

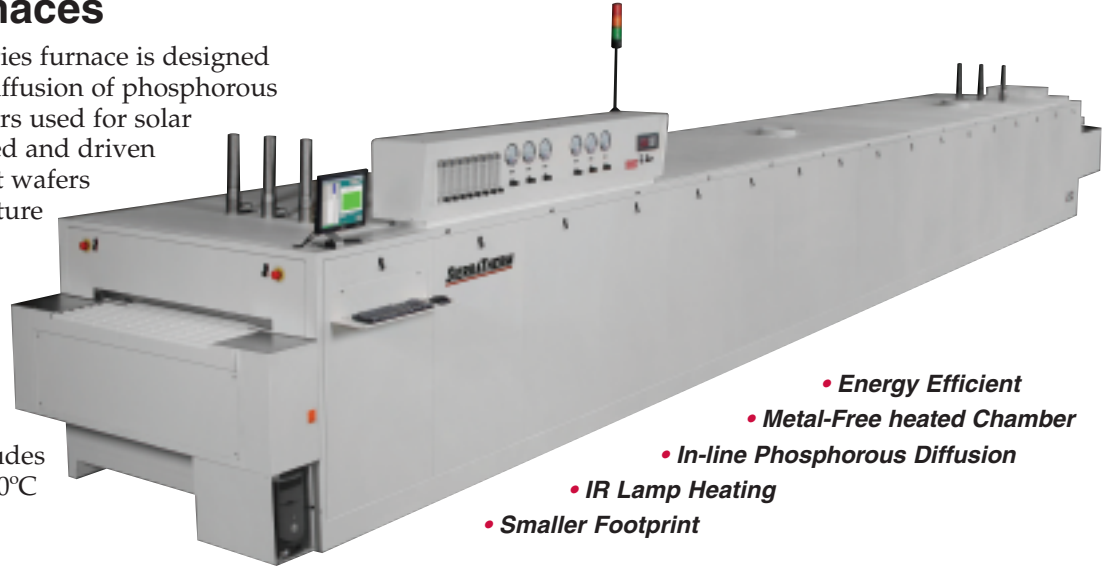
# SIERRATHERM

PRODUCTION FURNACES INC.

## XR Series

### Roller Hearth Metal-Free Phosphorous Diffusion Furnaces

The SierraTherm XR Series furnace is designed specifically for in-line diffusion of phosphorous dopant into silicon wafers used for solar cells. Precision machined and driven ceramic rollers transport wafers through a high temperature profile previously performed in batch or conveyor belt ovens. The XR Series excels in thermal processing for which metal contamination is a critical factor. This includes process profiles from 100°C to 1000°C.



- Energy Efficient
- Metal-Free heated Chamber
- In-line Phosphorous Diffusion
- IR Lamp Heating
- Smaller Footprint

#### Advantages

##### Ceramic Rollers:

Transportation of wafers with ceramic rollers replaces the traditional metal conveyor belt in the diffusion process. The heated process chamber is now completely metal-free and in-line which is ideal for phosphorous drive-in. In-line processing minimizes handling which can improve yields and process flow. Precision speed control and roller alignment insure uniformity of cell movement.

##### IR Lamps:

The XR Series uses tungsten filament infrared lamps as the primary heat source, which improves drive-in characteristics with short wavelength heat. The IR lamps provide dramatically rapid response and heat up to diffusion temperature minimizing production down-time. The IR lamp quartz envelope structure also protects filaments from acidic processing environments and isolates them from the furnace's metal-free interior.

##### Small Footprint:

The XR Series can substantially reduce process floor-space requirements. Extremely rapid heating and cooling rates can be achieved in SierraTherm's roller hearth furnace as only the parts in process need to be heated and cooled. This is unlike batch ovens in which surrounding materials (insulation, boats, etc.) must be heated, and belt furnaces which must heat and cool the conveyor belt along with the parts. The XR Series is

also capable of processing parts at higher temperatures than comparable conveyor belt furnaces which can improve diffusion rates. This, combined with rapid heating and cooling, can shorten overall system length dramatically.

##### Energy Efficiency:

The XR Series is an energy efficient addition to any production line. High mass metal conveyor belts that waste heating and cooling energy in the diffusion cycle have been completely eliminated. IR lamps are able to rapidly change temperature, allowing idling of the furnace to low temperature while not actively processing, thereby saving energy costs. In addition, the XR Series includes an ultra-clean low-mass refractory heating chamber which effectively limits external heat loss. The metal free, low mass ceramic fiber IR Lamp configuration also minimizes time between recipe changes.

##### Proven SierraTherm Control:

Included as standard equipment on the XR Series is the powerful and convenient Windows based MicroTherm furnace control, profiling, and monitoring system. First developed and introduced by SierraTherm in 1992, today's version is based on many years of furnace experience and customer input. This experience has also resulted in the creation of our precision IR lamp phased power control system which maximizes process temperature stability.

ARISING FROM EXPERIENCE





# XR Series ROLLER HEARTH FURNACES

## ORDERING INFORMATION AND SPECIFICATIONS

Type / Model	Processing Width (in/mm)	Heating Zones	Heated Length (in/mm)	Connected Load (kW)	Typical Operating Load (kW)
XR35-390-11	35/890	11	390/9900	160	29
XR35-460-13	35/890	13	460/11700	214	40
XR35-531-15	35/890	15	531/13500	270	51

Notes: 1. SierraTherm also manufactures custom designed furnaces to meet specific customer requirements  
 2. Specifications are subject to change without notice  
 3. Furnace models are subject to change without notice

### PERFORMANCE SPECIFICATIONS

Maximum Temperature Rating:  
1000°C

Normal Operating Temperature:  
100°C–1000°C

Energy Consumption:  
(for models operating at typical 900°C profiles)  
typically <20% of connected load

Overtemperature Protection:  
Redundant Overtemperature Protection in all zones

Cooling Module:  
Free and forced Convection

Atmosphere System:  
Air atmosphere  
Uniform flow distribution across entire chamber width  
Directional gas flow control

Power Supply:  
200/240 Volts, 3 Phase, 50-60 Hz standard, Other configurations available depending on destination country

Clearance Above Conveyor Surface:  
2 in. (51 mm) standard

Drive System:  
Microprocessor controlled, closed loop, digital feedback, ±0.1% accuracy  
Mechanical Drive Slip Clutch

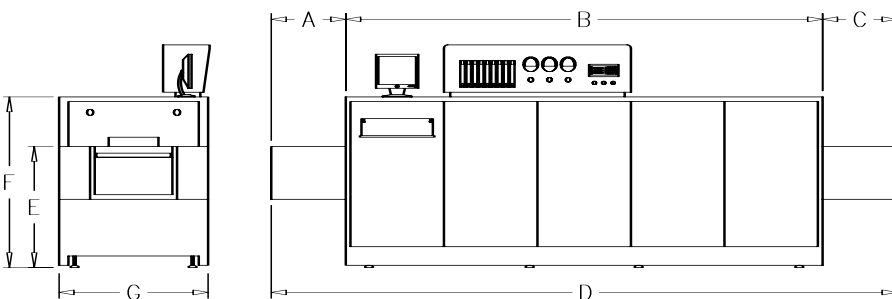
Control System:  
MicroTherm Windows Based PC Control System  
Pentium based PC with flat panel color monitor  
3 Port time/temperature part profiler

Control System (continued):  
SPC data logging and historical display  
OPC Server compatible  
On-line help manual

Exhaust System:  
2" diameter, air powered venturi exhauster  
Full chamber width exhausting  
Removable condensate collection trap  
Exhaust gas flow monitor and control

Performance specifications are based on nominal operating conditions. Actual performance characteristics are dependent on specific processing applications.

### DIMENSIONS (in/mm)



Type/Model	A	B	C	D	E	F	G
XR35-390-11	12/305	455/11557	42/1067	509/12929	36/914	72/1829	72/1829
XR35-460-13	12/305	515/13081	42/1067	569/14456	36/914	72/1829	72/1829
XR35-531-15	12/305	590/14986	42/1067	644/16358	36/914	72/1829	72/1829

### OPTIONS

- Air Filtration System
- Profiling Thermocouples
- Belt Stop Alarm System
- Individual Element Monitoring System
- Printer
- UPS for Computer and Belt Drive System
- Status Light Tower
- Part Sensor Alarm
- Air Filtration System

## SierraTherm Production Furnaces, Inc.

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