



CEILING UNIT FLUSHLINE BCAa

- FLUSHLINE BCAa is a complete climate control system offering great flexibility.
- Ideal for large areas with large cooling requirements.
- Integrated in a suspended ceiling to give a harmonious appearance.
- Compatible with standard T-profiles.

FUNCTION

- Cooling (BCAa A).
- Cooling and heating (BCAa AB).

AREAS OF APPLICATION

FLUSHLINE BCAa is suitable for all types of rooms cooled using water as the heat transfer medium:

- Offices and conference rooms
- Hotels
- Lecture theatres
- Computer rooms
- Banks
- Restaurants





KEY FIGURES

Cooling effect:	170 W/m (Δt _{mk} = 10°C, height 315).
Heating effect:	115 W/m (Δt _{mv} = 30°C).
Lengths:	From 1.2 m to 3.9 m.
Width:	592 mm (module 600).
Height:	233 mm and 315 mm.
Control unit:	Per room or centrally. Stifab Farex Control System, see separate brochure.

ADVANTAGES OF FLUSHLINE BCAa

- FLUSHLINE BCAa is a ceiling unit supplied complete for integration in a suspended ceiling.
- As with all other Stifab Farex products for ceiling mounting, FLUSHLINE BCAa is equipped with a full length lower section, for condensation and draught protection.
- All essential suspension fittings (excluding screws for fastening to slabs) are supplied with each unit.

FUNCTION

Cooling: When cooling is required the coolant circuit valve is opened and chilled water flows through the battery. The indoor air is fed, using convection by gravitation, through the unit and removes the excess heat.

Radiant heating: BCAa supplemented with a radiant lower section connected to the heating circuit. The heated water flows through the copper pipes that are connected to the extruded aluminium lower section and heats the room. The exchange of heat primarily takes place through radiation.

The control system should be designed with a neutral zone $(2^{\circ}C)$, to avoid simultaneous heating and cooling. Refer to the separate Control System brochure.

INSTALLATION

FLUSHLINE BCAa is designed to fit in standard support bars with a 600 mm modular measurement and with T-profiles that are 24 mm wide. FLUSHLINE BCAa is not suitable for 12 mm T-profile.

DESIGN

FLUSHLINE BCAa is made of enamelled sheet steel. Visible components are enamelled in Stifab Farex standard white RAL 9010 max $\Delta E = 1.0$ gloss value 30±6.

The cooling battery is made up of copper pipes with aluminium fins.

The radiant bottom section, where applicable, is made of extruded aluminium with fixed copper pipes.

Suspension consists of a ceiling bracket and drop rods. It can be adjusted laterally and vertically.

Max. recommended operating pressure:	600 kPa
Max. recommended test pressure for testing completed installations:	900 kPa
	1200

Min. recommended water temperature: +13°C

Max. recommended water temperature: +90°C

The cooling water temperature should be selected so that the system operates without condensation.



STANDARD MODELS

BCAa A:	Ceiling unit with cooling.						
BCAa AB:	Ceiling	Ceiling unit with cooling and heating.					
Colour:	RAL 90	RAL 9010 max. $\Delta E = 1.0$ gloss value 30±6					
Width:	592 m	592 mm.					
Height:	231 mm.						
Length:	Exact lengths in mm:						
	1188	1488	1788	2088	2388		
	2688	2988	3288	3588	3888		

Connection

Cooling: Plain pipe ends Cu Ø 15 x 0.5 mm.

Heating: Plain pipe ends $Cu \emptyset 12 \times 1.0 \text{ mm.}$ Note, intense heating of the connection pipes can damage the internal solder joints, consequently brazing is not permitted.

The units are supplied with Installation set M9 (threaded bars and ceiling brackets without screws for securing to the slabs).

Variants

Connection

- H = Horizontal from the end.
- I = Internal horizontal.

Internal horizontal connection is adapted for vertical coupling.

Design

In addition to the standard designs the following options are available: G - height 315 mm.

SPECIAL TYPES

Colour

Can be supplied in an optional colour or structured enamel on request.

Design

FLUSHLINE BCAa complete with factory fitted control system. Valves and actuators fitted to the ceiling unit's connections and a room sensor on the unit's under side.

Connections

Factory soldered nipples with connection thread G15, internal or external threads.

Please contact Stifab Farex for further information on special types

Special variants

Stifab Farex has a bank with object adapted special variants in addition to the material shown in the catalogue. Please contact Stifab Farex for further information.

ACCESSORIES

Installation fitting M95

The four threaded bars in installation set M9 are replaced by double threaded bars interconnected with a thread lock. See illustration and measurement table to the right.











Accessories



Installation fitting M9S

Installation	Threaded	Maximum
fitting	bar length	drop rod length
M9S-200	200	360
M9S-500	500	960
M9S-900	900	1760

Measurement table Installation fittings M9S

PROJECT PLANNING

1. Cooling capacity calculation

Using the Stifab Farex heat balance software FARCLIM a designer can produce an assured basis for calculating the capacity requirement.

2. Installation area

See "The Project Planning Guide" under "Installation spacing" overleaf.

3. Physical limits of contract

The installation of FLUSHLINE BCAa is easy to specify. The physical limit of contract is the point where the supply and return are connected to the cooling and heating medium systems and the connection sleeves on the air side. All parts in between these points are part of the system order. In order to avoid misunderstandings, contract negotiations should specify the physical limits of contract, preferably with a drawing as the example opposite.

4. Limitation of liability

In projects where FLUSHLINE BCAa is included as a separate contract, it is appropriate that filling, pressure testing and venting be carried out by the pipework contractor. These routines can then be combined with commissioning of the entire system.

5. Recommended limit values

Min. cooling water flow:	0.04 l/s
Min. flow temperature:	+13°C
Temperature increase cooling water:	2–4°C
Min. heating water flow:	0.012 l/s
Highest flow temperature:	+90°C
Temperature reduction heating water:	5–20°C

The cooling water temperature should be selected so that the system operates without condensation.

Max. recommended operating pressure:	600 kPa
Max. recommended testing pressure when testing a completed system:	900 kPa

6. Venting

Attempt to lay supply pipes higher than connections on the ceiling units. This will ensure that any air can be expelled at the min. recommended water flow per loop.

7. Circulated air openings in suspended ceilings

See the "Project Planning Guide" under "Circulated air openings" overleaf.

8. Control System

Permanent room division

There are no plans to utilise the room differently in the future. Several units can be controlled by the same valve, depending on the water velocity and pressure drop.

Flexible room division

The ceiling units and any heaters are equipped with a valve for each module. Units in the same room are connected in parallel.

Flexible room division is the most common method used to build up a control system and is also the preferred option.

9. Stifab Farex room control equipment

Stifab Farex offer a number of options tailored to the product range. See separate documentation or contact Stifab Farex.

Physical limits of contract



Example: BCAa with horizontal connection (H)
RE = Pipework contract

Control



PROJECT PLANNING GUIDE Circulated air openings

It is important that circulated air openings are fitted in the suspended ceiling for the FLUSHLINE BCAa to obtain the correct circulated air flow. Each metre of FLUSHLINE BCAa requires circulated air openings in the suspended ceiling with a net area of at least 0.125m².

Installation spacing

Distance from the ceiling

To ensure air circulation through the ceiling unit the opening (S) between the ceiling unit and the ceiling/slabs should be:

S = 50 mm, if the position of the circulated air opening permits circulated air supply from two sides.

 $\mathsf{S}=\mathsf{75}\;\mathsf{mm},$ if the position of the circulated air opening only permits circulated air supply from one side.

Distance to circulated air openings

The openings should be positioned at least 200 mm from the baffles to prevent circulated air from short circuiting.

Installation square to the perimeter wall To obtain satisfactory results from a convection by gravitation unit it should be installed so that the upwardly directed convection flow in the room is not counteracted by the chilled air from the openings. This normally means for the warm convection flow to interact with chilled air that the unit is fitted square to the perimeter wall.

Installation spacing S = 75 mm, circulated air supply from one side S = 50 mm, circulated air supply from two sides Distance to the ceiling L ≥ 200 mm Distance to circulated air openings Ø ~ Installation square to the perimeter wall

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TECHNICAL SPECIFICATION

Cooling

The capacity is measured in accordance with Nordtest NT VVS 078. In table 1 the stated values are corrected for $q_k = 0.060$ l/s.

Table 1. Cooling capacity Pk (W/m active length), as a function of the mean temperature difference Δt_{mk} (°C).

Diagram 1. The function between the cooling capacity $P_k(W)$, the temperature change $\Delta t_k(^{\circ}C)$ and the cooling water flow $q_k(I/s)$.

Diagram 2. The pressure drop Δp_k (kPa), in the cooling loop as a function of the cooling water flow q_k (l/s).

	Δtm	Δt_{mk} , temp. difference, room – water, °C					
Size	6	7	8	9	10	11	12
2560	70	87	105	124	144	164	186
2560 G-height 315	83	103	124	146	170	193	218





UNITS OF MEASURE

- P: Output in W, kW
- t_r: Room temperature °C
- v: Velocity m/s
- **q:** Flow I/s
- **p:** Pressure Pa, kPa
- tm: Mean water temperature °C

 Δt_m : Temperature difference $\mathbf{I} \mathbf{t_r} - \mathbf{t_m} \mathbf{I} \circ \mathbf{C}$

- Δt : Temperature difference between supply-return °C
- Δp : Pressure drop Pa, kPa

Supplemental index: $_{k}$ = Cooling, $_{v}$ = Heating







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TECHNICAL SPECIFICATION Heating

Table 2. Heating effect P, (W) as a function of the mean temperature difference Δt_{mv} (°C).

Diagram 3. The function between the heating water flow g (l/s), the temperature change $\Delta t_{\rm c}$ (°C) and the heating effect P (W)

Diagram 4. The pressure drop Δp_{μ} (kPa), in the heating loop as a function of the heating water flow g (l/s).

Table 2. Heating effect P	v (WIm),	radiant	lower section
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	_	Heatir	ng effect	at Δt_{mv}		
15	20	25	30	35	40	°C
50	70	90	115	140	165	W/m

Diagram 3. Water flow q_{V} , heating – radiant lower section





EXAMPLE BCAa AB

A shop with the dimensions w x d x h = 10 x 7 x 3.5 m has a cooling requirement of 4700 W and a heating requirement in winter of 2000 W. The air flow should be 200 l/s.

Dimensioned room temperatures: summer 24°C 20°C winter

SOLUTION

Cooling

Supply air that maintains a temperature of 16°C gives 2040 W in cooling effect. Accordingly, FLUSHLINE BCAa shall meet 4700 - 2040 = 2660 W.

Table 1 gives with a cooling water temperature of 13/15 (Δt_{mk} = 10°C) 144 W/m. The required length is 2660/ 144 = 18.5 m. Choose 6 x 3.3 metre lengths for integra-tion in the suspended ceiling. The units are positioned in three rows square to the perimeter wall. $L_{Act} = 3.288 - 0.2 = 3.088$ metres.

Cooling water

Diagram 1 gives the required water flow 0.082 l/s at a ^oC temperature increase. The pressure drop is read from Diagram 2. Each 3.3 metre length gives a pressure drop of 4.5 kPa.

Heating

With a heating water temperature of 53/47°C (Δt_{m} 30°C) the heating effect in **Table 4** is 115 W/m FLUSHLINE, i.e. 379 W per 3.3 metre length.

Heating water

With the heating requirement of 2000 W, Diagram 3 gives the required water flow divided by three circuits as 0.015 l/s per 3.3 metre length. From **Diagram 4** read off the pressure drop, which is 0.57 kPa.

The unit's active length

Horizontal connection from the end (H):
$L_{Act} = L_{Nom} - 200 \text{ (mm)}$
Internal horizontal connection (I):
$L_{Act} = L_{Nom} - 340 \text{ (mm)}$





SPECIFICATION

Ceiling unit system type FLUSHLINE BCAa for cooling and ventilation or cooling, heating and ventilation.

The units are supplied enamelled in Stifab Farex white standard colour RAL 9010 max. $\Delta E = 1.0$ gloss value 30±6.

Limits of contract

Stifab Farex's limits of contract are at the connection points for water (according to the figure under Project Planning Physical limits of contract). At these connection points RE connects to plain pipe ends, fills the system, vents and carries out a pressure test.

The units are supplied with suspension fittings (threaded bars and ceiling brackets excluding screws for securing to slabs).

Specification Product



Design G – height 315 mm



Accessories



WEIGHT

Weight per meter BCAa:

	Design A	Design AB
Dry weight Weight filled with water	15 kg/m 15.6 kg/m	16 kg/m 16.8 kg/m

Order examples:

Ceiling unit with cooling and connection H: BCAa A-2560-2388-H.

Ceiling unit with cooling, heating and connection H: BCAa AB-2560-2388-H.