

Using the Model 1500 Portable Chilled Mirror Hygrometer

The Model 1500 is a portable, multi-function, optical chilled mirror hygrometer designed to accurately measure the moisture content in gases. It offers precision dew point measurement in a robust, transportable carrying case.



The Model 1500 uses the chilled mirror (CM) dew point temperature condensation principle to determine the water vapor concentration in gas mixtures, and a precision platinum resistance thermometer to measure the mirror temperature. The CM uses a thermo-electric chiller to control the temperature of the chilled mirror. Since it is a direct measurement of dew point and thus a Primary Standard Measurement Technique, the Model 1500 is highly regarded by calibration technicians and manufacturing facilities for its portability, accuracy, quick dry down, fast response and long life.

The Model 1500 may be fitted with a precision air temperature sensor (needed to determine RH), pressure transducer, and a wide range of either local or remote chilled mirror sensors. Three main types of chilled mirror sensors are available for the 1500: the remote mounted D-Probe featuring a two stage air cooled chilled mirror. The S-Series sensor- available in both local and remote mount configurations. Depending on the desired measurement range, the S-Series sensor is available in Two or Three stage chilled mirror configurations. To accommodate different cooling thresholds, the S-Series sensor may be air cooled, fan cooled or liquid cooled. In contrast, the D-Probe is only available as a Two-Stage chilled mirror. But since it is configured as a probe, it may be used in a wide array of applications including ambient air monitoring, insertion into glove boxes, HVAC ducts, environmental test chambers, circulation pipes, refrigerated storage rooms, engine test filter rooms,... The new X3 Chilled mirror has recently been configured to operate within the model 1500 platform. The X3 is available in several models and offers the USER chemical resistance to aggressive background gases, fast response time and ability to measure very low dew point limits without the need for liquid cooling. Please refer to the X3 brochure for more information.

APPLICATIONS

Troubleshooting Dryer Systems

Diffusion Furnaces

Product Drying Chambers

Environmental Testing

Food Packaging

Medical Packaging

Heat Treat/ Annealing Ovens

Chemical Reactors

Cylinder Refill Testing

Fuel Cell Testing

Compressed Air Systems

Pharmaceutical Powder Drying

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The Model 1500 offers many standard features including:

- PRIMARY STANDARD MEASUREMENT: Chilled Mirror measurement technique
- NIST Traceable calibration certificate
- Automatic Balance Cycle (ABC) automatically re-standardizes and corrects for contaminants
- Choice of Analog Outputs (4-20 mA or 0-5 VDC)
- RS-232 Serial Interface
- Programmable electrically isolated alarm relay, 1 FORM C
- Integral Flowmeter for control and viewing sample flow
- 115/ 230 VAC Battery Recharger

BENEFITS of the Edgetech Instruments Model 1500:

- Portable unit great for troubleshooting and convenient measurements
- The CM Sensor is a direct, Primary Standard measurement method, **NIST traceable**
- **Improve** your quality control: Excellent Precision and Stability
- **Reduce Maintenance Costs:** Chilled Mirror is robust, long Life with no moving parts
- Rapid dry-down time in comparison to other technologies
- **Eliminate Scrap or Lost Time:** Fast response in responding to upset process conditions.

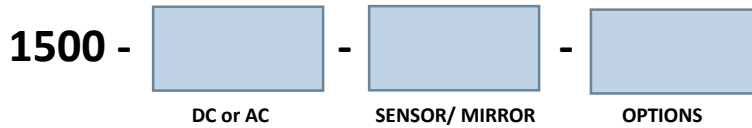
Sensor Notes/ Sampling Configuration Options

1. The D-probe is mounted (remote) tethered on a signal cable.
2. The S-series sensor can be mounted either local at the model 1500 or remote
3. The standard D-Probe is configured for diffusion sampling
4. The X3 sensor offers chemical resistance, fast response time and low dew point capability.
5. To measure an extracted flow of sample gas with the D-Probe, the optional flow through cover (SC) or the Sample Chamber (SC1) may be installed (includes fittings).
6. A precision air temperature probe is optional. Temperature can be used to calculate & display RH%
7. The integrated VP vacuum pump option may be used to extract a gas sample from the measurement point and direct it through the sensor @1-2 SCFH
8. An optional chiller may be used to obtain lower dew point readings when using the S-series sensors.
9. Optional Pressure transducers may be specified to compensate for sample pressure variation and Psychometric calculations.
10. The S-Series chilled mirror sensor are flow through sample gas design and are equipped with 1/4inch Swagelok fittings. Aluminum construction lends itself to most non-aggressive background gases. The S-Series do feature an option for Teflon Coating for additional chemical resistance.
11. The X3 body is constructed of 316SS and may be configured with Hastelloy or Teflon wetted materials. Inquire for pricing for the X3 inserts.
12. The S-Series sensors are equipped with a liquid chill port for the flow of chilled liquid to aid in cooling the TEC to allow for lower dewpoint.
13. The X-series sensors are designed as fan cooled or liquid cooled, but not both. The X3F and X3SF feature fans used for more efficient heat exchange of the TEC: hence lower DP with air cooling only.
14. The Standard D-Probe features air convection heat exchange .

TO ORDER THE Model 1500:

- a. Determine type of measurement: DewPoint, Relative Humidity, Pressure, Temperature. The AT temperature probe is required for Relative Humidity. If the sample pressure varies, you may want to consider the Pressure Transducer option that automatically corrects Dew Point reading.
- b. Determine the range of measurement and type of sensor: D-Probe, S-Series or X series.
- c. Determine if you need chemical resistance of the X3.
- d. Your application determines whether to select local mounted sensor(s) or remote
- e. The X3 and the S3 sensors require the base unit to be the 1500-AC. Otherwise, you may choose either the 1500-DC battery powered unit or the 1500-AC unit.

1. **Select 1500 DC or 1500 AC** based on the application and sensor type.
2. **Select Sensor Type- D-probe (remote mount), S or X series (remote or local mount)**
3. **Select Mirror Type:** Chrome (standard), Stainless Steel, Platinum
4. **Select Local or Remote Sensor (typical is local)**
5. **If choosing the D-Probe, then select related options**
6. **Select Options** such as temperature sensor, Pressure Transducer, RS232 serial interface,..
7. **List as separate line items additional choices such as Accessories, Calibration Packages,**



For Ex: **1500-AC-S3-ATDM** would be a 1500 VAC powered with S3 fan cooled CM sensor and air temperature probe.

STEP 1: SELECT DC battery powered or AC vac powered:

1500-DC Battery Powered, includes charger, must add sensor and options

1500-AC VAC Powered, provided w/ power cord, must add sensor and options. (Use this model with the X or S series sensors)

Additional Notes on configuring the model 1500:

To help determine the best sensor for your application:

1. The target dew point range will help you determine the right sensor. Our D-Probe, S2 and S2SC sensors feature the two stage chilled mirror sensor for measuring dew points no lower than -40DP (in some instances this may require liquid cooling of the sensor depending on the temperature of the ambient air). The S3 and the X series sensors can measure lower dew points. The X3F and X3SF can measure very low dew points without the need for any liquid cooling.
2. If you intend to measure sample gas that may be corrosive or reactive, the best choice may be the X3 series since the standard design is resistant to most aggressive gases.
3. The X3 and S3 sensors require the 1500-AC because of the power requirements of the larger TECs.

To help determine the best options for your application:

1. If the sample gas is positive pressure, then no special options required as long as the sample pressure does not exceed 300 psig.
2. If the positive pressure sample fluctuates, you may consider adding the pressure transducer option which can be set to automatically pressure compensate the dew point reading.
3. If you want to measure temperature (or if you want to measure RH%) you should add the AT temp probe.
4. If the sample pressure is at atmospheric or slightly negative pressure (no greater than -10mm Hg) then adding the vacuum pump option would be suitable for the application.
5. If using the D-Sensor insertion probe, you may choose different mounting configurations- see section 5

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Chilled Mirror Dew Point Sensors for the model 1500

S-Type, Standard Duty		
Description		Depression
S2	Two Stage, Al Body, Convection Air Cooled- No Fans, Flow Through Sampling	60C
S2SC	Two Stage, Al Body, Fan Cooled, Flow Through Sampling	65C
S3	Three Stage, Al Body, Fan Cooled, Flow Through Sampling	95C*
P	S2P or S3P: High Pressure option 900 PSIG	

* Liquid Chilling may be required in the S3 to attain 95C Depression, fan only –depression of 70C

Standard S & X series sensors rated for 300 PSIG sample Pressure

X-Type, Chemical Resistant, High Performance		
Description		Depression
X3P	3 Stage, Panel Mount, SS Body, Convection Air Cooled- No Fans, Flow Thru	65C
X3F	3 Stage, SS Body, Standard Fan Cooled, Flow Thru Sampling	85C
X3SF	3 Stage, SS Body, High Efficiency- Super Fan Cooled, Flow Thru Sampling	95C

D-Type, Insertion Probe		
Description		Depression
DS2	2 Stage, Insertion Probe, AL, Convection Air Cooled, Diffusion Sampling w/ cable	60C

STEP 3: SELECT MIRROR TYPE:

Applications CM Configuration	General Purpose Gases	Acids	Caustics	Salts	Organics	Nuclear Application	High Temperature
Chrome Plated	A	D	D	C	C	D	C
316 Stainless Steel	A	B	B	B	B	C	B
Platinum	A	A	A	A	A	A	A

- A** Excellent
- B** Very Good
- C** Good
- D** Not recommended
- NR** Not Rated

STEP 4: Choose Local or Remote Sensor (DS2 sensor always remote mounted):

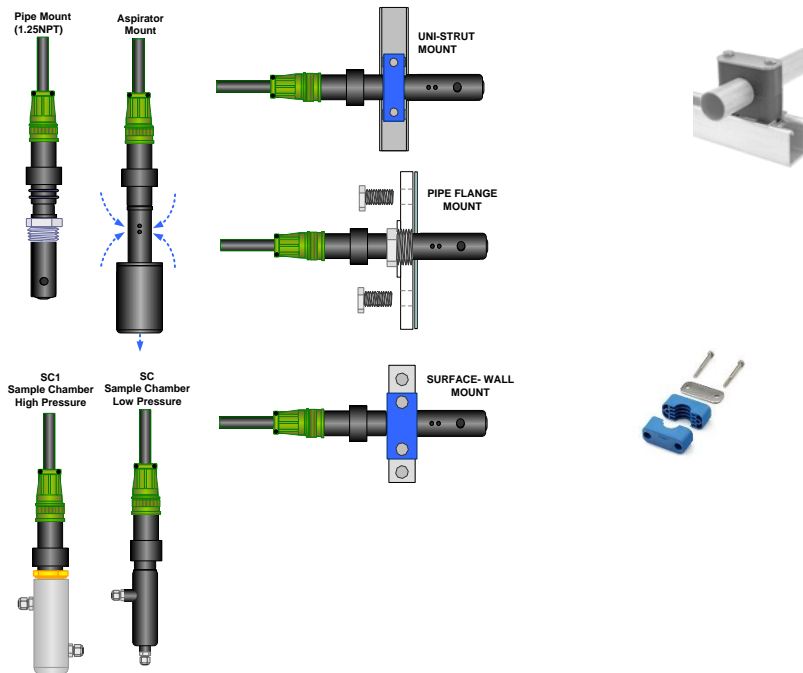
NO DESIGNATION = LOCAL SENSOR MOUNTED ON 1500 (S or X SERIES)- STANDARD CONFIGURATION

- RC Remote Mounting Kit S-type Sensor 10' Cable, additional lengths available
- RK Remote Mounting Kit D-type Sensor 10' Cable, additional lengths available
- RX Remote Mounting Kit X-type Sensor 10' Cable, additional lengths available

STEP 5: Choose Special Sensor Options for D-Probe: (The D-probe is always mounted remote)

-When Ordering the D-probe, you can specify:

- AR Aspirator Mount, this features a built in aspirator to extract a gas sample from the surrounding area
- P Pipe Mount, mounts to the D-Probe and allows 1.25inch Male NPT port on the probe
- F Pipe Flange Mount w/ Gasket, The D-Probe gets installed into a 4inch diameter SS Flange/ gasket seal, 4 bolt install. For use with Pipe Flanges, isolation chamber, and HVAC DUCT mounting
- SM Surface Wall Mount, The D-Probe is retained between two polypropylene blocks w/ bracket
- US Uni-Strut Mount, Same as the surface mount except the blocks are mounted on a unistrut clamp
- SC1 Sample Chamber High Pressure (up to 100psig), provides (2) 1/4in Swagelok compression fitting sample ports
- SC Sample Chamber Low Pressure (Slip on), same as -SC1 but is not permanent mount, it just slides on/off the probe



STEP 6: Choose Options such as PRESSURE COMPENSATION:

- AT Air temperature probe, stainless steel sheath with 10ft cable and connector
- PT Pressure Transducer, 0 to 25PSIA or 0-150PSIA, or 0-300PSIA automatic pressure compensation
- RS RS-232 Serial Interface
- RC Remote Mounting Kit for the S-Probe (up to 40 feet)
- VPAC Integrated Vacuum Pump extracts gas sample, for the VAC model
- VPDC Integrated Vacuum Pump extracts gas sample, for the VDC Battery Powered model
- SC1 Sample Chamber: Flow Through Chamber for D-Probe (up to 100 PSIG sample gas)
- SA/.1 0.1°C Special accuracy, traceable to NIST (Certified)
- SA/.15 0.15°C Special accuracy, traceable to NIST (Certified)

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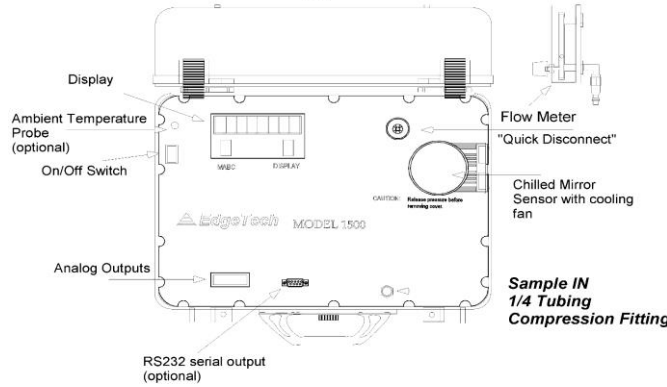
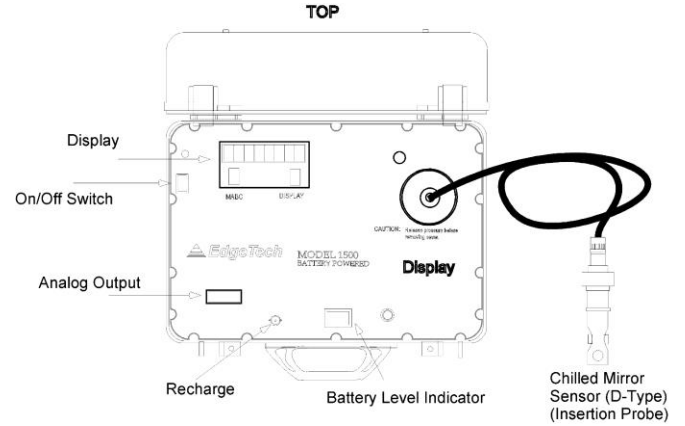
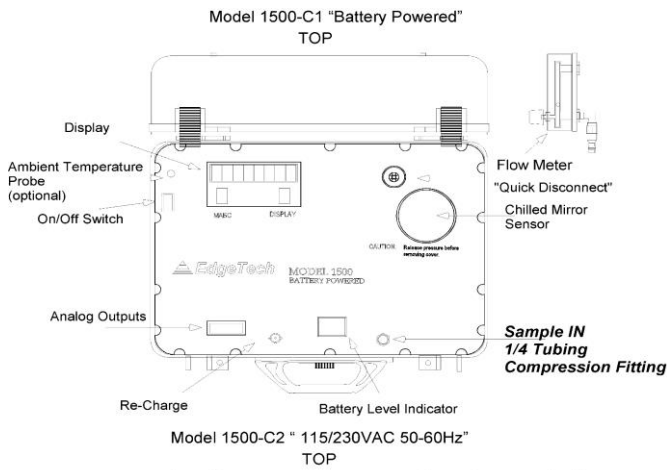
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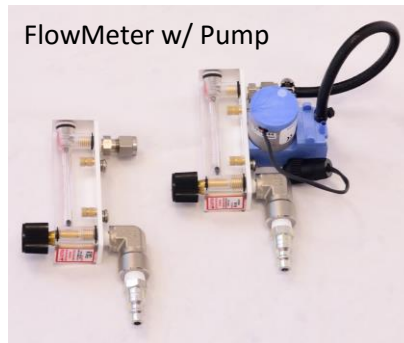
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LIST ACCESSORIES/ SPARE PARTS/ SPECIAL SERVICES AS SEPARATE LINE ITEMS:

- FIL** Filter kit: includes fittings and additional elements; rated for .1 micron particulate
- DX** Filter Element Kit, Qty 3
- SC/S** Screw On Replacement Sensor Cap for the S-Series
- SC/O** Slide on replacement cover for the D-probe sensor



1500AC-X3



FlowMeter w/ Pump



1500DC-S2SC-AT-VPDC

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