Ventilation unit with heat recuperation

DUOVENT® MODULAR DV

DR Digireg®

BP Bypass

EC EC motor

ErP ErP conform

94% Max. recuperation efficiency

VCC VAV-CAV-COP control types

Technical Parameters

Cabinet

Patented ISOSTREAM® modular system with wall panels of thickness 45 mm made from steel galvanized sheet of external paint RAL9002 (gray-white). The panels are lined with acoustic and thermal insulation from inflammable glass mineral wool. To simplify the service the unit cabinet is fitted with openable door with locks or fully removable panels. The unit frame is made from aluminium profiles with wall panels screwed to the frame. From the operation side the unit cabinet us fitted with openable door with pressing locks, and optionally with fully removable panels. The condensate water outlets from the recovery exchanger and cooler are located always at the lower unit panel and are ready for connection of anti-smell air trap. Optionally, the unit case can be fitted with atypical surface protection of higher corrosion resistance.

Fans

The fans with back-bent blades are installed at the unit inlet and outlet side. The impeller is made from composite material and is statically and dynamically balanced.

Motors

EC motor is assembled directly on the fan impeller. The fan motor can be continuously controlled by external signal 0…10 V. The motor is fitted with own integrated thermal protection. Motor efficiency class IE4, electric motor insulation protection IP54.

Recuperator

The recuperation counter-flow exchanger with fully separated inlet and discharge air flows is made from aluminium. The recuperator contains a bypass with flap, which fully controls air inlet to the exchanger or to the bypass. Optionally, the recuperator can be fitted with circulation or mixing flap (indicated with C or MX in the unit code).

Filters

Suction of fresh air and suction of exhaust air can be fitted with 2 sets of compact filtering cartridges of various filtering classes of thickness 48 mm or 1 set of filtering cartridges of thickness 96 mm. Filters in filtering classes from G4 to F9 are available. Access to the filters is provided through inspection door at the unit operation side.

Flaps

Aluminium control flaps ready for fitting with servo-drive are integrated on the suction of fresh air and at the discharge of waste air. The flaps comply with the tightness class 2 acc. to EN1751. Optionally, the unit can be fitted with the flaps of the tightness class 3.

Air heaters/coolers

Depending on the variant, the unit is fitted with water or electric air heater. Water cooler or direct evaporation unit is installed for the air cooling. The evaporation unit can be made as reversible and with selection of modes to enable direct heating and cooling

with bivalent water/electric heating. As standard, the evaporation units are designed for R410A coolant. Water heaters, coolers and evaporation units are as standard fitted with copper tubes and aluminium segments in galvanized steel frame. To provide higher corrosion resistance the exchangers can be fitted with additional anti-corrosion protection. As standard, the electric heaters feature smooth heating bars and are fitted with operation thermostat with activating temperature of 60°C and emergency thermostat with manual reset and activating temperature of 120°C.

Electric Connection

Power supply: 3x 400V / 50Hz. Inlet cables, signalling cables and power cables are passed to the unit through plastic penetration holes in the unit walls. Inside the unit, the rubber penetration pieces with membrane

are provided for cable passing.

Control

As standard, the unit is fitted with Digireg® digital control system acc. to the unit configuration. In case the unit is fitted with I&C system from the factory, it is electrically connected and all sensors and drives are tested. The control box is located at the unit operating panel (eventual atypical location of the I&C system control box must be consulted with the manufacturer and specified in the order).

Assembly

In the vertical position at the machine hall floor or on the building roof. Particular arrangement of the inlet/discharge air necks in relation to the operation side must be specified, see below. Specified service area for the service intervention needs, such as the filter replacement etc., must be provided in front of the unit. Space for installation of the air trap for condensate discharge must be provided below the unit. The unit must be installed with gradient of 1° toward the condensate

discharge neck at the air cooler side. A/C piping must be connected to the square necks integrated to the sandwich panel. It is recommended to install flexible collars between the pipe necks and the unit to eliminate vibration transfer from the unit to piping. The square necks are integrated in the wall sandwich panel of the unit, spacing of the corner connecting holes is optimized for P30 connecting flanges (flange height 30 mm).

Noise

Noise data specified in the tables represent acoustic power levels at the unit individual necks with A weighing filter correction, acoustic power level of the case of the whole unit and acoustic pressure level at distance of 1 m from the unit operation side (in free field Q = 2). The acoustic parameters are within tolerance ±3 dB.

Variants

The individual unit variants are identified by the code acc. to their accessory. Atypical variants must be consulted.

Warranty Terms

DUOVENT® MODULAR DV equipment, incl. its DVAV, DCAV, DCOP and MVAV system, must be commissioned only by the Seller or by the person authorised by the Seller. Failure to keep this condition results in termination of rights of the Buyer from fault performance and from the Quality Warranty. Detailed terms are specified in the Seller's Complaint Procedure.

A/C Accessory

- SPIRO round piping and fittings (K7.3)
- IAE flexible couplings (K7.1)
- IAA noise dampers (K7.1)
- TSK check flaps (K7.1)
- MSK, IJK throttle and mixing flaps (K7.1)
- Disc valves, diffusers, orifices, grids (K7.2)
- Rain louvres (K7.1)
- ESU mixing nods (K7.1)
- SF-P vacuum air trap (K7.1)

EL Accessory

- Digireg® digital control system for units with heating and cooling, controller with touch-screen display (K9)
- JTR triac switch for eletric heater power control (K9)
- HIG, HYG hygrostats (K8.2)
- AIRSENS, EDF-CO2, SQA sensors CO2 (K8.2)
- RTR thermostats (K8.2)
- DTS PSA pressure sensors (K8.2)
- Servo-drives (K8.2)

General Information

The unit is designed for ventilation of commercial areas. The unit is intended to permanent operation. The unit is supplied in 3 separate blocks. The blocks are connected during installation procedure within the unit assembly. Connecting materials are within scope of delivery. Units of PROCESS variant (i.e. outside the applicability of EC regulation no. 1253/2014) must be consulted.

Unit Order Code

DUOVENT MODULAR DV	10100	DCA	DCC	MX	KL	F7/M5	DVAV	AV	PRV
	1	2	3	4	5	6	7	8	9	10

1 – unit size – 8500, 10100, 12000, 14500

2 – heater type:

DI – electric

DCA – water, temperature gradient at water 80/60 °C

DCB – water, temperature gradient at water 45/35 °C

3 – water cooler type:

DCC – water, temperature gradient at water 6/12 °C

DX – direct evaporation unit for R410A coolant, evaporation temperature 6 °C (for direct evaporation unit the coolant type, required power and arrangement of the cooling power to sections acc. to type of condensing unit used must be always specified). For evaporation units used for reverse operation with the thermal pump this fact must be specified in the order.

DXr – evaporation unit connected to reverse operation (cooling/heating), R410A coolant

4 – **MX** – mixing flap ready for assembly of servo-drive (if the unit is fitted with I&C system, the servo-drive is within the scope of delivery)

C – mixing flap providing 100% air recirculation ready for assembly of servo-drive (if the unit is fitted with I&C system, the servo-drive is within the scope of delivery)

5 – **KL** – inlet and outlet flap ready for assembly of servo-drive (if the unit is fitted with I&C system, the servo-drive is within the scope of delivery)

6 – filtering class at the fresh air inlet / exhaust from vented area (G4–F9)

7 – control system type:

D – Digireg®

8 – air flow control type:

VAV – variable air flow

CAV – constant air flow

COP – constant static pressure delivered to A/C piping network

9 – position of necks in relation to operation side – AV or AV2

10 – **PRV** – unit arrangement for process ventilation (PROCESS) – for applications excluded from applicability of EC regulation no. 1253/2014, further for applications and markets beyond applicability of EC regulation no. 1253/2014

Order examples

DUOVENT® MODULAR DV 14500 DI DX MX KL G4+F7/F7 DVAV AV2

Unit of size 14500 with electric heater, direct evaporation unit only for cooling, bypass and mixing flap, two-stage filtering at inlet G4+F7, single-stage filtering at outlet F7, I&C system Digireg® with VAV, neck position AV2.

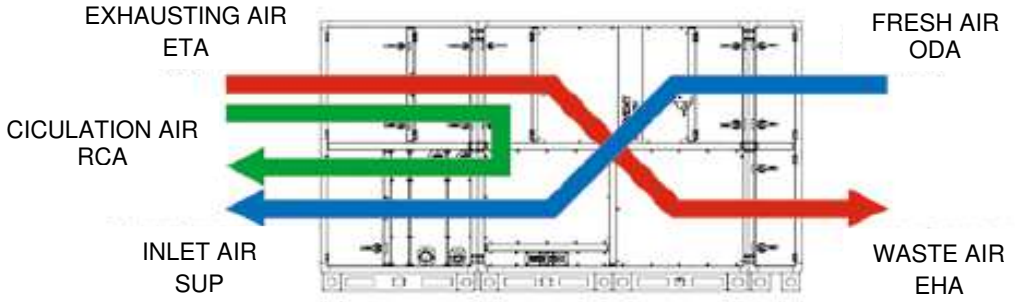
DUOVENT® MODULAR DV 8500 DCA M5/G4 DVAV AV PRV

Unit of size 8500 with water heating 80 / 60 °C, inlet filter M5, exhaustion filter G4, I&C system Digireg® with VAV, neck position AV, unit in process arrangement not complying EC regulation no- 1253/2014.

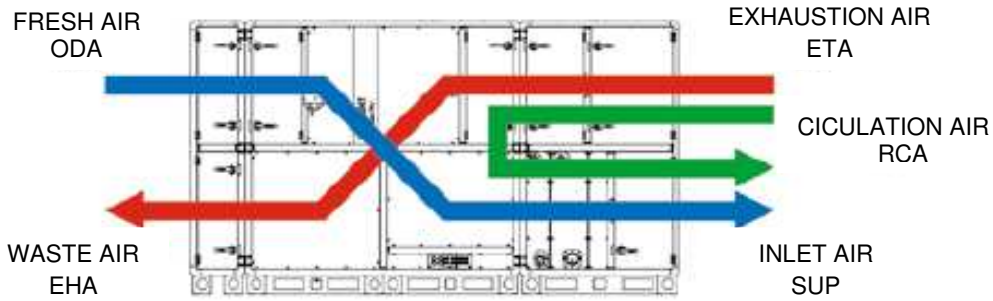
Supplementing Figures

Air flow directions in DUOVENT® MODULAR DV units:

DUOVENT MODULAR DV
Neck position AV



DUOVENT MODULAR DV
Neck position AV2



Type	nominal flow	voltage	fan inlet/outlet		heater		cooler power*	efficiency*	max. unit air flow**	control system	weight ***
			max. input	power	current*	power					
	[m³/h]	[V/Hz]	[W]	[A]	[kW]	[A]	[kW]	[%]	[m³/h]	Digireg®	[kg]
8500	8500	3x400V 50Hz	4178/2952	6/4,3	-	-	-	94,3	9000	M3-Vx	860-950
8500 DCA					64,2	-	-				
8500 DCB					45,5	-	-				
8500 DCA DCC					64,2	-	65,8				
8500 DCA DX					64,2	-	69,9				
8500 DI					30,0	43,3	-			M3-E36	
10100	10100	3x400V 50Hz	4907/3763	7,1/5,4	-	-	-	94,6	11500	M3-Vx	1025-1138
10100 DCA					79,5	-	-				
10100 DCB					56,0	-	-				
10100 DCA DCC					79,5	-	81,7				
10100 DCA DX					79,5	-	84,8				
10100 DI					45,0	65,0	-			M3-E72	
12000	12000	3x400V 50Hz	5738/4297	8,3/6,2	-	-	-	94,3	13500	M3-Vx	1188-1321
12000 DCZ					94,5	-	-				
12000 DCB					65,0	-	-				
12000 DCA DCC					94,5	-	98,0				
12000 DCA DX					94,5	-	993,3				
12000 DI					45,0	65,0	-			M3-E72	
14500	14500	3x400V 50Hz	6738/5075	9,8/7,3	-	-	-	92,3	16500	M3-Vx	1469-1631
14500 DCA					116,0	-	-				
14500 DCB					79,5	-	-				
14500 DCA DCC					116,0	-	121,0				
14500 DCA DX					116,0	-	119,0				
14500 DI					60,0	86,6	-			M3-E72	

* at nominal air flow, t_e = -12 °C / 90 % r.h., t_i = 22 °C / 50 % r.h., t_e = 35 °C/35 % r.h. (SUMMER)

** for arrangement – inlet: filter F7+DV+DCB, outlet: filter M5+DV

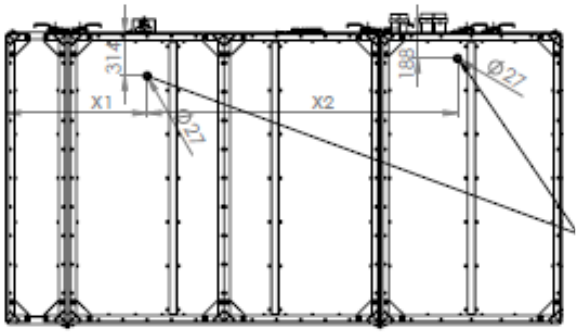
*** in relation to the unit accessory (without I&C)

Water cooler power DCC for t_e = 35 °C / 35 % r.h., t_w = 6/12 °C. Water heater power DCA for t_e = 10 °C, t_w = 80/60 °C.

Water heater power DCB for t_e = 10 °C, t_w = 45/35 °C. Direct evaporating unit power DX for R410A coolant, t_e = 35 °C / 35 % r.h., t_{evap}= 6 °C.

Dimensions

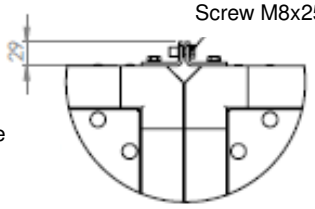
DUOVENT® MODULAR DV 8500 to 14500

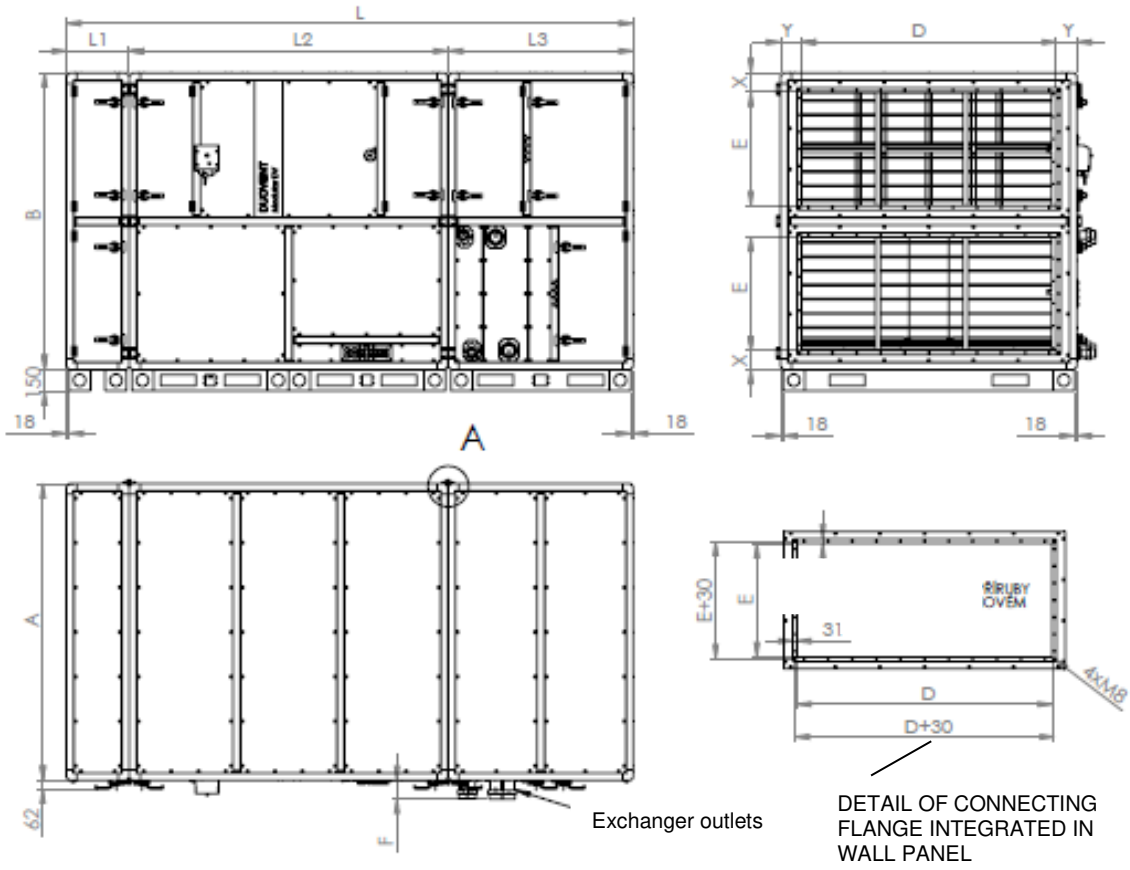


Condensate discharge

DETAIL A – block connecting element

Screw M8x25





Exchanger outlets

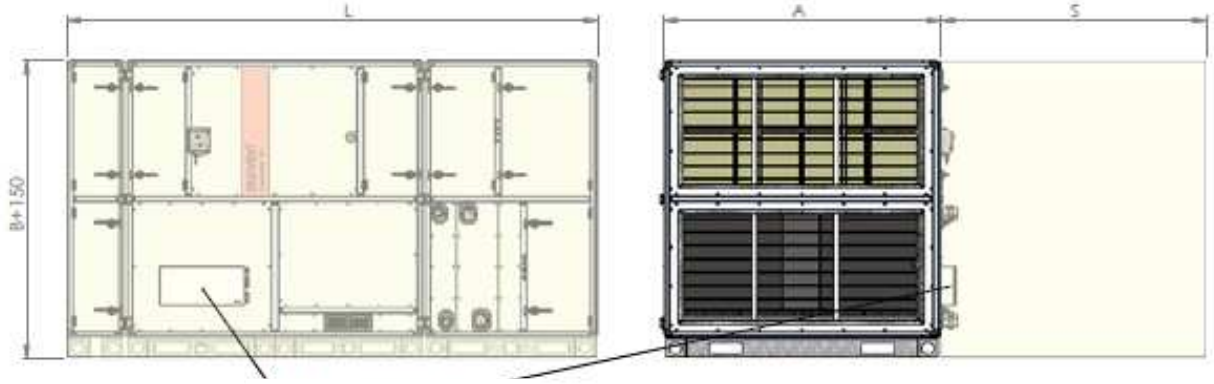
DETAIL OF CONNECTING FLANGE INTEGRATED IN WALL PANEL

Type	A [mm]	B [mm]	D [mm]	E [mm]	F [mm]	L [mm]	L1 [mm]	L2 [mm]	L3 [mm]	X [mm]	Y [mm]	X1 [mm]	X2 [mm]
DV 8500	1620	1620	1350	600	132	3289	442	1698	1149	118	135,0	740	1883
DV 10100	1777	1777	1500	650	132	3525	442	1934	1149	132	138,5	858	2001
DV 12000	1934	1934	1650	700	132	3604	442	1934	1228	146	142,0	858	2018
DV 14500	2091	2091	1800	800	132	3996	442	2248	1306	135	145,5	1015	2233

Supplementing Figures

Minimum unit service space

Size	A [mm]	B [mm]	L [mm]	S [mm]
DV 8500	1620	1620	3289	1700
DV 10100	1777	1777	3525	1800
DV 12000	1934	1934	3604	2000
DV 14500	2091	2091	3996	2150

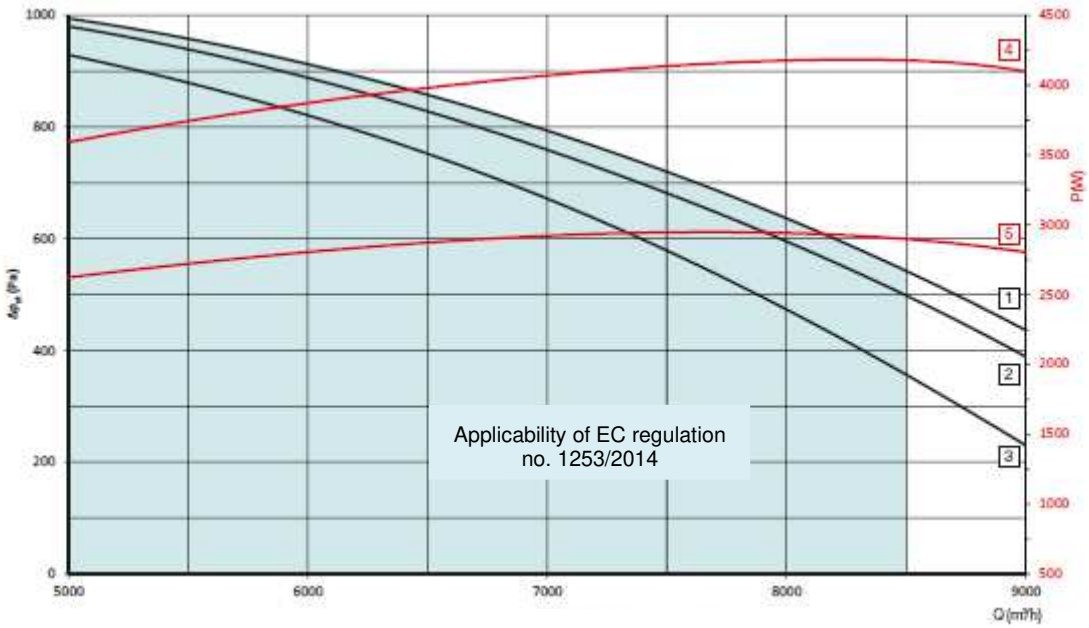


I&C control box – Digireg®

Characteristics

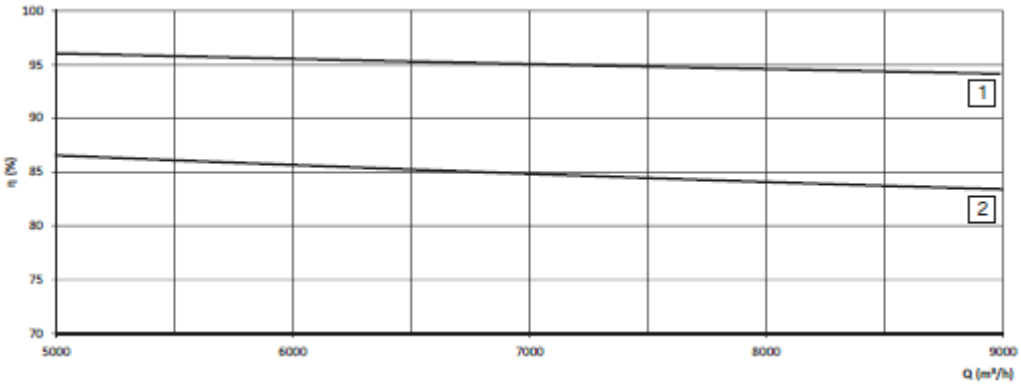
Q air flow (m^3/h)
Δp_{st} unit external static pressure (Pa)
P fan electric input power (W)
η heat recuperation efficiency (%)
F7+DV+DCB+DCC … performance curve with maximum pressure loss of inner parts at inlet side (i.e. filter F7 at inlet, regenerator, water heaters 3 lines, water cooler 4 lines, drop eliminator)

Duovent® Modular DV 8500



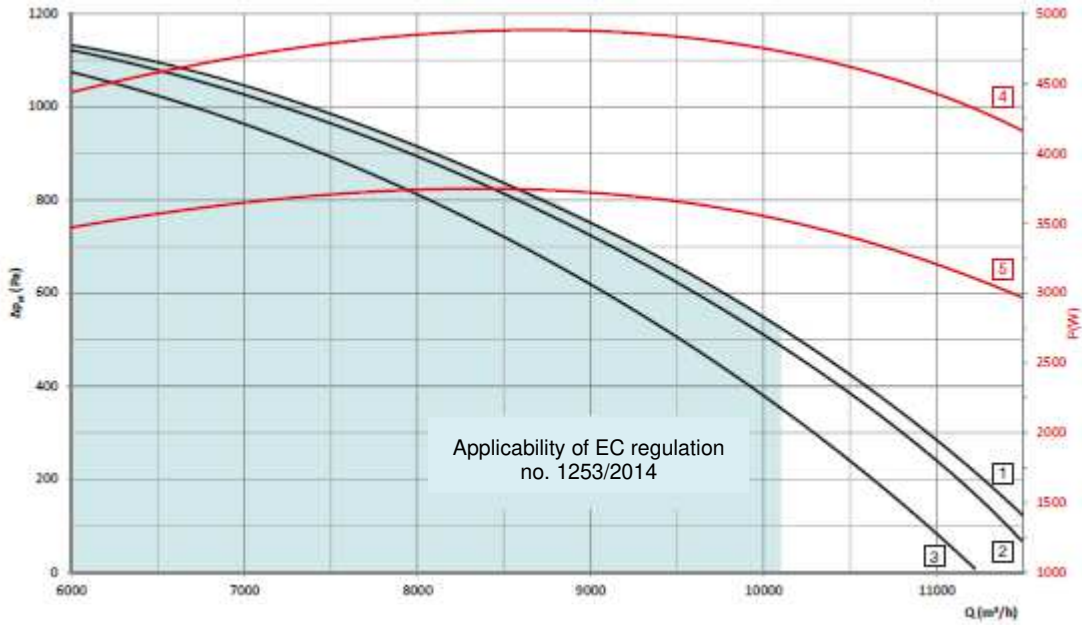
1	Inlet F7+DV	3	Inlet F7+DV+DCB+DCC	5	El. power – outlet (W)
2	Inlet F7+DV+DCB	4	El. power – inlet (W)		

Duovent® Modular DV 8500 - recuperation efficiency



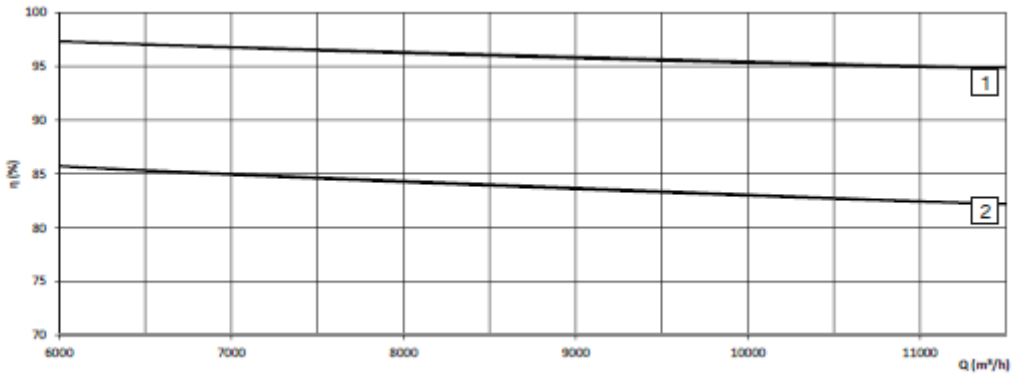
1	Efficiency for parameters: EXHAUSTION 22 °C / 50% r.h. INLET: -12°C/90%r.h.
2	Efficiency acc. to EC/1253/2014

Duovent® Modular DV 10100



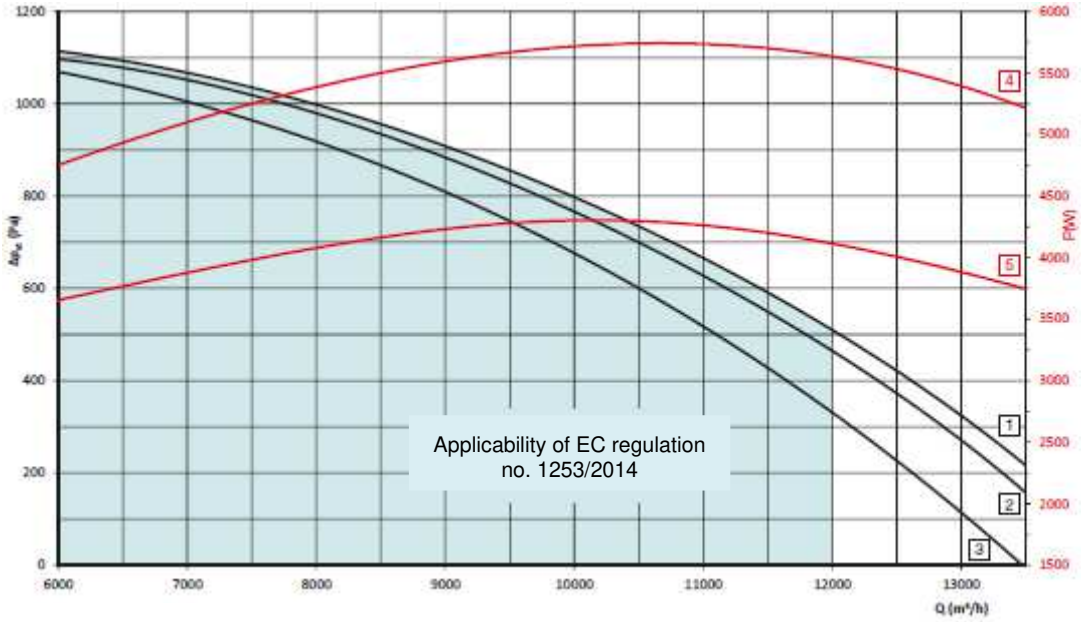
1	Inlet F7+DV	3	Inlet F7+DV+DCB+DCC	5	El. power – outlet (W)
2	Inlet F7+DV+DCB	4	El. power – inlet (W)		

Duovent® Modular DV 10100 - recuperation efficiency



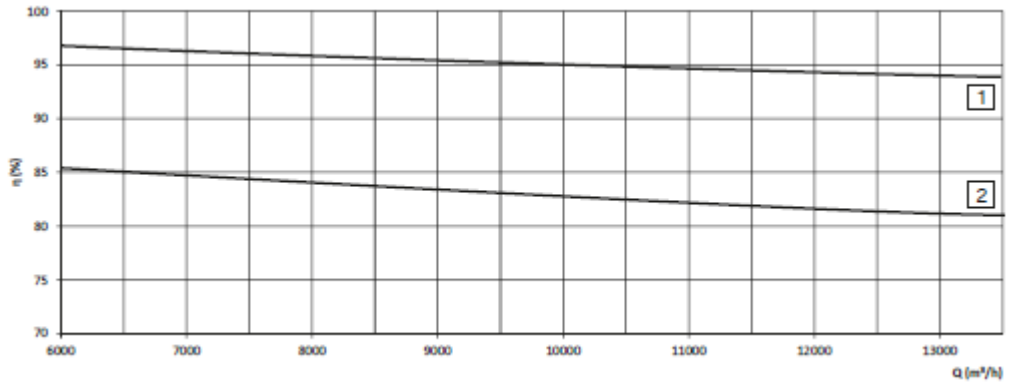
1	Efficiency for parameters: EXHAUSTION 22 °C / 50% r.h. INLET: -12°C/90%r.h.
2	Efficiency acc. to EC/1253/2014

Duovent® Modular DV 12000



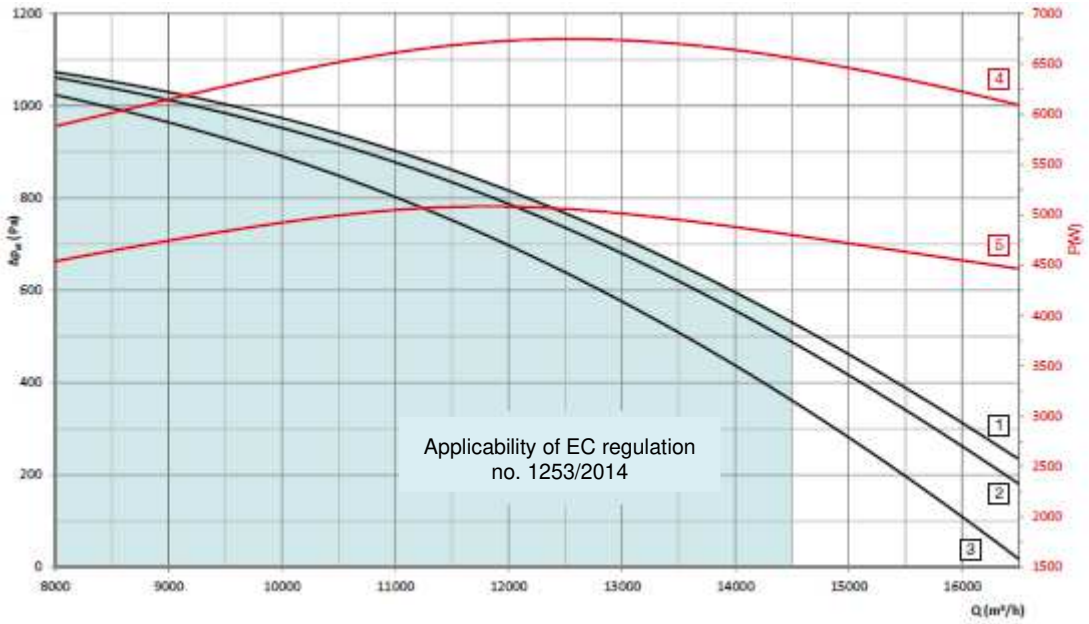
1	Inlet F7+DV	3	Inlet F7+DV+DCB+DCC	5	El. power – outlet (W)
2	Inlet F7+DV+DCB	4	El. power – inlet (W)		

Duovent® Modular DV 12000 - recuperation efficiency



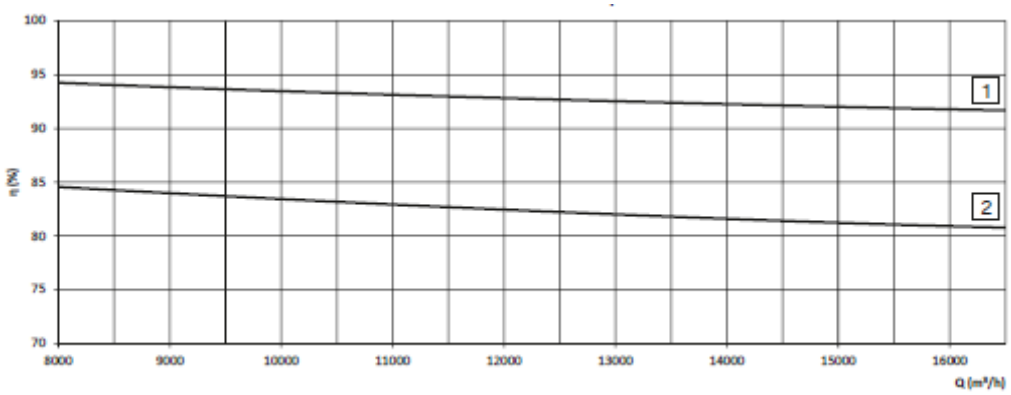
1	Efficiency for parameters: EXHAUSTION 22 °C / 50% r.h. INLET: -12°C/90%r.h.
2	Efficiency acc. to EC/1253/2014

Duovent® Modular DV 14500



1	Inlet F7+DV	3	Inlet F7+DV+DCB+DCC	5	El. power – outlet (W)
2	Inlet F7+DV+DCB	4	El. power – inlet (W)		

Duovent® Modular DV 14500 - recuperation efficiency



1	Efficiency for parameters: EXHAUSTION 22 °C / 50% r.h. INLET: -12°C/90%r.h.
2	Efficiency acc. to EC/1253/2014

Acoustic power (pressure) level in octave ranges [db(A)]*

DUOVENT® MODULAR DV 8500 (for V_{nom} = 8500 m³/h)

	Hz	63	125	250	500	1000	2000	4000	8000	L_{wA}
	fresh	39	45	63	64	61	61	55	53	69
	inlet	51	59	75	79	85	83	78	74	88
L_{wA}	exhaustion	40	48	67	68	65	66	61	61	73
	waste	45	53	69	72	78	75	68	66	81
	case**	30	37	53	54	55	44	28	22	59
L_{PA}	ambient (1m)**	22	29	45	46	47	36	20	14	51

DUOVENT® MODULAR DV 10100 (for V_{nom} = 10100 m³/h)

	Hz	63	125	250	500	1000	2000	4000	8000	L_{wA}
	fresh	40	46	65	65	62	62	56	55	70
	inlet	51	59	77	81	87	84	79	76	90
L_{wA}	exhaustion	44	51	70	71	68	68	63	66	76
	waste	48	56	72	75	80	78	70	70	84
	case**	31	39	56	56	57	46	30	25	61
L_{PA}	ambient (1m)**	23	31	48	48	49	38	22	17	53

DUOVENT® MODULAR DV 12000 (for V_{nom} = 12000 m³/h)

	Hz	63	125	250	500	1000	2000	4000	8000	L_{wA}
	fresh	41	47	67	65	62	63	56	54	71
	inlet	55	62	79	82	86	84	78	75	90
L_{wA}	exhaustion	44	51	73	71	68	68	63	64	77
	waste	49	57	74	76	79	76	69	69	83
	case**	34	41	58	57	56	45	29	24	62
L_{PA}	ambient (1m)**	26	33	50	49	48	37	21	16	54

DUOVENT® MODULAR DV 14500 (for V_{nom} = 14500 m³/h)

	Hz	63	125	250	500	1000	2000	4000	8000	L_{wA}
	fresh	42	51	69	68	64	62	53	53	73
	inlet	51	64	82	84	89	88	82	77	93
L_{wA}	exhaustion	49	58	74	74	71	68	61	64	79
	waste	51	62	77	79	82	81	74	70	86
	case**	32	44	61	59	59	49	33	25	65
L_{PA}	ambient (1m)**	24	36	53	51	51	41	25	17	57

* Configuration data (integrated flaps, water cooler DCC, water heater DCA, filtering class F7/M5)
** case damping with R_w value

Characteristics of recuperation units acc. to 2009/125/EC, EC regulation no. 1253/2014.

unit size	nominal air flow [m³/h]	SFP_{int} [m³/h]	recuperation efficiency [%]	$SFP_{int\ LIMIT\ 2018}$ [W/(m³/s)]	external pressure [Pa]
DV 8500	8500	1015	83,7	1121	350
DV 10100	10100	1047	82,1	1073	350
DV 12000	12000	1031	81,6	1058	350
DV 14500	14500	918	81,8	1064	350

Technical data of water heaters DCA (t_w = 80/60 °C) and DCB (t_w = 45/35 °C)

unit size	temperature gradient [°C/°C]	power [kW]	nominal air flow [m³/h]	inlet air temperature [°C]	outlet air temperature [°C]	pressure loss at water side [kPa]	water flow [m³/h]
DV 8500	80/60 45/35	64,2 45,5	8500	10	32,6 26,0	10 27	2,82 3,95
DV 10100	80/60 45/35	79,5 56,0	10100	10	33,5 26,6	12 31	3,49 4,86
DV 12000	80/60 45/35	94,5 65,0	12000	10	33,5 26,2	15 13	4,15 5,64
DV 14500	80/60 45/35	116,0 79,5	14500	10	33,8 26,4	19 17	5,08 6,91

Technical data of water coolers DCC (t_w = 6/12 °C) and evaporation units DX (t_{evap} = 6 °C, R410A coolant)

unit size	temperature gradient/ evaporation temperature [°C/°C]	power [kW]	nominal air flow [m³/h]	inlet air temperature [°C]	outlet air temperature [°C]	pressure loss at water/ coolant side [kPa]	water flow [m³/h]
DV 8500	6/12 6	65,8 69,9	8500	35 °C/35%	18,3 17,8	30 48	9,40 -
DV 10100	6/12 6	81,7 84,8	10100	35 °C/35%	17,8 17,4	35 57	11,67 -
DV 12000	6/12 6	98,0 99,3	12000	35 °C/35%	17,7 17,6	46 73	14,00 -
DV 14500	6/12 6	121,0 119,0	14500	35 °C/35%	17,5 17,6	57 89	17,23 -

Technical data of electric heaters (supply voltage 3× 400 V / 50 Hz), assignment of control sets

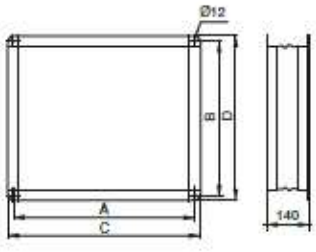
unit size	DI type	power [kW]	No. of sections	Digireg® set
DV 8500	IBE-Duovent® DV8500_30/1	30	1 (30kW)	M3-E36
DV 10100	IBE-Duovent® DV10100_45/2	45	2 (15+30kW)	M3-E72
DV 12000	IBE-Duovent® DV12000_45/2	45	2 (15+30kW)	M3-E72
DV 14500	IBE-Duovent® DV14500_60/2	60	2 (30+30kW)	M3-E72

Optionally, the unit can be ordered with atypical powers of electric heaters For this variant contact our technical dept.

Unit Accessories

DUO-DV-IAE

- Flexible coupling for connection of inlet/outlet necks of A/C unit with A/C piping
- Prevents transfer of vibration to air-ducts
- Flange width 30 mm



Type	A [mm]	B [mm]	C [mm]	D [mm]
DUO-DV-IAE-8500-P30	1380	630	1410	660
DUO-DV-IAE-10100-P30	1530	680	1560	710
DUO-DV-IAE-12000-P30	1680	730	1710	760
DUO-DV-IAE-14500-P30	1830	830	1860	860

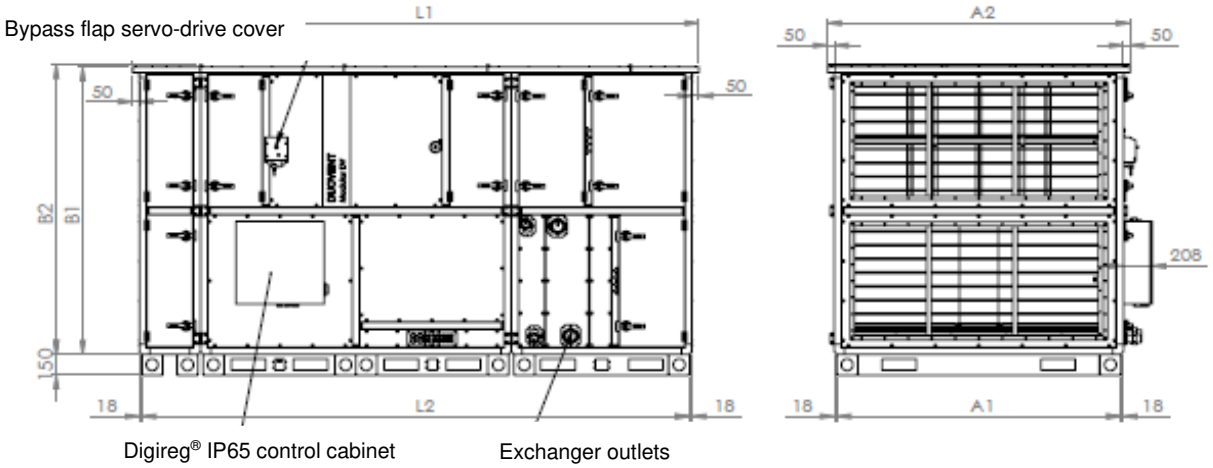
ROOFPACK-A

- Roof from galvanized steel or painted sheet
- Direct installation to the unit
- Frame height 150 mm in combination with feet
- Insulated corner profiles of cabinet frame
- Watertight variant of external case
- Digireg® control box in IP65
- Optionally, the unit inlet part may be fitted with electric heaters IBET of power 1000 W in combination with thermostat F2000 with adjustable switching temperature. The heater heats the unit inner space at the water exchangers and prevents freezing of the exchangers, when the unit is not in operation.

Type key for ordering of ROOFPACK accessory

ROOFPACK-A-DUO-MOD DV-8500
1 2 3

1 – ROOFPACK accessory type: A
2 – Identification of recuperation unit type:
DUO-MOD-DV = DUOVENT® MODULAR DV
3 – Size of unit DUOVENT® MODULAR DV:
8500, 10100, 12000, 14500

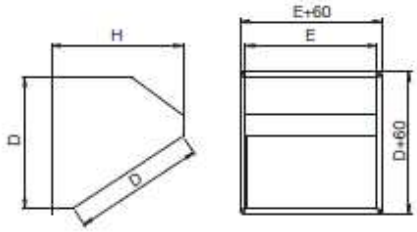


unit size	L1 [mm]	L2 [mm]	A1 [mm]	A2 [mm]	B1 [mm]	B2 [mm]	weight [kg]
DV 8500	3389	3253	1584	1720	1622	1640	61
DV 10100	3625	3489	1741	1877	1779	1797	71
DV 12000	3704	3568	1898	2034	1936	1954	79
DV 14500	4096	3960	2055	2191	2093	2111	94

Example of ROOFPACK-A
for units DUOVENT® MODULAR DV

DUO-DV-MOUNT
RAIN LOUVRES

- The rain louvres for outdoor use of the unit
- Made from galvanized steel sheet
- Fitted with anti-bird meshes
- Optionally delivered with dust coat spraying of external view louvre surfaces
- Flange width 30 mm



Type	D [mm]	E [mm]	H [mm]
DUO-DV-MOUNT-8500-P30	600	1350	600
DUO-DV- MOUNT -10100-P30	650	1500	650
DUO-DV- MOUNT -12000-P30	700	1650	700
DUO-DV- MOUNT -14500-P30	800	1800	800