

INSTALLATION & SUBMITTAL DATA

system 350 duct sensing system

gas-fired duct furnace/make-up air units

model series: "D", "H", "I", & "O"

! WARNING

1. Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.
2. All units must be wired strictly in accordance with wiring diagram furnished with the unit. Any wiring different from the wiring diagram could result in a hazard to persons and property.
3. All wiring must be done with a wiring material having a temperature rating of at least 105°C.

IMPORTANT

The use of this manual is specifically intended for a qualified installation and service agency. All installation and service of these units must be performed by a qualified installation and service agency. Modine manuals may contain excerpts from component supplier literature adapted for Modine products. Any accompanying component supplier literature is for general information.

Application

The System 350 series is an on/off electronic temperature control with single-pole, double-throw relay output and LED indication. The series is designed with heating or cooling modes of operation, adjustable differential, and an interchangeable duct temperature sensor. The A350 will accept up to nine S350 Temperature Stage Modules to control a total ten stages of heating, cooling, or combinations thereof.

Components

A350AA-1C - Range: 30-130°F, Differential: 1 to 30°F
SET189A-600R Sensor with 9 inch leads.

The A350 Temperature Control operates on 24 VAC and supplies a SPDT relay output when the thermostat calls for heat. A front panel "ON" LED lights to indicate when the relay is energized. Adjustable features include the setpoint, differential, and heat/cool mode. See definitions further explanation of adjustable features.

S350AA-1C - Differential: 1 to 30°F

The S350 Stage Modules operate on 24 VAC and provide SPDT relay output when the differential from the A350 has been satisfied. A front panel "ON" LED lights to indicate when the relay is energized. Adjustable features include the offset, differential, and heating/cooling (reverse/direct) action mode. See definitions further explanation of adjustable features.

D350AA-1C - Fahrenheit Scale

The D350 receives its power, sensor, and setpoint information from the A350. A three digit, Liquid Crystal Display (LCD), give continuous read-out of the sensed temperature. Pushing the "PRESS FOR SETPOINT" button on the front of the D350 will cause the setpoint of the adjoining A350 to be displayed.

Figure 1.1
System 350 Components



Definitions

See Figure 2.1 for a graphical representation of the definitions.

Setpoint Adjustment

Setpoint is defined as the temperature at which the relay will de-energize. With the mode jumper in either the heating or cooling position, the relay will de-energize when the sensor temperature reaches setpoint.

Differential Adjustment

Differential is defined as the change in sensor temperature between energization and de-energization of the relay. The differential can be adjusted between 1 and 30°F. Adjustment is made using the potentiometer marked "DIFF" on the control.

Heating/Cooling Mode Adjustment

The heating/cooling mode is determined by the position of the jumper blocks. Mounting the blocks on the pins in the vertical position selects heating/reverse action operation. Mounting the blocks on the pins in the horizontal position selects cooling/direct action operation.

With the **heating mode** selected, the differential is below the setpoint. The relay and LED indicator will de-energize as the temperature rises to the setpoint. As the temperature drops to the setpoint minus the differential setting, the relay will energize and the LED will illuminate.

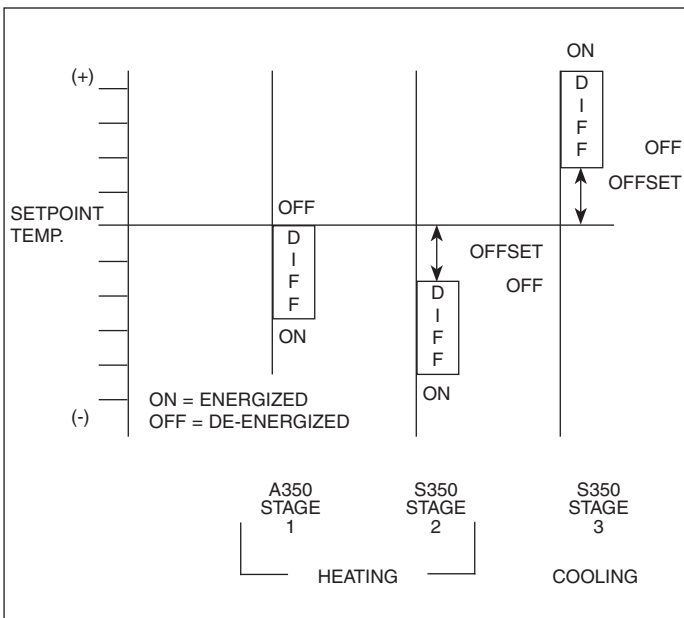
With the **cooling mode** selected, the differential is above the setpoint. The relay and LED indicator will de-energize as the temperature drops to the setpoint. As the temperature rises to the setpoint plus the differential setting, the relay will energize and the LED will illuminate.

As shipped from the factory, the heating/cooling jumper blocks are installed in the horizontal cooling position.

Offset

The offset adjustment determines the amount of offset from the A350 setpoint that the S350's relay will de-energize. This adjustment is made using the potentiometer marked "OFFSET" on the control.

Figure 2.1
Typical Two-Stage Heating with Single-Stage Cooling



Application Installation and Wiring

Installation of wiring must conform with local building codes, or in the absence of local codes, of the National Electric Code ANSI/NFPA 70 - Latest Edition. Unit must be electrically grounded in conformance to this code. In Canada, wiring must comply with CSA C22.1, Part 1, Electrical Code.

The System 350 components are housed in a NEMA 1 plastic enclosure designed for standard 35-mm DIN rail mounting. Four key-slot mounting holes on the back of the control case are provided for surface mounting.

When mounting any System 350 component to rigid conduit, attach the hub to the conduit before securing the hub to the control enclosure.

Sensor Connection

Shielded cable is not generally required for sensor wiring on runs of less than fifty feet, but is recommended for lengths greater than fifty feet. When using shielded cable, isolate and tape the shield at the sensor. Connect the shield to the "COM" sensor terminal on the A350.

Table 2.1
Recommended Sensor Cable Lengths

Wire Gauge	Shielded Cable Length (Feet)
14 AWG	800
16 AWG	500
18 AWG	310
20 AWG	200
22 AWG	124

Values provided are for two-wire stranded cable.

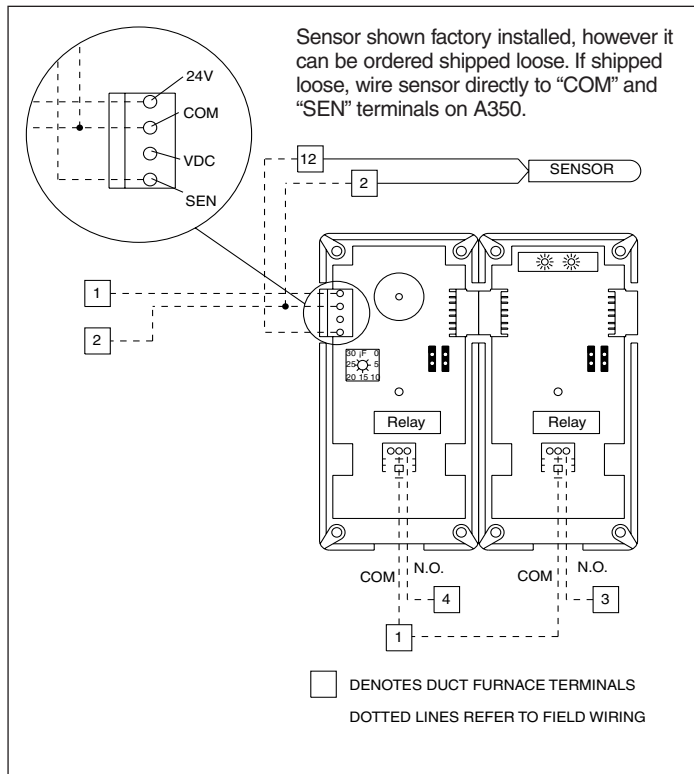
The sensors are not polarity sensitive.

The sensor must be mounted so that it can accurately sense the temperature of the controlled medium.

Wiring Diagram Selection

- * For duct furnaces (non-factory supplied blower): refer to the following figures for wiring.
- * For system units (factory supplied blower): refer to the job specific unit wiring diagram provided with the unit.
- * For deviations to these wiring diagrams or the job specific wiring diagrams: consult the factory.

Figure 2.2
Typical Duct Furnace Wiring



Adjustments

Verify that the heating/cooling jumper blocks are in the proper position before powering the System 350 modules. If the jumper blocks on the control or staging modules are left in the wrong position, the device will activate the relay in response to the opposite signal. The heating or cooling equipment will remain energized until the error is corrected.

A350

1. Remove the A350 cover by loosening the four captive cover screws.
2. Set the heating/cooling jumper blocks to the desired mode of operation. Position the jumper blocks vertically for heating or horizontally for cooling.
3. Adjust the differential potentiometer "DIFF" as desired (the number of degrees between relay energized and de-energized). Clockwise rotation increases the differential.
4. Replace the cover, fasten in place with the four screws, and move the setpoint dial to the desired setpoint.

S350

When the A350 is used in conjunction with multiple S350 Stage Modules, the following adjustments must be made to each S350.

1. Remove the A350 cover by loosening the four captive cover screws.
2. Set the heating/cooling jumper blocks to the desired mode of operation. Position the jumper blocks vertically for heating or horizontally for cooling.
3. Adjust the S350's differential potentiometer "DIFF" to the desired setting.
4. Adjust the S350's offset potentiometer "OFFSET" to the number of degrees from the A350 setpoint (above setpoint with cooling mode selected or below setpoint with heating mode selected) that the stage relay will de-energize.
5. Replace the cover, fasten in place with the four screws, and move the setpoint dial to the desired setpoint.

Checkout Procedure

Before applying power, make sure installation and wiring connections are according to job specifications. After necessary adjustments and electrical connections have been made, put the system in operation and observe at least three complete operating cycles before leaving the installation.

Figure 3.1
A350 Layout and Terminal Connections

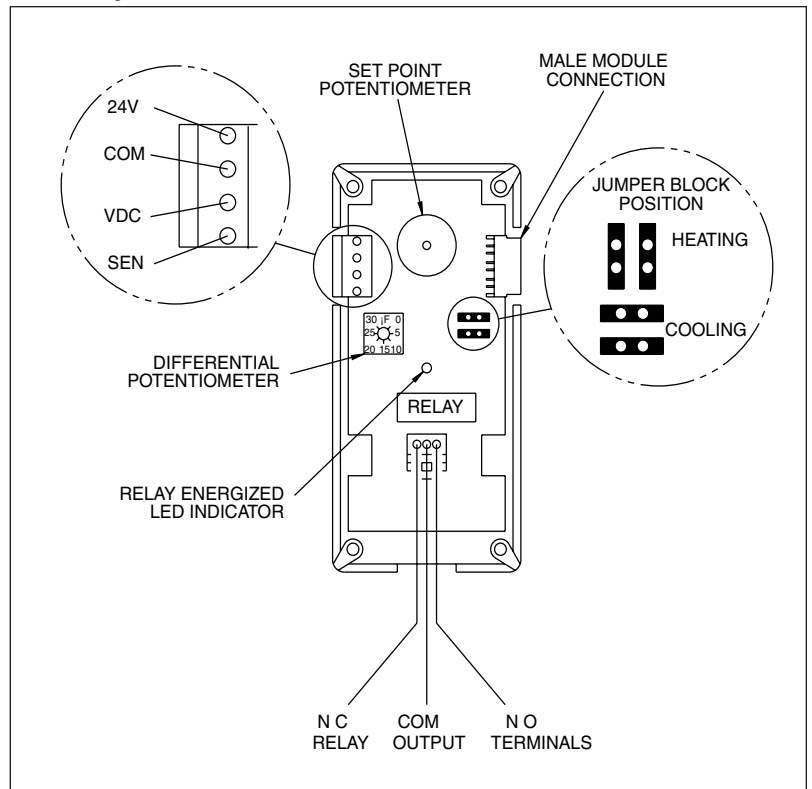


Figure 3.2
S350 Layout and Terminal Connections

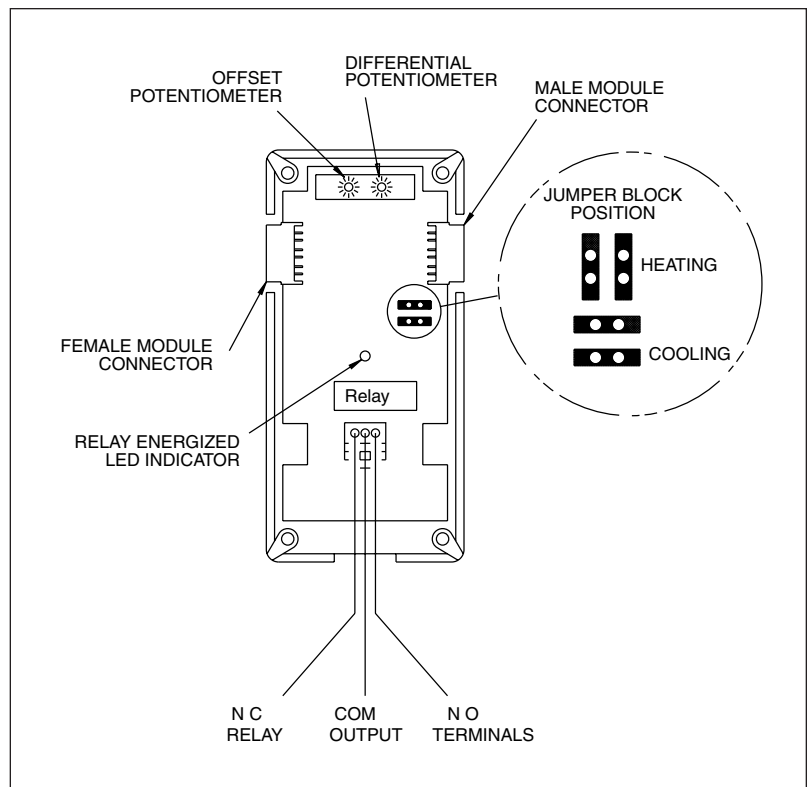


Figure 4.1
A350 & S350 DIMENSIONS (All dimensions are in inches)

Dimensions for the A350 and S350 are identical except the S350 does not include the Set point Adjustment Dial.

