Integrated chilled beam



PACIFIC CHILLED BEAM

- The PACIFIC is a high performance chilled beam for installation in false ceilings.
- O Built-in flexibility, designed to meet the needs of today and tomorrow.
- The modular design offers great freedom of choice for configuring its arrangement to meet current needs.
- O Primary air, cooling and heating

KEY FIGURES

Primary airflow: Typical 116 CFM (up to 200 CFM)
Pressure range: Typical 0.5 inWG (up to 0.75 inWG)

Cooling capacity: Up to 8872 Btuh

Heating capacity: Water: Up to 10, 236 Btuh

Lengths: Min. 47 in / max. 120 in*
Widths: Min. 23.4 in / max. 26.26 in*
Heights: 6.4 in - with Ø4 in air connection

7.4 in - with Ø5 in air connection 10.9 in - with Ø6 in air connection

*Lengths and widths are matched to suit different types of false ceilings.





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Technical description

Operation

The PACIFIC is an active chilled beam with two-way air distribution. The unit does not contain a fan of its own but is driven by the pressure and flow generated by a centrally located air handling unit, which means low sound level and excellent comfort in the room.

The PACIFIC is designed for dry systems, i.e. without condensation and therefore does not require any condensate drainage system or any filter. The minimum number of moving parts and lack of filter guarantees very little need for maintenance.

Flexibility

The modular design and the built-in commissioning functions make the PACIFIC adaptable to meet current needs in all phases of its useful product life.

- In the planning phase of the project: adapt the performance and the physical dimensions to suit the current project.
- In the installation phase: commission the airflow volume, distribution and direction of discharge to provide optimum comfort.
- In the operational phase: adjust the airflow volume, distribution and direction of discharge to deal with changes in the layout or programming of the building.





Figure 1. PACIFIC.

Induction principle

The PACIFIC chilled beam operates according to the induction principle. A centrally located air handling unit distributes primary air via the duct system into the plenum of the unit and creates excess pressure. The plenum is equipped with a number if sliding strips that in turn contain a row of nozzles of various sizes. The excess pressure in the plenum forces the primary air through the nozzles at relatively high velocity. When the primary air is distributed at high velocity through the nozzles, negative pressure is created in the space above the built-in heat exchanger (coil). The negative pressure draws (induces) the room air up through the heat exchanger where the air is treated as required.

If cooling is required, the room control equipment opens the cooling circuit valve and chilled water circulates through the cooling circuit of the heat exchanger. The induced air is chilled and is mixed with the primary air before it is

discharged into the room.

If heating is required, the heating circuit valve opens instead and hot water circulates in the heat exchanger and the

induced air is heated before it is mixed with the primary air and is discharged into the room.

The PACIFIC can also be equipped with electric heating if desired. The electric heat is generated by heating rods that have been inserted into the heating tubes of the heat exchanger. The induction principle is the same as that of waterborne heating; however, instead of opening a valve, the heating rods are energised.

If neither cooling nor heating is required, then the induced air passes through the heat exchanger without being treated.

The ratio between the primary air and the induced air varies depending on the magnitude of the excess pressure and the airflow rate of the primary air. This relationship is also called the degree of induction or induction ratio.

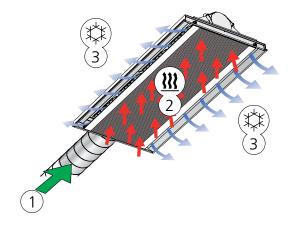


Figure 2. Cooling operation. 1 = Primary air

2 = Induced room air

3 = Primary air mixed with chilled room air

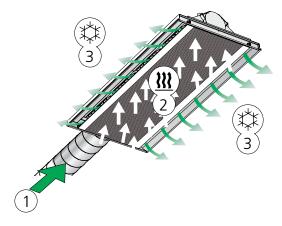


Figure 4. Neutral operation. 1 = Primary air

2 = Induced room air

3 = Primary air mixed with untreated room air

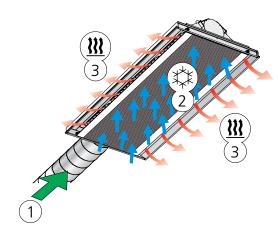


Figure 3. Heating operation.

1 = Primary air 2 = Induced room air 3 = Primary air mixed with heated room air



Range of Application

- Offices and conference rooms
- Classrooms
- Hotels
- Restaurants
- Hospitals
- Shops
- Shopping centers

Certified

The Swegon PACIFIC is Eurovent certified, which is your guarantee that all specified data has been confirmed by tests and has been validated. This includes data provided in Swegon's selection software, Room Unit Design.

Capacity we take responsibility for

Swegon PACIFIC has been developed for generating high cooling and heating capacity without compromising comfort. The outlet of the unit is designed to handle large pressure and flow ranges while maintaining the Coanda effect. The result is that the discharged air is kept near the ceiling, has time to mix with the room air and its velocity decreases before it reaches the occupied zone. This provides an excellent indoor climate with low air velocities.

Flexibility

Modern office buildings make ever stricter demands on adaptability to various needs. A layout designed from the beginning as an open-plan office may in the next phase need to be partitioned into smaller rooms. By carefully planning the cooling, heating and ventilation installations from the beginning, the costs for future operational changes or needs can be drastically reduced. Swegon PACIFIC is developed for maximum flexibility throughout its life.

Since different buildings involve different demands on performance as well as physical measurements, the Swegon PACIFIC is designed so that you can configure it to meet different needs. The unit is divided into two modules: Capacity module and Design module.

The capacity module contains a combined cooling and heating coil with two separate water circuits, one for cooling and the other for heating. The capacity modules come in four different lengths. The appropriate length is determined by capacity and flexibility requirements.



Figure 5. Capacity module – 4 lengths.

Three different air connection sizes are available to choose from depending on airflow and sound requirements: Ø4; Ø5 and Ø6 in nominal duct sizes. The size of the air connection determines the height of the unit which means that you must take into consideration the available space above the false ceiling.



Figure 6. Capacity module - Ø4; Ø5 and Ø6 in nominal duct sizes



Figure 7. Several PACIFIC climate beams connected in a series.

The plenum in the PACIFIC is designed so that the runs of connected ducting are always well above the profiled T-sections of the load-carrying ceiling grid system. This offers several advantages. One advantage is that there is never any risk of the ductwork colliding with the T-section grid system or that you will need to use duct components to avoid such a collision. A second advantage is that the sound level will be minimised if you can connect straight runs of ducting. A third advantage is that you can connect the primary air duct to several units in series by allowing a certain portion of the air to pass through the first unit and on to the next one. The number of units that can be interconnected in a series depends on the airflow per unit and the selected connection size of the ducting. The sound level in the first unit in the series is the design level. By using the Room Unit Design software, you can easily calculate how many units you can connect in series.

Comfort and commissioning functions

The ADC (Anti Draught Control) and VariFlow comfort and commissioning functions are also included as standard features.

ADC

ADC consists of a number of sections with adjustable fins arranged in the outlet of the unit. With a simple grip of the hand, the fins can be set to an appropriate angle to direct the discharge of air and in this way create the desired air.

distribution pattern. The standard setting for ADC is straight but the unit can be supplied factory-preset to a V-shape distribution pattern, if desired.

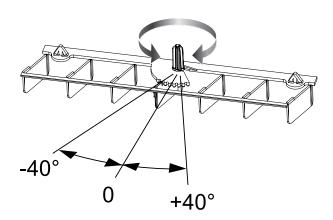


Figure 8. Detailed illustration of ADC.

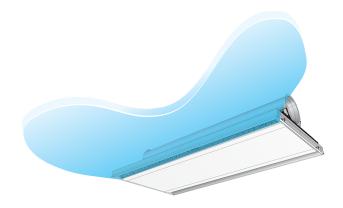


Figure 9. ADC set to the V-shape setting.

VariFlow

VariFlow is the name of Swegon's unique adjustable nozzle strips. There are three airflow variants to choose from:

- LF = Low airflow
- MF = Medium Flow
- HF = High Flow

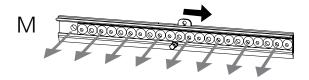
The most suitable airflow variant is selected depending on current airflow needs and future needs to possibly increase or decrease the airflow. The number of VariFlow nozzle strips varies depending on the length of the capacity module.

Table 1. Number of VariFlow nozzle strips per capacity module

Length of the capacity module (in)	Number of VariFlow nozzle strips
43.4	8
63.0	12
86.6	16
106.3	20

The three different airflow variants of VariFlow nozzle strip can also be set to three different positions:

- L = Low flow
- M = Medium flow
- H = High flow



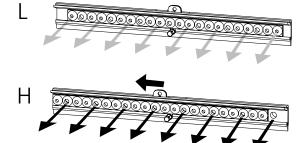


Figure 10. VariFlow nozzle strip adjusted in three positions. L, M and H.

By setting the VariFlow nozzle strips in different ways, you can easily set the beam to provide symmetric, asymmetric or displaced air distribution.



Figure 11. VariFlow with asymmetric airflow distribution.



Figure 12. VariFlow with symmetric airflow distribution.

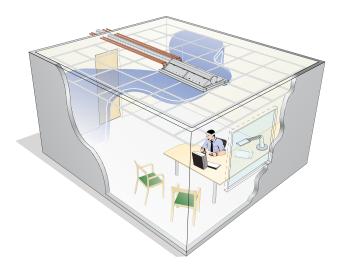


Figure 13. VariFlow with displaced airflow distribution.

The K factors (COP) of the nozzle strips are designed to enable you to change how the airflow is distributed without affecting the total K factor of the chilled beam. This means that you do not need to re-commission the unit when you make a change.

The sectional division of VariFlow offers tremendous flexibility. This technical brochure outlines only some of the settings that are possible to set. The PACIFIC can be supplied preset to basic settings for subsequent commissioning at the site or it can be supplied factory-preset to specified settings, if so desired. Note that it is most often more advantageous to commission the beams at the building site considering the logistics, especially if the project involves a larger number of variants with different settings. Pacific configurations may be analyzed using the Room Unit Design selection software.





Figure 14. Design module.

The design module serves as the interface to the current false ceiling system. Customized modules are available for integration in most false ceiling systems sold on the market.

- T-section grid systems, Imperial (USA) 24 in center-to-center
- T-section grid systems, 23.6 in center-to-center
- T-section grid systems, 24.6 in center-to-center
- T-section grid systems, 26.6 in center-to-center
- Sheet-metal modular ceiling
- Strip grid systems
- Gypsum ceiling (requires separate accessories)

The face plate of the design module is hinged and can be swung out from either side to a 90-degree open position. This completely exposes the coil for cleaning. Safety cords secure the face plate and ensure that it cannot fall down.



Figure 15. Hinged face plate.

In certain cases it could be advantageous to select a design module that is extra long in relation to the capacity module. One typical case is when the beam is installed in a gypsum ceiling and there is a need for inspecting the valves and/or the commissioning damper. By employing a design module that is longer than the capacity module you get built-in access to the air and water connections and controls. The inactive section of the design module is covered to avoid acoustic disturbance and to conceal the space above the false ceiling from occupants of the room.

The capacity module is always installed offset toward the one end panel with the water connections on the side where the inactive section is situated.



Figur 16. Built-in access panel using shorter capacity module.

Accessories

Damper, model CRP

4, 5 and 6 in nominal diameter balancing and commissioning damper with perforated damper blade and manual adjusting knob.

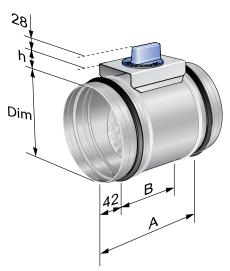


Figure 17. SYST CRPc 9-100, -125 or -160 commissioning damper.

	CRPc 9	А	В	h	Weight
Size	Dim.	in	in	in	lbs
-100	3.94	8.3	4.3	0.8	1.54
-125	4.92	8.3	4.3	0.8	1.76
-160	6.3	8.3	4.3	0.8	1.9

Connection piece, air – 90° duct bend, model SYST CA

Used if the PACIFIC will be connected on the long side or vertically. Available in three dimensions: See Figures 35-37.



Figure 18. Connection piece, air – 90° duct bend.

Connection piece, air – insertion joint, model SYST AD1

Model SYST AD1 is used as an insertion joint between the PACIFIC and the duct system. Available in three dimensions: See Figures 35-37.



Figure 19. Connection piece, air – insertion joint.

Side connection kit, water, model SYST CK1

The PACIFIC is as standard equipped with vertical water connections but can be converted to a unit with side connections by specifying a side connection kit.

This kit can be easily installed on the side required, by means of quick-fit, push-on couplings and matched copper tubing.

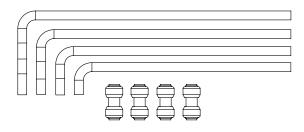


Figure 20. Side connection kit, SYST CK1.

Horizontal connection kit, water, model SYST CK2

The PACIFIC is standard equipped with vertical water connections but can be converted to a unit with horizontal connections by specifying a horizontal connection kit.

This kit can be easily installed by means of quick-fit, pushon couplings and matched copper tubing.



Figure 21. Horizontal connection kit, SYST CK2.

Flexible connection hoses

Flexible hoses are available with quick-fit, push-on couplings as well as clamping ring couplings for quick and simply connection. The hoses are also available in various lengths and end connectors. Note that clamping ring couplings require support sleeves inside the tubes.

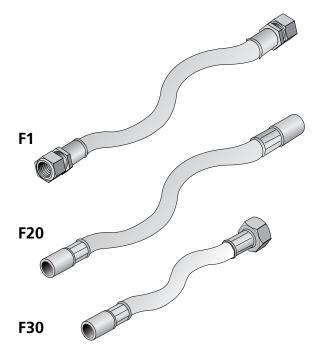


Figure 22. Flexible connection hoses, SYST FH.

F1 = Flexible hoses with clamping ring couplings

F20 = Flexible hoses with quick-fit couplings (push-on)

F30 = Flexible hose with quick-fit, push-on coupling in one end and threaded nut in the other end.

Air Vent, push-on, model SYST AR-12

An air vent is available as a complement to the flexible hoses with push-on couplings. The air vent fits directly in the push-on hose coupling and can be installed in an instant.

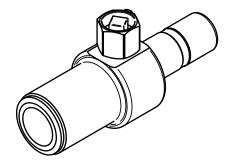


Figure 23. Air Vent, SYST AR-12.

Installation

The PACIFIC is designed for installation flush-mounted in the majority of false ceilings available on the market.

 T-section grid systems with IP units (USA) Width: 23.70 inches

• T-section grid systems with to 23.6 in c–c and gypsum

Width: 24.4 in

Lengths: 47, 70.6, 94.3 and 117.9 in

• T-section grid systems with 23.6 in c–c in combination with 3.94 in wide strip grid systems, 70.9 in c–c

Width: 24.4 in Length: 67.6 in

• T-section grid systems with 24.6 in c-c

Width: 24.3 in

Lengths: 48.9, 73.5, 98.1 in

• T-section grid systems with 26.6 in c-c

Width: 26.25 in

Lengths: 52.8, 79.4, 106.0 in

• Length: 47.80, 71.81, 95.79, 119.80 in

 Clip-in ceiling / sheet metal modules 598 in Lengths: 1,198, 1,498, 1,698, 1,715, 1,798, 2,398,

2,998 in.

Connection dimensions

Cooling (water):	1/2" NPT threaded
Heating (water):	1/2" NPT threaded
Air:	Insertion joint, 4, 5 or 6 in nominal diameter

Suspension:

The PACIFIC is supplied with four mounting brackets and self-tapping screws packaged separately and supplied with each unit. The mounting brackets can be located at any position along the entire long side of the unit for maximum

adjustability. The pre-punched holes in each mounting bracket simplify the fastening work. The mounting brackets are designed to be turned in any optional direction depending on the type of suspension system selected. Turned inward, the mounting brackets offer simple installation by means of mounting strips. Turned outward, the mounting brackets work at their best for suspending the beams by means of threaded rods. Threaded rods must be ordered separately and are available in a variety of lengths. Mounting strips are by others.

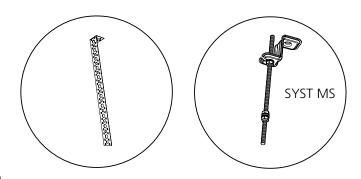


Figure 24. Optional mounting strips (L) and threaded rods (R).

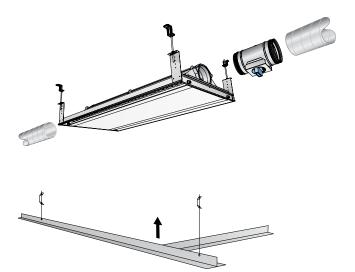


Figure 25. Installation of PACIFIC, here suspended by means of threaded rods.

See the PACIFIC Installation, Commissioning & Maintenance document for more details.





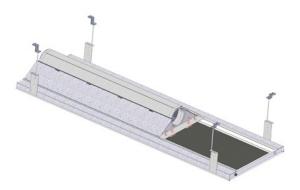
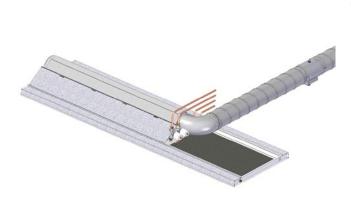


Figure 26. Example with straight air connection and vertical water connections.

Figure 29. Example of beam suspension with threaded rods.



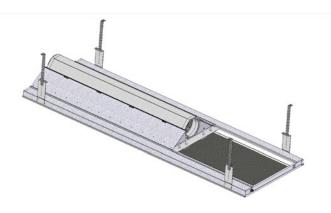


Figure 27. Example with air and water connections from the side.

Figure 30. Example of beam suspension with mounting strips.

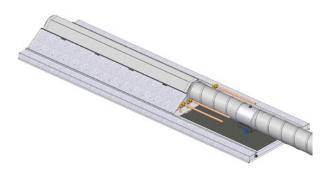
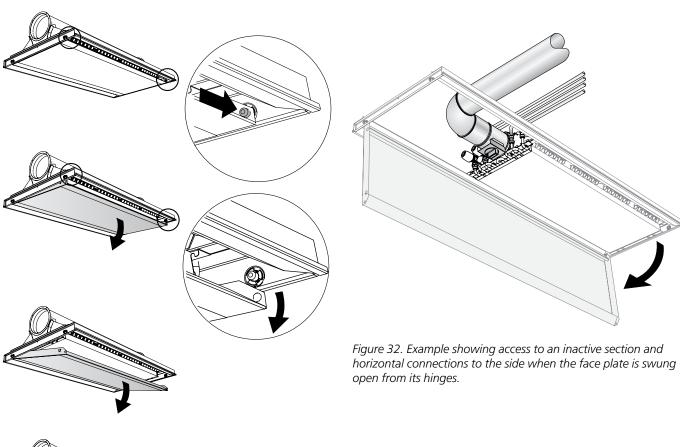


Figure 28. Example with straight, horizontal air and water connections.



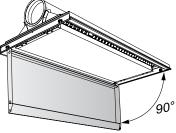


Figure 31. Simple opening of the face plate from its hinges on either long side.

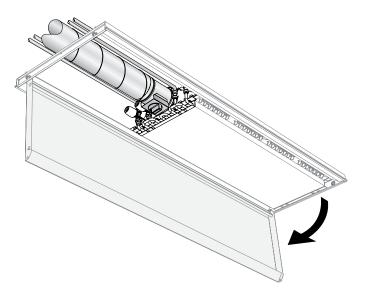


Figure 33. Example showing access to an inactive section with straight horizontal connections when the face plate is open from its hinges.

Technical data

Selection

Room Unit Design is Swegon's chilled beam selection program. With only a few basic inputs you can easily calculate cooling and heating capacity. The program also presents recommended minimal distance between unit/wall (as well as between unit/unit) dimensions, sound data, pressure data, customized printouts and schedule generation. Capacity values in Room Unit Design are Eurovent **certified.** The PACIFIC is as standard equipped with a coil containing two separate tube circuits. The first functions as a cooling circuit and the second as a heating circuit.

Cooling

When chilled water circulates through the coil, induced air is cooled as it passes through the coil, then mixed with primary air and is distributed into the room.



Heating

When hot water circulates in the tube circuit, the induced air is heated up in the coil, and is then mixed with the primary air and is distributed to the room. The inlet flow temperature of the heating water should be kept as low as possible to minimize the temperature difference between the air at ceiling level and at floor level. The temperature stratification in the room will be negligible if the inlet flow temperature is kept at 104°F or lower. If the inlet flow temperature is up to the recommended max temperature (140°F), the stratification will be perceptible even if it normally is within the prescribed range.

In the majority of cases, the system will heat the room air to a satisfactory temperature. In order to achieve good operating temperature, other factors must be taken into account. The following factors are typical in this respect: Window dimensions, the U factor of the windows, the orientation of the room, the location of the occupants, etc. The quality and dimensions of the windows are also important with regard to possible cold down drafts. Windows available today are usually so well insulated that cold down drafts do not arise. Cold down drafts are especially likely to occur in the renovation of old buildings if the planner decides to keep the existing windows.

The cooling/heating capacity of the primary air

The following formula can be used for calculating the cooling/heating capacity of the primary air:

 $P_i = q_i \times 1.2 \times \Delta T_i$

 P_i = cooling/heating capacity of the primary air (W)

 $q_i = the primary airflow (I/s)$

 ΔT_{i} = Temperature differential between the temperature of the primary air and the room temperature (K)

Recommended limit values – water

Max. recommended operating pressure: 232 PSI 348 PSI Max. recommended test pressure: Min. cooling water flow* 0.48 GPM

Capacity module: L = 43.4; 63.0 in:

Min. cooling water flow* 0.7 GPM Capacity module: L = 86.6; 106.3 in:

Min. permissible heating water flow*: 0.21 GPM 3.6-9°F Increase in temperature, cooling water: 9-18°F Decrease in temperature, heating water:

Min. supply flow temperature: Should always be sized to avoid

condensation

140°F Max. permissible inlet flow temperature:

* Min. recommended water flows ensure the entrainment of any air pockets in the circuit.

Recommended limit values – air

Max. recommended inlet pressure: 0.75 inWG Max. recommended nozzle pressure: 0.2 inWG



Acoustics

Pressure and Sound data is determined using Room Unit Design.

Diagrams 7-9 show the total generated sound power (L_{Wtot} dB), as a function of the airflow and pressure drop across the commissioning damper. By correcting L_{Wtot} with the correction factors from Table 28, the sound power level for each octave band ($L_{W} = L_{wtot} + K_{ok}$)can be obtained. For detailed acoustical analysis, refer to Room Unit Design.

Table 28. Sound power level for commissioning damper SYST CRPc, Correction factor, K_{ok}

Size		Mid-frequency (Octave band) Hz						
CRPc 9	63	63 125 250 500 1000 2000 4000 800					8000	
100	0	-2	-9	-15	-20	-25	-29	-35
125	0	-2	-11	-17	-22	-25	-29	-34
160	0	-2	-12	-16	-18	-21	-26	-36

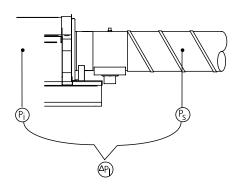


Figure 34. Pressure relationship, air.

 $p_{\rm i}$ = nozzle pressure (inWG), read from ProSelect software output.

 p_s = duct pressure (inWG) upstream of unit and commissioning

 $\Delta p_{_{\parallel}} =$ damper commissioning range, for CRPc 9, see the Diagram for each size.

Diagram 7. Commissioning range, SYST CRPc 9-100 damper

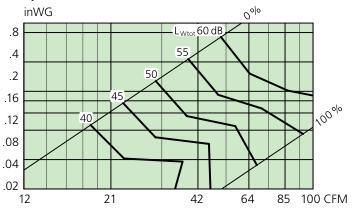


Diagram 8. Commissioning range, SYST CRPc 9-125 damper

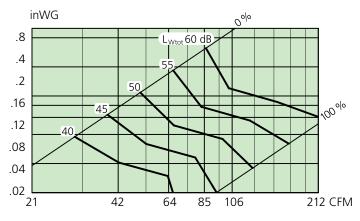
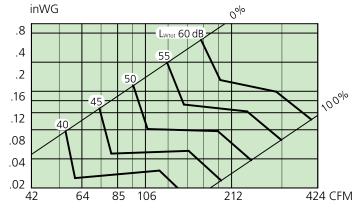


Diagram 9. Commissioning range, SYST CRPc 9-160 damper





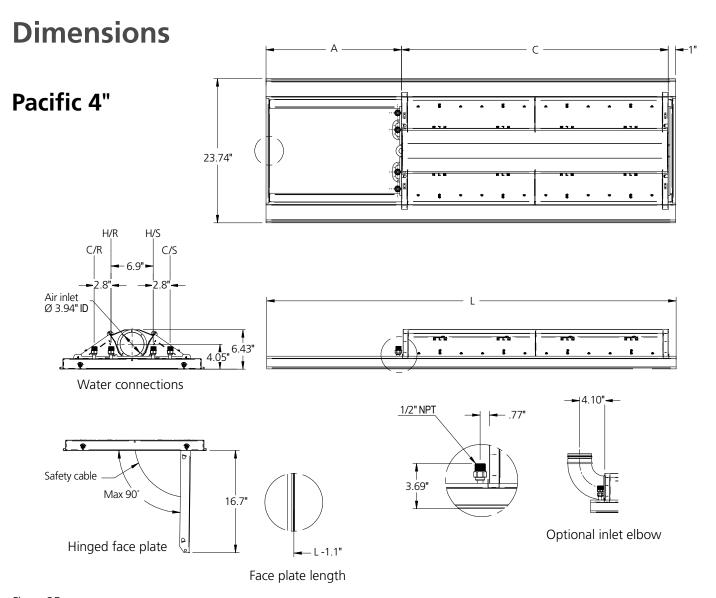


Figure 35.

Weight table, lbs

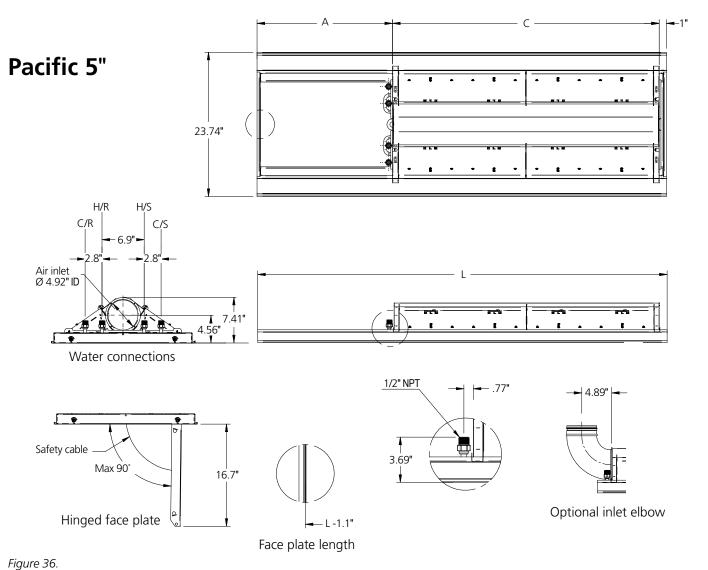
			В	С
Unit length*	Coil length**	Dry Weight	weight of cool water	weight of hot water
4′	4′	36	2.4	0.7
6′	4′	41	2.4	0.7
6′	6′	50	3.3	0.1
8′	6′	56	3.3	0.1
8′	8′	69	4.6	0.1
10′	8′	74	4.6	0.1
10′	10′	84	5.8	1.5

^{*}Unit length corresponds to length of appearance module
**Coil length corresponds to length of capacity module
For shipping weight, use column A
Operating weight, 4-pipe cooling and heating, add columns
A+B+C
Operating weight 2 pipe cooling and heating.

	L - Unit Lenht			
Nominal Length FT	4′	6′	8′	10′
Order Code	1213	1823	2433	3043
Actual Length IN (")	47.76	71.77	95.79	119.80

		C - Co	oll Lenht	
Nominal Length	4′	6′	8′	10′
Order Code	1100	1600	2200	2700
Actual Length	43.5	64.4	87.1	107.9
a - access	3.2	6.4	7.7	10.9
Nominal Length	Availability, L - Unit Lenht			enht.
	4′	6′	8′	10′
4'	✓	✓		
6′		✓	✓	
8'			✓	✓
10'				✓

Operating weight, 2-pipe cooling only, add columns A + B



Weight table, lbs

			В	С
Unit length*	Coil length**	Dry Weight	weight of cool water	weight of hot water
4′	4′	36	2.4	0.7
6′	4′	41	2.4	0.7
6′	6′	50	3.3	0.1
8′	6′	56	3.3	0.1
8′	8′	69	4.6	0.1
10′	8′	74	4.6	0.1
10′	10′	84	5.8	1.5

^{*}Unit length corresponds to length of appearance module **Coil length corresponds to length of capacity module For shipping weight, use column A Operating weight, 4-pipe cooling and heating, add columns A+B+C

Operating weight, 2-pipe cooling only, add columns A + B

	L - Unit Lenht			
Nominal Length FT	4′	6′	8′	10′
Order Code	1213	1823	2433	3043
Actual Length IN (")	47.76	71.77	95.79	119.80

	C - Coil Lenht			
Nominal Length	4′	6′	8′	10′
Order Code	1100	1600	2200	2700
Actual Length	43.5	64.4	87.1	107.9
a - access	3.2	6.4	7.7	10.9
Nominal Length	Ava	ailability,	L - Unit L	enht
	4′	6′	8′	10′
4'	✓	✓		
6′		✓	✓	
8'			✓	✓
10'				✓



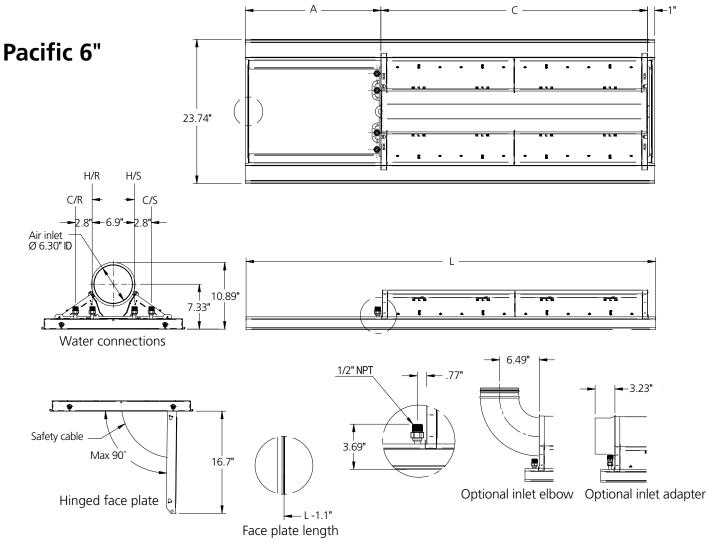


Figure 37.

Weight table, lbs

	_			
		А	В	С
Unit length*	Coil length**	Dry Weight	weight of cool water	weight of hot water
4′	4′	36	2.4	0.7
6′	4′	41	2.4	0.7
6′	6′	50	3.3	0.1
8′	6′	56	3.3	0.1
8′	8′	69	4.6	0.1
10′	8′	74	4.6	0.1
10′	10′	84	5.8	1.5

^{*}Unit length corresponds to length of appearance module **Coil length corresponds to length of capacity module For shipping weight, use column A Operating weight, 4-pipe cooling and heating, add columns A+B+C

Operating weight, 2-pipe cooling only, add columns A + B

	L - Unit Lenht			
Nominal Length FT	4′	6′	8′	10′
Order Code	1213	1823	2433	3043
Actual Length IN (")	47.76	71.77	95.79	119.80

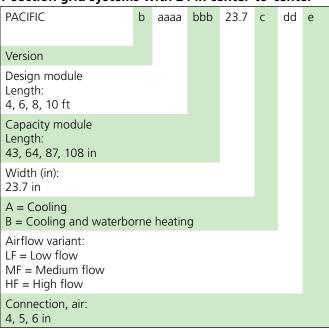
	C - Coil Lenht			
Nominal Length	4′	6′	8′	10′
Order Code	1100	1600	2200	2700
Actual Length	43.5	64.4	87.1	107.9
a - access	3.2	6.4	7.7	10.9
Nominal Length	Availability, L - Unit Lenht			
	4′	6′	8′	10′
4'	✓	✓		
6′		✓	✓	
8'			✓	✓
10'				✓



Ordering key

Swegon's PACIFIC chilled beam for integrated installation in false ceilings, for cooling, heating and ventilation

T-section grid systems with 24 in center-to-center



Use this chart as a guide only. Actual ordering codes are generated automatically by Room Unit Design.

Accessories

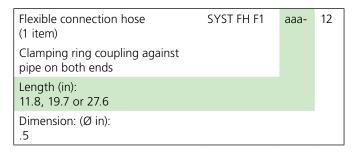
Air connection: Ø

4, 5 or 6

Connection piece, air – insertion joint	SYST AD1	а	
Dimension (in): 4, 5 or 6			
Connection piece, air	SYST CA a	90	
Dimension (in): 4, 5 or 6			
90° duct bend			
Commissioning damper	SYST CRPc 9	a	
Dimension (in): 4, 5 or 6			
Side connection kit, water	SYST CK1	а	

Accessories continued

Horizontal straight connection kit, water	SYST CK2		
Air vent	SYST AR-12		



Flexible connection hose (1 item)	SYST FH F20	aaa-	12
Quick coupling (push-on) on both ends			
Length (in): 10.8, 18.7 or 26.6			
Dimension: (Ø in): .5			

Flexible connection hose (1 item)	SYST FH F30	aaa-	12
Quick-fit coupling (push-on) on one end, G20ID sleeve nut on the other end			
Length (in): 7.9, 15.7 or 23.6			
Dimension (Ø in): .5			

Suspension kit – threaded rod	SYST MS	aaa-	b-	M8
Length of threaded rod (in): 7.9, 19.7 or 39.4				
Type: 1 = Threaded rod only 2 = Double threaded rods with thread locking device.				

