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 rootftop 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 with 30 mm PIR insulation with heat transfer coefficient λ = 0,024 W/mK.

DUPLEX 8000–15000 Roto-N are frame construction, casing is made of painted metal sheet with 45 mm mineral wool insulation with heat transfer coefficient λ = 0,037 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 2015
- SFP < 0,45 W/(m^3/h) according to PassivHaus*
- Hygienic requests according to VDI 6022
- Commision 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/(m^3/h)*
- High heat recovery efficiency of the rotary heat exchanger – up to 85 %
- Integrated control system including temperature sensors
- Integrated web server (RD5 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

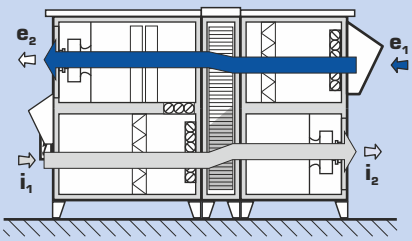
ErP 2018 Atrea

1500 to 15000 Roto-N

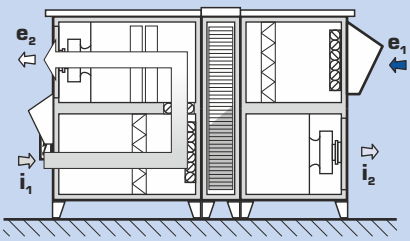
AVAILABLE MODIFICATIONS (CAN BE COMBINED)

– 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		

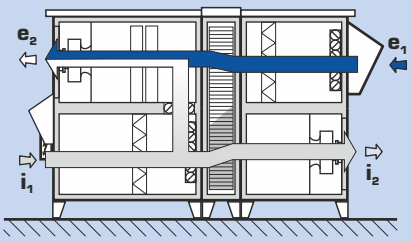
OPERATING MODES OF DUPLEX ROTO-N UNITS



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



Circulation heating or cooling



Combined mode (ventilation with circulation)

- ➡ e_1 ... Fresh outdoor air suction
- ⇨ e_2 ... Fresh filtered air outlet
- ⇨ i_1 ... Exhaust air suction
- ⇨ i_2 ... 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.

Atrea®
UNIT VENTILATORS & HEAT RECOVERY
ATREA s.r.o., Čs. armády 32
466 05 Jablonec n. Nisou
Czech Republic
Phone: +420 483 368 111
Fax: +420 483 368 112
E-mail: atrea@atrea.eu
www.atrea.eu

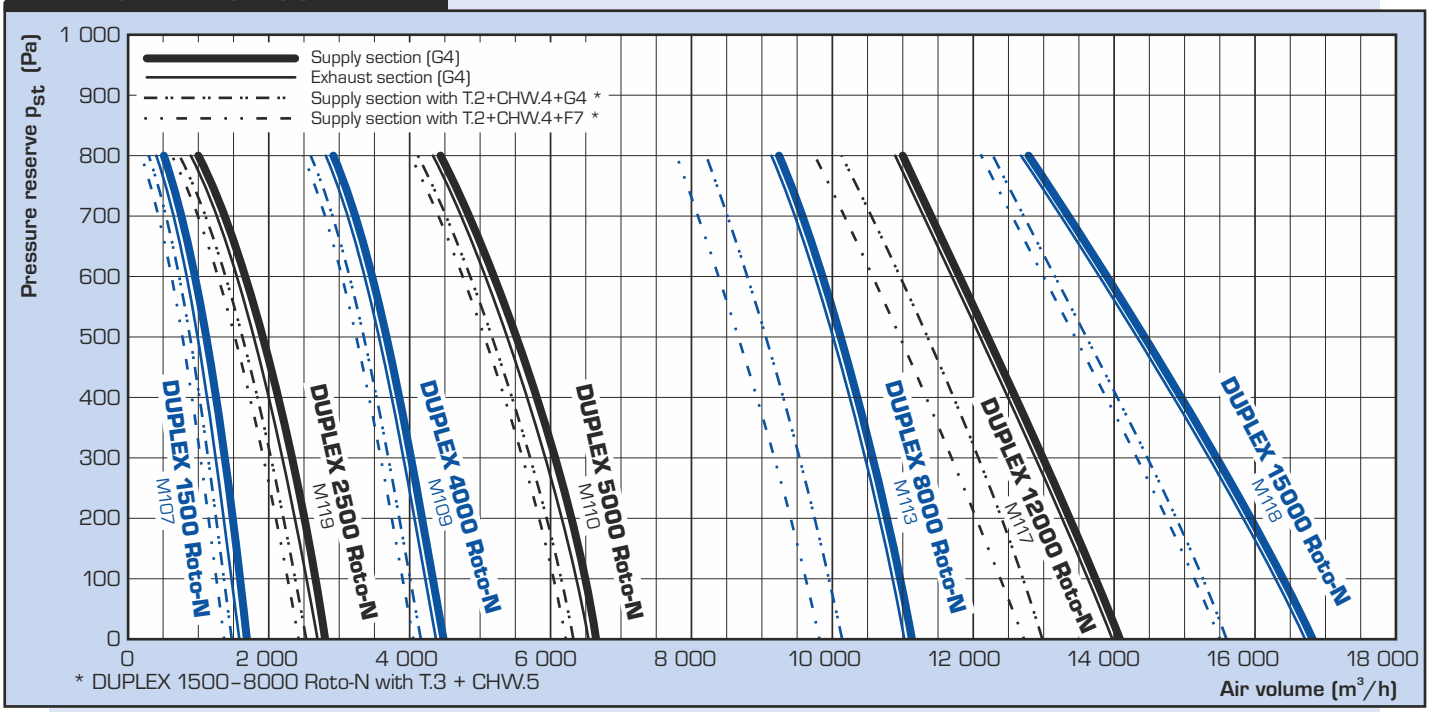
PERFORMANCE GRAPHS

BASIC PARAMETERS

DUPLEX Roto-N		1500	2500	4000	5000	8000	12000	15000
Supply air – max. [1]	m^3h^{-1}	1 550	2 750	4 600	6 600	11 200	14 100	16 700
Extraction air – max. [1]	m^3h^{-1}	1 500	2 700	4 650	6 650	11 100	14 000	16 600
Max. nominal airflow according to ErP 2018 [5]	m^3h^{-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

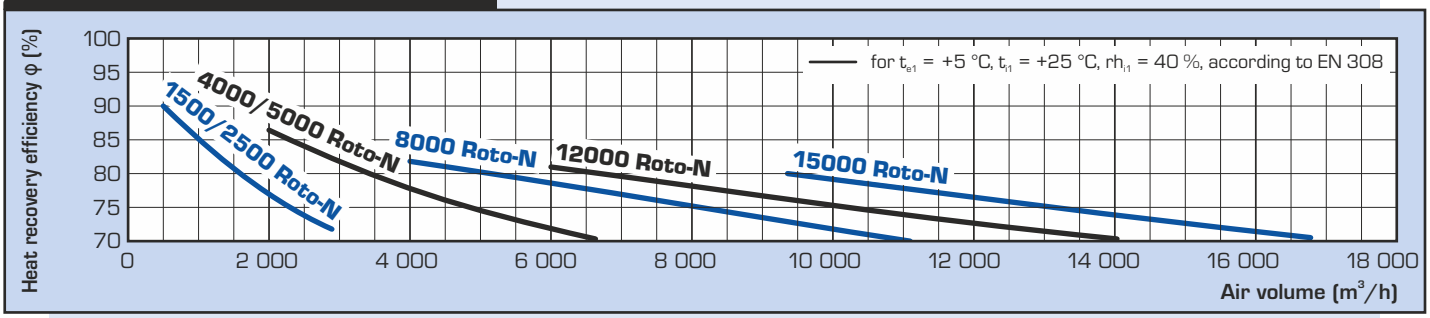
[1] Maximum flow rate through units at zero external pressure
[2] According to air volume
[3] Depending on register type, liquid and flow rates
[5] For detailed information please use our DUPLEX selection software.

PERFORMANCE SUMMARY

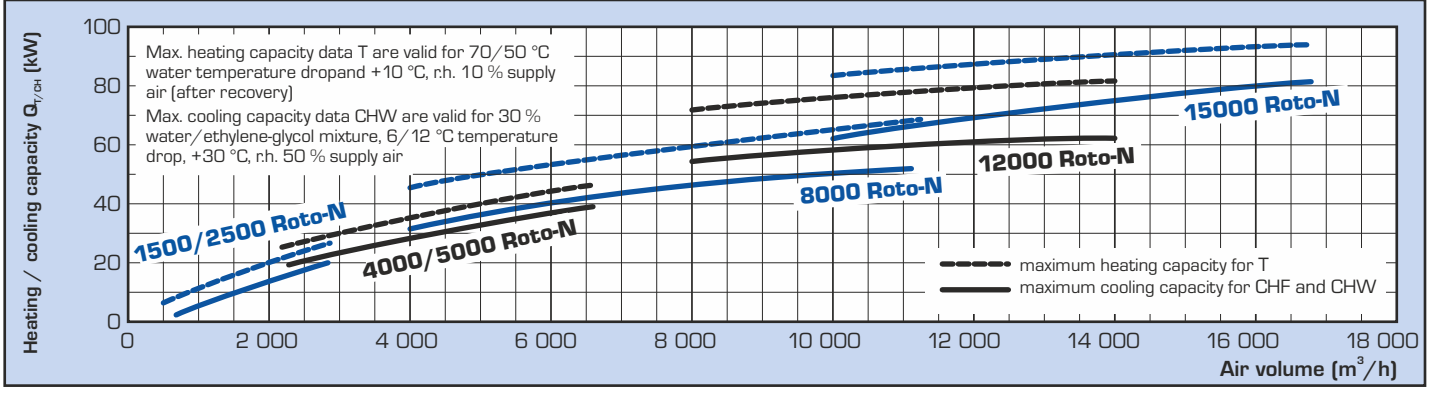


* DUPLEX 1500–8000 Roto-N with T.3 + CHW.5

HEAT RECOVERY EFFICIENCY

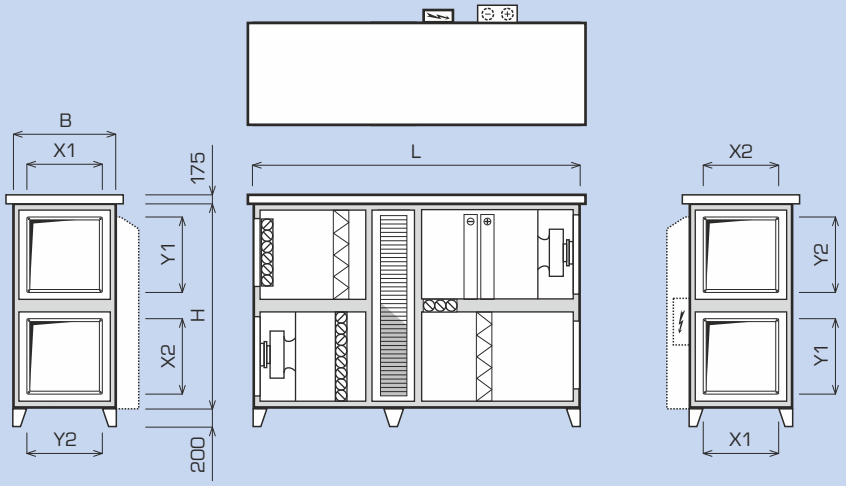


HEATING AND COOLING PERFORMANCES

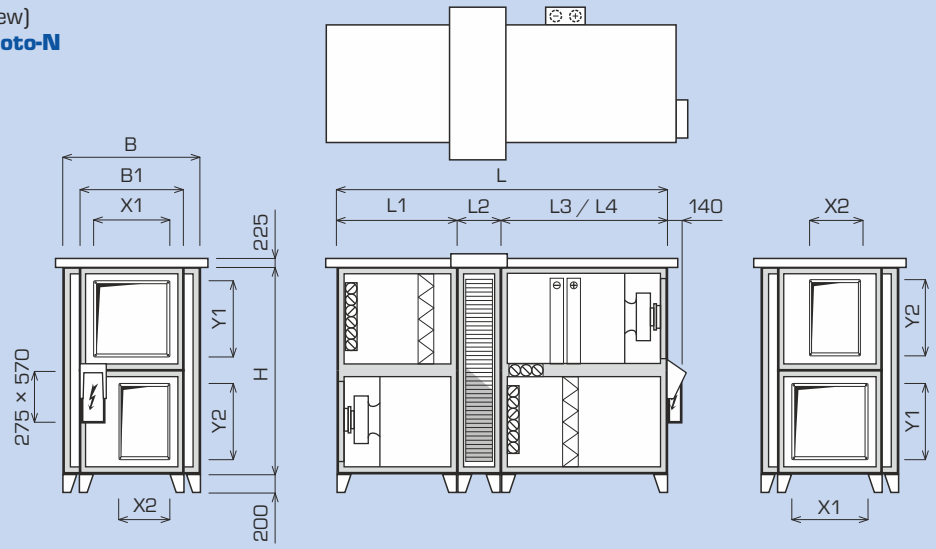


BASIC DIMENSIONS

ROOFTOP (front view)
1500 to 5000 Roto-N

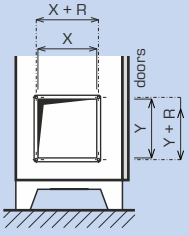


ROOFTOP (front view)
8000 to 15000 Roto-N



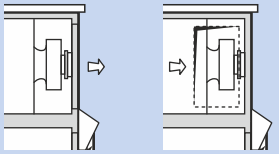
DUPLEX Roto-N		1500	2500	4000	5000	8000	12000	15000
Dimension **B**	mm	880	880	1 200	1 200	1 600	1 780	1 930
Dimension **B1**	mm	–	–	–	–	1 160	1 430	1 705
Dimension **H**	mm	1 150	1 150	1 760	1 760	1 820	2 100	2 250
Length **L** (without / with mixing)	mm	2 030 / 2 030	2 030 / 2 030	2 250 / 2 250	2 250 / 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

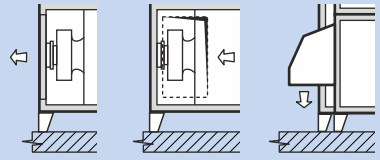


DUPLEX Roto	R
1500–5000 Roto-N	20
8000–15000 Roto-N	30

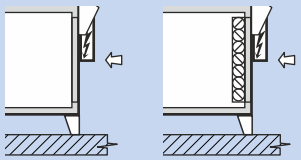
Outlet port e_2



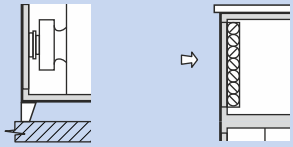
Outlet port i_2



Inlet port i_1



Inlet port e_1



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

INSTALLATION AND VERSIONS

INSTALLATION VERSIONS AND CONNECTING PORTS

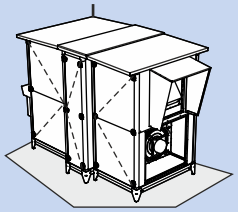
DUPLEX 1500 to 15000 Roto-N units are available in a range of versions to facilitate their installation in the machine room. This significantly increases options to install DUPLEX Roto-N units in cramped spaces.

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.

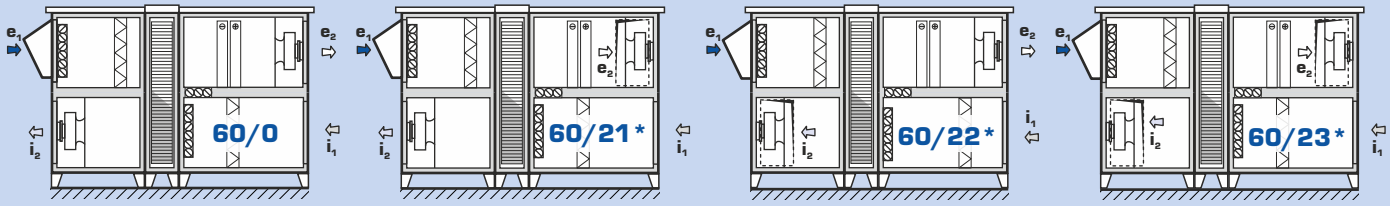
MOUNTING POSITIONS

ROOFTOP

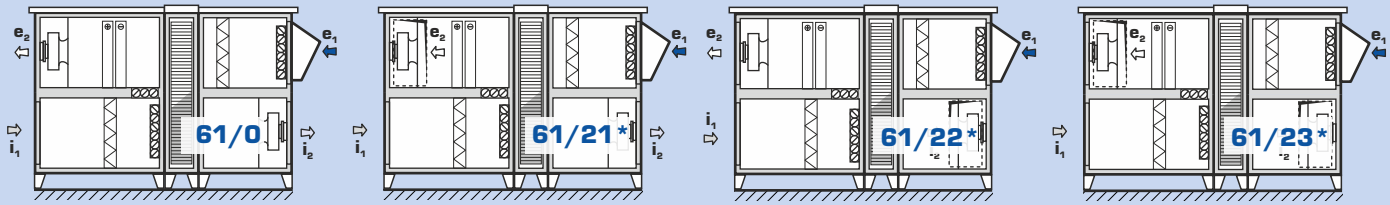
1500 to 15000 Roto-N



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



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

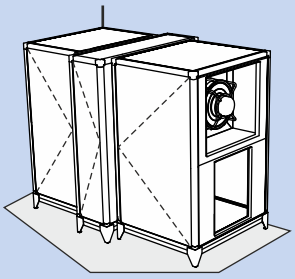


* Only for DUPLEX 8000–15000 Roto-N units

OTHER CONFIGURATIONS OF DUPLEX ROTO

FLOOR-STANDING

DUPLEX 1500 to 15000 **Roto**



For detailed information please see separate technical catalogues.

HANDLING SPACE

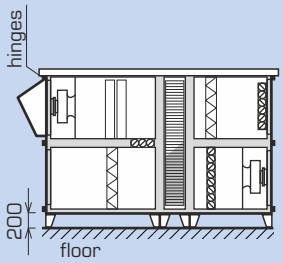
DUPLEX units must be installed with the prescribed handling space around the unit in mind.
Below the unit at least 150 mm must be left to install the DN 32 condensate drain line. This line must run through a U-bend at least 150 mm high into a sewer. This space is easily provided when the steel supporting 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.

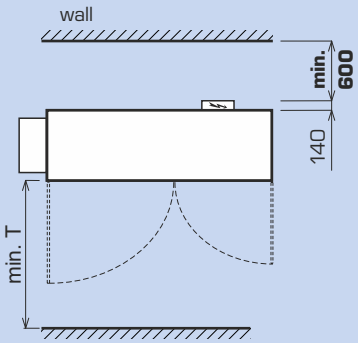
Each drawing shows the minimum handling space.
In addition, each unit must have the minimum handling space of 600 mm from the side of the control system electric switchboard according to CSN.
Units with a heating or cooling control manifold must have free space from the side of the manifold, too.

Handling space in front of the door

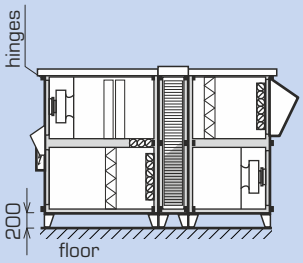
Floor-standing horizontal

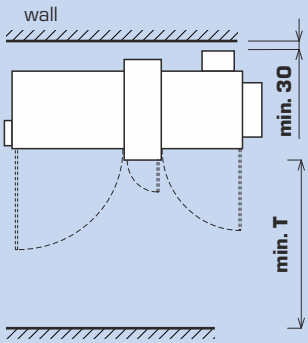
1500–5000 Roto-N





8000–15000 Roto-N

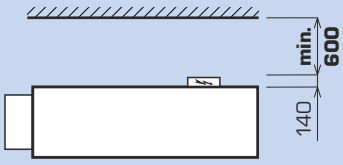




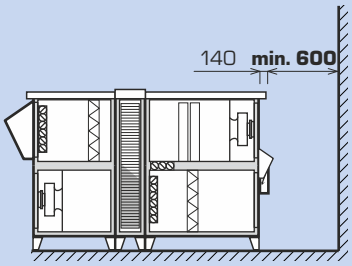
Handling space for accessories

Control modules

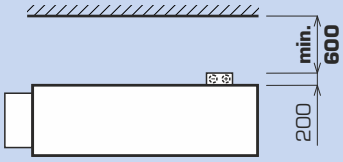
1500–5000 Roto-N

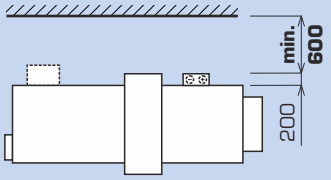


8000–15000 Roto-N



Control manifolds





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

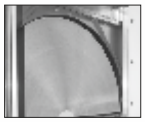
ACOUSTIC POWER L_w AND ACOUSTIC PRESSURE L_{D3}

Type	Working point	Acoustic power L_w [dB(A)]					Acoustic pressure L_{D3} [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 accoustic parameters we recommend using our specialized selection software.

MODIFICATIONS

DUPLEX ROTO-N – BASIC UNIT



DUPLEX xxxx Roto-N

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 Commision regulation (EU) No. 1253/2014 (Ecodesign) in the defined working area.

Me.xxx; Mi.xxx

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.

R.x

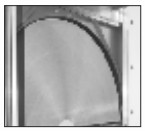
Heat exchanger

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 „RD5" control (rotor revolutions are controlled by 0–10 V signal input).

DUPLEX ROTO-N – MODIFICATION DESCRIPTION



R.x

Rotary heat exchanger

Optionally it is possible to select from following features:

R.E

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.xP

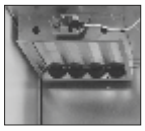
Purge chamber

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.xL

Labyrinth sealing

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



C.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 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").

T.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-TP04 or RE-TP03 type can be supplied with the coil upon request.

E.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.

CHF.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.

CHW.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.

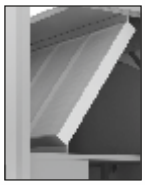
OTHER OPTIONAL ACCESSORIES (BASIC OVERVIEW)

Ke.xxx; Ki.xxx

Shutoff damper e_1; i_1

Shutoff dampers standardly fitted with BELIMO actuators are located in the air inlet port.
The following damper types are available:
– **fresh air dampers e_1, i_1** – mandatory for C modification (with mixing damper)
– **fresh air damper e_1** – mandatory for T modification (with heating coil)
– **exhaust air damper i_1**

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. Pressure drop of the filter is then 50 to 150 Pa (clean filter) depending on air flow rate, unit type and dirt accumulated.

RE-TPO.x

Heating coil hydraulic kit

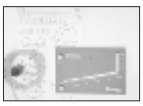
Its function is to control heating capacity of a heating coil. It consists of a three-speed pump, two globe shutoff valves and connection pipes. Further equipment depends on the type:
– **RE-TPO4** – four-way mixing valve with an actuator for digital control system
– **RE-TPO3** – three-way mixing valve 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 (only for DUPLEX 8000–15000 Roto-N units).

Delivery of diassembled 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 equipment with the steam-gas capillary thermostat.
Capacities and diameters can be found in respective catalogue sheets.

EPO-V

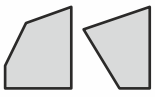
Electric heating coil (EPO-V)

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 RD5 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 (e_1) and outlet (i_2) ports. The hood for e_1 port in combine with integrated droplet eliminator.

CONTROLS

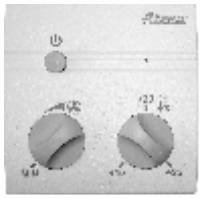
DUPLEX Roto-N units are delivered with basic control components or with complete control systems.

There are three types of control systems available according to customer needs and an application. The systems also include variety of sensors (temperature, humidity, air quality, CO_2) 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 incorect 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	– 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.	**basic version** (fans, actuators, thermostats, pressure switches and others on request) ↕ Supervisory control system
„RD5" controls	**Standard functions of the „RD5" controls** – EC fan speed control (based on selected mode) – automatic control of the rotary heat exchanger – evaluates and prevents emergency limits based on measured temperature – ventilation and temperature weekly program setting – A web server and an Ethernet interface built in as standard connection for remote internet communication – inputs for switching using 230 V (4 inputs – 3 delayed, 1 instantenious) – switch e.g. from bathrooms etc. – optional connection of CO_2 or RH sensor – max. 2 sensors with a switch or 0–10 V output – outputs for electric preheater and heater control (pulse 10 V) or hot-water control (0–10 V) **Additional RD-IO module** – optional manometer connection to ensure constant airflow control (see Constant airflow and pressure control on previous page) – constant pressure control – cooling control outputs (DX- or chilled-water cooling), possibly for a heat pump **Additional RD-K module** – additional inputs and outputs significantly extending control system functions **BACnet / KNX converter** – optional converter allowing connection to supervisory control system via BACnet or KNX protocol	**CP Touch** **CP10RT**  **Web server (as standard)**