

Accel® II valves with Theris® BACnet® valve controllers are specifically designed for healthcare critical space ventilation requirements where infection control, energy savings, and reduced maintenance costs are important considerations.

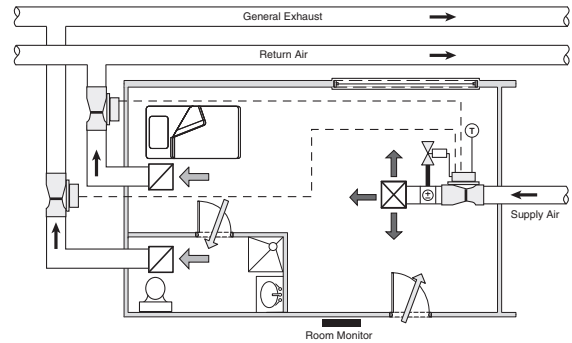
The Theris controller provides variable air volume (VAV) solutions for directional airflow, climate control, and overall ventilation balance.

System Benefits

- Factory characterization reduces system commissioning time.
- Pressure-independent valves avoid rebalancing costs.
- No flow sensors to maintain.
- High turndown ratios contribute to reducing energy costs.
- Room-level communication via BACnet® MS/TP.

PRODUCT MODELS

MODEL	DESCRIPTION
Theris TP	To meet the need of directional airflow, Theris-TP features tracking valve pairs that maintain a prescribed CFM offset enabling accurate space pressurization and complete room climate control.
Theris TX	For tracking pair applications in demanding spaces that require some additional features like humidity control and shut-off capabilities. TX also provides additional multi-use inputs to support a pressure sensor and valve alarming.
Theris TX-EXH	Along with many of the standard TX tracking pair features, TX-EXH provides the ability to locally control an additional exhaust valve without an additional controller (3 valves - 1 controller). This is an ideal solution for spaces that have an additional BSC or 2-state hood.
Theris TX-RTN	Similar feature set to the TX-EXH. The TX-RTN provides the ability to add an optional return valve (Ratio metric) without an additional controller (3 Valves - 1 controller). This is an ideal solution for common areas near a lab or for use in a lab being monitored by IAQ with pandemic switch.
Theris SO	In VAV applications where ducted exhaust is sufficient to meet local codes and engineering guidelines, Theris SO provides a cost effective main valve when no tracking valve is required.
Theris EO	Theris EO provides an additional exhaust valve with controller to allow 2 state LED control from a switch (Min or Max flow limits), shut-off and alarming for a 2 state hood, snorkel or Bio Safety Cabinet. This functionality also lends itself to green-Ready/red-Unoccupied indicator lights outside an OR.



Theris-TX-RTN Supply with Return and Exhaust Tracking

OSHPD Certified*

This device is certified for OSHPD Seismic Certification Preapproval per 2013 CBC, 2012 IBC, ASCE 7-10, and IEC-ES-AC-156. OSHPD Special Certification number OSP-0290-10.

NVLAP Accreditation

All venturi valves are characterized on NVLAP Accredited Airstations, Lab Code 200992-0. NVLAP is administered by the National Institute of Standards and Technology (NIST).

ISO

Phoenix Controls Designs, Develops, Manufactures, and sells products, systems, and service to control the environment and airflow of critical spaces. Phoenix Controls is registered to ISO 9001:2015.

Warranty

Phoenix Controls Warrants all venturi valves against defects in material and workmanship for a period of 5 years. In addition, all other equipment manufactured by Phoenix Controls, such as sash sensors, fume hood displays, and equipment supplied but not manufactured by Phoenix Controls is covered by a 3 year warranty.

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SPECIFICATIONS

Construction

- 16 ga. spun aluminum valve body with continuous welded seam
- Shaft bearings are polypropylene (Class A, B, and C) or PTFE Teflon (Class D)
- Spring grade stainless steel spring and PPS slider assembly
- Supply valves insulated with 3/8" (9.5 mm) flexible closed-cell polymer-based foam. Flame/smoke rating 25/50. Density is 1.5 lb/ft³ (24.0 kg/m³).

Operating Range

- 32-122 °F (0-50 °C) ambient
- 10-90% non-condensing RH

Performance

- Pressure independent over a 0.3"-3.0" WC (74-747 Pa) drop across valve.
- Volume control accurate to ±5% of airflow command signal.
- No additional straight duct runs needed before or after valve.
- Available in flows from 35-5000 CFM (59-8495 m³/hr).
- Response time to change in command signal:
 - Standard (Design A)
 - < 40 seconds: Control Type L
 - < 1 minute: Control Type H (with 60 Hz power) and I (except dual 14")
 - < 2 minutes: Control Type I on dual 14"
 - Shut-off (Designs S and L)
 - < 50 seconds: Control Type L
 - < 1.5 minute: Control Type H (with 60 Hz power) and I (except dual 14")
 - < 2.5 minutes: Control Type I on dual 14"
- Response time to change in duct static pressure: <1 second.

Power

- 24 Vac (±15%)
- Binary output loads:
 - TP, TX, TX-EXH, TX-RTN: 110 VA max
 - SO, EO: 80 VA max
- Power consumption (singles and duals)
 - SO, EO (one controller/one actuator): 10 VA
 - TP, TX (one controller/two actuators): 12 VA
 - TX-EXH, TX-RTN (one controller/three actuators): 15 VA

Notes:

1. All power consumption VA ratings listed here are based on fully-loaded I/O except for floating point reheat actuators.
2. VA ratings for floating point reheat actuators must be factored in separately.

Sound

Designed for low sound power levels to meet or exceed ASHRAE noise guidelines.

BACnet® Controller Inputs

See Available Inputs and Outputs tables to determine whether I/O is Field Configurable or Factory Configured.

THERIS TP/TX

- 11 universal inputs with 10-bit resolution
- 8 binary outputs - 24 VAC, 0.5 A
- 8 analog outputs with 8-bit resolution
 - Selectable 0-10 or 2-10 Vdc, or 4-20 mA
- Three 20 Vdc outputs - up to 100 mA of 20 Vdc to power trans devices or other devices

See chart on pages 4 and 7 for usage.

THERIS SO/EO

- 8 universal inputs with 10-bit resolution
- 5 binary outputs - 24 Vac, 0.5 A
- 3 analog outputs with 8-bit resolution
 - Selectable 0-10 or 2-10 Vdc, or 4-20 mA
- Two 20 Vdc outputs - up to 100 mA of 20 Vdc to power trans devices or other devices

See chart on pages 8 and 9 for usage.

Input Accuracy

Voltage, current, resistance: ±1% full scale

Output Accuracy

- 0 to 10 Vdc: ±1% full scale into 10 KΩ minimum
- 4 to 20 mA: ±1% full scale into 500 Ω +0/-50 Ω

Full Span Travel Time

- Standard (Design = A) valves
 - Control Type L: 40 seconds @ 50 or 60 Hz
 - Control Type H: 60 seconds @ 60 Hz; 70 seconds @ 50 Hz; Single 8, 10, and 12" only
 - Control Type I:
 - 60 seconds @ 50 or 60 Hz; All singles and 10 and 12" duals
 - 120 seconds @ 50 or 60 Hz; 14" duals
- Shut-off (Design = S or L) valves
 - Control Type L: 50 seconds @ 50 or 60 Hz
 - Control Type H: 90 seconds @ 60 Hz; 110 seconds @ 50 Hz; Single 8, 10, and 12"
 - Control Type I:
 - 90 seconds @ 50 or 60 Hz; All singles and 10 and 12" duals
 - 150 seconds @ 50 or 60 Hz; 14" duals I

Interoperability

- B-ASC level device
- BACnet® compliant on MS/TP LAN at up to 76.8 Kbps
- See Protocol Implementation Conformance Statement (PICS)



BACnet® is a registered trademark of ASHRAE

Regulatory Compliance



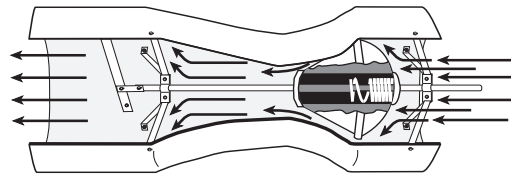
- RoHS
- FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

- EU Contact Address:
 - Pittway Tecnologica Srl
 - Via Caboto 19/3
 - 34147 Trieste TS
 - Italy

Pressure Independence



Unlike commercial controls using velocity pressure sensors mounted in the airstream, venturi valves are impervious to lint, dust, dirt, and sensor drift. Phoenix Controls Accel II valves continue to work even in the event of a power failure; ensuring correct room pressurization and directional airflow are maintained at all times.

Before valves leave the factory, every Theris valve controller's on-board microprocessor is downloaded with unique flow characterization coefficients for the supply and exhaust valves serving the installation. The controller uses this flow data to accurately control flow-tracking between the two or three valves, virtually eliminating the need for field calibration and rebalancing.

FEATURES

Feature	Model	Description
Pressure independence	All	CFM airflow maintained regardless of changes in duct static pressure.
No flow sensors	All	Factory flow characterization eliminates the need for flow sensors.
Airflow offset maintained	TP, TX, TX-EXH, TX-RTN	Supply and exhaust CFM offset settings maintain accurate pressurization.
Temperature and occupancy control	TP, TX, TX-EXH, TX-RTN, SO	Primary and secondary loops. Occupied or Unoccupied. Building Management System (BMS) or local set point input.
HVAC emergency modes	All	Four emergency modes available. Custom setup for each mode.
Multi-Use inputs	TP, TX (4 inputs) TX-EXH, TX-RTN (2 inputs)	<ul style="list-style-type: none"> Humidity Sensor (TX, TX-EXH, TX-RTN) Discharge Air Sensor (All) Local Offset Selection Switch (All) Emergency Switch (All) Additional Flow Input (All) <ul style="list-style-type: none"> Supply Flow Input (All) Exhaust Flow Input (All) Exhaust Flow 2 Command (TX-EXH) Pressure Monitoring (All) IAQ Control (TP, TX, TX-EXH) Local Cooling Override (All) Local Occupancy Sensor (All)
	SO (3 inputs) EO (5 inputs)	SO provides 3 Multi-Use Inputs. EO provides 5 Multi-Use Inputs. Multi-Use Inputs are selectable as follows: <ul style="list-style-type: none"> SO Only IAQ Control, Local Cooling Override, Local Occupancy Sensor SO and EO Additional Flow Input, Emergency Switch, Discharge Air Sensor, Pressure Sensor EO Only (Humidity, 3-Way Switch, Sash Switch)
Reheat (modulating)	TP, TX, TX-EXH, TX-RTN, SO	
Reheat (floating point)	TP, TX, TX-EXH, TX-RTN, SO	
Auxiliary temperature (modulating)	TP, TX, TX-EXH, TX-RTN	
Auxiliary temperature (two-state)	TP, SO	
Humidity control	TX, TX-EXH, TX-RTN	
Humidity monitoring	All except SO, TP	
Pressure monitoring	All	
Shut off	TX, TX-EXH, TX-RTN, EO	
IAQ Control	TP, TX, TX-EXH, SO	Volumetric IAQ sensor input
Zone Balance Control	TP, TX, TX-EXH, TX-RTN	<ul style="list-style-type: none"> Supply with tracking exhaust, constant volume, or additional supply or exhaust (TP, TX) Supply with tracking exhaust, locally controlled exhaust, constant volume, or additional supply or exhaust (TX-EXH) Supply with tracking exhaust, Ratio Metric RTN/Exhaust Control, constant volume, or additional supply or exhaust (TX-RTN)
Accommodates 2- or 3-state control switch with binary output status	EO	<ul style="list-style-type: none"> Normal Status (Green) Min Flow Status (Yellow) Shutoff/Alarm (Red)
Local Flow Control	EO TX-EXH (Exhaust 2)	Note: Local Cooling Override can be used on supply valves.

TP = Tracking pair VAV
 SO = Supply-only VAV
 EO = Exhaust-only VAV

TX = Enhanced tracking pair VAV
 TX-EXH = 3-valve set, tracking pair with locally controlled exhaust
 TX-RTN = 3-valve set, tracking pair with return valve

AVAILABLE INPUTS AND OUTPUTS

For Use With BACnet TP* Controllers

Type	Terminal #	I/O	Description / Function	Signal Format	Factory or Field Wired
Binary Input	1	BI 0	Momentary contact switch (Bypass Switch)	Dry contact	Field
Analog Input	3	AI 1	Room Temperature thermistor	Thermistor (Type 2)	Field
Analog Input	4	AI 2	Room temperature set point slider	0-20 K Ω	Field
Analog Input	6	AI 3	Multi-use input. Choose from options list below this table.	Selectable	Field
Analog Input	9	AI 4	Multi-use input. Choose from options list below this table.	Selectable	Field
Analog Input	11	AI 5	Supply valve vPot	0-5 Vdc	Factory
Binary Input	12	BI 6	Supply valve DP switch	Dry contact, open=alarm	Factory
Analog Input	14	AI 7	Exhaust valve vPot	0-5 Vdc	Factory
Binary Input	17	BI 8	Exhaust valve DP switch	Dry contact, open=alarm	Factory
Analog Input	19	AI 9	Multi-use input. Choose from options list below this table.	Selectable	Field
Analog Input	20	AI 10	Multi-use input. Choose from options list below this table.	Selectable	Field
Binary Output	27	BO 0	Supply valve FP actuator control CW (Close)	24 Vac Triac	Factory
Binary Output	29	BO 1	Supply valve FP actuator control CCW (Open)	24 Vac Triac	Factory
Binary Output	30	BO 2	Exhaust valve FP actuator control CW (Close)	24 Vac Triac	Factory
Binary Output	32	BO 3	Exhaust valve FP actuator control CCW (Open)	24 Vac Triac	Factory
Binary Output	34	BO 4	Auxiliary 2-state auxiliary Temperature Output	24 Vac Triac	Field
Binary Output	36	BO 5	Alarm (flashes on-off at 2-second intervals)	24 Vac Triac	Field
Binary Output	37	BO 6	Floating point reheat CW (Close)	24 Vac Triac	Field
Binary Output	39	BO 7	Floating point reheat CCW (Open)	24 Vac Triac	Field
Analog Output	40	AO 0	vPot reference voltage	5 Vdc	Factory
Analog Output	42	AO 1	Available for Modulating Reheat Actuator	0-10 or 2-10 Vdc, or 4-20 mA	Field
Analog Output	43	AO 2	Auxiliary Temperature Control (Modulating)	0-10 or 2-10 Vdc, or 4-20 mA	Field
Analog Output	45	AO 3	Total flow outputs (feedback) - Supply	0-10 Vdc	Field
Analog Output	46	AO 4	Total flow outputs - Exhaust	0-10 Vdc	Field
Analog Output	48	AO 5	Unavailable		
Analog Output	49	AO 6	Unavailable		
Analog Output	51	AO 7	Unavailable		

*The flow tracking function does not use any of the inputs or outputs in this table. For details, see the Wiring section of this document. Choose up to four of the following options. Assign a selection to either AI 3, AI 4, AI 9, or AI 10. Unused I/Os can be left unassigned.

- Discharge Temp Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Emergency Switch: Dry contact for Emergency Modes 1, 2, 3, 4
- Additional flow input: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA (Supply or Exhaust)
- Local Offset Selection Switch (Dry Contact)
- Pressure Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Local Cooling Override: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Local Occupancy Sensor (Dry Contact)
- IAQ Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA

AVAILABLE INPUTS AND OUTPUTS (CONTINUED)

For Use With BACnet TX* Controllers

Type	Terminal #	I/O	Description / Function	Signal Format	Factory or Field Wired
Binary Input	1	BI 0	Momentary contact switch (Bypass Switch)	Dry contact	Field
Analog Input	3	AI 1	Room Temperature thermistor	Thermistor (Type 2)	Field
Analog Input	4	AI 2	Room temperature set point slider	0-20 K Ω	Field
Analog Input	6	AI 3 ¹	Multi-use input. Choose from options list after this table.	Selectable	Field
Analog Input	9	AI 4 ¹	Multi-use input. Choose from options list after this table.	Selectable	Field
Analog Input	11	AI 5	Supply valve vPot	0-5 Vdc	Factory
Binary Input	12	BI 6	Supply valve DP switch	Dry contact, open=alarm	Factory
Analog Input	14	AI 7	Exhaust1 valve vPot	0-5 Vdc	Factory
Binary Input	17	BI 8	Exhaust1 valve DP switch	Dry contact, open=alarm	Factory
Analog Input	19	AI 9	Multi-use input. Choose from options list below this table.	Selectable	Field
Binary Input	20	AI 10	Multi-use input. Choose from options list below this table.	Selectable	Field
Binary Output	27	BO 0	Supply valve FP actuator control CW (Close)	24 Vac Triac	Factory
Binary Output	29	BO 1	Supply valve FP actuator control CCW (Open)	24 Vac Triac	Factory
Binary Output	30	BO 2	Exhaust1 valve FP actuator control CW (Close)	24 Vac Triac	Factory
Binary Output	32	BO 3	Exhaust1 valve FP actuator control CCW (Open)	24 Vac Triac	Factory
Binary Output	34	BO 4	Supply Shut-off/Alarm	24 Vac Triac	Field
Binary Output	36	BO 5	Exhaust Shut-off/Alarm	24 Vac Triac	Field
Binary Output	37	BO 6	Floating point reheat CW (Close)	24 Vac Triac	Field
Binary Output	39	BO 7	Floating point reheat CCW (Open)	24 Vac Triac	Field
Analog Output	40	AO 0	vPot reference voltage	5 Vdc	Factory
Analog Output	42	AO 1	Available for Modulating Reheat Actuator	0-10 or 2-10 Vdc, or 4-20 mA	Field
Analog Output	43	AO 2	Auxiliary Temperature Control (Modulating)	0-10 or 2-10 Vdc, or 4-20 mA	Field
Analog Output	45	AO 3	Total flow outputs (feedback) - Supply	0-10 Vdc	Field
Analog Output	46	AO 4	Total flow outputs - Exhaust	0-10 Vdc	Field
Analog Output	48	AO 5	Unavailable		
Analog Output	49	AO 6	Available for humidification (modulating)	0-10 or 2-10 Vdc, or 4-20 mA	Field
Analog Output	51	AO 7	Available for dehumidification (modulating)	0-10 or 2-10 Vdc, or 4-20 mA	Field

*The flow tracking function does not use any of the inputs or outputs in this table. For details, see the Wiring section of this document.

1. Choose from the following options. Assign a selection to AI 3, AI 4, AI 9, or AI 10. Unused I/Os can be left unassigned.

- Pressure Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Humidity Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Discharge Temp Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Emergency Switch: Dry Contact for Emergency Modes 1, 2, 3, 4
- Additional flow input: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA (Supply, Exhaust)
- IAQ Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Local Offset Selection Switch (Dry Contact)
- Local Cooling Override: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Local Occupancy Sensor (Dry Contact)

AVAILABLE INPUTS AND OUTPUTS (CONTINUED)

For Use With BACnet TX-EXH* Controllers

Type	Terminal #	I/O	Description / Function	Signal Format	Factory or Field Wired
Binary Input	1	BI 0	Momentary contact switch (Bypass Switch)	Dry contact	Field
Analog Input	3	AI 1	Room Temperature thermistor	Thermistor (Type 2)	Field
Analog Input	4	AI 2	Room temperature set point slider	0-20 K Ω	Field
Analog Input	6	AI 3 ¹	Multi-use input. Choose from options list below this table.	Selectable	Field
Analog Input	9	AI 4 ¹	Multi-use input. Choose from options list below this table.	Selectable	Field
Analog Input	11	AI 5	Supply valve vPot	0-5 Vdc	Factory
Binary Input	12	BI 6	Supply valve DP switch	Dry contact, open=alarm	Factory
Analog Input	14	AI 7	Exhaust1 valve vPot	0-5 Vdc	Factory
Binary Input	17	BI 8	Exhaust1 valve DP switch	Dry contact, open=alarm	Factory
Analog Input	19	AI 9	Exhaust2 valve vPot	0-5 Vdc	Factory
Binary Input	20	BI 10	Exhaust2 valve DP switch	Dry contact, open=alarm	Factory
Binary Output	27	BO 0	Supply valve FP actuator control CW (Close)	24 Vac Triac	Factory
Binary Output	29	BO 1	Supply valve FP actuator control CCW (Open)	24 Vac Triac	Factory
Binary Output	30	BO 2	Exhaust1 valve FP actuator control CW (Close)	24 Vac Triac	Factory
Binary Output	32	BO 3	Exhaust1 valve FP actuator control CCW (Open)	24 Vac Triac	Factory
Binary Output	34	BO 4	Exhaust2 valve FP actuator control CW (Close)	24 Vac Triac	Factory
Binary Output	36	BO 5	Exhaust2 valve FP actuator control CCW (Open)	24 Vac Triac	Factory
Binary Output	37	BO 6	Floating point reheat CW (Close)	24 Vac Triac	Field
Binary Output	39	BO 7	Floating point reheat CCW (Open)	24 Vac Triac	Field
Analog Output	40	AO 0	vPot reference voltage	5 Vdc	Factory
Analog Output	42	AO 1	Available for Modulating Reheat Actuator	0-10 or 2-10 Vdc, or 4-20 mA	Field
Analog Output	43	AO 2	Auxiliary Temperature Control (Modulating)	0-10 or 2-10 Vdc, or 4-20 mA	Field
Analog Output	45	AO 3	Total flow outputs (feedback) - Supply	0-10 Vdc	Field
Analog Output	46	AO 4	Total flow outputs - Exhaust1	0-10 Vdc	Field
Analog Output	48	AO 5	Total flow outputs - Exhaust2	0-10 Vdc	Field
Analog Output	49	AO 6	Available for modulating humidification	0-10 or 2-10 Vdc, or 4-20 mA	Field
Analog Output	51	AO 7	Available for modulating dehumidification	0-10 or 2-10 Vdc, or 4-20 mA	Field

*The flow tracking function does not use any of the inputs or outputs in this table. For details, see the Wiring section of this document.

1. Choose from the following options. Assign a selection to AI 3 or AI 4. Unused I/Os can be left unassigned.

- Pressure Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Humidity Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Discharge Temp Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Emergency Switch: Dry Contact for Emergency Modes 1, 2, 3, 4
- Additional flow input: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA (Supply, Exhaust)
- Exhaust2 Local Flow Command: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, 4-20 mA, or Dry Contact
- IAQ Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Local Offset Selection Switch (Dry Contact)
- Local Cooling Override: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Local Occupancy Sensor (Dry Contact)

AVAILABLE INPUTS AND OUTPUTS (CONTINUED)

For Use With BACnet TX-RTN* Controllers

Type	Terminal #	I/O	Description / Function	Signal Format	Factory or Field Wired
Binary Input	1	BI 0	Momentary contact switch (Bypass Switch)	Dry contact	Field
Analog Input	3	AI 1	Room Temperature thermistor	Thermistor (Type 2)	Field
Analog Input	4	AI 2	Room temperature set point slider	0-20 K Ω	Field
Analog Input	6	AI 3	Multi-use. Choose from options list below this table.	Selectable	Field
Analog Input	9	AI 4	Multi-use. Choose from options list below this table.	Selectable	Field
Analog Input	11	AI 5	Supply valve vPot	0-5 Vdc	Factory
Binary Input	12	BI 6	Supply valve DP switch	Dry contact, open=alarm	Factory
Analog Input	14	AI 7	Exhaust valve vPot	0-5 Vdc	Factory
Binary Input	17	BI 8	Exhaust valve DP switch	Dry contact, open=alarm	Factory
Analog Input	19	AI 9	Return Air valve vPot	0-5 Vdc	Factory
Binary Input	20	BI 10	Return Air valve DP switch	Dry contact, open=alarm	Factory
Binary Output	27	BO 0	Supply valve FP actuator control CW (Close)	24 Vac Triac	Factory
Binary Output	29	BO 1	Supply valve FP actuator control CCW (Open)	24 Vac Triac	Factory
Binary Output	30	BO 2	Exhaust valve FP actuator control CW (Close)	24 Vac Triac	Factory
Binary Output	32	BO 3	Exhaust valve FP actuator control CCW (Open)	24 Vac Triac	Factory
Binary Output	34	BO 4	Return Air valve FP actuator control CW (Close)	24 Vac Triac	Factory
Binary Output	36	BO 5	Return Air valve FP actuator control CCW (Open)	24 Vac Triac	Factory
Binary Output	37	BO 6	Floating point reheat CW (Close)	24 Vac Triac	Field
Binary Output	39	BO 7	Floating point reheat CCW (Open)	24 Vac Triac	Field
Analog Output	40	AO 0	vPot reference voltage	5 Vdc	Factory
Analog Output	42	AO 1	Available for Modulating Reheat Actuator	0-10 or 2-10 Vdc, or 4-20 mA	Field
Analog Output	43	AO 2	Auxiliary Temperature Control (Modulating)	0-10 or 2-10 Vdc, or 4-20 mA	Field
Analog Output	45	AO 3	Total flow outputs (feedback) - Supply	0-10 Vdc	Field
Analog Output	46	AO 4	Total flow outputs - Exhaust	0-10 Vdc	Field
Analog Output	48	AO 5	Total flow outputs - Return	0-10 Vdc	Field
Analog Output	49	AO 6	Available for humidification (modulating)	0-10 or 2-10 Vdc, or 4-20 mA	Field
Analog Output	51	AO 7	Available for dehumidification (modulating)	0-10 or 2-10 Vdc, or 4-20 mA	Field

* The flow tracking function does not use any of the inputs or outputs above. For more details, see the Wiring section of this document. Choose from the following options. Assign a selection to AI 3 or AI 4. Unused I/Os can be left unassigned.

- Pressure Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Humidity Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Discharge Temp Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Pandemic Switch: Dry Contact
- Emergency Switch: Dry Contact for Emergency Modes 1, 2, 3, 4
- Additional flow input: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA (Supply, Exhaust, Return)
- Local Offset Selection Switch (Dry Contact)
- Local Cooling Override: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Local Occupancy Sensor (Dry Contact)

AVAILABLE INPUTS AND OUTPUTS (CONTINUED)

For Use With BACnet SO Controllers

Type	Terminal #	I/O	Description / Function	Signal Format	Factory or Field Wired
Binary Input	1	BI 0	Momentary contact switch (Bypass Switch)	Dry contact	Field
Analog Input	3	AI 1	Room temperature thermistor	Thermistor (Type 2)	Field
Analog Input	4	AI 2	Room temperature set point slider	0-20K Ω	Field
Analog Input	6	AI 3	Multi-use input 1. Choose from options list below this table.	Selectable	Field
Analog Input	7	BI 4	Multi-use input 2. Choose from options list below this table.	Selectable	Field
Analog Input	10	AI 5 ¹	Supply valve vPot	0-5 Vdc	Factory
Binary Input	12	BI 6	Supply valve DP switch	Dry contact, open=alarm	Factory
Analog Input	13	AI 7	Multi-use input 3. Choose from options list below this table.	Selectable	Field
Binary Output	21	BO 0	Supply valve FP actuator control CW (Close)	24 Vac Triac	Factory
Binary Output	23	BO 1	Supply valve FP actuator control CCW (Open)	24 Vac Triac	Factory
Binary Output	24	BO 2	Floating point re-heat CW (Close)	24 Vac Triac	Field
Binary Output	26	BO 3	Floating point re-heat CCW (Open)	24 Vac Triac	Field
Binary Output	27	BO 4	Auxiliary temperature control (2-state)	24 Vac Triac	Field
Analog Output	29	AO 0	vPot reference voltage	5 Vdc	Factory
Analog Output	31	AO 1	Available for Modulating Reheat Actuator	0-10 or 2-10 Vdc, or 4-20 mA	Field
Analog Output	33	AO 2	Total Flow Output (supply feedback)	0-10 Vdc	Field

Choose from the following options. Assign the selection to either AI 3, AI 4, AI 7.

- IAQ Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Discharge Temp Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Additional Flow Input (Supply): 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Pressure Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Local Cooling Override: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Local Occupancy Sensor (Dry Contact)
- Emergency Modes 1, 2, 3, 4 (Dry Contact)

AVAILABLE INPUTS AND OUTPUTS (CONTINUED)

For Use With BACnet EO Controllers

Type	Terminal #	I/O	Description / Function	Signal Format	Factory or Field Wired
Binary Input	1	BI 0	Multi-Use Input 1. Choose from options list below this table.	Selectable*	Field
Analog Input	3	AI 1	Multi-Use Input 2. Choose from options list below this table.	Selectable	Field
Analog Input	4	AI 2	Multi-Use Input 3. Choose from options list below this table.	Selectable	Field
Analog Input	6	AI 3	Multi-Use Input 4. Choose from options list below this table.	Selectable	Field
Analog Input	7	AI 4	Multi-Use Input 5. Choose from options list below this table.	Selectable	Field
Analog Input	10	AI 5	Exhaust Valve vPot	0-5 Vdc	Factory
Analog Input	12	AI 6	Exhaust Valve DP Switch	Dry Contact Open = Alarm	Factory
Analog Input	13	AI 7	Local Flow Command	0-10 Vdc	Field
Binary Output	21	BO 0	Exhaust valve FP actuator control CW (Close)	24 Vac Triac	Factory
Binary Output	23	BO 1	Exhaust valve FP actuator control CCW (Close)	24 Vac Triac	Factory
Binary Output	24	BO 2	Normal Operation	24 Vac Triac	Field
Binary Output	26	BO 3	Minimum Flow	24 Vac Triac	Field
Binary Output	27	BO 4	Shut-Off/ Alarm Shut-off = ON if active. Alarm = flashes on-off at 2-second intervals.	24 Vac Triac	Field
Analog Output	29	AO 0	vPot Reference Voltage	5 Vdc	Factory
Analog Output	31	AO 1	Unused		
Analog Output	33	AO 2	Total Flow Output (Total Exhaust feedback)	0-10 Vdc	Field

*Dry Contact ONLY.

Choose from the following options, Assign a selection to either - AI 1, AI 2, AI 3, or AI 4. Unused I/O's can be left unassigned.

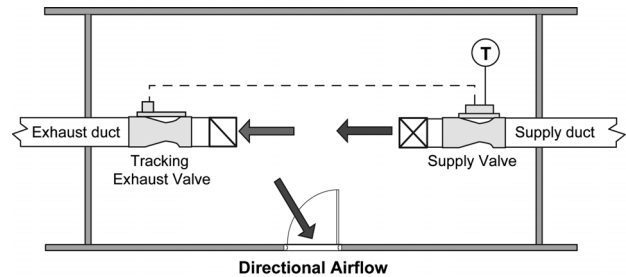
- Emergency Modes 1, 2, 3, 4 (Dry Contact)
- Humidity Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Discharge Temp Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Additional flow input: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA (Exhaust)
- Pressure Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA
- Tri-State Mode (Min, Max, Shutoff): Dry Contact, requires BI0 and AI1.
- IAQ Sensor: 0-5 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mA

APPLICATIONS

Theris TP VAV Isolation or Patient Room

VAV Tracking Pair - One Supply and One Exhaust Valve

This patient room has Theris-TP valve controllers on the supply and exhaust sides. Supply and exhaust both track airflow rates to maintain room pressure and offset. The Theris-TP supply controller can have an associated temperature sensor and control a hot water valve, as well as a second stage of heating, if needed. An optional duct temperature sensor can be placed in the ductwork on either the supply or exhaust side to monitor or control temperature.

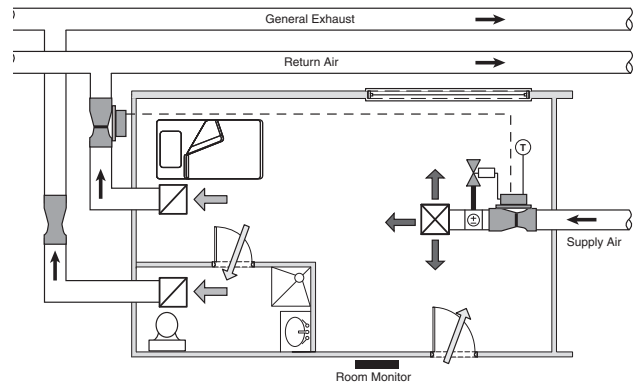


Theris TX Enhanced VAV Tracking Pair

Operating Rooms and Other Critical Pressurized Spaces

A single Theris TX tracking pair can be used in a patient room, isolation room, operating room, or other critical healthcare space. The Theris TX valve controller has sufficient I/O for the room pressure monitoring and humidity control used in operating suites.

In the example to the right, Theris tracking pair valves control the patient room while a Phoenix Controls constant volume valve exhausts the bathroom. Refer to MKT-0274 and MKT-0278 for details on Phoenix Controls constant volume valves.

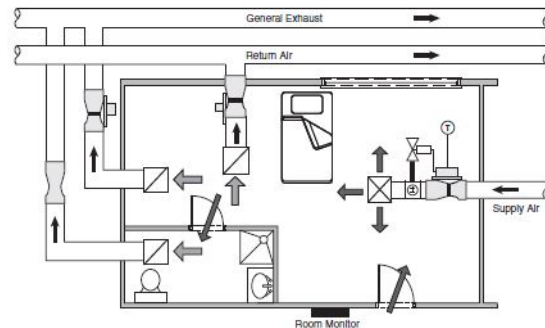


Theris TX-RTN Enhanced Tracking Pair

Pandemic-Ready Patient Room

A single bed patient room can be converted to an isolation room on-demand in the event of a pandemic incident. On the exhaust side, this is done by designating one valve for return air and a second valve for exhaust to outdoor air. Three Theris valves serve the patient room while a Phoenix Controls constant volume valve exhausts the bathroom. Refer to MKT-0274 and MKT-0278 for details on Phoenix Controls constant volume valves.

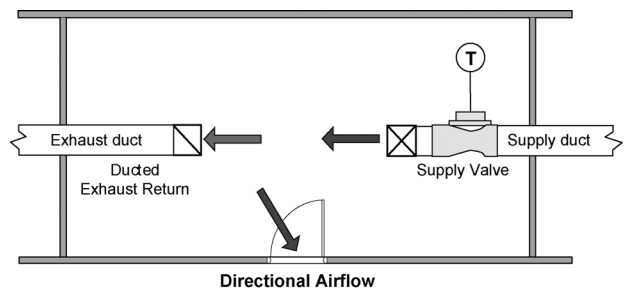
Under normal patient use, the exhaust air valve is in shut-off position and the return air valve tracks the supply valve to maintain neutral offset condition to the corridor. In pandemic mode, a panic button on the floor or BMS command initiates an emergency mode sequence which drives the return air valve to shut-off position and opens the exhaust air valve to a flow that achieves negative room offset.



Theris SO VAV Patient Room

Standalone Supply with Ducted Return

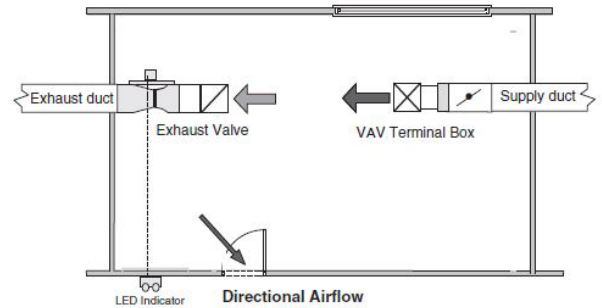
This patient room has standalone Theris-SO valve controller on the supply side valve and ducted return on the exhaust side. The Theris-SO valve controller can have an associated temperature sensor and control a hot water valve. An optional temperature sensor can be placed in the ductwork to monitor duct temperature either on the supply or exhaust side.



Theris EO

Standalone Exhaust

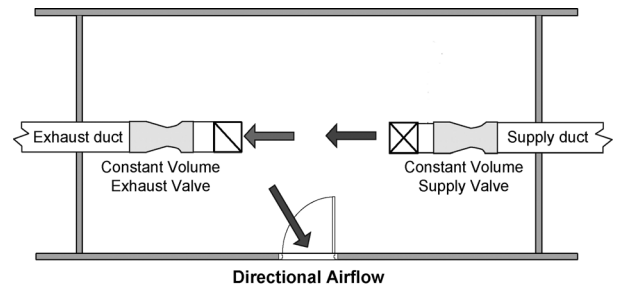
This patient room has a standalone Theris-EO valve controller on the exhaust side. An optional temperature sensor can be placed in the duct work to monitor duct temperature. In a healthcare setting, EO can be used as a direct replacement for VAV terminal boxes to address the problem of clogging cross flow sensors. An LED can also be used to signal via an indicator light outside the door whether the room is in low-flow Unoccupied mode (red) or a higher flow Occupied mode (green).



Constant Volume Patient Room

Constant Volume with Supply and Exhaust

This patient room has Phoenix Controls constant volume valves on both the supply and exhaust. Temperature control can be managed by a separate controlling thermostat. Equipment can be set and left alone. No maintenance is required and valve will keep these flow settings indefinitely. Refer to MKT-0274 and MKT-0278 for details on Phoenix Controls constant volume valves.



ORDERING GUIDE

HSV A 2 10 M - A I B H Z - PSL

VALVE FAMILY

HSV = Theris Supply valve
(comes standard with insulation)
HEV = Theris Exhaust valve

VALVE CONSTRUCTION

A = Body and cone uncoated aluminum;
shaft uncoated 316 stainless steel

NUMBER OF VALVE BODIES

F = One valve body with welded circular flanges
1 = One valve body, no flange
2 = Two valve bodies as one unit (dual); *available for 10", 12" and 14" valves only*

VALVE SIZE

08 = 8" valve (7.88"/200mm actual diameter); *see Note 1*
10 = 10" valve (9.67"/246mm actual diameter)
12 = 12" valve (11.84"/301mm actual diameter)
14 = 14" valve (13.88"/353mm actual diameter); *see Note 2*

FLOW/PRESSURE OPERATING RANGE

See the *Flow/Pressure Operating Range* tables in this section.
M = Medium pressure operation; pressure independent over a range of 0.6 to 3.0" WC (150 to 750 Pa),
L = Low pressure operation; pressure independent over a range of 0.3 to 3.0" WC (75 to 750 Pa)

VALVE OPTIONS

EVI = Exhaust valve with insulation and blocks
IBO = Insulation blocks only, no insulation
PSL = Pressure switch, low limit
REI = Remote electronics - indoor; *see Note 5*
SFB = Square flanges on both ends of bodies = 1
SFD = Single square flange on discharge of bodies = 1 (supply or exhaust)
SFI = Single square flange on inlet of bodies = 1 (supply or exhaust)

FAIL SAFE POSITION

Z = Fails to last position

VALVE ORIENTATION

H = Horizontal
U = Vertical upflow
D = Vertical downflow

VALVE CONTROLLER DESIGNATION

A = Theris TP Supply (controlling valve of tracking pair)
B = Theris TX Supply (controlling valve of tracking pair with expanded features)
C = Theris SO Supply only (no tracking pair ability); *available on supply or exhaust*
D = Theris EO Exhaust only (no tracking pair ability); *available on exhaust or supply*
Y = Theris TX-RTN (supply controlling primary exhaust and return valves)
Z = Theris TX-EXH (supply controlling primary exhaust and locally controlled exhaust)
N = No electronics (tracking valve)

CONTROL TYPE

H = Rotary, low-speed electric actuator; NEMA 1; on single 8", 10", and 12" only
I = Rotary, low-speed electric actuator; IP54
L = Rotary, low-speed electric actuator; IP56

VALVE DESIGN

A = Conical-shaped diffuser
S = Standard shut-off valve (metal-on-metal seal): TX, TX-EXH, TX-RTN, or EO; *see Note 3*
L = Low-leakage shut-off valve (gasketed seal): TX, TX-EXH, TX-RTN, or EO; *see Note 4*

NOTES:

- 8-inch Shut-off Valves (Design = S or L) are available ONLY in Construction A (uncoated).
- 14-inch Valves are currently NOT available as Low Leakage Shut-off (Design = L) with Medium Pressure (Range = M).
- Low Pressure (Range = L), Standard Shut-off (Design = S) valves are NOT available in Orientation = U (vertical upflow).
- Low Pressure (Range = L), Low Leakage (Design = L) valves are currently NOT available in any size.
- Option REI: Remote Electronics, Indoor installations ONLY. The distance to the valve controller is limited to: 150 feet (45.7 meters) of 22 gauge cable for low-speed electric actuators (Control Type = H, I, or L).

ORDERING GUIDE (CONTINUED)

Flow/Pressure Operating Range Tables

FLOW/PRESSURE OPERATING RANGE FOR VALVE DESIGN A

Designation	Size	Operating Range in CFM (m ³ /hr)		Pressure Drop Across Valve
		Single	Dual	
M = Medium pressure	08"	35-700 (60-1185)	—	0.6-3.0" WC (150-750 Pa)
	10"	50-1000 (85-1695)	100-2000 (170-3390)	
	12"	90-1500 (155-2545)	180-3000 (310-5090)	
	14"	200-2500 (340-4245)	400-5000 (680-8490)	
L = Low pressure	08"	35-500 (60-845)	—	0.3-3.0" WC (75-750 Pa)
	10"	50-550 (85-930)	100-1100 (170-1860)	
	12"	90-1050 (155-1780)	180-2100 (310-3560)	
	14"	200-1400 (340-2375)	400-2800 (680-4750)	

FLOW/PRESSURE OPERATING RANGE FOR SHUT-OFF VALVE DESIGNS S AND L

Designation	Size	Operating Range in CFM (m ³ /hr)		Pressure Drop Across Valve
		Single	Dual	
M = Medium Pressure	08"	35-600 (60-1015)	—	0.6-3.0" WC (150-750 Pa)
	10"	50-850 (85-1440)	100-1700 (170-2880)	
	12"	90-1300 (155-2205)	180-2600 (310-4410)	
	14"	200-1600 (340-2715)	400-3200 (680-5430)	
L = Low Pressure	08"	35-400 (60-675)	—	0.3-3.0" WC (75-750 Pa)
	10"	50-450 (85-760)	100-900 (170-1520)	
	12"	90-900 (155-1525)	180-1800 (310-3050)	
	14"	200-1000 (340-1695)	400-2000 (680-3390)	