- Time up output

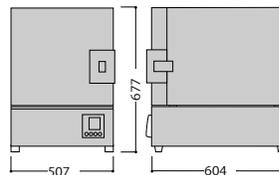
Dimensions (mm)



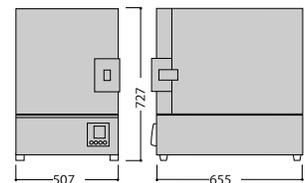
FO100CR/110CR
(1.5L)



FO300CR/310CR
(7.5L)



FO610CR
(17.5L)



FO810CR
(30L)

New! Standard Muffle Furnace



FO101CR/111CR/201CR/211CR/301CR/311CR/411CR/511CR/611CR/711CR/811CR*

* replacement models of FO100CR/110CR/200CR/210CR/300CR/310CR/410CR/510CR/610CR/710CR/810CR

Operating temp. range	100~1150°C	Temp. control accuracy	±2°C (at 1150°C)	Internal capacity	1.5L (FO101CR/111CR)	3.75L (FO201CR/211CR)	7.5L (FO301CR/311CR)	9L (FO411CR)	11.3L (FO511CR)	17.5L (FO611CR)	23.6L (FO711CR)	30L (FO811CR)
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- Wide selection of space-saving compact units with maximum inner capacity
- Easy to use controller
- Excellent heat tightness with a firmly sealed chamber door
- High temperature accuracy at ±2.0°C
- Program operation of maximum of 6 patterns: 30 steps x 1 pattern, 15 steps x 2 patterns or 10 steps x 3 patterns
- Safety features include self-diagnostic functions, calibration offset, lock function, auto-recovery after power failure, earth leakage breaker and automatic overheat prevention device
- Selectable options include exhaust unit, N₂ gas loading device (with flow meter), temperature output terminal, time up / alarm output terminal and sample tray
- Equipped with R-thermocouple sensors
- Designed with communication port



1.5L
FO101CR



7.5L
FO301CR



17.5L
FO611CR



30L
FO811CR

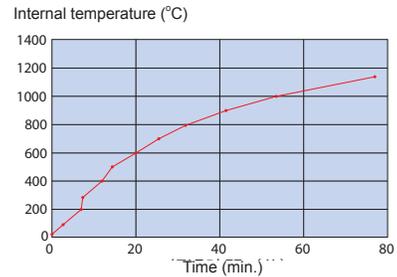
Specifications

Model	FO101CR/111CR	FO201CR/211CR	FO301CR/311CR	FO411CR	FO511CR	FO611CR	FO711CR	FO811CR		
Operating temp. range	100~1150°C									
Temp. adjustment accuracy	±2°C (at 1150°C)									
Max. temp. reaching time @LT:1150°C (@RT:850°C)	~60min. (~40min)		~70min. (~50min)		~80min. (~50min)	~80min. (~65min)	~80min. (~55min)	~80min. (~60min)		
Exterior material	Steel, Melamine, epoxy composite resin coating, stainless steel, SUS304									
Interior material	Ceramic fiber									
Sensor	R-thermocouple (W sensor)									
Heater	Iron-chrome wire (Cantal AF)									
	1.1kW	1.65kW	1.5kW	2.2kW	2.0kW	2.2kW	2.5kW	3kW	3.5kW	4.0kW
Exhaust port	ø20mm (top)									
Cooling Fan Type	Axial fan motor									
Temp. control system	PID control by VS6 controller									
Temp. setting/display method	Digital setting by ▲/▼ keys / Digital display									
Operation function	Fixed temperature operation, timer operation (auto stop, auto start), program operation (maximum 6 patterns: 30 steps x 1 pattern, 15 steps x 2 patterns or 10 steps x 3 patterns)									
Additional function	Lock function, auto recovery after power failure, calibration offset									
Timer	1 min. to 99 Hrs. 59 min. and 100 Hrs. to 999 Hrs.									
Safety Device	Self diagnostic (memory error, sensor error), earth leakage/circuit breaker, overheat prevention device									
Internal dimensions(WxDxHmm)	100×150×100	100×250×150	200×250×150	200×300×150	300×250×150	250×350×200	270×350×250	300×400×250		
External dimensions(WxDxHmm)	346×405×517	346×505×567	446×505×567	446×554×567	507×504×627	507×604×677	507×605×727	507×655×727		
Internal capacity	1.5L	3.75L	7.5L	9L	11.3L	17.5L	23.6L	30L		
Power source (50/60Hz)	AC115V / 220V				AC220V single phase					
	10A / 5A	14.5A / 7.5A	19A / 9.5A	10.5A	12A	14A	16.5A	18.5A		
	no plug, round terminal	no plug, round terminal	no plug, round terminal	no plug, round terminal	no plug, round terminal	no plug, round terminal	no plug, round terminal	no plug, round terminal		
Weight	~24kg	~30kg	~37kg	~38kg	~44kg	~52kg	~58kg	~62kg		
Included accessory	Exhaust port cap 1 pc.									

Control Panel



Temperature Rising Curve (FO301CR)



Optional items

Product code	Description
*214096	Exhaust unit, 115V
*214097	Exhaust unit, 220V
*281301	Time up output terminal
*Contact Customer Service for part number 281310	N ₂ gas inlet system w/ flow meter
B011908001	Sample tray
	Exhaust opening

* Please specify when ordering main unit.

Interior



Adoption of reasonable insulation structure increased thermal insulation characteristics and temperature distribution accuracy

Sample tray



Exhaust unit



Gas generated due to the increase of temperature in the furnace will be quickly exhausted.

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

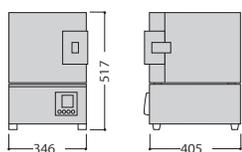
Aluminum flexible duct
Length 1.5m / Diameter 50mm

Temperature Output Terminal

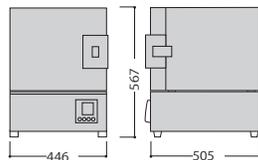


- Record and monitor internal temperature
- Temperature output: 4-20mA
- Time up output

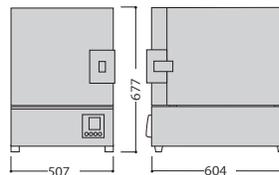
Dimensions (mm)



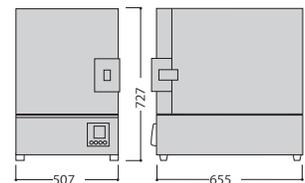
FO101CR/111CR
(1.5L)



FO301CR/311CR
(7.5L)



FO611CR
(17.5L)



FO811CR
(30L)

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, N₂ 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 ₂ 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

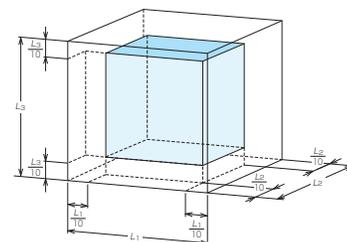
Control Panel



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
FP313	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 ₂ 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

Sample Tray



Dimensions (mm)

