BSA

Active climate beam with cooling, heating and ventilation

CLIMATE BEAM BSA

- BSA is a climate beam with small installation measurements for areas with large cooling requirements.
- Fits in standard T-profiles for integration in suspended ceilings.

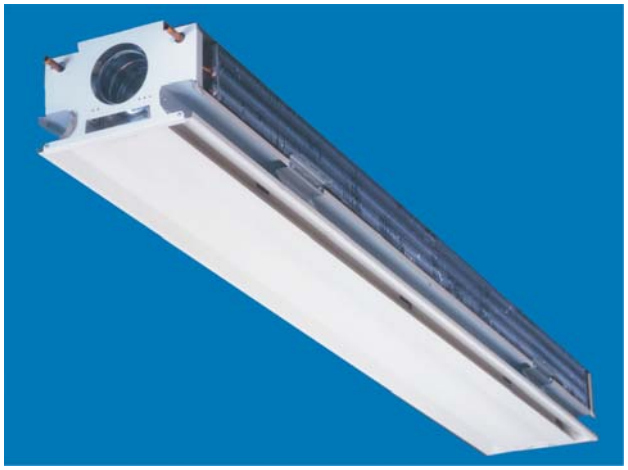
FUNCTION

- Cooling
- Heating (optional)
- Ventilation
- Lighting (optional)

APPLICATION

BSA is suitable for all types of buildings with water based climate cooling:

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



Cooling capacity

P_k (W/m)	q (l/sm)	p_i (Pa)	ΔT_{mk} (°C)	ΔT_l (°C)
465	10	31	10	10
485	10	55	10	10
640	15	70	10	10

Heating capacity: 280 W/m (ΔT_{mv} = 15°C, q_l = 10 l/sm)
Air flow: Up to 15 l/sm.
Range: From 1.2 to 3.9 m.
Width x Height: 294 mm (module 300) x 200 mm.

ADVANTAGES OF BSA

- BSA is a climate beam for integration in suspended ceilings and can also be surface mounted. Built-in height only 200 mm
- The unit's air duct is easily accessible for cleaning via the cover located the in the duct's lower section.
- The cooling batteries are located on the side of the unit, which facilitates inspection and cleaning without the need of dismantling any of the components.
- BSA is an excellent supply air unit. The narrow openings distribute the air in a thin jet along the entire length of the suspended ceiling.
- The underside of the unit can be removed to adjust the configuration of the supply nozzles and to access the air duct for cleaning, etc.
- Thanks to the advantageous supply air principle BSA has a very low sound level.
- BSA is supplied as standard with adjustment damper and commissioning point.

BSA

BSA is a climate beam with two-way air supply. Cooling and ventilation or cooling, heating and ventilation.

Installation

BSA is designed to fit in standard T-profiles with modular measurement 300 mm and with T-profiles that are 24 mm wide. For exact outside dimensions see "DIMENSIONS".

Connection dimensions:
Cooling (water): plain pipe ends Cu Ø12 x 1.0 mm.
Heating (water): plain pipe ends Cu Ø10 x 1.0 mm.
Air: insert parts (nipple) Ø100 mm.

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

Function

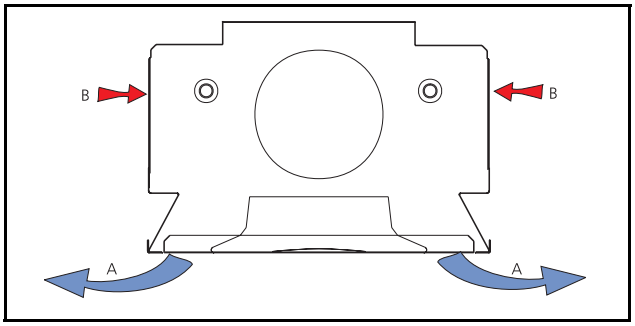


Figure 1. *Cooling, ventilation.*
A = primary air and chilled room air
B = warm room air

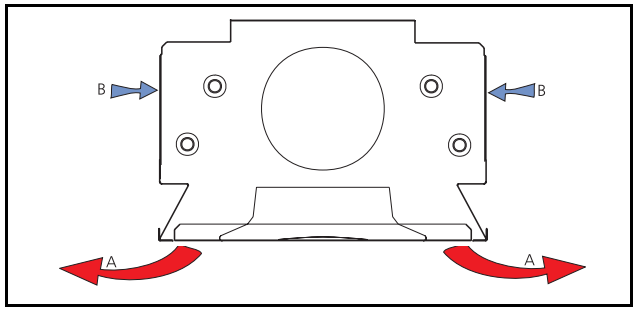


Figure 2. *Heating, ventilation.*
A = primary air and heated room air
B = cold room airroom air

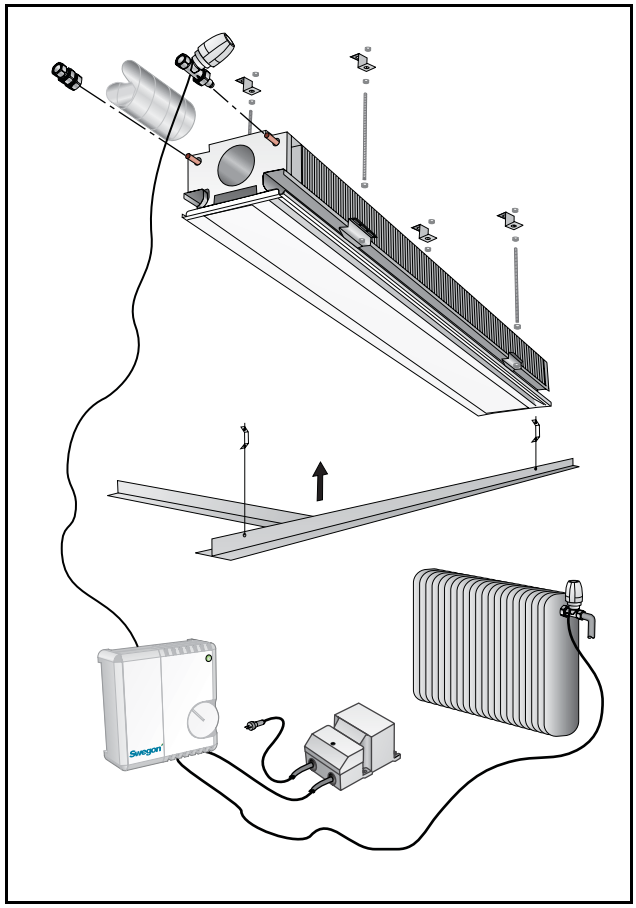


Figure 3. *Installation.*

RANGE AVAILABLE ON ORDER

Nozzle configuration is the number of nozzle holes in the air duct to supply the room with air. For further information see TECHNICAL SPECIFICATION. The following nozzle configurations are available: 1 = standard, 2 and 3 for less air flow, 4 and E for one way (75/25%).

Range availabe on order

Length:	From 1.2 to 3.9 m in increments of 300 mm.
Colour:	RAL 9010 gloss value 30 ± 6%.
Connection:	OH and TH for description see under specification

Water based heating variant -B

SPECIAL TYPES

Colour

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

Horizontal connection Ø125 mm

Air connection horizontal on a push-in fitting (nipple) Ø125 mm. Supplied with damper.

Vertical connection Ø125 mm

Air connected vertically on a push-in fitting (nipple) Ø125 mm. Supplied without damper.

Connection on long side

Air and water connection on the unit's long side. Slight reduction in capacity due to reduced coil length.

Integrated luminaire

Contact Swegon for further information about special types.

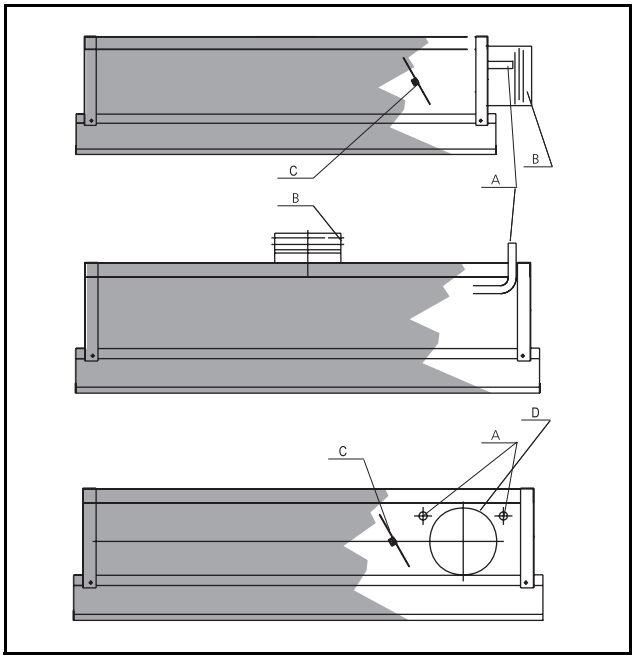


Figure 4. *Special types.*
A = cooling
B = air, push-in fitting (nipple) ø125 mm
C = damper
D = air, push-in fitting (nipple) ø100 mm
Note! With air connection on the long side only ø100 mm is possible.

Figure 5. *BSA with integrated luminaire.*

ACCESSORIES

Flexible connection hose

Flexible hose with compression ring couplings on both ends for connection to copper pipe 12 mm or compression ring coupling in one end and female nut G20ID in the other end.

Angled ducting connection fitting

Nozzle plug

Assembly set SYST MS

RECOMMENDED LIMIT VALUES -WATER

Max. recommended working pressure:	1600 kPa
Max. recommended test pressure for testing completed installations:	2400 kPa
Min. cooling water flow rate:	0.03 l/s
Temperature increase chilled water:	2–5°C
Min. supply temperature:	Should always be selected so that the system works without condensation.
Temperature drop warm water:	2-10°C
Highest supply temperature:	60°C
Min. warm water flow rate:	0.013 l/s

The evacuation of air is ensured at the recommended water flow per cirkuit.

TECHNICAL SPECIFICATION

Cooling

The capacity is measured in accordance with the V-publication 1996:1and Nordtest NT VVS 078 (the Norwegian Building Research Institute).

Selection tables 1-4

The tables are listed according to the duct pressure and configuration, i.e. the number of nozzles active to supply air to the room. By utilising alternative configurations (**Tables 1-4**) the air flow, duct pressure and cooling capacity can be influenced.
The following can be read from the selection guide:
- Climate beam's length (m)
- Primary air flow (l/s)
- Sound level with an open damper (dB(A))
- Nozzle pressure (Pa)
- Airborne cooling capacity P_l (W)
- Waterborne cooling capacity P_k (W)
- Pressure constant

Important! The total cooling power is the sum of the air-based and the water-based cooling capacities

Configuration

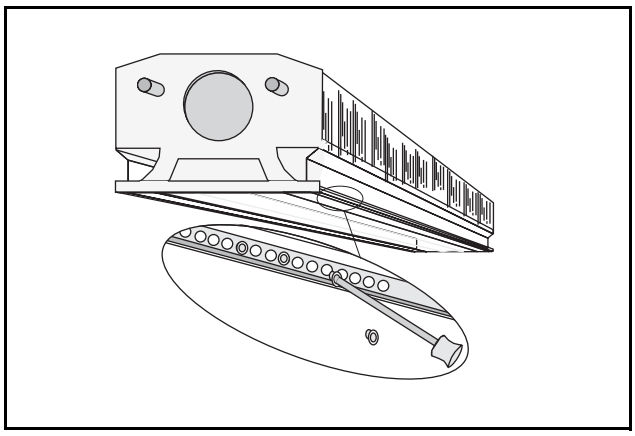


Figure 6. *Changing the nozzle configuration.*

Nozzle configuration

By plugging the nozzle holes in the air duct, based on nozzle configuration 1, you can redo the nozzle configuration as follows:

- For nozzle configuration 2: plug every fourth hole (both sides)
- For nozzle configuration 3: plug every other hole (both sides)
- For nozzle configuration E: plug two of three holes on the low flow side

UNITS OF MEASURE

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

Supplemental index: k = Cooling, l= Air, v= Heating, i = Adjustment

Pressure drop on the water side is calculated according to the formula:
$\Delta p_k = (q_k / k_{pk})^2$ [kPa] where:
Δp_k = pressure drop in the water cirkuit (kPa)
q_k = the water flow (l/s), taken from **Diagram 1**
kp_k = Pressure drop constant, taken from **Table 1-4**

The air's cooling capacity is calculated according to the formula:
P_l (W) = q_l x 1,2 x ΔT_l, where:
P_l = the air's cooling capacity (W)
q_l = the air flow (l/s)
ΔT_l = temperature difference (°C)

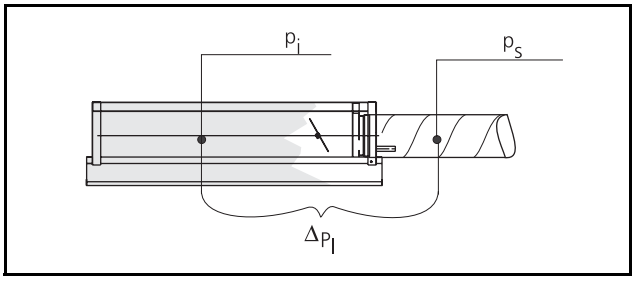


Figure 7. *Pressure differential, air.*

p_i = nozzle pressure, taken from **Table 1-4**
p_s = pressure before the unit and damper
Δp_l = throttle range, fitted damper (taken from **Diagram 3**)

Table 1. Data - cooling. Selection guide, nozzle configuration 1 and horizontal connection.

Unit's length:	Air flow (l/s)	Sound level dB(A)*	p_i (Pa)	**Cooling capacity Primary air (W)**					**Cooling capacity water (W)**								k_{pk}
				ΔT_l	6	8	10	12	ΔT_{mk}	6	7	8	9	10	11	12	
1,2 m	8,5	<25	18		61	82	102	122		187	213	244	270	301	327	358	0,0265
1,2 m	11,5	<25	31		83	110	138	166		231	269	302	341	374	412	445	0,0265
1,2 m	14,5	<25	50		104	139	174	209		265	310	354	398	442	487	530	0,0265
1,2 m	17	<25	70		122	163	204	245		304	350	401	453	499	550	602	0,0265
1,5 m	11	<25	18		79	106	132	158		241	274	314	348	388	421	462	0,0240
1,5 m	14,5	<25	31		104	139	174	209		298	348	390	440	482	532	575	0,0240
1,5 m	18,5	<25	50		133	178	222	266		342	399	456	513	570	627	684	0,0240
1,5 m	22	<25	70		158	211	264	317		392	451	517	585	643	709	776	0,0240
1,8 m	13,5	<25	18		97	130	162	194		295	336	385	426	475	516	565	0,0225
1,8 m	17,5	<25	31		126	168	210	252		365	425	477	538	590	651	703	0,0225
1,8 m	23	<25	50		158	211	264	317		419	489	558	628	698	768	837	0,0225
1,8 m	27	<25	70		194	259	324	389		480	553	633	715	788	869	950	0,0225
2,1 m	15,5	<25	18		112	149	186	223		349	397	455	504	562	610	669	0,0210
2,1 m	21	<25	31		151	202	252	302		431	504	565	637	699	771	832	0,0210
2,1 m	26	<25	50		187	250	312	374		495	578	660	743	825	908	990	0,0210
2,1 m	31	26	70		223	298	372	446		568	653	749	846	932	1028	1124	0,0210
2,4 m	18	<25	18		130	173	216	259		403	459	526	582	649	705	772	0,0195
2,4 m	24	<25	31		173	230	288	346		498	581	652	736	807	889	960	0,0195
2,4 m	30	26	50		216	288	360	432		572	668	763	858	953	1049	1144	0,0195
2,4 m	36	29	70		259	346	432	518		665	755	865	977	1076	1187	1298	0,0195
2,7 m	21	<25	18		151	202	252	307		457	520	596	660	736	799	876	0,0185
2,7 m	27	<25	31		194	259	324	389		565	659	740	834	915	1009	1090	0,0185
2,7 m	34	29	50		245	326	408	490		649	757	865	973	1081	1190	1297	0,0185
2,7 m	41	33	70		295	394	492	590		744	855	981	1108	1220	1346	1472	0,0185
3,0 m	23	<25	18		166	221	276	331		511	582	667	738	823	894	979	0,0180
3,0 m	30	<25	31		216	288	360	432		632	737	827	933	1023	1128	1218	0,0180
3,0 m	38	31	50		266	355	444	533		725	847	967	1088	1209	1330	1451	0,0180
3,0 m	46	35	70		324	432	540	648		831	957	1097	1239	1365	1505	1646	0,0180
3,3 m	25	<25	18		180	240	300	360		565	643	737	816	910	988	1083	0,0170
3,3 m	33	26	31		238	317	396	475		699	815	915	1031	1131	1248	1347	0,0170
3,3 m	42	33	50		295	394	492	590		802	936	1069	1203	1337	1471	1604	0,0170
3,3 m	50	38	70		360	480	600	720		919	1057	1213	1370	1508	1664	1820	0,0170
3,6 m	28	<25	18		202	269	336	403		619	705	808	894	997	1083	1186	0,0165
3,6 m	36	28	31		259	346	432	518		765	893	1002	1130	1239	1366	1476	0,0165
3,6 m	46	36	50		324	432	540	648		879	1026	1172	1318	1464	1611	1757	0,0165
3,6 m	55	40	70		396	528	660	792		1007	1159	1329	1501	1653	1823	1995	0,0165
3,9 m	30	<25	18		216	288	360	432		673	766	878	972	1084	1177	1290	0,0160
3,9 m	39	30	31		281	374	468	562		832	971	1090	1229	1347	1486	1605	0,0160
3,9 m	50	38	50		353	470	588	706		955	1115	1274	1433	1592	1752	1911	0,0160
3,9 m	59	42	70		425	566	708	850		1095	1260	1445	1632	1797	1982	2168	0,0160

*Room attenuation = 4 dB, open damper

Table 2. Data - cooling. Selection guide, nozzle configuration 2 and horizontal connection.

Unit's length:	Air flow (l/s)	Sound level dB(A)*	p_i (Pa)	Cooling capacity Primary air (W)					Cooling capacity water (W)								k_{pk}
				ΔT_l	6	8	10	12	ΔT_{mk}	6	7	8	9	10	11	12	
1,2 m	8,5	<25	31		61	82	102	122		192	223	254	291	322	353	384	0,0265
1,2 m	11,5	<25	55		83	110	138	166		239	278	316	360	398	436	475	0,0265
1,2 m	14	<25	85		101	134	168	202		274	320	364	409	460	504	550	0,0265
1,5 m	11	<25	31		79	106	132	158		248	288	328	375	415	455	495	0,0240
1,5 m	14,5	<25	55		104	139	174	209		309	358	407	464	512	562	611	0,0240
1,5 m	18	<25	85		130	173	216	259		354	411	470	527	593	650	708	0,0240
1,8 m	13	<25	31		94	125	156	187		303	352	401	459	508	557	606	0,0225
1,8 m	17,5	<25	55		126	168	210	252		378	439	499	568	628	688	749	0,0225
1,8 m	22	<25	85		158	211	264	314		433	504	575	646	726	796	867	0,0225
2,1 m	15,5	<25	31		112	149	186	223		359	417	475	543	601	659	717	0,0210
2,1 m	21	<25	55		151	202	252	302		447	519	590	672	742	814	885	0,0210
2,1 m	26	<25	85		187	250	312	374		513	596	680	764	859	942	1026	0,0210
2,4 m	18	<25	31		130	173	216	259		414	481	548	627	694	761	828	0,0195
2,4 m	24	<25	55		173	230	288	346		517	600	681	776	858	940	1023	0,0195
2,4 m	30	26	85		216	288	360	432		592	689	785	882	991	1088	1185	0,0195
2,7 m	20	<25	31		144	192	240	288		470	546	622	711	787	863	939	0,0185
2,7 m	27	<25	55		194	259	324	389		586	679	773	880	972	1066	1159	0,0185
2,7 m	34	29	85		245	326	408	490		672	781	891	1000	1124	1233	1344	0,0185
3,0 m	23	<25	31		166	221	276	331		525	610	695	795	880	965	1050	0,0180
3,0 m	30	<25	55		216	288	360	432		655	760	864	984	1088	1192	1297	0,0180
3,0 m	37	31	85		266	355	444	533		751	874	996	1119	1257	1379	1502	0,0180
3,3 m	25	<25	31		180	240	300	360		581	675	769	879	973	1067	1161	0,0170
3,3 m	33	26	55		238	317	396	475		725	840	956	1088	1202	1318	1433	83170
3,3 m	41	33	85		295	394	492	590		831	966	1102	1237	1390	1525	1661	0,0170
3,6 m	27	<25	31		194	259	324	389		636	739	842	963	1066	1169	1272	0,0165
3,6 m	36	28	55		259	346	432	518		794	921	1047	1192	1318	1444	1571	0,0165
3,6 m	45	36	85		324	432	540	648		909	1058	1206	1355	1523	1671	1820	0,0165
3,9 m	30	22	31		216	288	360	432		692	804	916	1047	1159	1271	1383	0,0160
3,9 m	39	30	55		281	374	468	562		863	1001	1138	1296	1432	1570	1707	0,0160
3,9 m	49	38	85		353	470	588	706		989	1150	1312	1473	1656	1817	1979	0,0160

*Room attenuation = 4 dB, open damper

Table 3. Data - cooling. Selection guide, nozzle configuration 3 and horizontal connection.

Unit's length:	Air flow(l/s)	Sound level dB(A)*	p_i (Pa)	**Cooling capacity Primary air (W)**					**Cooling capacity water (W)**								k_{pk}
				ΔT_l	6	8	10	12	ΔT_{mk}	6	7	8	9	10	11	12	
1,2 m	3,5	<25	11		25	34	42	50		109	130	145	161	176	192	231	0,0265
1,2 m	5,5	<25	31		40	53	66	79		156	182	208	234	260	285	311	0,0265
1,2 m	8,5	<25	70		61	82	102	122		206	244	275	307	344	375	413	0,0265
1,5 m	4,5	<25	11		32	43	54	65		140	167	187	207	227	248	274	0,0240
1,5 m	7	<25	31		50	67	84	101		201	234	268	301	335	368	401	0,0240
1,5 m	11	<25	70		79	106	132	158		266	314	355	396	444	485	532	0,0240
1,8 m	5	<25	11		36	48	60	72		172	205	229	254	278	303	336	0,0225
1,8 m	9	<25	31		65	86	108	130		246	287	328	369	410	450	491	0,0225
1,8 m	13	<25	70		94	125	156	187		325	385	435	485	543	593	652	0,0225
2,1 m	6	<25	11		43	58	72	86		203	242	271	300	329	359	397	0,0210
2,1 m	10,5	<25	31		76	101	126	151		291	339	388	436	485	533	581	0,0210
2,1 m	15,5	<25	70		112	149	186	223		386	455	514	573	643	702	771	0,0210
2,4 m	7	<25	11		50	67	84	101		235	280	313	347	380	414	459	0,0195
2,4 m	12	<25	31		86	115	144	173		336	392	448	504	560	615	671	0,0195
2,4 m	18	<25	70		130	173	216	259		445	525	594	662	742	810	890	0,0195
2,7 m	8	<25	11		58	77	96	115		266	317	355	393	431	470	520	0,0185
2,7 m	13,5	<25	31		97	130	162	194		381	444	508	571	635	698	761	0,0185
2,7 m	20	<25	70		144	192	240	288		505	596	673	751	842	919	1010	0,0185
3,0 m	9	<25	11		65	86	108	130		298	355	397	440	482	525	582	0,0180
3,0 m	15	<25	31		108	144	180	216		426	497	568	639	710	780	851	0,0180
3,0 m	23	<25	70		166	221	276	311		564	666	753	839	940	1027	1129	0,0180
3,3 m	10	<25	11		72	96	120	144		329	392	439	486	533	581	643	0,0170
3,3 m	16,5	<25	31		119	158	198	238		471	549	628	706	785	863	941	0,0170
3,3 m	25	<25	70		180	240	300	360		624	736	832	928	1040	1136	1248	0,0170
3,6 m	11	<25	11		79	106	132	158		361	430	481	533	584	636	705	0,0165
3,6 m	18	<25	31		130	173	216	259		516	602	688	774	860	945	1031	0,0165
3,6 m	27	<25	70		194	259	324	389		683	807	912	1017	1139	1244	1368	0,0165
3,9 m	12	<25	11		86	115	144	173		392	467	523	579	635	692	766	0,0160
3,9 m	20	<25	31		144	192	240	288		561	654	748	841	935	1028	1121	0,0160
3,9 m	30	25	70		216	288	360	432		744	877	991	1106	1239	1354	1487	0,0160

*Room attenuation = 4 dB, open damper

Table 4. Data - cooling. Selection guide, nozzle configuration E (flow distribution 75-25%) and horizontal connection.

Unit's length:	Air flow (l/s)	Sound level dB(A)*	p_i (Pa)	**Cooling capacity Primary air (W)**					**Cooling capacity water (W)**								k_{pk}
				ΔT_l	6	8	10	12	ΔT_{mk}	6	7	8	9	10	11	12	
1,2 m	11,5	<25	70		83	110	138	166		229	267	299	338	371	408	441	0,0265
1,5 m	14,5	<25	70		104	139	174	209		295	344	386	436	478	527	569	0,0240
1,8 m	17,5	<25	70		126	168	210	252		361	421	473	533	585	645	696	0,0225
2,1 m	21	<25	70		151	202	252	302		427	499	560	631	692	763	824	0,0210
2,4 m	24	<25	70		173	230	288	346		494	575	646	729	799	881	951	0,0195
2,7 m	27	<25	70		194	259	324	389		560	653	733	826	906	1000	1079	0,0185
3,0 m	30	<25	70		216	288	360	432		626	730	819	924	1013	1117	1206	0,0180
3,3 m	33	27	70		238	317	396	475		692	807	906	1022	1120	1236	1335	0,0170
3,6 m	36	29	70		259	346	432	518		758	884	992	1119	1227	1353	1462	0,0165
3,9 m	39	31	70		281	374	468	562		824	962	1079	1217	1335	1472	1590	0,0160

*Room attenuation = 4 dB, open damper

Table 5. Cooling capacity with natural convection.

Length	Temperature difference room - water °C							
	ΔT_{mk}	6	7	8	9	10	11	12
1.2m		36	47	59	73	87	103	120
1.5m		46	60	76	94	113	133	155
1.7m		56	74	93	115	138	163	190
2.1m		67	87	110	136	163	193	225
2.4m		77	101	128	157	189	223	259
2.7m		87	115	145	178	214	253	294
3.0m		98	128	162	199	239	283	329
3.3m		108	142	179	220	164	312	364
3.6m		119	155	196	241	290	342	399
3.9m		129	169	213	262	315	372	433

Gravity refers to capacity without supply air.

Table 6. Effect factors, conncection long side.

Length	Capacity factor for water based cooling	Reduction factor for air volume
1.2	0.82	0.92
1.5	0.86	0.96
1.8	0.88	0.88
2.1	0.90	0.90
2.4	0.91	0.91
2.7	0.92	0.92
3.0	0.93	0.93
3.3	0.94	0.94
3.6	0.94	0.94
3.9	0.95	0.95

For special types with connection on the long side the capacity is calculated as follows:
$P_{k(long\ side)} = P_{(table\ 1\text{-}5)} \cdot$ Capacity factor (table 6).
Air flow is calculated: $q_{l(long\ side)} = q_{(table\ 1\text{-}4)} \cdot$ Reduction factor (table 6).
Capacities assume that the stated nozzle pressure in tables 1-4 is not changed.

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

Diagram 2. The function of the correction factor for the cooling capacity P_k (W) and the cooling water flow q_k (l/s). Different water rates affect to a certain degree the cooling capacity effect. By checking the obtained water flow rate using diagram 2, the specified outputs in tables 1-6 may need to be adjusted upwards or downwards according to the formula: $P_{corrected} = P_{k(table\ 1\text{-}4)} \cdot k_{(diagram\ 2)}$.

Diagram 3. Throttling range for the in-built damper CRPc 9-125, shows the relation between the pressure drop Δp_l and the air flow q_l (l/s)

Table 7. Natural attenuation ΔL (dB) including end reflection.

Table 8. Typical R_w values between an office with BSA installed in the suspended ceiling.

Diagram 1. Water flow - cooling capacity.

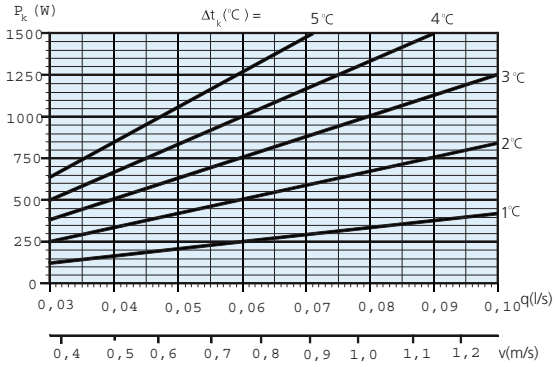
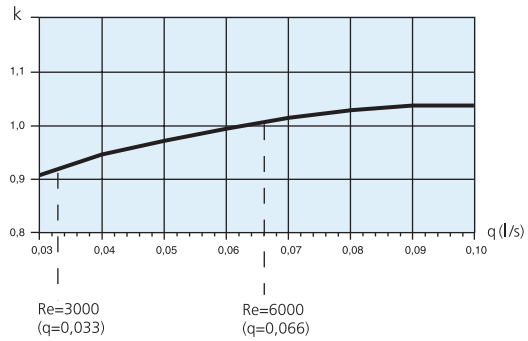
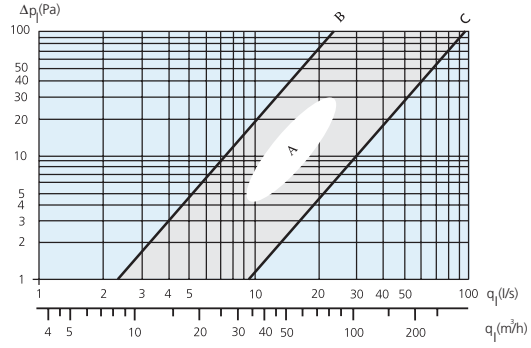


Diagram 2. Water flow - capacity reduction.



k = correction factor

Diagram 3. Throttling range, in-built damper.



A = throttle range
B = closed
C = open

Table 7. Natural attenuation, nozzle configuration 1.

Natural attenuation ΔL (dB), for climate beams with configuration 1								
63	125	250	50	1k	2k	4k	8k	Hz
13	14	5	1	6	7	7	12	dB

Table 8. Rw-values.

Construction	Suspended Ceiling R_W(dB)	With BSA R_W(dB)
Light acoustic suspended ceiling. Mineral wool or perforated steel /aluminium cassettes or screen.	28	28
Light acoustic suspended ceiling. Mineral wool or perforated steel /aluminium cassettes or screen. The suspended ceiling is covered with 50 mm mineral wool*.	36	34
Light acoustic suspended ceiling. Mineral wool or perforated steel /aluminium cassettes or screen. Standing 100 mm mineral wool blocks as a seal between the offices*.	36	34
Perforated plasterboard tiles in T-profile supports. Acoustic insulation on top (25 mm).	36	34
Sealed plaster suspended sealing with insulation on the top.	45	34

*Top layer: Rockwool 70 kg/m^3, Glasswool 50 kg/m^3.

HEATING

Additional heat – heating coil

The heating function is only intended as an addition in those cases where surplus heat normally prevails, but then under short periods when there is a need of small additional heat, for example during the evenings and at night.

A condition for the function and the heat additional to be of use to the room is that the supply air is running (switched on). The mixture of hot and cold air takes place with the help of the ventilation air, which is why the temperature distribution in the room is fully dependent on the condition between the supply air and the capacity taken out of the beam.

Heat is supplied along the ceiling which, in order to work, requires a low supply temperature and a specific impulse. Normally a temperature gradient of 3°C between the floor and ceiling is obtained.

Recommendations for the additional heat function

Highest supply temperature: 60°C
Lowest warm water flow: 0.013 l/s
Nozzle pressure, p_i: >30 Pa
It is recommended for facades with large glazed areas that radiation from colder surfaces is compensated for using radiant heat in the ceiling or radiators along the facade. With other conditions please contact Swegon.

Diagram 4. The function of the heating effect – four pipe system P_v (W) as a function of the mean temperature difference ΔT_{mv} (°C).

Diagram 5. Water flow – heating.
The function between the warm water flow q_v (l/s), temperature change ΔT_v (°C) and the heating effect P_v (W).

Table 9. Pressure drop – heating, four pipe system.
Pressure drop constant k_{pv} for heating cirkuit.
Pressure drop calculated according to the formula:
$\Delta p_v = (q_v / k_{pv})^2$ [kPa] where:
Δp_v = the pressure drop in the water cirkuit (kPa)
q_v = the water flow (l/s), taken from Diag. 5
k_{pv} = Pressure drop constant

Table 10. The unit's active length. A deduction for the inactive length must be made when calculating the capacity per unit.

Table 9. Pressure drop constant for heating cirkuit.

Length (m)	1.2	1.5	1.8	2.1	2.4
k_{pv}	0.0220	0.0200	0.0185	0.0175	0.0165
Length (m)	2.7	3.0	3.3	3.6	3.9
k_{pv}	0.0160	0.0150	0.0145	0.0140	0.0135

Table 10. The unit´s active length.

$L_{Akt} = L_{Nom}$ -160 mm

Diagram 4. Heating capacity.

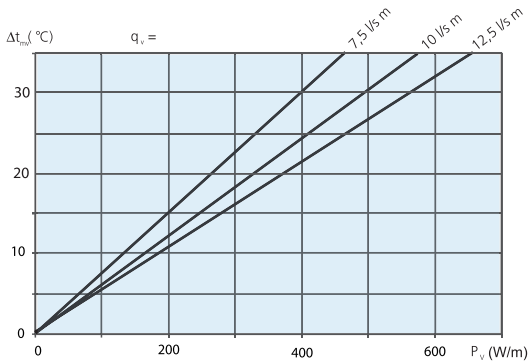
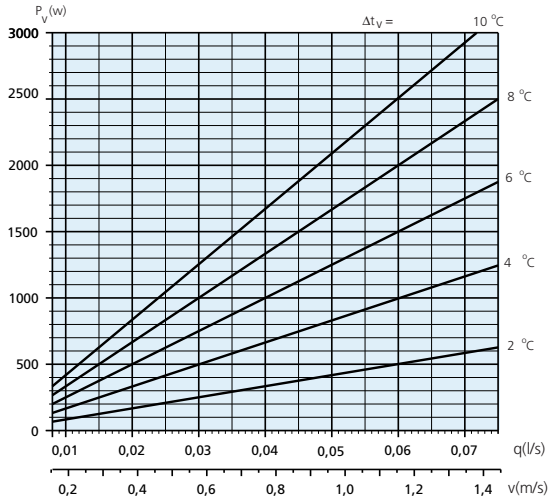


Diagram 5. Water flow - heating.



PRESSURE DROP DIAGRAM

Diagram 6. Pressure drop Δp_k (kPa) in the cooling cirkuit as a function of the cooling water flow q_k (l/s) and the length of the unit.

Diagram 7. Pressure drop Δp_v (kPa) in the heating cirkuit as a function of the heating water flow q_v (l/s) and the length of the unit.

Diagram 6. Pressure drop cooling.

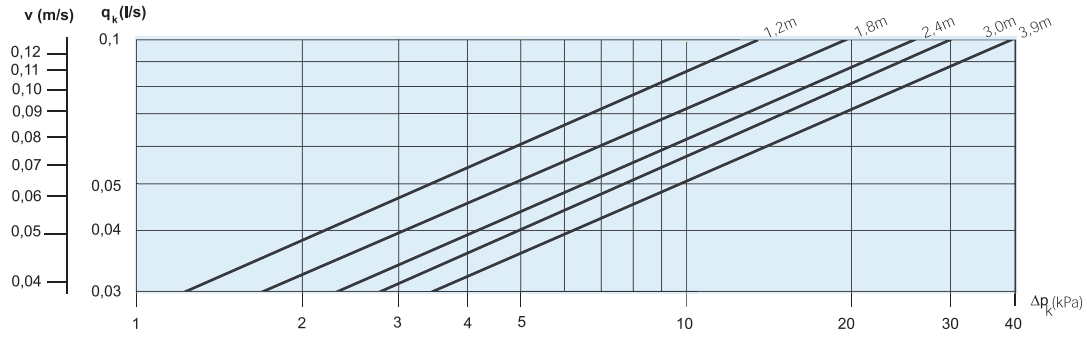
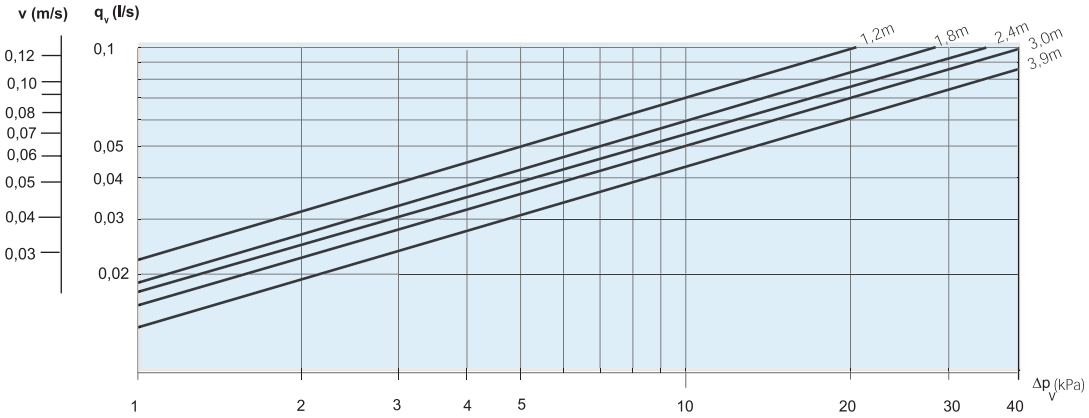


Diagram 7. Pressure drop heating.



EXAMPLE cooling

An office with the dimensions w x d x h = 4.2 x 4.5 x 2.7 m has a cooling requirement of 74 W/m^2. The air flow should be 2 l/s m^2, which gives 38 l/s in the room.
The sound level must not exceed 35 dB(A).
Selected room temperature summer: 25°C
Chilled water temperature 15/19 gives: ΔT_k = 4°C; ΔT_{mk} = 8°C
Supply air temperature 15°C gives: ΔT_l = 10°C
The requirement is to place BSA in the centre of the room in a line from the corridor wall towards the façade.

SOLUTION
Cooling
The supply air's cooling capacity is P_l = 1.2 x 10 x 38 = 456 W.
The remaining water based cooling effect required will then be the total required cooling capacity minus the air's cooling effect: 74 x 4.2 x 4.5 – 456 = 942 W.
From **Table 1**, assume a length of 3.0 metres, 967 W cooling power if ΔT_{mk} = 8°C and the airflow is 38 l/s, which is sufficient to meet comfort requirements.
Cooling water
With the cooling capacity requirement of 942 W for the cooling water the requisite water flow is taken from **Diagram 1.** With the temperature increase of ΔT_k = 4°C the water flow rate is 0.056 l/s.

Diagram 2 shows that the water flow per beam 0.056 nearly gives sufficient turbulent flow in the coil. The water flow 0.056 l/s gives 98% of the nominal capacity.
The drop in capacity can be compensated by counting the unit's requisite performance according to the following: P_k = 942/0.98 = 961 W.

The new water flow is taken from **Diagram 1**, q_k = 0.057 l/s.

The pressure drop is calculated based on the water flow rate of 0.057 l/s and the pressure constant k_{pk} = 0.0180, which is taken from **Table 1.** The pressure drop is then: $\Delta p_k = (q_k / k_{pk})^2 = (0.057 / 0{,}0180)^2$ = 10 kPa. The pressure drop can also be read from diagram 6.

Sound level
In **Table 1**, we see that the sound level is 31 dB(A) for an open damper.

EXAMPLE heating

An office with the dimensions w x d x h = 4.2 x 4.5 x 2.7 m has a heating requirement of 25 W/m^2 = 475 W. The air flow should be 38 l/s.
Selected room temperature winter: 22°C
The warm water temperature 40/34 gives: ΔT_v = 6°C; ΔT_{mv} = 15°C.
The requirement is to place BSA in the centre of the room in a line from the corridor wall towards the façade.

SOLUTION
Heating
The air flow of 38 l/s gives, when calculating the active length as set out in **Table 10** , the air flow per metre as follows:
Active length for BSA length 3.0 m = 3000 mm – 160 mm = 2840 mm. This gives the air flow per metre 38 / 2,84 = 13,4 l/s m. The requisite heating capacity per metre is 475/ 2.84 = 167 W/m.

From **Diagram 4** we get ΔT_{mv} 15°C and the air flow 13.4 l/s m the heating capacity 300 W/m BSA, which gives 320 x 2.24 = 716 W, which is sufficient to cover the heating requirement.

Heating water
With the heating capacity requirement of 475 W the requisite water flow is taken from **Diagram 5**. With the temperature drop of ΔT_k = 6°C the water flow rate is 0.019 l/s.

The pressure drop is calculated based on the water flow rate of 0.019 l/s and the pressure constant k_{pv} = 0.015, which is taken from **Table 9**. The pressure drop is then: $\Delta p_v = (q_v / k_{pv})^2 = (0.019 / 0.015)^2$ = 1.6 kPa. The pressure drop can also be read from **Diagram 7**.

DIMENSIONS

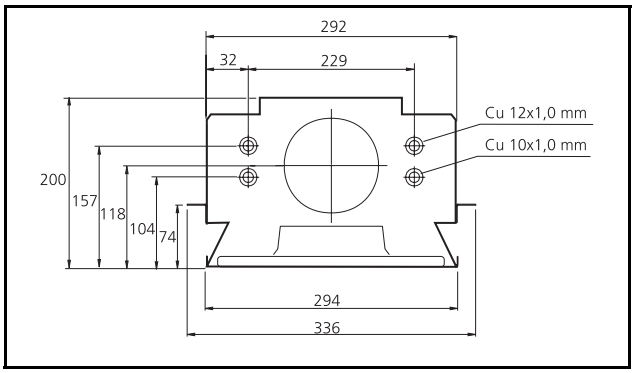


Figure 8. *End view. Ø12 = cooling, Ø10 = heating.*

Length BSA

Nominal dimensions BSA (m):	1.2; 1.5; 1.8; 2.1; 2.4; 2.7; 3.0; 3.3; 3.6 and 3.9 m.
Length BSA:	Nominal – 8 mm (+4/-2) mm.

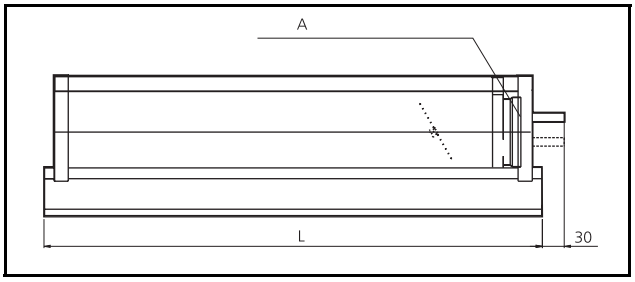


Figure 9. *BSA horizontal connection -OH, side view.*
A = air, push-in fitting (nipple) Ø100 mm.
L = length according to the table.

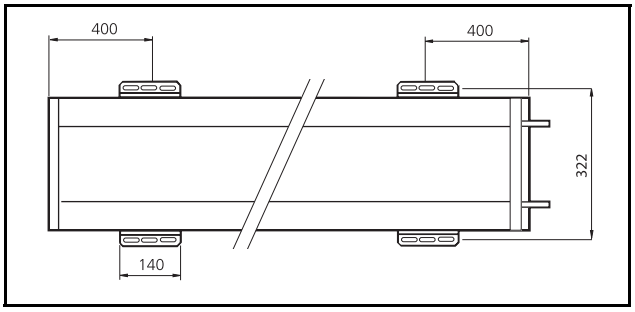


Figure 10. *Suspension bracket, top view.*

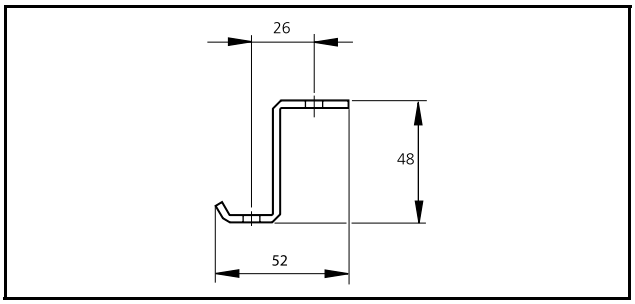


Figure 11. *Suspension: Ceiling mounting bracket (included in the SYST MS)*

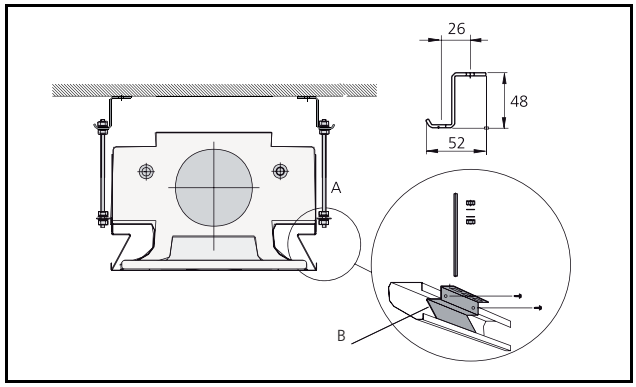


Figure 12. *Suspension: SYST MS assembly set, end view.*
A = M6 threaded rod
B = Lower suspension bracket

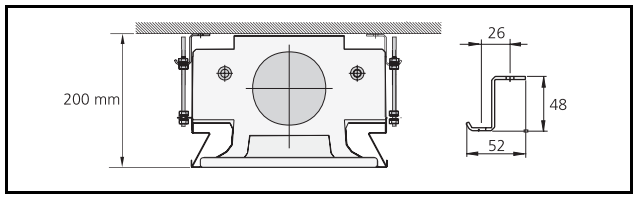


Figure 13. *Suspension: Assembly set SYST MS, surface mounted, end view.*

Special types

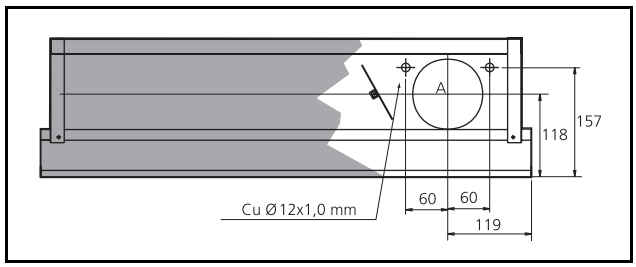


Figure 14. *Connection long side, end view.*
A = air, push-in fitting (nipple) Ø 100 mm

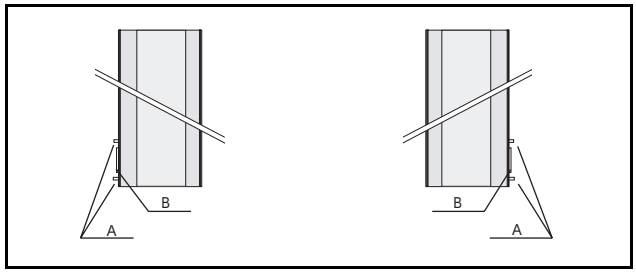


Figure 15. *Connection, long side, top view.*
A = connection cooling
B = connection ventilation

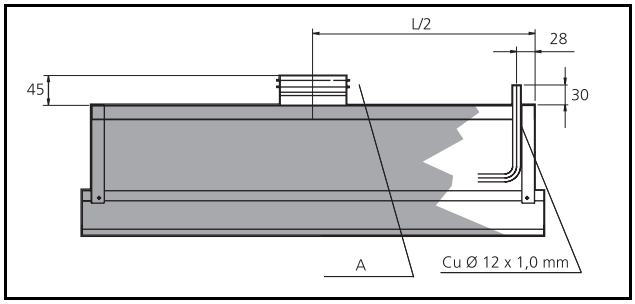


Figure 16. *Connection vertical, side view.*
A = air, push-in fitting (nipple) Ø125

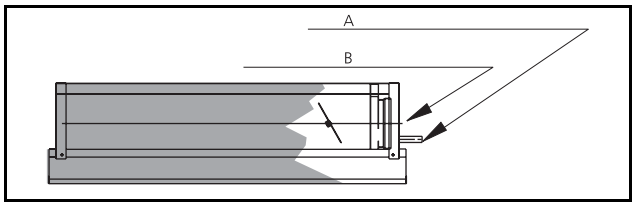


Figure 17. *Connection, side view.*
A = cooling: Plumber connection to pipe Cu 12 x 1.0 mm
B = ventilation contractor connection to push-in fitting (sleeve) Ø100 mm

WEIGHT

Weight per metre BSA:	
Dry weight	12 kg/m
Weight filled with water	13 kg/m

SPECIFICATION

Climate beam type BSA for cooling and ventilation or cooling, heating and ventilation.

The beams are supplied enamelled in Swegon white standard colour RAL 9010 gloss value 30±6%.

Limits of contract

Swegon limits of contract are the connection points for water (according to the figure under Dimensions – Limits of contract/connection points). At these connection points the plumbing contractor connects to plain pipe ends, fills the system, vents and performs pressure testing.

The ventilation contractor connects to the duct connections with dimensions as set out on the basic size drawing under the section **"Dimensions".**

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

Specification

Product

Active climate beam BSA	d	aa-	bb-	cc-	d
Version:					
Length:					
1.2; 1.5; 1.8; 2.1; 2.4; 2.7; 3.0 3.3; 3.6; 3.9.					
Nozzle configuration:					
1, 2 and 3					
ER = 75% of air flow to the right seen from the coil connection.					
EL = 75% of air flow to the left seen from the coil connection.					
Conncection					
Range available on order:					
OH = Horizontal from the end, air and water on the same side.					
TH = Horizontal from the end, air and water on opposite sides.					
Special types:					
RS = From the side, air and water on the same side.					
Connection on right-hand side seen from the closest end.					
LS = From the side, air and water on the same side.					
Connection on the left-hand side seen from the closest end.					
V = Vertical					
Heating function:					
B = Water based heating					

ACCESSORIES

Assembly set	SYST MS	aaaa-	b
Length drop rod:			
200, 500, 1000 mm			
1= only the drop rod 2= double drop rods with thread lock			

Flexible connection hose (1)	SYST	FS	aa-	bbb
Type:				
F1 = compression ring on pipe Ø12 x 1.0 mm, both ends. F20 = Push-on coupling against Ø12 x 1.0 mm pipe on both ends.				
Length:				
500 and 700 mm. Flexible connection hose delivered individually.				

Flexible connection hose (1)	SYST	FS	aaa-	bbb
Type:				
F30 = Push-on coupling against Ø12 x 1.0 mm pipe on one end, G20ID sleeve nut on the other.				
Length:				
200, 400 and 600 mm. Flexible connection hose delivered individually.				

Order example

Active climate beam with equal two-way air supply, cooling, ventilation and connection OH: BSA –2.4-1-OH.
Active climate beam with two-way air supply, cooling, ventilation, flow distribution 75/25% to the right and connection OH: BSA 2.4-ER-OH.

EXPLANATORY TEXT

Example of the explanatory text.
Swegon enclosed active climate beam system BSA for integration in suspended ceilings with the following functions:

- Cooling.
- Heating (optional).
- Ventilation.
- Low build-in height.
- Adjustable damper.
- Cleanable.
- Fixed measuring point with hose.
- Enamelled in white standard finish RAL 9010.
- Complete delivery including requisite fittings for suspension excluding screws for securing to joists.
- As standard fits T-bars with modular measurement 300 mm T-profile 24 mm.
- Limits of contract at connection points for water and air according to principal drawing.
- At connection points the plumbing contractor connects to plain pipe ends 12 mm and the mechanical installer connects to connection sleeves, 100 mm.
- The plumbing contractor fills, vents and pressure tests as well as bears responsibility that the planned water flow reaches every system branch and unit.
- The ventilation contractor adjusts to design the air flow.

Accessories:

- Assembly set SYST MS aaaa - b xx
  Flexible connection hose SYST FS aa - bbb xx
  Size: TD XX-1 BSA aa - bb - cc - d, xx
  TD XX-2 BSA aa - bb - cc - d, xx
  etc.
- Control equipment, see separate section in the brochure water based climate systems.