

DUPLEX

1500 to 15000 Roto-N

All-purpose rooftop units with rotary heat exchangers

DUPLEX 1500-15000 Roto-N is a new generation of all-purpose rooftop ventilation units with rotary heat recovery exchangers. The rooftop version of compact DUPLEX 1500-15000 Roto-N units are used for comfort ventilation, hot-air heating and cooling in 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 Roto-N units are produced in compact (1500 to 5000 Roto-N) and semi-compact (8000 to 15000 Roto-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 G4, M5 or F7 filters, drain pans and possibly also a circulation damper with a servo drive or integrated air heaters and coolers.

Unit casing is divided into two versions:

DUPLEX 1500-5000 Roto-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 8000-15000 Roto-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 Roto ventilation units meet the requirements of the most stringent European standards:

- Casing properties according to EN 1886
- EC motors according to ErP 2018
- 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 Roto-N units:

- New design of ventilation units with excellent parameters
- Great thermal insulation of the casing (class T2)
- Reduced thermal bridging (class TB1/TB2 **)
- Compact dimensions
- Ease of installation
- Variable configuration of discharge ports
- Unified dimensions of ports
- Optional versions with circulation damper, purge chamber or different types of a heat exchanger
- Optional versions with built-in T, CHF, CHW coils
- High efficiency fans – SFP < 0,45 W/(m³/h)*
- High heat recovery efficiency of the rotary heat exchanger – up to 85 %
- Integrated control system including temperature sensors
- Integrated web server (aMotion regulation)
- Comprehensive design software
- The heat exchangers are certified by the renowned Eurovent Certification Company

* in the defined working area

** TB1 for 1500-5000 Roto-N
TB2 for 8000-15000 Roto-N

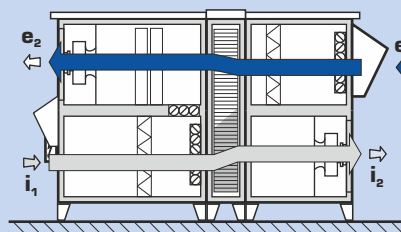


1500 to 15000 Roto-N

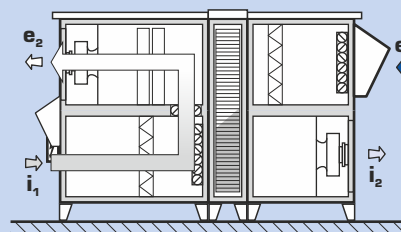
AVAILABLE MODIFICATIONS (CAN BE COMBINED)

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

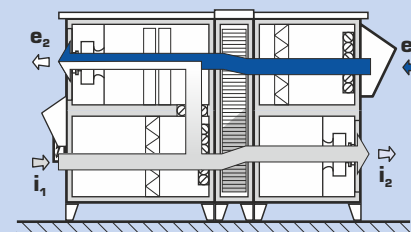
OPERATING MODES OF DUPLEX ROTO-N UNITS



Ventilation with heat recovery with re-heating (with cooling)



Circulation heating or cooling



Combined mode (ventilation with circulation)

- ➔ e₁ ... Fresh outdoor air suction
- ↻ e₂ ... Fresh filtered air outlet

- ↻ i₁ ... Exhaust air suction
- ↻ i₂ ... Exhaust air outlet

- T/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.eu or request a CD at our office.



UNIT VENTILATORS & HEAT RECOVERY

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PERFORMANCE GRAPHS

BASIC PARAMETERS

DUPEX Roto-N		1500	2500	4000	5000	8000	12000	15000
Supply air - max. ¹⁾	m ³ h ⁻¹	1 550	2 750	4 600	6 600	11 200	14 100	16 700
Extraction air - max. ¹⁾	m ³ h ⁻¹	1 500	2 700	4 650	6 650	11 100	14 000	16 600
Max. nominal airflow according to ErP 2018 ⁵⁾	m ³ h ⁻¹	1 400	2 400	4 200	5 050	7 600	9 600	11 600
Heat recovery efficiency ²⁾	%	up to 85 %						
Number of versions and positions	-	see table „Mounting positions“, page 4						
Weight ³⁾	kg	355-400	360-405	570-640	575-645	850-1 060	1 140-1 360	1 340-1 610
Max. power input	kW	0,8	1,7	2,9	5,1	9,9	10,2	11,3
Voltage	V	230	230	400	400	400	400	400
Frequency	Hz	50						
Revolutions - max.	min ⁻¹	3 350	2 960	3 000	2 980	2 570	2 130	1 860
Heating output E low - max. ⁵⁾	kW	4,2	4,2	7,2	7,2	-	-	-
Heating output E high - max. ⁵⁾	kW	8,4	8,4	12,6	12,6	-	-	-
Heating output T - max. ⁴⁾	kW	17	22	42	50	70	100	120
Cooling output CHW - max. ⁴⁾	kW	10	18	35	39	50	61	80
Cooling output CHF - max. ⁴⁾	kW	17	24	36	40	47	60	85

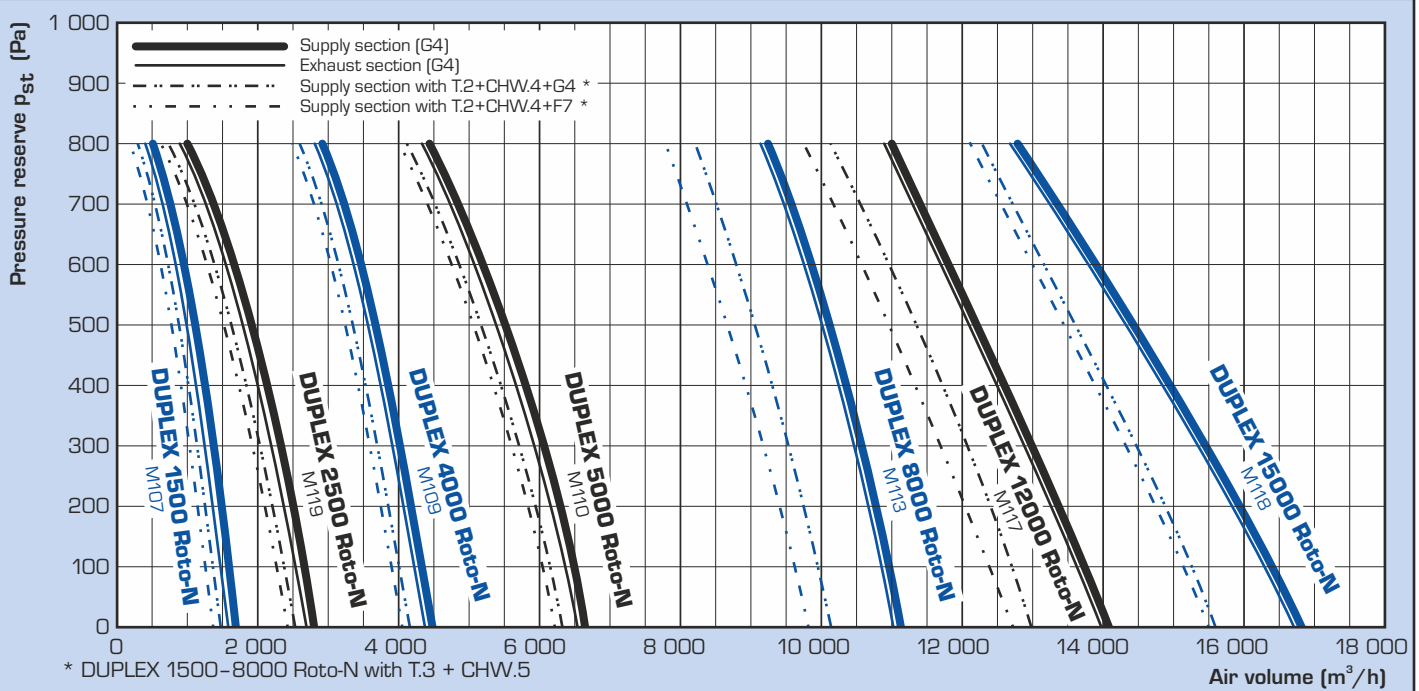
¹⁾ Maximum flow rate through units at zero external pressure

²⁾ According to air volume

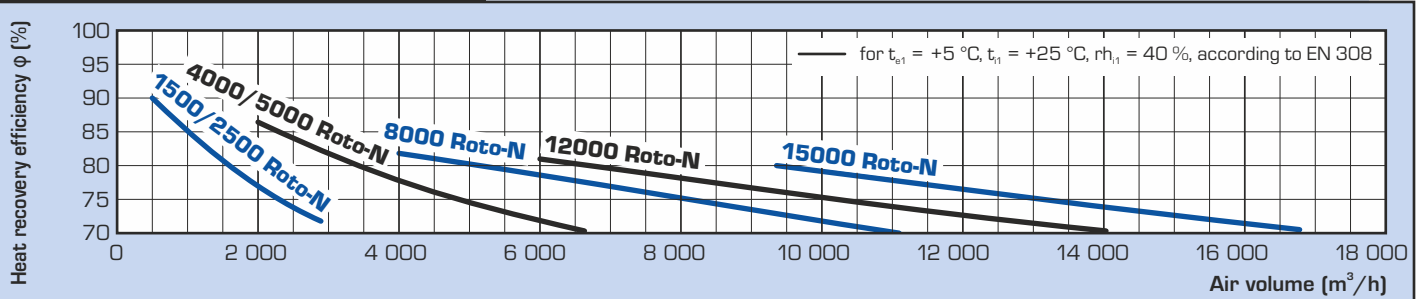
⁴⁾ Depending on register type, liquid and flow rates

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

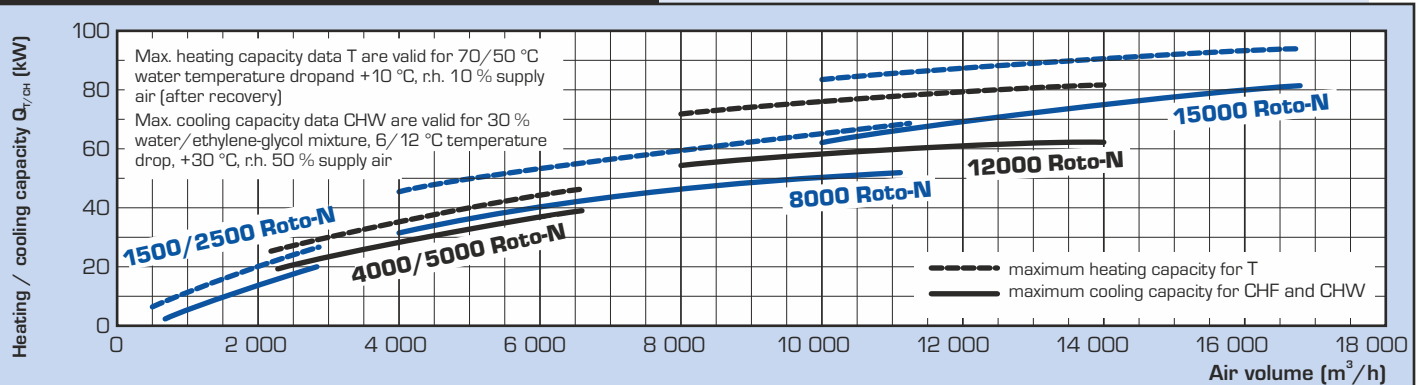
PERFORMANCE SUMMARY



HEAT RECOVERY EFFICIENCY

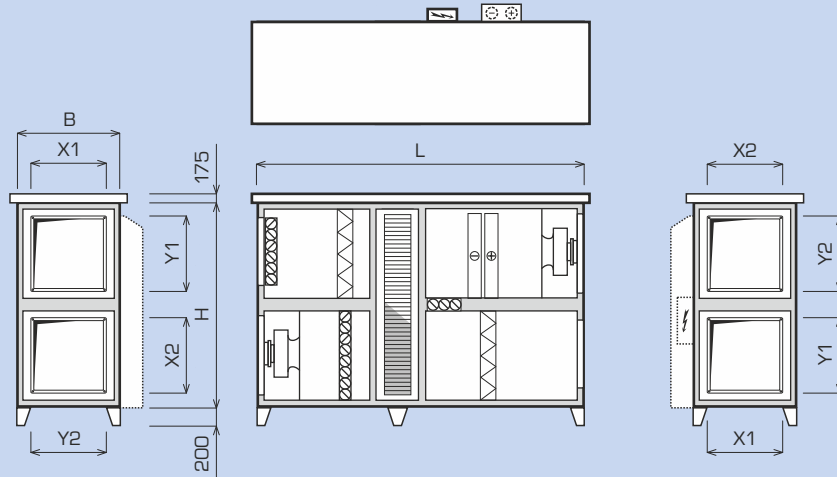


HEATING AND COOLING PERFORMANCES

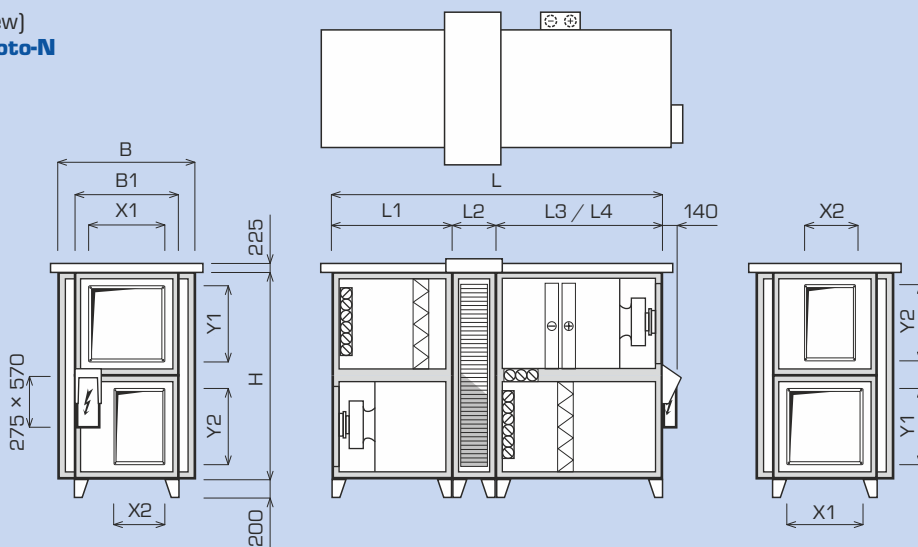


BASIC DIMENSIONS

ROOFTOP (front view) 1500 to 5000 Roto-N



ROOFTOP (front view) 8000 to 15000 Roto-N



DUPLEX Roto-N		1500	2500	4000	5000	8000	12000	15000
Dimension B	mm	880	880	1 200	1 200	1 600	1 780	1 930
Dimension B1	mm	-	-	-	-	1 160	1 430	1 705
Dimension H	mm	1 150	1 150	1 760	1 760	1 820	2 100	2 250
Length L (without / with mixing)	mm	2 030 / 2 030	2 030 / 2 030	2 250 / 2 250	2 250 / 2 250	2 665 / 2 965	2 830 / 3 130	2 970 / 3 270
Length L1	mm	-	-	-	-	1 000	1 055	1 125
Length L2	mm	-	-	-	-	530	530	530
Length L3 (without mixing)	mm	-	-	-	-	1 135	1 245	1 315
Length L4 (with mixing)	mm	-	-	-	-	1 435	1 545	1 615
Condensate drain	mm	ø 32 (only with CHW, CHF or CHP)						
Connecting ports								
Dimension X1 × Y1 (e ₂ , i ₂)	mm	400 × 400	400 × 400	710 × 710	710 × 710	900 × 710	1 000 × 900	1 200 × 900
Dimension X2 × Y2 (e ₁ , i ₁)	mm	400 × 400	400 × 400	710 × 710	710 × 710	500 × 700	710 × 710	900 × 900

TYPES AND DIMENSIONS OF CONNECTING PORTS

Outlet port e₂

Outlet port i₂

Inlet port i₁

Inlet port e₁

DUPLEX Roto	R
1500-5000 Roto-N	20
8000-15000 Roto-N	30

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

INSTALLATION AND VERSIONS

INSTALLATION VERSIONS AND CONNECTING PORTS

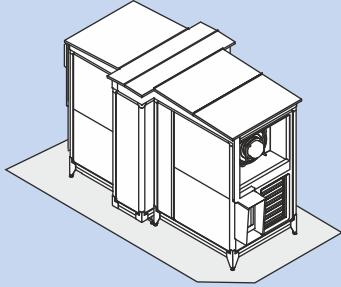
DUPLEX 1500 to 15000 Roto-N units are available in a range of versions to facilitate their installation in the machine room. This significantly increases options to install DUPLEX Roto-N units in cramped spaces.

Detailed drawings are shown in the summary table "Mounting positions". DUPLEX Roto-N units are characterised by a wide range of accessories – the ports may be optionally fitted with flexible flanges and inlet ports may have shut-off dampers if required.

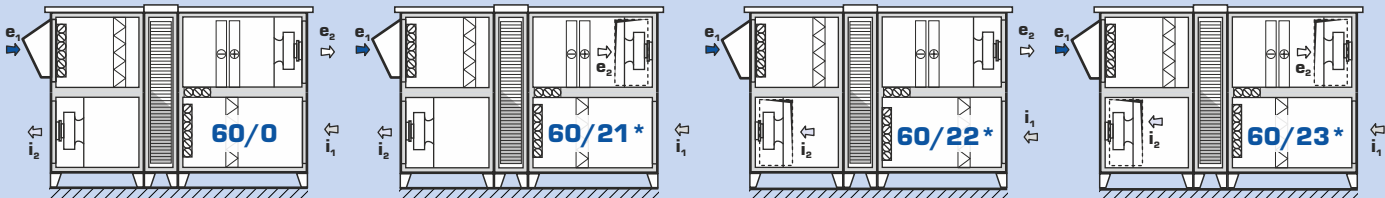
MOUNTING POSITIONS

ROOFTOP

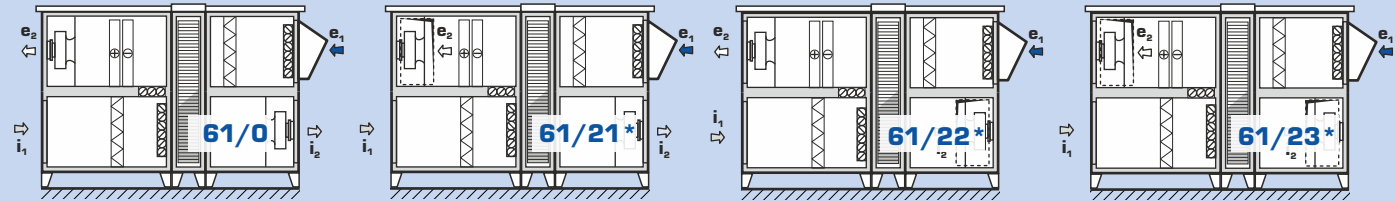
1500 to 15000 Roto-N



configuration 60/x – door-side view (up to 4 configurations in total)



configuration 61/x – door-side view (up to 4 configurations in total)

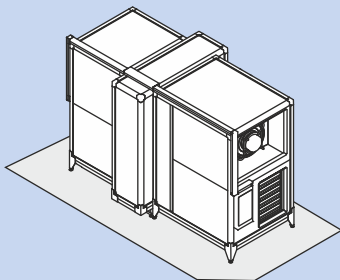


* Only for DUPLEX 8000-15000 Roto-N units

OTHER CONFIGURATIONS OF DUPLEX ROTO

FLOOR-STANDING

DUPLEX 1500 to 15000 Roto



For detailed information please see separate technical catalogues.

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 200 mm high into a sewer. This space is easily provided when the steel supporting feet supplied as standard are used. Handling space in front of the unit must be maintained for opening the front door; replacing filters and providing servicing and installation access to each unit part.

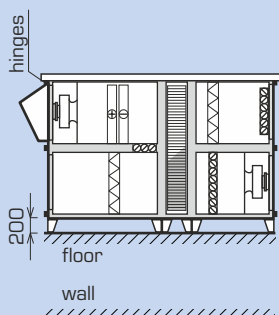
Each drawing shows the minimum handling space.

In addition, each unit must have the minimum handling space of 600 mm from the side of the control system electric switchboard according to CSN. Units with a heating or cooling control manifold must have free space from the side of the manifold, too.

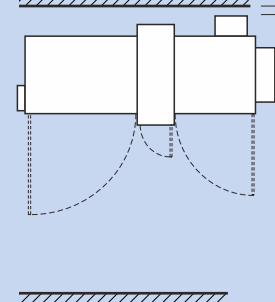
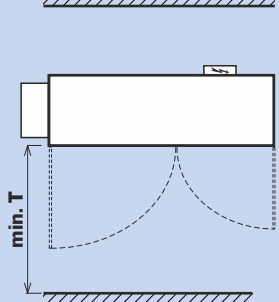
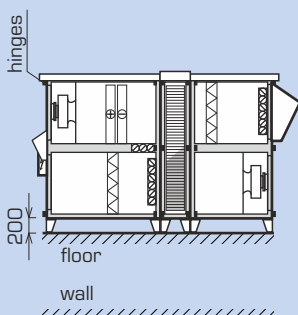
Handling space in front of the door

Floor-standing horizontal

1500-5000 Roto-N



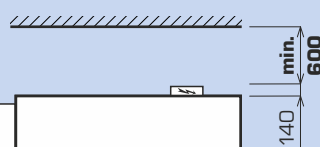
8000-15000 Roto-N



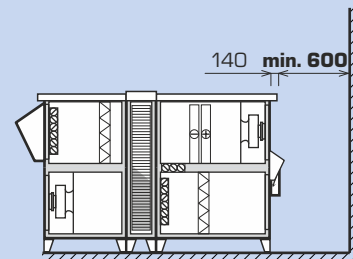
Handling space for accessories

Control modules

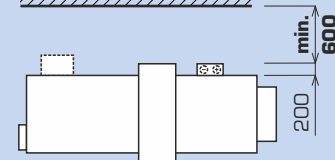
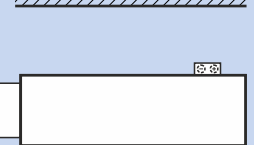
1500-5000 Roto-N



8000-15000 Roto-N



Control manifolds for coils



Type	standard doors T (mm)
DUPLEX 1500 Roto-N	900
DUPLEX 2500 Roto-N	900
DUPLEX 4000 Roto-N	1 200
DUPLEX 5000 Roto-N	1 200
DUPLEX 8000 Roto-N	1 600
DUPLEX 12000 Roto-N	1 800
DUPLEX 15000 Roto-N	2 000

ACOUSTIC POWER L_w AND ACOUSTIC PRESSURE L_{p_2}

Type	Working point	Acoustic power L_w [dB(A)]					Acoustic pressure L_{p_2} [dB(A)] at distance of 3 m
		inlet e_1	inlet i_1	outlet e_2	outlet i_2	unit	
DUPLEX 1500 Roto-N	1300 m ³ /h (200 Pa)	63	62	81	81	54	34
DUPLEX 2500 Roto-N	2300 m ³ /h (200 Pa)	68	68	83	83	61	40
DUPLEX 4000 Roto-N	3500 m ³ /h (200 Pa)	69	69	87	87	68	48
DUPLEX 5000 Roto-N	5000 m ³ /h (200 Pa)	67	66	91	91	65	45
DUPLEX 8000 Roto-N	8000 m ³ /h (200 Pa)	81	81	97	96	76	56
DUPLEX 12000 Roto-N	10000 m ³ /h (200 Pa)	80	80	99	99	69	49
DUPLEX 15000 Roto-N	15000 m ³ /h (200 Pa)	81	81	97	97	72	52

Note: for detailed acoustic parameters we recommend using our specialized selection software.

MODIFICATIONS

DUPLEX ROTO-N - BASIC UNIT



Basic configuration

DUPLEX 1500-5000 Roto-N

The compact unit consists of supply and exhaust fans with free-running impellers, removable rotary heat recovery exchanger, removable supply and exhaust air class G4 (alter: M5 or F7) filters. A front door enables easy access to all built-in components and filters.

DUPLEX 8000-15000 Roto-N

The unit consists of 3 separate sections:

- 1 - supply centrifugal fans with electric motors in anti-vibration mounting, removable supply filter G4, M5 or F7
- 2 - rotary heat exchanger with an electric motor, a belt pulley and a belt
- 3 - exhaust centrifugal fans with electric motors in anti-vibration mounting, removable exhaust filter G4, M5 or 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 EC fans (Ziehl Abegg) with free-running impellers and backward curved blades. Whole range of DUPLEX 1500 to 15000 Roto-N units fans meets the requirements of the European directive ErP 2015.

Heat exchanger

DUPLEX Roto-N are equipped with a thermal rotor made of aluminum with high efficiency - up to 85 %. The heat exchangers are certified by the Eurovent certification company.

There are two types of exchanger drive:

- 1) AC motor - option only for 8000-15000 Roto-N units with „basic“ control system (constant rotor revolutions mode).
- 2) Stepper motor - option for „basic“ and „aMotion“ control (rotor revolutions are controlled by 0-10 V signal input).

DUPLEX xxxx Roto-N

Me.xxx; Mi.xxx

R.x

DUPLEX ROTO-N - MODIFICATION DESCRIPTION



Rotary heat exchanger

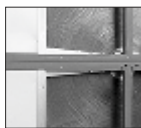
Optionally it is possible to select from following features:

R.x

Hygroscopic rotor

The hygroscopic rotor is wound from aluminium foil with a special hygroscopic layer allowing the transfer of heat (up to 85 %) together with humidity with an efficiency of up to 90 %.

R.E



Purge chamber

The purpose of the purge chamber is to allow some of the supply air to get through the rotor into the exhaust air stream. In this way the rotor channels are purged, which considerably reduces the risk of contaminating the supply air.

R.xP

Labyrinth sealing

This special type of sealing minimizes the leakage values. Available only for 8000-15000 Roto-N units.

R.xL



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 increases the size of the unit (see chapter Dimensions).

Important:

For DUPLEX 8000-15000 Roto units increases the mixing damper dimensions of the unit (see chapter „Dimensions“).

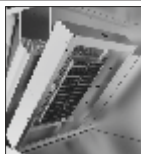
C.x



Hot water heating coil ("T")

Built-in water-to-air two-, three- or 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.

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 1500-5000 Roto 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 drain 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

OTHER OPTIONAL ACCESSORIES (BASIC OVERVIEW)

Ke.xxx; Ki.xxx

Shutoff damper e₁; i₁

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

- fresh air dampers e₁, i₁ - mandatory for C modification (with mixing damper)
- fresh air damper e₁ - mandatory for T modification (with heating coil)
- exhaust air damper i₁



Fe.xxx; Fi.xxx

Air filtration

All DUPLEX Roto-N units can be equipped with supply or exhaust air filtration of M5 or F7 class instead of standard G4 class. External static pressure then drops by 50 to 150 Pa (clean filter) depending on air flow rate, unit type and dirt accumulated.



RE-TPO.x

Heating coil hydraulic kit

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



R-CHW.x

Cooling coil hydraulic kit

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



MFF

Tube manometers

Accessory for filters for simple view of current pressure drop.



FK.x

Spare filters

Replacement filter cartridges in different sizes based on the unit type. Available in G4, M5 and F7 filtration class. Filter F7 can be selected as a cassette or bag filter (only for DUPLEX 8000-15000 Roto-N units).



Delivery of disassembled unit

All units can be delivered dismantled on request. The unit is to be assembled by rivets and bolts directly on site, therefore the unit can be installed in inaccessible location.

H.P

Flexible connections

Round and rectangular ports can be equipped with flexible connections upon request.



TPO

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. Capacities and diameters can be found in respective catalogue sheets.



EPO-V

Electric heating coil (EPO-V)

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



CF.XXX

Constant air flow and pressure

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



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 Roto-N units are delivered with basic control components or with complete control systems.

There are two types of control systems available 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 ROTO-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="text-align: center;"> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> basic version (fans, actuators, thermostats, pressure switches and others on request) </div> <div style="margin: 5px 0;"> ↑ ↓ </div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> Supervisory control system </div> </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-CL 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>  <p>aDot (touchscreen)</p>  <p>aSpace (internet interface)</p> 