Model: **CSS-VAV-LP Diffuser**

The Holyoake CSS - VAV - LP is an externally controlled pressure dependant* 'Low Profile' VAV Diffuser, complete with an adjustable blade control damper, positioned by a 24 V AC variable actuator, via a 0-10 V DC control signal.

* Performance data on pages 124D to 128D is based on a constant static pressure behind the diffuser being maintained. Holyoake Spiro-set Semi-Rigid Aluminium ducting was used for all performance testing. We recommend the use of Spiro-set ducting for all VAV applications.

Control of the diffuser is via a room thermostat and building management system (supply and installation by others).

Designed to control the temperature in a space by having the ability to change the supply air volume between a minimum and maximum, as detailed in the performance data.
(The Primary Air Temperature is not controlled by this system and would require an input from the building system temperature control).

As standard the CSS – VAV – LP is suitable for lay-in applications into a typical 600mm ceiling grid and has the advantage of being only 275mm deep, which enables it to be installed into shallower ceiling voids. +The complete assembly comprises of the following:

CSS 16, CSS 24 or CSS 48 Ceiling Slot Swirl Diffuser.
Premi-Aire™ Pre-Insulated 'Low Profile' Box.
Single Blade Control Damper.
24 V AC Modulating Motor, with 0-10 VDC Control Signal.

The CSS - VAV - LP is one of the strongest performing diffusers on the market, with proven induction technology, strong ceiling effect and capable of handling a wide range of air flows.

Using the CSS range of Square Ceiling Slot Swirl diffusers with radially mounted angled slots, providing a circular swirling airflow, this creates strong room air induction into the supply air path, creating mixing at high level, minimising draughts and fluctuating temperature gradients.

The whole CSS - VAV - LP assembly, including diffuser, supply plenum box, damper and motor, is a light weight 9.3KG.

Installation

Installation is simple due to the 'Low Profile', light weight, square, lay-in design. The assembly can easily be placed into a 'T – Rail' ceiling grid and the supply duct connected to the side entry oval spigot +.

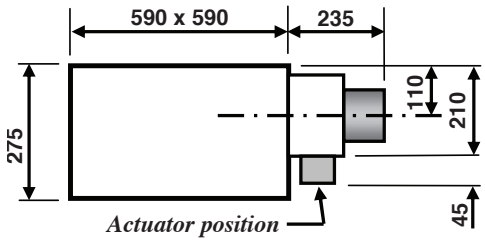
Construction

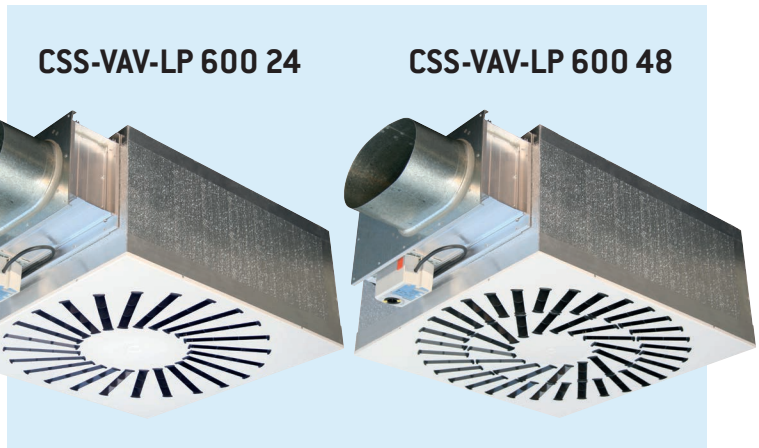
The CSS - VAV - LP face plate is constructed of powder coated zinc coated steel, with tough UV stabilised air pattern elements, available in black, or white. The 'Low Profile' supply plenum box is assembled from Premi-Aire™ board and is complete with a galvanised steel oval connecting spigot and an aluminium single blade damper. A 24 V AC Modulating Motor is positioned for easy access for wiring and maintenance through an adjoining ceiling tile.

Features

- Low Profile Design (275 mm).
- Lightweight Premi-Aire™ Box Construction.
- Infinite Range of Throw Patterns.
- High Induction Swirl.
- 24 V AC Modulating Actuator, c/w 0-10 VDC Control.
- Pressure Dependant Control.

Technical Data	
Swirl Type	CSS16, CSS24, or CSS48
Box Type	Premi-Aire™
Thermal Rating	R1.0
Control Damper	Single Blade
Actuator	24 V AC, c/w 0-10 V DC Signal
Oval Spigot	Equivalent Diameter 200 or 250mm
Gross Weight	9.3 kg





+Note

Space will be required for manoeuverability above the T Rail ceiling supports and will be dependant on site conditions and other services. (A separate 'T' Rail support frame is available for conventional Plasterboard ceilings if required).

CSS-VAV-LP 600 16 – Performance Data

Inlet Static Pressure 13Pa - CSS16-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.076	1.8	1.1	0.6	25
75% Open	7.5 VDC	0.070	1.7	1.0	0.6	24
50% Open	5 VDC	0.056	1.5	0.9	0.5	22
25% Open	2.5 VDC	0.029	0.7	0.3	n/a	20
20% Open	2 VDC	0.027	0.7	0.3	n/a	20
Min Position	0 VDC	0.016	0.4	n/a	n/a	<20

Inlet Static Pressure 20Pa - CSS16-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.094	2.1	1.4	0.9	28
75% Open	7.5 VDC	0.087	2.1	1.4	0.9	26
50% Open	5 VDC	0.070	1.7	1.0	0.6	24
25% Open	2.5 VDC	0.037	1.0	0.4	n/a	22
20% Open	2 VDC	0.034	1.0	0.4	n/a	20
Min Position	0 VDC	0.021	0.5	n/a	n/a	<20

Inlet Static Pressure 25Pa - CSS16-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.103	2.3	1.6	1.0	29
75% Open	7.5 VDC	0.098	2.2	1.5	1.0	28
50% Open	5 VDC	0.078	1.8	1.1	0.7	26
25% Open	2.5 VDC	0.042	1.1	0.5	0.3	24
20% Open	2 VDC	0.038	1.0	0.4	n/a	23
Min Position	0 VDC	0.024	0.5	n/a	n/a	20

Inlet Static Pressure 30Pa - CSS16-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.114	2.4	1.7	1.1	33
75% Open	7.5 VDC	0.108	2.3	1.6	1.0	30
50% Open	5 VDC	0.086	2.1	1.4	0.9	28
25% Open	2.5 VDC	0.046	1.2	0.6	0.4	26
20% Open	2 VDC	0.042	1.1	0.5	0.3	25
Min Position	0 VDC	0.026	0.6	n/a	n/a	21

Inlet Static Pressure 40Pa - CSS16-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.131	2.7	2.0	1.3	37
75% Open	7.5 VDC	0.124	2.5	1.8	1.2	35
50% Open	5 VDC	0.100	2.2	1.5	1.0	32
25% Open	2.5 VDC	0.054	1.5	0.9	0.5	27
20% Open	2 VDC	0.049	1.3	0.8	0.4	26
Min Position	0 VDC	0.031	0.7	0.3	n/a	23

***Note**

The air volume performance for VAV diffusers is dependant on static pressure behind the diffuser being maintained.

Performance Data – CSS-VAV-LP 600 24

Inlet Static Pressure 13Pa - CSS24-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.151	2.4	1.6	0.9	30
75% Open	7.5 VDC	0.145	2.3	1.5	0.8	29
50% Open	5 VDC	0.091	1.3	0.8	0.3	26
25% Open	2.5 VDC	0.034	0.6	n/a	n/a	23
20% Open	2 VDC	0.027	0.5	n/a	n/a	21
Min Position	0 VDC	0.016	0.3	n/a	n/a	20

Inlet Static Pressure 20Pa - CSS24-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.188	2.8	1.9	1.3	32
75% Open	7.5 VDC	0.183	2.7	1.8	1.3	31
50% Open	5 VDC	0.120	2.0	1.2	0.6	28
25% Open	2.5 VDC	0.043	0.7	n/a	n/a	25
20% Open	2 VDC	0.035	0.6	n/a	n/a	23
Min Position	0 VDC	0.021	0.3	n/a	n/a	21

Inlet Static Pressure 25Pa - CSS24-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.208	3.2	2.3	1.6	36
75% Open	7.5 VDC	0.202	3.1	2.1	1.4	34
50% Open	5 VDC	0.134	2.2	1.3	0.7	29
25% Open	2.5 VDC	0.049	0.8	n/a	n/a	26
20% Open	2 VDC	0.040	0.7	n/a	n/a	25
Min Position	0 VDC	0.024	0.3	n/a	n/a	21

Inlet Static Pressure 30Pa - CSS24-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.232	3.4	2.5	1.8	42
75% Open	7.5 VDC	0.225	3.3	2.4	1.7	37
50% Open	5 VDC	0.148	2.3	1.5	0.8	30
25% Open	2.5 VDC	0.054	0.8	n/a	n/a	27
20% Open	2 VDC	0.044	0.7	n/a	n/a	25
Min Position	0 VDC	0.027	0.5	n/a	n/a	22

Inlet Static Pressure 40Pa - CSS24-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.265	3.6	2.8	2.1	50
75% Open	7.5 VDC	0.255	3.5	2.7	2.0	48
50% Open	5 VDC	0.173	2.7	1.8	1.1	35
25% Open	2.5 VDC	0.063	1.0	n/a	n/a	27
20% Open	2 VDC	0.051	0.8	n/a	n/a	26
Min Position	0 VDC	0.032	0.6	n/a	n/a	23

***Note**

The air volume performance for VAV diffusers is dependant on static pressure behind the diffuser being maintained.

CSS-VAV-LP 600 24 – Performance Data

Inlet Static Pressure 13Pa - CSS24-VAV-250-LP						
Damper Position	Actuator Signal	Flow m³/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.157	2.5	1.6	0.9	31
75% Open	7.5 VDC	0.148	2.4	1.6	0.9	30
50% Open	5 VDC	0.102	1.4	0.8	n/a	27
25% Open	2.5 VDC	0.040	0.7	n/a	n/a	24
20% Open	2 VDC	0.030	0.5	n/a	n/a	22
Min Position	0 VDC	0.020	0.3	n/a	n/a	21

Inlet Static Pressure 20Pa - CSS24-VAV-250-LP						
Damper Position	Actuator Signal	Flow m³/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.193	2.9	2.0	1.3	33
75% Open	7.5 VDC	0.185	2.7	1.8	1.3	31
50% Open	5 VDC	0.127	2.1	1.2	0.6	29
25% Open	2.5 VDC	0.048	0.8	n/a	n/a	26
20% Open	2 VDC	0.041	0.7	n/a	n/a	24
Min Position	0 VDC	0.025	0.4	n/a	n/a	22

Inlet Static Pressure 25Pa - CSS24-VAV-250-LP						
Damper Position	Actuator Signal	Flow m³/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.219	3.3	2.4	1.7	37
75% Open	7.5 VDC	0.206	3.1	2.1	1.4	34
50% Open	5 VDC	0.144	2.3	1.4	0.8	30
25% Open	2.5 VDC	0.057	0.9	n/a	n/a	27
20% Open	2 VDC	0.048	0.8	n/a	n/a	26
Min Position	0 VDC	0.028	0.5	n/a	n/a	22

Inlet Static Pressure 30Pa - CSS24-VAV-250-LP						
Damper Position	Actuator Signal	Flow m³/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.241	3.4	2.5	1.8	44
75% Open	7.5 VDC	0.229	3.3	2.4	1.7	37
50% Open	5 VDC	0.158	2.5	1.6	0.9	32
25% Open	2.5 VDC	0.065	1.0	n/a	n/a	28
20% Open	2 VDC	0.053	0.8	n/a	n/a	27
Min Position	0 VDC	0.031	0.5	n/a	n/a	23

Inlet Static Pressure 40Pa - CSS24-VAV-250-LP						
Damper Position	Actuator Signal	Flow m³/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.279	3.7	2.8	2.2	50
75% Open	7.5 VDC	0.259	3.5	2.7	2.0	48
50% Open	5 VDC	0.185	2.9	2.0	1.3	36
25% Open	2.5 VDC	0.076	1.2	0.3	n/a	29
20% Open	2 VDC	0.063	1.0	n/a	n/a	27
Min Position	0 VDC	0.036	0.6	n/a	n/a	24

***Note**

The air volume performance for VAV diffusers is dependant on static pressure behind the diffuser being maintained.

Performance Data – CSS-VAV-LP 600 48

Inlet Static Pressure 13Pa - CSS48-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.153	2.5	1.7	1.1	28
75% Open	7.5 VDC	0.147	2.4	1.7	1.1	27
50% Open	5 VDC	0.093	1.8	1.2	0.7	26
25% Open	2.5 VDC	0.035	0.8	n/a	n/a	22
20% Open	2 VDC	0.028	0.5	n/a	n/a	21
Min Position	0 VDC	0.018	0.4	n/a	n/a	20

Inlet Static Pressure 20Pa - CSS48-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.190	2.9	1.9	1.4	31
75% Open	7.5 VDC	0.185	2.8	1.8	1.4	30
50% Open	5 VDC	0.122	1.9	1.4	0.8	26
25% Open	2.5 VDC	0.044	1.5	0.5	n/a	23
20% Open	2 VDC	0.036	0.8	n/a	n/a	22
Min Position	0 VDC	0.023	0.4	n/a	n/a	21

Inlet Static Pressure 25Pa - CSS48-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.210	3.3	2.2	1.6	33
75% Open	7.5 VDC	0.204	3.1	2.1	1.5	32
50% Open	5 VDC	0.136	2.1	1.6	1.0	27
25% Open	2.5 VDC	0.050	1.6	0.6	n/a	24
20% Open	2 VDC	0.042	1.5	0.5	n/a	23
Min Position	0 VDC	0.026	0.5	n/a	n/a	22

Inlet Static Pressure 30Pa - CSS48-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.234	3.7	2.6	1.9	35
75% Open	7.5 VDC	0.227	3.5	2.4	1.7	33
50% Open	5 VDC	0.150	2.5	1.8	1.2	29
25% Open	2.5 VDC	0.056	1.6	0.6	0.3	25
20% Open	2 VDC	0.046	1.5	0.5	n/a	24
Min Position	0 VDC	0.029	0.8	n/a	n/a	22

Inlet Static Pressure 40Pa - CSS48-VAV-200-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.267	3.9	3.0	2.3	40
75% Open	7.5 VDC	0.257	3.8	2.9	2.2	39
50% Open	5 VDC	0.175	2.7	1.8	1.4	32
25% Open	2.5 VDC	0.064	1.6	0.7	0.3	26
20% Open	2 VDC	0.052	1.6	0.6	n/a	25
Min Position	0 VDC	0.033	0.8	n/a	n/a	23

***Note**

The air volume performance for VAV diffusers is dependant on static pressure behind the diffuser being maintained.

CSS-VAV-LP 600 48 – Performance Data

Inlet Static Pressure 13Pa - CSS48-VAV-250-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.174	2.7	1.8	1.4	31
75% Open	7.5 VDC	0.161	2.6	1.7	1.2	29
50% Open	5 VDC	0.110	1.8	1.3	0.8	26
25% Open	2.5 VDC	0.041	1.5	0.5	n/a	23
20% Open	2 VDC	0.032	0.8	n/a	n/a	22
Min Position	0 VDC	0.020	0.4	n/a	n/a	20

Inlet Static Pressure 20Pa - CSS48-VAV-250-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.216	3.4	2.3	1.6	32
75% Open	7.5 VDC	0.203	3.1	2.1	1.5	31
50% Open	5 VDC	0.139	2.3	1.7	1.1	27
25% Open	2.5 VDC	0.052	1.6	0.6	n/a	24
20% Open	2 VDC	0.040	1.4	0.5	n/a	23
Min Position	0 VDC	0.025	0.5	n/a	n/a	22

Inlet Static Pressure 25Pa - CSS48-VAV-250-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.243	3.8	2.7	2.0	35
75% Open	7.5 VDC	0.225	3.5	2.4	1.7	32
50% Open	5 VDC	0.156	2.5	1.8	1.2	29
25% Open	2.5 VDC	0.061	1.6	0.7	0.3	25
20% Open	2 VDC	0.047	1.5	0.5	n/a	24
Min Position	0 VDC	0.028	0.8	n/a	n/a	22

Inlet Static Pressure 30Pa - CSS48-VAV-250-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.267	3.9	3.0	2.3	40
75% Open	7.5 VDC	0.245	3.8	2.7	2.0	35
50% Open	5 VDC	0.171	2.7	1.8	1.3	31
25% Open	2.5 VDC	0.067	1.7	0.7	0.3	26
20% Open	2 VDC	0.051	1.6	0.6	n/a	25
Min Position	0 VDC	0.031	0.8	n/a	n/a	23

Inlet Static Pressure 40Pa - CSS48-VAV-250-LP						
Damper Position	Actuator Signal	Flow m^3/s	Throw (m) at Vt(m/s)			NC
			0.25	0.5	0.75	
100% Open	10 VDC	0.307	4.2	3.3	2.6	47
75% Open	7.5 VDC	0.285	3.9	3.0	2.3	43
50% Open	5 VDC	0.198	3.1	2.1	1.5	34
25% Open	2.5 VDC	0.079	1.7	1.1	0.7	29
20% Open	2 VDC	0.063	1.6	0.7	0.3	25
Min Position	0 VDC	0.035	0.8	n/a	n/a	23

***Note**

The air volume performance for VAV diffusers is dependant on static pressure behind the diffuser being maintained.