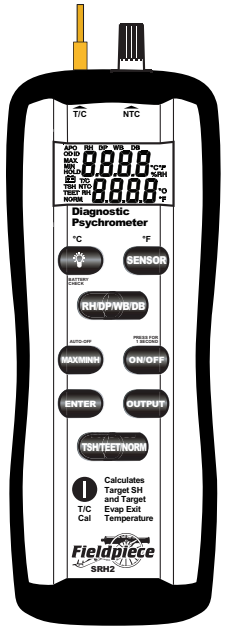
Standalone Diagnostic Psychrometer Model: SRH2



Fieldpiece

OPERATOR'S MANUAL

Description

The SRH2 is a complete digital psychrometer and a very valuable HVAC diagnostic tool. As a psychrometer, it measures wet bulb (WB), dry bulb (DB), percent relative humidity (RH%), and dew point (DP). As a diagnostic tool, it helps the HVAC technician easily diagnose problems with air flow across the evaporator. It can also calculate the target superheat of a fixed restrictor air conditioning system.

Use the NORM mode (normal psychrometer) to display wet bulb (WB), dry bulb (DB), percent relative humidity (RH%), or dew point (DP).

Use TSH (Target Superheat) to help set the proper refrigerant charge for a fixed restrictor system. Use the Fieldpiece SSX34, ASX14, or ASH3 to easily measure Actual Superheat without the need of additional charts.

Use TEET (Target Evaporator Exit Temperature) to ensure proper evaporator airflow.

How it Works

The SRH2 has three sensors. One for RH% and two for temperature. Depending on where you place these sensors and how you set up the SRH2, the meter will display the measurements and the results of calculations from these inputs. DB Temperature and RH% are measured directly. WB, DP, TSH, and TEET are calculated and displayed. WB may be displayed directly when using the ATWB1 wet sock thermocouple and choosing the T/C sensor.

Inside the 'cage' on the top of the meter is a thermistor, right next to the RH% sensor. It's used to measure ambient air (DB). In addition to the thermistor, a thermocouple can be plugged into the top of the meter. Use a thermocouple for getting temperatures (including wet bulb) in hard to reach places, such as in front or in back of the evaporator coil.

To use the SRH2, you must tell it what test you want it to perform. Select the parameter you want to measure, and choose which temperature sensor to use, either the thermocouple (T/C) or the 'caged' thermistor (NTC). Take your measurements. Read the results, both the directly measured readings and the calculated results.

Thermocouple Calibration

Adjust the thermocouple measurements to match the measurements from the built in negative temperature coefficient (NTC) thermistor (in the 'cage' on the top of the meter). Here's how:

1. Plug the thermocouple into the SRH2 and put its sensor inside the 'cage' so it's measuring the same ambient air as the thermistor.
2. Press TSH/TEET/NORM until NORM is displayed.
3. Press RH/DP/WB/DB until DB is displayed.
4. Press SENSOR to compare NTC and T/C readings. Adjust T/C Cal pot on front of meter until readings are the same. Make sure you have waited long enough for the sensors to stabilize. The thermocouple (T/C) will react much faster than the thermistor (NTC).

Battery check function:

The SRH2 allows the user to check the battery charge at any time during use, simpily by holding down the BACKLIGHT button for over one second.

The approximate percentage of battery charge will be displayed on the main display for two seconds before returning to its reading prior to preforming the battery check.

Step by Step Operation

Select °C or **°F**

Start with the instrument turned OFF. Press and hold ☼ for °C or SENSOR for °F, and simultaneously press the ON/OFF button.

Normal Psychrometer (NORM)

1. Select NORM by pressing TSH/TEET/NORM until NORM is displayed in the lower left hand corner of the LCD.
2. Press SENSOR to select temperature sensor: T/C for thermocouple, NTC for sensors in the 'cage'.
3. For T/C, the display will show the temperature.
4. For NTC, press RH/DP/WB/DB until the desired icon (RH, DP, etc.) is displayed. Then read the display.

Target Superheat (TSH)

1. Select TSH by pressing TSH/TEET/NORM until TSH is displayed in the lower left hand corner of the LCD. **Note**: blinking numbers mean you are seeing real-time measurements. Non-blinking numbers mean the reading has been 'locked in'. Press ENTER to unlock and take a new reading.
2. **The more accurate method**:
   a. Wet the ATWB1. Clip it to the front of the evaporator coil. Plug it into the top of the SRH2. Make sure the display shows ID and WB. If not, press RH/DP/WB/DB. Press SENSOR until T/C is displayed. Once the reading is stable, press ENTER.
   b. Unplug the ATWB1 and plug in the ATA1.
   c. Clip the ATA1 thermocouple to the side of the condenser. Press RH/DP/WB/DB until OD and DB are displayed. Press SENSOR until T/C is displayed. Once reading is stable, press ENTER. **Note**: for DB, you can put the 'caged' sensors where air is entering the condenser and select NTC if that is easier.

   The easy way: While the numbers are blinking, press SENSOR until NTC is displayed. Press RH/DP/WB/DB until WB or DB is displayed. When WB is displayed, place the 'caged' sensors in front of the indoor return and press ENTER once reading is stable. When DB is displayed, put the 'caged' sensors in front of the condenser and press ENTER when the reading is stable.
3. Press OUTPUT to display Target Superheat.
4. Compare Target Superheat to Actual Superheat.
5. Adjust refrigerant levels accordingly for a fixed restrictor system. If Actual Superheat is higher than Target Superheat, add refrigerant. If Actual Superheat is lower than Target Superheat, recover refrigerant.

Target Evaporator Exit Temperature (TEET)

1. Select TEET by pressing TSH/TEET/NORM until TEET is displayed in the lower left hand corner of the LCD. **Note**: blinking numbers mean you are seeing real time measurements. Non-blinking numbers mean the reading has been 'locked in'. If numbers are not blinking press ENTER to unlock and take a new reading.
2. Wet the ATWB1 wet sock thermocouple and clip both thermocouples (ATWB1 and ATA1) in front of the evaporator, (see figure 1 on next page).
3. Plug the ATWB1 into the top of the SRH2. **Note**: If "OL" is displayed, then the measurements are out of range. Retake the temperature measurements and ensure the temperature inputs are correct.
4. Press RH/DP/WB/DB until WB is displayed. Press SENSOR until T/C is displayed. When reading is stable, press ENTER.
5. Unplug the ATWB1 and plug in the ATA1.
6. Press RH/DP/WB/DB until DB is displayed. Press SENSOR until T/C is displayed. When reading is stable, press ENTER.
7. Press OUTPUT and read Target Evaporator Exit Temperature. **Note**: If "OL" is displayed, then the measurements are out of range. Retake the temperature measurements and ensure the temperature inputs are correct.
8. Compare Target Evaporator Exit Temperature to Actual Evaporator Exit Temperature. The Actual Evaporator Exit Temperature is the measured temperature of the air after it has passed through the evaporator.
9. Adjust airflow accordingly. An Actual Evap. Exit Temp. below the Target Evap. Exit Temp. indicates low airflow. Increasing airflow can be accomplished by eliminating restrictions in the duct system, increasing blower speed, cleaning filters or opening registers. An Actual Evap. Exit Temp. above the Target Evap. Exit Temp. usually indicates low capacity. Occasionally airflow is higher than expected. Look for causes of low capacity such as refrigerant mischarge or a dirty condenser coil. If the airflow is high, correct it by lowering the fan speed.

   Note: If "OL" is displayed, then the measurements are out of range. Retake the temperature measurements and ensure the temperature inputs are correct.

IMPORTANT:

Because everything within the system is interdependent, one adjustment can affect other parts of the system. For example, increasing airflow increases the superheat, which may require adding refrigerant. After any modifications, allow 15 minutes to stabilize and then retest. For the best results take measurements right after each other.

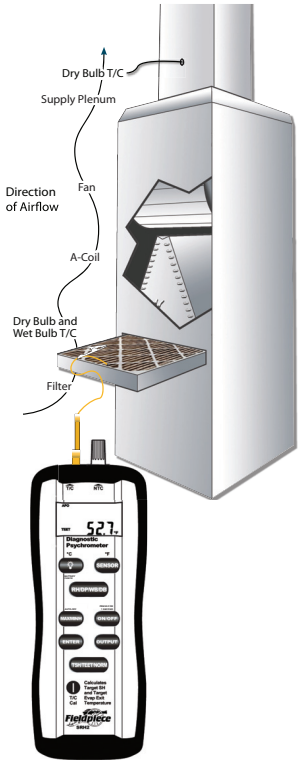


Figure 1

Air Conditioning Basics

The Evaporator, Condenser, Restrictor (Throttling valve) and Compressor are the four basic components of an air conditioner. Following one pound of refrigerant through the system shows the function of each component.

Subcooled liquid refrigerant at high pressure enters the restrictor and is throttled to saturated refrigerant at a lower pressure. The restrictor can be of either a fixed or TXV/EXV type. The fixed type must be charged to a target superheat that varies with indoor and outdoor conditions. TXV/EXV systems must be charged to subcooling.

The evaporator capacity varies with the indoor heat load on a fixed restrictor. The TXV/EXV regulates the size of the restriction to maintain a constant superheat. This essentially adjusts the capacity of the evaporator responding to the indoor heat load.

After the restrictor, refrigerant enters the evaporator at a low temperature and pressure and boils (evaporates) into a gas by absorbing heat from the indoor air. The refrigerant stays at the same temperature and pressure until all the refrigerant evaporates into a gas. After the refrigerant becomes a gas, it will continue to absorb heat and become superheated at which point its temperature will change. The Superheat measurement is the best indication of refrigerant charge level in a fixed restrictor system. A TXV/EXV system will keep the superheat constant. There must be superheat present to ensure liquid does not flood the compressor.

Superheat measurements are taken on the suction line between the evaporator and compressor.

The compressor takes this low temperature, low pressure, slightly superheated refrigerant and compresses it to a much higher temperature and pressure.

The highly superheated gas enters the condenser and rejects heat into the outside air. The refrigerant condenses back into a liquid. Once all of the gas is condensed into a liquid, additional removal of heat causes a temperature drop that is known as subcooling. TXV/EXV systems are charged to subcooling since superheat is controlled by the throttle valve. Subcooling measurements are taken on the liquid line between the condenser and TXV/EXV. Finally, the subcooled liquid enters the restrictor and the cycle starts again.

⚠ WARNING ⚠

If creating a hole in the return or supply plenum is necessary to take accurate measurements, make sure you do not damage any equipment.

Plug any hole that may have been created in the supply or return plenum with an air-tight, long-lasting plug.

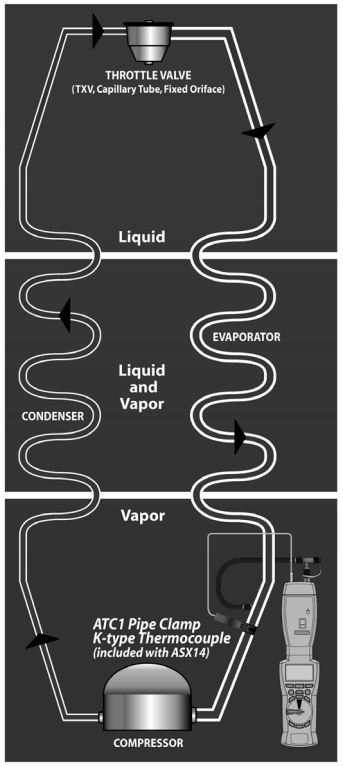


Figure 2

Specifications:

Operating temperature: 0 to 122°F (-18 to 50°C) at <75%RH
Storage Temperature: -4 to 140°F (-20 to 60°C) 0 to 80%RH with battery removed.
Low battery indication: The is displayed when the battery drops below the operating level.
Battery Life: Approx. 150 hours (9V alkaline)
Auto Power Off: After 15 minutes of non-usage.
Temperature (K-Type Thermocouple):
Range: -58 to 1832°F (-50 to 1000°C)
Accuracy: ±1°F 50 to 113°F (±0.5°C 10 to 45°C), when calibrated to NTC at room temperature
±(0.1% rdg+2°F) -58 to 1832°F
±(0.1% rdg+1°C) -50 to 1000°C
Temperature (NTC):
Range: 32 to 140°F (0 to 60°C)
Accuracy:
±1°F 50 to 113°F (±0.5°C 10 to 45°C)
±4°F 32 to 50°F and 113 to 140°F
±2°C 0 to 10°C and 45 to 60°C
Relative Humidity: 0% to 100% RH range
Accuracy: ±2.5% at 77°F (25°C), 10% to 90%RH
±5% at 77°F (25°C) 0 to 10% RH & 90 to 100%RH
Dimensions: 7.9"(20cm) x 2.6"(6.6cm) x 1.4"(3.6cm)
Weight: Approx. 11oz with battery installed
Accessories: (ATA1) K-type dry bulb thermocouple w/ clip, (ATWB1) K-type wet bulb thermocouple w/ clip, battery and Operator's Manual.

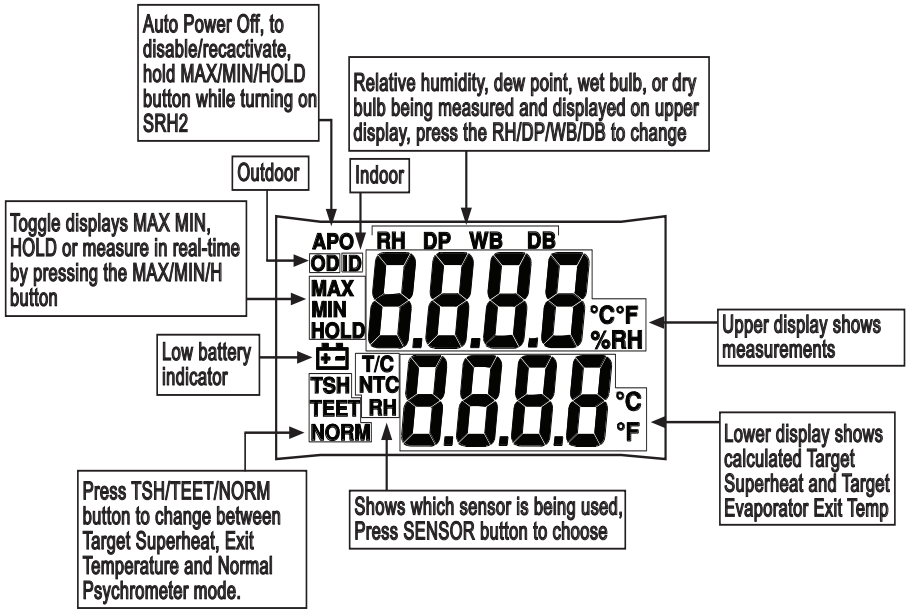


Figure 3

Warranty and Service

The product is warranted to the original purchaser against defects in material or workmanship for a period of one (1) year from the date of purchase. During the warranty period, Fieldpiece Instruments will, at its option, replace or repair the defective unit.

This warranty does not apply to defects resulting from abuse, neglect, accident, unauthorized repair, alteration, or unreasonable use of the instrument. Any implied warranty arising out of the sale of Fieldpiece's products including but not limited to implied warranties of merchantability and fitness for purpose are limited to the above. Fieldpiece shall not be liable for incidental or consequential damages.

Return any defective SRH2 to Fieldpiece for warranty service along with proof of purchase. Contact Fieldpiece for out of warranty repair charges.

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