EL Therma-Fuser™

Interoperable Linear Slot VAV Diffuser

acutherm™
Therma-Fuser™ Systems

Models: **EL-B** Interoperable with BACnet™
EL-L Interoperable with LonTalk®

EL: Product Overview
FORM 095.101 Rev 1401

BENEFITS AT A GLANCE.

SPECIFICALLY DESIGNED FOR INTEROPERABILITY

The EL provides more information about what's happening in the space than any other VAV terminal because it monitors load, supply air temperature and flow at each diffuser. Native BACnet™ BTL® Listed or LonMark® compliance ensures that the EL will exchange data with products from other vendors on any LonWorks® or BACnet™ DDC building control network. Interoperability with other control networks is easy using gateways by other manufacturers.

Features

+ **Comfort** - Individual temperature control	✓
+ **Comfort** - Superior air distribution	✓
+ **Energy** - Energy saving system	✓
+ **Sustainability** - Adaptable system	✓
+ **BAS** room air temperature output to BAS	✓
+ **BAS** room temperature setpoints adjustable by BAS	✓
+ **BAS** diffuser supply air temperature output to BAS	✓
+ **BAS** diffuser supply air volume output to BAS	✓

BACnet BTL Testing Laboratories

LonMark 3.2

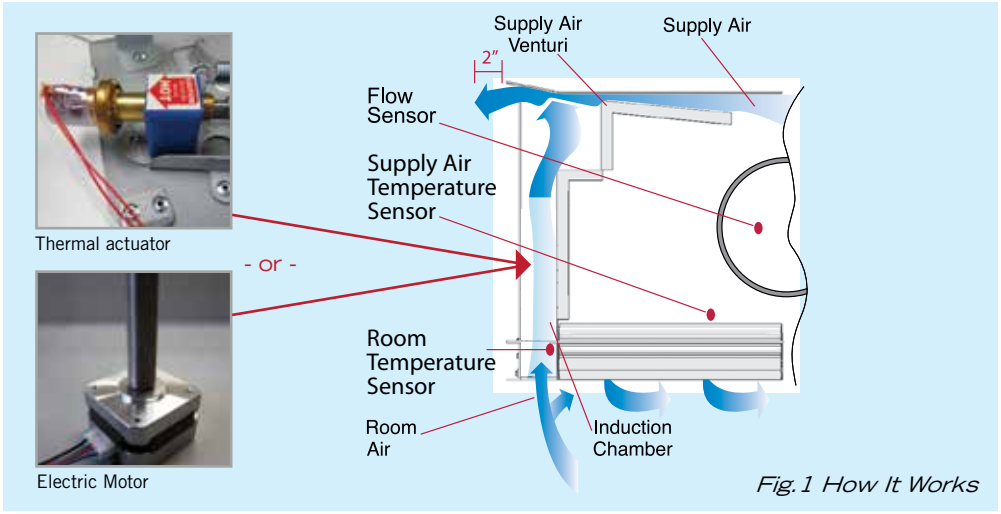


Fig. 1 How It Works

HOW IT WORKS

Model EL Therma-Fuser diffusers are linear slot ceiling diffusers with built in DDC controller, temperature sensors, flow sensors and VAV damper. Damper blade(s) open and close to meter air flow (hot or cold) into the room in response to room temperature. The damper(s) are modulated by a thermal actuator.

Thermal actuators, used for reliability and low maintenance, have a piston in a cylinder wrapped with a resistance heater. The cylinder is filled with petroleum wax which, when heated by the resistance heater, expands to push out the piston. When heat is stopped the wax rapidly cools and contracts and the piston retracts. The thermal actuator piston is precisely positioned with a variable DC signal to the resistance heater from the DDC controller.

Electric motors deliver a deliberate response for control of room temperature and, when required, a quick response to commands. The electric motor directly drives a threaded shaft connected with a linkage to the damper eliminating a failure prone gear box. The electric motor has been rigorously tested and will provide many years of reliable service.

The controller uses an 'expert system' control similar to having an "expert" sitting there making the adjustments. Unlike PID control, 'expert system' control does not require field tuning. Every 10 seconds it determines if the flow should be adjusted and the amount of any adjustment based on temperature relationships and both the rate and direction of change of flow.

ROOM AIR SENSING

As with all diffusers, air circulates around the room in a circular motion. Secondary air rises under the diffuser, passes beneath the diffuser and entrains with the primary air at the outside edge of the diffuser. This secondary air best represents average room temperature.

To monitor average room temperature, a continuous sample of secondary air is drawn up into the induction chamber and over the room temperature sensor by the action of a venturi fed by supply air. This venturi is located at the top of the induction chamber. A properly applied EL will hold the room average within 1.5˚F/0.9˚C of the temperature selected.

COOLING & HEATING MODES

In the cooling mode, the damper blade(s) open on a rise in room temperature. In the heating mode the operation is reversed with the damper blade(s) closing on a rise in room temperature. Determination of cooling/heating mode is made automatically by comparing supply air temperature to room temperature and set point. The diffuser is in the heating mode if the supply air temperature is warmer than **both** the room temperature and set point. The diffuser is in the cooling mode if the supply air temperature is cooler than **either** the room temperature or set point. The automatic selection of the heating/cooling mode can be overridden through the BAS.

FLOW MEASUREMENT

The radius of the inlet elbow or direction of the supply air duct will bias the air flow out of a diffuser. To minimize any inlet effect, the EL uses a plenum boot to distribute the air along the length of the slot with the flow sensor located near the middle of the slot Heated thermistor flow sensors are used to provide accurate and maintenance free measurements.

STANDARD OPEN COMMUNICATION PROTOCOLS

The EL is available with either BACnet™ or LonTalk® standard open communication protocol to make interoperability easier and simplify integration with building automation systems.

BACnet™

Native BACnet™ to ANSI/ASHRAE Standard 135

BTL® Tested and Listed.

BACnet™ MS/TP three wire daisy chain network connection.

LonTalk®

LonMark® 3.2 Certification

LonMark® Functional Profile ID:8010 conformance

Free Topology FTT-10 two wire daisy chain, star or bus network connection.

CONFIGURABLE VARIABLES / OBJECTS

Measurements
- Room Temperature
- Supply Air Temperature
- Air Flow

Set Points
- Separate cooling and heating set points in each occupancy mode
- Offset for temporary vacancy (for example, lunch break)
- Set limit on range of adjustment
- Reset on occupancy mode

Mode Settings
- Occupancy modes; Occupied, Unoccupied and Standby
- VAV heating and cooling modes
- Vacancy modes

Flow Settings
- Maximum flow
- Minimum flow
- Minimum flow standby
- Maximum flow heating only

Overrides
- All built in sensors from external values
- Damper position; open, closed or flow setting

Special Features
- Interface with CO2 sensor (by others) and purge room
- Terminal load

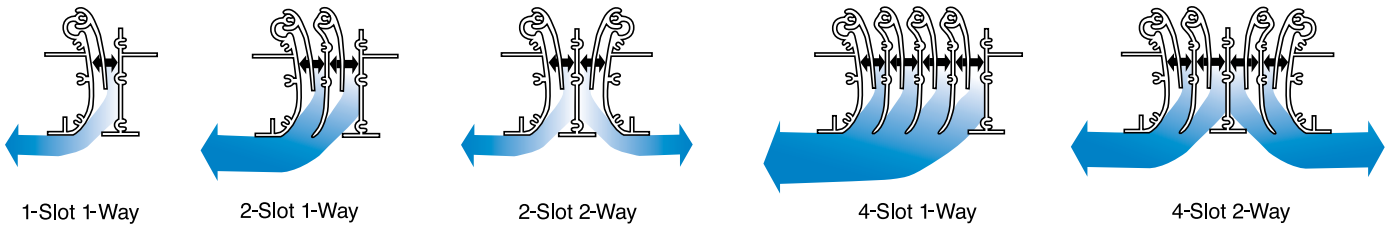
SUPPLY POWER

24VAC +3/-1, 10VA Max (18VA on some models)

OPEN FOR BALANCING

An EL with a thermal motor ships with stop(s) holding open the damper blade(s. An EL with an electric motor ships in the open position allowing the EL to be balanced prior to connection of power and network.

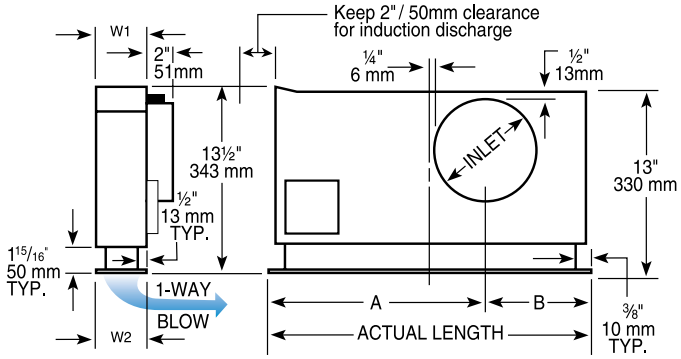
LINEAR SLOT ARRANGEMENTS:



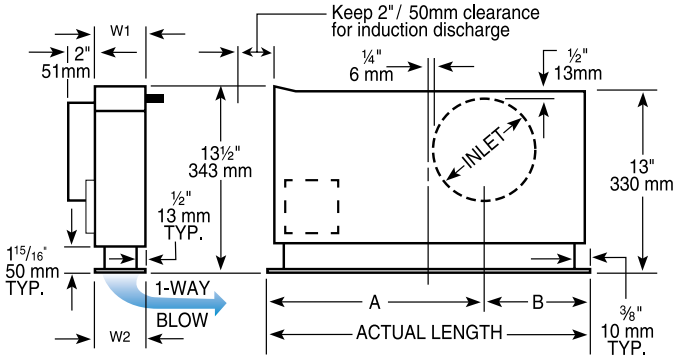
1-Slot 1-Way | 2-Slot 1-Way | 2-Slot 2-Way | 4-Slot 1-Way | 4-Slot 2-Way

DIMENSIONS:

STANDARD INLET - One-way blow diffusers blow toward the same side with the inlet.



OPPOSITE INLET - One-way blow diffusers blow away from the side with the inlet.



←INLET→ Contact Acutherm for dimensions of rectangular top inlet.

Matching returns also available.

ONE- AND TWO-SLOT								
Nominal length	Actual length*	Inlet	A	B	W1	1-Slot 1-Way	2-Slot 1-Way	2-Slot 2-Way
24	23¾ in 603mm	5⅞ in 150mm	15 1/16 in 382mm	8 11/16 in 221mm	4 in 102mm	2 9/16in 65mm	3¾in 95mm	4 in 102mm
36	35¾ in 908mm	5⅞ in 150mm	21 1/16 in 535mm	14 11/16 in 373mm	4 in 102mm	2 9/16in 65mm	3¾in 95mm	4 in 102mm
48	47¾ in 1213mm	7⅞ in 200mm	28 1/16 in 713mm	19 11/16 in 500mm	4 in 102mm	2 9/16in 65mm	3¾in 95mm	4 in 102mm
60	59¾ in 1518mm	7⅞ in 200mm	34 1/16 in 865mm	25 11/16 in 653mm	4 in 102mm	2 9/16in 65mm	3¾in 95mm	4 in 102mm

FOUR-SLOT							
Nominal length	Actual length*	Inlet	A	B	W1	4-Slot 1-Way	4-Slot 2-Way
24	23¾ in 603mm	7⅞ in 200mm	15 1/16 in 382mm	8 11/16 in 221mm	6 5/16in 160mm	6 in 153mm	6⅜in 162mm
36	35¾ in 908mm	7⅞ in 200mm	21 1/16 in 535mm	14 11/16 in 373mm	6 5/16in 160mm	6 in 153mm	6⅜in 162mm
48	47¾ in 1213mm	9⅞ in 250mm	28 1/16 in 713mm	19 11/16 in 500mm	6 5/16in 160mm	6 in 153mm	6⅜in 162mm
60	59¾ in 1518mm	11⅞ in † 300mm †	34 1/16 in 865mm	25 11/16 in 653mm	6 5/16in 160mm	6 in 153mm	6⅜in 162mm

† Oval shaped inlet

* 595, 895, 1195 and 1495mm lengths are available to fit metric ceilings.

- Dimensions ±1/16"/±2mm

SELECTION GUIDELINES

Minimum/Maximum Spacing—Use the throw ratings for design air volume (maximum flow in the Performance Guide) to determine distances for minimum and maximum spacing to walls and other diffusers. Below design air volume, room air motion will be kept to acceptable levels by the increasing entrainment ratio as the diffuser turns down.

Less than 100fpm / 0.51m/s (interpolate) is normally satisfactory for air discharged against an inside partition and up to 150fpm / .076m/s can be tolerated against an outside wall. Maximum throw is usually figured around the 50fpm / 0.25m/s point.

When given a choice, put diffusers in line with one another, not blowing at each other. When unavoidable, space diffusers at least two times the 150fpm / 0.76m/s throw (preferably two times the 100fpm / 0.51m/s throw) to avoid down drafts.

Maximum center line spacing between diffusers in line (in the same row) should be three to four times the unit's length. A 48in / 1200mm diffuser would then cover an area 12 to 16ft / 3.6 to 4.8m wide (maximum).

Layouts should be made on a reflected ceiling plan (looking down from above the ceiling). Make the ceiling grid and lighting layouts first, then the diffuser layout. The center of the room is often an ideal location for a 2-way blow diffuser, but if the lighting gets there first, Acutherm diffusers have enough flexibility to provide good air distribution when not centered. Where large air quantities are required, a frequently used arrangement is "staggered" with alternate rows blowing 1-way in opposite directions.

Do not obstruct the venturi outlet at the end of the diffuser *(See Fig.1)*. Allow a spacing of 2in / 50mm or more between the venturi opening at the end of the diffuser and lights, joists, other diffusers, etc.

Acutherm diffusers are designed for mounting in place of a portion of a ceiling panel. They are not intended to straddle or replace a ceiling T-bar. (See Acutherm's brochure on Ceiling Approaches.)

Return Air may be handled in the conventional manner using return air grills or, more typically, return air slots can be provided to match the supply air diffusers. Use of return air slots will generally improve air distribution in the space and blend into the overall ceiling pattern along with the supply air diffusers.

Each space should have returns. Select returns with the same total length of slot as the supply air diffusers in the space. Arrangement should be in line with or perpendicular to the supply diffusers. If return air slots must be located in the supply air stream, place them beyond the 50fpm / 0.25m/s throw for the supply air diffuser.

Horizontal air discharge streams are not affected by ceiling beams or other construction under 2in / 50mm in height provided they are at least 2ft / 600mm from the diffuser. Obstructions greater than 2in / 50mm will cause downward air deflection and objectionable drafts. Within 2ft / 600mm from the diffuser, obstacles should not extend more than 1/16in / 1.5mm below the plane of the bottom of the diffuser.

PERFORMANCE GUIDE in I-P UNITS

2-Slot 2-Way Linear

Nominal Length in	Inlet Static Pressure in wg	Maximum Flow cfm	Maximum Flow Throw - Feet* @ v_t=50/100/150FPM	†NC	25% Maximum Flow Throw* - Feet @ v_t=50/100/150FPM	†NC
24	.05	70	4/3/2	<15	3/<1/<1	<15
	.10	90	5/4/3	<15	4/3/<1	<15
	.15	120	9/7/4	21	6/4/3	20
	.18	135	10/8/5	23	7/5/3	22
	• .20	145	10/8/5	25	7/5/3	24
	.25	165	13/10/7	30	8/6/4	29
36	.05	80	4/3/2	<15	3/<1/<1	<15
	.10	115	7/5/3	16	4/3/<1	<15
	• .14	143	9/7/5	22	6/4/2	21
	.15	150	9/7/5	23	6/4/2	22
	.20	170	11/9/7	28	7/5/3	27
	.25	185	13/10/8	32	8/6/4	31
48	.05	150	7/5/3	<15	4/3/<1	<15
	.10	200	11/9/7	20	6/4/2	19
	.15	240	13/11/9	25	8/6/4	25
	• .17	256	15/12/9	27	9/6/4	27
	.20	280	17/14/10	29	10/7/5	29
	.25	310	19/15/11	33	12/9/6	32
60	.05	170	6/4/3	<15	4/3/<1	<15
	.10	240	8/6/4	20	5/3/2	19
	• .12	260	9/7/4	22	6/3/2	21
	.15	290	10/8/5	26	7/4/3	25
	.20	330	14/11/7	31	9/6/4	30
	.25	370	18/14/9	34	11/8/5	33

2-Slot 1-Way Linear

Nominal Length in	Inlet Static Pressure in wg	Maximum Flow cfm	Maximum Flow Throw - Feet* @ v_t=50/100/150FPM	†NC	25% Maximum Flow Throw* - Feet @ v_t=50/100/150FPM	†NC
24	.05	65	6/4/3	<15	4/3/<1	<15
	.07	75	7/5/4	17	5/3/<1	17
	.10	90	9/7/5	20	6/4/2	19
	.15	110	14/11/7	25	9/6/4	24
	.20	130	17/13/8	29	10/7/5	28
	• .25	145	19/14/9	32	12/9/6	31
36	.05	85	5/3/2	16	3/<1/<1	<15
	.10	120	9/7/5	23	5/4/2	22
	.12	130	11/8/6	24	6/5/3	23
	• .15	145	13/10/7	26	8/6/4	25
	.20	165	16/12/8	30	10/7/5	29
	.25	180	18/14/9	33	12/9/6	32
48	.05	150	8/6/4	17	5/4/2	<15
	.10	200	15/13/8	24	9/6/4	20
	.15	240	22/17/11	30	13/9/6	26
	• .17	256	23/17/11	31	13/10/6	27
	.20	280	24/18/12	32	14/11/7	28
	.25	310	25/19/13	35	15/12/7	31
60	.05	170	6/4/3	17	4/3/<1	16
	.10	230	14/11/7	24	8/6/4	23
	• .13	263	17/13/8	28	11/7/5	27
	.15	280	19/14/9	30	12/8/5	29
	.20	320	20/15/10	32	12/9/6	31
	.25	360	22/17/11	35	13/10/6	34

1-Slot 1-Way Linear

Nominal Length in	Inlet Static Pressure in wg	Maximum Flow cfm	Maximum Flow Throw - Feet* @ v_t=50/100/150FPM	†NC	25% Maximum Flow Throw* - Feet @ v_t=50/100/150FPM	†NC
24	.05	45	6/4/3	<15	4/3/<1	<15
	.10	60	9/7/4	19	6/4/2	<15
	.15	70	13/10/7	23	8/6/4	16
	◉.18	76	15/11/8	25	9/7/5	19
	.20	80	17/12/8	27	10/8/5	21
	.25	90	19/14/9	30	12/9/6	24
36	.05	70	6/4/3	<15	4/3/<1	<15
	◉.07	78	8/6/4	17	5/3/<1	<15
	.10	90	10/8/6	20	6/4/2	<15
	.15	110	13/10/7	24	8/6/4	17
	.20	125	18/14/9	28	10/7/5	21
	.25	140	20/15/10	31	12/9/6	24
48	.05	90	6/4/3	16	4/3/<1	<15
	.10	125	14/10/6	23	8/6/4	17
	◉.12	135	16/12/7	25	10/7/4	18
	.15	150	20/14/8	28	12/8/5	20
	.20	175	21/15/9	31	13/10/6	24
	.25	190	22/17/11	34	14/12/7	28
60	.05	100	6/5/4	17	4/3/<1	<15
	◉.09	140	9/7/6	23	6/4/2	18
	.10	150	10/8/6	24	6/4/2	19
	.15	180	15/13/8	30	9/6/4	23
	.20	210	17/13/9	32	10/7/5	26
	.25	230	20/15/10	35	12/9/6	29

PERFORMANCE GUIDE in I-P UNITS CONTINUED

4-Slot 2-Way Linear

Nominal Length in	Inlet Static Pressure in wg	Maximum Flow cfm	Maximum Flow Throw - Feet* @ v_t=50/100/150FPM	†NC	25% Maximum Flow Throw* - Feet @ v_t=50/100/150FPM	†NC
24	.05	150	4/3/2	<15	3/2/<1	<15
	.10	210	7/5/3	23	4/3/<1	22
	.13	240	8/6/4	25	5/4/2	24
	•.15	260	9/7/5	26	5/4/2	25
	.20	300	11/9/7	30	7/5/3	29
	.25	335	13/11/8	33	8/6/4	32
36	.05	185	5/4/3	<15	3/2/<1	<15
	•.10	260	8/6/4	23	5/4/2	22
	.13	296	9/7/5	25	6/5/3	24
	.15	320	10/8/6	27	6/5/3	26
	.20	370	12/10/8	31	8/6/4	30
	.25	410	14/12/9	34	9/7/4	33
48	.05	275	8/7/5	<15	5/4/3	<15
	.10	390	11/9/7	25	9/7/4	24
	•.11	408	12/10/7	26	10/8/5	25
	.15	480	14/12/9	32	12/10/7	31
	.20	550	17/14/10	37	14/12/8	36
	.25	620	20/17/12	39	16/14/10	38
60	.05	430	9/8/6	20	5/4/3	<15
	•.09	570	11/10/8	28	8/6/4	19
	.10	605	12/10/8	30	9/7/4	20
	.15	745	16/14/10	35	14/11/7	29
	.20	860	19/16/12	39	15/13/8	34
	.25	960	21/18/13	42	18/15/10	36

4-Slot 1-Way Linear

Nominal Length in	Inlet Static Pressure in wg	Maximum Flow cfm	Maximum Flow Throw - Feet* @ v_t=50/100/150FPM	†NC	25% Maximum Flow Throw* - Feet @ v_t=50/100/150FPM	†NC
24	.05	150	6/5/3	<15	4/3/<1	<15
	.10	210	13/10/7	26	8/6/4	24
	.13	240	17/13/8	27	10/7/5	25
	•.15	260	19/15/9	28	11/8/5	26
	.20	300	20/16/10	33	12/9/6	31
	.25	335	21/18/12	36	13/10/7	34
36	.05	180	6/5/4	<15	4/3/<1	<15
	.10	250	14/12/8	26	8/6/4	24
	• .11	262	15/12/8	27	9/6/4	25
	.15	310	19/14/10	30	11/8/5	28
	.20	360	21/18/12	34	13/10/7	32
	.25	400	22/19/13	37	14/12/7	35
48	.05	315	16/13/9	<15	9/7/4	<15
	• .08	393	18/15/11	23	10/8/5	22
	.10	445	20/17/12	28	10/8/5	26
	.15	545	26/23/16	34	13/10/7	32
	.20	630	35/29/21	38	19/15/9	36
	.25	700	37/32/24	42	21/18/12	39
60	.05	400	17/14/11	16	9/7/4	<15
	.10	570	25/22/15	28	12/10/7	20
	•.11	596	26/23/16	29	13/11/7	22
	.15	700	32/26/18	34	15/13/9	31
	.20	805	36/30/22	38	21/16/12	36
	.25	903	40/33/25	41	25/19/14	38

- • Denotes 750 fpm / 3.81 m/s inlet velocity. ◉ Denotes 400 fpm / 2.03 m/s inlet velocity.
- * Throw data is for air 20°F/11°C lower than room temperature. Throws for isothermal air are 40 to 50% greater.
- † NC based on L_w(10^{-12} watts reference) -10db.
- - Ratings independently verified by Inchcape Testing Services, ETL Testing Laboratories.
- - Tested in accordance with ANSI/ASHRAE 70-1991, ANSI S12.31, ARI 890-2001, ISO 5219 and ISO 3741.

The volume of induction air (into the ceiling) required in addition to rated air volume is:

Inlet SP in wg	1- and 2-Slots CFM	4-Slots CFM
.05	7	11
.10	9	14
.15	11	17
.20	12.5	20

SYSTEM DESIGN

The best control for heating/cooling units supplying air to VAV terminals is a discharge thermostat that maintains a constant supply air temperature. With DX equipment, this is a low limit. Use a room thermostat for changeover between heating and cooling modes. For hybrid systems (part VAV and part constant volume), control the heating/cooling supply unit with a thermostat in one of the rooms with a constant volume diffuser, preferably the space with the greatest load. For both VAV or hybrid systems, the fan should run continuously.

Static pressure at the inlet of the Therma-Fuser diffuser should be between .05"wg / 12Pa and .25"wg / 62Pa, at full and partial airflows. Static pressure below .05"wg / 12Pa will result in low airflow and less induction. Above .25"wg / 62Pa, Therma-Fuser diffusers operate well, but excessive noise may result.

If the system turns down more than 30%, static pressure should be controlled. Included in the options for static pressure control are fan speed control and modulating bypass dampers. Modulating zone dampers are recommended where several diffusers share a higher pressure duct or riser.

When designing ducts, if Therma-Fuser diffusers are to deliver nominal volume at inlet static pressure of .15"wg / 37Pa and if a maximum static pressure of .25"wg / 62Pa is to be held for quiet operation, size the duct for a maximum pressure drop of .1"wg / 25Pa between the first and last takeoff.

Manual balancing dampers should be used at the takeoff for each diffuser. Manual balancing dampers may not be required with ducts designed to Acutherm specifications.

A short length of low pressure flexible duct should be used to connect the diffuser. To avoid static pressure losses, flexible duct runs should be designed and installed as straight as possible (equivalent of one 90° turn max.) and should NOT be formed in a centerline radius of less than 1½ times the duct diameter.

Because Therma-Fuser diffusers control room temperature by sensing room air induced under the diffuser, care should be taken not to disturb room air induction and entrainment. For example, located to blow at walls or dropped lights results in the reflection of primary air back at the Therma-Fuser diffuser. To avoid this, relocate either the Therma-Fuser diffuser or the light.

Acutherm has "how to" system design brochures for almost every ducted air system.

GUIDE SPECIFICATION

(Suitable for Section 23 36 16 Variable Air Volume Units of the CSI Master Format). *Sections in italics show different options - delete the option that does not apply.*

2.2 DDC Interoperable VAV Diffusers

A. Interoperable linear slot variable air volume diffusers shall be Therma-Fuser model EL manufactured by Acutherm, Hayward, CA.

B. Each diffuser shall be a complete VAV terminal with room air sensor, supply air sensor, flow sensor, "expert system" controller, actuator and damper(s) contained in a linear slot diffuser.

C. They shall be:

• Native BACnet™and BTL® Listed for interoperability on any BACnet™ network.

- OR -

• LonMark® certified for interoperability on any LonWorks® network, conform to LonMark® Functional Profile ID:8010 and shall provide all optional and mandatory network and configuration variables (except the inapplicable internal heater and internal fan control options).

D. They shall be:

• A no maintenance thermal actuator wrapped with a resistance heater is shipped with stop(s) holding the damper(s) open for balancing, should the diffuser not yet be connected to the network.

- OR -

• A brushless DC stepper motor with a direct linkage to the damper shipped in the open position for balancing should the diffuser not yet be connected to the network.

E. Flow sensor shall accurately measure flow regardless of radius of the inlet elbow or direction of the supply air duct.

F. The expert system controller shall have the ability to change control response as the space changes. P, PI, PD and PID control shall not be acceptable. The controller shall be field configured as either VAV heating / VAV cooling or VAV cooling only.

G. The diffuser and blades shall be constructed of extruded aluminum with all visible portions powder coated. The diffuser shall be complete with plenum constructed of 24-gauge galvanized steel.

H. The VAV diffusers shall have positive induction of secondary room air over the sensor at all flows from fully closed to fully open. It shall have an induction chamber and supply air venturi at one end for inducing room air past the room sensor. The venturi shall be at least 4in/100mm wide for effective induction.

I. Manufacturer's ratings for flow and sound shall be verified by an independent testing laboratory certified for ARI 890 and ADC testing

PERFORMANCE GUIDE in SI (METRIC) UNITS

2-Slot, 2-Way Linear

Nominal Length mm	Nominal Inlet Dia. mm	Inlet Static Pressure Pa	Maximum Flow		Maximum Flow Throw (m)*@v_t =				25% Maximum Flow Throw (m)*@v_t =			
			L/s	m³/h	.25 m/s	.50 m/s	.75 m/s	†NC	.25 m/s	.50 m/s	.75 m/s	†NC
600	150	10	31	112	1.2	0.9	0.6	< 15	0.9	< 0.3	< 0.3	< 15
		20	39	140	1.4	1.1	0.8	15	1.1	0.7	< 0.3	< 15
		30	48	174	2.0	1.6	1.1	17	1.5	1.1	0.6	17
		40	59	213	2.8	2.2	1.3	22	1.9	1.3	0.9	21
		• 50	69	247	3.1	2.5	1.6	25	2.1	1.5	0.9	24
		60	76	274	3.8	3.0	2.1	29	2.4	1.8	1.2	28
900	150	10	35	124	1.0	0.8	0.6	< 15	0.9	< 0.3	< 0.3	< 15
		20	48	172	1.8	1.3	0.8	16	1.1	0.7	< 0.3	< 15
		30	61	220	2.4	1.8	1.2	19	1.5	1.1	0.5	18
		• 40	73	262	2.8	2.3	1.7	24	1.9	1.3	0.7	23
		50	80	290	3.4	2.8	2.2	28	2.1	1.5	0.9	27
		60	86	310	3.9	3.0	2.4	31	2.4	1.8	1.2	30
1200	200	10	66	238	1.7	1.3	0.7	< 15	1.1	0.9	< 0.3	< 15
		20	85	307	2.9	2.3	1.7	18	1.6	1.1	0.5	17
		30	102	368	3.6	3.0	2.4	22	2.2	1.5	0.9	21
		• 40	117	423	4.2	3.6	2.8	26	2.6	1.9	1.3	26
		50	132	477	5.2	4.3	3.1	29	3.1	2.2	1.6	29
		60	144	518	5.7	4.6	3.4	32	3.6	2.7	1.8	31
1500	200	10	74	266	1.7	1.1	0.9	< 15	1.2	0.9	< 0.3	< 15
		20	100	361	2.2	1.6	1.1	18	1.4	0.9	0.5	17
		• 30	123	443	2.7	2.1	1.4	22	1.8	1.1	0.7	21
		40	141	508	3.3	2.7	1.7	27	2.3	1.4	1.0	26
		50	156	562	4.3	3.4	2.2	31	2.8	1.9	1.3	30
		60	171	617	5.3	4.1	2.7	33	3.3	2.4	1.5	32

2-Slot, 1-Way Linear

Nominal Length mm	Nominal Inlet Dia. mm	Inlet Static Pressure Pa	Maximum Flow		Maximum Flow Throw (m)*@v_t =				25% Maximum Flow Throw (m)*@v_t =			
			L/s	m³/h	.25 m/s	.50 m/s	.75 m/s	†NC	.25 m/s	.50 m/s	.75 m/s	†NC
600	150	10	28	102	1.7	1.1	0.8	<15	1.1	0.9	< 0.3	<15
		20	38	136	2.4	1.8	1.3	18	1.6	1.1	0.5	17
		30	46	167	3.4	2.7	1.8	22	2.2	1.5	0.9	21
		40	54	194	4.5	3.5	2.3	26	2.8	1.9	1.3	25
		50	61	221	5.2	4.0	2.5	29	3.1	2.2	1.6	28
		• 60	67	242	5.7	4.3	2.8	31	3.6	2.7	1.8	30
900	150	10	37	133	1.3	0.7	0.4	<15	0.8	0.1	< 0.3	<15
		20	50	181	2.3	1.7	1.2	20	1.3	0.9	0.5	19
		30	61	221	3.3	2.5	1.8	24	1.9	1.5	0.9	23
		• 40	70	254	4.1	3.2	2.2	27	2.6	1.9	1.3	26
		50	78	281	4.9	3.7	2.5	30	3.1	2.2	1.6	29
		60	84	302	5.4	4.2	2.8	32	3.6	2.7	1.8	31
1200	200	10	66	238	1.8	1.4	1.0	<15	1.3	1.1	0.5	<15
		20	85	307	3.7	3.1	2.0	20	2.3	1.6	1.0	18
		30	102	368	5.5	4.5	2.9	26	3.5	2.2	1.5	22
		• 40	117	423	6.9	5.3	3.5	30	4.0	2.9	1.9	26
		50	132	477	7.3	5.5	3.8	32	4.3	3.4	2.2	28
		60	144	518	7.6	5.8	4.0	34	4.5	3.6	2.2	30
1500	200	10	75	269	1.4	0.8	0.7	16	1.0	0.7	< 0.3	<15
		20	97	351	3.3	2.5	1.7	21	2.0	1.5	0.9	20
		• 30	118	426	4.9	3.8	2.4	26	3.0	2.1	1.4	25
		40	136	491	5.9	4.4	2.9	30	3.7	2.5	1.6	29
		50	151	545	6.1	4.6	3.1	32	3.7	2.8	1.9	31
		60	166	600	6.6	5.1	3.4	34	3.9	3.0	1.9	33

1-Slot, 1-Way Linear

Nominal Length mm	Nominal Inlet Dia. mm	Inlet Static Pressure Pa	Maximum Flow		Maximum Flow Throw (m)*@v_t =				25% Maximum Flow Throw (m)*@v_t =			
			L/s	m³/h	.25 m/s	.50 m/s	.75 m/s	†NC	.25 m/s	.50 m/s	.75 m/s	†NC
600	150	10	20	72	1.7	1.1	0.9	<15	1.1	0.9	< 0.3	<15
		20	26	92	2.4	1.8	1.1	17	1.6	1.1	0.5	<15
		30	30	109	3.3	2.5	1.6	21	2.1	1.5	0.9	15
		40	34	123	4.2	3.2	2.2	24	2.6	2.0	1.3	17
		◉ 50	38	136	5.2	3.7	2.5	27	3.1	2.5	1.6	21
		60	42	150	5.7	4.2	2.8	29	3.6	2.7	1.8	23
900	150	10	31	112	1.6	1.0	0.7	<15	1.1	0.9	< 0.3	<15
		◉ 20	39	140	2.6	2.0	1.5	18	1.6	1.1	0.5	<15
		30	46	167	3.4	2.7	2.0	22	2.1	1.5	0.9	16
		40	53	193	4.2	3.3	2.3	25	2.6	1.9	1.3	18
		50	59	213	5.5	4.3	2.8	28	3.1	2.2	1.6	21
		60	65	233	6.0	4.6	3.1	30	3.6	2.7	1.8	23
1200	200	10	39	141	1.0	0.9	0.7	<15	1.0	0.7	< 0.3	<15
		20	52	189	3.3	2.4	1.5	20	2.0	1.5	0.9	16
		◉ 30	64	230	5.0	3.6	2.1	25	3.2	2.1	1.4	18
		40	73	264	6.2	4.4	2.6	29	3.7	2.6	1.6	21
		50	83	298	6.4	4.6	2.8	31	4.0	3.1	1.9	24
		60	88	319	6.7	5.1	3.3	33	4.2	3.6	2.1	27
1500	200	10	43	153	1.6	1.4	1.1	16	1.1	0.9	< 0.3	<15
		◉ 20	62	222	2.6	2.1	1.6	21	1.6	1.1	0.5	17
		30	77	276	3.7	3.1	2.1	26	2.2	1.5	0.9	21
		40	88	317	4.7	4.0	2.6	30	2.8	1.9	1.3	24
		50	99	358	5.2	4.0	2.8	32	3.1	2.2	1.6	26
		60	107	385	6.0	4.5	3.1	34	3.6	2.7	1.8	28

PERFORMANCE GUIDE in SI (METRIC) UNITS CONTINUED

4-Slot, 2-Way Linear

Nominal Length mm	Nominal Inlet Dia. mm	Inlet Static Pressure Pa	Maximum Flow		Maximum Flow Throw (m)*@v_t =				25% Maximum Flow Throw (m)*@v_t =			
			L/s	m^3/h	.25 m/s	.50 m/s	.75 m/s	†NC	.25 m/s	.50 m/s	.75 m/s	†NC
600	200	10	65	235	1.0	0.8	0.6	<15	0.9	0.6	< 0.3	<15
		20	88	317	1.8	1.3	0.8	20	1.1	0.8	0.3	19
		30	109	392	2.4	1.8	1.2	24	1.3	1.0	0.5	23
		• 40	127	457	2.9	2.3	1.7	27	1.7	1.3	0.7	26
		50	142	511	3.4	2.8	2.2	30	2.1	1.5	0.9	29
		60	155	559	3.9	3.3	2.4	32	2.4	1.8	1.2	31
900	200	10	80	290	1.3	1.1	0.9	<15	0.8	0.5	< 0.3	<15
		20	109	392	2.1	1.6	1.1	20	1.3	1.0	0.5	19
		• 30	134	484	2.7	2.1	1.5	25	1.7	1.4	0.8	24
		40	156	562	3.1	2.6	2.0	28	2.0	1.6	1.0	27
		50	175	630	3.7	3.1	2.5	31	2.5	1.9	1.2	30
		60	190	685	4.2	3.6	2.7	33	2.7	2.1	1.3	32
1200	250	10	119	429	2.1	2.0	1.4	<15	1.3	1.0	0.9	<15
		20	163	586	3.0	2.5	1.9	21	2.3	1.8	1.1	20
		• 30	201	726	3.7	3.1	2.4	28	3.3	2.5	1.6	27
		40	234	842	4.5	3.8	2.9	33	3.8	3.2	2.2	32
		50	260	937	5.2	4.3	3.1	37	4.3	3.7	2.5	36
		60	287	1033	5.9	5.0	3.6	39	4.8	4.2	3.0	38
1500	300◊	10	187	673	2.6	2.3	1.7	18	1.3	1.0	0.9	<15
		20	253	912	3.3	2.8	2.2	26	2.3	1.8	1.1	18
		• 30	313	1126	4.2	3.6	2.7	32	3.4	2.7	1.6	24
		40	363	1309	5.1	4.4	3.2	36	4.3	3.5	2.3	30
		50	406	1465	5.8	4.9	3.7	39	4.6	4.0	2.5	34
		60	445	1602	6.3	5.4	4.0	41	5.3	4.5	3.0	36

4-Slot, 1-Way Linear

Nominal Length mm	Nominal Inlet Dia. mm	Inlet Static Pressure Pa	Maximum Flow		Maximum Flow Throw (m)*@v_t =				25% Maximum Flow Throw (m)*@v_t =			
			L/s	m^3/h	.25 m/s	.50 m/s	.75 m/s	†NC	.25 m/s	.50 m/s	.75 m/s	†NC
600	200	10	65	235	1.4	1.2	0.7	<15	1.0	0.7	< 0.3	<15
		20	88	317	3.1	2.5	1.7	22	2.0	1.5	0.9	20
		30	109	392	4.7	3.7	2.4	27	2.8	2.1	1.4	25
		• 40	127	457	5.9	4.7	2.9	29	3.4	2.5	1.6	27
		50	142	511	6.1	4.9	3.1	33	3.7	2.8	1.9	31
		60	155	559	6.4	5.4	3.6	35	3.9	3.0	2.1	33
900	200	10	78	283	1.4	1.1	1.0	<15	1.0	0.7	< 0.3	<15
		20	105	378	3.3	2.8	2.0	22	2.0	1.5	0.9	20
		• 30	130	467	4.9	3.9	2.7	28	2.8	2.1	1.4	26
		40	151	545	5.9	4.6	3.2	31	3.5	2.6	1.7	29
		50	170	613	6.4	5.5	3.8	34	4.0	3.1	2.2	32
		60	185	668	6.7	5.8	4.0	36	4.2	3.6	2.2	34
1200	250	10	137	492	4.5	3.7	2.6	<15	2.7	2.1	1.2	<15
		• 20	186	670	5.6	4.7	3.4	23	2.9	2.3	1.4	22
		30	229	826	6.9	6.0	4.2	30	3.6	2.7	1.8	28
		40	266	958	8.5	7.4	5.3	35	4.4	3.4	2.3	33
		50	298	1073	10.7	8.9	6.5	38	5.8	4.6	2.8	36
		60	324	1169	11.2	9.6	7.3	41	6.3	5.4	3.6	38
1500	300◊	10	173	623	4.7	3.8	3.1	16	2.6	2.0	1.1	<15
		20	237	856	6.7	5.8	4.2	23	3.3	2.7	1.8	18
		• 30	294	1060	8.5	7.2	5.1	30	4.0	3.4	2.4	25
		40	341	1228	10.0	8.2	5.9	35	5.0	4.2	3.0	32
		50	381	1372	11.0	9.2	6.8	38	6.4	4.9	3.7	36
		60	418	1506	12.0	10.0	7.6	40	7.4	5.7	4.2	38

All SI (metric) ratings are soft conversion from I-P ratings.

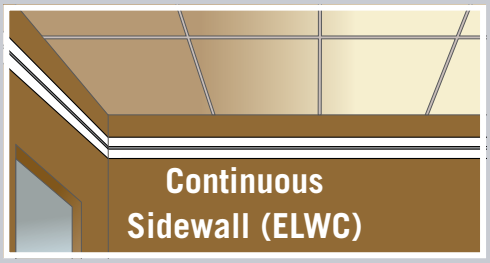
- • Denotes 750 fpm / 3.81 m/s inlet velocity.
- ◉ Denotes 400 fpm /2.03 m/s inlet velocity.
- * Throw data is for air 20°F/11°C lower than room temperature. Throws for isothermal air are 40 to 50% greater.
- † NC based on L_w(10^{-12} watts reference) -10db.
- - Ratings independently verified by Inchcape Testing Services, ETL Testing Laboratories.
- ◊ Oval shaped inlet.
- - Tested in accordance with ANSI/ASHRAE 70-1991, ANSI S12.31, ARI 890-2001, ISO 5219 and ISO 3741.

The volume of induction air (into the ceiling) required in addition to rated air volume is:		
Inlet SP Pa	1- and 2-Slots L / s	4-Slots L / s
12	.33	5.2
25	4.2	6.6
37	5.2	8.0
50	5.9	9.4

J. Optional—The diffuser shall be lined with ½" 2 pound density bonded blanket of glass fibers with smooth fire resistant airstream surfaces adhered with ASTM C 916 adhesive. The insulation and adhesive shall meet the requirements of NFPA 90A and 90 B.

K. All VAV diffusers shall warrant that the diffuser shall be free from defects in materials and workmanship for a period of two years from date of shipment

Linear Therma-Fuser™ Diffusers are also available in Sidewall, Continuous Ceiling and Continuous Sidewall models.



For information on sidewall diffusers, see Acutherm's ELW brochure.

EL Therma-Fuser™ Interoperable Linear Slot VAV Diffuser

TWO YEAR WARRANTY

Acutherm warrants that its EL Therma-Fuser diffusers, exclusive of any options and accessories (whether factory or field installed) shall be free from defects in material or workmanship for a period of two (2) years from the date of shipment and agrees to repair or replace, at its option, any parts that fail during said two (2) year period due to any such defects which would not have occurred had reasonable care been taken, provided that such parts have been inspected by Acutherm and found defective and provided the diffusers have been given normal and proper usage and all parts and controls remain unaltered. Acutherm makes NO WARRANTY OF MERCHANTABILITY OF PRODUCTS OR OF THEIR FITNESS FOR ANY PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY WHICH EXTENDS BEYOND THE LIMITED WARRANTY ABOVE. ACUTHERM'S LIABILITY FOR ANY AND ALL LOSSES AND DAMAGES RESULTING FROM DEFECTS SHALL IN NO EVENT EXCEED THE COST OF REPAIR OR REPLACEMENT OF PARTS FOUND DEFECTIVE UPON EXAMINATION BY ACUTHERM. IN NO EVENT SHALL ACUTHERM BE LIABLE FOR INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR DAMAGES FOR INJURY TO PERSONS OR PROPERTY. Acutherm shall not be responsible for freight to or from its plant in connection with the inspection, repair or replacement of parts under the terms of this limited warranty nor for cost of removal or installation. Protected by U.S. Patents 6,250,560 & 6,581, 847

ACUTHERM PRODUCT GUIDE


Square VAV Diffusers


Round VAV Diffusers


Linear VAV Diffusers


Accessories


Pressure Control


Temperature control

PRODUCT INFORMATION DESCRIPTION

Use the following model number nomenclature to order Therma-Fuser diffusers, options and accessories.

Product

(1) Model	(2) Protocol	(3) Actuator	(4) Nominal Length	(5) Slots
EL				

(6) Blow	(7) Inlet

Product
1. Model: **EL** Linear Therma-Fuser Diffuser
2. Protocol: **B** BACnet™, **L** LonTalk®
3. Actuator: **T** Thermal Actuator, **M** Electric Motor
4. Nominal Length: **24, 36, 48 or 60 in**.
   600, 900, 1200 and 1500 mm lengths are available to fit metric ceilings.
5. **1**-slot, **2**-slot, **4**-slot
6. **1**-way, **2**-way
7. **S** Standard, **O** Opposite, **R** Top Rectangular

Options

(1) Insulation

Options
1. **I** Internal insulation

Accessories

(1) Ceiling Frame

Accessories
1. **AC-TL-HCF** for Hard Ceiling, **AC-TL-TEG1** for tegular $^{9}/_{16}$" T-Bar
   (requires +**TEG end-angles**), and for thin metal tiles use +**MP end-angles**

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