

DUPLEX 1500 to 11000

Multi-N Rooftop

All-purpose rooftop ventilation units with counterflow heat exchangers

DUPLEX 1500-11000 Multi-N is a new generation of all-purpose ventilation units with counterflow heat recovery exchangers. The rooftop version of DUPLEX 1500-11000 Multi-N compact units are used for comfort ventilation, hot-air heating and cooling in small facilities, shop floors, stores, schools, restaurants, shops, sports and industrial halls.

They are suitable wherever efficient ventilation and possibly hot-air circulation ventilation and cooling must be provided at minimum running cost, i.e. the highest efficiency of heat recovery, low power input of fans and as little noise as possible.

DUPLEX Multi-N units are produced in compact (1500 to 8000 Multi-N) and semi-compact (10000 to 11000 Multi-N) version and contain two independently controlled EC fans with backward curved blades, a heat recovery exchanger with large heat-transfer surface and high efficiency, slide-out supply and exhaust air class Coarse 60 % (G4), ePM10 50 % (M5) or ePM1 55 % (F7) filters, drain pans and possibly also an a circulation damper with a servo drive or integrated air heaters and coolers.

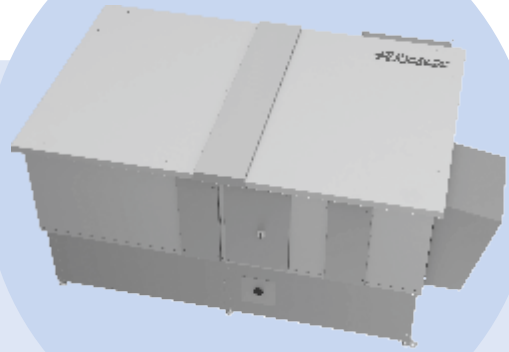
Unit casing is divided into two versions:

DUPLEX 1500-8000 Multi-N are frameless construction, casing is made of painted metal sheet (colour RAL 9007) with 30 mm PIR insulation with heat transfer coefficient ($\lambda = 0,024 \text{ W/mK}$).

DUPLEX 10000-11000 Multi-N are frame construction, casing is made of painted metal sheet (colour RAL 9007) with 45 mm mineral wool insulation with heat transfer coefficient ($\lambda = 0,037 \text{ W/mK}$).

DUPLEX Multi-N ventilation units meet the requirements of the most stringent European standards:

- Casing properties according to EN 1886
- EC motors according to ErP 2015
- SFP < 0,45 W/(m³/h) according to PassivHaus*
- Hygienic requests according to VDI 6022
- Commission regulation (EU) requirements No. 1253/2014 (Ecodesign)



Advantages of DUPLEX Multi-N units:

- New design of ventilation units with excellent parameters
- Great thermal insulation of the casing (class T2)
- Reduced thermal bridging (class TB2)
- Filter side changing
- Elegant and efficient connections through the roof
- Compact dimensions
- Ease of installation
- Variable configuration of discharge ports
- Unified dimensions of ports
- Optional versions with a bypass and circulation damper
- High efficiency fans – SFP < 0,45 W/(m³/h)*
- High heat recovery efficiency of the counterflow heat exchanger – up to 93 %
- Recessed junction box
- Integrated control system including temperature sensors
- Integrated web server (aMotion regulation)
- Comprehensive design software
- Insulated duct extensions as an option

*in the defined working area

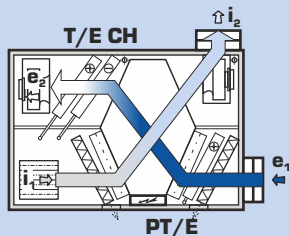


1500 to 11000 Multi-N

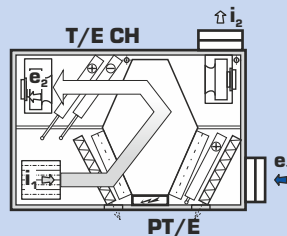
AVAILABLE MODIFICATIONS (CAN BE COMBINED)

- | | | | |
|-----|----------------------------------|-------|-----------------------------------|
| - B | with built-in bypass damper | - PT | with built-in preheater |
| - C | with built-in circulation damper | - CHF | with built-in direct chiller |
| - E | with built-in electrical heater | - CHW | with built-in water-based chiller |
| - T | with built-in hot-water heater | | |

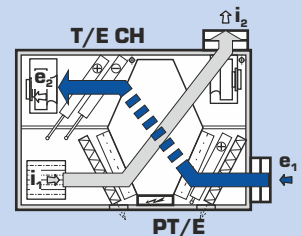
OPERATING MODES OF DUPLEX MULTI-N UNITS



Ventilation with heat recovery with heating, cooling and preheating



Circulation heating or cooling



Ventilation without heat recovery (via bypass)

- ➔ e₁ ... Fresh outdoor air suction
- ➔ e₂ ... Fresh filtered air outlet
- ➔ i₁ ... Exhaust air suction
- ➔ i₂ ... Exhaust air outlet

- T, PT/E ... Central heating / electrical heater connection
- CH ... Cooling connection

SELECTION SOFTWARE



For the detailed design of DUPLEX series units, accessories and control systems we recommend using our dedicated design software. You can find it on our website at www.atrea.com or request a CD at our office.



UNIT VENTILATORS & HEAT RECOVERY

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PERFORMANCE GRAPHS

DUPLEX MULTI-N

DUPLEX Multi-N		1 500	2 500	3 500	5 000	6 500	8 000	10 000	11 000
Supply air – max. ¹⁾	m ³ h ⁻¹	2 500	3 600	4 700	6 400	7 500	8 800	11 100	13 050
Extraction air – max. ¹⁾	m ³ h ⁻¹	2 300	3 650	4 600	6 350	7 100	8 900	10 700	12 300
Max. airflow according to ErP 2018 ⁵⁾	m ³ h ⁻¹	1 950	2 900	3 200	4 350	5 200	6 000	7 700	8 300
Heat recovery efficiency ²⁾	%	up to 93 %							
Number of versions and positions	–	see table „Mounting positions“, page 4							
Weight ³⁾	kg	290–350	350–420	405–480	460–560	520–630	630–750	1 220–1 330	1 280–1 400
Max. power input	kW	1,5	2,5	4,4	6,4	6,7	8,9	10,7	10,8
Voltage	V	230	400	400	400	400	400	400	400
Frequency	Hz	50							
Revolutions – max.	min ⁻¹	2 920	3 000	2 980	2 700	2 820	2 570	2 570	2 130
Heating output E low – max. ⁵⁾	kW	2,1	4,2	7,2	7,2	9,9	9,9	–	–
Heating output E high – max. ⁵⁾	kW	4,2	8,4	10,8	12,6	14,7	14,7	–	–
Heating output T – max. ⁴⁾	kW	18	27	36	46	67	75	95	100
Cooling output CHW – max. ⁴⁾	kW	9	12	22	30	39	46	65	70
Cooling output CHF – max. ⁴⁾	kW	10	13	25	37	41	50	60	65

¹⁾ Maximum flow rate through units at zero external pressure

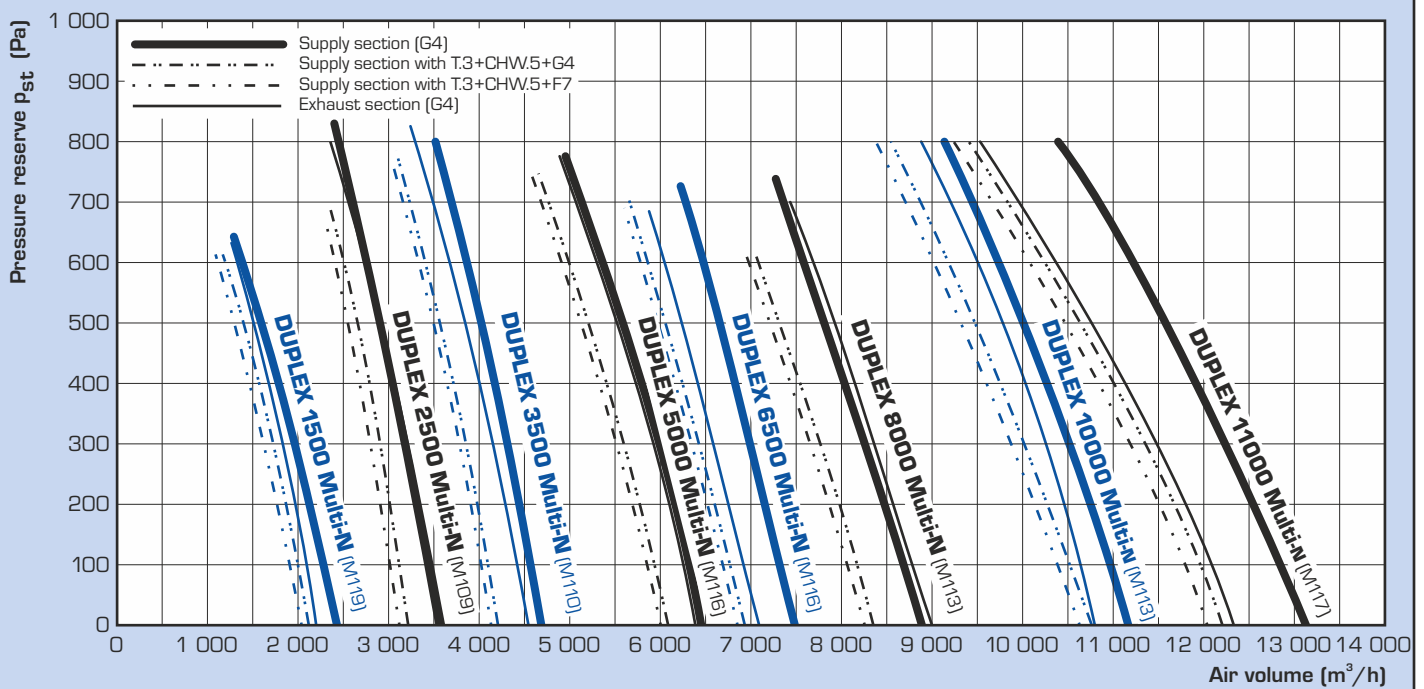
²⁾ According to air volume

³⁾ Depending on equipment

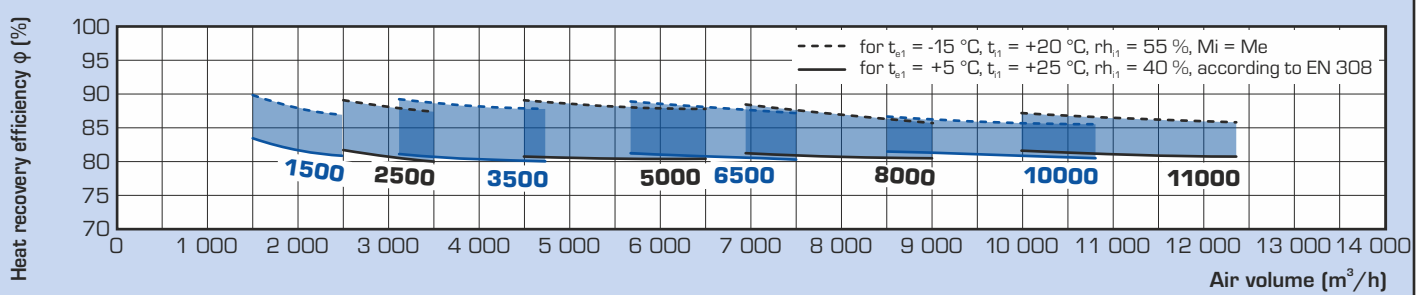
⁴⁾ Depending on register type, liquid and flow rates

⁵⁾ For detailed information please use our DUPLEX selection software.

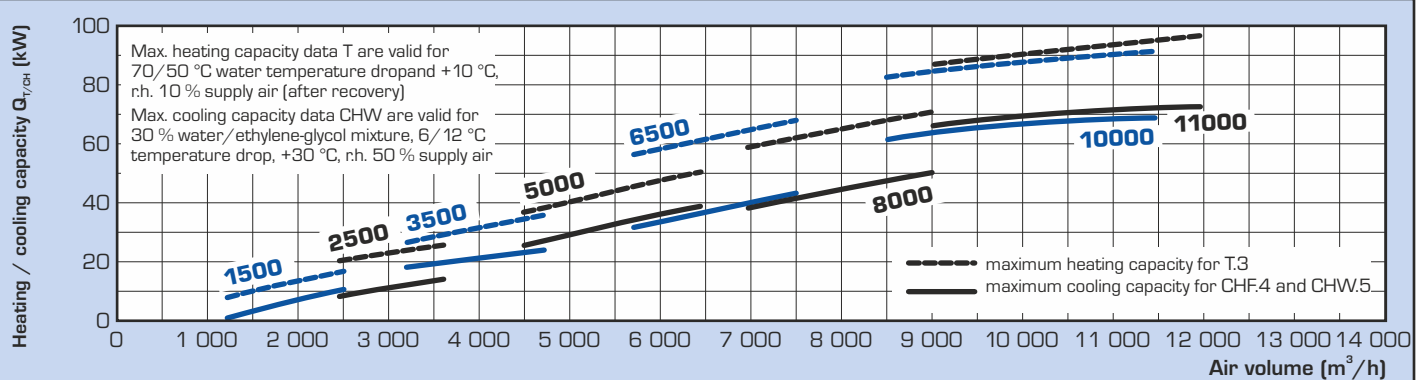
PERFORMANCE SUMMARY



HEAT RECOVERY EFFICIENCY

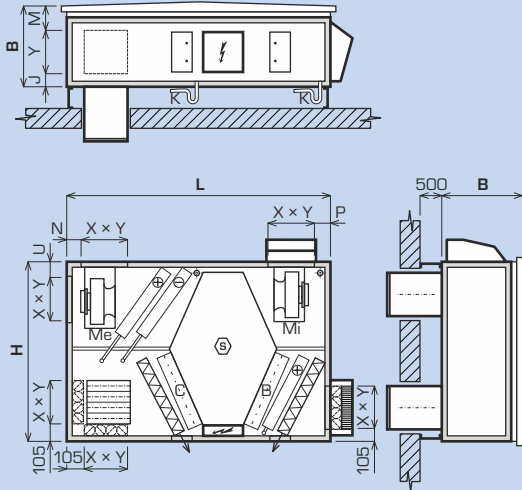


HEATING AND COOLING PERFORMANCES

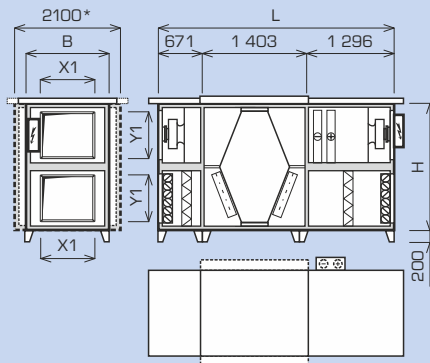


BASIC DIMENSIONS

1500-8000 Multi-N
configuration 4/16



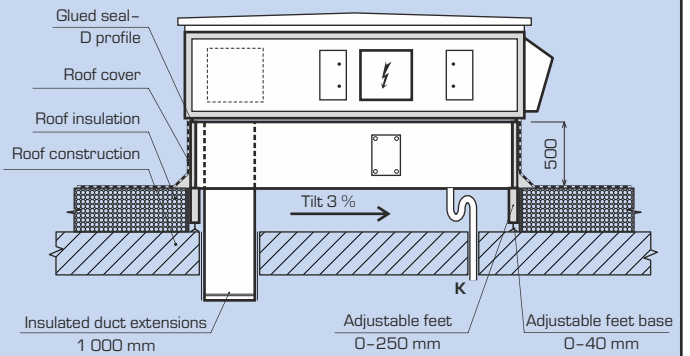
10000-11000 Multi-N
configuration 10/0



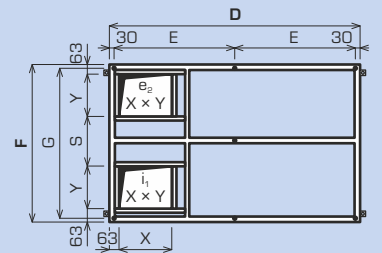
* dimension only for DUPLEX 11000 Multi-N

BASE FRAME (optional accessory)

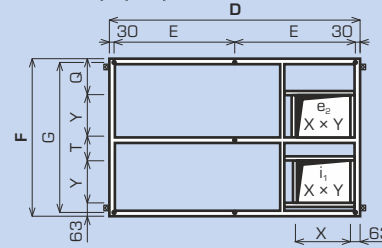
1500-8000 Multi-N



For position 4 / x



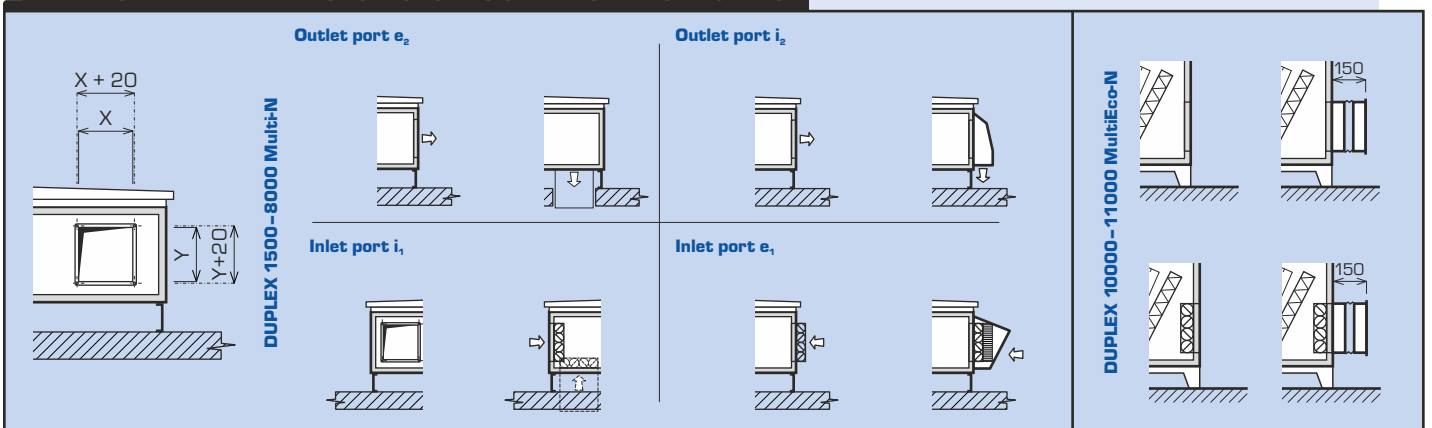
For position 3 / x



DUPLEX Multi-N		1 500	2 500	3 500	5 000	6 500	8 000	10 000	11 000
Dimension H	mm	1 605	1 605	1 605	1 605	1 605	1 700	1 795	1 795
Dimension B	mm	615	745	830	1 050	1 230	1 450	1 620	1 620
Length L	mm	2 560	2 560	2 560	2 560	2 560	2 650	3 370	3 370
Dimension N	mm	130	105	105	105	105	105	-	-
Dimension U	mm	270	105	105	105	105	105	-	-
Dimension P	mm	135	105	105	105	105	105	-	-
Dimension J	mm	100	100	165	225	315	340	-	-
Dimension M	mm	155	185	205	265	355	350	-	-
Condensate drain	mm	ø 32							
Connecting ports									
Dimension X x Y	mm	300 x 300	400 x 400	400 x 400	500 x 500	500 x 500	700 x 500	900 x 710	900 x 710
Base frame									
Dimension D	mm	2 530	2 530	2 530	2 530	2 530	2 625	-	-
Dimension F	mm	1 585	1 585	1 585	1 585	1 585	1 670	-	-
Dimension E	mm	1 235	1 235	1 235	1 235	1 235	1 289	-	-
Dimension G (between anchoring holes)	mm	1 525	1 525	1 525	1 525	1 525	1 610	-	-
Dimension S	mm	659	459	459	259	259	344	-	-
Dimension Q	mm	289	189	189	89	89	202	-	-
Dimension T	mm	433	333	333	233	233	205	-	-

Note: For detailed design and technical data we recommend using our dedicated selection software.

TYPES AND DIMENSIONS OF CONNECTING PORTS



INSTALLATION AND VERSIONS OF DUPLEX MULTI-N

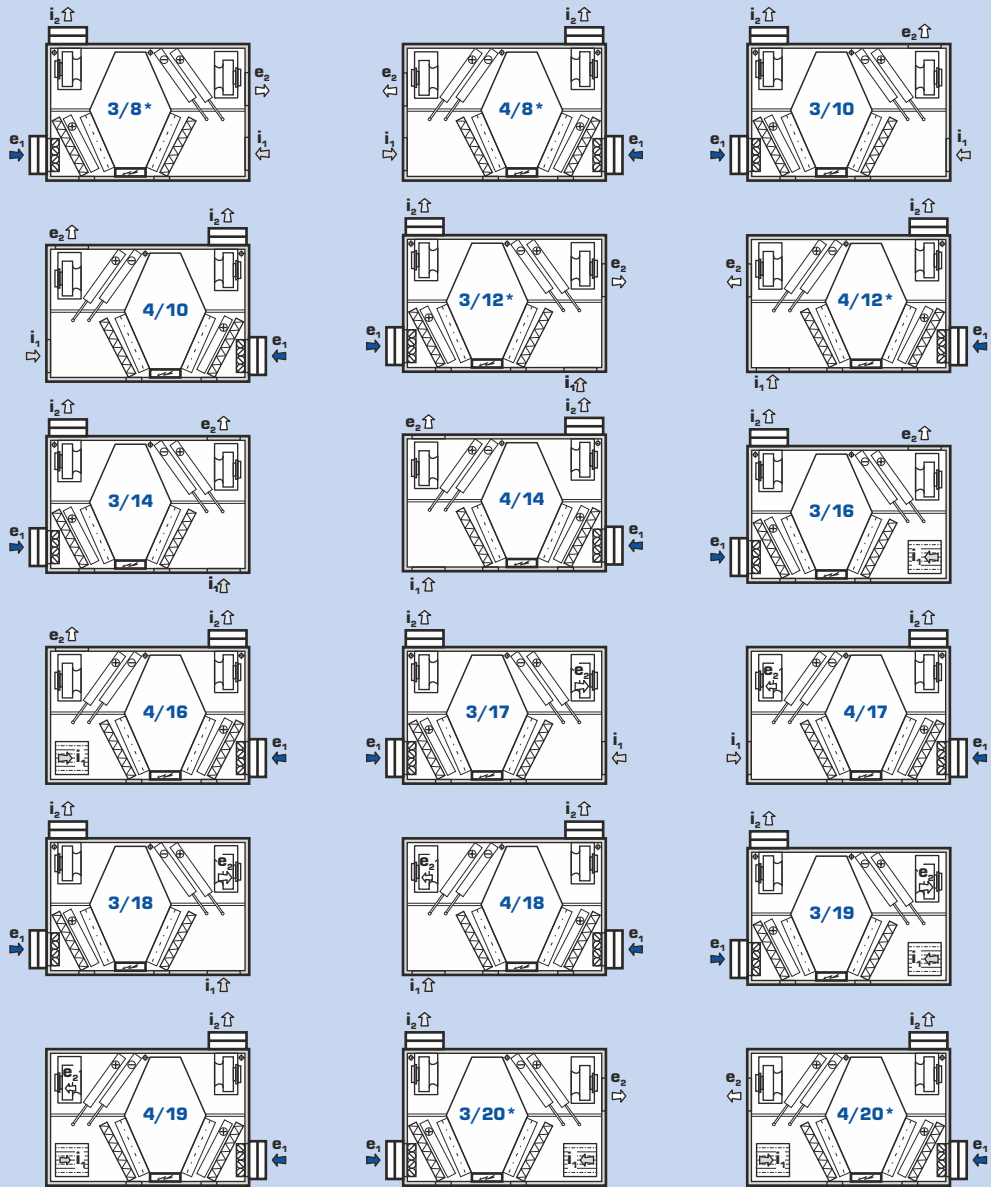
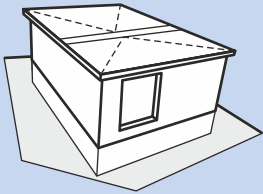
INSTALLATION VERSIONS AND CONNECTING PORTS

DUPLEX 1500 to 11000 Multi-N units are available in a range of versions to facilitate their installation on the roof (outside). Rooftop units enable to go through the roof which is an excellent solution that saves material and labour costs in ducting and also significantly saves the energy lost

Detailed drawings are shown in the summary table "Mounting positions". DUPLEX units are characterised by a wide range of accessories - the ports may be optionally fitted with flexible flanges, duct extensions or special hoods if required.

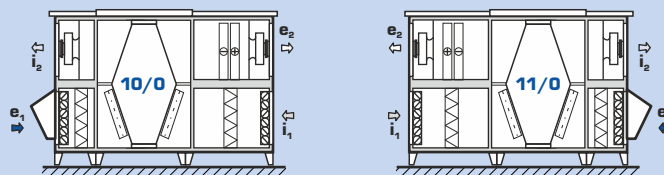
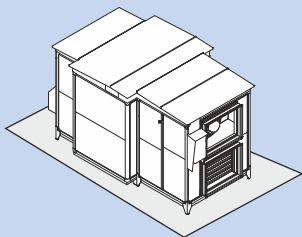
MOUNTING POSITIONS AND PORT CONFIGURATION

DUPLEX 1500-8000 Multi-N

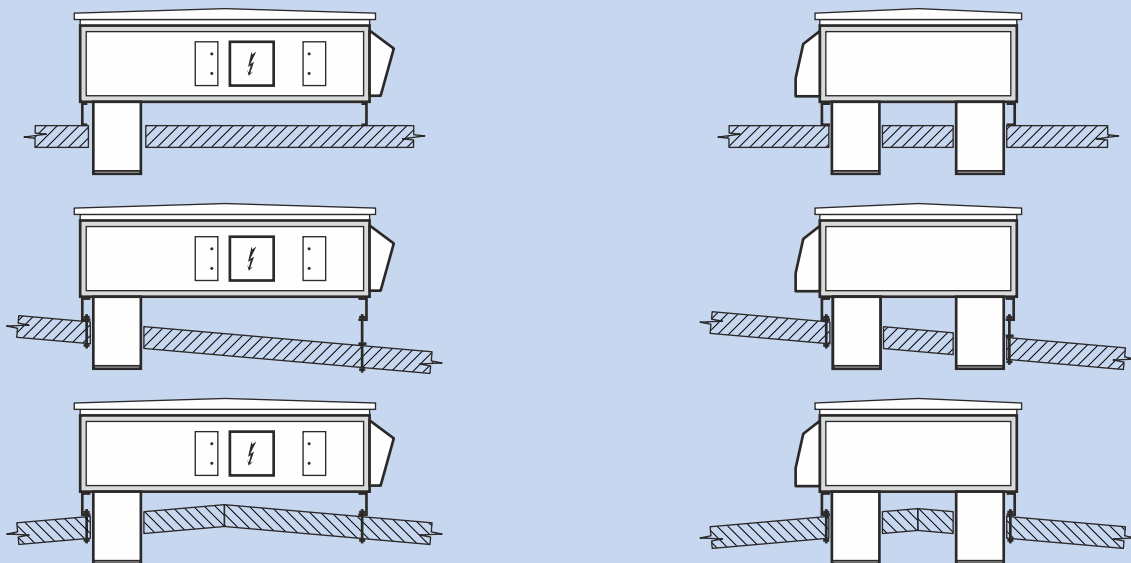


* DUPLEX 3500-8000 Multi-N with max. one coil

DUPLEX 10000-11000 Multi-N



MOUNTING POSITIONS - CONNECTIONS THROUGH THE ROOF

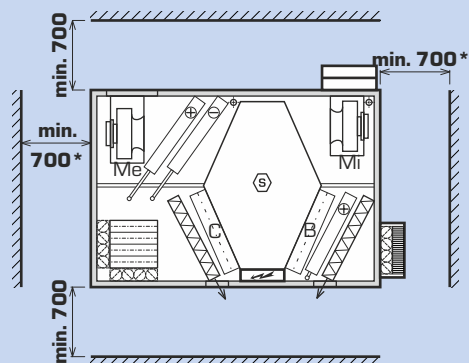
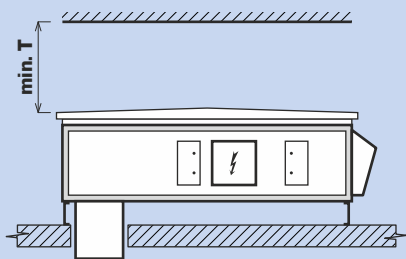


HANDLING SPACE

DUPLEX units must be installed with the prescribed handling space around the unit in mind.
Below the unit at least 150 mm must be left to install the DN 32

condensate drain line. This line must run through a U-bend at least 150 mm high into a sewer. Handling space in front of the unit must be maintained for replacing filters.

1500-8000 Multi-N



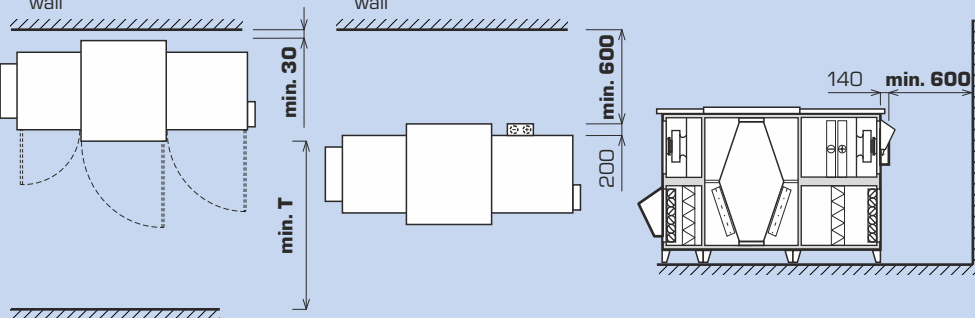
* only for units with built-in coil

handling space in front of the door
wall

control manifolds for coils
wall

control module

10000-11000 Multi-N



Type	T (mm)
DUPLEX 1500 Multi-N	600
DUPLEX 2500 Multi-N	700
DUPLEX 3500 Multi-N	800
DUPLEX 5000 Multi-N	1 000
DUPLEX 6500 Multi-N	1 200
DUPLEX 8000 Multi-N	1 400
DUPLEX 10000 Multi-N	1 600
DUPLEX 11000 Multi-N	1 600

ACOUSTIC POWER L_w AND ACOUSTIC PRESSURE $L_{D,3}$

Type	Working point	Acoustic power L_w [dB(A)]					Acoustic pressure $L_{D,3}$ [dB(A)] at distance of 3 m
		inlet e_1	inlet i_1	outlet e_2	outlet i_2	unit	
DUPLEX 1500 Multi-N	1 500 m ³ /h (200 Pa)	57	57	87	87	60	40
DUPLEX 2500 Multi-N	2 500 m ³ /h (200 Pa)	57	57	82	82	61	40
DUPLEX 3500 Multi-N	3 500 m ³ /h (200 Pa)	58	59	87	88	59	38
DUPLEX 5000 Multi-N	5 000 m ³ /h (200 Pa)	68	68	89	89	62	42
DUPLEX 6500 Multi-N	6 500 m ³ /h (200 Pa)	72	72	94	95	66	45
DUPLEX 8000 Multi-N	8 000 m ³ /h (200 Pa)	66	62	76	79	71	50
DUPLEX 10000 Multi-N	9 000 m ³ /h (200 Pa)	66	67	98	97	74	53
DUPLEX 11000 Multi-N	10 000 m ³ /h (200 Pa)	63	64	88	88	73	52

MODIFICATIONS

DUPLEX MULTIECO-N - BASIC UNIT



DUPLEX 1500-8000 Multi-N

The compact unit consists of supply and exhaust fans in semispiral casing with anti-vibration mounting, removable counterflow air-to-air heat recovery core assembled from thin plastic plates, removable Coarse 60 % (G4), ePM10 50 % (M5) or ePM1 55 % (F7) supply and exhaust air filters, and a condensate pan with DN 32 flexible hose. Top doors enable easy access to all built-in components. Front doors for easy filters changing.

DUPLEX 10000-11000 Multi-N

The unit consists of 3 separate sections:

1 - supply free-wheel fan with electric motors in anti-vibration mounting, removable supply filter Coarse 60 % (G4),

ePM10 50 % (M5) or ePM1 55 % (F7)

2 - cross-flow heat recovery exchanger with an electric motor, a belt pulley and a belt

3 - exhaust free-wheel fan with electric motors in anti-vibration mounting, removable exhaust filter Coarse 60 % (G4),

ePM10 50 % (M5) or ePM1 55 % (F7)

A front door enables easy access to all built-in components and filters.

The units meet requirement in accordance with Commission regulation (EU) No. 1253/2014 (Ecodesign) in the defined working area.

Fans

All units are equipped with high-efficiency fans (ebm-papst and Ziehl Abegg) with free-running impellers and backward curved blades. Whole range of DUPLEX 1500 to 11000 Multi-N fans meets the requirements of the European directive ErP 2015.

Heat recovery exchanger

The only heat recovery core type made of plastic in counterflow arrangement with high efficiency - up to 93 %.



DUPLEX xxxx Multi-N

Me.xxx; Mi.xxx

S7.C

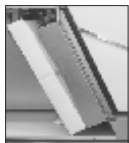
DUPLEX MULTI-N - MODIFICATION DESCRIPTION



By-pass („B“)

By-pass of the plate heat recovery core on supply air side. By-pass consists of an opposed-blade damper and an actuator. It is fitted next to the recovery core inside the unit; it does not increase size of the unit. The standard actuator is BELIMO 24 V; other types are available upon request.

B.x



Mixing damper („C“)

The mixing damper is used to mix exhaust and supply air. Circulation valve consists of an opposed-blade damper and actuator. It is fitted next to the recovery core inside the unit; it does not increase the size of the unit. The standard actuator is BELIMO 24 V; other types are available upon request.

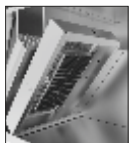
C.x



Hot water heating coil („T“)

Built-in water-to-air three-row (possibly five-row) heating coil; made of copper pipes and aluminum fins. Designed for systems up to 110 °C and 1,0 MPa. The coil is standardly equipped with flexible connection and a steam-gas capillary thermostat for freeze protection. Units in modification T (with heating coil) must be equipped with e, supply air shutoff damper; an actuator with spring-return function is recommended. A coil hydraulic kit for heating capacity control of RE-TPO4 or RE-TPO3 type can be supplied with the coil upon request. Due to roof installation we strictly recommend to use non-freezing liquid.

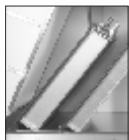
T.x



Electric heating coil („E“)

Integrated electric heating coils consist of PTC (Positive Temperature Coefficient) cells; they are generally used to heat up supply air. By default, electric heating coils always include protective thermostats (operational as well as emergency with manual reset) and regulation module KM featuring power switching elements with so called "zero" switching function (SSR). Built-in electric heating coils are offered in the 1500-8000 Multi-N units in two power options (basic and powerful). For more information please refer to the selection software DUPLEX.

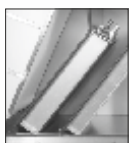
E.x



Direct expansion (DX) coil („CHF“)

A built-in coil made of copper pipes and aluminum fins, including a condensate pan with individual condensate drainage and a pressure switch for freeze alarm. Three- or four-row coils with various evaporate temperature are chosen depending on capacity required, refrigerant type and air parameters. Optionally it is possible to deliver double-circuit evaporator in division 1:1 or 1:2, or completely atypical with needed capacity.

CHF.x



Chilled water cooling coil („CHW“)

A built-in coil made of copper pipes and aluminum fins, including a condensate pan with individual condensate drainage. Three- or five-row coils are chosen depending on capacity required, cooling medium type and air parameters. The cooling coil can be equipped with the R-CHW2 or R-CHW3 hydraulic kit on request.

CHW.x



Integrated pre-heater („PT“)

Built-in water-to-air three-row heating coil; made of copper pipes and aluminum fins. Designed for systems up to 110 °C and 1,0 MPa. Non-freezing liquid must be used.

PT.x

OTHER OPTIONAL ACCESSORIES (BASIC OVERVIEW)

Shutoff damper e₁; i₂

Ke.xxx; Ki.xxx



Shutoff dampers standardly fitted with BELIMO actuators are located in the air inlet port. The following damper types are available:

- fresh air damper e₁ - mandatory for C modification (with mixing damper) and T, PT modification (with heating coil)
- exhaust air damper i₂

Air filtration

Fe.xxx; Fi.xxx



All DUPLEX MultiEco-N units can be equipped with supply or exhaust air filtration of ePM10 50 % (M5), ePM1 55 % (F7) classes instead of standard Coarse 60 % (G4) class. Pressure drop of the filter is then 50 to 100 Pa (clean filter) depending on air flow rate, unit type and dirt accumulated.

Heating coil hydraulic kit

RE-TPO.x



Its function is to control heating capacity of a heating coil. It consists of a three-speed pump, two globe shutoff valves and connection pipes. Further equipment depends on the type:

- RE-TPO4 - four-way mixing valve with an actuator for digital control system
- RE-TPO3 - three-way mixing valve with an actuator for digital control system

Cooling coil hydraulic kit

R-CHW.x



Its function is to control cooling capacity of a chilled-water cooling coil. It always consists of two globe shutoff valves and connection pipes. Further equipment depends on the type:

- R-CHW3 - three-way mixing valve with an actuator
- R-CHW2 - throttling valve with an actuator for digital control system

Hot water heating coil (TPO)

Separately supplied coil for installation into round duct. It is suitable for cramped locations, where it is impossible to put the coil inside the unit, as well as for rooftop units. The coil is standardly equipped with the steam-gas capillary thermostat.



Electric heating coil (EPO-V)

Separately supplied heating coil to be fitted into round or rectangular duct. Capacities and diameters can be found in respective catalogue sheets.



Spare cartridge filters

FK.x



Replacement filter cartridges in different sizes based on the unit type. Available in Coarse 60 % (G4), ePM10 50 % (M5), ePM1 55 % (F7) filtration classes.

Flexible connections

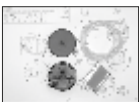
H.P



Ports can be equipped with flexible connections upon request.

Constant air flow and pressure

CF.XXX



Manometers reading fan pressure together with controls, enables intelligent fan control of preselected airflow. This accessory assumes the unit is equipped with digital controls of aMotion type. Using a second manometer (optional accessory) in the supply air duct enables the user to control constant pressure in the supply duct.

Insulated duct extension

Rectangular duct extension for connection through the roof. The casing is made from sandwich panels with mineral insulation. Standard length is 1 m.



Tube manometers

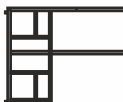
MFF



Accessory for filters for simple view of current pressure drop. The tube manometers are obligatory for hygienic unit design in accordance with the VDI 6022.

Base frame

Dismountable base frame with integrated PIR (30 mm) insulation and service doors. Standard height 500 mm, others on request. Available only for DUPLEX 1500-8000 DUPLEX Multi-N units.



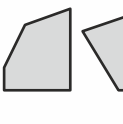
Feet

The Multi-N units can be equipped with adjustable feet (alternative to base frame).



Special hoods

Special weatherproof hoods for inlet (e₁) and outlet (i₂) ports. The hood for e₁ port in combine with integrated droplet eliminator.



CONTROLS






DUPLEX Multi-N Rooftop units are delivered with basic control components or with complete control systems.

There are two types of control systems available (Basic, CPM and aMotion) according to customer needs and an application. The systems also include variety of sensors (temperature, humidity, air quality, CO₂) for effective operation control.

Features of the control systems

- selection of the most suitable and efficient control system at the lowest cost, depending on the particular application
- control system is integrated with the unit, most components are already wired and checked in factory, thus reducing the risk of incorrect wiring
- no control system project documentation is necessary for standard cases, standardized solutions can be used
- simple wiring, system simplicity, error indication
- qualified technical support and consulting

SUMMARY OF DUPLEX MULTI-N CONTROL SYSTEMS

Type	Use	Controller
"Basic" controls	<ul style="list-style-type: none"> - all electrical components are wired to a junction box terminal strip inside or outside the unit - standard components are fans, damper actuators, capillary freeze protection thermostat of hot water heating coil - more components are included upon customer's request (exact actuator type, sensors, thermostats, pressure switches etc.) - suitable for applications with separate delivery of control system; e.g. large buildings with central control system etc. 	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center;">basic version (fans, actuators, thermostats, pressure switches and others on request)</p> </div> <p style="text-align: center;">↑ ↓</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center;">Supervisory control system</p> </div>
"CPM" controls	<p>Standard functions</p> <ul style="list-style-type: none"> - EC fan speed control (stepless) - automatic by-pass damper position - frost protection of heat exchanger - switching of electric or water heater - input for external switch - inlet and outlet shut-off damper control - minimum and maximum fan speed preselection - analogue input (0-10 V) for air quality sensor (CO₂, RH) - outputs for controlling electrical preheater and heater (pulse switched 10 V) or water heater (controlled by 0-10 V signal) - outputs for controlling cooling (direct or water), eventually heat pump <p>Controller CPM</p> <ul style="list-style-type: none"> - fully graphic touchscreen - weekly program - „party" mode - „holiday" mode - filter change notice - automatic operation based on constant signal - e.g. constant pressure <p>Controller CP 10 RA</p> <ul style="list-style-type: none"> - rotatable controller 	<div style="text-align: center;">  <p>CPM controller with touchscreen display</p> </div> <div style="text-align: center; margin-top: 20px;">  <p>CP 10 RA with mechanical knob</p> </div>
"aMotion" controls	<p>Standard aMotion control functions</p> <p>Elementary aM-CE basic module</p> <ul style="list-style-type: none"> - EC fans speed control (according to selected mode) - Automatic heat and cool recovery control (by-pass control) - Evaluates and prevents all emergency conditions according to the measured values - Possibility of setting basic and user scenes and weekly calendars to select modes, power, temperatures and other functions - Ethernet connection for communication over the Internet - Inputs for external signals - control e.g. from kitchens, toilets and similar - Possibility of connecting air quality sensors (e.g. CO₂ concentration or relative humidity) either by contact, 0-10V voltage, or via the bus. - Outputs for continuous control of electric preheater and heater (pulse switched 10 V) - Possibility of connecting up to two controllers of different types - Connection to supervisory control system via Modbus TCP protocol <p>Legendary aM-LE advanced module (with all functions from Elementary aM-CE module and additional options below)</p> <ul style="list-style-type: none"> - Control of systems with VAV boxes - Control of systems with heat sources (heat pumps, heat accumulators etc.) - Communication by BACnet protocol over the bus - Possibility of connecting more than two controllers - More than 4 external bus elements (controllers, CO₂ sensors, outdoor temperature sensors,...) - Multiple adjustable scenes (more than 10) - More than 2 user calendars - More than 4 users (excluding service access) <p>Additional module aM-IO18</p> <ul style="list-style-type: none"> - Inputs for 4 external signals - control from kitchens, toilets and similar - Hot water heater control (0-10 V) - Control of circulation modes <p>Additional module aM-IO12</p> <ul style="list-style-type: none"> - Control of cooling (direct and water) and heat pumps - Rotary regenerator <p>Additional aM-XCF</p> <ul style="list-style-type: none"> - Unit control based on flow measurement <p>Additional RD-K module</p> <ul style="list-style-type: none"> - Additional inputs and outputs significantly expanding the control system functionality <p>BACnet / KNX converter</p> <ul style="list-style-type: none"> - Connection to the superior system via BACnet or KNX protocol 	<p>aTouch (touchscreen)</p> <div style="text-align: center;">  </div> <p>aDot (touchscreen)</p> <div style="text-align: center;">  </div> <p>aSpace (internet interface)</p> <div style="text-align: center;">  </div>