VICONICS

μNISTAT

ELECTRONIC THERMOSTAT: T950

- One floating output

DESCRIPTION

The T950 series thermostats are microcomputer-based, proportional and integral (PI) devices with one floating (incremental) output. It can be used with most controlled devices in the HVAC industry that are compatible with this signal. A typical applications would be to control a floating VAV or valve actuator. The thermostats also contain three dip switch adjust the following parameters :

- Actuator stroke time
- Cooling or heating applications
- VAV or valve application

Type of output	In cooling	In heating
Modulating floating	**Modulating devices** Floating damper actuator Floating valve actuator	**Modulating devices** Floating damper actuator Floating valve actuator

SPECIFICATIONS

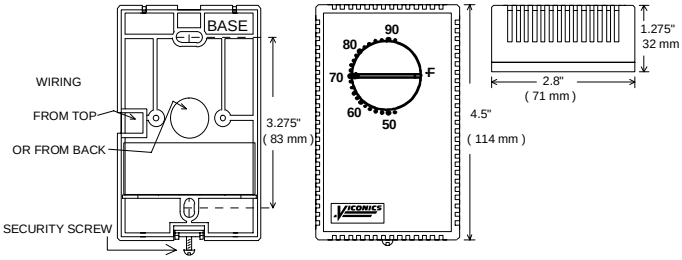
Operating Conditions:	0 °C to 50 °C (32 °F to 122 °F) 0% to 95% R.H. non-condensing
Sensor:	Local 47 K NTC thermistor
Resolution:	± 0.1 °C (± 0.2 °F)
Control accuracy:	± 0.2 ° C (± 0.4 °F) (calibrated)
Ranges:	10 °C to 32 °C (50 °F to 90 °F)
Night setup for cooling mode (T950N only):	5°C (9°F) night setup
Night setback for heating mode (T950N only):	5°C (9°F) night setback
Proportional band for room temperature control:	1.8°C (3.2°F)
Floating output:	Non isolated triacs: 30 Vac, ½ A max.
Power:	24 Vac -15%, +10% 50/60 Hz; 2 VA

DAY-NIGHT MODE (T950N ONLY)

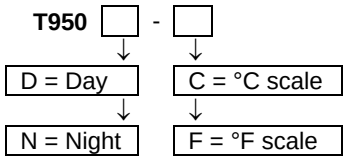
The T950N has a day / night input and an override button and night mode led mounted on the thermostat cover. The night mode, initiated by a remote timer or computer contact, provides energy savings during unoccupied periods of up to 10 %, without sacrificing comfort in occupied rooms. A flashing LED indicates that the thermostat is in Night mode. The occupant may override this condition locally for 2.5 hours by pressing the button on the thermostat cover.

When output is in	NSB input activates
Cooling mode	5°C (9°F) night setup
Heating mode	5°C (9°F) night setback

DIMENSIONS



HOW TO ORDER



Notes: Order changeover sensors such as S60, S70, S80 and S90 separately.
Vertical covers are standard.

Example:

T950D-C Thermostat without night mode
Lexan cover with: °C

MODULATING FLOATING OUTPUT

This output is designed to give true PI modulation out of floating actuator for VAV dampers and valves.

The tri-state output has dip switch located inside the thermostat which sets the maximum running time of the tri state actuator being used. Proper setting will give performances equal to more expensive modulating analog devices. Suitable for many brands of actuator, different time settings are available.

- **For VAV applications (S1 switch to off / S1=0)**

The available selections for the actuator timing switch on the tri-state output are mostly for VAV damper actuator applications.

Switch #2 off (S2=0)	Actuator maximum timing range 1.0 to 2.0 minutes
Switch #2 on (S2=1)	Actuator maximum timing range 2.5 to 5.5 minutes

- **For valve applications (S1 switch to on / S1=1)**

The available selections for the actuator timing switch on the tri-state output are mostly for valve actuator applications.

Switch #2 off (S2=0)	Actuator maximum timing range 1.0 to 2.0 minutes
Switch #2 on (S2=1)	Actuator maximum timing range 0.5 to 1.0 minutes

The output is normally cooling but can be reversed to heating mode with 3 different methods:

- **An internal dip switch reverses the output to a fixed heating mode**

- **Auto changeover to heating mode with a supply sensor.**
  A remote sensor can be used for each thermostat.(S60 or S70 or S90)
  Supply temperature > 78°F (26°C) = heating mode
  Supply temperature < 75°F (24°C) = cooling mode
  Hysterisys is 3°F (2°C)

- **Auto changeover to heating mode with a dry contact**.
  A closed contact on the changeover input will change operation of the floating output to heating mode.
  Open contact = cooling mode
  Closed contact = heating mode

Characteristics of changeover sensor 47 KΩ
(S60, S70 or S90).

Temperature °F	Temperature °C	Sensor resistance
150.0 °F	65.6 °C	9.610 Kohm
140.0 °F	60.0 °C	11.700 Kohm
130.0 °F	54.4 °C	14.342 Kohm
120.0 °F	48.9 °C	17.682 Kohm
110.0 °F	43.3 °C	21.940 Kohm
100.0 °F	37.8 °C	27.412 Kohm
90.0 °F	32.2 °C	34.483 Kohm
80.0 °F	26.7 °C	43.704 Kohm
70.0 °F	21.1 °C	55.834 Kohm
60.0 °F	15.6 °C	71.866 Kohm
50.0 °F	10.0 °C	93.340 Kohm
40.0 °F	4.4 °C	122.298 Kohm

THERMOSTAT INSTALLATION

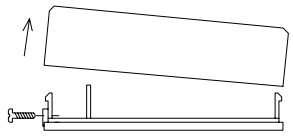
Important.
Electronic controllers require special care for wiring and startup. To avoid problems, carefully follow the procedures below.

Be sure to have all the literature on hand for all components installed: controller, actuators, relay, etc...

Look at the wiring diagrams, and study them carefully. Be sure that you understand how the system is supposed to work.

Make the wiring according to the wiring diagrams. Respect polarity for power terminals # 3 & # 4 between multiple controllers if the same transformer is used.

- Remove security screw on left side of thermostat cover.
- Open up by pulling on the bottom side of thermostat.



A) **Location:**
1- Shouldn't be installed on outside wall.
2- Must be installed away from any heat source.
3- Shouldn't be affected by direct sun radiation.
4- Nothing must restrain vertical air circulation to the thermostat.

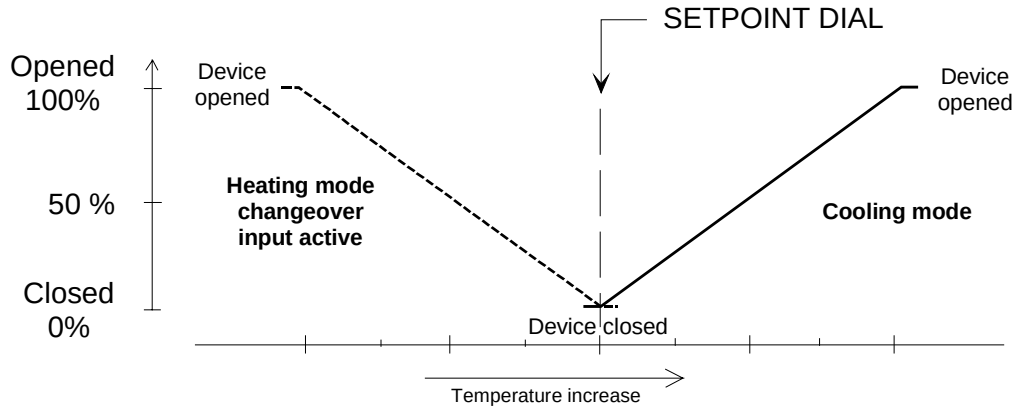
B) **Installation:**
1- Pull out cables 6" out of the wall.
2- Wall surface must be flat and clean.
3- Separate the thermostat and the base by pulling the cover by the bottom (same as the security screw.)
4- Insert cable in the central hole of the base.
5- Align the base and mark the location of the two mounting holes on the wall. Install proper side of base up.
6- Install shields in the wall.
7- Insert screws in mounting holes on each side of the base. **DO NOT OVERTIGHTEN!**
8- Strip each wire 1/4 inch.
9- Insert each wire according to wiring diagram.
10- Reinstall the cover (top side first) and gently push back extra wire length in the hole in the wall.
11- Install security screw.

DIP SWITCH ADJUSTMENTS PER APPLICATIONS

S1	S2	APPLICATION SWITCH ACTUATOR TIMING FOR FULL STROKE
		Generally for VAV room control applications
OFF	**OFF**	Actuator maximum timing range 1.0 to 2.0 minutes
OFF	**ON**	Actuator maximum timing range 2.5 to 5.5 minutes
		Generally for valve room control applications
ON	**OFF**	Actuator maximum timing range 1.0 to 2.0 minutes
ON	**ON**	Actuator maximum timing range 0.5 to 1.0 minutes

S3	CHANGEOVER OF FLOATING OUTPUT
OFF	**Output is cooling (DA)** • Auto changeover of output to **heating mode (RA)** with a supply sensor or, • Auto changeover to **heating mode (RA)** with a dry contact
ON	• Reverses the output to a fixed **heating mode (RA)**

CONTROL CURVES AND SEQUENCE

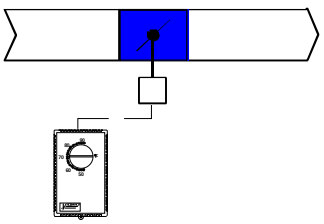


TYPICAL APPLICATIONS

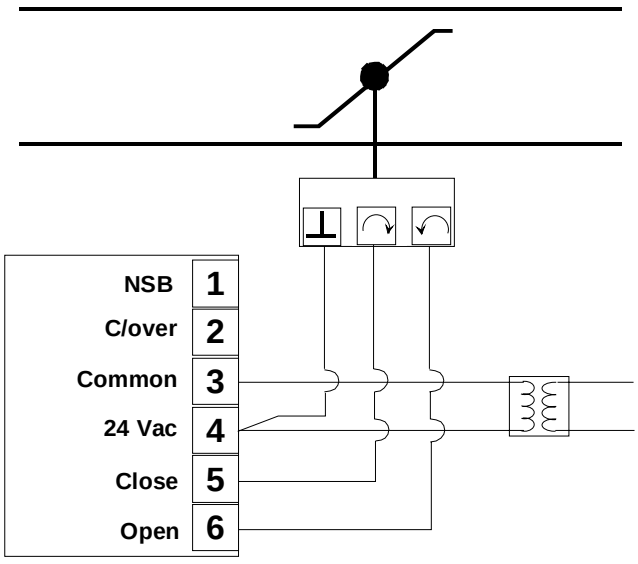
Pressure Dependent VAV

Dip switch position	S1	S2	S3
Cooling only for an actuator with maximum timing range 1.0 to 2.0 minutes	OFF	OFF	OFF
Cooling only for an actuator with maximum timing range 2.5 to 5.5 minutes	OFF	ON	OFF

Modulating Floating
VAV Actuator



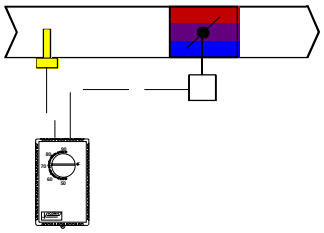
Room Temperature Control
Minimum & Maximum Position
Adjusted on the actuator



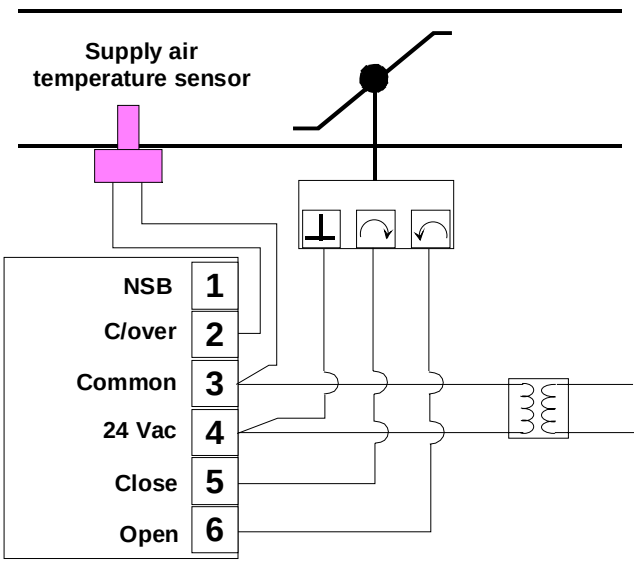
Pressure Dependent VAV With: Cool / Heat Auto Changeover Input

Dip switch position	S1	S2	S3
Cool/heat auto changeover input For an actuator with maximum timing range 1.0 to 2.0 minutes	OFF	OFF	OFF
Cool/heat auto changeover input For an actuator with maximum timing range 2.5 to 5.5 minutes	OFF	ON	OFF

Changeover Modulating Floating
Sensor VAV Actuator



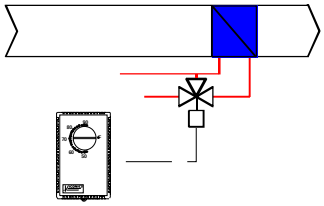
Room Temperature Control
Minimum & Maximum Position
Adjusted on the actuator



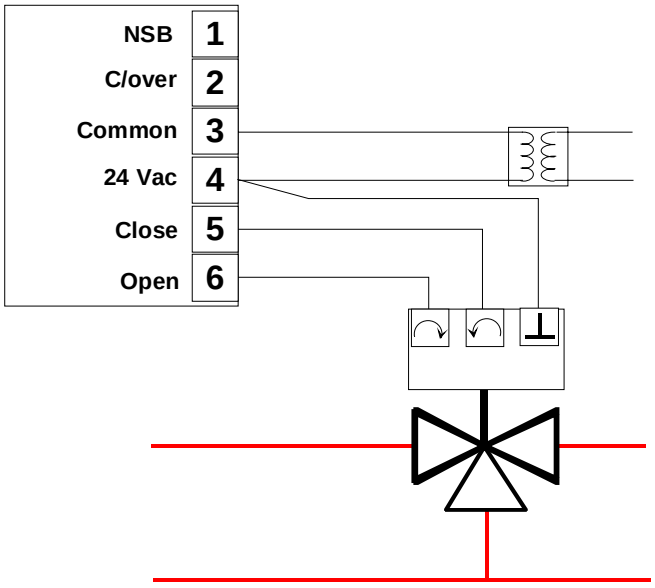
Valve Control With Room Thermostat

Dip switch position	S1	S2	S3
Cooling only for an actuator with maximum timing range 1.0 to 2.0 minutes	ON	OFF	OFF
Cooling only for an actuator with maximum timing range 0.5 to 1.0 minutes	ON	ON	OFF

Modulating Floating
Valve Cooling

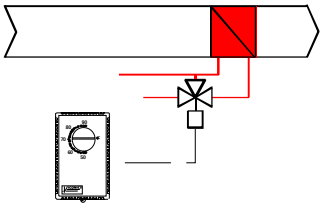


Room Temperature
Control Thermostat



Heating only for an actuator with maximum timing range 1.0 to 2.0 minutes	ON	OFF	ON
Heating only for an actuator with maximum timing range 0.5 to 1.0 minutes	ON	ON	ON

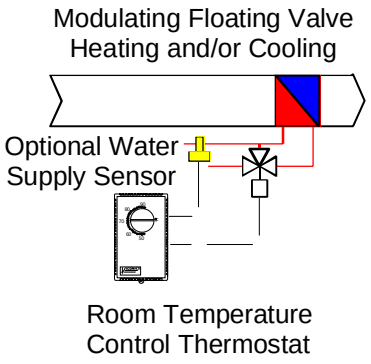
Modulating Floating
Valve Heating

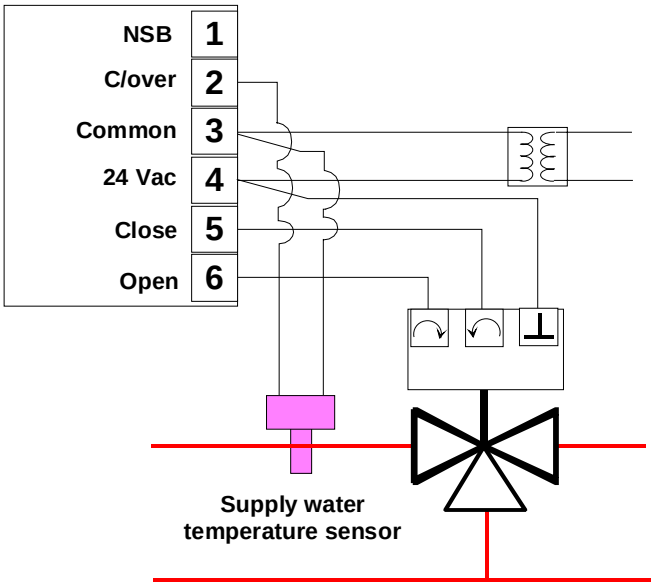


Room Temperature
Control Thermostat

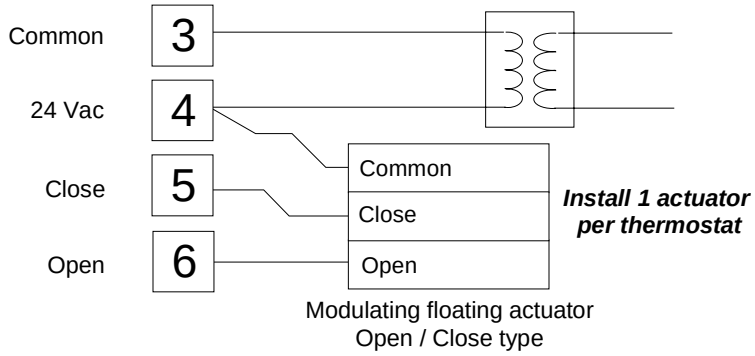
Valve Control With Room Thermostat With: Cool / Heat Auto Changeover Input

Dip switch position	S1	S2	S3
Cool/heat auto changeover input For an actuator with maximum timing range 1.0 to 2.0 minutes	ON	OFF	OFF
Cool/heat auto changeover input For an actuator with maximum timing range 0.5 to 1.0 minutes	ON	ON	OFF





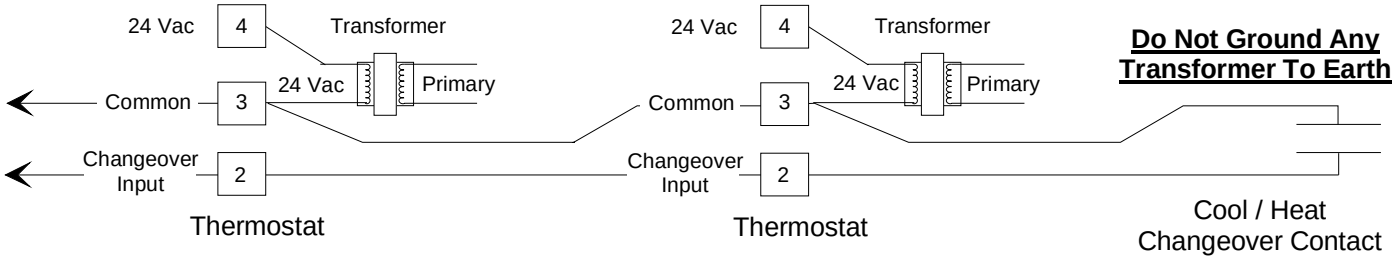
24 VAC POWER AND FLOATING ACTUATOR TYPICAL WIRING



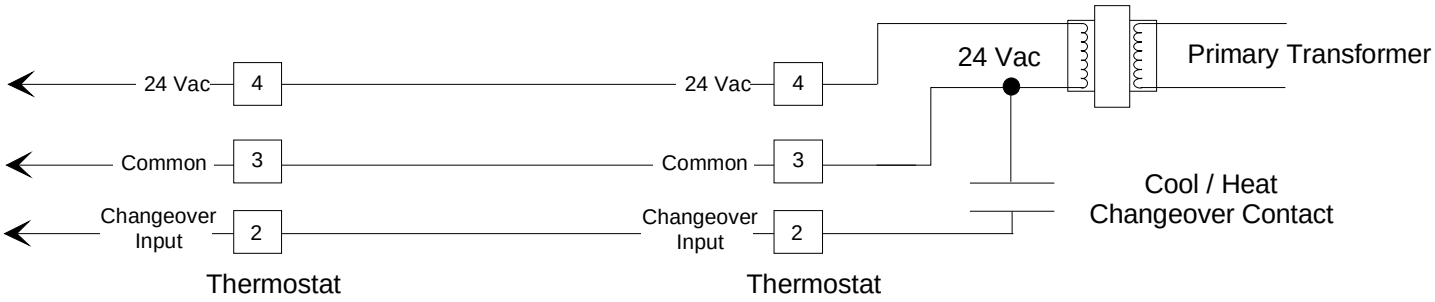
- Power Supply 24 Vac -15% +10% 50/60 HZ 2 VA
- If operation of the actuator is reversed, flip the reversing switch on the actuator or reverse wires #5 & #6.
- Always select an actuator timing which is slightly less than the true maximum running time the actuator
- Note: terminals 1, 2, and 3 can be wired together between each thermostat if polarity is respected
- Important: if using a common transformer, respect polarity (Common and 24 Vac between thermostats and actuator)

CHANGEOVER INPUT TYPICAL WIRING

MULTIPLE TRANSFORMERS (1 DRY CONTACT FOR ALL THERMOSTATS)
Open contact = Cooling mode. Closed contact = Heating mode

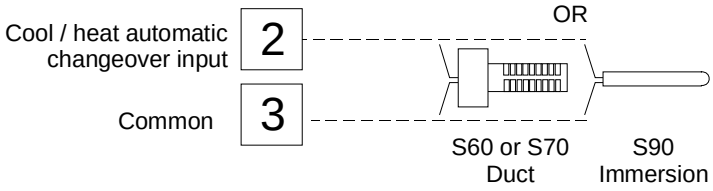


SINGLE TRANSFORMER (1 DRY CONTACT FOR ALL THERMOSTATS)
Open contact = Cooling mode. Closed contact = Heating mode



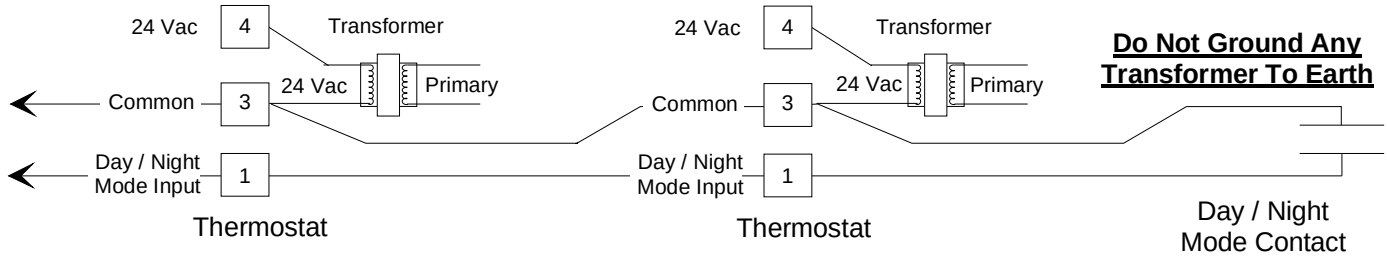
1 SUPPLY CHANGEOVER SENSOR PER THERMOSTAT (1 SUPPLY SENSOR PER THERMOSTAT)
Auto changeover input using an S60, S70 duct supply sensor or S90 immersion supply sensor

Supply temperature > 78°F (26°C) = Heating mode
Supply temperature < 75°F (24°C) = Cooling mode
Hysterisys is 3°F (2°C) between heating and cooling



NSB INPUT TYPICAL WIRING (T950N ONLY)

- **MULTIPLE TRANSFORMERS**
  Closed = night mode. 1 contact can be used for all thermostats on the same transformer.



- **SINGLE TRANSFORMER**
  Closed = night mode. 1 contact can be used for all thermostats on the same transformer.