

RO400FC Reflow Oven

Version 3.2 • May 2017

Configuration

		RO400FC	RO400FC-C
Machine base	Convection heating zones	4	4
	Convection cooling zones	1	1
PCB Handling	Mesh belt conveyor	●	
	Pin (chain) conveyor		●
	SMEMA interface		○
	Middle rail support		○

● standard feature ○ optional feature

Specifications

		RO400FC	RO400FC-C
Control	Type	Microprocessor	
	Languages	English, German, French	
	Temperatures selectable	°C, °F	
	Program capacity	49 (10x preset standard, 10x preset leadfree, 10x preset curing, 19x free)	
	Board counter	optional with sensor or standard with SMEMA option	
	Gas temperature adjustment	Adjustable from 20° to 290°C (68° to 554°F) for each zone	
Substrate dimensions	Max. reflow width	400 mm (15.8")	
	Max. Substrate width	10-400 mm (0.39-15.8")	60-400 mm (2.4" - 15.8")
	Max. substrate width without middle rail support	400 mm	Approx. 250 – 300mm (9.84 – 11.81") by 1.5mm (0.06") PCB material
Conveyor	Transport direction	left to right	
	Pin length	-	3 mm (0.12")
	Conveyor speed range	100-800 mm / min (3.9" - 31.5" / min), see slow speed option for slower speed	
	Conveyor speed repeatability	+/- 2 mm (0.079") / min	
	Conveyor motor type	24V DC with encoder	
	Rail parallelism	-	+/- 0.3mm (0.012") from 20 to 290°C
	In feed length	300 mm (11.8")	
	Out feed length	200 mm (7.9")	
	Entrance height (max)	30 mm (1.18")	
	Free space below substrate	0	20 mm (0.79")
	Process dimensions	Heated length	1'620 mm (63.8")
Length of heating zone		400 mm (15.75")	
Length of active cooling zone		250mm (9.84")	
Overall length cooling zone		450mm (17.72")	
Process data	Total Air circulation heating zones	2'575 m ³ /h (1'515 cfm)	
	Air circulation per heating zone	515 m ³ /h (303 cfm)	
	Air circulation peak zone	1'030 m ³ /h (606 cfm)	
	Air circulation cooling zone	300 m ³ /h (177 cfm)	
Machine dimensions	Footprint	2'800x914mm (110.2x36")	
	Machine height	1'350 mm (53.2")	
	Weight	660 kg (1455 lb)	760 kg (1675 lb)
Supplies	Electrical	EU: 3x400 VAC, 50Hz, 25 A, circuit breaker not required	
		US: 3x480/277/249/209 VAC, 60Hz, 25 A (with transformer), 3 phase circuit breaker required in front of transformer	
	Power consumption	5.8 kW continuous, 11.6 kW (during initial heat up, 15 min)	
	Minimum exhaust volume	2x150 m ³ /h = 300 m ³ /h (2x88 cfm=176 cfm)	
	Recommended exhaust volume	2x250 m ³ /h = 500 m ³ /h (2x150 cfm=300 cfm), option RO400FC-VNT recommended.	
Filter / Air Cleaning Systems	No / must be added in the exhausting system		
Exhaust specifications	1 each at entry and exit, distance 2.075 m (81.69"), diameter 150 mm (5.9"), length 50 mm (1.97"), gas temperature at exhaust <45°C (<113F)		



Specifications (cont.)

		RO400FC	RO400FC-C
Environment	Noise level	70 dB (A) maximum	
Features	Emergency stop buttons	2 (on left and right side of the machine)	
	Main power disconnect	1 with undervoltage circuit breaker	
	Overheat security	Overheat temperature control for each zone (permanent breaker)	
	Safety standards	CE, EN 954-1 Class 3	
	Color	White (RAL9002) silky lustre, fine structure	

Heating zone specifications

Temperature Profile	Preheat 1	Preheat 2	Preheat 3	Reflow	Cooling
Type	Convection	Convection	Convection	Convection	Convection
Max. gas temperature setting	290°C (554°F)	290°C (554°F)	290°C (554°F)	290°C (554°F)	--
Heating power	3000 W	3000 W	3000 W	2x3000 W	--
Regulation (Reflow conditions)	+/- 3°C	+/- 3°C	+/- 3°C	+/- 3°C	--
Ramp times (FR4 inboard measurment.)	1.8-2°C /sec	1.8-2°C /sec	1.8-2°C /sec	2-3°C /sec	2.5-3°C /sec
Temperatur measurement	in airstream*	in airstream*	in airstream*	in airstream*	--
Heating up time from 20°C (68°F) to set temperature 160–160–160–235°C (320-320-320-455°F) (Typical used Profile)	9 min	7 min	7 min	18 min	--
ΔT within 400 mm (15.8") conveyor width	<4°C (39.2°F)	<4°C (39.2°F)	<4°C (39.2°F)	<4°C (39.2°F)	--
Cold start warm up to 235°C (455°F)	21 min	15 min	15 min	18 min	--
Cold start warm up to 290°C (554°F)	35 min	26 min	26 min	30 min	--
Max temp difference between two adjacent zones	← 270°C (518°F)	← 80°C (176°F)	← 80°C (176°F)	← 80°C (176°F)	← 260°C (500°F)
Blower rpm	2600	2600	2600	2x2600	2600

* Temperature measurement directly within air stream on PCB height

Option specification

Option	Value	Specification
Signal tower	Colours	3
	Audio signal	optional
Slow speed option	Order number	RO400FC-15
	Conveyor speed range	10-200 mm / min (0.4"-7.9" / min)
Flying thermocouples	Order number	RO400FC-1
	Length	5 m (16.4 ft)
	Quantity	2
	Temperature display	Directly on the on the integrated LCD Panel or optional importable into RO-Soft
RO-Soft profiling software	Order number	RO400FC-SOFT-2
	Measure channels	6 (2 for thermocouples, 4 for zone temperature)
	Recording time	up to 180 hours
	Data export format	.pdf (pdf writer necessary on the PC), .csv (for excel import)
	Delivered with	RS232 connection cable, SUB-D Adapter 25pin-9pin
	Data Connection	RS232
	PC requirements	Pentium 3 or better
	System requirements	Option RO400FC-1 (Flying Thermocouples)
Exhaust incl. ventilator	Order number	RO400FC-VNT
	Scope of delivery	Covered exhaust fan with connection pipes to the two exhausting nozzles, Power cable connected to the oven
	Technical details	500m ³ /h (300cfm) air exhausting, 230V 50/60Hz
	Customers side installation	1 Pipe or tube to the outside or to air cleaning equipment Diameter 150mm (5.9"), max length 5.0m (16.4 ft). Fire proof and temperature resistant up to 70°C (158°F)

Option specification (cont.)

Option	Value	Specification
Exhaust Tubes (without Ventilator)	Scope of delivery	Connection pipes to the two exhausting nozzles. Diameter 150mm (5.9") with T connection on top, Diameter 150mm (5.9").
	Customer side installation	Exhausting system with 1 Pipe or tube Diameter 150mm (5.9"), max length 5.0m (16.4 ft). Fire proof and temperature resistant up to 70°C (158°F) Technical requirements for exhausting system see on chapter "Exhausting"
Slide out unit	Order number	RO400FC-14,
	Sliding angle	adjustable with screws
PCB Counter	Sensor type	Optical polarized
	Order numbers:	Mesh belt RO400FC-3B Chain conveyor) RO400FC-3
Middle support rail	Order number	RO400FC-9
	Support Type	Steel rope
	Width adjustment	motorized
	Height adjustment	Motorized, 18mm (0.71") up-down
	Oiling system	not necessary
	Weight	50 kg
Oiling System for Chain conveyor	Order number	RO400FC-10
	Located	Directly on the two chain rails at the entrance side
	Type of used oil	High temperature oil up to 300°C (572°F)
	Oiling cycle	Daily to weekly (depending to operation time)
	Oil consumption	Depends from the oiling cycles
SMEMA Interface	Order number	RO400FC-12
	Sensor	one at entrance and one at exit side
	Sensor type	Optical polarized
	Functions by side	Board counter
	Scope of delivery	SMEMA connectors at entrance and exit side of the oven, one SMEMA cable, two sensors
3 color signal tower	Order number	RO400FC-13
	Light colors	Red, yellow, green
	Standard with SMEMA interface	No, but recommended
PC monitor and keyboard support arm	Order no.	RO400FC-7
	Located	At the entrance side of the oven, easy to handle from the operators place and moveable to the backside if not needed.
Universal transformer	Order number	RO400FC-20
	Input voltage (primary side)	3x480/277/240/208VAC, 60Hz, 25A
	Input connections	3 phases, earth (neutral not connected)
	Power input	16kWh max.
	Fuses	25Amp. each phase
	Transformer wiring	Star with neutral at middle
	Output voltage (secondary)	3x400V
	Output connections	3 phases, earth, neutral (neutral generated by the transformer)
	Frequency	50/60Hz
	Necessary circuit breaker (at customers side)	Yes, 3 phase breaker in front of transformer
	Location	Outside or built in into the housing of the oven

Packing information

Specification	Value
Box (LxWxH)	3090x1150x1600 mm (10.14x3.77x.25 ft)
Shipping weight (air freight)	924 kg (2037 lb) with meshbelt
	1024 kg (2258 lb) with pinchain conveyor
	1074 kg (2368 lb) with pinchain conveyor and middle support rail
Shipping weight (sea freight)	961 kg (2119 lb) with meshbelt
	1061 kg (2339 lb) with pinchain conveyor
	1111 kg (2449 lb) with pinchain conveyor and middle support rail
Additional weight	+ 70kg (154 lb) with built-in transformer

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RO300FC Reflow Oven

Version 3.2, June 2017

Configuration

		RO300FC	RO300FC-C
Machine base	Heating zones	3	3
	Cooling zones	1	1
	Air operation	●	●
	Base console	●	●
PCB Handling	Mesh belt conveyor	●	
	Pin (chain) conveyor		●
	SMEMA interface		○

● standard feature ○ optional feature

Specifications

		RO300FC	RO300FC-C
Dimensions	Length x Width x Height	2'000x710x1'200 mm (78.8x28x47.2")	
	Weight	237 kg (523 lb)	237 kg (523 lb)
Control	Type	Microprocessor	
	Languages	English, German, French	
	Temperatures selectable	°C, °F	
	Program capacity	49 (10 preset standard, 10 preset leadfree, 10 preset curing, 19 free)	
	Board counter	optional with sensor or standard with SMEMA option	
	Gas temperature adjustment	Adjustable from 20° to 300°C (68° to 572°F) for each zone	
Substrate dimensions	Max. reflow width	300 mm (11.8")	
	Substrate width	10-300 mm (0.39-15.8")	10-300 mm (0.39-11.8")
Conveyor	Transport direction	left to right	
	Pin length	-	3 mm (0.12")
	Conveyor speed range	100-800 mm/min (3.9"-31.5"/ min), see slow speed option for slower speed	
	Conveyor speed repeatability	+/- 2 mm (0.079") / min	
	Conveyor motor type	24V DC with encoder	
	Rail parallelism	-	+/- 0.3mm (0.012") from 20 to 290°C
	In feed length	170 mm (6.7")	
	Out feed length	165 mm (6.5")	
	Entrance height (max)	38 mm (1.5")	34 mm (1.34")
	Free space below substrate	0	32 mm (1.26")
Process dimensions	Heated length	1'160 mm (45.7")	
	Length of heating zone	380 mm (15.0")	
	Length of active cooling zone	140mm (5.5")	
	Overall length cooling zone	290mm (11.4")	
Process data	Total Air circulation heating zones	1'200 m ³ /h (706 cfm)	
	Air circulation per heating zone	400 m ³ /h (235 cfm)	
	Air circulation peak zone	400 m ³ /h (235 cfm)	
	Air circulation cooling zone	300 m ³ /h (177 cfm)	
	Atmosphere quality	air	air
Supplies	Electrical	EU: 3x400 VAC, 50Hz, 25 A US: 3x208 VAC, 60Hz, 32 A (without transformer)	
	Power consumption	6.1 kW continuous, 10 kW (during initial heat up, 15 min)	
	Minimum exhaust volume	2x250 m ³ /h = 500 m ³ /h (2x150 cfm=300 cfm). Option RO300FC-VNT recommended.	
	Filter / Air Cleaning Systems	No / must be added in the exhausting system	
	Exhaust specifications	1 each at entry and exit, distance 1,34 m (52.76"), diameter 80 mm (3.15"), length 40 mm (1.57"), gas temperature at exhaust <55°C (<131F)	
Environment	Noise level	70 dB (A) maximum	
Features	Emergency stop buttons	1 (on left side of the machine)	
	Main power disconnect	1 with undervoltage circuit breaker	
	Overheat security	Overheat temperature control for each zone (electronic detection)	
	Safety standards	CE, EN 954-1 Class 3	
	Color	White (RAL9002) silky lustre, fine structure	



Heating zone specifications

Temperature Profile	Preheat 1	Preheat 2	Reflow	Cooling
Type	Convection	Convection	Convection	Convection
Max. gas temperature setting	300°C (572°F)	300°C (572°F)	300°C (572°F)	--
Max. Heating power	3000 W	3000 W	3000+2500 W	--
Regulation (Reflow conditions)	+/- 3°C	+/- 3°C	+/- 3°C	--
Ramp times (FR4 inboard measurem.)	1.8-2°C /sec	1.8-2°C /s	2-3°C /sec	2.5-3°C /sec
Temperature measurement	in airstream*	in airstream*	in airstream*	--
Heating up time from 20°C (68°F) to set temperature 160–160–160–235°C (320-320-320-455°F) (Typical used Profile)	6 min	4 min	8 min	--
ΔT within 300 mm conveyor width	<4°C (39.2°F)	<4°C (39.2°F)	<4°C (39.2°F)	--
Cold start warm up to 235°C (455°F)	14 min	8 min	8 min	--
Cold start warm up to 300°C (554°F)	35 min	13 min	14 min	--
Max temp difference between two adjacent zones	← 280°C** (536°F)	← 90°C** (194°F)	← 90°C** (194°F)	← 270°C** (518°F)
Blower rpm	2 x 1850	2 x 1850	2 x 1850	2 x 2600

* Temperature measurement directly within air stream adjusted to PCB height.

** External exhausting with specified volume required.

Option specification

Option	Value	Specification
Signal tower	Colours	3
	Audio signal	optional
Slow speed option	Order number	RO300FC-15
	Conveyor speed range	10-200 mm / min (0.4"-7.9" / min)
Flying thermocouples	Order number	RO300FC-1
	Length	5 m (16.4 ft)
	Quantity	2
	Temperature display	Directly on the on the integrated LCD Panel or optional importable into RO-Soft
RO-Soft profiling software	Order number	RO300FC-SOFT-2
	Measure channels	5 (2 for thermocouples, 3 for zone temperature)
	Recording time	up to 180 hours
	Data export format	.pdf (pdf writer necessary on the PC), .csv (for excel import)
	Delivered with	RS232 connection cable, SUB-D Adapter 25pin-9pin
	Data Connection	RS232
	PC requirements	Pentium 3 or better
	System requirements	Option RO300FC-1 (Flying Thermocouples)
Exhaust incl. ventilator	Order number	RO300FC-VNT
	Scope of delivery	Covered exhaust fan with connection pipes to the two exhausting nozzles, Power cable connected to the oven
	Technical details	500m ³ /h (300cfm) air exhausting, 230V 50/60Hz
	Customers side installation	1 Pipe or tube to the outside or to air cleaning equipment Diameter 125 mm (4.92") (150mm (5.91") with adaptor), max length 5.0m (16.4 ft). Fire proof and temperature resistant up to 70°C (158°F)
Exhaust Tubes (without Ventilator)	Scope of delivery	Connection pipes to the two exhausting nozzles. Diameter 80mm (3.15") with T connection on top, Diameter 125 mm (4.92"), 150mm (5.91") with adaptor.
	Customer side installation	Exhausting system with 1 Pipe or tube Diameter 150mm (5.91"), max length 5.0m (16.4 ft). Fire proof and temperature resistant up to 70°C (158°F) Technical requirements for exhausting system see on chapter "Exhausting"
Slide out unit	Order number	Meshbelt: RO300FC-4, pin conveyor: RO300FC-4C
	Sliding angle	adjustable with screws
	Transport width	Meshbelt: 400 mm (15.8"), Pin conveyor: 10-300 mm (0.4" - 15.8")

Option specification (cont.)

Option	Value	Specification
PCB Counter	Sensor type	Optical polarized
	Order numbers:	Mesh belt RO300FC-3B Chain conveyor) RO300FC-3
Oiling System for Chain conveyor	Order number	RO300FC-10
	Located	Directly on the two chain rails at the entrance side
	Type of used oil	High temperature oil up to 300°C (572°F)
	Oiling cycle	Daily to weekly (depending to operation time)
	Oil consumption	Depends from the oiling cycles
SMEMA Interface	Order number	RO300FC-13
	Sensor	one at entrance and one at exit side
	Sensor type	Optical polarized
	Functions by side	Board counter
	Scope of delivery	SMEMA connectors at entrance and exit side of the oven, one SMEMA cable, two sensors
3 color signal tower	Order number	
	Light colors	Red, yellow, green
	Standard with SMEMA interface	No, but recommended
PC monitor and keyboard support arm	Order no.	RO300FC-7
	Located	At the entrance side of the oven, easy to handle from the operators place and moveable to the backside if not needed.
Packing information	Box (LxWxH)	2170x1040x955 mm (7.12x3.41x3.13 ft)
	Shipping weight with meshbelt (Airfreight)	340 kg (750 lb)
	Shipping weight with pinchain conveyor (Airfreight)	340 kg (750 lb)

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