

ULTRA THERMO

Carbonation Test Chamber



Detailed Working Specifications

The Chamber will be fabricated with extremely high standard, high quality of finish, which matches the performance with emphasis on reliability and economy of use.

The use of the most up to date Eurotherm 2604 programmable 2 loop PID Controller, a SENSE CO2 Detector and Controller, shall make it to be currently the best available and with the attractive Corrosion Free MS Powder Coated Exterior to enhance any test facility.

Internal Volume	Internal Dimensions
125Ltrs	500X500X500mm
210Ltrs	600X600X600mm
350Ltrs	700X700X700mm
425Ltrs	800X800X800mm
750Ltrs	900X900X900mm
1000Ltrs	1000X1000X1000mm
1350Ltrs	1100X1100X1100mm
1800Ltrs	1200X1200X1200mm
Custom Size Available	

ULTRA THERMO SCIENTIFIC

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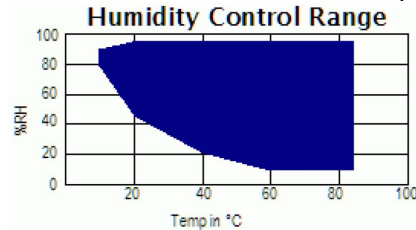
Carbonation Test Chamber

Temperature Range : 5 °C to +60°C,

Temperature Measurement Accuracy : +/- 0.1 °C

Temperature Control Accuracy : with in +/- 1 °C after stabilization

Humidity Range (RH) : 20% to 95% RH, ± 2% in standard temp range



Humidity accuracy at control point during the dwell after stabilization around +/-2%RH.

Humidity distribution of the empty chamber after stabilization with in +/- 2% RH

Access Port : 1 No. 50 mm dia. with Silicone Closure

Humidifier system : Air Atomizers for Humidification, Warm water vapor generator, complete with blowing system, heating and over-heat safety system.

Rotronics Direct measurement Platinum Resistance type sensors shall used for the measurement and control of the Humidity

Dry Compressed Air at 3-4bar pressure will be required at the site of installation for precise Low humidity Low Temperature control.

CO2 Purging and Control System : A CO2 purging valve assembly is provided for the purging of CO2 inside the chamber. aSENSE CO2 Transmitter detects the CO2 level in the air (0-10% Concentration) and gives a 4-20mA output to control the opening and closing of the purging valve, to maintain the set concentration level.

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Heating System	: Inconel sheathed type evenly spaced in the annular space surrounding the working volume.
Refrigeration Unit	: Single Stage Copeland/Danfoss make Air Cooled Condenser System, complete with Compressor, Condensing unit, and CFC free refrigeration gas will be used.
Finish	: 18SWG MS Powder Coated Exterior Finish and 16SWG SS304 Interior with Full TIG Welding for Vapor Tight Finish.
Door Assembly and Viewing window	: Door System with full front opening type, compensating hinges with locking mechanism. Incorporated in the centre is the 400 X 400mm 5 Pane viewing window, with the whole being insulated with non-flammable Rock-wool and with an exterior finish, matching the main cladding. Viewing window will be provided with light. Interlock protection will be provided for opening of door.
Insulation	: Non-flammable 96Kg/m3 Density Rock wool 100 mm thick
Fan system	: High performance externally mounted, flange-mounted motor drives internal fan through extended stainless steel shaft.
Controller system	: The Eurotherm 2604 high performance Multi Loop PID Controller or equivalent shall be used. Over and under temperature indicator shall be of standard make. <u>Main Features of the controller shall be</u> <ul style="list-style-type: none">➤ PC interface – with remote logging inclusive of acquisition and configuration software➤ High Stability Control & High Precision input➤ Real time clock.➤ High accuracy, high stability temperature and process controller➤ Dual 7-segment display (5 digit) of the process value and set point

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- Advanced control algorithm gives stable straight line control. Automatic tuning simplifies the commissioning procedure by performing a one shot tune to calculate the optimum PID and cutback valves for each loop and further optimize each control loop, gain scheduling can be used to automatically transfer control between up to three sets of PID values.
 - Incorporates a self-correcting input circuit (INSTANT ACCURACY) to preserve & maximize the accuracy, performance during warm up and change in ambient temperature.
- Display : The Eurotherm Controller will show measured variable and set value in °C, and humidity in %. A separate indicator will be provided for CO2 measurement and display
- Safety features :
 - Door Interlock
 - Input supply variation >10%
 - Under & over temperature protection
 - Circuit breaker
 - Thermal overload relay for Fans and Compressor
 - Safety alarm for chamber malfunction
- Calibration : Calibration certificate will be issued which has traceability to NABL for the complete system.
- Other features :
 - Drain for condensate and cleaning water will be provided.
 - Earth point will be provided
 - The power consumption by safety & control devices will be as low as possible.
 - Energy efficient motors will be used (Siemens/Alstom).
 - All the electrical items used shall be of std IP 55grade suitable for Humidity chamber (Schneider Electric)
 - All the switch gears and MCB's used in the construction shall be of high quality reputed brands.(Schneider Electric-Telemecanique, Merlin Gerin)
 - Noise Level of the chamber shall be around 78dBA measured at 1 Mtr distance

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Carbonation Test Chamber

Electrical Supply : 415 V \pm 10%, 3 Phase, 50 Hz AC

- Working Ambient Peak Specifications confines to the working ambient of 35degC, 90% RH

User Guide

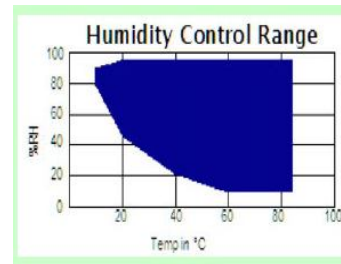
- Technical, Operation and Maintenance Manual Will contain technical specifications and operating limits of the system. Installation layout w.r.t. the required electrical & air connections at site, Software programming to load the required test profiles, their interpretation, Calibration procedures, Test data dumping options & Test result printout etc., . blue-prints of assembly & circuit drawings of the equipment, periodic maintenance checks, part nos. of sub-assemblies of the equipment

Commissioning & Operational Training

- System will be Commissioned by factory trained engineers at the site.
- Training for programming of test profiles, execution, cautions while operating, sequential steps to commence operations etc, is provided at site during commissioning of the system.



Danfoss



Danfoss Refrigeration Accessories



Programmable PID Controller



Schneider Elec. Accessories




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Direct Measurement Humidity Probe from Rotronics AG

Rotronics Model XB20 Dual Temperature & Humidity Sensor with Latest Air Chip Digital Technology	
	<p>Humidity Measurement Sensor Type : Rotronics Hygromer Temperature Measurement : PT 100 RTD Humidity Measuring Range : 0 to 100% RH Accuracy : +/- 1% RH Temperature Measuring Range : -100degC to +200degC Operating Limits at Electronics : -40degC to +85degC Probe cable length : more than 2 mtrs.</p>
Manufacturer : Rotronics, USA	

IMPROVED PERFORMANCE IN ENVIRONMENTAL CHAMBERS, INCUBATORS AND DRYERS

- Relative humidity and temperature measurement
- Outstanding accuracy and repeatability
- Wide choice of probes to satisfy every application
- Various analog outputs available
- Freely scalable analog signals
- Simulator mode
- Automatic humidity sensor test and drift compensation
- Pt100 RTD direct 4-wire connection option available
- 2.000 point data recording

Sense Air aSENSE CO2 Transmitter

Range : 0-10% Volume
Measurement Accuracy :
1% of the measuring range
5% of the measured value
Principle of Detection :
NDIR Technology with automatic base line correction
Response time : less than 2 Minutes
Output : 4-20mA
Mounting : Space
Electrical Input Supply : 24VDC

Tempsen CO2 Controller

Size : 96X96mm
Range : 0.00 – 10.00%
Input : 4-20mA
24VDC to power Transmitter
Relay O/P to control the CO2 inlet Valve
Electrical Input Supply: 230VAC



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aSENSE™ transmitter Technical Specification* (rev nr 040317)

General Performance

Compliance with	EMC directive 89/336/EEC, RoHS directive 2002/95/EG
Operating Temperature Range ¹	0 to +50 °C
Storage Temperature Range	-40 to +70 °C (standard model) (models -D: -20 to +70 °C)
Operating Humidity Range	0 to 95% RH (non-condensing)
Warm-up Time	≤ 1 min. (@ full specs ≤ 10 minutes)
Sensor Life Expectancy	> 15 years
Maintenance Interval	no maintenance required ²
Self Diagnostics	complete function check of the sensor
Display	4 Digits, 7 segments LCD with ppm / °C / % indicator (models -D)

Electrical/Mechanical

Power Input	24 VAC/VDC±20%, 50-60 Hz (half-wave rectifier input)
Power Consumption	≤ 3 Watts average
Wiring Connections	screw terminals, max 1,5 mm ² wires/ European and US standard J-boxes

Outputs

Analogue ³	
Protection	PTC fuse (auto reset) on signal return M, short-circuit safe
Linear outputs OUT1 & OUT2	0/2-10 VDC R _{OUT} < 100 OHM, R _{LOAD} > 5k OHM (0/1-5 VDC optional) 0/4-20 mA
	R _{EXT} < 500 OHM
Default ranges	0 – 2000 ppm CO ₂ , 0 - 50°C
D/A Resolution	10 bits, 10 mV / 0.016 mA
D/A Conversion Accuracy	voltage mode: ± 2% of reading ± 50 mV current loop: ± 2% of reading ± 0.3 mA
ON/OFF	
Relay (OUT3)	(accessory -R) isolated N.O., 1mA/5V up to 1A/50VAC/24VDC.
UART Serial com port	
Protocol	SenseAir protocol (see <i>comprot 0700xx rev 3_04.pdf</i>) Modbus as option ⁴
PC-interface	RS232 UART cable with sliding contact and driver (model A232 Cable)
PC User Interface Program	UIP4 (or higher) ⁵
RS485 network com	(accessory -485) RS485 terminal slide-on port, network capabilities up to 30 units
LonWorks™ network com.	(accessory -LON) LonWorks™ add-on Option Modbus RTU

CO₂ Measurement

Operating Principle	Non-dispersive infrared (NDIR) with Automatic Baseline Correction (ABC) ⁶
Response Time (T _{1%})	2 min. diffusion time
Accuracy ⁷	± 1% of measurement range ± 5 % of measured value
Pressure Dependence	+ 1.58 % reading per kPa deviation from normal pressure, 100 kPa
Annual Zero Drift ⁷	< ± 0.3 % of measurement range
Measurement ranges	different sensor models from 0 - 3 000 ppm (standard) to 0 - 10 %vol.

Temperature Measurement

Operating Principle	Thermistor
Measurement Range	-20 to +60 °C
Accuracy ⁸ / Digital Resolution	± 0.5 °C / 0.1 °C (0.01 °C via UART)



Housing Options

The housings are available with and without display (-D) From the left:

WALL HOUSING
Dim.: 120 x 82 x 30 mm
Protection class: IP30

INDUSTRIAL WALL HOUSING
Dim.: 142 x 84 x 46 mm
Protection class: IP54

DUCT HOUSING (model -K)
Dim.: 142 x 84 x 46 mm
Duct probe length: 245 mm
(adjustable according to duct dimension). Protection class: IP65

- Note 1:** Lower temperature operation range can be reached by adding a box heater assembly
Note 2: In normal IAQ applications. Some industrial applications may require an annual zero gas purge, which automatically recalibrates the CO₂ sensor.
Note 3: The specifications are valid for the output load connected to ground G0 or common signal return M
Note 4: For more information, please contact SenseAir AB.
Note 5: Free download from SenseAir's web site www.senseair.com
Note 6: The ABC function is the key for maintenance free operation. It assumes normal IAQ environments or applications, where some ventilation occurs (at least during some moment over a week period)
Note 7: In normal indoor environment. Accuracy is defined at continuous operation (3 weeks minimum after installation)
Note 8: Valid only for units configured in voltage outputs mode



*Can be changed without notice

aSENSE transmitter_4

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