

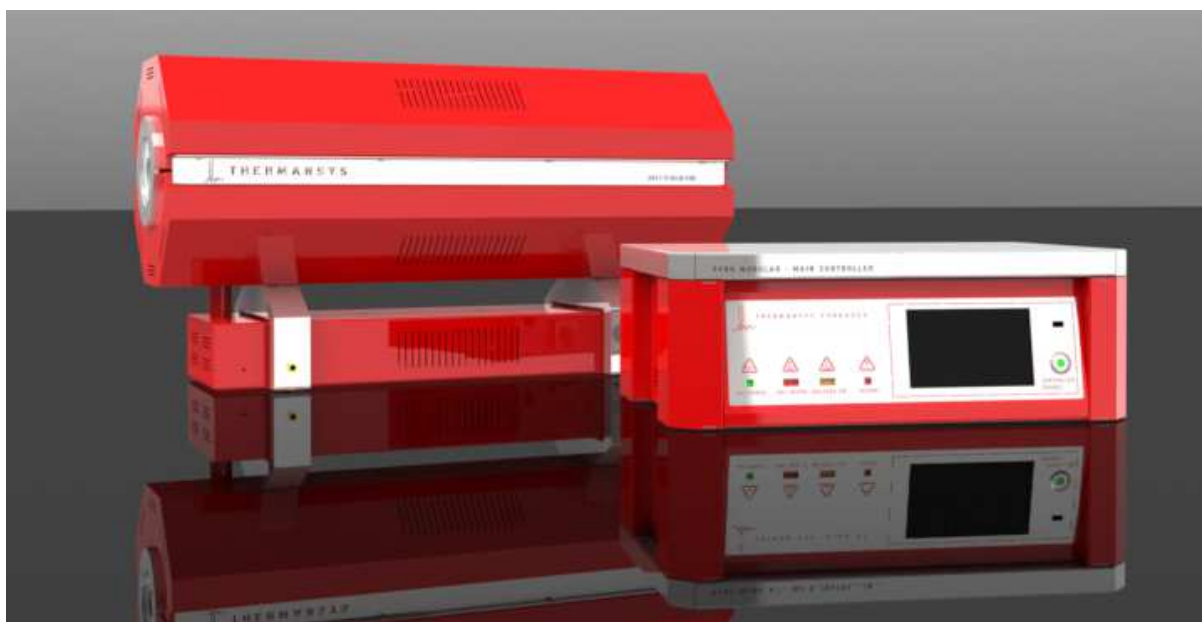
REACTOR TYPE FURNACES

Universal mounting - Remote Control – Single or Three Zone

Model family: **RCT-AW1-T-1300**

Description.

RCT-AW1-T-1300 model family designed to provide the highest performance that a, wire wound heaters, tube tunnel furnace can have. Thick powerful FeCrAl resisting heaters, capable to withstand high power rates at **1300 °C continuous operation** temperature, bring this family close to the very high temperature operation area, retaining however considerable cost effectiveness compared with alternative ceramic resistors models. Rated with very high power density this model is capable to reach fast temperature raise rates. Coil type resistors with minimum pitch provide a very dense heater structure ensuring excellent temperature uniformity. Long end insulation flanges result in narrow axial temperature distribution profiles while three zone models can reach central uniform length (± 10 °C) of 700mm. Remotely controlled and powered by THERMANSYS® state of the art **PYROMODULAR** control system and in combination with a gas sealed tubular reactor this furnace is an ideal solution for several controlled atmosphere processes.



Model shown is RCT-AW1-T-3Z_D4L66-1300 with PYROMODULAR main controller.

Key features.

- Best available quality KANTHAL® FeCrAl wire wound resistors insure furnace long life operation.
- Extremely low mass vacuum formed thermal insulation enables high output available for the load and fast heat up rates while significantly contributes to energy savings under daily thermal cycling.
- Control strategy focusing in high power factor for all workable temperature areas leads to energy savings and insures compliance with EMC (Electro-Magnetic Compatibility) standards.
- Vertical and horizontal mounting flexibility covers different possible present and future laboratory needs.
- Accurate and uniform temperature profiles.
- Very high power density -fast temperature ramping.
- Modern double wall construction keeps external surfaces temperature low, emphasizing in operator safety. Internal skin is exclusively made from stainless steel to enhance durability.
- Ergonomic design with no protruding edges, bolts or other features combines stainless steel parts with painted finish parts for an improved esthetic result.
- Deterministic over-temperature limiter with manual reset, in accordance with EN 60519-2 to protect the oven and load.
- PID control constantly conforms to various load needs.

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PYROMODULAR System at a Glance.

Operated through the specially developed **PYROLOGISM 2.0** software and equipped with a touch screen computer **PYROMODULAR** is a state of the art control, monitoring and data acquisition **system**. Taking advantage of the optional expanding capabilities of this system the user can not only just control the furnace but create a fully instrumented and totally integrated high temperature reactor system.

PYROMODULAR Main Controller.

Each **RCT-AW1-T-1300** furnace is equipped as a standard with the **PYROMODULAR Main Controller** that enables:

- Touch Screen Computer running user friendly operator **PYROLOGISM 2.0** software human-machine interface.
- Single or three heating zones models remote closed loop control and power circuits.
- 3 user process thermocouple inputs available (B, E, J, K, N, R, S, T type- software configurable).
- Power and true rms Current measuring circuits for each heating zone(s).
- Heater failure, open control thermocouple detection alarms and interlocks. Alarms and events front panel led array.
- Stand alone over-temperature limiter (Watchdog) with manual reset in accordance with EN 60519-2 to protect the oven and load for each heat zone(s). Overrides main controller and cut off heater power if user adjustable high limit is reached.
- Alarm event output (dry contact 3A/250V AC/DC).
- USB client B type and RJ45 port for connection to PC.



PYROMODULAR- Modules Palette

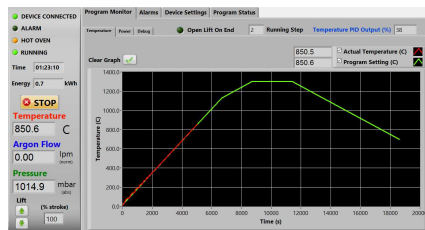
PM – Gas Flow and Pressure

Gas flow control manifold with Mass Flow Meters and Controllers for process gas control.

PM – Gas Analyzers *In line low cost embedded IR analyzers.*

PM – Vacuum *Rough (up to 10^{-3} torr) and High (up to 10^{-7} torr) complete vacuum systems.*

For detailed information and ordering please refer to our corresponding Technical Bulletin “Pyromodular System”



Description	Status	Reset
Open Thermocouple	OK	Over Alarm Reset
Open Circuit	OK	
Short Circuit	OK	
Lift Collision	OK	Lift Alarm Reset
Low Argon Flow	OK	Argon Low Flow Alarm Reset
Vacuum Leak	OK	Vacuum Leak Alarm Reset
Over Temperature Watchdog	OK	Watchdog Alarm Reset
Watchdog Temperature (C)	0.0	Subst
Watchdog Active Set Point (C)	0.0	



PYROLOGISM 2.0 control and monitoring software.

Having in mind user's convenience and daily work facilitation, Thermansys® design and develop a special windows architecture software providing a friendly human machine interface solution with advanced features:

- Quick setting of a single ramp rate to a set point -run on timer function.
- Set-point programming with up to 15 ramp and constant temperature programming steps – graphical inspection of programming.
- Storage and reload of unlimited number of distinct programs.
- Real time chart illustrating control temperature(s), running set point(s) and user process temperatures with dynamic zoom.
- Real time true-rms Current (A), Voltage (V) and Power (W) measurements.
- Real time actual Power (W) and totalized Energy (kWh) chart.
- Saves all data on local memory.
- Tools for manual PID tuning or auto-tuning.
- Dynamic Help function tool, virtual keyboard, alarm and event message bar.
- Watchdog over temperature limiter monitor/configuration page.
- Gas flow and pressure, gas analyzers signals, monitoring and control interface pages activated if corresponding PM modules are enabled.
- Versions running at Microsoft® Windows are available for control by a PC through Ethernet USB port.
- Remotely monitoring and control through network connection.

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Accessories Available.

Work-tubes.

Several work tube materials to choose from:

- Dense ceramic Alumina work-tubes for the highest temperature applications.
- Quartz work-tubes for maximum chemical inertia and for aggressive environments to work under vacuum or low pressure conditions up to 1100 °C continuously.
- KANTHAL® APM™/APMT metallic (FeCrAl based) work-tubes to serve under vacuum or pressure up to 1250 °C.

End Gas Sealing Flanges and Manifolds.

THERMANSYS® is providing work-tube End Gas Sealing Flanges for vacuum or pressure conditions. These flanges are provided either with hydraulic thread port or with Clamp Flange (CF) port for gases inlet/outlet- connection to the tubing network. Cooling fluid recirculation compartment is standard. Also available, flanges assembled with manifolds having ports for instrumentation mounting (e.g thermocouples, pressure sensors), quick-open loading port and quartz sight window.

For detailed information and ordering please refer to our corresponding Technical Bulletin “Reactor Type Furnaces Accessories”



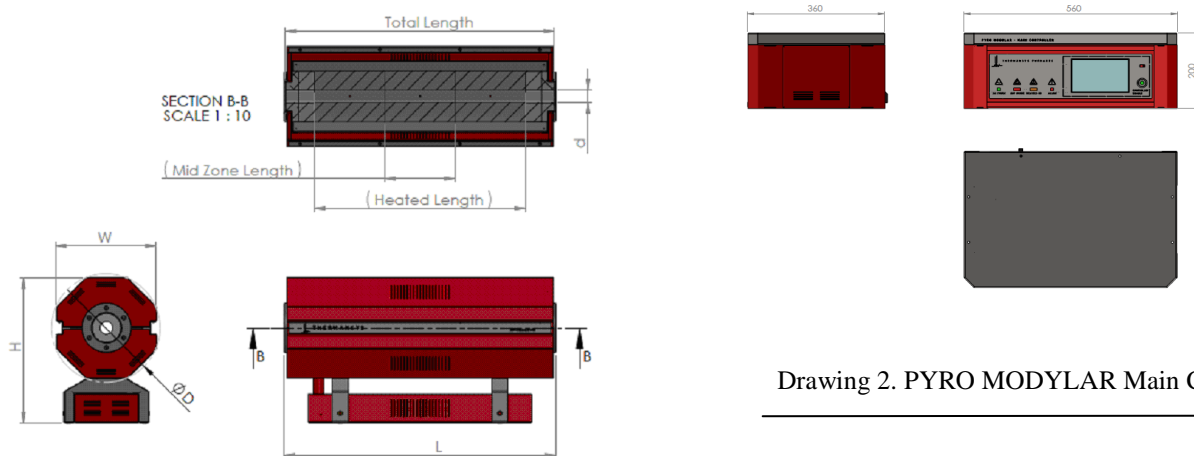
Model shown RCT-AW1-T-3Z_D4L66-1300 with optional mounting stand, Alumina work-tube and inlet/outlet end sealing gas flanges

Mounting Stands.

Assembled and constructed using BOSCH-REXROTH® structural profile systems these stands provide the ideal solution for vertical furnace stand alone positioning plus reactor and instrumentation mounting. Using the commercially available accessories, tubing and cable routing is easy and professionally accomplished. Stands with electronically actuated furnace move-up and down provide a solution for heating zone moving along the reactor length.

For detailed information and ordering please refer to our Technical Bulletin “Reactor Type Furnaces–Mounting Stands”

Technical Drawings.



Drawing 2. PYRO MODYLAR Main Controller

Drawing 1. RCT-AW1-T-....-1300 Furnace

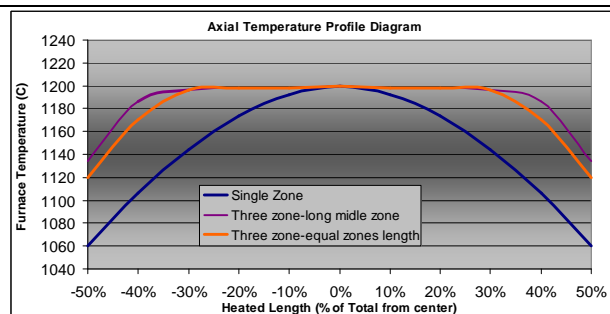
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Specifications and Ordering Information.

- Maximum continuous temperature 1300 °C.
- Operating Power: 208 /240VAC – 50/60Hz.
- R type embedded thermocouples.
- Mounting orientation: Horizontal, and vertical.
- Temperature control accuracy ± 1 °C.
- Exposed resistors type.
- Single zone or three heating zone(s) configuration models.
- Each zone is equipped with two independent thermocouples for controller and over-temperature limiter feedback.
- Thermocouple inputs:
3 chan. - B, E, J, K, N, R, S, T type -software configurable
24 bit A/D conversion, 0-45°C cold junction compensated
Typical accuracy $\pm 0.2\%$ f.s @ 25 , resolution 0.1 °C



Curves presented are simulated indicative data and are valid for common set-point for all heating zones, dense alumina process reactor fit to furnace diameter and with both ends plugged. Actual performance may vary depending on orientation, load mass and placement, reactor size and process gas flow existence

CE Certified. Compliant with **Low Voltage Directive 2006/95/EC** (harmonized referenced standard EN 61010-1: 2001 and EN 61010-2-010:2003) and **EMC Directive 2004/108/EC** (harmonized referenced standard EN 61326-1:2006).
Produced in **GREECE** following **ISO 9001:2008 quality management system** and **ISO 14001:2004 environmental management system**.

TABLE1. Single Zone Models

Model Part Number	Max. Cont. Temp. °C x Heat up time* min	Furnace I.D. mm x Heated length mm x Total length mm	Uniform Temp. length mm ± 10 °C approx. **	Furnace external dim. WxHxL mm see drawing 1	Nominal Max. Power (W)
RCT-AW1-T-1Z...					
_D4/L22-1300	1300 x 40	40x220x400	60	355x540x410	1000
_D4/L52-1300	1300 x 40	40x520x700	160	355x540x710	2500
_D7/L22-1300	1300 x 40	70x220x400	60	385x570x410	1500
_D7/L52-1300	1300 x 40	70x520x700	160	385x570x710	3800
_D10/L44-1300	1300 x 40	100x440x620	60	415x600x630	4000
_D10/L52-1300	1300 x 40	100x520x700	160	415x600x710	5000
_D15/L52-1300	1300 x 40	150x520x700	160	465x650x710	7000
_D20/L52-1300	1300 x 40	150x520x700	160	515x700x710	9000

TABLE2. Three Zone Models

Model Part Number	Max. Cont. Temp. °C x Heat up time* min	Furnace I.D. mm x Heated length mm x Mid. zn. length mm x Total length mm	Uniform Temp. length mm ± 10 °C approx. **	Furnace external dim. WxHxL mm see drawing 1	Nominal Max. Power (W)
RCT-AW1-T-3Z...					
_D4/L66-1300	1300 x 40	40x660x220x840	480	355x540x850	3000
_D4/L88-1300	1300 x 40	40x880x440x1100	700	355x540x1110	4000
_D7/L66-1300	1300 x 40	70x660x220x840	480	385x570x850	4500
_D7/L88-1300	1300 x 40	70x880x440x1100	700	385x570x1110	6000
_D10/L66-1300	1300 x 40	100x660x220x840	480	415x600x850	6000
_D10/L88-1300	1300 x 40	100x880x440x1100	700	415x600x1110	8000
_D15/L66-1300	1300 x 40	150x660x220x840	480	465x650x850	7500
_D15/L88-1300	1300 x 40	150x880x440x1100	700	465x650x1110	9000
_D20/L96-1300	1300 x 40	150x960x520x1180	780	515x700x1190	15000

* Furnace working with no load and both ends closed

** Simulated indicative data. Valid for common set-point for all heating zones, dense alumina process reactor fit to furnace diameter and with both ends plugged. Actual performance may vary depending on orientation, load mass and placement, reactor size and process gas flow existence.

IMPORTANT ORDERING NOTES:

- Models Part Number listed in Tables 1 and 2 concern complete turn key systems with PYROMODULAR main controller included.

Ordering Example:

RCT-AW1-T-3Z_D4/L66-1300: This Part Number includes one RCT-AW1-T-1300 family furnace having 3 heating zones, 40mm internal diameter, 220mm mid zone length and one PYROMODULAR Main Controller.

- To order only the furnace add at the end of the part number the suffix "Single", e.g. RCT-AW1-O-3Z_ D7/L75-1150 **Single**.

- Optional furnace accessories or mounding stands are ordered separately according to the respective data sheet ordering information.

- Additional PYROMODULAR Modules are ordered separately according to the respective data sheet ordering information.

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