BerlinerLuft.

Air conditioning.

HygCond

The right climate for everyone.
BerlinerLuft. Central air handling units combine efficient air conditioning with the objectives of environment and climate protection.

Hygienic.
Energy-efficient.
Climate-friendly.

OPTIMAL SITE CLIMATE FOR YOU.

Not least because of cost and management reasons, challenges for advanced central air handling units include energy efficiency, resource-saving, climate-friendliness and environmental compatibility. Tailored to these requirements and geared to our customers' needs, BerlinerLuft. develops and manufactures central AHUs that meet the highest functional and aesthetic requirements.

BEST ENVIRONMENTAL CLIMATE FOR ALL.

Pharmaceutical production facilities, exhibitions or datacentres – each process and each environment requires specific climatic conditions. We provide them using innovative technology, decades of expertise and the highest quality standards for an optimal climate.

With this philosophy in mind, we develop high-performance components and manufacture them as complete system solutions customized to your specific needs.

Qualified. Certified. Resource-saving.

With HygCond, we have created
an modular air handling unit for highest requirements
in the field of advanced energy-efficient
air conditioning.

HygCond compact unit

FLEXIBLE. MODULAR. EXTENDABLE.

HygCond is a modular air conditioning unit featuring all air handling functions. During its development, great importance has been attached to hygienic conditions. Optionally, it is available with integrated refrigeration system and instrumentation and control equipment.

18 HygCond model sizes for air flow rates up to 100,000 m^3/h are available as standard. Flexible production processes with BerlinerLuft. allow a variety of special-purpose solutions to enable tailored adjustments to local site conditions. Units for larger air flow rates can be delivered as special solutions.

HIGH PERFORMANCE – ALSO WITH RESPECT TO HYGIENE.

The new HygCond generation combines the highest hygiene requirements with thermal, acoustic and mechanic casing characteristics. With its further optimized bottom design with integrated drain pan, the unit is thermally decoupled from the base frame.

A rugged frame structure located inside is flush with the new stepped section that is generally thermally decoupled.

HygCond

HygCond combines the highest hygiene requirements with best thermal, acoustic and mechanic casing characteristics. This modular range includes 18 differently sized models for air flow rates up to 100,000 m^3/h as standard.

High degree of air tightness

Optimised casing characteristics

Optional with refrigeration and control cabinet

Highly hygienic casing design

HygCond range

ENGINEERED SOLUTIONS FOR PERFECT CLIMATE

All HygCond units always feature a closed sectional frame structure that is based on a torsionally rigid connection between frame and panel. This design allows us to adjust the air conditioning unit to constructional site requirements.

The thermally decoupled panels with stepped edges are available in three versions: sendzimir-galvanized, sendzimir-galvanized coated and stainless steel. The insulating core of the panels is made from inflammable insulating mineral material.

Perfectly smooth inside surfaces and an efficient utilisation of the cross section allow a cost-reduced operation of the unit. At the same time, it meets the strictest hygienic requirements. This design helps to reduce maintenance times.

All used attachments and built-in parts comply with European standards with respect to function and quality and are subject to a permanent control.

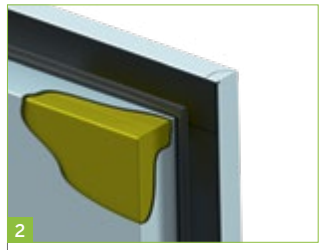
QUALITY MANAGEMENT

BerlinerLuft. Technik GmbH air conditioning units meet the European standards EN 1886, EN 13053, EN 13779, and VDI 3803. The units are type tested as per VDI 6022. Hygiene units are manufactured according to DIN 1946 Part 4.

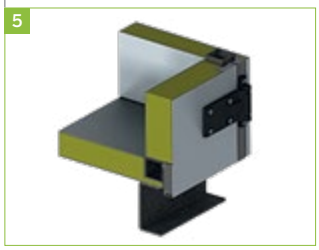
BerlinerLuft. Technik GmbH is a member of the RLT Raumlufttechnische Geräte Herstellerverbandes e.V. (German AHU manufacturer's association). Our units are labelled according to the AHU Guidelines 01 (RLT 01).

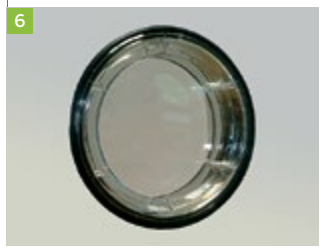
BerlinerLuft. Technik GmbH is certified according to DIN ISO 9001. All processes are subject to an internal quality control.

Device construction



1 | Crane transport eyes
2 | Panel composition
3 | Lockable lever catch
4 | Door with lever handle
5 | Base frames
6 | Inspection glass
7 | Door hinge
8 | Intermediate section/panel





HOUSING DESIGN

The modular unit construction is designed to a length grid of 76.5 mm. This ensures the units can be individually adjusted. The functional parts can be put together according to customer requirements. HygCond units can be completely dismantled and consist of a square tube construction and screwed-on layered panels. The unit is smooth and flush on the inside without screw heads and wall fixings and therefore meets the requirements of the VDI 6022.

PAN DESIGN

The pans used are smooth and sloped on all sides, designed to serve as the unit base and are provided with a condensate trap at the deepest point.

FRAME DESIGNS

Standard

Up to design size 36, self-supporting closed frame made of aluminium section (AlMg3)

From design size 42 or greater, self-supporting closed frame made of hot-dip galvanised steel section

Optional

Self-supporting closed frame made of stainless steel section (1.4301 and 1.4571), for all construction sizes

The frame is located internally to avoid cold bridges and to accommodate on-site connections.

PANEL DESIGN

The panels consist of double-shell sandwich plates with an internal and external wall made from hot-dip galvanised steel sheet. The external wall is also available coil coated in RAL 7035. The insulating core, made of mineral fibre insulation material, is non-flammable as per DIN 4102, class A 1. The inner and outer sheet is thermally decoupled by a special circumferential section. HygCond wall construction is synonymous with high warp resistance and a long service life.

PANEL VARIATIONS

In general, the internal and external surfaces of the panels can be in any combination of the following materials depending on the requirement:

Galvanised sheet steel
Steel sheet galvanised with coil coating RAL 7035
Aluminium
Stainless steel 1.4301, stainless steel 1.4571
Special coatings are possible at customer request

Panel thickness:	NW 64
Base:	NW 62
Density of the insulation min.:	40 kg/m^3
Sheet thickness inner/outer:	1 mm

Device construction

HOUSING DATA AS PER DIN EN 1886

Mechanical strength:	Class D1 (M)
Housing leakage:	Class L1 (M)
Filter bypass leakage:	0.1% up to filter class F9
Thermal bridge factor:	Class TB2
Thermal transition factor:	Class T2

Hz	125	250	500	1000	2000	4000	8000
dB	14.3	23.8	27.8	28.7	28.1	37.0	40.6

BASE FRAME AND TRANSPORT OPTIONS

To avoid corrosion of the base elements and for better transportation and installation, a hot-dip galvanised base frame is delivered with the housing as standard. It is 24 mm smaller around the periphery than the housing dimensions and its frame height is individually adapted to the necessary siphon height (e.g. 100 mm, 160 mm). Depending on the construction size, it is possible to transport units using the crane eyes attached to the corners of the unit roof, by means of lifting tubes inserted through the base frame or by means of lifting lugs mounted on the base frame (see illustration).

Standard base frame height

Size 4 – size 49	100 mm
Size 56 – size 110	160 mm

The base frame is 24 mm smaller around the periphery than the housing dimensions.

ADDITIONAL FEATURES

- Walk-on base of the units > size 16 all doors and operating cover with all-round seals
- No visible joints or raw edges
- Operating cover with external latches that can only be opened only by means of tools (optional: with lockable handle)
- Removable operating lid with clamping levers
- Adjustable door hinge

1

Unit versions

WEATHERPROOF DESIGN

For outdoor installation the unit is provided with a roof, with an overhang of 40 mm all around, and a drip edge made from a UV-resistant, PVC-free roof membrane. Alternatively, a sheet metal roof with coil coating in RAL 7035 can be fitted. External corrosion is avoided at relevant positions, by using stainless steel screws with sealing washers. The external surfaces of the panels are made from hot-dip galvanised steel and coil coated in RAL 7035. The coating is weatherproof and UV resistant.

To seal the roof membrane provided by the customer, hot-dip galvanised roof base frames with a drip edge can be supplied in different heights. To prevent injuries during maintenance work, the doors are fitted with locking devices.

EXPLOSION-PROOF DESIGN

The unit is type tested by TÜV Saarland according to the ATEX guidelines 2014/34/EU. The units are compliant with the requirements for explosion protection in zones 2 and 3.

1 | Loading HygCond in monoblock design
2 | Corner section with roof membrane

HYGIENE DESIGN

The following additional features characterise the hygiene units:

The inside of the unit base is made of stainless steel (1.4301), is smooth, easy to clean and disinfect.

The unit joints are sealed both hygienically and against vapour with a sealing material that is resistant to disinfectant and fungal infestation.

Inner walls of the unit are made from steel sheet, are hot-dip galvanised and coated (RAL 7035) or optionally made of stainless steel (1.4301).

Multi-leaf dampers made of aluminium (AlMg) conforming to airtightness class 2 as per EN 1751;
As space sealing dampers, airtight conforming to airtightness class 4 as per EN 1751

Inspection glasses and interior lighting are installed in the fan, filter, and humidifier chambers. The lights are designed to have a smooth surface.

Cooler frame made of aluminium (AlMg), optionally made of stainless steel.
Aluminium fins, optionally coated. Pipes and collectors made of copper; optionally coolers can be entirely coated.

Coated fans, coated fan frames, optionally made from stainless steel (1.4301)

Humidifier chambers made from stainless steel (1.4301) on the inside.

Rotary and plate heat exchanger frames are galvanised and coated, blades made from aluminium (AlMg)

Installation bars made from stainless steel (1.4301)

Filter frames made from stainless steel (1.4301)

Flexible connectors are designed as closed-cell rubber section binders

Built-in parts

FREE-RUNNING IMPELLER WITH DIRECT DRIVE

Fan impeller with backward curved blades mounted on the motor shaft Speed-controlled motor with frequency converter or EC motor.

Free-running fan with enclosed motor and forced ventilation via the housing wall. The hydraulic adjustment of the enclosed system is carried out by BerlinerLuft. Technik GmbH, Competence-Center Klimatechnik for the perfect motor cooling function.

Accessories (optional)

Suction section safety guard

Detachable touch guard

Extractable fan unit

Frequency converter for infinitely variable speed regulation

Flow rate measuring device using measurement line and pressure cell

1

FILTERS

Bag filter with standard dimensions as per ISO 16890

Construction size ≤ 20, up to and including filter class F7, entirely extractable with frame, filter class F8–F9 and integral high-efficiency particulate air (HEPA) filter with standard filter frame

Construction size > 20 and above with standard filter frame integrated in the housing

Accessories (optional)

Inclined tube manometer

Analogue manometer

Differential pressure switch

Continuous measurement of differential pressure

AIR HEATER

Made from seamless copper pipes with integrally moulded aluminium fins

Steel collectors

Galvanised steel sheet frame

Optional

Electric heater battery

AIR COOLER

Made from seamless copper pipes with integrally moulded aluminium fins

Copper collectors

Frame made from galvanised aluminium

Droplet separator in a housing made from seawater-resistant aluminium, separator section made of plastic

Condensate pan made from stainless steel 1.4301, sloped all around to lead to the drainage outlets

Optional

Heat exchanger in copper/aluminium with plastic coating

Heat exchanger in Cu/Cu

Heat exchanger with steel rib pipes and collectors, entirely galvanised

Stainless steel heat exchanger

Frame made from seawater-resistant aluminium

Frame made from stainless steel 1.4301

Extractable frost protection frame

Flange and counterflange


2


3

1 | HygCond for process cooling application
2 | Fan, free-running wheel with IE3 motor
3 | Compact filter can be lifted out on the outdoor air side

Built-in parts

HEAT RECOVERY

The following systems can be supplied:

- EcoCond I EcoCond+ high-performance run-around coil system
- Heat pump circuit (integrated or with outdoor unit)
- Circulating heat exchangers in condensation, enthalpy or sorption rotor design
- Plate heat exchanger in cross-flow or counter-flow design, and double plate heat exchanger

HUMIDIFIERS

The following systems can be supplied:

- Nozzle-type humidifier made of stainless steel or GRP
- High pressure humidifier
- Steam humidifier with self generated or externally generated steam
- Cold vapour generator
- Evaporation humidifier

1 | EcoCond+
2 | EcoCond for outdoor installation

1

2

SOUND INSULATION

Splitters up to 20 m/s abrasion-resistant made of mineral wool, covering made of glass fibre, galvanised frame

Optional

Splitters with Beta-Stream® upstream flow

Splitters with perforated plate covering

Splitters with foil cover (washable)

Resonance absorbers

DUCT CONNECTIONS

Elastic connectors with four-hole connecting piece

Rubber section connecting pieces

Potential equalisation

MULTI-LEAF DAMPERS

Frames and blades made of hot-dip galvanised steel sheet, aluminium or stainless steel 1.4301

Designs

With lip seal according to EN 1751, airtightness class 2

Airtight according to EN 1751, airtightness class 4

Optional

with external linkage

painted

Accessories (optional)

24 V or 230 V actuator motor

4 | Extractable silencer
5 | Multi-leaf damper installed with actuator
6 | Connectors with potential equalisation


4


5


6

Built-in parts

WEATHERPROOF GRILLES

Weatherproof grille made of galvanised steel, with bird protection made from corrugated wire

Optional

Weatherproof grille painted as per customer's instructions

Acoustic weatherproof grilles

Heatable weatherproof grille

Droplet separator

INTAKE AND DISCHARGE HOOD

Intake and discharge hood made of galvanised steel sheet with corrugated wire guard, also available as short hood

Optional

Intake and discharge hood painted as per customer's instructions

1

1 | HygCond for outdoor installation in monoblock form

HygCond with integrated refrigeration technology

ADVANTAGES AT A GLANCE

- Individual project planning adapted to the application
- High performance figures due to direct heat transfer
- Optimised partial load adaptation
- Environmentally friendly refrigerants with low global warming potential
- Low space requirement (all components are integrated in the AHU)
- No external condensers (condensation heat is dissipated to the exhaust air)
- High redundancy compared to central cooling
- External chiller incl. cold water piping not required
- Complete solution with clear delivery and warranty limits

Scope of supply

- Cold control cabinet is entirely wired internally with all switching devices required for operation
- Engineering project management
- Preparation of RI flow diagrams and circuit diagrams
- Documentation
- Commissioning by in-house specialists

Optional

- Heat exchanger with outdoor unit (split air conditioning system)
- Designed as reversible heat pump for summer and winter operation (integrated or with outdoor unit)
- Dehumidification mode with reheating by means of condensation heat
- Heat output with external condenser
- Communication options via BACnet IP (B-ASC), Modbus IP/RTU
- Supply air temperature control or overall transfer of control and regulation functions for the air handling unit

1 | Version with outdoor unit

HygCond with integrated instrumentation and control engineering

SWITCH CABINET

The ICE switch cabinet plays a crucial role in ensuring normal and efficient operation of an AHU, free from interference. There is an overall control strategy that is optimally matched to the unit components.

ADVANTAGES AT A GLANCE

- Low electrical installation cost
- High reliability due to decentralisation
- Short installation times and therefore installation costs
- Individual adaptation at the I/O level and customer-specific control software

Scope of supply

- Unit control cabinet is wired internally entirely with all switching devices required for operation
- Internal unit wiring
- Engineering project management
- Creation of control diagrams, circuit diagrams
- Programming of system software
- Documentation
- Optionally available with manual operation
- Commissioning by in-house specialists

Optional

- Software adaptation to individual customer systems

1

2

Control cabinet with DDC module
1 | Open
2 | Closed

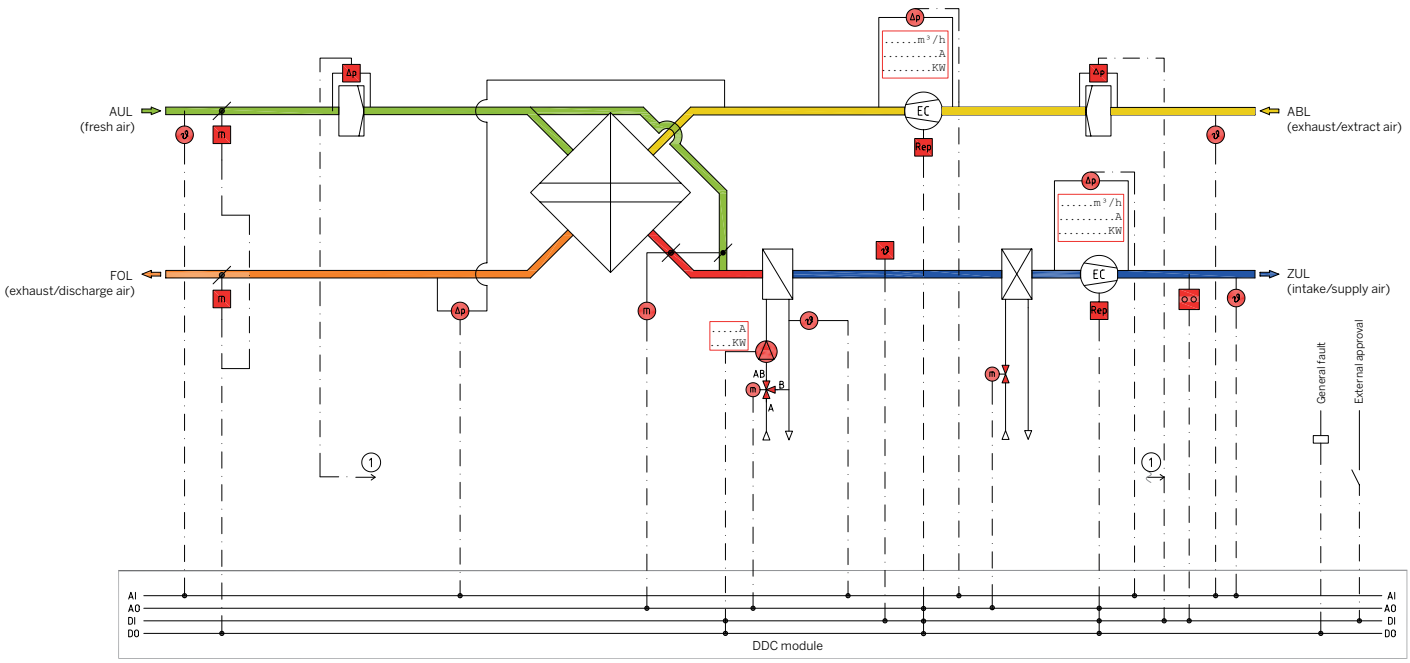
COMMUNICATION

Freely programmable or freely configurable control systems (SAIA or Siemens brand) are used to control the AHUs. These are characterised by modular design options, the latest WEB technology and flexible communication options, which can be easily incorporated into IT infrastructures. Various IT protocols are available for this purpose (DHCP, DNS, SNTP, SMTP, etc.). As a result of the integrated WEB server, all system-specific data can be displayed on a standard PC without additional software.

Optional

BACnet
Modbus
EIB
LONWORKS
MP-BUS
Telecommunication via analogue, ISDN or GSM modem with remote maintenance, remote diagnosis and remote programming functions

EXAMPLE CONTROL DIAGRAM



HygCond special versions

Special design variants can also be implemented in the standard version:

DESIGN VARIANTS

AHU as monoblock

Compact unit serves as a roof control centre with integrated operator aisle and chambers to incorporate all control groups

Ventilation unit with combustion chamber for gas and oil heating up to a capacity of 900 kW

AREAS OF APPLICATION

High temperature and process air

Drying technology

Swimming pools

Laboratories and clean rooms

Kitchens

Hospital and OP areas

Industry

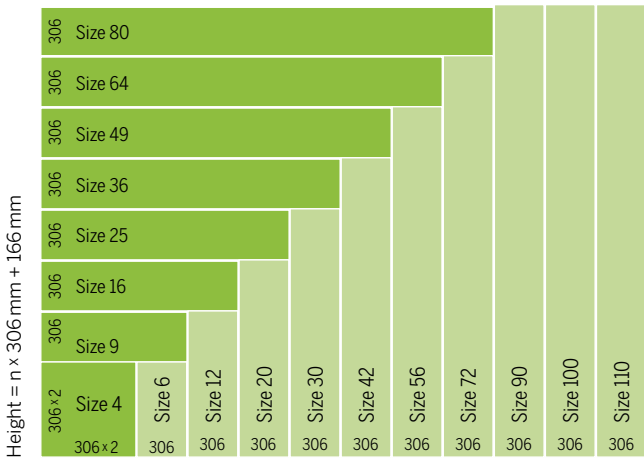
Test bench technology

1

1 | Air handling unit for brake test stand

Technical parameters

UNIT DIMENSIONS



Width = n x 306 mm + 128 mm

Base frame height up to size 49 = 100 mm

Base frame height starting from size 56 = 160 mm

Functioning part length = n x 76.5 mm

Total unit length = functioning part lengths +48 mm

* Height without base frame

VOLUME FLOW

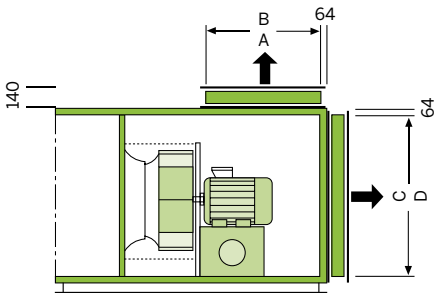
Unit construction size	Flow rate [m3/h] *				
Size	$V_2 \leq 1.8$ m/s	$V_2 \leq 2.0$ m/s	$V_2 \leq 2.2$ m/s	$VV_2 \leq 2.5$ m/s	$V_2 \leq 2.8$ m/s
4	2600	2900	3200	3600	4000
6	3900	4300	4700	5400	6000
9	5700	6300	7000	7900	8900
12	7600	8400	9300	10600	11800
16	10000	11100	12300	13900	15600
20	12500	13900	15300	17400	19500
25	15600	20800	22800	25900	29100
30	18700	22000	28000	33000	39000
36	22300	24800	27300	31000	34700
42	26000	28900	31800	36200	40500
49	30300	33700	37000	42100	47100
56	34600	38500	42300	48100	53800
64	39500	43900	48200	54800	61400
72	44400	49300	54300	61700	69100
80	49900	55400	60900	69300	77600
90	55400	61600	67700	76900	86200
100	60900	67700	74500	84600	94800
110	66500	73900	81300	92300	103400

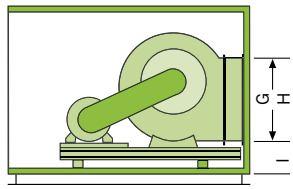
* For different flow-through speeds based on the free cross-section of the unit

Other unit sizes on request

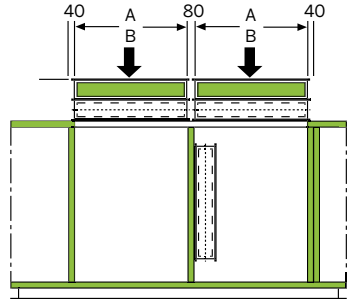
Technical parameters

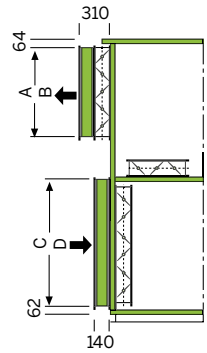
INTAKE/DISCHARGE/MIXING CHAMBER CONNECTION DIMENSIONS



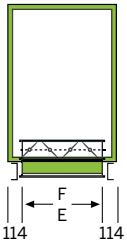


Dimensions G, H and I dependant on size of fan (on request)

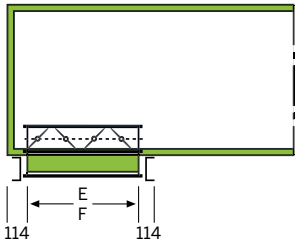




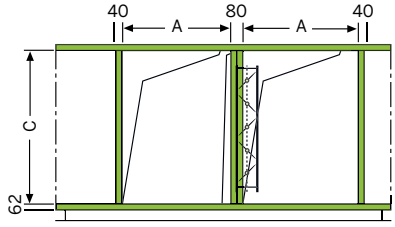
Side view



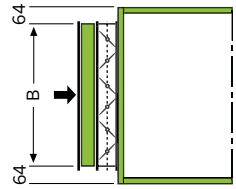
Cross section



Longitudinal section



Lateral intake



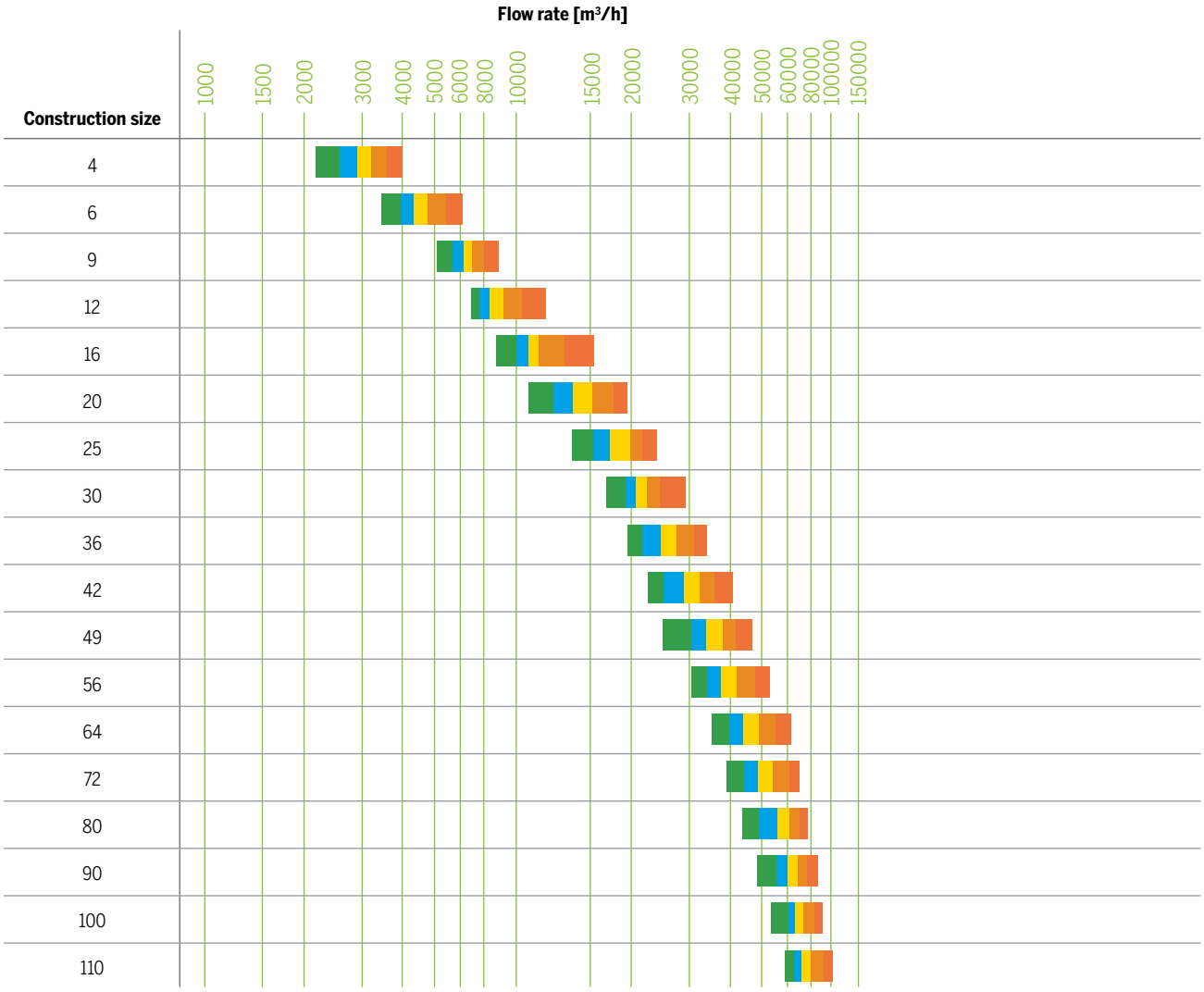
Top view

MULTI-LEAF DAMPERS CONNECTION DIMENSIONS

Design size Size	Small flexible connectors		Large flexible connectors		Flexible connectors, base, below	
	Height dimension A [mm]	Height dimension B [mm]	Height dimension C [mm]	Height dimension D [mm]	Height dimension E [mm]	Height dimension F [mm]
4	379	612	652	612	345	512
6	379	918	652	918	324	818
9	532	918	958	918	476	818
12	532	1224	958	1224	462	1124
16	685	1224	1264	1224	610	1124
20	685	1530	1264	1530	599	1430
25	838	1530	1570	1530	744	1430
30	838	1836	1570	1836	736	1736
36	838	1836	1876	1836	879	1736
42	838	2142	1876	2142	872	2042
49	991	2142	2182	2142	1014	2042
56	991	2448	2182	2448	1008	2348
64	1144	2448	2488	2448	1149	2348
72	1144	2754	2488	2754	1144	2654
80	1297	2754	2794	2754	1284	2654
90	1297	3060	2794	3060	1280	2960
100	1297	3366	2794	3366	1276	3266
110	1297	3672	2794	3672	1273	3572

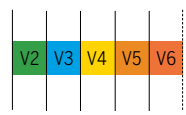
Other unit sizes on request

SELECTION DIAGRAM

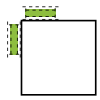


Volume flow [m/s]

1.6 1.8 2.0 2.2 2.5 2.8



Speed class
as per EN 13053

Construction size	External unit dimensions		Emptying and deflector unit		Suction, pressure unit Front connection		Mixing chamber horizontal		Mixing chambers one above the other Total height = 2 x height		Mixing part can be combined		Fan Spiral housing and belt drive max. length dimensions		Fan Free running wheel Max. length		Electric heater L = 765 mm	Heater		Frost protection L = 306 mm	Cooler With droplet separator Max. length	
																							
Size	H[1] [mm]	W [mm]	L [mm]	Wgt [kg]	L [mm]	Wgt [kg]	L [mm]	Wgt [kg]	L [mm]	Wgt [kg]	L [mm]	Wgt [kg]	L [mm]	Wgt [kg]	L [mm]	Wgt [kg]	Wgt [kg]	L [mm]	Wgt [kg]	Wgt [kg]	L [mm]	Wgt [kg]
4	778	740	535.5	60	306	33	1079	110	459	119	1224	108	918	177	918	159	98	306	63	40	765	123
6	778	1046	535.5	72	306	40	1079	127	459	153	1377	130	1224	231	918	240	114	306	84	47	765	160
9	1084	1046	688.5	99	306	45	1377	172	459	181	1377	158	1377	345	1224	291	129	306	96	53	765	192
12	1084	1352	688.5	113	306	52	1377	197	612	252	1836	205	1530	399	1377	431	148	306	126	60	765	240
16	1390	1352	841.5	151	459	80	1683	258	765	312	1836	249	1836	688	1377	500	192	306	126	66	146	280
20	1390	1658	841.5	172	459	93	1683	287	765	371	2295	313	1836	718	1530	609	222	306	168	73	765	356
25	1696	1658	994.5	215	765	147	1989	350	765	410	2295	366	2142	933	1683	683	259	306	212	79	765	415
30	1696	1964	994.5	235	765	160	1989	370	765	462	2754	436	2142	969	1836	753	301	306	236	88	765	436
36	2002	1964	994.5	281	918	217	1989	436	918	576	2754	516	2448	1159	1836	820	351	306	258	101	765	509
42	2002	2270	994.5	304	918	233	1989	470	918	649	3060	574	2448	1200	1989	990	390	306	274	*	765	546
49	2308	2270	1147.5	391	918	248	2295	555	1071	790	3060	646	2601	1700	2142	1185	428	306	307	*	765	614
56	2308	2576	1147.5	409	918	264	2295	577	1071	861	3366	715	2754	2096	2295	1293	462	306	326	*	765	642
64	2614	2576	1300.5	471	918	280	2601	683	1071	939	3672	824	3366	2602	2295	1420	499	306	366	*	765	718
72	2614	2882	1300.5	502	918	296	2601	710	1224	1067	3825	883	3366	2658	2295	1463	540	306	396	*	765	940
80	2920	2882	1453.5	564	918	311	2907	811	1224	1138	3978	1004	3366	2716	2448	1547	584	306	433	*	765	942
90	2920	3188	1453.5	613	918	337	2907	845	1377	1304	*	*	2754	2373	2142	1874	625	459	505	*	918	998
100	2920	3494	1453.5	647	918	353	2907	861	1530	1440	*	*	2907	3165	2295	2068	667	459	514	*	918	1064
110	2920	3800	1453.5	680	918	370	2907	897	1530	1543	*	*	3060	3900	2295	2112	707	459	574	*	918	1115

[1] Height **without** base frame

* Other unit sizes on request

All data without weights and dimensions of external multi-leaf dampers and connectors

Activated carbon filter L = 765 mm	**Grease separator L = 459 mm**	**Bag filter L = 459 mm** G3-M5, bag length 360 mm, or compact filter, M5-F9, extractable	**Bag filter G3/M5** Bag length 360 mm or compact filter M5-F9, with operating unit		**Bag filter L = 765 mm** Bag length 635 mm M5-F9, extractable	**Bag filter M5–F9** Bag length 635 mm, with operating unit		**Silencer L = 841.5 mm** 20 dB	**Silencer L = 1224 mm** 30 dB	**Silencer L = 1759.5 mm** 40 dB	**RAC system, fresh air L = 459 mm**	**RAC system, exhaust air** With droplet separator		**Cross flow plate heat exchanger, long** Max. length		**Heat pipe L = 765 mm** With inflow and outlet chamber	**Circulation heat exchanger L = 459 mm**	**Circulation heat exchanger** With inflow and outlet chamber		**Steam humidifier L = 1244 mm**	**Nozzle-type humidifier L = 1377 mm**
																					
Wgt [kg]	Wgt [kg]	Wgt [kg]	L [mm]	Wgt [kg]	Wgt [kg]	L [mm]	Wgt [kg]	Wgt [kg]	Wgt [kg]	Wgt [kg]	Wgt [kg]	L [mm]	Wgt [kg]	L [mm]	Wgt [kg]	Wgt [kg]	Wgt [kg]	L [mm]	Wgt [kg]	Wgt [kg]	Wgt [kg]
160	87	65	1071	100	77	1300.5	124	107	140	198	88	765	122	1071	233	197	162	1377	289	125	499
212	106	81	1071	122	94	1300.5	148	133	171	250	117	765	160	1224	326	258	193	1377	382	148	659
261	138	93	1071	139	109	1300.5	170	158	203	312	139	765	192	1530	423	306	274	1377	484	165	671
345	187	107	1071	176	124	1453.5	210	189	228	363	180	765	239	1683	510	385	312	1377	543	188	839
441	232	126	1224	219	162	1453.5	275	238	302	461	211	765	279	1989	722	484	390	1683	781	223	854
530	281	146	1224	249	187	1453.5	311	271	346	527	255	765	355	2295	910	571	433	1683	860	249	1021
616	336	160	1224	295	264	1530.0	339	310	393	600	296	765	415	2601	1101	653	532	1683	1006	271	1047
735	386	176	1377	323	225	1530.0	372	345	440	675	343	765	436	2601	1199	746	634	1683	1139	293	1223
855	458	227	1377	385	253	1530.0	411	406	545	818	393	765	508	2754	1446	*	802	1989	1410	354	1494
981	529	253	1377	423	282	1530.0	479	450	604	907	460	765	546	*	*	*	986	1989	1631	379	1699
*	*	*	1377	465	315	1530.0	525	497	665	1002	538	918	581	*	*	*	1004	1989	1700	487	1734
*	*	*	1377	499	339	1530.0	562	544	730	1099	583	918	670	*	*	*	1023	2295	1859	432	1943
*	*	*	1377	529	359	1530.0	596	590	793	1196	656	918	748	*	*	*	1036	2295	2008	459	1982
*	*	*	1377	572	392	1530.0	642	643	861	1301	725	918	971	*	*	*	*	*	*	479	2201
*	*	*	1377	603	414	1530.0	677	694	930	1408	830	918	975	*	*	*	*	*	*	505	2243
*	*	*	1377	638	440	1530.0	716	751	1004	1522	903	918	998	*	*	*	*	*	*	534	2457
*	*	*	1377	676	467	1530.0	757	811	1126	1634	972	918	1064	*	*	*	*	*	*	566	2671
*	*	*	1377	712	494	1530.0	798	870	1200	1746	1049	918	1115	*	*	*	*	*	*	594	2889

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