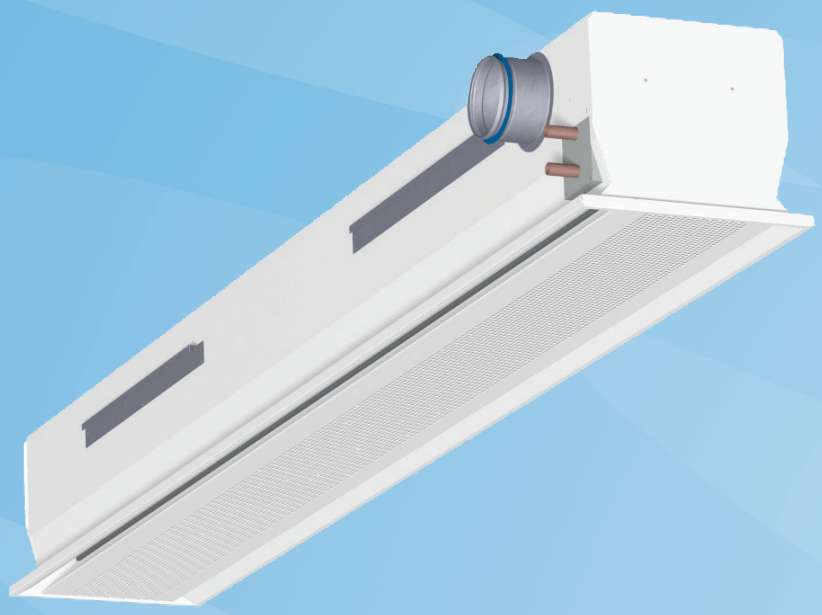
Halton CBD

Active Chilled Beam

20/CBD/3500/0606/EN



- Combined cooling, heating and supply air unit for flush installation within suspended ceiling
- Comprises an integral recirculation air path
- Well suited for spaces with high cooling loads, low humidity load and low ventilation requirement
- Ideal for a wide range of buildings, where high quality environmental conditions and individual room control are required
- Typical applications: office rooms, landscape offices, meeting rooms, hotel guest rooms and patient care rooms etc.

Product Models & Accessories

- Model with combined cooling and heating coil
- Options for duct and water pipe connections

Material and finishing

Cooling/heating water pipe connections are Cu15/Cu10 with a wall thickness of 1.0 mm, fulfilling the European Standard EN 1057:1996.
The maximum operating pressure for chilled/hot water pipework is 1.0 MPa. Supply air duct connection is D100 mm.

MATERIAL AND FINISHING

PART	MATERIAL	FINISHING	NOTE
Bottom panel	Pre-painted galvanised steel	Polyester-painted White RAL 9010/ 20 % gloss	Special colours available Polyester-epoxy-painted
Side plates	Pre-painted galvanised steel	Polyester-painted White RAL 9010/ 20 % gloss	Special colours available Polyester-epoxy-painted
End plates	Galvanised steel	Polyester-epoxy-painted	Special colours available
Supply air plenum	Galvanised steel		
Brackets	Galvanised steel		
Coil pipes	Copper		
Coil fins	Aluminium		

QUICK SELECTION

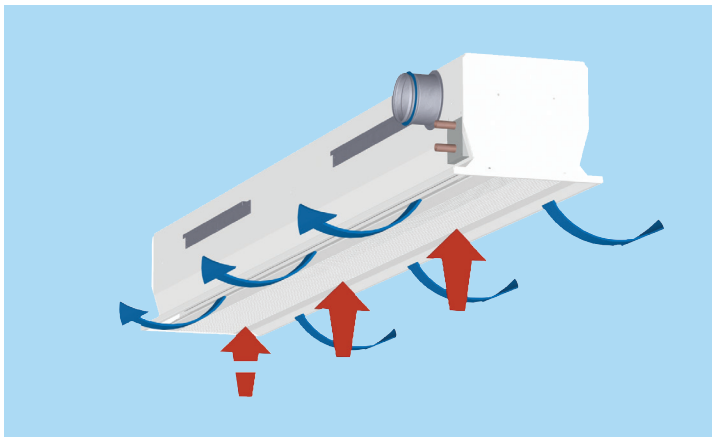
qv								
	Pa	72	108	144	180	216	252	288
	l/s	10	15	20	25	30	35	40
	m³/h	36	54	72	90	108	126	144
Leff								
1300	Pw		266	256	301			
	NZ/ΔPtot		C/78	D/64	D/100			
	Lmin		1,9	2,3	4,3			
	Ld		3,2	4	4,8			
1600	Pw	260	353	356	327	374		
	NZ/ΔPtot	A/78	B/93	C/95	D/72	D/104		
	Lmin	1,3	1,7	1,9	2,3	3,9		
	Ld	2,6	3	3,4	4	4,8		
1800	Pw		377	381	450	402	450	
	NZ/ΔPtot		B/68	C/71	C/110	D/80	D/108	
	Lmin		1,3	1,3	1,9	2,3	3,9	
	Ld		2,4	3	3,6	4	4,6	
2200	Pw		397	495	477	546	477	
	NZ/ΔPtot		A/96	B/92	C/86	C/123	D/87	
	Lmin		1,3	1,3	1,3	1,3	2,3	
	Ld		2,8	2,8	3	3,6	4	
2500	Pw		420	521	615	575	503	554
	NZ/ΔPtot		A/75	B/73	B/115	C/99	D/72	D/94
	Lmin		1,3	1,3	1,3	1,3	1,3	2,3
	Ld		2,4	2,4	3	3,2	3,4	4
2800	Pw			540	642	601	673	579
	NZ/ΔPtot			A/108	B/94	C/82	C/112	D/80
	Lmin			1,3	1,3	1,3	1,3	2,3
	Ld			3	2,8	3	3,4	3,6

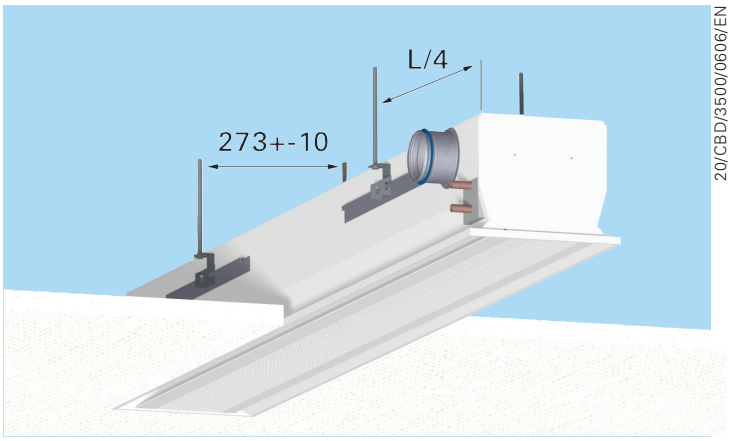
Leff	Effective length, length of cooling coil, mm
Pa	Supply air capacity, W
Pw	Coil capacity, W
NZ	Nozzle type
ΔPtot	Chilled beam chamber pressure, Pa
Lmin	Minimum distance between central lines of two supply units, m
Ld	Distance where supply air jet detaches from the ceiling, m

Room temperature (Tr)	= 24 °C
Chilled water inlet temperature (Twin)	= 15 °C
Chilled water outlet temperature (Twout)	= 17 °C
Supply air temperature (Ta)	= 18 °C
A-weighted sound pressure level, reduced by total equivalent absorption surface of 10m² , dB(A) red 10m² sab	< 35 dB(A)

PRODUCT MODELS AND ACCESSORIES

ACCESSORY MODEL	CODE	DESCRIPTION	NOTE
Combined cooling and heating coil	TC = H	Coil with hot water circulation	Cooling/heating copper water pipe connections are Ø 15/10 mm
Duct connections	E = R1N or L1N	R1N = connection from right, duct size 100 mm, without damper L1N = connection from left, duct size 100 mm, without damper	
Water pipe connections	WD = A, B, C or D	A = connection from left side at front end B = connection from right side at front end C = connection from left side at back end D = connection from right side at back end	





20/CBD/3500/0606/EN

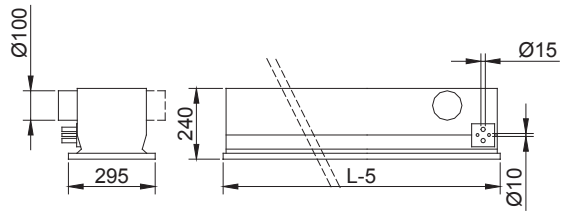
Function

The primary supply air enters the plenum of the active chilled beam, from where it is diffused into the room through nozzles and supply slots located at the bottom of the beam.
The supply air nozzle jets induce efficiently ambient room air through the heat exchanger, where it is either cooled or heated.
The supply air jet is directed horizontally along the ceiling surface.
Four different nozzle sizes are available to enable different supply airflow rates.
The cooling and heating capacities of the chilled beam are controlled by regulating the water flow rate according to the control signal of the room temperature controller.

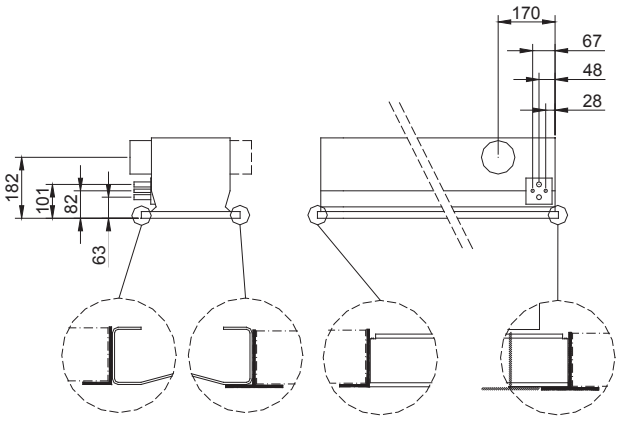
Installation

The CBD active chilled beam is suitable for mounting in ceilings running parallel to the long or short side of the room. When selecting the beam direction, the supply air and water circuit connection directions should be taken into account. The CBD unit is designed for flush mounting within a false ceiling.
The beam can be fixed directly onto the ceiling surface (H1=240 mm) or suspended using threaded drop rods (8 mm). The beam is equipped with movable brackets. It is recommended that the bracket be positioned one quarter of a unit length (L/4) away from the end of the beam.
The main pipelines of the cooling and heating water circuits should be installed above the beam in order to enable venting of the pipework.

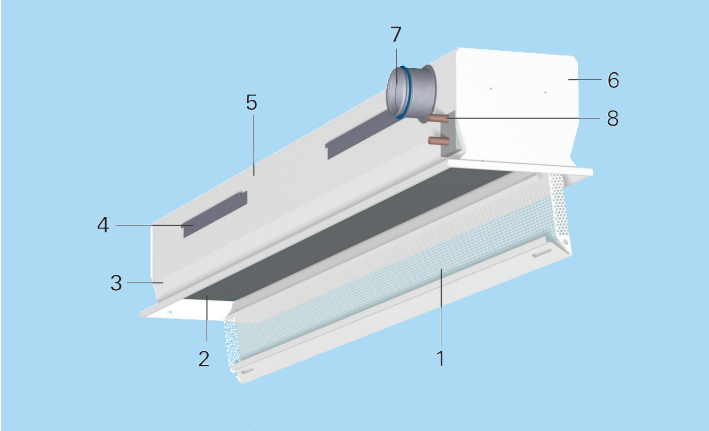
DIMENSIONS AND WEIGHT



Coil length	1000,1300,...,2800
L-5	1195,1495,...,2995
kg/m	12



Location of the pipe connections and integration to suspended ceiling



Servicing

CODE	DESCRIPTION
1	Bottom panel
2	Heat exchanger
3	Side plate
4	Movable bracket
5	Supply air plenum
6	End plate
7	Supply air connection
8	Chilled & hot water pipe connections

Open the bottom panel of the chilled beam.
Clean the supply air plenum, duct and finned coils of the heat exchanger using a vacuum cleaner, taking care not to damage the finned coils.
Clean the bottom panel and, if required, the side plates using a damp cloth.

Adjustment

Cooling

The recommended cooling water mass flow rate is 0.03 - 0.10 kg/s, resulting in a temperature rise of 1 - 3°C in the heat exchanger. To avoid condensation the recommended inlet water temperature of the heat exchanger is 14 - 16°C.

Heating

The recommended heating water mass flow rate is 0.01 - 0.04 kg/s, resulting in a temperature drop of 5 - 15°C in the heat exchanger.
The recommended temperature of the inlet water to the heat exchanger is 35 - 45°C.

Balancing and control of water flow rates

Balance the water flow rates of the chilled beam with adjustment valves installed on the outlet side of the cooling and heating water loops. Cooling capacity and heating capacity of the chilled beam are controlled by regulating the water mass flow rates. The water mass flow rate can be controlled using either an ON/OFF valve or a 2- or 3-way valve for proportional operation.

Adjustment of supply airflow rate

Each beam is equipped with a measurement tap for static pressure measurement, which enables fast and accurate measurement of the supply airflow rate. The airflow rate is calculated using the formula below.

$$q_v = k * l_{eff} * \sqrt{\Delta p_m}$$

MODEL	k
A	0,71
B	0,99
C	1,33
D	2,00

CBD selection tables

Cooling: nozzle A

qv	l/s	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Leff	m³/h	25	29	32	36	40	43	47	50	54	58	61	65	68	72
1200	ΔPtot	67	87	110	136										
	Pw	252	252	252	252										
	Pt	302	309	316	323										
	LpA	12	13	16	19										
	Lmin	1,3	1,3	1,3	1,3										
	Ld	2,2	2,6	3	3,4										
1600	ΔPtot				78	95	113	132							
	Pw				260	278	296	314							
	Pt				331	357	382	407							
	LpA				11	12	13	14							
	Lmin				1,3	1,3	1,3	1,3							
	Ld				2,6	2,8	3	3,4							
2000	ΔPtot						73	86	100	115	131	147			
	Pw						326	345	364	382	399	417			
	Pt						412	438	464	490	514	538			
	LpA						11	11	11	12	12	13			
	Lmin						1,3	1,3	1,3	1,3	1,3	1,3			
	Ld						2,4	2,6	2,8	3	3,2	3,4			
2400	ΔPtot								71	81	92	104	117	130	144
	Pw								393	413	432	451	469	488	506
	Pt								493	521	546	573	598	624	649
	LpA								11	11	12	12	13	14	15
	Lmin								1,3	1,3	1,3	1,3	1,3	1,3	1,3
	Ld								2,4	2,6	2,6	2,8	3	3,2	3,4

Heating: nozzle A

Recommended maximum linear meter heating capacity in 80-120 Pa pressure level is 170 W/m.

Cooling: nozzle B

qv	l/s	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Leff	m³/h	40	43	47	50	54	58	61	65	68	72	76	79	83	86	90	94	97
1200	ΔPtot	85	101	119	137													
	Pw	252	267	283	299													
	Pt	331	353	376	399													
	LpA	17	19	22	24													
	Lmin	1,3	1,3	1,3	2,3													
	Ld	3	3,2	3,4	3,6													
1600	ΔPtot		59	70	81	93	106	119	134	149								
	Pw		299	317	335	353	370	387	404	420								
	Pt		385	410	436	460	484	509	533	556								
	LpA		11	12	13	14	15	16	17	18								
	Lmin		1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3								
	Ld		2,4	2,6	2,8	3	3	3,4	3,6	3,6								
2000	ΔPtot					62	70	79	89	99	110	121	133	145				
	Pw					385	404	422	441	459	476	495	512	529				
	Pt					492	519	544	570	595	620	645	669	694				
	LpA					14	15	16	18	19	20	21	22	23				
	Lmin					1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3				
	Ld					2,4	2,6	2,6	2,8	3	3	3,4	3,4	3,6				
2400	ΔPtot								64	71	79	87	96	104	114	123	133	144
	Pw								473	493	512	531	549	568	586	604	622	640
	Pt								602	630	655	682	707	733	758	784	808	833
	LpA								17	18	19	20	21	22	23	24	25	26
	Lmin								1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	0,3
	Ld								2,4	2,4	2,6	2,8	3	3	3	3,2	3,4	3,6

Heating: nozzle B

Recommended maximum linear meter heating capacity in 80-120 Pa pressure level is 200 W/m.

CBD selection tables

Cooling: nozzle C

qv	l/s	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Leff	m³/h	50	54	58	61	65	69	72	76	79	83	87	90	94	97	101	105	108	112	115	119	122	126
1200	ΔPtot	78	90	102	115	129	144																
	Pw	252	258	270	282	294	306																
	Pt	352	365	385	403	423	442																
	LpA	14	15	16	17	18	19																
	Lmin	1,3	1,3	1,3	1,3	1,3	2,3																
	Ld	3,2	3,4	3,6	4	4,2	4,2																
1600	ΔPtot			61	69	77	86	95	105	115	126	137	149										
	Pw			302	316	330	343	356	370	382	395	407	420										
	Pt			417	438	459	480	499	520	540	560	579	599										
	LpA			15	15	16	17	18	20	21	22	23	24										
	Lmin			1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3										
	Ld			2,8	3	3	3,2	3,4	3,6	3,6	4	4,2	4,2										
2000	ΔPtot								71	78	85	93	101	109	118	127	136	145					
	Pw								404	418	432	445	459	473	486	499	513	525					
	Pt								555	575	596	617	638	659	680	700	721	740					
	LpA								19	20	21	21	22	23	24	25	26	27					
	Lmin								1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3					
	Ld								3	3	3	3,4	3,4	3,6	3,6	3,8	4	4					
2400	ΔPtot												74	80	86	93	99	106	114	121	129	137	145
	Pw												493	508	523	537	552	565	579	593	607	619	633
	Pt												673	695	717	738	760	780	801	822	843	863	884
	LpA												22	23	24	24	25	26	27	27	28	29	29
	Lmin												1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3
	Ld												2,8	3	3	3	3,2	3,4	3,4	3,6	3,6	3,8	4

Heating: nozzle C

Recommended maximum linear meter heating capacity in 80-120 Pa pressure level is 240 W/m.

Cooling: nozzle D

qv	l/s	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Leff	m³/h	72	76	79	83	86	90	94	97	101	104	108	112	115	119	122	126	130	133	137	140	144	148	151	155	158	162
1200	ΔPtot	73	81	88	97	105	114	123	133	143																	
	Pw	252	258	266	275	284	292	300	309	317																	
	Pt	395	408	423	440	456	471	486	503	518																	
	LpA	20	21	22	23	24	25	26	27	28																	
	Lmin	1,3	1,3	2,3	2,3	2,3	3,3	2,3	3,3	3,3																	
	Ld	4,2	4,4	4,6	4,8	5	5,2	5,4	5,6	5,8																	
1600	ΔPtot				61	66	72	78	84	90	97	104	111	118	126	133	141	150									
	Pw				308	318	327	338	347	356	365	374	383	393	402	411	419	428									
	Pt				473	490	507	524	540	557	573	589	606	622	638	655	670	686									
	LpA				22	23	23	24	25	26	27	28	28	29	30	31	32	32									
	Lmin				1,3	1,3	1,3	1,3	1,3	1,3	2,3	2,3	2,3	2,3	3,3	3,3	2,3	3,3									
	Ld				3,6	3,6	4	4	4,2	4,2	4,6	4,8	4,8	5	5,2	5,4	5,4	5,6									
2000	ΔPtot									64	69	74	79	84	89	95	100	106	112	118	125	131	138	144			
	Pw									389	399	410	420	430	440	450	459	469	478	488	497	506	515	524			
	Pt									590	607	625	642	660	676	694	710	727	744	760	776	793	809	825			
	LpA									25	25	26	27	28	28	29	30	31	31	32	33	33	34	35			
	Lmin									1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	2,3	2,3	2,3	2,3	2,3	3,3	3,3			
	Ld									3,6	3,6	3,6	4	4	4,2	4,2	4,2	4,4	4,6	4,8	4,8	4,8	5	5,2			
2400	ΔPtot															72	77	81	86	90	95	100	105	110	116	121	127
	Pw															483	495	505	515	524	535	545	555	564	575	585	594
	Pt															727	745	763	780	797	814	832	849	865	883	900	917
	LpA															29	29	30	31	31	32	33	33	34	34	35	35
	Lmin															1,3	1,3	1,3	2,3	1,3	1,3	1,3	1,3	1,3	2,3	2,3	2,3
	Ld															3,6	3,6	3,6	3,8	4	4	4,2	4,2	4,2	4,4	4,6	4,6

Heating: nozzle D

Recommended maximum linear meter heating capacity in 80-120 Pa pressure level is 300 W/m.

Notations of the selection tables

LpA values presented with room attenuation 4 dB (red 10m² - sab).
When using room attenuation 8 dB (red 25m² - sab): LpA - 4dB.

Leff	Effective length, length of cooling coil, mm
ΔPtot	Chilled beam chamber pressure, Pa
Pw	Coil capacity, W
Pt	Total capasity, W
LpA	A-weighted sound pressure level, reduced by total equivalent absorption surface of 10m², dB(A) red 10m² - sab
Lmin	Minimum distance between central lines of two supply units, m
Ld	Distance from the supply unit, at which air jet detaches from ceiling, m

Room temperature (Tr)	= 24 °C
Chilled water inlet temperature (Twin)	= 15 °C
Chilled water outlet temperature (Twout)	= 18 °C
Supply air temperature (Ta)	= 18 °C

Water pressure drop

$$\Delta p_w = k_{coil} * q_{mw}z$$
$$k_{coil} = a + b * L_{eff}$$

Factor	Unit	Description
Δp_w	[kPa]	Pressure drop of water flow
q_{mw}	[kg/s]	Water flow rate
L_{eff}	[mm]	Effective length of the chilled beam
k_{coil}	[ ]	k value
a,b	[ ]	Parameters for the selected beam

Beam	Cooling b	Cooling a	Z	Heating b	Heating a	Z
CBD	0.2293	87.07	1.87	0.7464	275.21	1.87

Water flow range

Beam	Cooling	Heating
CBD	0.030 – 0.100 kg/s	0.010 – 0.040 kg/s

Suggested specifications

The active chilled beam shall have an integral recirculation air path through the perforated bottom panel.
The bottom panel shall be openable and demountable from either side for general maintenance and cleaning.
The bottom panel shall be removable without using any special tools.
The air supply shall be bi-directional.
The active chilled beam shall be 295mm wide and 240mm high.
The active chilled beams shall have an inlet duct diameter of 100 mm.
The frame, bottom and side panels shall be made of galvanised steel plate.
All visible parts shall be white RAL 9010 20% gloss.
All pipes shall be manufactured from copper connection pipes with a wall thickness of 1.0 mm.
The cooling heat exchanger shall consist of six 15mm pipes connected in series.
The fins of the heat exchanger shall be manufactured from aluminium.
Heating shall be incorporated within the heat exchanger by two 10mm pipes connected in series.
All joints shall be soldered and factory pressure tested.
Pipework shall have a maximum operation pressure of 1.0 MPa.
Each active chilled beam shall be protected by a removable plastic coating.
Duct connection and pipe ends shall be sealed during transit.
The active chilled beams shall be identifiable by a serial number printed on labels attached to both the active chilled beam and the cardboard packaging.

Product code

CBD/S-E-L-C

S = Direction of supply patterns & nozzle type

A	Bi-directional / Nozzle 1
B	Bi-directional / Nozzle 2
C	Bi-directional / Nozzle 3
D	Bi-directional / Nozzle 4

E = Duct connection/Duct size/Damper

R1N	Right / 100 / Without damper
L1N	Left / 100 / Without damper

L = Total length

1200,+100, 1700, 1720, 1800,+100,...,3000

C = Effective length (Cooling coil length)

L=1200: 1000
1000,+100,..,L-200

Specifics and accessories

WD = Location of the pipe connections

A	Left side at front end
B	Right side at front end
C	Left side at back end
D	Right side at back end

TC = Cooling / Heating functions (Coil type)

C	Cooling
H	Cooling and Heating

CO = Colour

W	White
X	Special colour

AC = Accessories

MN	1/2" nipple connection, male

Code example

CBD/A-R1N-1200-1000, WD=A,TC=C,CO=W