P.Energy S.p.A.
Via Caduti sul Lavoro, 15 – IT35014
Fontaniva (Padova)
Tel: +39 049 7966190 – Fax: +39 049 7968776
info@penergy.it www.penergy.it

P.ENERGY CL20PV

WALK-IN TEST CLIMATIC CHAMBER

P.ENERGY CL20PV is a walk-in climatic chamber for testing photovoltaic (PV) modules and Thermal modules according with :

IEC61215 – Terrestrial crystalline silicon photovoltaic (PV) modules
Test 10.11 Temperature Cycling – TC
Test 10.12 Humidity Freezing – HF
Test 10.13 Damp Heat – DH

IEC61546 – Terrestrial thin film photovoltaic (PV) modules
IEC62108 – Concentrator photovoltaic (PV) modules and assemblies

EN12975-1 Thermal modules
EN12975-2 Thermal Modules

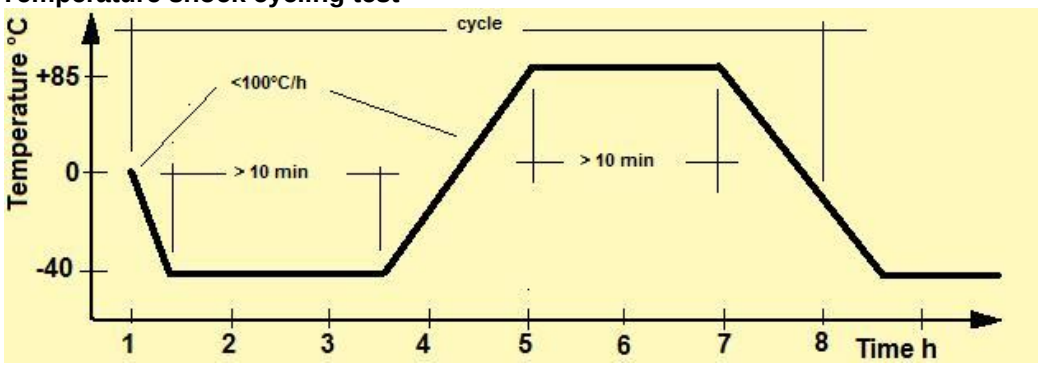
Compact design with :
- Insulated chamber in stainless steel
- Air conditioning unit , located at the rear wall
- Special designed air flow system
- Refrigeration unit water-cooled
- Humidification and dehumidification unit
- Compressed air flashing system
- Colour touch panel
- Independent adjustable temperature limiter
- Adjustable software temperature limit
- Humidity input and display in % relative humidity
- Serial interface RS232

MEASURING SENSOR
- **Temperature measuring sensor Pt 100, DIN EN 60751, 1/3 class B**
- **Psychometric humidity measurement**

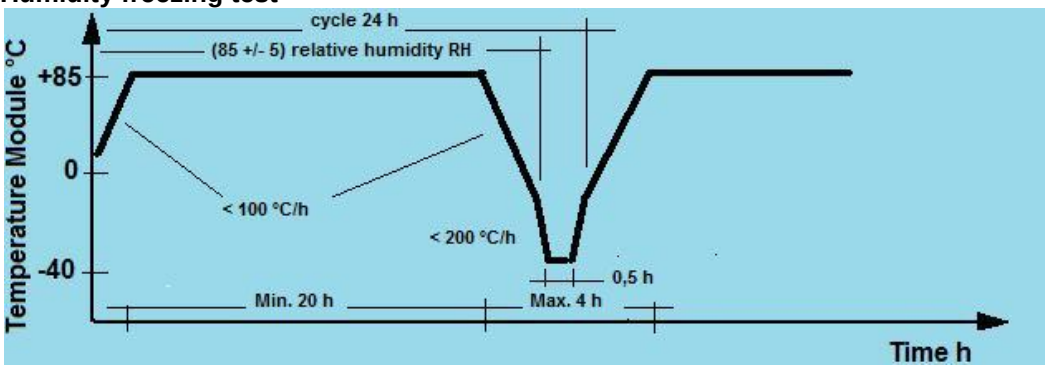
P.Energy S.p.A.
Via Caduti sul Lavoro, 15 – IT35014
Fontaniva (Padova)
Tel: +39 049 7966190 – Fax: +39 049 7968776
info@penergy.it www.penergy.it

SAMPLE TESTS :

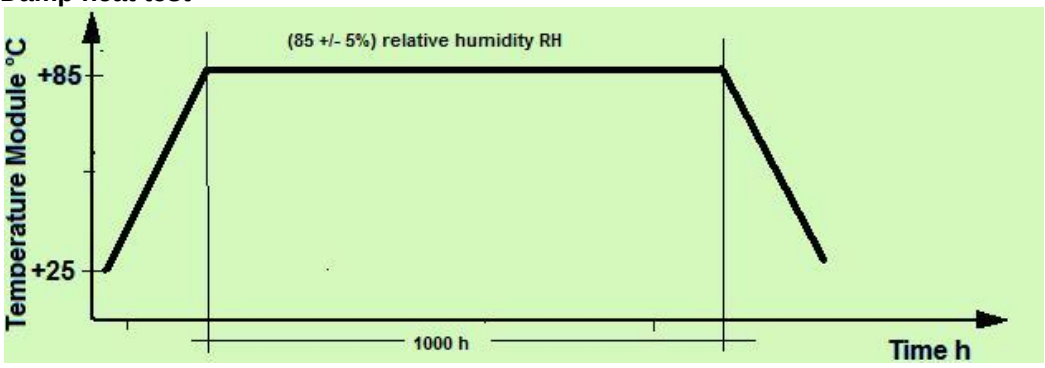
Temperature shock cycling test



Humidity freezing test



Damp heat test



P.Energy S.p.A.
Via Caduti sul Lavoro, 15 – IT35014
Fontaniva (Padova)
Tel: +39 049 7966190 – Fax: +39 049 7968776
info@penergy.it www.penergy.it

The working space is W 2500 mm
L 1500 mm
H 2400 mm

Performance range for temperature testing

Temperature range	-45°C to 90°C
Temperature deviation in time in centre of working space	±0.3 K to ±1.0 K
Temperature deviation in space	≤±2.0 K Measured in a distance of 250mm from walls, floor and ceiling
Temperature rate of change in average, **with** test specimen, **without** heat load, measured in the supply air stream	Heating: approx. 2.0 K/min in the range from -40°C to +85°C Cooling: approx. 2.0 K/min in the range from +85°C to -40°C
Operating mode	Discontinuously at temperatures < approx.. +5°C

Performance range for climatic testing

Temperature range	+10°C to +90°C
Temperature deviation in time in centre of working space	±0.3 K to ±1.0 K
Temperature deviation in space	≤±2.0 K Measured in a distance of 250mm from walls, floor and ceiling
Humidity range	10% r. h. to 95% r. h. without heat load
Dew point range	+ 5°C to + 89°C without heat load
Humidity deviation in time in centre of working space	
Humidity diagram	

Test specimens

Kind	PV-Modules
	PV Module: 40x1000x1600mm
Number of pieces	20
Weight	500kg + 80kg = 580 kg (modules + rack)
Specific heat capacity	c=0.85 kJ/kgK
Thermal reaction	65 %
Admissible heat load from test specimens	0 W
	Not specified; not included
Fresh air	

Data for installation and operation

Compact design	Consisting of: • Work space • Machine unit • Switch cabinet • Humidification unit

Dimensions

Work space	2500 mm wide 1500 mm deep 2400 mm high
Work space area	approx. 3.7 m²
Work space capacity	approx. 9.0 m²
Double wing door Inner door dimensions	approx. 2500 mm wide approx. 2200 mm high
Overall dimensions	approx. 3900 mm wide[1] approx. 2250 mm deep[2] approx. 2950 mm high

[1] Plus approx. 1000 mm for service and maintenance on the right side

[2] Plus approx. 350 mm for fans

P.Energy S.p.A.
Via Caduti sul Lavoro, 15 – IT35014
Fontaniva (Padova)
Tel: +39 049 7966190 – Fax: +39 049 7968776
info@penergy.it www.penergy.it

Connections

Power supply	rated voltage: rated power: rated current: main connection:	3/N/PE AC 400 V ± 10 % 50 Hz about 52 kW about 90 A (neutral conductor fully loaded) taken to terminals, connection from the top
Master switch	installed in side wall of the switch cabinet, according to installation on l. h. or r. h. side	
Humidification water	supplied on site with distilled of fully demineralised water, pH value 6 to 7, pressure min 1 bar, conductivity 5-20 µS/cm (max.), chloride concentration < 1 mg/l inlet R 3/8”	
Drain for condensate and cleaning water	R 1”, gravitational	
Cooling water quality	without contaminant (max. grain size: 100 micrometers, pH-value approx.. 7)	
Cooling water supply	3 to max. 6 bar excess water pressure, pressure loss in system about 2.5 bar inlet R 2” outlest R 2” cooling water consumption max. approx. 10 m³/h at Δt= 5 K cooling water temperatures: max. + 27°C inlet resp. max approx. 5m³/h at Δt=10K cooling water temperature: max. + 18°C inlet	
Notes for cooling water	• water purification and increase of pressure on site (customer responsibility) • design for using cooling mediums (e.g. water –glycol mixtures) upon request • for operation with well/pond water special measures must be taken, on request	
Compressed air connenction	compressed air system on site with min. 6 bar excess pressure and compressed air temperature of < ±40 °C, pressure dew point ≤ +3 °C, connection quantity: approx. 10m³/h	

P.Energy S.p.A.
Via Caduti sul Lavoro, 15 – IT35014
Fontaniva (Padova)
Tel: +39 049 7966190 – Fax: +39 049 7968776
info@penergy.it www.penergy.it

Installation conditions

dry and aerated rooms with:	max. permissible air contamination according to DIN EN 50 178: class 2
an ambient temperature of max. dew point	+10 °C to +35 °C +20 °C
max. rel. air humidity	75%

The equipment is designed for installation in normal rooms. The max. permissible ambient temperature for storage and installation is + 55 °C.
Installation room with level foundation according to DIN 18 202, section 4, table 3, line 3. Please protect cabinet against direct sunlight and sources of heat.

Design

Interior lining	stainless steel V2A, grade 1.4301 hard edges of the cellular elements are **steam-proof welded**	
Exterior lining	galvanized steel plastic coated	
Floor	stainless steel V2A, grade 1.4301 hard edges of the cellular elements are **steam-proof welded**	
Insulation	Cfc-free pu-foam	
Floor loading	30 000 N/m²	
Wheel load	3 000 N/rubber wheel (supporting surface 4 cm²)	
Finish	chamber machine unit switch cabinet	RAL 9002 grey white RAL 9002 grey white RAL 9002 grey white
Air flow	A Economy/Standard: air outlet suction underneath ceiling of the air treatment compartment; air inlet at the base of the air compartment	
Temperature conditioning	direct: dooling by evaporation of coolants in a laminated heat-exchanger; heating with electric stainless steel resistance heater	
Refrigeration unit	cascade, water cooled	

Refrigerant	R23 / R404
Climatic module	steam generator, dew point cooler
Noise measurement	refrigeration unit: noise pressure level approx. 70 dB(A) measured a semispherical sound propagation at a distance of 1 m
Illumination	approx. 250 lx temperature and humidity resistance light source
Observation window	400 x 400 mm, integrated in the door
Compressed air system	for flushing the chamber at test 10.11 for preventing condensation at test specimen

Design of the control system

Control

- 64 bit technology
- graphical representation of set point and actual value
- digital display of set point and actual value of temperature in °C and relative humidity in %
- digital input of temperature in °C and humidity in % relative humidity
- integrated programme generator
- programme memory
- manual and automatic operation
- fault diagnostic system

Control unit

Colour touch panel

- graphic colour LCD-display
- display with VGA resolution
- display with backlighting
- operation by touching function symbols
- graphic symbols for programming functions
- graphical representation of the current test values
- menu-guiding, clear text display, trend function
- easy programming of individual test programmes
- storage of individual programmes, which can be activated at any time
- programme storage for 100 programmes with total 1000 sections, 250 loops and 9999 cycles
- software support for up to 32 digital switching channels
- password protection
- inspection system (maintenance system), giving information about combined working hours, number of switching events of a particular component and its failure

Interface RS 232	for connection of the laptop control unit or for communication with customer's computer
Test Specimen protection	• independent adjustable temperature limiter t min /t max according to EN 60 519-2 1993, thermal safety class 2 individually adjustable fixed values, movable sensor in test space • adjustable software temperature limiter min./max., individually adjustable fixed values
Protection of test specimens	safety switch especially for heat emitting test specimens connection onto potential-free changeover contact, max . load 24 V, o.5 A
Temperature safety device	safety temperature limiter (STB) for protection of the test cabinet against overheating
Digital customer I/O	• 4 digital outputs for switching of customers' equipment via potential-free contacts, load max. 24 V-DC; 0.5 A • 4 digital inputs for feedback from customers equipment, load max. 24 V-DC approx.. 30 mA The insulation voltage for inputs against earth is 1000 V-DC
Socket	European socket 220-230 V, max. 2A for connection of a measuring or registration device
Measuring Sensor	• temperature measuring sensor Pt 100, DIN EN 60751, ⅓ class B • psychometric humidity measurement

Safety devices

- Emergency release device for the door
- Emergency off-switch in the work space with alarm device
- Malfunction signal taken to potential-free contact
- Over temperature protection
- Excess pressure in the refrigeration cycle according directive for pressurized equipment (PED)/EN 378
- Water shortage- and temperature protection for the humidification unit