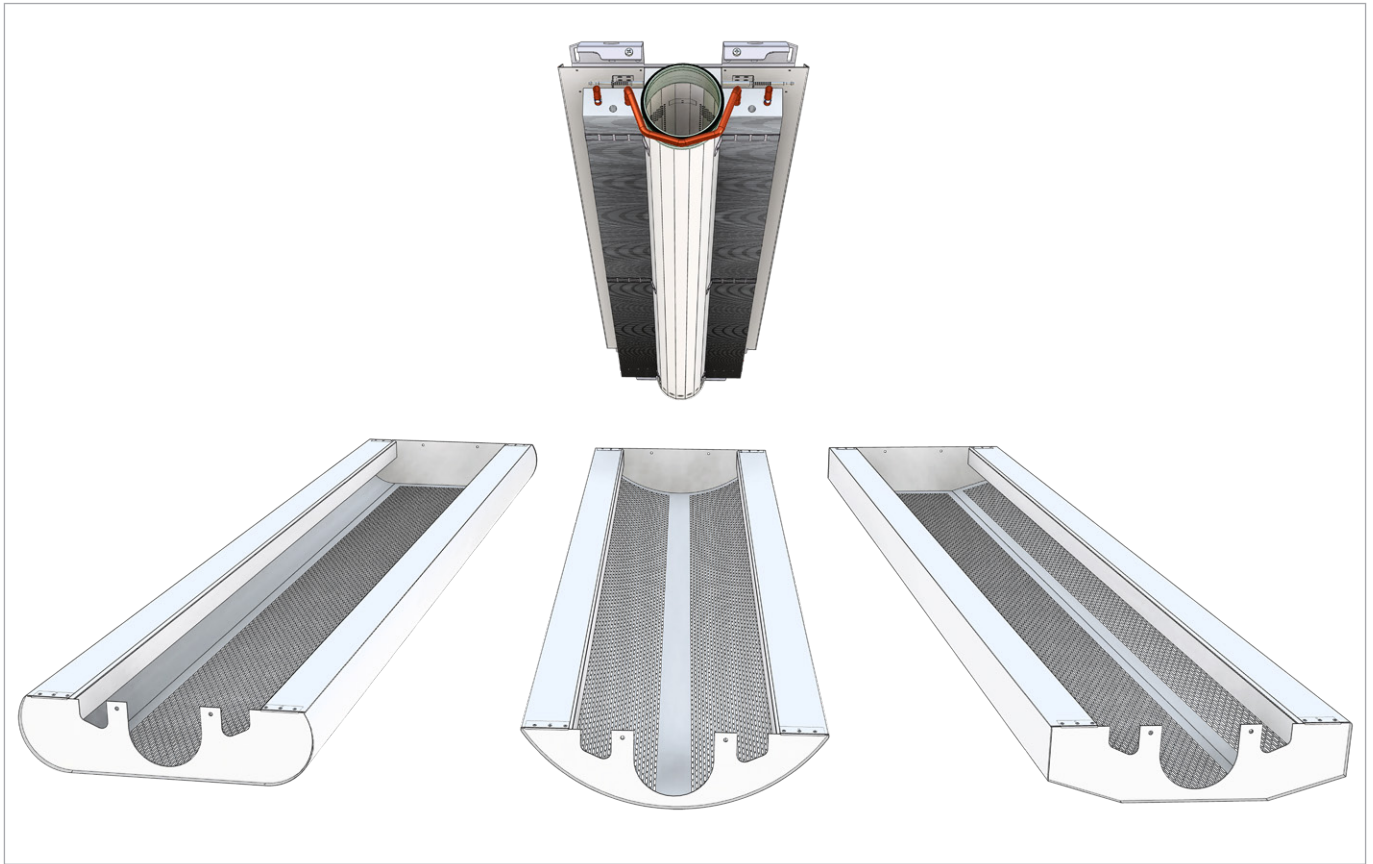# Lindab **Architect**

Active chilled beam

Lindab®

Active chilled beam

Architect

Picture 1. Architect Circum, Luna and Prisma.

Introduction

Architect is a flexible and aesthetical, free hanging active chilled beam, designed to deliver a great flexibility and a perfect indoor climate. With three different designs, the Architect Circum, Luna and Prisma can fit any layout design.

Worth noting

Architect features the Lindab JetCone, an innovative way of regulating the air volume. The air volume can easily be adjusted without having to worry about pressure and noise issues.

The Angled Nozzles system secures a perfect air spread pattern, available in a number of factory preset angles.

The beam can be easily integrated/used in a Pascal water system to enable VAV/DCV.

Lindabs active chilled beams are Eurovent-certified and tested according to EN-15116.

Key figures

Length: 1200 - 3000 [mm] (in steps of 100 [mm])
Width: 497 - 523 [mm] (design specific)
Height: 175 [mm]
Capacity: 1384 [W]

Calculation setup
Room temp: 25 [°C],
Water temp: 14-17 [°C],
Air temp: 18 [°C],
Nozzle air pressure: 80 [Pa],
Air flow: 15 [l/s/m]

Active chilled beam

Architect

Highly flexible active chilled beam

The Architect delivers great cooling and ventilation in an architectural, free hanging wrapping.

Equipped with the market leading Lindab JetCone technology, the Architect delivers a precision in air volume handling, only known to Lindab products.

Many mounting possibilities

With the mounting options, Ceiling, Wall, or Free hanging, the Architect will fit any mounting need.

Designed for visible mounting, the Architect can be fitted on any plane surface, or even freely suspended, with a perfect result.

To hide the air duct and water pipes, the Lindab Architect can be delivered with a Connection Cover (Available in any length up to 3600 mm), in order to perfect the overall design in the room.

Lindab Pascal Water Solution VAV/DCV combined with active chilled beams

For an extra energy- and cost saving and environmentally friendly ventilation and cooling system, the Lindab Pascal Water solution should be applied. The Pascal solution will optimize the ventilation, cooling, heating and even lighting for a perfect indoor climate at the lowest running cost by combining the active chilled beam with VAV (Variable Air Volume) or DCV (Demand Controlled Ventilation) technique.

Please refer to: Pascal Water Solutions

Freedom of design

With three different designs, the Architect Luna, Prisma and Circum can fit any layout design. Project specific adaption based on the actual design of the building is also possible when using the Lindab Architect Luna, Prisma and Circum beam (special).
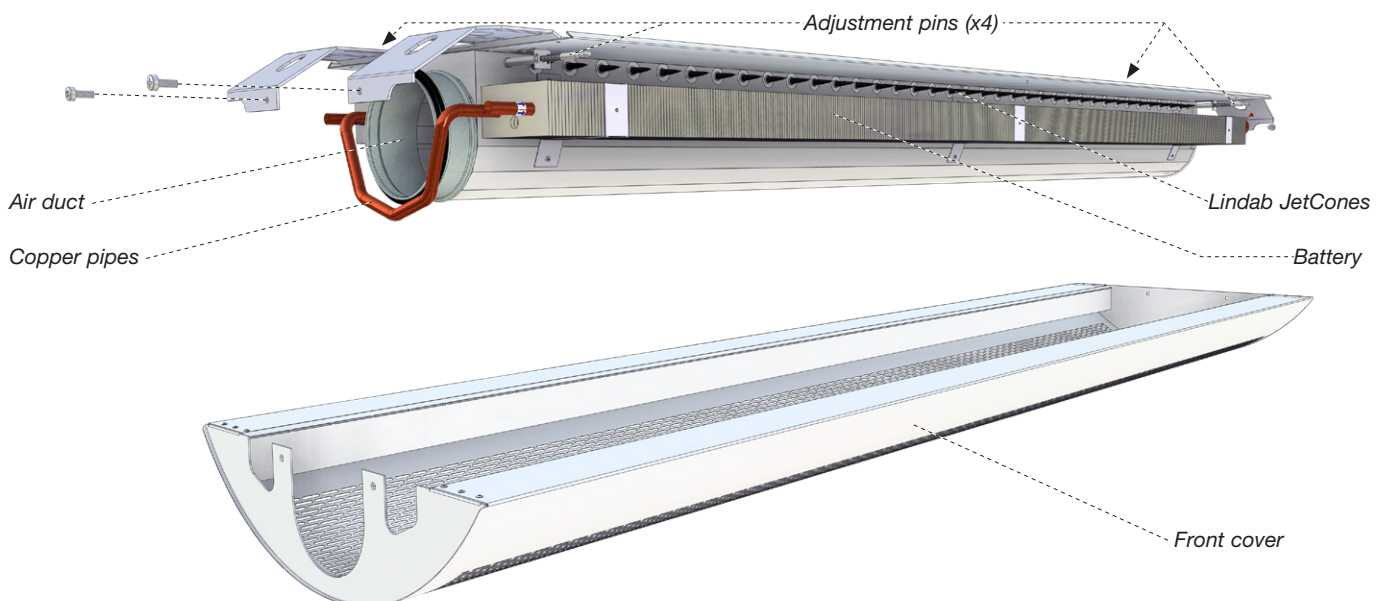
As the beam consists of an independent body and an interchangeable faceplate, the initial installation of the beam can be carried out, before the design of the faceplate is decided.

Perforation pattern

The beam is available in two perforation pattern Slot 50% (standard) and Dotx2 50% (plus feature).

Slot 50%   *Dotx2 50%*
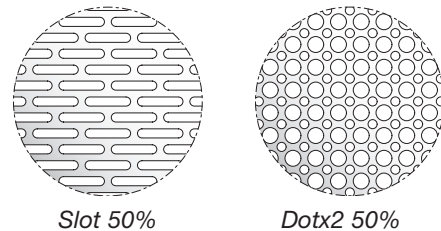
Picture 2: Perforation pattern

Picture 3. Architect body with battery and JetCone system and front cover Circum.

Active chilled beam

Architect

JetCones and angled nozzles

The opening size of the nozzles can be adjusted, by operating the adjustment pins in each corner of the beam. The air distribution can also be adjusted, to achieve different amounts of air on either side of the beam, or to achieve an asymmetrical air pattern along the side of the beam. All thanks to our patent pending JetCone system.

Architect Luna, Prisma and Circum are fitted with the JetCone air volume adjustment technology. The JetCone technology provides a market leading flexibility, with the possibility of adjusting the air diffusion pattern and air volume according to air pressure.

Adjustment is made by changing the positions of the four adjustment pins. The adjustment pins can be set in any of the 10 steps, thereby offering a total of 40 different settings. The adjustment is done without any tools, making adjustments a fast and easy process.

The Lindab Angled Nozzles system successfully combines the Jetcone air volume adjustment with a preset air spread pattern. The combination of the Jetcone and the Angled Nozzles systems results in reduced throw lengths and optimized air volume regulation.

The fast adjustment system offers a unique opportunity within planning, as the air flow can be adjusted at any point after ordering.

Presetting Angled Nozzles

To achieve a desired air spread pattern the beam is delivered with the Angled Nozzles air distribution system. The Angled Nozzles are a simple yet effective way of creating a divergent air spread pattern without the capacity issues normally related to an air deflector system. The Angled Nozzles can be delivered preset in one of the following standard settings:

    30° (default setting)
    16°
    10°

NB! Please note that the Angled Nozzles are manufactured in a fixed position (default 30°) and cannot be retrofitted or changed.

JetCone adjustment pins (x4)
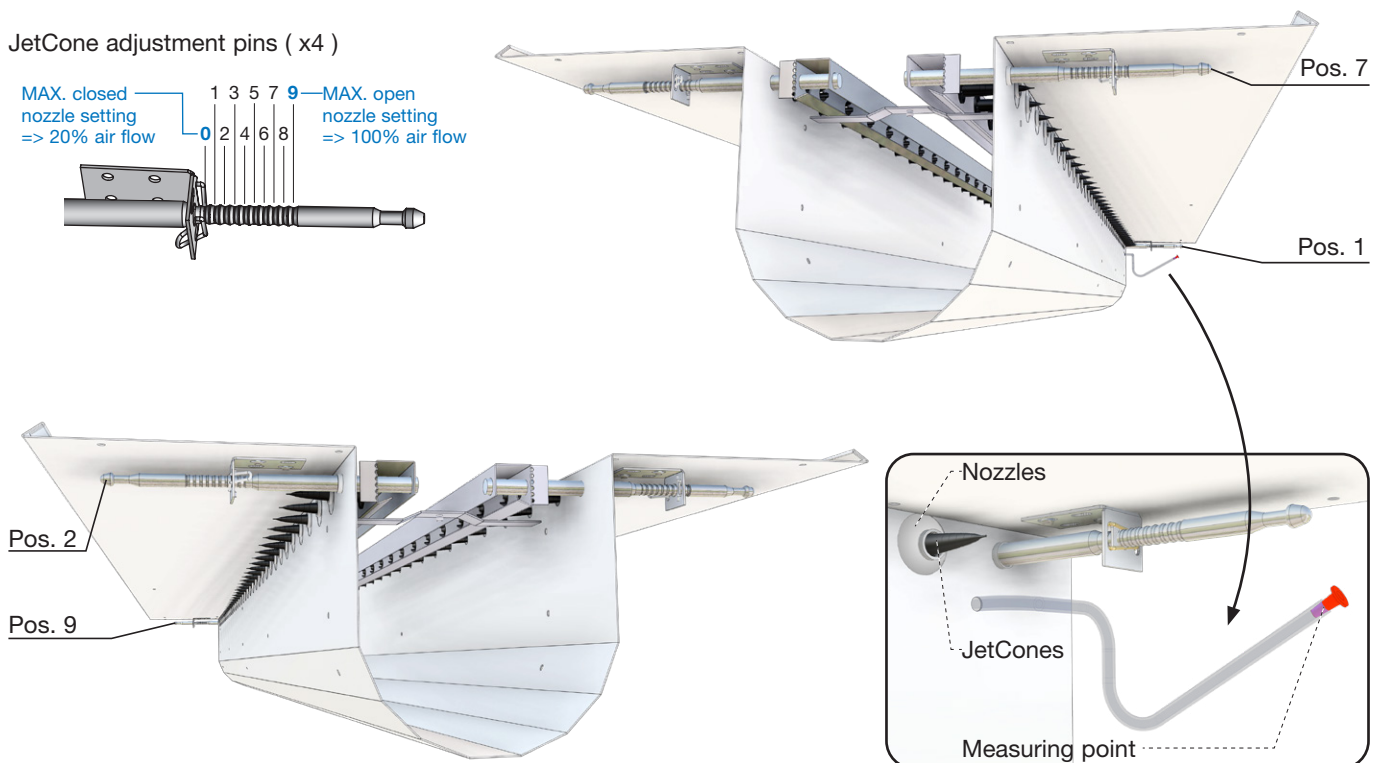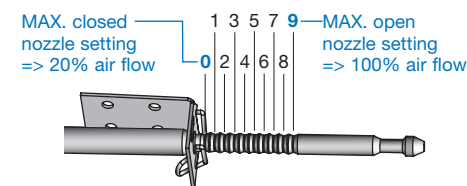
Picture 4. Architect Lindab's JetCone air volume adjustment system.

Lindab

Active chilled beam

Architect

Data

Variants

Architect is an exposed, 2-way active chilled beam installed as an independent part of any ceiling or as a free hanging beam. Wall mounting also possible. Available in 3 different designs: Luna, Circum and Prisma and is standardly prepared for ventilation and cooling (2-Pipe connection).

Lengths: Architect is available in lengths from:
1.2 [m] to 3.0 [m] (in steps of 0.1 [m]).

Width: According to type between 497 and 523 [mm] (see table 1).

Height: Is 175 [mm] for all different types.

Water connection: The cooling water connections are 12 [mm].

JetCone: The JetCone is a standard feature. The factory pre-settings will be done according to desired pressure [Pa] and supply air flow [l/s] and can be changed easily on site.

Angled Nozzles: The Angled Nozzles are manufactured in a fixed position and cannot be retrofitted or changed (default is 30°).

Air connection: The air connection is horizontal or vertical, Ø125 [mm].

Design: Architect is supplied as standard with perforation Slot 50%, see page 3.

Surface treatment: Architect is manufactured as standard from enamelled sheet metal.

Colour

The product is available as standard, in signal white RAL 9003 or in pure white RAL 9010, gloss value 30. Other RAL colours on request.

Pascal Water Solution

The beam can be easily integrated/used in a Pascal water system to enable VAV/DCV.

Please refer to: Pascal Water Solution documentation.

Plus features

Factory preinstalled.

Heating: The product can be equipped with an additional water circuit, with 12 [mm] connections, in the battery to provide a heating function.

Integrated Regula Secura: Lindab's Regula Secura condensation protection can be installed in the product.

Integrated Regula Connect: The product can be equipped with the Regula Connect connection card. Please see the Regula chapter for further information.

Integrated valve and actuator: A control valve, with variable Kv value, and an actuator can be pre-installed in the product.

Design: Other perforation Dot2x 50% is available on request (see page 3).

Wall installation: Architect can also be mounted horizontally or vertically on to a wall. Contact Lindab for more detailed information.

Extended cover: Where it is installed with a horizontal air and water connection, the product's cover can be extended to conceal the connection pipes. The cover can be produced in lengths of up to 3.6 [m]. The extended underside also includes wall or ceiling attachments. See next page.

Air connection: The beam is available with aditional 125 [mm] connection on the opposite side.

Accessories

Delivered separately.

Control: Refer to the chapter Regula.

Hangers: For recommended installation principles (see: "Architect Installation Instruction").

All these different hangers are available at Lindab:
- pendulum hangers (in different sizes)
- threaded rods M8

For additional accessories please refer to the "Accessories" document on www.lindQST.com.
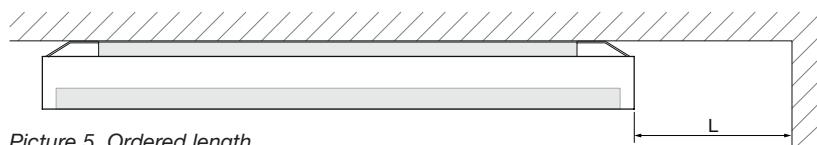
Active chilled beam

Architect

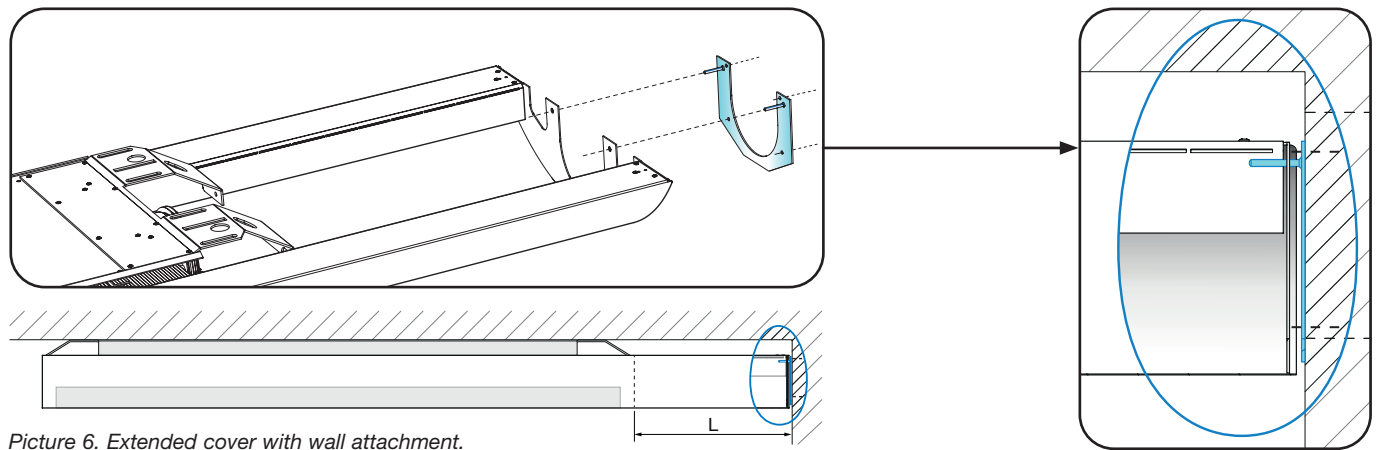## Extended cover / Connection cover

For installation with horizontal air and water connections, the connection pipes can be concealed, using one of three alternative options, depending on the placement and attachment options.

Options

1. Extended cover with wall attachments (see picture 6). Maximum length: 3600 mm (in steps of 1 mm).
2. Extended cover with attachment directly against ceiling (see picture 7). Maximum length: 3600 mm (in steps of 1 mm).
3. Connection cover with attachment directly against ceiling (see picture 8). Maximum length: 3600 mm (in steps of 1 mm).
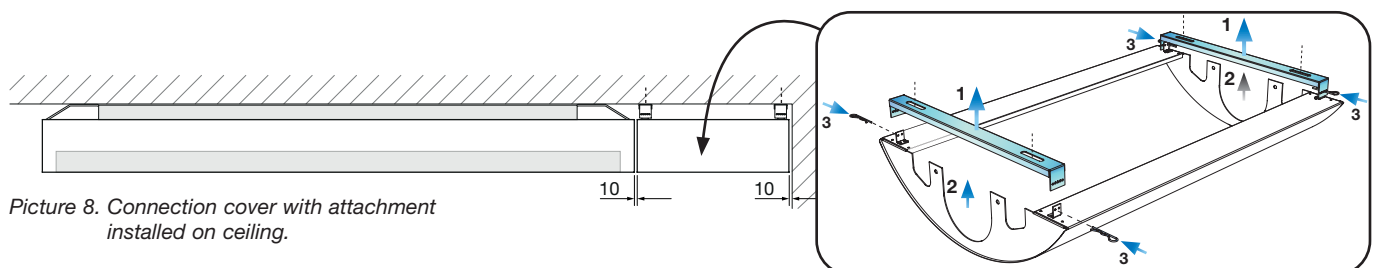

Picture 5. Ordered length.

Picture 6. Extended cover with wall attachment.
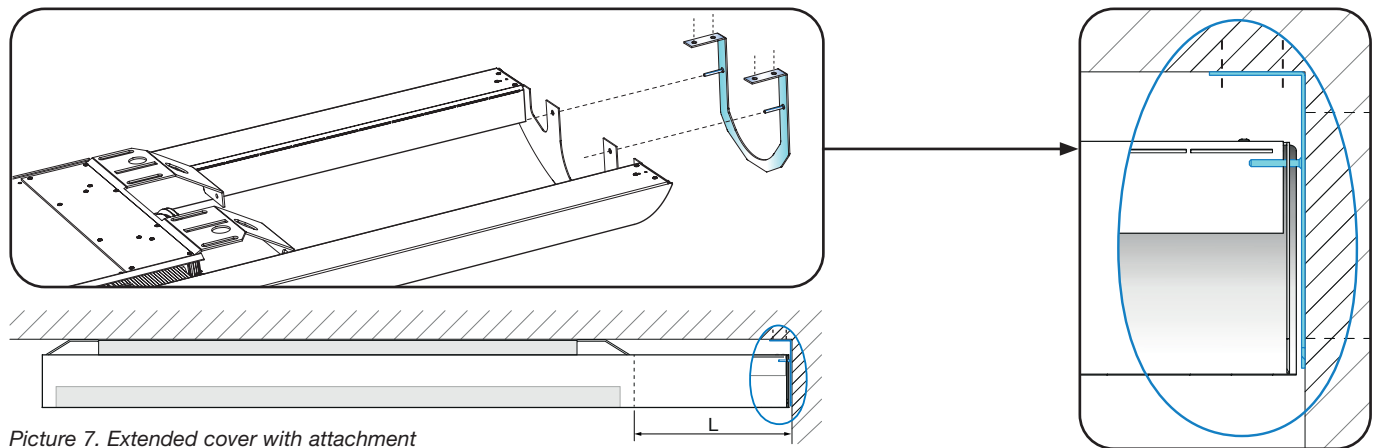
Picture 7. Extended cover with attachment installed on ceiling.

Picture 8. Connection cover with attachment installed on ceiling.

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Active chilled beam

Architect

Dimensioning

Cooling capacity air P_a

1. Start by calculating the capacity required for the room, to keep a certain temperature. Lindab's TEKNOsim is an excellent tool for this.
2. Calculate which cooling capacity, or read in diagram 1, that is supplied by the ventilation air
3. Remaining cooling capacity needs to be cooled by the water circuit in Architect.

The formula for calculating the capacity of the air:
$$P_a = q_{ma} \times c_{pa} \times \Delta t_{ra}$$

Size comparison by $t_r = 25°C$ with:
q_a = Primary air flow rate
P_a [W] = q_a [l/s] x 1.2 Δt_{ra} [K] and
P_a [W] = q_a [m³/h] x 0.33 Δt_{ra} [K]

Minimum flow

Please note that flows below the recommended minimum water flow q_{wmin}, can result in unwanted air in the water pipes. Exceeding the nominal flows is not recommended as the capacity gains will only be minimal.

Pipe diameter	q_{wmin}	q_{wnom}
12 [mm]	0.025 [l/s]	0.038 [l/s]

Definitions:

|	
P_a	= Cooling capacity air [W]
P_w	= Cooling capacity water [W]
P_{tot}	= Cooling capacity total [W]
q_{ma}	= Air mass flow rate [kg/s]
q_a	= Primary air flow rate [l/s]
q_w	= Water flow rate [l/s]
q_{wmin}	= Minimal water flow rate [l/s]
q_{wnom}	= Nominal water flow rate [l/s]
c_{pa}	= Specific heat capacity air [1,004 kJ/kg K]
t_r	= Room air temperature [°C]
t_{wi}	= Water inlet temperature [°C]
t_{wo}	= Water outlet temperature [°C]
Δt_{ra}	= Temp. diff., room air and primary air temp. [K]
Δt_{rw}	= Temp. diff., room air and mean water temp. [K]
Δt_w	= Temp. diff. water circuit [K]
$\varepsilon_{\Delta tw}$	= Capacity correction for temperature
ε_{qw}	= Capacity correction for water flow
P_{Lt}	= Specific cooling capacity [W/(m K)]
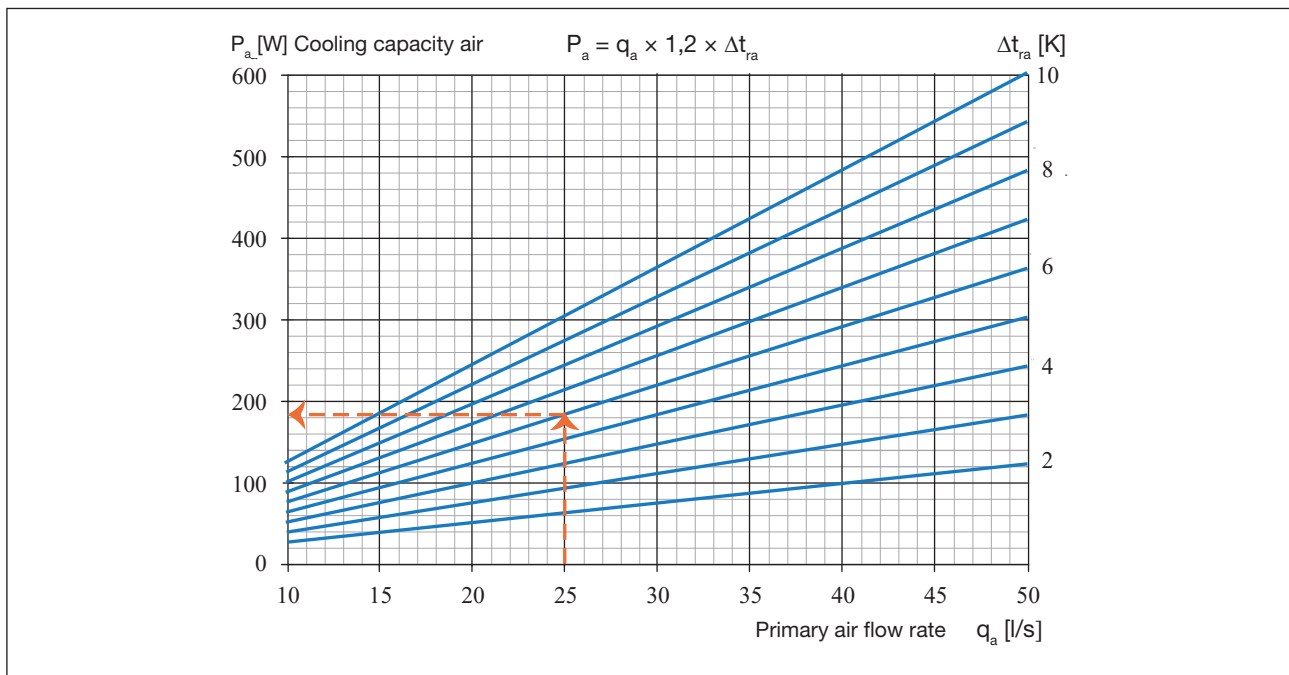
Diagram 1. Cooling capacity air P_a as function of the primary air flow rate q_a. If the air supply flow is 25 [l/s] and the temperature difference of the room air and the supply air is $\Delta t_{ra} = 6$ K, then the Cooling capacity air of the air is 180 [W].

Active chilled beam

Architect

Dimensioning

Cooling capacity water P_w

Follow the instructions below to read off the effect from the diagram.

1. Calculate Δt_{rw}.
2. Product length L minus 0.4 [m], to obtain the active length L_{act}.
3. Divide the primary airflow rate q_a by the active length L_{act}. Enter the result on the lower axis of diagram 2.
4. Follow the flow line to the right pressure, and then read off the specific cooling capacity P_{Lt} per active metre.
5. Multiply the specific cooling capacity that was read off by Δt_{rw} and active length L_{act}.

Example 1 Cooling:

What is the cooling capacity of a 2.4 [m] Architect with 20 [l/s] and pressure of 60 [Pa] ?

The room's summer temperature is assumed to be $t_r = 24.5°C$ The cooling water temperature in/out of the Architect is 14/17 [°C].

Answer:
Temperature difference:
$\Delta t_{rw} = t_r - (t_{wi} + t_{wo})/2$
$\Delta t_{rw} = 24.5 \,[°C] - (14\,[°C] + 17\,[°C])\,/\,2 = 9\,[K]$

Active length:
$L_{act} = 2.4\,[m] - 0.4\,[m] = 2\,[m]$
$q_a\,/\,L_{act} = 20\,[l/s]\,/\,2\,[m] = 10\,[l/(s\,m)]$

Read off, from diagram 2: $P_{Lt} = 31.3\,[W/(m\,K)]$.

Cooling capacity: $P_w = 31.3\,[W/(m\,K)] \times 9\,[K] \times 2\,[m] = 563\,[W]$

NB! The capacity diagram applies for the nominal water flow of $q_{wnom} = 0.038$ [l/s]. To obtain the right cooling capacity P_w for other flows, read off the capacity correction factor ε_{qw} from diagram 3, and then multiply the capacity, which is read off, by this factor as shown in example 2 for heating.
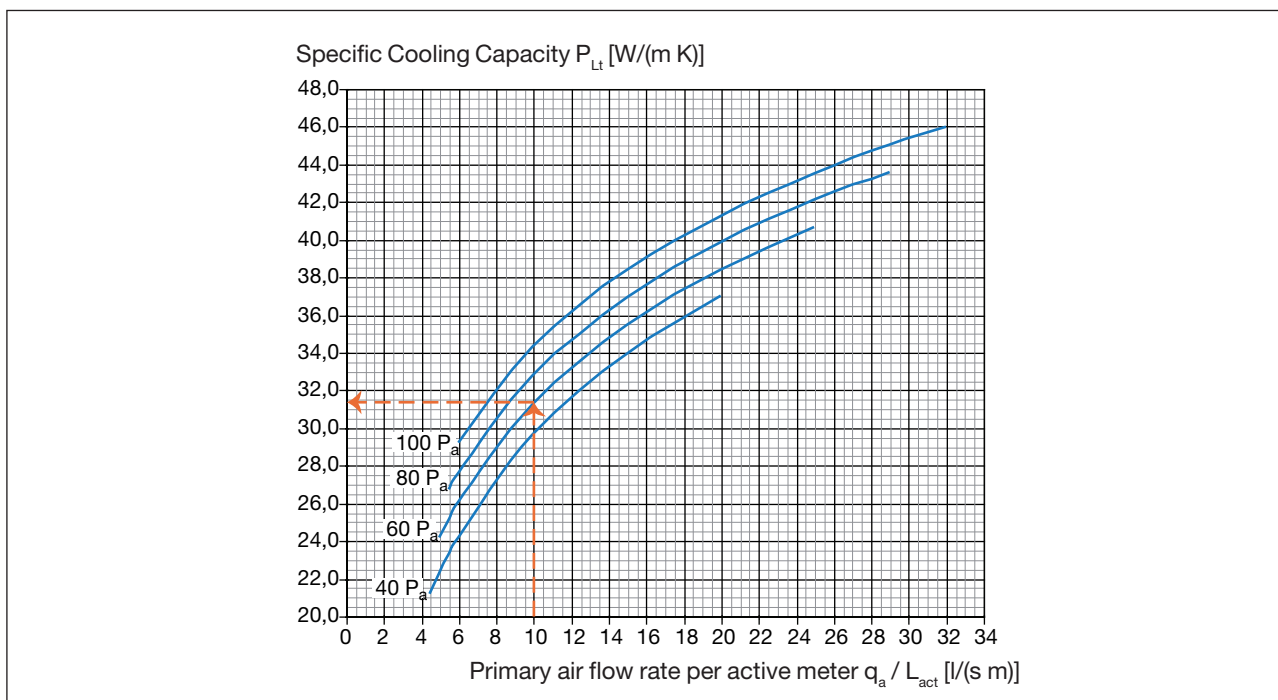

Diagram 2. *Specific cooling capacity P_{Lt} as a function of primary air flow rate per active metre at nozzle pressures of 40, 60, 80 and 100 [Pa].*

Active chilled beam

Architect

Dimensioning

Capacity correction for water flow ε_{qw}

Example 2 Heating:
What is the heating capacity of a 2.4 [m] Architect with 20 [l/s] and pressure of 60 [Pa]?

The room winter temperature is assumed to be t_r = 21 [°C].
The hot water temperature in/out of Architect is 55/47 [°C].

Answer:
Temperature difference:
$\Delta t_{rw} = (t_{wi} + t_{wo})/2 - t_r$
Δt_{rw} = (55 [°C] +47 [°C]) / 2 - 21 [°C] = 30 [K]

Active length:
L_{act} = 2.4 [m] - 0.4 [m] = 2 [m]
q_a / L_{act} = 20 [l/s] / 2 [m] = 10 [l/(s·m)]

Read off, from diagram 2: P_{Lt} = 31.3 [W/(m K)].

Water capacity: P_w = 31.3 [W/(m K)] × 30 [K] × 2 [m] = 1878 [W]

Use the calculated water capacity and calculate the water flow: $q_w = P_w / (c_{pw} \times \Delta t_w)$
q_w = 1878 / (4200 × 8) = 0.056 [l/s]

The capacity correction ε_{qw} will then be 0.743 (see diagram 3) and the new capacity:
P_w = 1878 [W] x 0.743 = 1395 [W]

Using the new heating capacity, a new water flow is calculated: q_w = 1395 [W] / (4200 [Ws/(kg K)] × 8 [K]) = 0.042 [l/s].

Read off the capacity correction ε_{qw} at 0.74 and calculate the capacity: P_w = 1878 [W] x 0.74 = 1390 [W].

Using the new heating capacity, a new water flow is calculated: q_w = 1390 [W] / (4200 [Ws/(kg K)] × 8 [K]) = 0.041 [l/s].

Seeing that the flow is near stabile at this point in the calculation, the heating capacity is calculated to be 1390 [W].
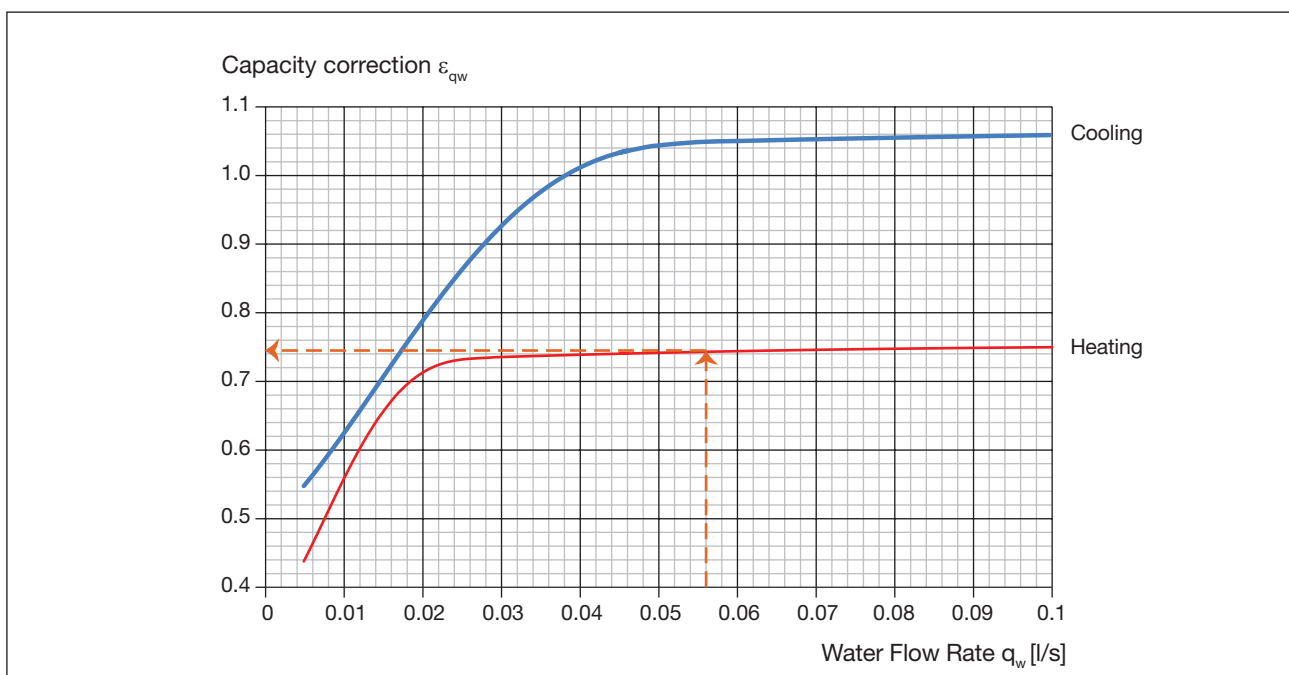

Diagram 3. Capacity correction ε_{qw} for water flow for both cooling and heating.

Active chilled beam

Architect

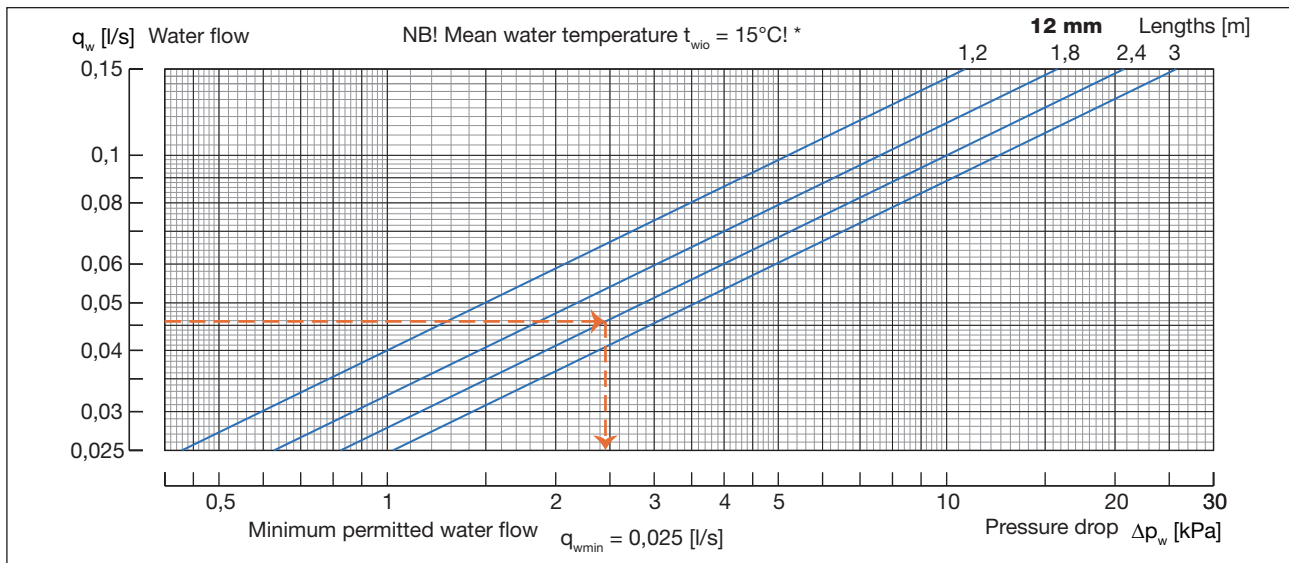## Pressure drop in water circuit, cooling/heating
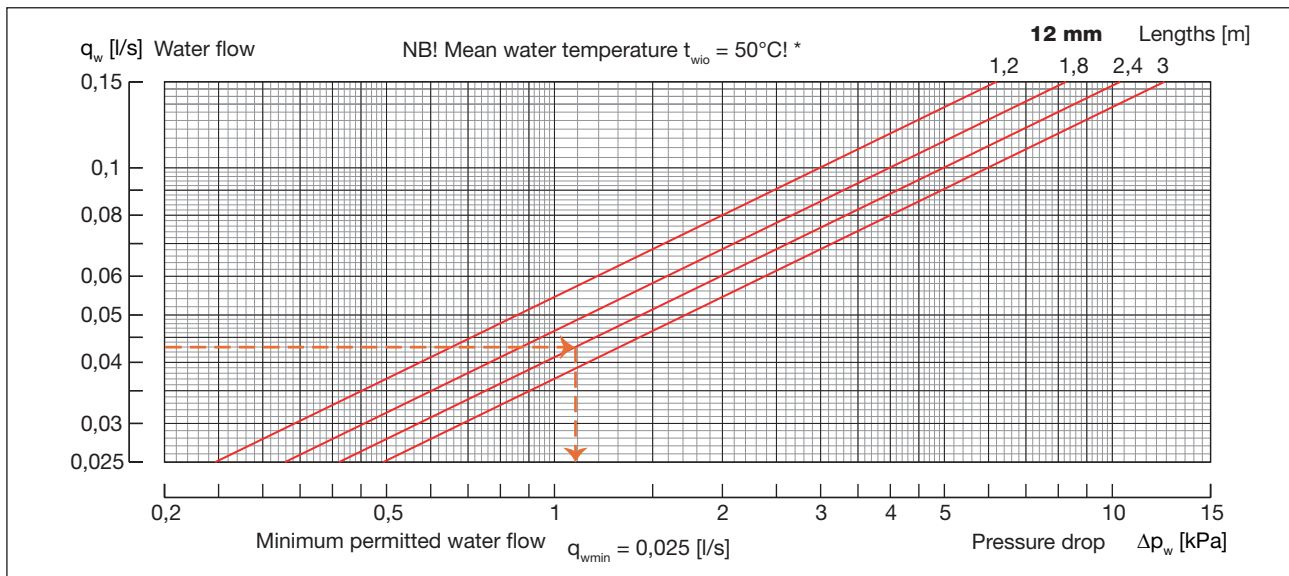

Diagram 4. Pressure drop in water circuit, cooling.

Diagram 5. Pressure drop in water circuit, heating.

Example 3 Cooling:
Architect 2.4 [m], which provides an output of 583 [W].
$\Delta t_w = 3$ [K]
$q_w = P_w / (c_{pw} \times \Delta t_w)$
$q_w = 583$ [W] / (4200 [Ws/(kg K)] x 3 [K]) = 0.046 [l/s]
The pressure drop in the water circuit in diagram 4 is read off as $\Delta p_w = 2.45$ [kPa].

Example 4 Heating:
Architect 2.4 m, which provides an output of 1390 [W].
$\Delta t_w = 8$ [K]
$q_w = P_w / (c_{pw} \times \Delta t_w)$
$q_w = 1390$ [W] / (4200 [Ws/(kg K)] × 8 [K]) = 0.041 [l/s]
The pressure drop in the water circuit in diagram 5 is read off as $\Delta p_w = 1.09$ [kPa].

Definitions:
q_w = Water flow rate [l/s]
P_w = Cooling capacity water [W]
c_{pw} = Specific heat capacity water 4200 [Ws/(kg K)]
Δt_w = Temperature difference water circuit [K]
t_{wio} = Mean water temperature [°C]
Δp_w = Pressure loss water circuit [kPa]

* Diagrams are for a certain mean water temperature t_{wio}. For other temperatures please do your calculations in our water-borne calculator in www.lindQST.com!

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Active chilled beam

Architect

Dimensions, weight & water content

Architect Luna

Architect Prisma
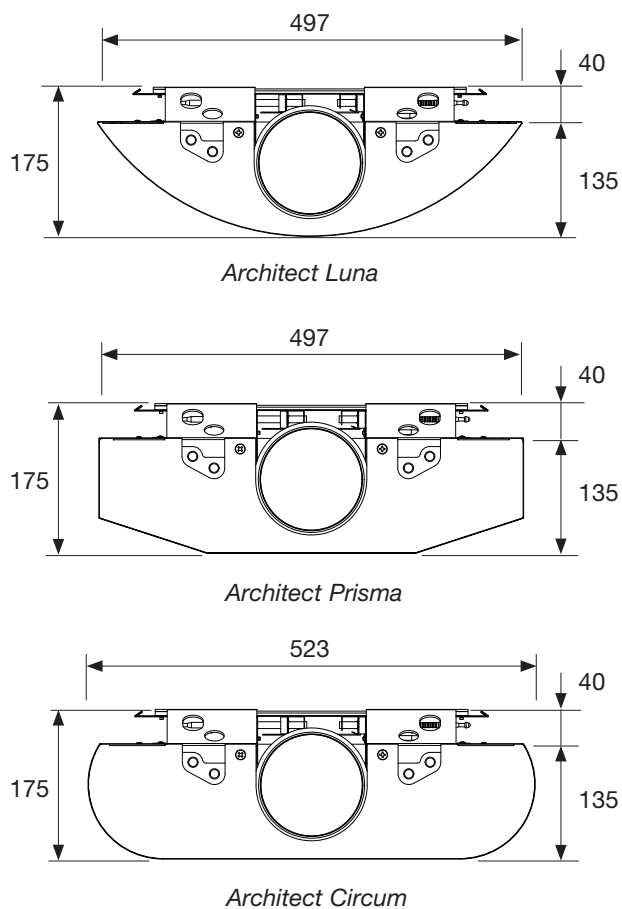
Architect Circum

Figure 1. Architect's different versions.

Dimensions	Luna	Prisma	Circum
Width, [mm]	497	497	523
Height, [mm]	175	175	175
Product length undersize, [mm]	8*	8*	8*
Dry weight, [kg/m]	11	11	11
Water content cooling [l/m]	0.50	0.50	0.50
Water content heating [l/m]	0.25	0.25	0.25

* The face plate extends 4 [mm] beyond the end gables, on each side.

Table 1. Dimensions, weight and water content.
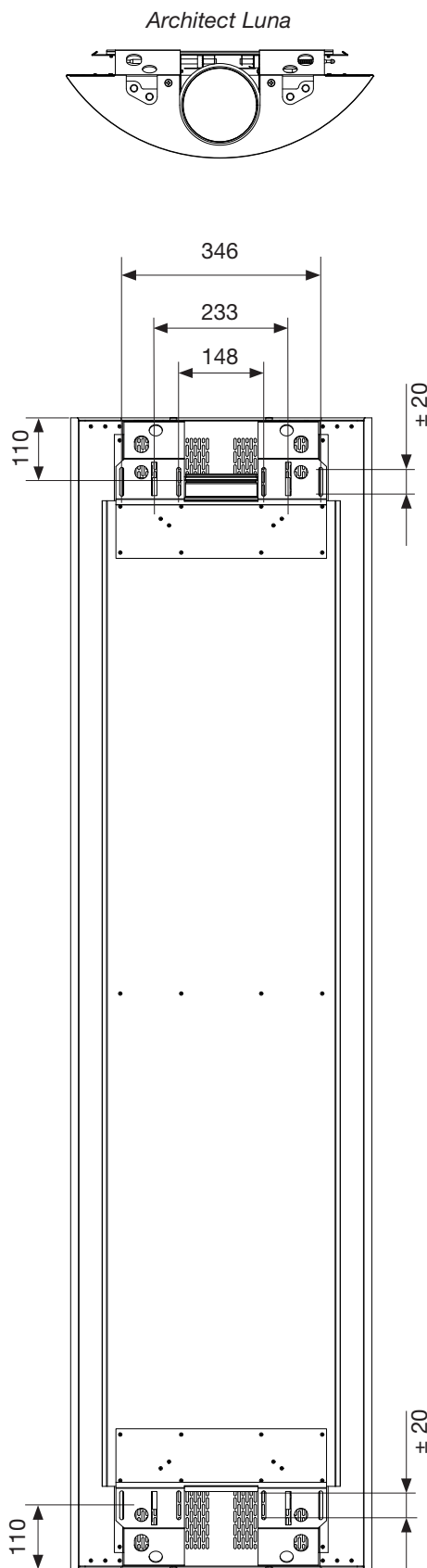
Architect Luna

Figure 2. Architect Luna, Prisma and Circum, suspension / dimensions.

Active chilled beam

Architect

Couplings & connections

Architect is supplied in lengths from 1.2 [m] to 3.0 [m], in steps of 0.1 [m]. The connection dimension is 12 [mm] for the water and 125 [mm] for the air for Architect Luna, Prisma and Circum.

Architect Luna, Prisma and Circum is available with a large number of coupling options. This is how to find the designation, for the coupling option you require:

Step 1.
Indicate the position for the ventilation connection.

Step 2.
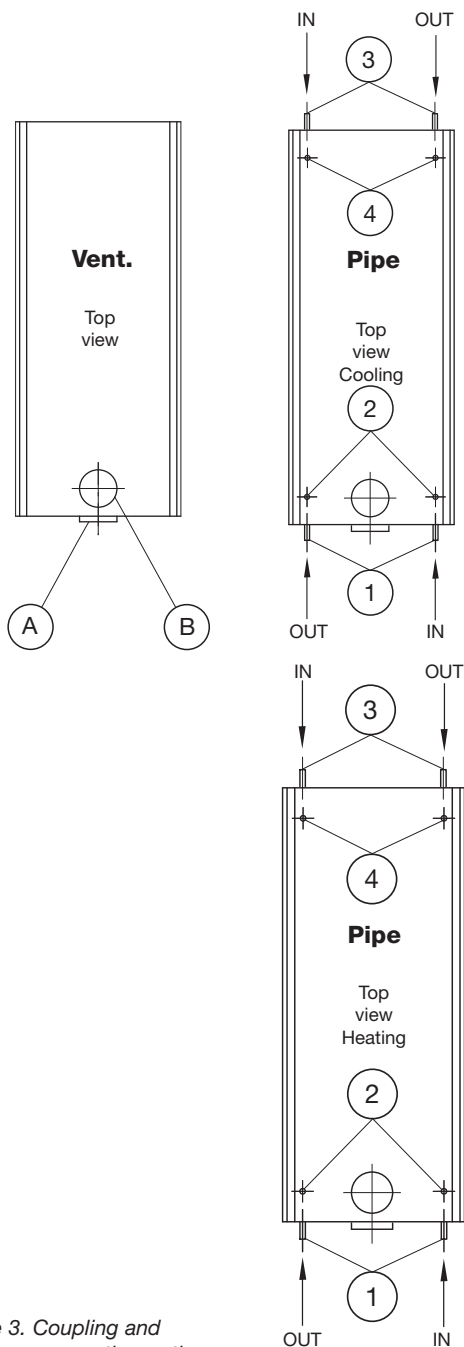Indicate the position for the pipe connection.

Figure 3. Coupling and connection options.

Examples of designations

Below are examples of common coupling options: Type A1 has a horizontal air connection at the end, and a horizontal pipe connection at the same end of the beam.
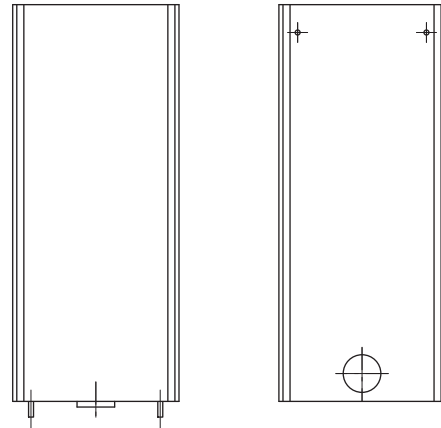

Figure 4. Coupling options A1 and B4.

Active chilled beam

Architect

Connection dimensions, cooling

Connection B1 + B3 (A1 + A3)
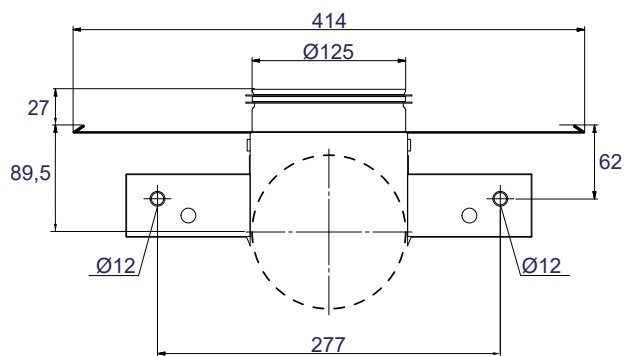
Connection A2, B2, A4, B4

Figure 5. Architect cooling. Dimensions for the parts.
Total width and length for the respective models vary (see table 1).

Connection dimensions, heating

Connection A1 + A3 (B1 + B3)

Connection A2, B2, A4, B4

Figure 6. Architect, heating. Dimensions for the parts.
Total width and length for the respective models vary (see table 1).

Active chilled beam

Architect

Sound effect

Architect
L = 1.2-2.0 [m]

Architect
L = 2.1-3.0 [m]
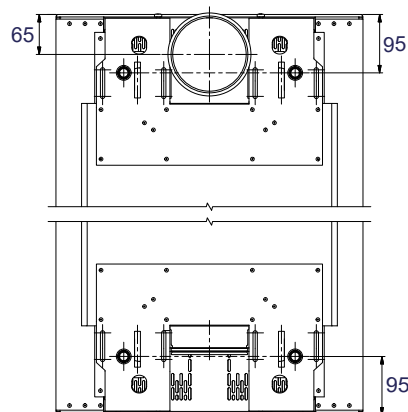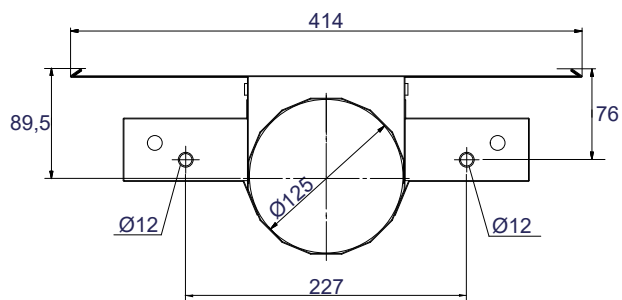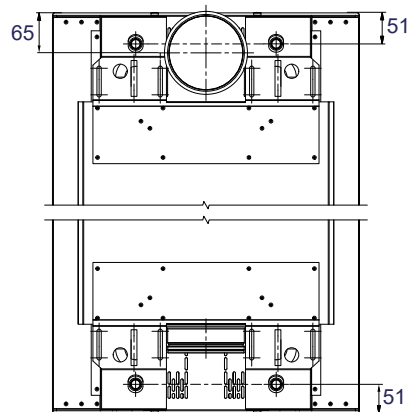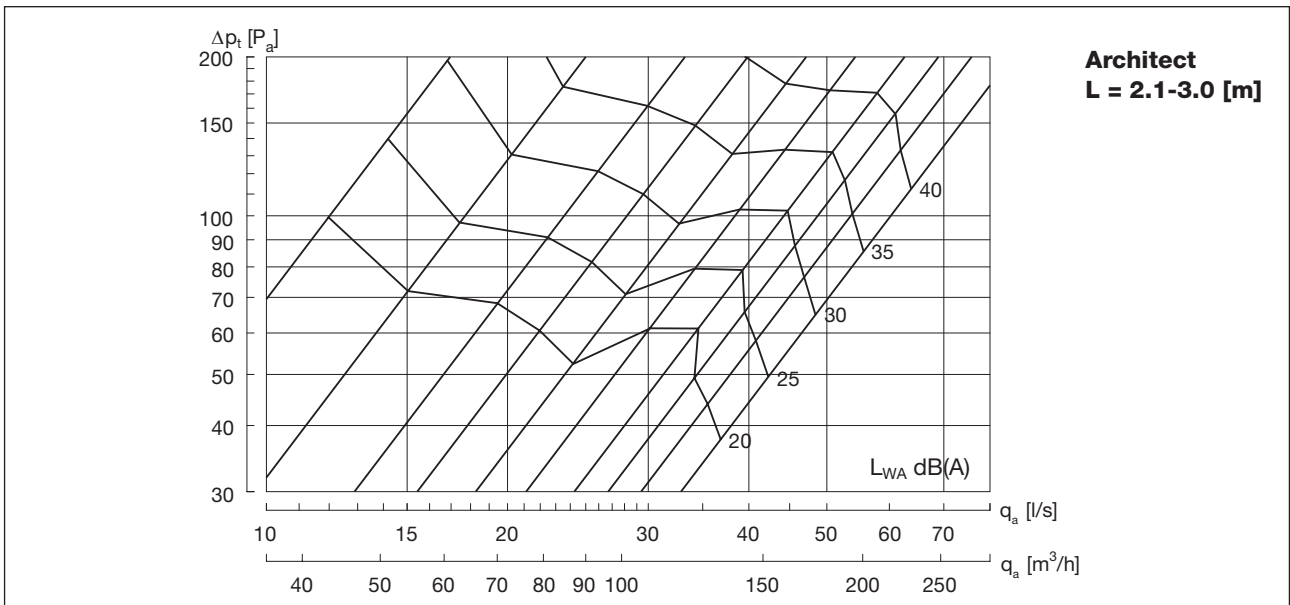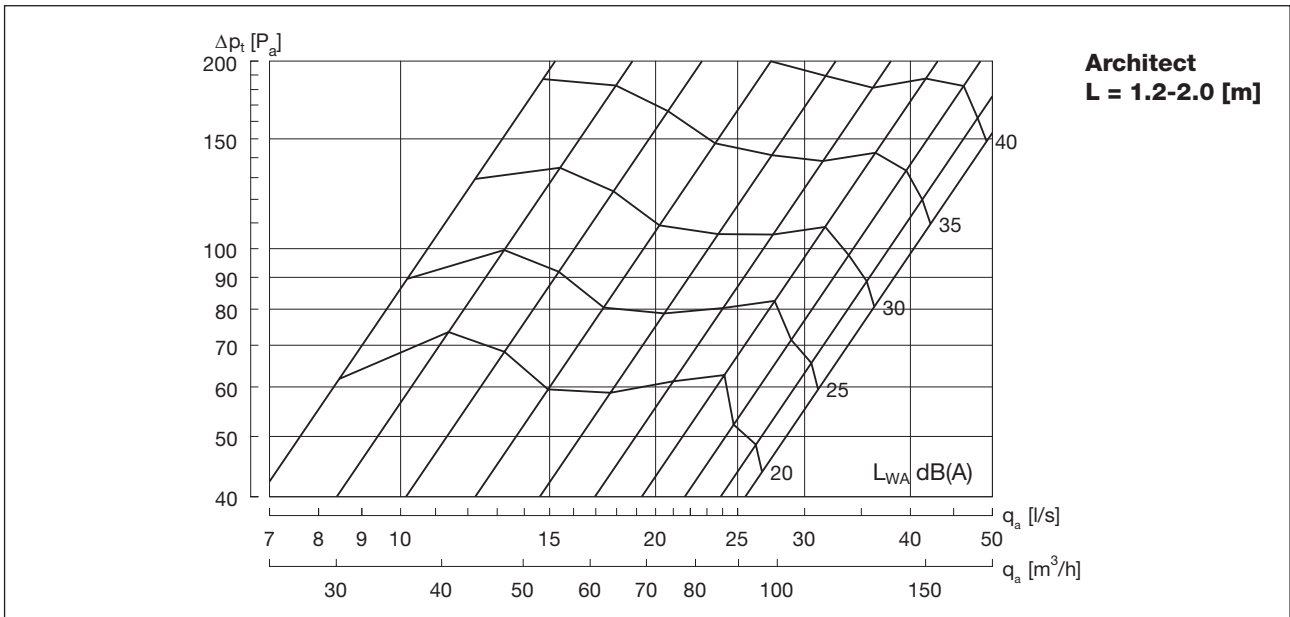
Diagram 6a+6b. Sound effect level L_WA at JetCone setting for Architect.

Active chilled beam

Architect

Dimensioning

For dimensioning of chilled beams please refer to our water-borne calculator on www.lindQST.com.

Pressure drop in air connection

Table 2 shows the pressure drop in the connection. After calculating the necessary pressure for the active chilled beam, add the connection pressure drop to the selected static pressure in the nozzles.

Example 5:

Architect Luna-12-125-A1 with 20 [l/s] and a static nozzle pressure of 60 [Pa]. This provides a necessary total pressure in the duct of 60 [Pa] + 1 [Pa] = 61 [Pa].

Architect						
Air flow [l/s]	**20**	**25**	**30**	**40**	**50**	**65**
Pressure drop [Pa]	1	2	2	3	5	8

Table 2. Air pressure drop in the connection to Architect.

Sound data

Internal sound dampening ΔL									
[Hz]	**Jetcone Position**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
[dB]	5	17	13	7	5	2	5	8	13

Table 3. Architect 1.8m position 5, internal sound dampening.

Noise level L_{woct}

For calculation of the noise level

Correction C_{oct} [dB] Octave band, average frequency [Hz] L = 1.2- 2.0 [m]								
[Hz]	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
[dB]	13	-1	-4	-5	-5	-7	-10	-16

Correction C_{oct} [dB] Octave band, average frequency [Hz] L = 2.1- 3.0 [m]								
[Hz]	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
[dB]	5	0	-2	-4	-5	-7	-12	-18

Table 4a+4b. Architect's noise levels L_{woct} for each octave band in the beam, are calculated by adding the corrections C_{oct} from the table above to the sound power level L_{wa} [dB(A)]. The noise levels are calculated using the following formula:

$$L_{woct} = L_{wa} + C_{oct}$$

Active chilled beam

Architect

Dimensioning

The specific dimensioning of the product can be easily done with our waterborne calculator in our online quick selection tool LindQST.
Calculate the Architect here

Picture 9. LindQST - Indoor Climate Designer

LindQST® helps you select the right waterborne products, e. g. active chilled beams, passive radiant chilled beams, radiant cooling- and heating panels and facade units and quickly finds the corresponding documentation.

In *Waterborne Documentation* you can easily find all available product documentation. Always in the latest version.

In *Waterborne Calculator* you can do a professional calculation based on your specific input data to finetune your choice or calculate different variants of the product. Smart warnings piont out if a set-up will not work.

In *Waterborne Selector* you can compare the proposed products according to your specific reguirements and select the one which fits best to your needs .

Not enough? With *Indoor Climate Designer* you can insert your selected waterborne product into your room and simulate the actual air distribution, optimise the placing in the ceiling taking into account the calculated air velocities and sound levels.

You can at anytime display your selection and calculations graphically. In addition, you can print or save all results and related documents for your documentation (incl. data sheets, dxf-files and room books).

With lindQST® you will easily find the most suitable product for your project.

It provides easy and quick access to the latest product information, technical specifications and assembly instructions on the internet, making it the ideal tool for installers, consultants and architects alike.
www.LindQST.com

• Easy access to all current documentation.

• Fast design of waterborne products.

• Indoor Climate Designer: Graphical representation of the spatial situation in 2D / 3D and floor plans from AutoCAD®.

• Calculation of capacities, sound power levels, pressure losses and flow conditions.

• 3D particles or smoke show the air distribution in the room.

• Diagram showing the time course of the CO_2 concentration in the room.

• Room book generation and data sheet for individual rooms and outlets or entire projects.

• Project can be saved and exchanged in its own project area.

• Fast product selection waterborne products in accordance to Eurovent (chilled beams and facade units).

Active chilled beam

Architect

Programme text

Active chilled beam for visible installation. Adjustments to air flow and spread pattern must be possible without tools. Air volume regulation should be as fluent as possible, allowing as many air volume options at any specific air pressure between 30 [Pa] and 120 [Pa]. Only linear air flow regulation can be accepted.

Technical data (examples)*

Active chilled beams from Lindab	Qty
Product:	
Architect Luna-12-125-A1-1.8 [m]	40
Air volume:	15 [l/s]
Nozzle pressure:	60 [Pa]
Distribution profile:	16°
Colour:	RAL 9003,gloss 30
Plus features:	
Regula Secura	
Cooling control valve	
Cooling actuator	
Accessories:	
Regula Combi:	40

Active chilled beams from Lindab	Qty
Product:	
Architect Circum-12-125-B2-2.4 [m]	20
Air volume:	20 [l/s]
Nozzle pressure:	60 [Pa]
Distribution profile:	30°
Colour:	RAL 9003,gloss 30
Plus features:	
Heating	
Regula Secura	
Cooling control valve	
Cooling actuator	
Heating control valve	
Heating actuator	
Accessories:	
Regula Combi:	20

* For correct update of your program text use the Waterborne calculator on www.LindQST.com .

Control

Lindab offers control equipment that is very simple to use. To avoid the heating and cooling being activated at the same time, the system is controlled sequentially (Regula Combi). For the technical data, refer to the chapter Regula.

Specifications

Product/Version:	Architect Luna, Prisma, Circum
Connection diam. water, [mm]:	12
Connection diam. air, [mm]:	125
Coupling options:	A1, A2, A3, A4
	B1, B2, B3, B4
Length, [m]:	1.2 - 3.0 [m] in steps of 0.1 [m]
Air quantity, [l/s]:	5-65 [l]/s
Nozzle pressure, [Pa]:	30-120 [Pa]
Distribution profile:	30° (default), 16° or 0°
Plus features:	See page 5

Order code

Product	Architect	Luna	12	125	A1	1.8	60	15

Type:
Luna, Prisma, Circum

Water connection:
12 [mm]

Air connection:
125, 2 x 125

Connection type:
A1, A2, A3, A4, B1, B2, B3, B4

Product length:
1.2 [m] - 3.0 [m] (in steps of 0.1 [m])

Static nozzle pressure:
30 - 120 [Pa]

Air volume:
5 - 65 [l/s]

Most of us spend the majority of our time indoors. In-door climate is crucial to how we feel, how productive we are and if we stay healthy.

We at Lindab have therefore made it our most important objective to contribute to an indoor climate that improves people's lives. We do this by developing energy-efficient ventilation solutions and durable building products. We also aim to contribute to a better climate for our planet by working in a way that is sustainable for both people and the environment.

Lindab | For a better climate

Lindab®
For a better climate