

Calorimeter Pre-Conditioner

CD295 Series

Introduction

The ANTECH CD295 Series Thermal Pre-Conditioner is a high-performance instrument for the optimisation of the temperature of containers to be used in support of ANTECH CD285 Series Calorimeters. It is designed to provide a stable environment within a sample chamber so that the container is heated or cooled whilst isolated from the effects of fluctuations in the ambient temperature in the facility. By heating or cooling, the container is prepared for assay within the calorimeter, cutting down the time to reach thermal equilibrium within the calorimeter.

By Pre-Conditioning the sample, the measurement time in the calorimeter can be reduced, as the sample container is brought into thermal equilibrium with the temperature of the calorimeter measurement chamber prior to inserting into the Calorimeter. This means the Pre-Conditioner can be used in a process line with the calorimeter, pre-conditioning a sample whilst the previous sample is being assayed in the calorimeter unit. This increases throughput for the system.

Operation

The Pre-Conditioner features two functions; a chamber cylinder with heater windings to provide heat to the container to increase the temperature, and a peltier fan to provide cooling of the sample. The sample chamber is surrounded by high performance insulation to provide an environment with a high thermal inertia, thereby reducing the power required for the heating or cooling circuits to reach thermal equilibrium at the set temperature. A set of cooling fans allow for the heat generated by the sample to get dissipated using the peltier fan which forces cooled air around the sample chamber.

An instrument enclosure mounted on the single chassis contains PID controllers, monitoring the temperature of the sample and automatically selecting the heating or cooling circuits. The controllers are configured and operated by an embedded controller housed within an IP rated electronics enclosure. This controller features the ANTECH Pre-CAL software package, which provides an intuitive user interface (UI) to configure and set up the Pre-Conditioner limits and set points. Continuous monitoring of the environment is used to monitor the current.



Features

- Dual stabilisation control
 - Heater circuit wound around the outside of the sample chamber
 - Peltier-fan air cooling circuit
- Thermally insulated sample chamber
- Dedicated PID controllers for the heating and cooling circuits
- In-built data logger
- Electrical Safety protection to disable the heater circuit in the event of loss of heater control
- Options for a portable system with heavy duty braked castors or a fixed system with adjustable mounting feet for securing to the floor.

Customisation

The performance criteria for this data sheet applies to a 3013 canister for plutonium samples which can reach high temperatures whilst in storage (up to 75°C), however each pre-conditioner module can be customised to suit the sample size and thermal characteristics of the measurement challenge in order to optimise the performance of the system. Options for multiple pre-conditioner wells for increased throughput can be configured on a single chassis.

Benefits

- Increased throughput
- Shortened Measurement Time
- In line process capability
- Optimisation for the sample canister characteristics
- Embedded control unit for un-monitored operation
- Data logging
- In addition, in-line automation with auxiliary sample handling equipment has previously been provided in a multi-stage pre-conditioner, calorimetry and gamma assay suite.

Specification

Attribute	Value
System	
External dimensions (H x W x D) mm (in)	1200mm 775mm x 610mm (47.24" x 30.51" x 24.01")
Sample Chamber (H x D) mm (in)	254mm (10") x 125mm (4.92")
Weight kg (lbs)	215 (474)
Electrical	
Power Supply	110vac, 60Hz
Power Consumption (W)	250 (Typical)
Environment	
Operating temperature (ambient)	19 to 26°C (optimum), 32°C (maximum)
Humidity	5 to 90% (non-condensing)
Electrical Enclosure	IP54
Compliance	
Safety	NFPA 70
Performance (12kg, 3013 Canister at elevated temperature)	
Cooling time to set temperature of 27°C. [Start temperature 75°C] (min)	<60 mins (30 mins Typical)
Warming time to set temperature of 27°C. [Start temperature 4°C] (min)	< 150 mins
Reproducibility (°C)	< +/- 0.5°C