



High Temperature Test Systems

129620 Furnaces / 129621 Sample Holders

Solartron Analytical, NorECs Norwegian Electro Ceramics AS, and Carbolite Ltd, have joined forces to produce the ultimate advanced high-temperature solid-state materials characterization system.

Systems can be configured to your specific requirements using top performance, highly referenced system components including:

- ▶ Solartron Analytical's range of precision time domain (ramp, pulse, I-V), and AC (impedance, capacitance, dielectric constant/loss) electrical measurement instrumentation
 - ModuLab XM MTS
 - 1260A /1296A
- ▶ High quality split tube Carbolite furnaces that cover multiple temperature range requirements from room temperature to 1200 °C (higher upon request)
- ▶ NorECs' market leading ProboStat™ high temperature 2, 3 and 4 electrode sample holders, manufactured using the finest high temperature materials, and able to test varied sample geometries in wet, dry, inert, oxidizing, reducing, or corrosive environments

These well proven systems are perfectly suited to studying a wide range of materials (dielectric, ionic, semiconducting, electronic) and their interfaces (e.g. grain boundaries and electrodes).

Applications include:

- ▶ Development of advanced ceramic materials
- ▶ High temperature dielectrics and insulators
- ▶ Fuel cells materials
- ▶ Studies of bulk and interfaces; grain boundaries and electrodes
- ▶ Electroceramics
- ▶ Sensor materials
- ▶ Reactivity and degradation

High Temperature Furnace

The system uses a Carbolite vertical split tube furnace 129620A, that provides even heat distribution and easy access to the sample. The furnace is customized for the Probostat™ sample holder with over-temperature cutoff and flexible holder positioning using a LabJack positioner.

Sample Holders

The **129621A** sample holder is equipped for measurements on disk samples with 2 or 3 electrodes; conductivity, impedance, fuel cell tests, electrode studies, etc. in single or dual atmospheres.

The **129621B** is more extensively furnished providing the full range of techniques for disk and bar samples, including Seebeck coefficient and van der Pauw 4 point conductivity measurements.

The **129621C** is a simpler holder for 2 electrode measurements on disk samples in a single atmosphere, comprising a sample support that provides faster and easier mounting and exchange of samples.

Solartron materials test systems...

Solartron materials test systems run a wide range of electrical techniques including I-V, Pulse, C-V, Impedance, and Mott-Schottky.

- ▶ PC software provides fully integrated electrical measurements with temperature control
- ▶ High and low impedance materials can be analyzed depending on the choice of instrumentation and sample holder configuration
- ▶ Wide frequency range from 10 μHz to 32 MHz enables full materials characterization



129620A High Temperature Furnace Specification

High Temperature Furnace	Customized Carbolite VST12/300
Furnace type	Vertical, hinged, split tube furnace for easy access to sample holder
Temperature range	Room temperature to 1200°C (Contact us for other temperature ranges)
Temperature stability	Stability: < 1°C
Temperature resolution	0.1°C
Heating elements	Spiral wire coils embedded in vacuum formed ceramic fibre half cylinders
Construction	Heating elements embedded in ceramic fibre forms part of insulation together with fibre board and blanket. Outer case stainless steel with mesh cover for maximum operator safety
Heated length	300 mm
Physical setup	Furnace is positioned 550, 650 or 750 mm (from base to middle of heated zone) using a desk top stand. ProboStat sample holder height is adjustable (80 mm) using 'Lab-Jack'
Control thermocouple	Selectable between internal furnace and ProboStat thermocouple
Main Controller	Eurotherm 2416CG connected to PC via ModBus RS232 interface
Overtemperature detection / shutdown	Internal furnace mineral insulated Type N thermocouple hard-wired to over-temperature safeguard controlled by a Eurotherm 2132 temperature controller
Operating voltage	208-240 V or 120 V single phase
Power	1.5 kW
Dimensions (h.w.d)	1200 mm X 500 mm x 500 mm

System Compatibility

Carbolite 129620A furnace with 129621A/B/C NorECs ProboStat™ sample holder is fully compatible with all Solartron materials test products, including:

- 1260A Impedance Analyzer
- 1296A Dielectric Interface (with 12xx FRA or 1260A)
- ModuLab XM MTS Materials Test System
- ModuLab and SMaRT software

129621A/B/C Sample Holder Specification

High Temperature Sample Holder	NorECS ProboStat™ base unit brass (-A/B/C) or stainless steel (-SA/SB/SC)
Hot zone parts	Spring-loaded sample support tubes, alumina Gas supply tubes, alumina / silica Electrode connects, Pt and alumina Thermocouples, S type
Sample types	129621A - disk only (normal) 129621B - disk & bar (extensive) 129621C - disk only (easy load)
Sample disk size	20 mm sample diameter recommended (10-24 mm diameter upon request) Max diameter 15 mm for '129621C'
Max. size bar sample	25-50 mm long
Temperature range	Room Temperature to 1200°C depending on range of furnace
Temperature accuracy	Typically 1°C, depending on thermocouple life, calibration, and user expertise
Atmosphere control	Swagelok quick-connects Single or dual atmospheres (dual only for versions 'A' and 'B') Gas mixers and other ancillary equipment available upon request

Test Capability	129621A/B/C			Equip	
	-A	-B	-C	MTS	1260/96
Disk samples	✓	✓	✓		
Bar samples		✓			
Simplified sample load			✓		
Dual atmosphere mode	✓	✓			
Conductivity vs. T, pO ₂ , pH ₂ O	✓	✓	✓	✓	
Impedance, (bulk, grain boundary, electrode)	✓	✓	✓	✓	✓
3-electrode mode	✓	✓		✓	✓
Single (button) fuel cells and electrolyzer	✓	✓		✓	✓
Transport number measurements	✓	✓		✓	✓
Accessories are included for:					
Gas permeation	✓	✓			
4pt conductivity (van der Pauw)		✓			
Seebeck coefficient measurements		✓			
Further expansion and customization	✓	✓	✓		



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