FRB

Exposed passive chilled beam for suspended installation

QUICK FACTS

- FRB is a passive chilled beam for comfort cooling especially designed for visible/suspended installation in the room.
- High cooling capacity, even when there is a large difference in temperature between the coolant supply and the return temperature.
- A small, compact unit.

Cooling capacity		
Size	P_k (W/m)	ΔT_{mk} (°C)
FRB	252	10

Length: From 1.2 to 3.9 m.

Width: 430 mm.

Height: 133 mm.

Contents

Technical description

Advantages of FRB

- FRB is a very compact passive chilled beam. The low build-in height, plus the fact that water is used as an energy transfer medium, means that the system requires a minimum of space.
- The high performance of this chilled beam means that it maintains high cooling capacity even at low Dt_{mk}, thus making it possible to increase the temperature difference between the flow and return. This gives the product good operating properties and high output efficiency.
- FRB is specially designed for suspended installation. The softened form of the beam means that it blends into the room environments in a natural way.
- FRB is particularly suitable for areas where heating and ventilation have already been installed, and require supplimentary cooling.
- The system has no moving parts, generates no sound and is maintenance free.
- Connection details and valves are easily covered by a neat connection cover. The cover is mounted after that the beam is hanged and connected.

Function

- Cooling

Application

Suitable for all types of room that are cooled with a water based system:

- Offices (cellular offices and open)
- Hotels
- Class rooms
- Conference rooms
- Computer rooms
- Restaurants
- Banks
- Shops

Installation

FRB is designed for suspended installation.

Connection dimensions:
Cooling (water): plain pipe ends Cu Ø12 x 1.0 mm.

Suspension:
The units are equipped with mounting brackets designed for the SYST MS M8 assembly set. The assembly sets are available in various variants to fit various suspended distances. The SYST MS M8 must be specified and ordered separately.

Standard product range held in stock

For particulars of the standard product range held in stock, visit www.swegon.com.

Range available on order

Width:	430 mm.
Length:	From 1.2 to 3.9 in increments of 300 mm.
Colour:	RAL 9003 gloss value 30±6%.
Design:	With horizontal connection at the end-H or with the 300 mm connection area and internal connections –I.

Special models
Colour

FRB is available on request in optional colours.

Function

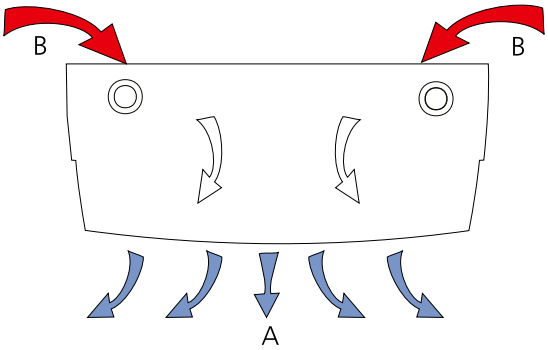


Figure 1. Cooling.A = chilled air
B = warm room air

Assembly

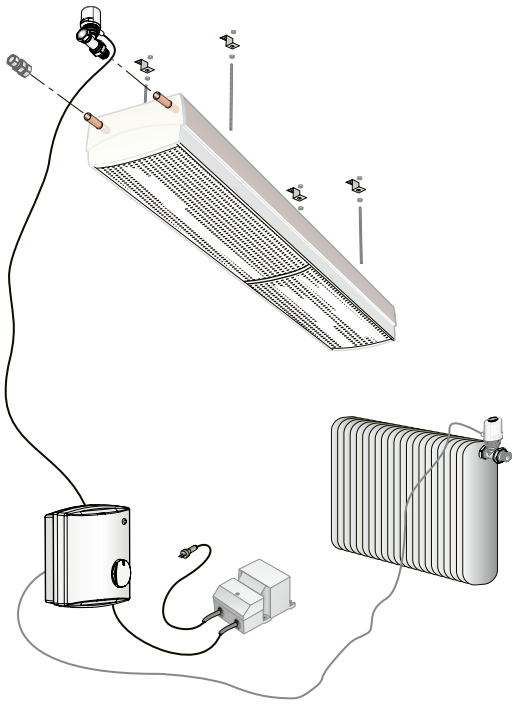


Figure 2. Assembly.

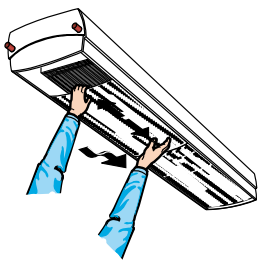


Figure 3. Maintenance, sliding lower section.

Accessories

Connection cover
The connection cover is fitted over the extended section of the chilled beam to conceal the pipe connections.

Flexible connection hose
Flexible hose with either quick connect couplings at both ends for connection to Ø12x1.0 mm pipes or with quick connect coupling at one end and a male thread G20ID for connection to a valve at the other end. Supplied individually.

SYST MS M8 assembly set
The assembly set for suspended installation consists of threaded rods of different length (200; 500 and 1000 mm). Specify the length desired to meet site design requirements. The set also contains plastic sleeves to make the installation more attractive. The necessary ceiling brackets, nuts and washers are included in the supply.

Extended connection pipe
Pipe extension with compression ring coupling at one end for connection to the chilled beam. Supplied in pairs.

Accessories

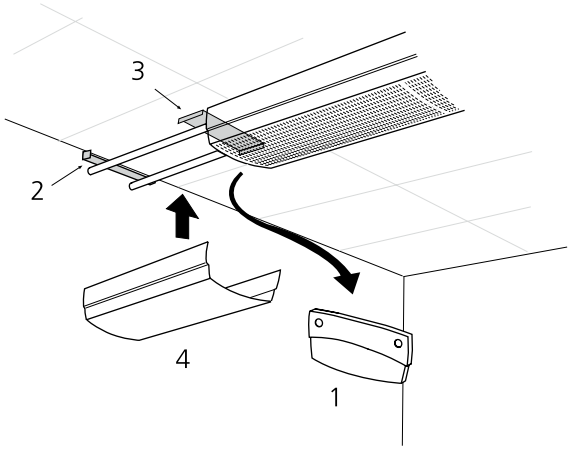


Figure 4. Cover for connection against a wall.
1. Dismount the plastic end cover of the beam.
2. Fasten the wall attachment to the wall.
3. Insert the attachment plate on the top of the beam.
4. Fit the cover into the wall attachment and to the beam. Lock the position of the cover with the attachment plate by pushing the plate back.

Sizing

Cooling

The cooling capacity is measured according to EN 14 518 and is calculated for a constant water flow according to Diagram 2.

Diagram 1. The function between the cooling capacity P_k(W), temperature change ΔT_k (°C) and cooling water flow q_k (l/s).

Diagram 2. The function between the cooling capacity P_k(W) and the cooling water flow q_k (l/s). Different water flow rates affect the output capacity, to a certain degree. By checking the obtained water flow value using diagram 2 the documented capacities in table 1 may, to a certain degree, need to be adjusted upwards or downwards.

Selection guides table 1

The following can be read off from the selection tables:

- Chilled beam's length (m)
- Water cooling capacity P_k(W)
- Pressure drop constant

Units of measurment

P:	Capacity in W, kW
t_r:	Room temperature °C
t_m:	Mean water temperature °C
v:	Velocity m/s
q:	Flow l/s
p:	Pressure Pa, kPa
Δp:	Pressure drop Pa, kPa
ΔT_m:	Temperature difference $[t_r - t_m]$ °C
ΔT:	Temperature difference between supply-return, °C

Supplemental index: k = Cooling

The pressure drop on the water side is calculated according to the formula:
$\Delta p_k = (q_k / k_{pk})^2$ **[kPa]** where:
Δp_k = The pressure drop in the water cirkuit (kPa)
q_k = The water flow (l/s), taken from Diagram 1
k_{pk} = Pressure constant

Recommended limit values -Water

Max. recommended working pressure:	1600 kPa
Max. recommended test pressure when testing the completed installation:	2400 kPa
Min. cooling water flow:	0.03 l/s
Temperate increase cooling water:	2–5°C
Min. supply temperature:	Should always be selected so that the system works without condensation.

Ensures that any air in the system can be expelled at the minimum water flow rate per circuit.

Diagram 1. Water flow - cooling effect.

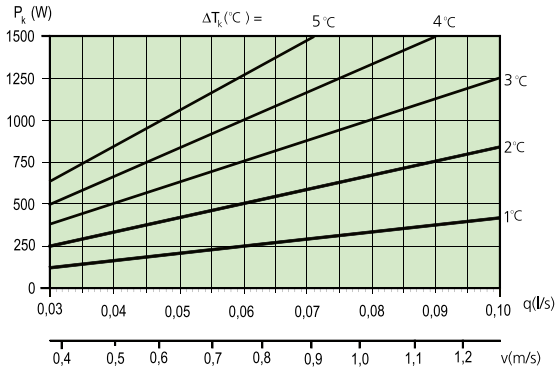
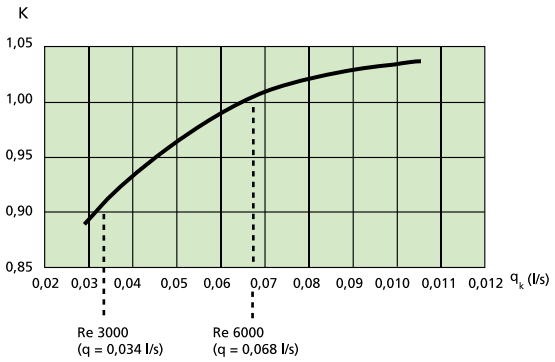


Diagram 2. Water flow - capacity correction.



K = capacity correction factor for FRB.

Table 1. Data - cooling. Selection guide FRB

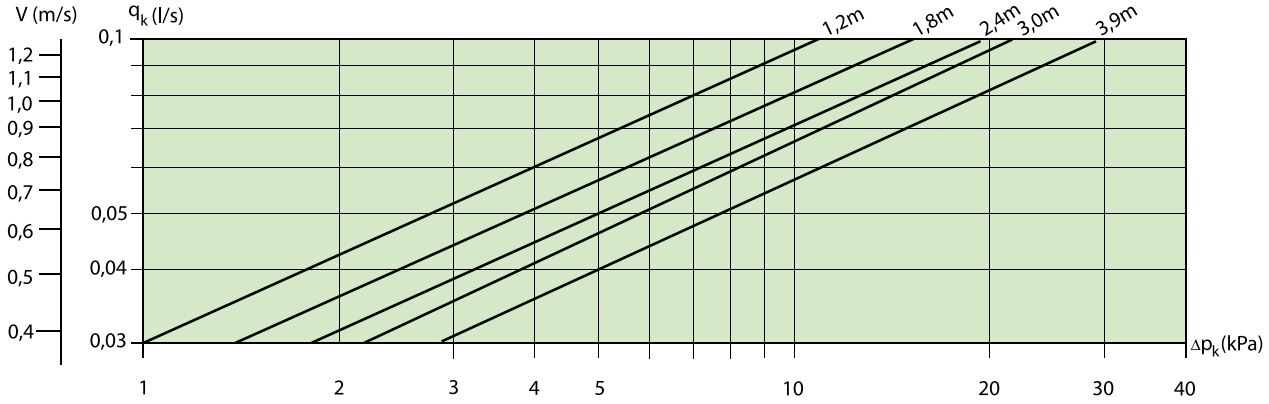
Unit's length	Cooling capacity water (W)								kpk
m	ΔT_{mv}	6	7	8	9	10	11	12	
1,2		130	162	195	230	266	303	342	0,0300
1,5		169	209	251	295	342	390	440	0,0275
1,8		206	255	307	361	418	476	537	0,0255
2,1		244	301	362	426	493	563	635	0,0239
2,4		281	348	418	492	569	649	732	0,0225
2,7		318	394	474	558	645	736	830	0,0214
3,0		356	440	530	623	721	822	927	0,0204
3,3		393	487	585	689	797	909	1025	0,0195
3,6		431	533	641	754	872	995	1122	0,0188
3,9		468	579	697	820	948	1082	1220	0,0181

For variants with a connection section the capacity data is read for the closest previous length.

Pressure drop diagram

Diagram 3. Pressure drop Δp_k(kPa) in the cooling circuit as a function of the cooling water flow q_k(l/s) and unit's length.

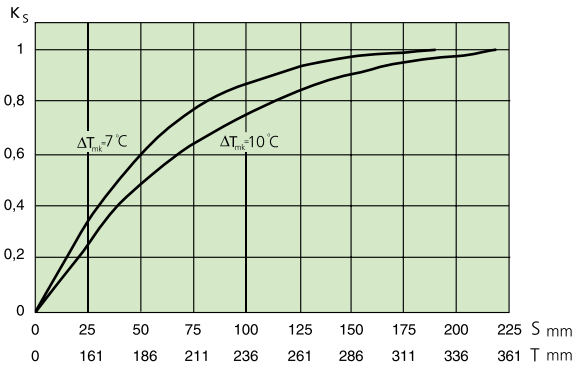
Diagram 3. Pressure drop - water flow.



Circulation air openings

Diagram 4. FRB 430 - the relation between the circulation air openings and the output. The cooling capacity is corrected according to the size of the circulation openings as per the following $P = P_{table2} \cdot K$.

Diagram 4. FRB, reduction factor



S = Ceiling spacing
T = Total installation height including circulation air gap
k_s =Effect reduction factor
The ceiling spacing is valid when there is circulation air from two sides. When there is circulation air only from one side the same effect reduction factors is applied if the ceiling spacing is increased 1,5 times.

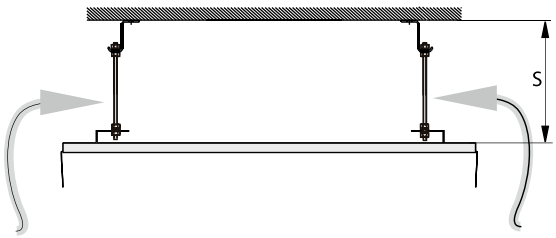


Figure 5. Circulation air openings.With circulation air measurement from one side only the opening "S" is increased by 1.5 times.

Dimensions

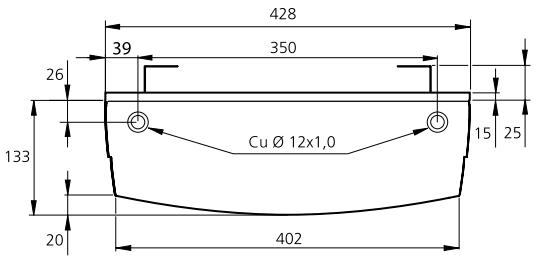


Figure 6.FRB, end view.

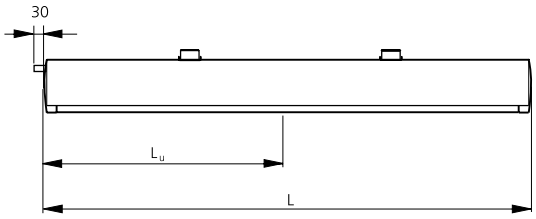


Figure 7. Connection -H, side view.
L = length FRB
Lu = length of lower section's subdivision

Length FRB

Nominal size (m) :	1.2, 1.5, 1.8, 2.1, 2.4, 2.7, 3.0, 3.3, 3.6 and 3.9 m.
Length:	Nominal - 12 mm. (+4/-2)
Size of lower section's subdivision Lu = L/2	

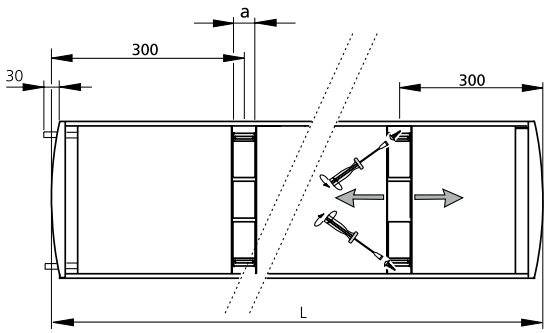


Figure 8. Horizontal connection at the end -H, top view.
a = adjustment allowance suspension fittings 43 mm.

Weight

Weight per metre FRB	
Dry weight	7.3 kg/m
Weight, water-filled	8.0 kg/m

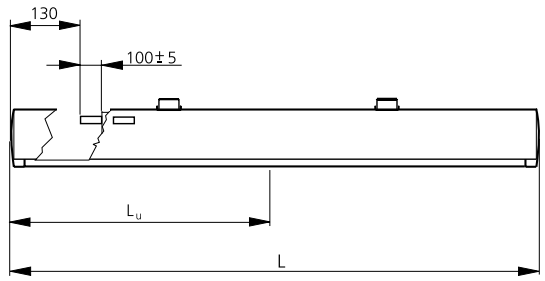


Figure 9. Connection -I, side view.
L = length FRB
Lu = length of lower section's subdivision

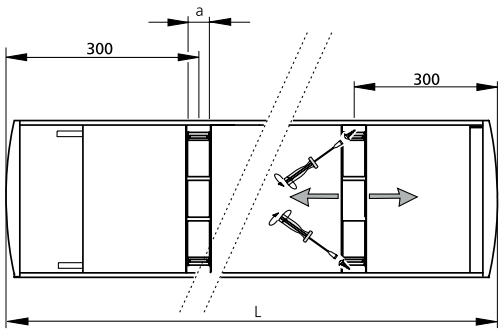


Figure 10. Connection -I, top view.
a = adjustment allowance suspension fittings 43 mm.

Installation measurements

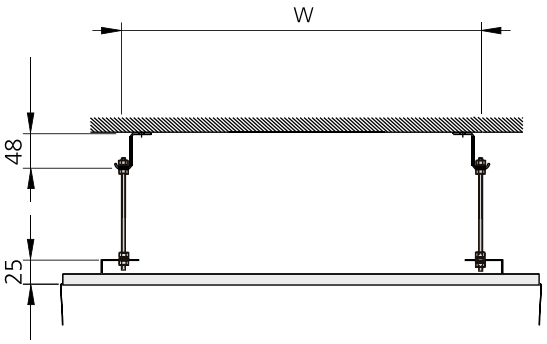


Figure 11. Assembly fittings SYST MS.
FRB: W = 326 mm

Limits of contract

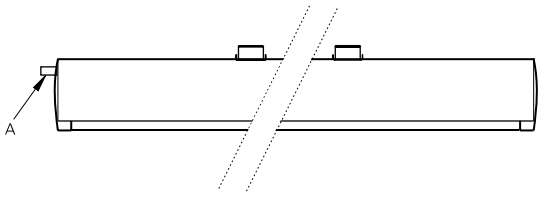


Figure 12.Connection, side view.
A = cooling: the plumbing contractor connections to pipe Cu 12 x 1.0 mm

Specification

Cooling system type FRB for cooling.
The units are supplied enamelled in Swegon white standard colour RAL 9003 gloss value 30 ± 6%.

Limits of contract

Swegon limits of contract are at the connection points for water (in accordance with the **figure 12** under Dimensions - Limits of contract/connection points). At these connection points the plumbing contractor connects to plain pipe ends, fills the system, vents and carries out pressure testing.

The units are supplied exclusive of assembly kits. These are to be ordered separately.

Product

FRB	c-	430-	aaa-	b
Version:				
Size:				
Width 430				
Length:				
1.2, 1.5, 1.8, 2.1, 2.4, 2.7, 3.0, 3.3, 3.6, 3.9 m.				
Connection:				
H = horizontal connection outside the end				
I = connection section, inside				

Accessories

Connection cover	FRB c-	T-KA	430-	bbb
Version				
Type:				
Size: 430				
Length:				
120, 300, 500 and 700				

Loose endplates	FRBT GL	aa-	430
UH = without hole MH = with hole			
Size: 430			

Extension pipe, 2	SYST FR	aaa
Length: 300 or 430 mm		

Assembly set	SYST MS M8	aaaa-	b-	RAL9003
For suspended installation				
Length drop rod:				
200, 500, 1000 mm				
1 = only the drop rod 2 = double drop rods with tread lock				

Flexible connection hose (1)	SYST FH F1	aaa-	12
compression ring on pipe (Ø12 mm)			
Length:			
300, 500 and 700 mm			

Flexible connection hose (1)	SYST FH F20	aaa-	12
Push-on coupling (Ø12 mm) against pipe on both ends			
Length:			
275, 475 and 675 mm			

Flexible connection hose (1)	SYST FH F30	aaa-	12
Push-on coupling (Ø12 mm) against a pipe on the one end, a G20ID sleeve nut on the other end.			
Length:			
200, 400 and 600 mm			

Explanatory text

Example of the explanatory text.
Swegon passive chilled beam FRB for individually suspended installation on ceilings, with the following functions:

- Cooling
- For individually suspended installation
- Connection section (optional)
- Low build-in height
- Sliding lower section
- The units delivered enamelled in white standard finish RAL 9003
- Limit of contract at connection points for water according to principal drawing.
- At connection points the plumbing contractor connects to plain pipe ends, cooling 12 x1.0 mm.
- The plumbing contractor fills, vents and pressure tests and bears responsibility that the planned water flow reaches each system branch and beam.

Accessories:

- Assembly set SYST MS M8 aaaa - b - RAL9003 xx, qty
- Flexible connection hose SYST FH F1 aaa- 12 xx, qty etc.

Size:
KB XX-1 FRB c - 430 - aaa - b xx, qty
KB XX-1 FRB c - 430 - aaa - b xx, qty
etc.

- Control equipment, see separate section in the catalogue Indoor Climate Systems