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# Building Automation Guide for Therma-Fuser™ Systems



# HIGH PERFORMANCE OPTIONS FOR THERMA-FUSER SYSTEMS

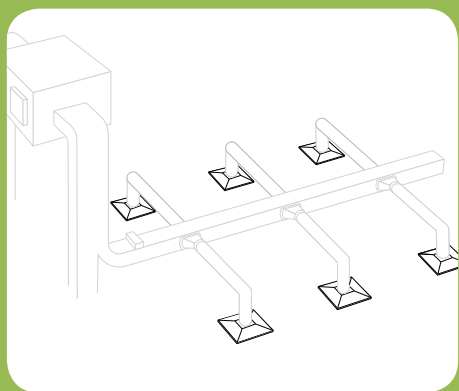
As energy costs continue to rise, the management of energy while balancing tenant comfort and operational costs is a significant challenge for commercial building owners and managers. A Building Automation System (BAS) is an option that provides monitoring of entire building systems with single source control and troubleshooting.

Acutherm's Therma-Fuser VAV System is designed to work cooperatively with the wide range of BAS options available. Whether you're looking for simple individual temperature control, requiring no energy for operation, or full-scale networking for system scheduling, monitoring, reporting, troubleshooting and more, this guide will help you determine what is best for your building needs and budget. Six basic options are compared using the quick chart on the following page, then each option is described in more detail throughout.



## T-Series Stand Alone Diffusers

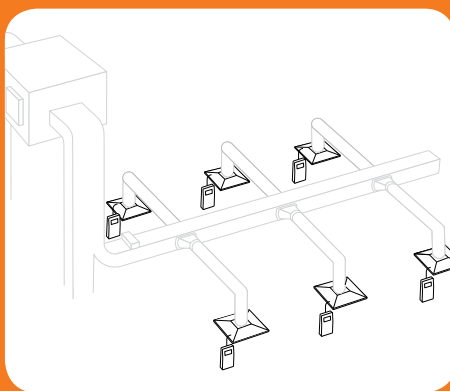
The T-Series Stand Alone diffusers are simple to install, require no maintenance, come with a 10-year warranty, and offer the lowest cost per zone of control.



Powered: Thermally. No wires.

## M-Series Motorized Diffusers

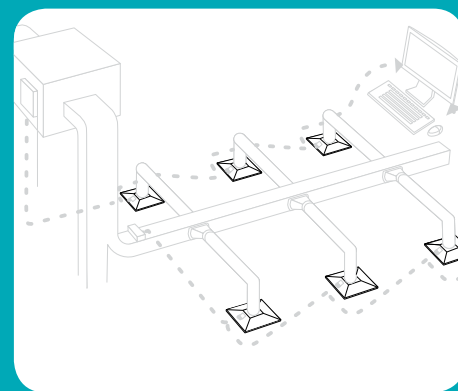
The M-Series Motorized diffusers provide a greater range of operation and increased speed of response required by some projects.



Powered: Electric motor

## E-Series Interoperable Diffusers

The E-Series Interoperable diffusers are specifically designed for application in multi-vendor DDC building control networks that use BACnet™ or LonTalk® open communication protocols.



Powered: Electric motor or thermal

# QUICK CHART FOR THERMA-FUSER SYSTEM OPTIONS

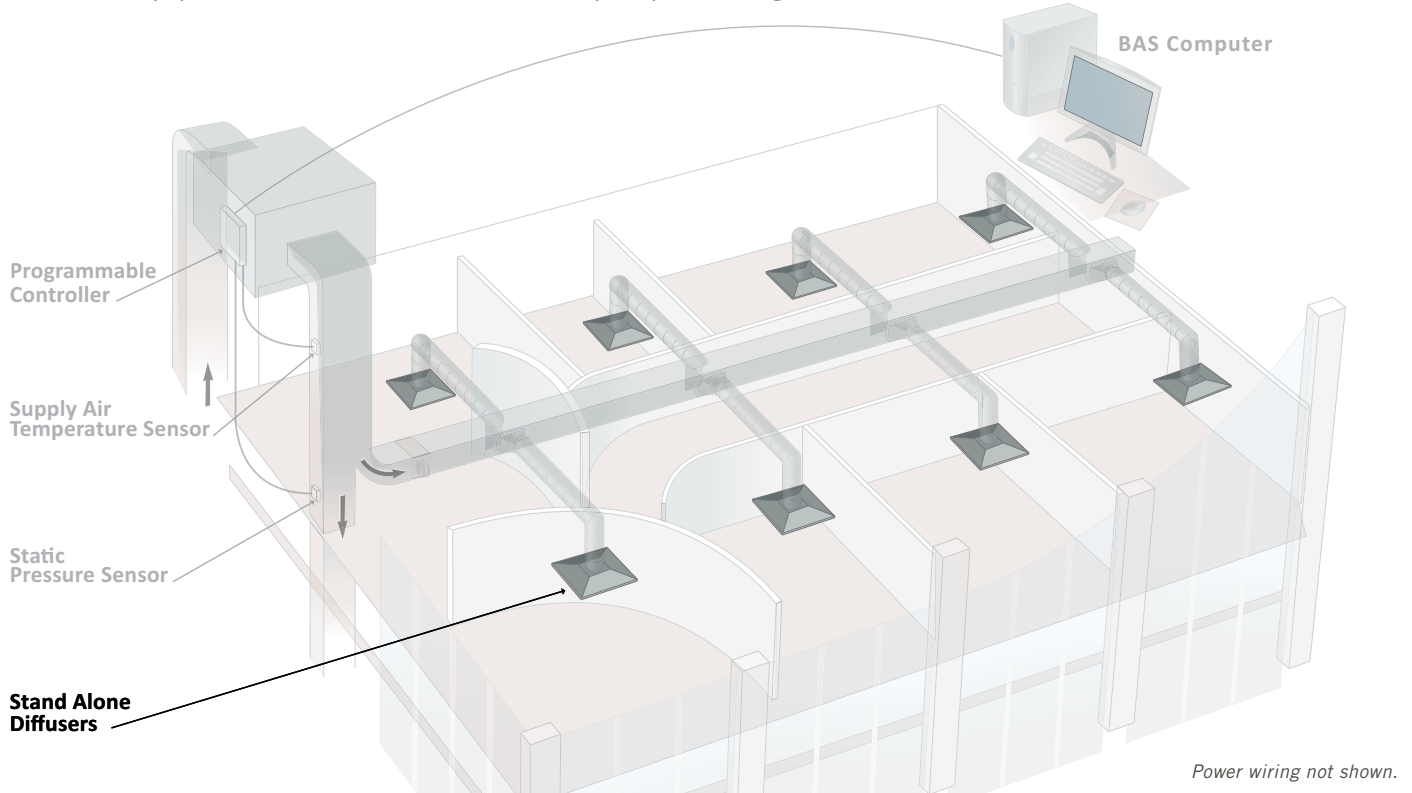
Features	T-Series		M-Series	E-Series	Hybrids	
	Option 1 Therma-Fuser Stand Alone diffusers	Option 2 Therma-Fuser Stand Alone diffusers + Room Temp Sensors and Adjusters	Option 3 Therma-Fuser Motorized Diffusers	Option 4 Therma-Fuser DDC Interoperable diffusers	Option 5 Combination of Stand-Alone and Motorized diffusers	Option 6 Combination of Stand-Alone and DDC Interoperable Series
+ Comfort - Individual temperature control	✓	✓	✓	✓	✓	✓
+ Comfort - Superior air distribution	✓	✓	✓	✓	✓	✓
+ Energy - Energy saving system	✓	✓	✓	✓	✓	✓
+ Sustainability - Adaptable system	✓	✓	✓	✓	✓	✓
+ Sustainability - No diffuser maintenance	✓ <sup>1</sup>	✓ <sup>1</sup>			✓ <sup>1</sup>	✓ <sup>1</sup>
+ Simplicity - No diffuser wiring	✓					
+ Simplicity - BAS only monitors parts of system requiring periodic maintenance	✓					
+ Network - monitors room air temperature		✓		✓		✓ <sup>3</sup>
+ Network - monitors and adjusts room temperature setpoints		✓	✓	✓	✓ <sup>2</sup>	✓ <sup>3</sup>
+ Network - monitors diffuser supply air temperature				✓		✓ <sup>3</sup>
+ Network - monitors diffuser supply air volume				✓		✓ <sup>3</sup>
+ Network Protocol		Analog	Analog	BACnet™ or LonTalk®	Analog <sup>2</sup>	BACnet™ or <sup>3</sup> LonTalk®
+ Other Network Functions (see description)			✓	✓	✓ <sup>2</sup>	✓ <sup>3</sup>
+ Diffuser power	Thermal	Thermal	Electric Motor	Thermal or Electric Motor	Thermal and Electric Motor	Thermal and Electric Motor
+ Installed cost	\$	\$\$	\$\$	\$\$\$	\$\$	\$\$

AS NOTED ABOVE:

1. 10-year warranty on Therma-Fuser stand alone diffusers. (Not applicable to diffuser options and accessories.)
2. Only on Therma-Fuser M-Series Motorized Network diffusers. (2-year warranty)
3. Only on Therma-Fuser E-Series DDC interoperable diffusers. (2-year warranty)

# Option 1: Therma-Fuser Stand Alone Diffusers

Achieve all the benefits of Therma-Fuser VAV and only use the BAS to monitor the parts of the system that need periodic maintenance. This simple configuration provides the comfort and energy savings of individual temperature control, easy adaptability to office changes, and no maintenance VAV terminals along with simplicity and low installation cost due to no diffuser wiring. The BAS monitors and controls only the portions of the VAV system requiring maintenance including the fan, VSD, coils and filters plus other HVAC equipment such as the chiller, boiler, pumps, cooling tower, etc...



## Features

+ Comfort - Individual temperature control	✓
+ Comfort - Superior air distribution	✓
+ Energy - Energy saving system	✓
+ Sustainability - Adaptable system	✓
+ Sustainability - No diffuser maintenance	✓ <sup>1</sup>
+ Simplicity - No diffuser wiring	✓
+ Simplicity - BAS only monitors parts of system requiring periodic maintenance	✓

### NOTES:

1. 10-year warranty on Therma-Fuser™ stand alone diffusers. (Not applicable to diffuser options and accessories.)

## Inputs from BAS

## Outputs to BAS

### THERMA-FUSER SYSTEM OPTIONS

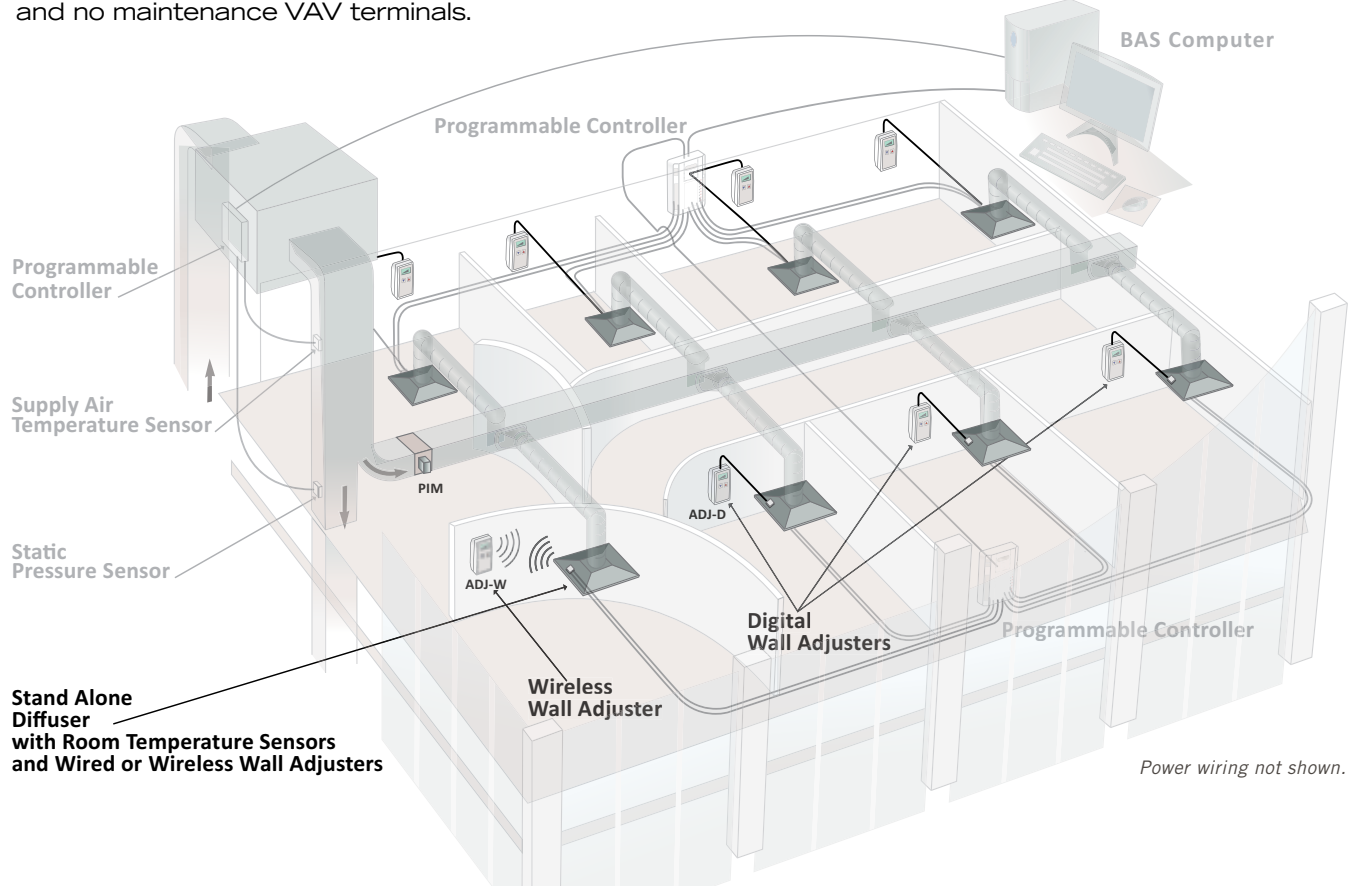
(Maintains room temperature with no input or output from BAS.)

### TYPICAL INDUSTRY CONTROL OPTIONS

<i>Occupancy Schedule</i>	<i>Discharge Air Temperature</i>
<i>Emergency Override</i>	<i>Static Pressure Mode</i>
<i>Static Pressure Setpoint</i>	<i>Chilled Water Temperature</i>
<i>Discharge Air Cooling Setpoint</i>	<i>Hot Water Temperature</i>
<i>Discharge Air Heating Setpoint</i>	<i>Supply Fan Capacity</i>
<i>Minimum Outdoor Air Setpoint</i>	<i>Exhaust Fan Capacity</i>
	<i>Return Air Capacity</i>
	<i>Economizer Enabled</i>
	<i>Outdoor Air Temperature</i>
	<i>Outdoor Air Damper Position</i>
	<i>Outdoor Airflow</i>
	<i>Return Air Temperature</i>
	<i>Mixed Air Temperature</i>
	<i>Space Temperature</i>
	<i>Filter Differential Pressure</i>

# Option 2: Therma-Fuser Stand Alone Diffusers with Room Temperature Sensors and Adjusters

Achieve benefits of Therma-Fuser VAV and both monitor room air temperatures and make setpoint changes with the BAS. The BAS can read an analog room temperature signal from a sensor installed in each diffuser and can read and reset the room temperature setpoint of each diffuser using analog signals from an Acutherm Wall Adjuster. The BAS also monitors and controls the portions of the VAV system requiring periodic maintenance. This approach provides the Therma-Fuser VAV advantages of comfort and energy savings from individual temperature control, easy adaptability to office changes, and no maintenance VAV terminals.



## Features

+ Comfort - Individual temperature control	✓
+ Comfort - Superior air distribution	✓
+ Energy - Energy saving system	✓
+ Sustainability - Adaptable system	✓
+ Sustainability - No diffuser maintenance	✓ <sup>1</sup>
+ BAS monitors room air temperature	✓
+ BAS monitors and adjusts room temperature setpoints	✓

1. 10-year warranty on Therma-Fuser™ stand alone diffusers. (Not applicable to diffuser options and accessories.)

## Inputs from BAS

## Outputs to BAS

### THERMA-FUSER SYSTEM OPTIONS

#### Room Temperature Setpoints

#### Room Temperature Setpoints Room Temperatures

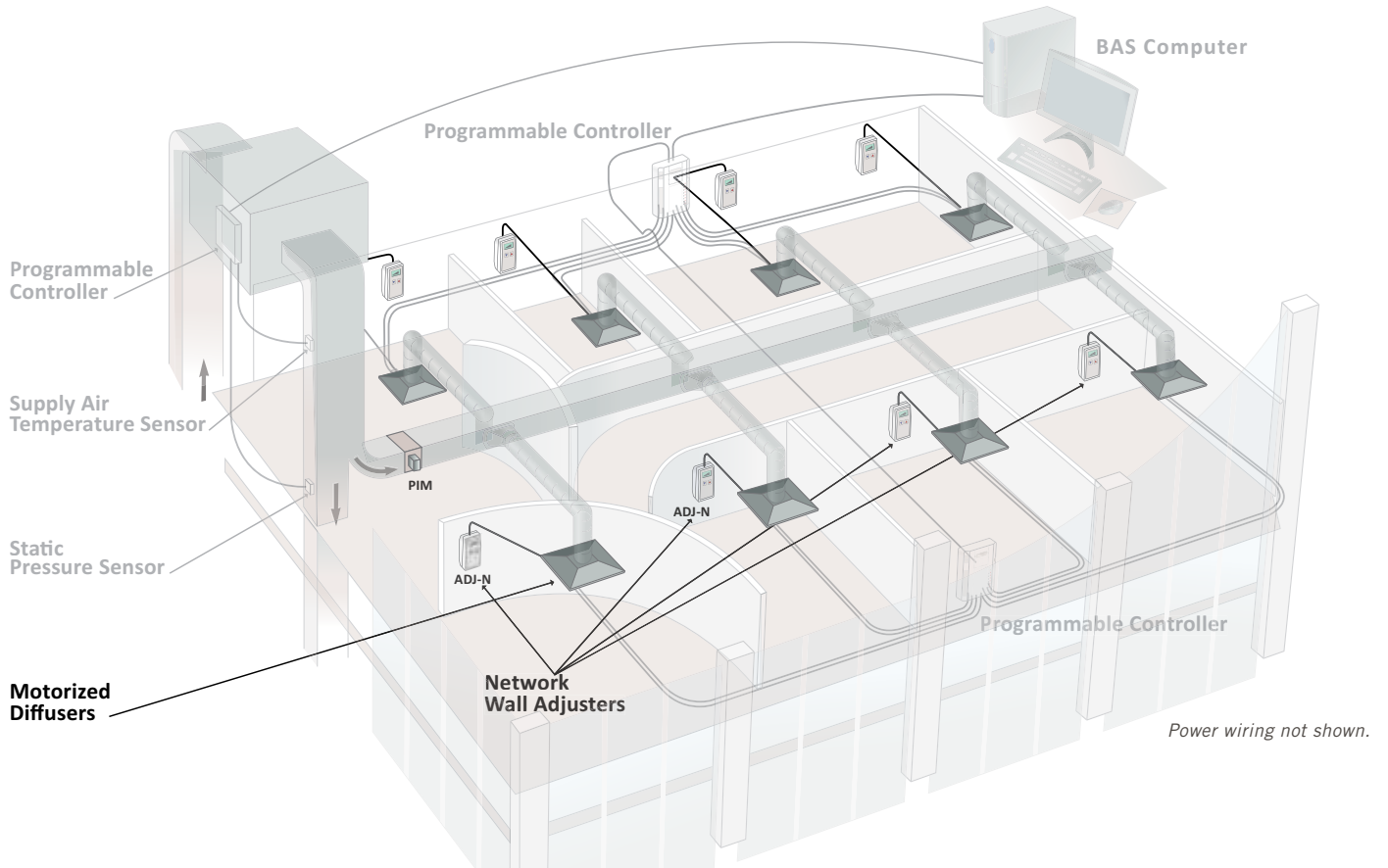
### TYPICAL INDUSTRY CONTROL OPTIONS

Occupancy Schedule  
Emergency Override  
Static Pressure Setpoint  
Discharge Air Cooling Setpoint  
Discharge Air Heating Setpoint  
Minimum Outdoor Air Setpoint

Discharge Air Temperature  
Static Pressure Mode  
Chilled Water Temperature  
Hot Water Temperature  
Supply Fan Capacity  
Exhaust Fan Capacity  
Return Air Capacity  
Economizer Enabled  
Outdoor Air Temperature  
Outdoor Air Damper Position  
Outdoor Airflow  
Return Air Temperature  
Mixed Air Temperature  
Space Temperature  
Filter Differential Pressure

# Option 3: Therma-Fuser Motorized Diffusers

Achieve benefits of Therma-Fuser VAV and make room temperature setpoint changes with the BAS. The BAS can reset the room temperature setpoint of each diffuser using analog signals from the controller on the motorized diffuser. A Wall Adjuster may be installed to allow the occupants access to a wide range of setpoints. The BAS also monitors and controls the portions of the VAV system requiring periodic maintenance. This approach provides the Therma-Fuser VAV advantages of comfort and energy savings from individual temperature control and easy adaptability to office changes.



## Features

+ Comfort - Individual temperature control	✓
+ Comfort - Superior air distribution	✓
+ Energy - Energy saving system	✓
+ Sustainability - Adaptable system	✓
+ BAS adjusts room temperature setpoints	✓ <sup>2</sup>

### NOTES:

1. 10-year warranty on Therma-Fuser™ stand alone diffusers. (Not applicable to diffuser options and accessories.)
2. Only on Therma-Fuser Motorized diffusers. (2-year warranty)
3. Only on Therma-Fuser DC Interoperable diffusers. (2-year warranty)

## Inputs from BAS

## Outputs to BAS

### THERMA-FUSER SYSTEM OPTIONS

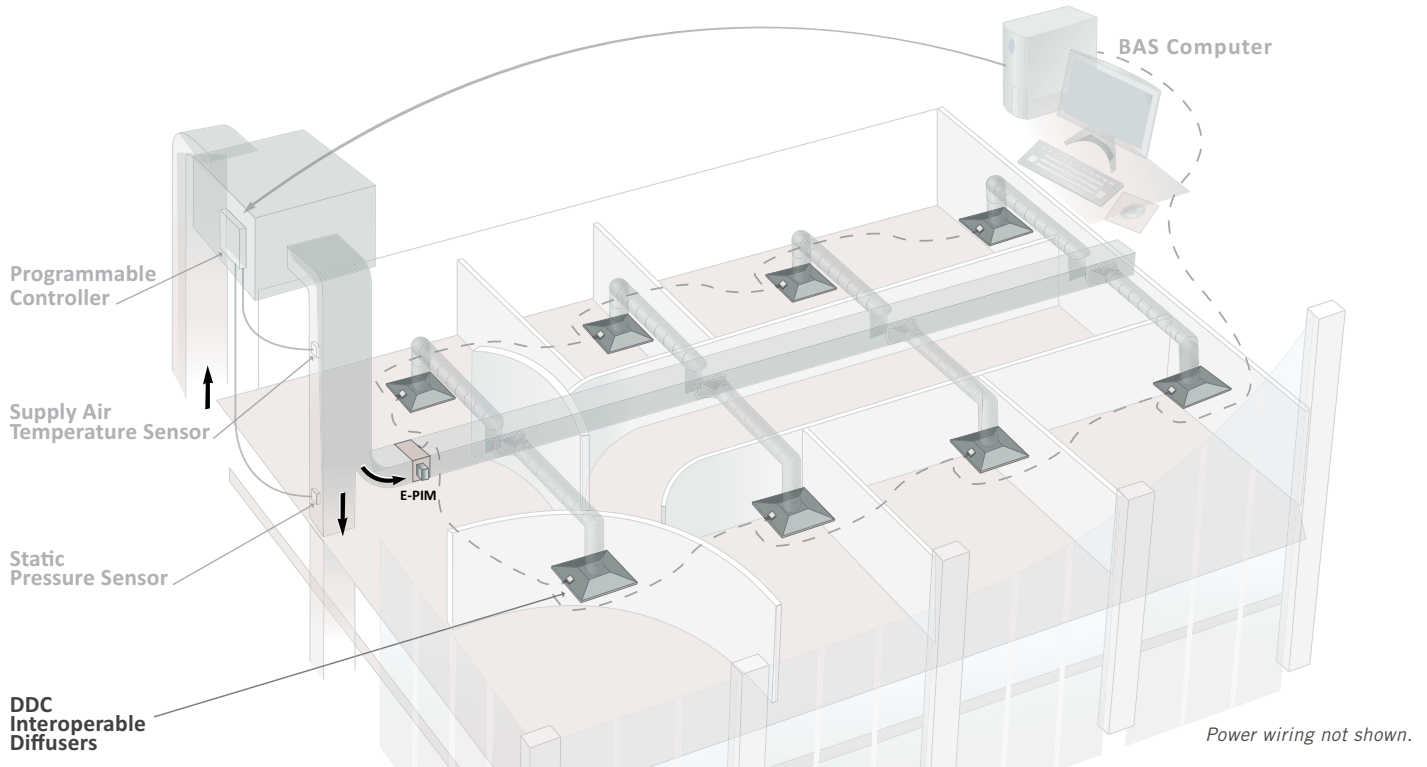
#### Room Temperature Setpoints

#### TYPICAL INDUSTRY CONTROL OPTIONS

<i>Occupancy Schedule</i> <i>Emergency Override</i> <i>Static Pressure Setpoint</i> <i>Discharge Air Cooling Setpoint</i> <i>Discharge Air Heating Setpoint</i> <i>Minimum Outdoor Air Setpoint</i>	<i>Discharge Air Temperature</i> <i>Static Pressure Mode</i> <i>Chilled Water Temperature</i> <i>Hot Water Temperature</i> <i>Supply Fan Capacity</i> <i>Exhaust Fan Capacity</i> <i>Return Air Capacity</i> <i>Economizer Enabled</i> <i>Outdoor Air Temperature</i> <i>Outdoor Air Damper Position</i> <i>Outdoor Airflow</i> <i>Return Air Temperature</i> <i>Mixed Air Temperature</i> <i>Space Temperature</i> <i>Filter Differential Pressure</i>
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# Option 4: Therma-Fuser DDC Interoperable Diffusers

Achieve benefits of Therma-Fuser VAV and complete digital input and output with the BAS. Each diffuser has the ability to supply room temperature, airflow and supply air temperature and receive signals for room temperature setpoint, minimum airflow setpoint, maximum airflow setpoint, override open, override closed, CO<sub>2</sub> override and more. Digital signals can be either BACnet™ or LonTalk®. The BAS also monitors and controls the portions of the VAV system requiring periodic maintenance. This approach provides the Therma-Fuser VAV advantages of comfort and energy savings from individual temperature control and easy adaptability to office changes.



## Features

+ Comfort - Individual temperature control	✓
+ Comfort - Superior air distribution	✓
+ Energy - Energy saving system	✓
+ Sustainability - Adaptable system	✓
+ Sustainability - No diffuser maintenance	✓ <sup>1</sup>
+ BAS monitors room air temperature	✓ <sup>3</sup>
+ BAS monitors and adjusts room temperature setpoints	✓ <sup>3</sup>
+ BAS monitors diffuser supply air temperature	✓ <sup>3</sup>
+ BAS monitors diffuser supply air volume	✓ <sup>3</sup>
+ Other BAS functions (see description)	✓ <sup>3</sup>

### NOTES:

- 10-year warranty on Therma-Fuser™ stand alone diffusers. (Not applicable to diffuser options and accessories.)
- Only on Therma-Fuser Motorized diffusers. (2-year warranty)
- Only on Therma-Fuser DC Interoperable diffusers. (2-year warranty)

## Inputs from BAS

## Outputs to BAS

### THERMA-FUSER SYSTEM OPTIONS

Room Temperature Setpoints  
Room Minimum Airflow Setpoints  
Room Maximum Airflow Setpoints  
Override Open  
Override Closed  
CO<sub>2</sub> Override

Room Temperature Setpoints  
Room Temperatures  
Room Airflows  
Room Supply Air Temperatures

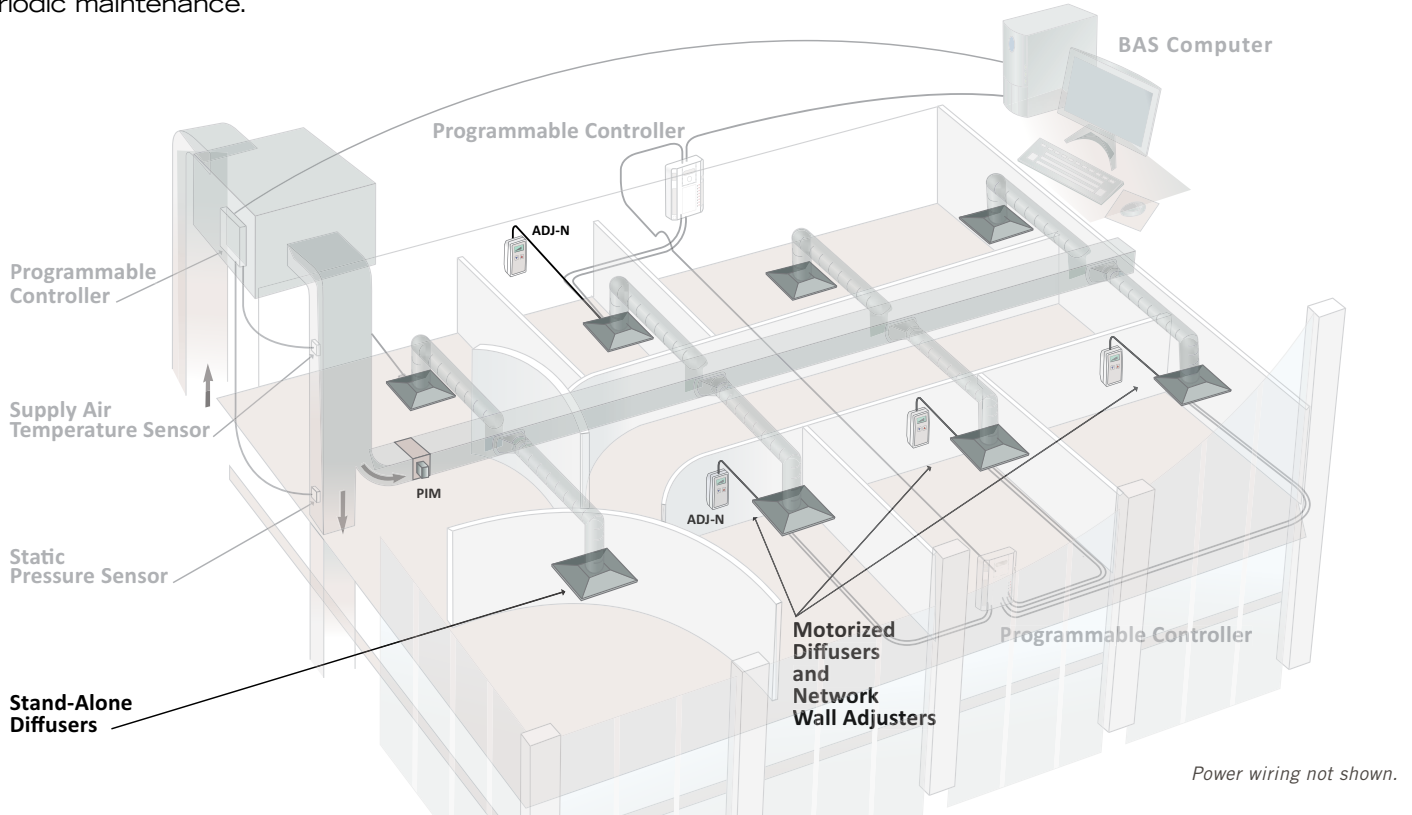
### TYPICAL INDUSTRY CONTROL OPTIONS

Occupancy Schedule  
Emergency Override  
Static Pressure Setpoint  
Discharge Air Cooling Setpoint  
Discharge Air Heating Setpoint  
Minimum Outdoor Air Setpoint

Discharge Air Temperature  
Static Pressure Mode  
Chilled Water Temperature  
Hot Water Temperature  
Supply Fan Capacity  
Exhaust Fan Capacity  
Return Air Capacity  
Economizer Enabled  
Outdoor Air Temperature  
Outdoor Air Damper Position  
Outdoor Airflow  
Return Air Temperature  
Mixed Air Temperature  
Space Temperature  
Filter Differential Pressure

# Option 5: Combination of Therma-Fuser stand alone + Therma-Fuser Motorized diffusers

Achieve benefits of Therma-Fuser VAV, motorized diffusers with the BAS on selected diffusers and the simplicity of no wiring to the others. Key spaces are controlled by the BAS. Other spaces have the benefit of simplicity and low installation cost due to no diffuser wiring. All spaces have the Therma-Fuser VAV advantages of comfort and energy savings from individual temperature control and easy adaptability to office changes. The BAS also monitors and controls the portions of the VAV system requiring periodic maintenance.



## Features

+ Comfort - Individual temperature control	✓
+ Comfort - Superior air distribution	✓
+ Energy - Energy saving system	✓
+ Sustainability - Adaptable system	✓
+ Sustainability - No diffuser maintenance	✓ <sup>1</sup>
+ BAS adjusts room temperature setpoints	✓ <sup>2</sup>

### NOTES:

- 10-year warranty on Therma-Fuser™ stand alone diffusers. (Not applicable to diffuser options and accessories.)
- Only on Therma-Fuser Motorized diffusers. (2-year warranty)
- Only on Therma-Fuser DC Interoperable diffusers. (2-year warranty)

## Inputs from BAS

## Outputs to BAS

### THERMA-FUSER SYSTEM OPTIONS

Room Temperature Setpoints\*  
(\*Only for select rooms)

### TYPICAL INDUSTRY CONTROL OPTIONS

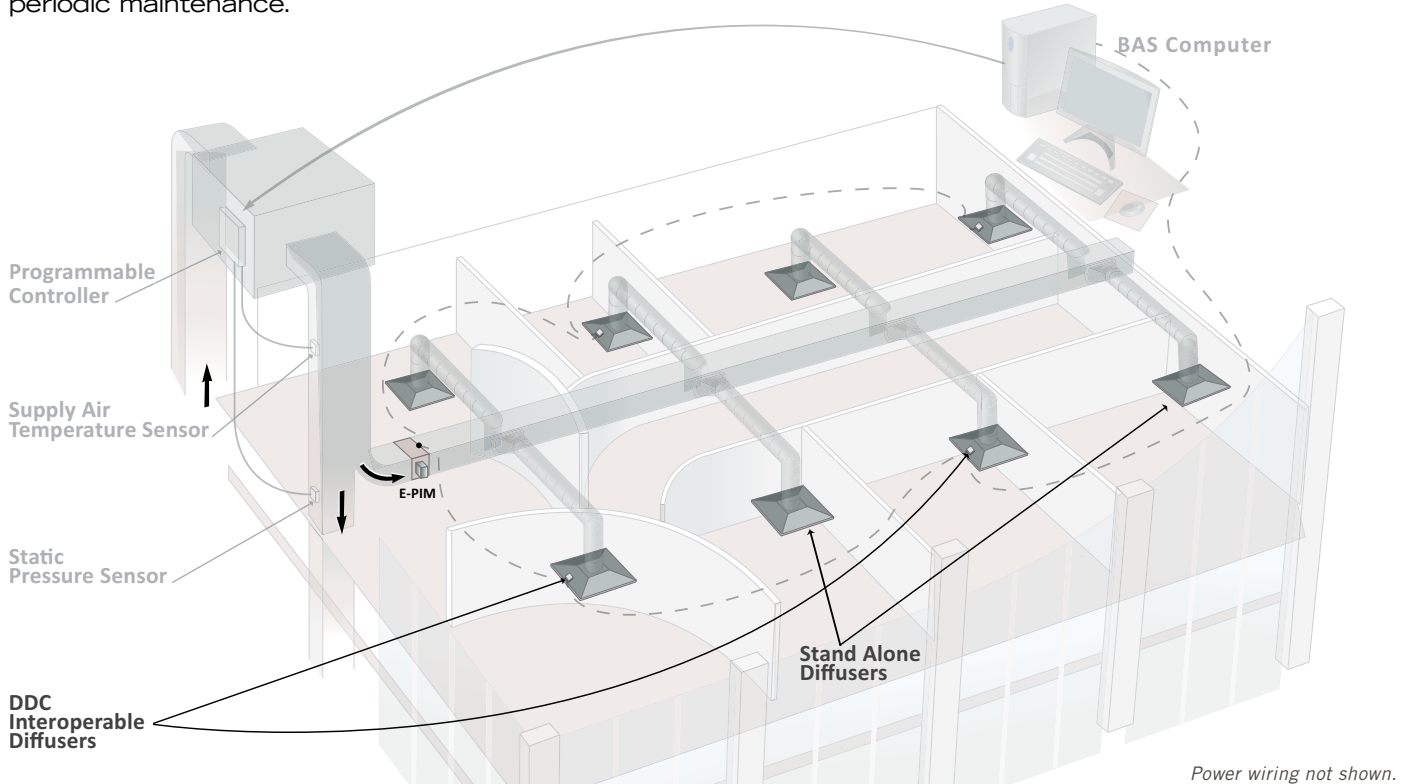
Occupancy Schedule  
Emergency Override  
Static Pressure Setpoint  
Discharge Air Cooling Setpoint  
Discharge Air Heating Setpoint  
Minimum Outdoor Air Setpoint

Discharge Air Temperature  
Static Pressure Mode  
Chilled Water Temperature  
Hot Water Temperature  
Supply Fan Capacity  
Exhaust Fan Capacity  
Return Air Capacity  
Economizer Enabled  
Outdoor Air Temperature  
Outdoor Air Damper Position  
Outdoor Airflow  
Return Air Temperature  
Mixed Air Temperature  
Space Temperature  
Filter Differential Pressure



# Option 6: Combination of Therma-Fuser stand alone + Therma-Fuser DDC interoperable diffusers

Achieve benefits of Therma-Fuser VAV, complete digital input and output with the BAS on selected diffusers and the simplicity of no wiring to the others. Key spaces are monitored and controlled by the BAS. Other spaces have the benefit of simplicity and low installation cost due to no diffuser wiring. All spaces have the Therma-Fuser VAV advantages of comfort and energy savings from individual temperature control and easy adaptability to office changes. The BAS also monitors and controls the portions of the VAV system requiring periodic maintenance.



## Features

+ Comfort - Individual temperature control	✓
+ Comfort - Superior air distribution	✓
+ Energy - Energy saving system	✓
+ Sustainability - Adaptable system	✓
+ Sustainability - No diffuser maintenance	✓ <sup>1</sup>
+ BAS monitors room air temperature	✓ <sup>3</sup>
+ BAS monitors and adjusts room temperature setpoints	✓ <sup>3</sup>
+ BAS monitors diffuser supply air temperature	✓ <sup>3</sup>
+ BAS monitors diffuser supply air volume	✓ <sup>3</sup>
+ Other BAS functions (see description)	✓ <sup>3</sup>

### NOTES:

- 10-year warranty on Therma-Fuser™ stand alone diffusers. (Not applicable to diffuser options and accessories.)
- Only on Therma-Fuser Motorized diffusers. (2-year warranty)
- Only on Therma-Fuser DC Interoperable diffusers. (2-year warranty)

## Inputs from BAS

## Outputs to BAS

### THERMA-FUSER SYSTEM OPTIONS

Room Temperature Setpoints\*  
 Room Minimum Airflow Setpoints\*  
 Room Maximum Airflow Setpoints\*  
 Override Open\*  
 Override Closed\*  
 CO<sup>2</sup> Override\*

(\*Only for select rooms)

Room Temperature Setpoints\*  
 Room Temperatures\*  
 Room Airflows\*  
 Room Supply Air Temperatures\*

(\*Only for select rooms)

### TYPICAL INDUSTRY CONTROL OPTIONS

Occupancy Schedule  
 Emergency Override  
 Static Pressure Setpoint  
 Discharge Air Cooling Setpoint  
 Discharge Air Heating Setpoint  
 Minimum Outdoor Air Setpoint

Discharge Air Temperature  
 Static Pressure Mode  
 Chilled Water Temperature  
 Hot Water Temperature  
 Supply Fan Capacity  
 Exhaust Fan Capacity  
 Return Air Capacity  
 Economizer Enabled  
 Outdoor Air Temperature  
 Outdoor Air Damper Position  
 Outdoor Airflow  
 Return Air Temperature  
 Mixed Air Temperature  
 Space Temperature  
 Filter Differential Pressure



For additional details on Therma-Fuser™ VAV system, Acutherm products or system design please contact our Engineering Department directly at (510) 785-0510 or [info@acutherm.com](mailto:info@acutherm.com).



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