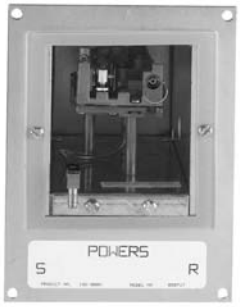
SIEMENS

Technical Instructions
Document No. 155-026P25
HT 186-1
March 16, 2005

Powers™ Controls

HT 186 Humidity Transmitters



Description

The HT 186 Humidity Transmitter is a one-pipe, pneumatic instrument. It senses space humidity and transmits a proportional 3 to 15 psi (20.7 to 103 kPa) output pressure signal to a remote receiver gauge calibrated to read percent relative humidity. The transmitter output may also be sent to a receiver-controller for further control of an air conditioning or process control system.

The inorganic sensing element gives rapid response to humidity changes. The transmitter features a flapper nozzle and operates on the force-balance principle with internal feedback to obtain linearity. Bimetal temperature compensation minimizes ambient temperature effects.

The room model is designed for vertical mounting. The duct model features a galvanized steel duct box that mounts into the side of any duct which is at least 6 inches (152 mm) high and at least 6-1/2 inches (165 mm) deep.

Product Numbers

Table 1.

Product Number	Description
186-0089	Duct Humidity Transmitter
186-0043	Room Humidity Transmitter

Warning/Caution Notations

WARNING:	⚠	Personal injury/loss of life may occur if you do not perform a procedure as specified.
CAUTION:	⚠	Equipment damage may occur if you do not follow procedure as specified.

Specifications

Operating	Action	Direct Acting
	Range	20 to 80% rh
	Maximum operating temperature	135°F (57°C)
	Supply pressure:	
	Maximum	30 psi (207 kPa)
	Normal operating	22 ± 1.0 psi (152 ± 6.89 kPa)
	Effect of 10°F (5.6°C)	
	Temperature change	Shift of 1% rh
	Air consumption	35 SCIM (9.6 cm3/s)
Physical	Chassis size	2-1/16 × 3-3/16 × 1-3/8 inches deep (52.4 × 81.0 × 35.0 mm deep)
	Standard room cover finish	Desert beige
	Duct box	
	Material	Galvanized steel
	Size	See Figure 5
	Air connection	1/4-inch barb connection

Application

Correct application of the transmitters is important. Since the room humidity transmitter needs a minimum air velocity of 30 feet per minute and many rooms do not meet this requirement, **duct** humidity transmitters should be used whenever possible. For best accuracy, follow these rules:

General Requirements

- **Air Velocity** - Must be 30 feet per minute (0.15 m/s) or greater across the room transmitter. There are two reasons for this:
  - It is important on any bleed type of humidity device to flush out the instrument air. This air is dehumidified below 10% rh and will cause a false humidity reading.
  - Circulation of room air over the sensing element is necessary for good response to room conditions.
- **Location**
  - Room - Should be located where it senses actual room conditions. Avoid locations near doors, equipment and temporary partitions.
  - Duct - Whenever possible, the transmitter should be located in the return air duct. Discharge units should be located as far downstream of the fan as possible, to allow good mixing of the vapor and air. The transmitter should always be located beyond the duct vibration isolator to avoid excessive vibration.
- **Air Supply** - Must be a constant 22 ± 1.0 psi (152 ± 6.89 kPa). The transmitter is calibrated in the factory at 22 psi (152 kPa) and any deviation in the supply pressure will affect the accuracy. Jobs with day/night air supplies [18/25 psi (124/172 kPa)] will need a separate 22 psi (152 kPa) air main for the humidity transmitters. The air must be clean and dry. A 40 scim (10.9cm^3/s) restrictor must be used.

Design Requirements

- Use duct transmitters in return air locations whenever possible rather than room transmitters. This eliminates the air velocity problem.
- Use a refrigerated air dryer to minimize moisture in the air line.
- Use the 908-033 air filter to minimize oil and dirt in the line.
- Proper air main sizing is necessary so that the air supply pressure **at the restrictor** is 22 ± 1.0 psi (152 ± 6.89 kPa).

Design Requirements, Continued

- The transmitter should not be placed in areas where process vapors or sprays are present that will coat the element and prevent it from sensing room conditions.
- Review the *General Requirements* section.

See *AB-263, Application, Installation and Service of Humidity Controls*, for more information.

Operation

The feedback lever provides feedback which ensures linearity. The element and nozzle levers pivot on flexure pivots to minimize hysteresis. A bimetal link on the element lever compensates for ambient temperature changes. See Figure 1.

A decrease in humidity shrinks the sensing element which exerts more force on the lever assemblies to move them downward. This decreases the load on the feedback lever, moving it away from the nozzle.

Air pressure bleeds off through the nozzle, thus decreasing the pressure in the chamber within the nozzle. It bleeds off until the decreased air pressure against the feedback lever exactly balances the downward force of the nozzle lever.

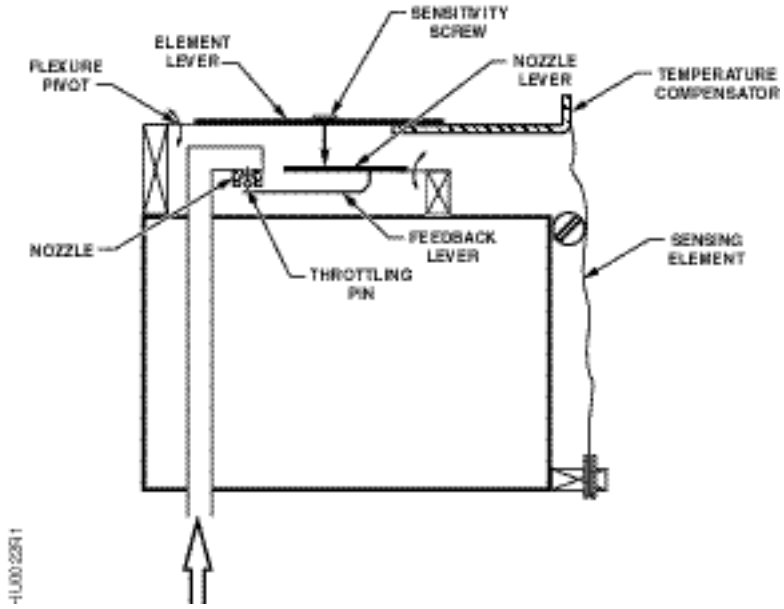


Figure 1. Operation Schematic.

Installation Requirements

CAUTION:

Do not press the lever against the nozzle to build up pressure. This can bend the lever and cause inaccurate output.

- Location
  - **Room** - Should be located where it senses actual room conditions. Avoid locations near doors, equipment and temporary partitions.
  - **Duct** - Whenever possible, the transmitter should be located in the return air duct. Discharge units should be located as far downstream of the fan as possible to allow good mixing of the vapor and the air. The transmitter should always be located beyond the duct vibration isolator to avoid excessive vibration.

Installation Requirements, Continued

1. Mounting.

   a. **Room Type**
   Use the standard Wall Plate Kit Number 180-443 furnished with each transmitter. Remove the two filters in the wall plate. Do not overtighten the screws.

   See Technical Bulletin *TB-145* (155-210P25) for instructions covering terminal roughing-in through the wall plate stage. HT 186 plugs into the wall plate. The transmitter does not utilize the return line, so this connection is not required for it. The supply connection used is marked "S" on the transmitter.

   b. **Duct Type** (See Figure 5)
   Cut opening in air duct 3-11/16 inches (94 mm) wide by 5-1/8 inches (130 mm) high. Fasten duct box flange to duct using four No. 8 sheet metal screws.

2. Test the air lines for leaks before installing the transmitter. A leak greater than 3 scim (0.82 cm^3/s) is unacceptable. To test the line, perform the following steps:

   a. Seal the wall plate (or mounting plate in the duct housing) with a piece of 1/8-inch (3.2 mm) O.D. copper tubing (plugged).

   b. Place a gauge in the transmitter air line (include transducer, restrictor and wall plate.) See Figure 2.

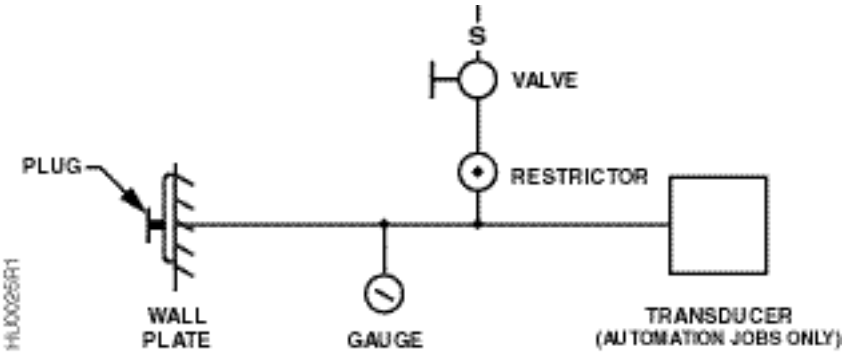


Figure 2. Gauge Placement.

3. Pressurize the line to 22 psi (152 kPa) and then close the hand valve.

   a. For each 100 feet (30.5 m) of 1/4-inch (6.4 mm) O.D. plastic tubing, the pressure must not drop below 15 psi (103 kPa) in less than 5 minutes (for 200 feet (61 m) the time is 10 minutes, etc.).

4. For each 100 feet (30.5 m) of 1/4-inch (6.4 mm) O.D. copper tubing, the pressure must not drop below 17 psi (117 kPa) in less than 5 minutes (for 200 feet [61 m] the time is 10 minutes, etc.).

5. Two captive mounting screws fasten the transmitter to the wall plate. Do not overtighten these screws when mounting the chassis on the wall plate.

6. The cover must slip on and off without any binding. If not, select another cover. Do not overtighten the cover screws. Screw them in until they just touch the cover. Use Allen Hex Key, Part Number 192-632.

Calibration

CAUTION:

Do not press lever against nozzle to build up pressure. This can bend the lever and cause inaccurate output.

General

The humidity transmitter is factory calibrated to have an output pressure of 3 psi (20.7 kPa) at 20% rh and 15 psi (103 kPa) at 80% rh.

The following steps must be taken for optimum performance of the humidity transmitter.

1. Check for 22 ± 1.0 PSI (152 ± 6.89 kPa) air supply.

2. Calibrate the automation transducer separately.

NOTE: Do not recalibrate transducer to compensate for humidity transmitter errors!

3. Be sure the instrument and method of measuring humidity are accurate and consistent.

    a. The accuracy of a manual sling is limited by the accuracy of the thermometers, the technique of the operator and several other factors. Siemens Building Technologies recommends using the Bendix Model 566 psychrometer. This unit has a battery operated fan, and with distilled water, gives consistent readings.

    b. Use an accurate gauge with 0.1 psi (0.69 kPa) graduations to measure the transmitter pressure. Connect the gauge at the transducer or at the receiver-controller. Do not use the test port on the transmitter since the cover must be on the transmitter during calibration.

    c. Be sure the humidity is not cycling.

    d. Measure the humidity as close as possible to the transmitter.

    e. Be sure the transmitter has been sensing steady humidity conditions for at least two hours before taking a reading.

4. Only a zero adjustment is possible in the field. Use the zero adjustment screw (See Figures 3 and 4). No other adjustments should be made.

    a. **Room** - The cover should remain on the unit during calibration. It has a hole in the bottom that permits access to the zero adjustment screw without removing the cover. See Figure 3.

    b. **Duct** - Remove plastic plug from faceplate and insert tool into duct housing as shown in Figure 4. After zero adjustment has been made, replace plug back into face plate.

See *AB-263, Application, Installation and Service of Humidity Controls*, for more information.

Calibration, Continued

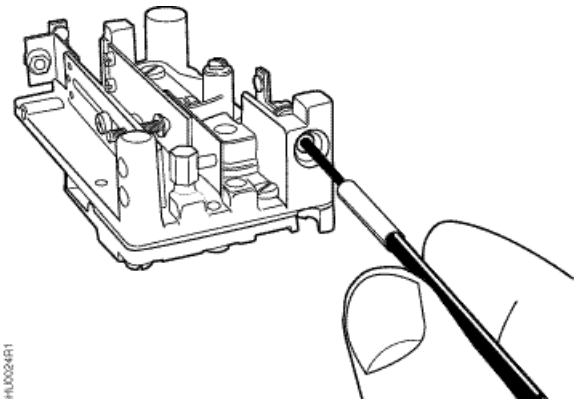


Figure 3. Room Transmitter Chassis Bottom View.

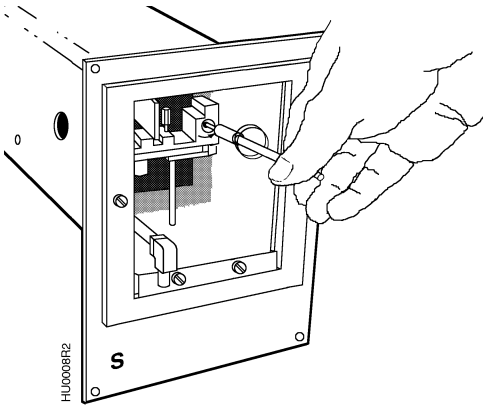


Figure 4.

Preventive Maintenance

- Yearly, check to see that humidity at sensing element agrees with humidity at gauge. See *Calibration*.
- Periodically, clean dust from transmitter element and flapper using a soft hair brush. Be sure cover slots are clear.
- Humidity transmitters do not require lubrication.

Repair Kits

No repairs are recommended. A transmitter is a precision instrument and alignment of parts is impossible on the job.

Troubleshooting

Table 2.

Complaint	Check	Probable Cause	Corrective Action
Low Humidity Indication	Restrictor	Plugged or undersized restrictors	Replace if necessary
	Receiver gauge humidity indication vs. pressure at transmitter	Receiver gauge out of calibration	Adjust receiver gauge
	Fittings and tubing	Leak in transmitter line	As necessary
High Humidity Indication	Receiver gauge humidity indication vs. pressure at transmitter	Receiver gauge out of calibration	Adjust receiver gauge
	Quantity of restrictors installed	Internal (in Receiver-Controller) restrictor and external restrictor installed	Remove all but one restricted air supply

Dimensions

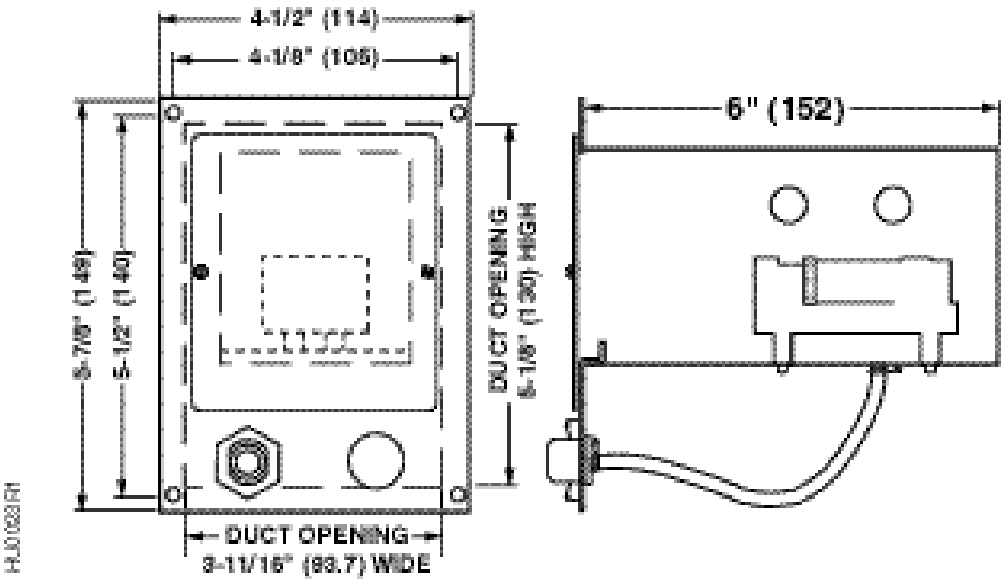


Figure 5. Mounting Dimensions for Duct Transmitter.