

DUPLEX 15000

Compact unit ventilators with heat recovery

The compact unit ventilators of the DUPLEX 15000 series are used for comfort ventilation of large shops, school facilities, restaurants, stores, sports centres, industrial buildings and swimming halls.

The units are suitable for applications requiring efficient ventilation with heat/cool recovery, warm-air circulation heating and cooling with minimum operation costs, i.e. with high recovery efficiency, low fan power input and low noise level.

The units are available in two basic versions:

- indoor version
- rooftop version (with double insulation)

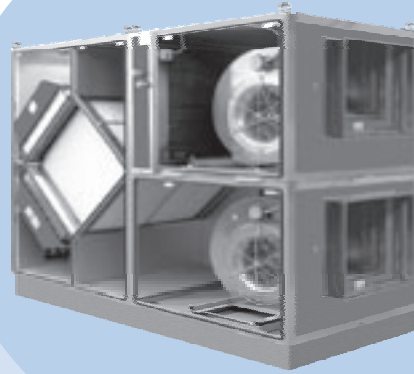
The DUPLEX unit is designed as compact appliance. In a single casing it contains: two independently driven centrifugal fans with anti-vibration motor support with backward curved impellers, highly-efficient cross-flow air-to-air heat recovery core assembled from thin plastic plates, removable supply and exhaust air filters of the G4 or F7 class, condensation pans, an optional internal by-pass with a remote-controlled actuator and an internal mixing damper.

The unit casing consists of a steel L-profile frame and sandwich panels made of aluminum metal sheets filled with polyurethane insulation (thermal resistance $R = 1,05 \text{ m}^2\text{KW}^{-1}$, or $2,1 \text{ m}^2\text{KW}^{-1}$). The sandwich panels are fixed to the frame. A front access door enables comfortable access to all components and filters. The surface finish is standard grade. Inlet and outlet ports are rectangular with various locations. Supplied to order.

The rooftop version has both the inlet and outlet neck covered by an extension, with both closing dampers in order to prevent spontaneous air flow.

An indoor version is always delivered in sections, optionally in a disassembled state with assembly on site by the manufacturer.

A rooftop version is delivered in separate sections to be assembled on site on a common base frame.



DUPLEX 15000

Features of the DUPLEX units

- considerable compactness
- low purchase cost
- optional custom-made port design
- low power input
- direct-driven fans; no need for additional filtration
- high efficiency of heat recovery
- different types of complete control systems based on application complexity; fully integrated into the unit, with the distributor mounted externally
- high chemical resistance of the hPS heat exchanger
- optional hygienic design according to VDI 6022
- delivery in disassembled state for inaccessible areas

AVAILABLE MODIFICATIONS (CAN BE COMBINED)

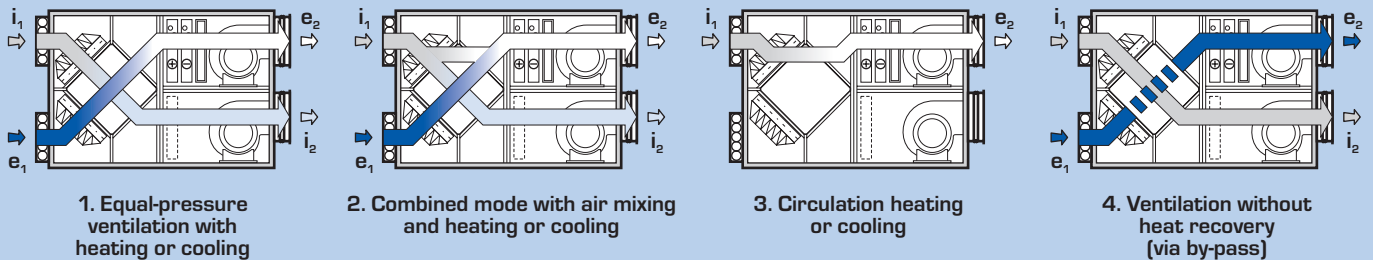
Indoor type

- B with built-in by-pass
- C with built-in mixing damper
- T with built-in hot water heating coil
- CHF with built-in DX cooling coil
- CHW with built-in chilled water cooling coil

Rooftop type

- N-B with built-in by-pass
- N-C with built-in mixing damper
- N-T with built-in glycol heating coil
- N-CHF with built-in in DX cooling coil
- N-CHW with built-in glycol chilled water cooling coil

OPERATING MODES OF THE DUPLEX UNITS



SELECTION SOFTWARE



For detailed selection of Duplex units, accessories and control system we recommend to use our special selection software. To select a heat recovery exchanger you can use our special selection software. Download it from our webpage www.atrea.cz or contact us at our mail address.



UNIT VENTILATORS & HEAT RECOVERY DIVISION

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PERFORMANCE CURVES

INDOOR TYPE

		DUPLIX 15000	
		M020	M021
fan type			
Fan protection		IP54	IP10
supply air - max. ¹⁾	m ³ h ⁻¹	13 500	15 000
exhaust air - max. ¹⁾	m ³ h ⁻¹	13 500	15 000
heat recovery efficiency	%	55 - 65	55 - 65
number of configurations	-	8	8
weight ²⁾	kg	690 - 870	690 - 870
number of fans	-	2	2
max. power input	kW	2x 3,7	2x 5,8
voltage	V	400	400
frequency	Hz	50	60 ³⁾
speed	rpm ⁻¹	1 390	1 600 ³⁾
max. heating capacity „T“ ⁴⁾	kW	185	229
max. cooling capacity „CHW“ ⁴⁾	kW	59	70
max. cooling capacity „CHF“ ⁴⁾	kW	65	77
filtration class (standard)	-	G4	G4

¹⁾ maximum volume flow through units at zero external pressure

²⁾ according to selected accessories

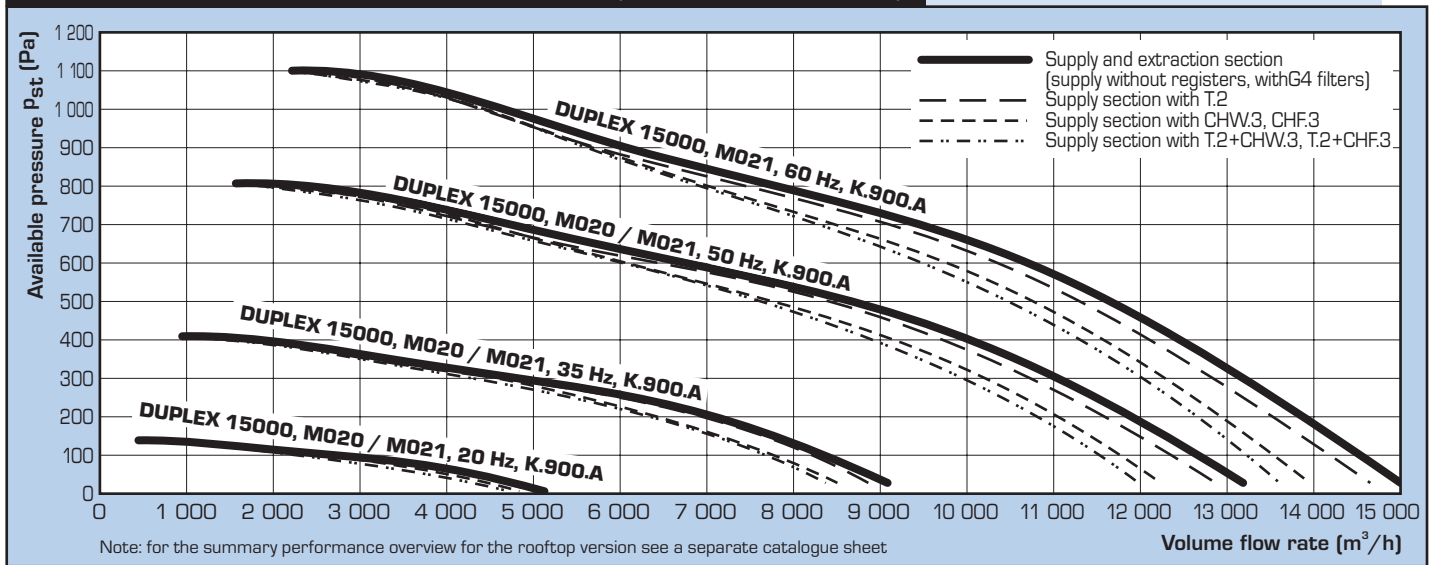
ROOFTOP TYPE

		DUPLIX-N 15000	
		M020	M021
fan type			
Fan protection		IP54	IP10
supply air - max. ¹⁾	m ³ h ⁻¹	13 500	15 000
exhaust air - max. ¹⁾	m ³ h ⁻¹	13 500	15 000
heat recovery efficiency	%	55 - 65	55 - 65
number of configurations	-	2	2
weight ²⁾	kg	1 100 - 1 300	1 100 - 1 300
number of fans	-	2	2
max. power input	kW	2x 3,7	2x 5,8
voltage	V	400	400
frequency	Hz	50	60 ³⁾
speed	min ⁻¹	1 390	1 600 ³⁾
max. heating capacity „T“ ⁴⁾	kW	185	229
max. cooling capacity „CHW“ ⁴⁾	kW	59	70
max. cooling capacity „CHF“ ⁴⁾	kW	65	77
filtration class (standard)	-	G4	G4

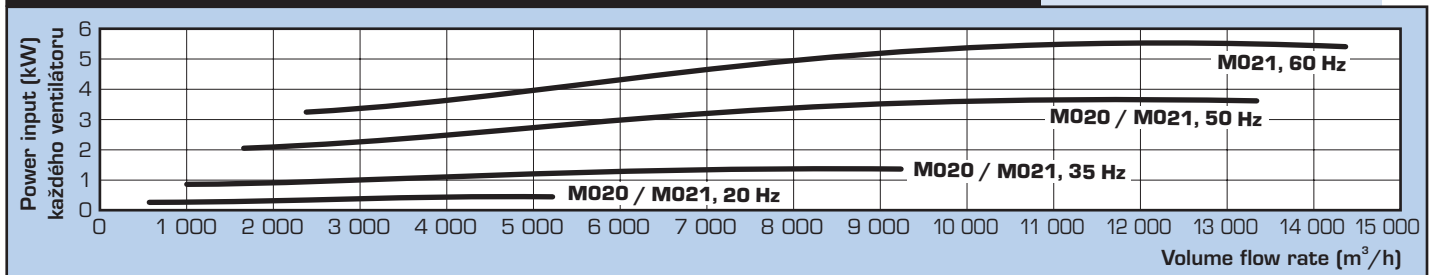
³⁾ the parameters of DUPLIX 15 000 with the M021 fans are valid only when used with 60 Hz / 400 V inverter control!

⁴⁾ according to coil and fluid type

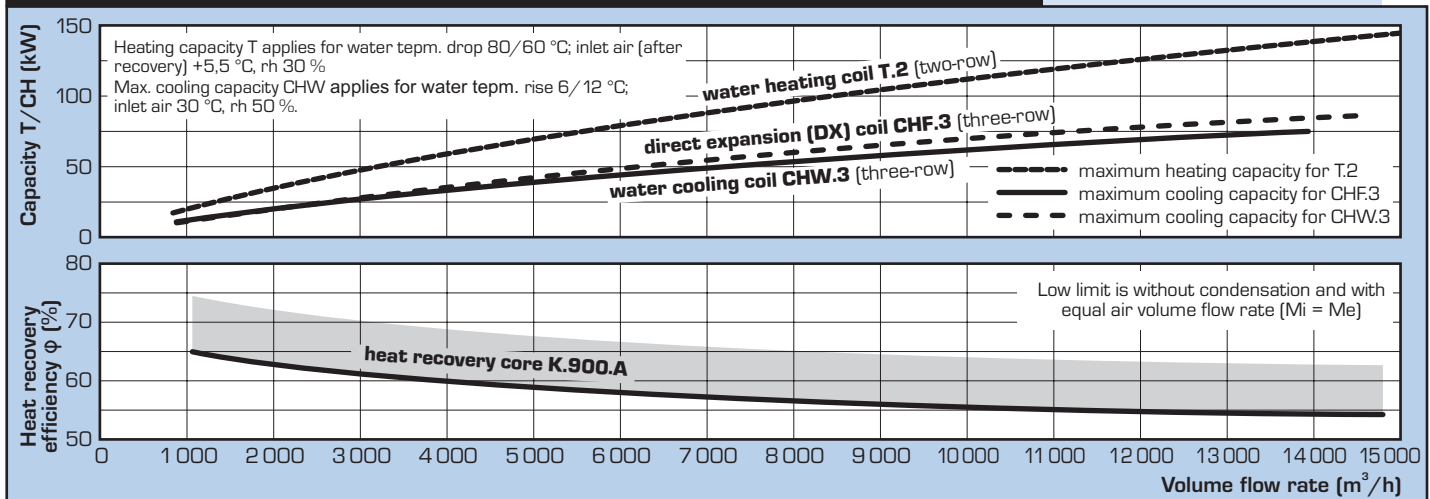
SUMMARY PERFORMANCE OVERVIEW (INDOOR VERSION)



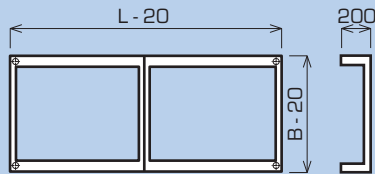
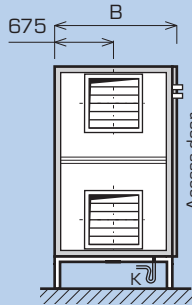
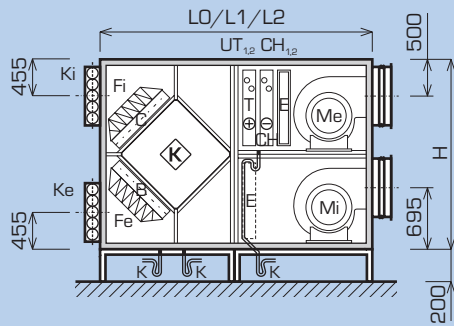
HEATING AND COOLING CAPACITY, HEAT RECOVERY EFFICIENCY



HEATING AND COOLING CAPACITY, HEAT RECOVERY EFFICIENCY



INDOOR TYPE

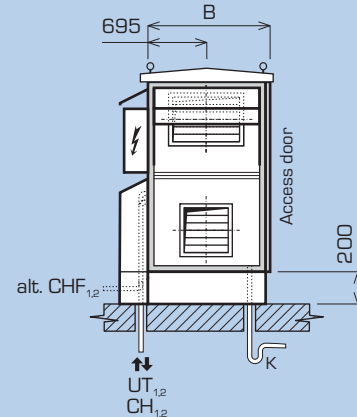
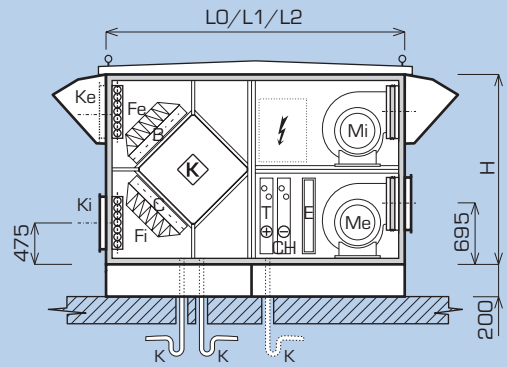


Base frame - standard
part of delivery
(consists of two assembled parts)

DUPLEX		15000
length L0/L1 (without / only T)	mm	3 000
length L2 (T / 2 coils)	mm	3 400
depth B	mm	1 380
height H	mm	2 350
connection ports - Y x X ¹⁾	mm	710 x 710

¹⁾ indicated min. rectangular port size, optionally other sizes

ROOFTOP TYPE

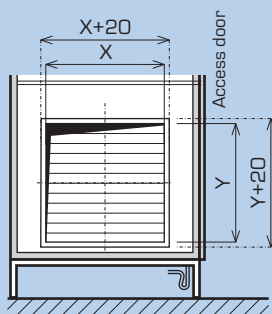


Base frame - standard
part of delivery (consists of two assembled parts)

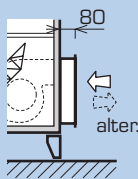
DUPLEX-N		15000
length L0/L1 (without / only T)	mm	3 140
length L2 (T / 2 coils)	mm	3 540
depth B	mm	1 420
height H	mm	2 390
connection ports - Y x X ¹⁾	mm	710 x 710

PORT TYPES AND DIMENSIONS

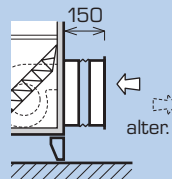
Rectangular



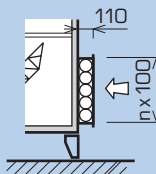
basic port
(inlet, outlet)



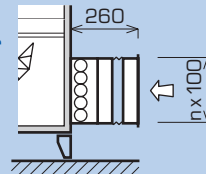
port with flexible connection
(max. length)
(inlet, outlet)



port with damper
(inlet only)

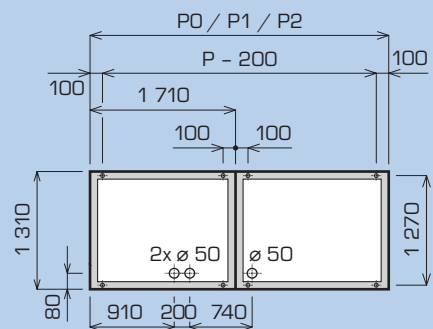
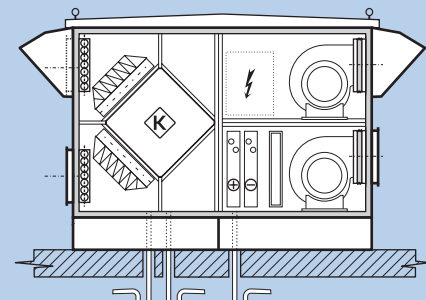


port with damper and flexible connection
(inlet only)



FIXING, BASE FRAMES

Base frame plan, roof openings



DUPLEX-N		15000
P0 / P1 (without / only T)	mm	3 130
P2 (T / 2 coils)	mm	3 520

INSTALLATION CONFIGURATION

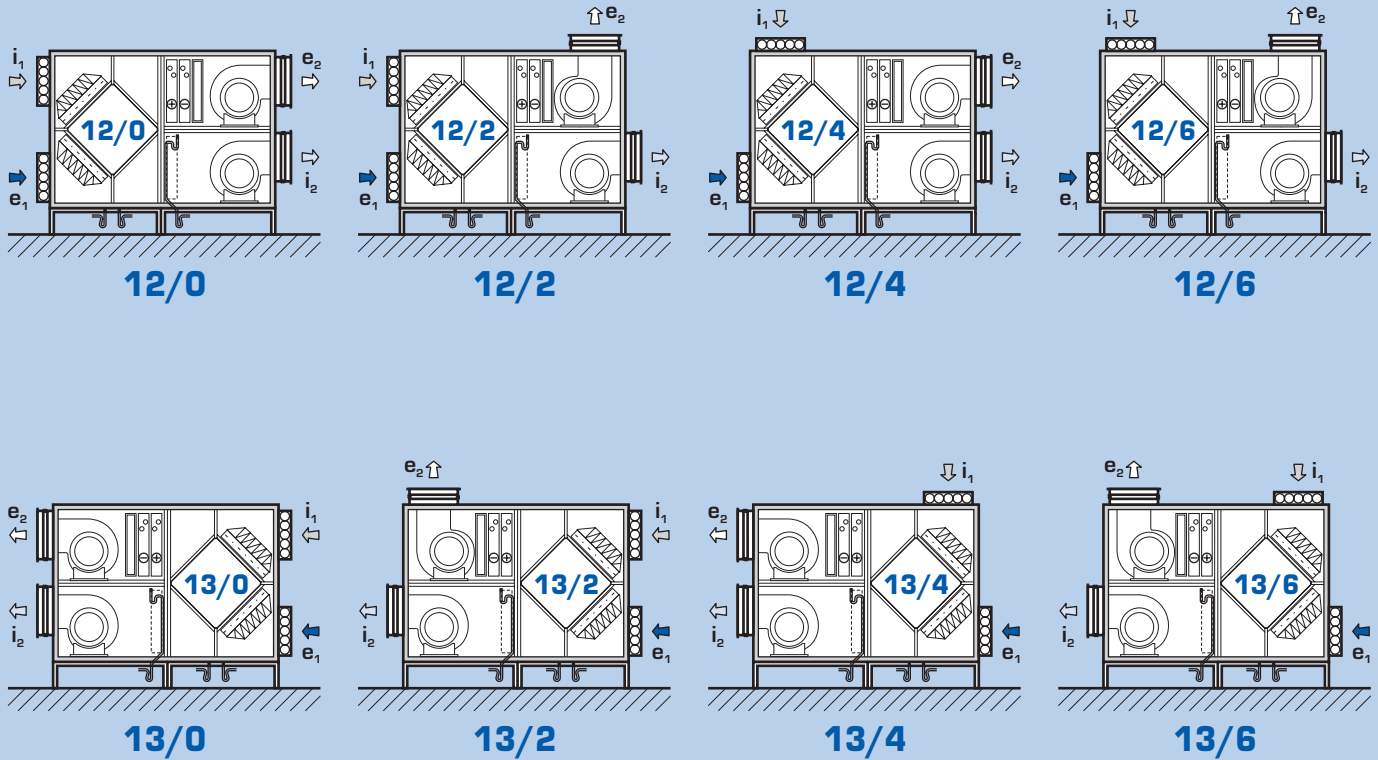
POSITION AND CONNECTION PORTS CONFIGURATION

The DUPLEX 15000 units are available in number of basic installation positions, simplifying their installation on site.

This increases the possibility of installing the unit even in cramped spaces.

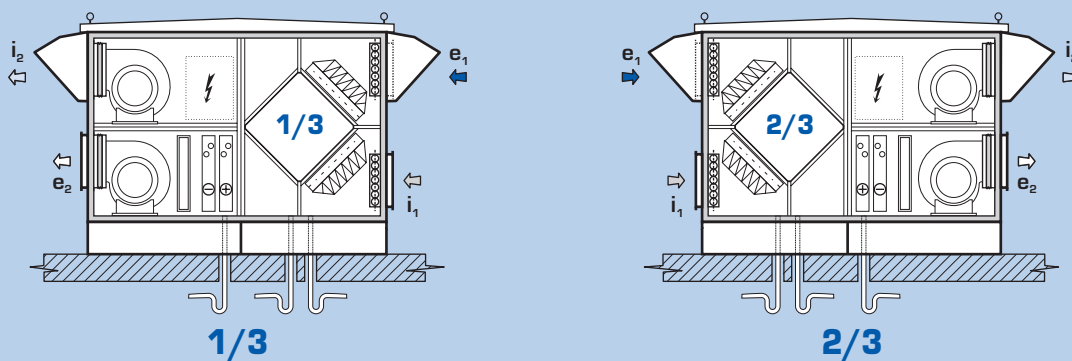
INDOOR TYPE

Individual configurations 12/0 to 13/6 (door-side view)



ROOFTOP TYPE

Individual configurations 1/3 and 2/3 (door-side view)



MANIPULATION SPACE

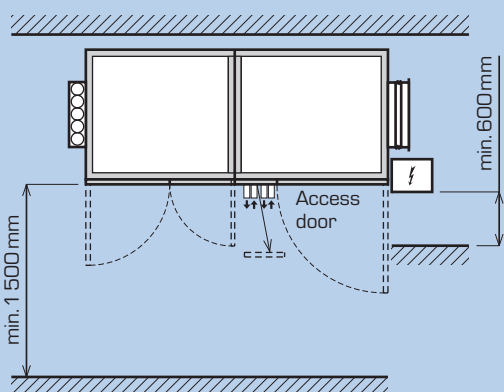
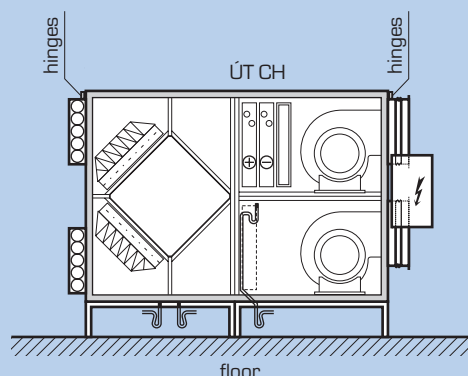
When installing DUPLEX units it is necessary to allow for recommended free manipulation space around the unit. Minimum space of 150 mm is needed under a unit to install a DN 32 condensate drain pipe. A trap of minimum height of 150 mm must be installed before connecting the pipe to a building sewer. This height is ensured when the standard steel base frame supplied is used.

Service space is needed at the front of the unit for opening access door; filter removal and service access for T and CH coil replacement.

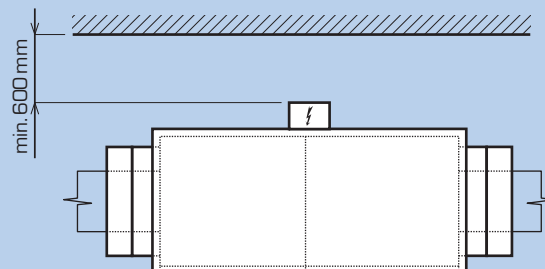
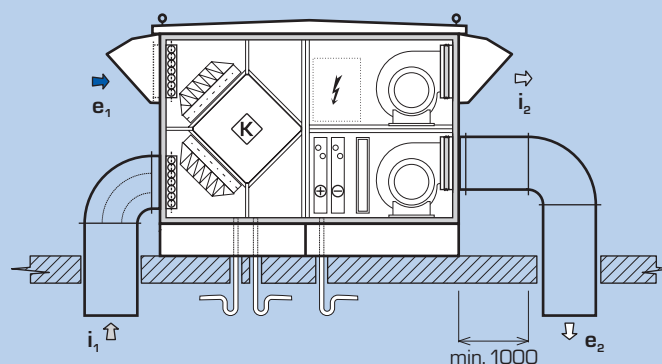
Minimum manipulation space on the control panel side is 600 mm for all units.

Units equipped with heating/cooling coil hydraulic kit require free manipulation on the kit side.

INDOOR TYPE



ROOFTOP TYPE



SOUND POWER LEVEL - L_w (dB)

	dB (A)	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
DUPLEX 15000 (MO21; 60 Hz; 12 500 m ³ /h)								
inlet e_1, i_1	70,8	78,8	72,3	72,1	70,5	65,1	56,3	45,9
outlet e_2, i_2	94,0	87,5	90,1	95,9	90,2	89,5	85,2	78,9
unit	89,3	78,9	74,3	85,9	81,0	86,2	83,0	75,6
DUPLEX 15000 (MO20 / MO21; 50 Hz; 10 990 m ³ /h)								
inlet e_1, i_1	68,5	78,0	71,8	70,0	68,3	62,0	53,3	43,0
outlet e_2, i_2	90,6	84,4	88,0	93,0	87,1	86,0	81,1	75,0
unit	85,4	80,7	78,6	88,3	77,3	80,5	78,8	69,3

SOUND PRESSURE LEVEL L_{p1} (dB)

	dB (A)	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
DUPLEX 15000 (MO21; 60 Hz; 12 500 m ³ /h)								
unit	78,3	67,9	63,3	74,9	70,0	75,2	72,0	64,6
DUPLEX 15000 (MO20 / MO21; 50 Hz; 10 990 m ³ /h)								
unit	74,4	69,7	67,6	77,3	66,3	69,5	67,8	58,3

The sound pressure level is measured at 1 m from the respective unit.

SOUND POWER LEVEL - L_w (dB)

	dB (A)	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
DUPLEX 15000 (MO20 / MO21; 35 Hz; 7 785 m ³ /h)								
inlet e_1, i_1	60,0	70,8	64,6	61,8	59,9	52,6	43,9	33,7
outlet e_2, i_2	81,5	77,4	87,7	84,8	78,0	75,7	70,8	64,0
unit	79,1	70,9	77,0	75,0	71,3	77,5	69,4	61,1
DUPLEX 15000 (MO20 + MO21; 20 Hz; 4 355 m ³ /h)								
inlet e_1, i_1	53,0	62,7	67,1	50,1	48,8	41,4	34,0	27,1
outlet e_2, i_2	65,2	66,7	72,7	66,0	60,8	60,5	55,8	47,5
unit	61,4	58,7	66,1	61,9	58,8	57,6	49,1	40,4

SOUND PRESSURE LEVEL L_{p1} (dB)

	dB (A)	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
DUPLEX 15000 (MO20 / MO21; 35 Hz; 7 785 m ³ /h)								
unit	68,1	59,9	66,0	64,0	60,3	66,5	58,4	50,1
DUPLEX 15000 (MO20 / MO21; 20 Hz; 4 355 m ³ /h)								
unit	50,4	47,7	55,1	50,9	47,8	46,7	38,1	29,4

The sound pressure level is measured at 1 m from the respective unit.

MODIFICATIONS

DUPLEX - BASIC CONFIGURATION



Basic configuration

The compact unit consists of supply and exhaust centrifugal fans with electric motors in anti-vibration mounting, removable cross-flow air-to-air heat recovery core assembled from thin plastic plates, removable G4 (or F7) supply and exhaust air filters, and a condensate pan with DN 32 flexible hose. The unit casing consists of steel frame and sandwich side panels made of painted aluminum sheets and filled with 22 mm of polyurethane insulation with thermal resistance $R = 1,05 \text{ m}^2\text{KW}^{-1}$, (rooftop units with insulation of 45 mm). The sandwich panels are fixed to the frame. A front door enables easy access to all built-in components and filters.

DUPLEX 15000



Fans

For the DUPLEX unit different fan types of different manufacturers may be used. They differ in airflow, external pressure, IP protection, control type, speed, noise and power input. All fans are 3-phase direct-driven.

Me.xxx; Mi.xxx

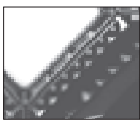


Air-to-air heat recovery exchanger

The DUPLEX 15000 unit is now available only with one heat recovery exchanger type. A heat recovery exchanger in a casing with LO and L1 length must be equipped with a droplet eliminator.

K.900.A

DUPLEX - DESCRIPTION OF ACCESSORIES



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 230 V; other types are available upon request.

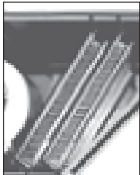
B.x



Mixing damper („C“)

Built-in opposed-blade damper including BELIMO 230 V actuator. It enables to mix fresh and stale (internal) air in 0 to 100 % range. Along with a mixing damper the e, shutoff damper without spring-return function must always be installed. Should the unit be equipped with a heating coil (DUPLEX-TC) and draft could occur in the duct system during power failure with the damper stuck open, it is necessary to install separate shutoff damper with spring-return function into the duct close to an air intake. The damper is controlled by the unit control.

C.x



Hot water heating coil („T“)

Built-in water-to-air two-row (possibly three-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 (BELIMO LF 230 V) is recommended. A coil hydraulic kit for heating capacity control of R-TPO, R-TPO-3 or RS-TPO type can be supplied with the coil upon request. Attention - the coil of rooftop units must always be protected against freezing by a water-glycol mixture.

T.x

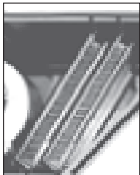


Provision for cooling („CHP“)

Provision to build in a chilled water cooling coil or a DX coil.

This provision consist of a coil chamber; condensate drain pan, optionally a droplet eliminator. Warning - in case the cooling coil is built in later, provide safety access and enough manipulation space. A unit in the CHP modification has always L2 length.

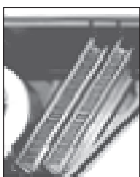
CHP



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. Two-row- or three-row coils are chosen depending on capacity required, refrigerant type and air parameters. A DX coil may be equipped with accessories mounted on unit housing. A cooling coil must be equipped with a droplet eliminator. A unit in CHF configuration has always L2 length.

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. Two-row or three-row coils are chosen depending on capacity required, cooling medium type and air parameters.

The cooling coil can be equipped with the R-CHW hydraulic kit on request.

A cooling coil must be equipped with a droplet eliminator. A unit in CHW configuration has always L2 length.

CHW.x

Individual modifications can be freely combined

e.g.: **DUPLEX-TC** (unit with heating coil and mixing damper)
DUPLEX-T-CHF (unit with heating coil and DX coil)
DUPLEX-BCT-CHP (a unit with a bypass, mixing damper, hot-water heating coil, and provision to build in a cooling coil)

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

Fe.xxx; Fi.xxx

Air filtration



All DUPLEX units can be equipped with supply air filtration of F7 class instead of standard 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. Prefilters made of multilayer pulled metal can be supplied.

R-TPO.x; RS-TPO.x

Heating coil hydraulic kit

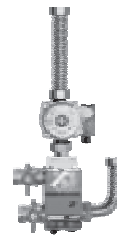


Its function is to control heating capacity of a heating coil. It consists of a three-speed pump, two globe shutoff valves and connection pipes. Further equipment depends on the type:

- R-TPO-4 - four-way mixing valve with an actuator for digital control system
- R-TPO-3 - three-way mixing valve with an actuator for digital control system
- RS-TPO - three-way diverting valve with a thermostatic valve for electric control system

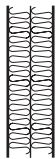
R-CHW.x

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:

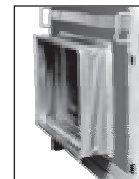
- R-CHW-2 - throttling valve with an actuator for digital control system



Double insulation

It is possible to increase polyurethane insulation to 45 mm thickness ($R = 2,1 \text{ m}^2\text{KW}^{-1}$). Then outer dimensions of the unit are 40 mm larger in all directions compared to catalogue dimensional data.

H.P

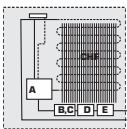


Flexible connections

Rectangular ports may optionally be equipped with flexible connection.

RCHF.x

Accessories for DX coil



It is possible to equip the DX coils with refrigeration circle components: expansion valve with nozzle (A), solenoid valve (B, C), sight glass (D), filter-drier (E), eventually with evaporating pressure controller.

NFT.x

Spare filter textiles (NFT)



Spare filter textiles in sizes depending on unit type. They are available in the filtration of G4 and F7 class.

CONTROL SYSTEMS

DUPLEX units are delivered with basic control components or with complete control systems. There are three types of control systems available (electric, digital and control for kitchens) 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 CONTROL SYSTEMS

Type	Characteristics	Use	Simplified diagrams of electrical wiring
„A“ – basic	<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 is included upon customer's request (exact actuator type, sensors, thermostats, pressure switches etc.) 	<ul style="list-style-type: none"> - suitable for applications with separate delivery of control system; e.g. large buildings with central control system etc. 	
„B“ – electric OPS 	<ul style="list-style-type: none"> - simple system - two-speed fan control (MIN, MAX) (exact volume flow rate can individually be set for each fan during commissioning) - on/off control of by-pass and mixing damper - on/off remote control of heating coil: temperature is set on the thermostatic valve of hot water coil or directly on the electric coil 	<ul style="list-style-type: none"> - electric system is suitable for simple applications (e.g. ventilation of locker rooms, gyms, restaurants etc.) - it cannot be used for units with cooling coil - it is recommended for applications with air reheat only (not for warm-air heating) 	
„D“ – for kitchens - RG - OP - SM 	<ul style="list-style-type: none"> - control system designed specially for effective control of kitchens - consist of SM microprocessor module fitted into kitchen hood or ventilation ceiling, OP control panel and RG junction board - control principle consists of automatic setting of volume flow rate depending on heat production of kitchen appliances (i.e. difference of temperatures under the kitchen hood and in the space) 	<ul style="list-style-type: none"> - suitable for kitchens of all types and sizes equipped with kitchen hoods of all types (e.g. DiNER, VARIANT, STANDARD) or by ventilation ceilings (SKV) - hot water or electric heating coil control according to supply air temperature (OP-T) - by-pass control summer / winter operation (OP-T-BP) 	
„E“ – DC-series digital control 	<ul style="list-style-type: none"> - A comfort control system for DUPLEX units - A programmable module software designed especially for DUPLEX units - Supply and exhaust fan speed control - Controlling supply or room temperatures - Optional control of a water and electric heating coil - Optional water and direct cooling - Heat pump performance control - Automatic control of by-pass and 	<ul style="list-style-type: none"> - Suitable for comfort applications - Optional fully automatic operation of the unit via a daily or weekly programme - Possibility to connect air quality, CO₂ concentration and relative humidity sensors etc. - Optional performance control via a 0-10 V signal from a higher-ranking system - Connectable to central control systems using expansion cards (KNX, Modbus, ...) - Settings can be done using the connected graphic controller 	