5128A
RHapid-Cal Humidity Generator

Fast, portable humidity probe and logger calibration with accredited 1 % RH system accuracy
Humidity calibration in the laboratory or on-site in the field

The Fluke Calibration 5128A RHapid–Cal Humidity Generator is a portable humidity generator for calibrating a large workload of probes in the laboratory or on-site in the field. It is used by corporate calibration/research labs and independent calibration labs where humidity measurement is critical to prevent spoilage of products in industries including pharmaceuticals, medical devices, semiconductors, chemicals, and food production.

In the lab, the 5128A calibrates humidity probes 33% faster than a two-pressure generator.

In the field, the 5128A provides more thorough, reliable multi-point calibrations than one-point spot checks using handheld humidity meters.

The 5128A RHapid–Cal is backed by Fluke Calibration’s world-class metrology and support. The 5128A comes standard with an ISO 17025 accredited system calibration. Support offerings include online chat, email, phone, and product service from Fluke Calibration, channel partners and authorized service centers around the world.
5128A overview

Desiccant cap provides easy, front-panel access to desiccant cartridge.

Sample In/Out port draws and returns gas to the working chamber. Used to measure the chamber’s dew point with a chilled mirror instrument.

Fill inlet for filling the humidity generator with distilled water. Water level indicator shows the relative amount of water in the generator.

Chamber door provides access to the working chamber. Different door types are available.

Working chamber which holds the mixing insert. A unit under test can be placed directly in the working chamber without the mixing insert if the temperature and humidity are monitored with an external reference probe.

Inlet/outlet holes and fan filters.

Mixing insert causes the air to circulate for better temperature and humidity uniformity inside the insert.

Display shows set points and actual temperature and humidity, plus the calculated dew point. Soft keys on the control panel make it easy to cycle through the command menu.

12 V dc output fuse.

Power supply fan access holes provide cooling for the internal power supply.

USB Type B connector for operating the 5128A via remote control.

Mains power cord receptacle and holder for mains fuses.

Two fans provide internal cooling to the 5128A.

HI terminal for 12 V dc output to power up transmitters and transducers.

Drain plug for the 5128A.

LO terminal for 12 V dc output.
Seven key features of the 5128A RHapid-Cal Humidity Generator

1. **Best-in-class system accuracy for dependable humidity probe calibration**
   
   The 5128A RHapid-Cal offers a best-in-class humidity system accuracy of ± 1.0 % RH (7 % to 80 % RH, 18 °C to 28 °C) which includes all known sources of error such as stability, uniformity, drift, and calibration uncertainty. Calibrate with confidence using an instrument with comprehensive specifications. Most competing generators don’t specify system accuracy. Their specifications can be complicated and confusing, making it difficult to know how to apply them to a particular calibration process.

   The 5128A also provides the flexibility to improve calibration uncertainty by using an external humidity reference such as a chilled mirror hygrometer.

2. **Rapid humidity and temperature stabilization time for high calibration throughput**
   
   The materials and air flow design used in the 5128A RHapid-Cal are selected to ensure that response time to a humidity or temperature step change is fast. Rate of change for temperature increase is typically 10 °C/minute and for temperature decrease is 1.5 °C/minute. Rate of change for humidity increase is typically 10 % RH/minute and for humidity decrease is 5 % RH/minute. A six-point calibration can be done in two hours using the 5128A RHapid-Cal. In contrast, a two-pressure humidity generator takes longer to respond to humidity or temperature changes. A similar six-point calibration with a typical two-pressure generator would take more than three hours.

3. **Supports on-site, multi-point calibration of humidity probes**
   
   Spot-check or one-point probe calibration using a handheld humidity meter in the field is convenient, but limited in value. Calibration with a handheld meter needs to be carefully managed. Temperature differences between the probe and its environment, technician body heat, and moisture from breath can all cause RH measurement errors.

   Further, one-point tests may cause out-of-tolerance readings when ambient conditions change. Using the 5128A RHapid-Cal for a multi-point calibration gives a more reliable test and truer characterization of how a humidity probe actually operates over its working range in the field.

4. **Versatile design accommodates a large workload**
   
   A large variety of humidity sensors can be accommodated in the 5128A test chamber. The 5128A comes with a five-port door for calibrating up to five RH probes, meters, and transmitters at a time. An optional transparent door with a shelf is available. Data loggers are placed on the shelf inside the chamber for calibration. The mixing insert can be removed to accommodate larger devices in the chamber.
Compact size and lightweight for easy transport
The 5128A RHapid-Cal measures 237 mm high x 432 mm wide x 521 mm deep (9.3 in x 17 in x 20.5 in) and weighs just 15 kg (33.06 lbs). It can be easily carried to any desired bench space in the lab or transported on-site to a field work location. Its front-loading internal desiccant cartridge design adds convenience and ruggedness. In comparison, a two-pressure humidity generator is practically limited to laboratory use because of its large size. It includes a generator, compressor, and supporting equipment. A “small” two-pressure generator requires about eight times the space that the 5128A RHapid-Cal does and weighs about four times as much. The 5128A RHapid-Cal is easily placed on a small cart for plant-wide transport and a convenient wheeled transport case is offered for shipment or transport to on-site calibrations.

ISO 17025 accredited system calibration included standard
Prior to shipment, each 5128A RHapid-Cal receives an accredited system calibration by Fluke of the humidity chamber with its internal reference probe, using a chilled mirror hygrometer as the reference standard. This system calibration provides the assurance that the 5128A and its internal reference probe have been optimized for the best performance when they leave the factory. In contrast, some humidity generator suppliers only provide a reference probe calibration, but not a complete system calibration that ensures uniformity and accuracy delivered at the location of your device under test.

Easy to maintain
The 5128A RHapid-Cal uses a mixed-flow method to generate relative humidity. A desiccant cartridge provides a source of low humidity and an internal humidifier generates high humidity. A display light indicates when the desiccant cartridge needs to be replaced. The 5128A front-loading internal desiccant cartridge design adds convenience and ruggedness. The desiccant cartridge can be easily changed by removing the front cap and sliding in a new one.

Only clean distilled water is needed to operate the 5128A RHapid-Cal. Compressed air or other additional fluids are not required. A water level indicator on the front panel shows status of water level in the humidity generator. When the water level falls below the minimum level, use clean distilled water to fill the reservoir.

No special shut-down routines are required after use, so you can move on to the next job quickly.
### General specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC mains voltage</td>
<td>100 V to 240 V ± 10 %</td>
</tr>
<tr>
<td>Standard frequency range</td>
<td>47 Hz to 63 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>300 VA</td>
</tr>
<tr>
<td>Required test fluid</td>
<td>Distilled water</td>
</tr>
<tr>
<td>Warm-up period</td>
<td>Twice the time since last warmed up, up to 30 minutes</td>
</tr>
<tr>
<td>Mains fuse rating</td>
<td>F 4A 250 V (fast blow)</td>
</tr>
<tr>
<td>Operating ambient relative humidity</td>
<td>Up to 80 % RH</td>
</tr>
<tr>
<td>Storage temperature and relative humidity</td>
<td>-20 °C to 50 °C, 0 % to 95 % RH, non-condensing</td>
</tr>
<tr>
<td>Transducer power output</td>
<td>12 V dc, 1 A maximum, fuse: F 1A 250 V (fast blow)</td>
</tr>
<tr>
<td>Computer interface</td>
<td>USB</td>
</tr>
<tr>
<td>Safety</td>
<td>IEC 61010-1, Installation Category II, Pollution degree 2, Indoor use only</td>
</tr>
<tr>
<td>Altitude</td>
<td>2000 m</td>
</tr>
</tbody>
</table>

### Electromagnetic compatibility (EMC)

#### International
- IEC 61326–1: Controlled electromagnetic environment
- **CISPR 11: Group 1, Class A**
  - **Group 1:** Equipment has intentionally generated and/or uses conductively-coupled radio frequency energy that is necessary for the internal function of the equipment itself.
  - **Class A:** Equipment is suitable for use in all establishments other than domestic and those directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted and radiated disturbances.

#### Korea (KCC)
- Class A Equipment (Industrial, broadcasting, and communication equipment)
  - **Class A:** Equipment meets requirements for industrial electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and not to be used in homes.

#### USA (FCC)
- 47 CFR 15 subpart B. This product is considered an exempt device per clause 15.103.

### Weight
- Chassis only: 15 kg (33.06 lbs)

### Dimensions
- **Chassis:** 237 mm × 432 mm × 521 mm (9.3 in × 17 in × 20.5 in) (height × width × depth)
- **Overall chamber dimensions:** 200 mm (7.87 in) (depth) x 150 mm (5.90 in) (diameter)
- **Working volume dimensions:** 109 mm (4.3 in) (depth) x 125 mm (4.92 in) (diameter)

### Temperature resolution
- **Display:** 0.1 °C
- **USB data:** 0.1 °C

### Humidity resolution
- **Display:** 0.1 % RH
- **USB data:** 0.1 % RH

### Dew point
- **Resolution:** 0.1 °C (for indication only)

**Note:** The displayed dew point reading (DP) is calculated from the product’s actual temperature and % RH readings. It is calculated as a dew point (water vapor over water) over the entire range, regardless if the dew point is equal to or lower than 0 °C, and at a nominal pressure of 101.325 kPa (1 atmosphere).
Humidity and temperature chamber technical specifications

The Product specifications describe the Absolute Instrumental Uncertainty of the Product. The Product specifications include stability, ambient temperature, and humidity (within specified limits), linearity, line regulation, the reference standard measurement uncertainty and long term stability of one year. The product specifications are provided at a 99 %, k=2.58, normally distributed level of confidence, unless otherwise noted.

**Chamber specifications**

One year, ambient temperature range 23 °C ± 3 °C

<table>
<thead>
<tr>
<th>Chamber temperature range</th>
<th>Chamber humidity range</th>
<th>Humidity specification</th>
<th>Temperature specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 °C to 23 °C</td>
<td>7 % to 80 % RH &gt;80 % to 95 % RH</td>
<td>± 1.0 % RH</td>
<td>±0.2 ºC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± 1.25 % RH</td>
<td>±0.2 ºC</td>
</tr>
<tr>
<td>&gt;23 °C to 28 °C</td>
<td>7 % to 80 % RH &gt;80 % to Hmax² % RH</td>
<td>± 1.0 % RH</td>
<td>±0.2 ºC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± 1.25 % RH</td>
<td>±0.2 ºC</td>
</tr>
</tbody>
</table>

1 For ambient conditions of 23 °C ± 5 °C, multiply the specifications by 1.5.
2 Hmax is the maximum humidity value at which the specification applies. See the Chamber Operational Limits graph below for Hmax.

Note: Specifications apply to the Working Volume shown in the Working Volume Template found at the end of the Operators Manual, and is referenced to the "Actual" reading on the Product display.

**Chamber uniformity and stability**

Ambient temperature range: 23 °C ± 3 °C

<table>
<thead>
<tr>
<th>Chamber temperature Min RH</th>
<th>Chamber humidity range Max RH</th>
<th>Chamber temperature uniformity²</th>
<th>Chamber humidity uniformity²</th>
<th>Chamber humidity stability³</th>
<th>Chamber temperature stability³</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 °C to 28 °C</td>
<td>Min RH</td>
<td>See chamber operational limits below</td>
<td>±0.12 ºC</td>
<td>±0.3 % RH</td>
<td>±0.15 % RH</td>
</tr>
</tbody>
</table>

The following specifications are typical for chamber conditions shown⁴

<table>
<thead>
<tr>
<th>Temperature range</th>
<th>Min RH</th>
<th>Humidity limit</th>
<th>Temperature uniformity²</th>
<th>Humidity uniformity²</th>
<th>Humidity stability³</th>
<th>Temperature stability³</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 °C to &lt;18 °C</td>
<td>15 %</td>
<td>See chamber operational limits below</td>
<td>±0.5 ºC</td>
<td>±1.5 % RH</td>
<td>±0.5 % RH</td>
<td>±0.5 ºC</td>
</tr>
<tr>
<td>&gt;28 °C to 30 °C</td>
<td>7 %</td>
<td>±0.2 ºC</td>
<td>±0.6 % RH</td>
<td>±0.3 % RH</td>
<td>±0.4 % RH</td>
<td>±0.2 ºC</td>
</tr>
<tr>
<td>&gt;30 °C to 35 °C</td>
<td>7 %</td>
<td>±0.3 ºC</td>
<td>±0.9 % RH</td>
<td>±0.4 % RH</td>
<td>±0.3 % RH</td>
<td>±0.3 ºC</td>
</tr>
<tr>
<td>&gt;35 °C to 40 °C</td>
<td>7 %</td>
<td>±0.5 ºC</td>
<td>±1.5 % RH</td>
<td>±0.5 % RH</td>
<td>±0.5 % RH</td>
<td>±0.5 ºC</td>
</tr>
<tr>
<td>&gt;40 °C to 50 °C</td>
<td>7 %</td>
<td>±0.5 ºC</td>
<td>±1.5 % RH</td>
<td>±0.5 % RH</td>
<td>±0.5 % RH</td>
<td>±0.5 ºC</td>
</tr>
</tbody>
</table>

1 For ambient conditions of 23 °C ± 5 °C, multiply the specifications by 1.5.
2 Defined as the uniformity of the Working Volume.
3 Defined as 1-sigma standard deviation of measurement readings over a 5-minute span.
4 Chamber humidity uniformity is listed for mid-level humidity settings. Lower humidity settings will give better uniformity while higher humidity settings will give worse uniformity.
5 The chamber control range is 5 °C to 50 °C. Achievable low temperature may be limited to 15 °C below ambient dependent upon stabilization time and temperature and humidity settings.

**Operational specifications**

| Temperature rate of change—down | 1.5 ºC/minute | (typical) |
| Temperature rate of change—up   | 10 ºC/minute  | (typical) |
| Humidity rate of change—down    | 5 ºRH/minute  | (typical) |
| Humidity rate of change—up      | 10 ºRH/minute | (typical) |
Ordering Information

Models
5128A  RHapid-Cal Humidity Generator with one Square 5-Port Door, one Desiccant Cartridge, one Fill Syringe with Extension Tube, five Grommets (one each of 1/4 inch, 3/8 inch, 1/2 inch, 3/4 inch, 7/8 inch sizes), one Mains Power Cord 2-meter, Fluke ISO 17025 Accredited System Calibration, 115 V ac/230 V ac

Accessories
5128-2680  Desiccant Cartridge (including desiccant material)
5128-2681-R5  Round Door, 5 ports
5128-2681-S0  Square Door, clear with shelf
5128-2681-SS  Square Door, 5 ports (spare)
5128-CASE  5128A Case with wheels
5128-2682-1/4  Port Grommets, 1/4 inch, 5 each
5128-2682-3/8  Port Grommets, 3/8 inch, 5 each
5128-2682-1/2  Port Grommets, 1/2 inch, 5 each
5128-2682-3/4  Port Grommets, 3/4 inch, 5 each
5128-2682-7/8  Port Grommets, 7/8 inch, 5 each
5128-2683  Port Plugs, 5 each
5128-2684  Fill Syringe with Extension Tube

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