

Name of Project:	Residential Building	Submitter:	CTU CE Prague
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RESIDENTIAL BUILDING

PRAGUE – MODŘANY

AIR VENTILATION AND COOLING SYSTEM

DOCUMENTATION FOR CONSTRUCTION

B1.6 TECHNICAL REPORT

Profession:	Air ventilation and Cooling System	Author:	Bc. David Šnajdr
Content:	Technical Report	Date:	05/2019

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1. Introduction

The subject of the project is a new residential complex. The building has 15 above-ground floors and 1 underground floor. In the underground floors there is a cellar, garbage depot and technical facilities. There are 70 housing units on the above-ground floors.

The project documentation solves the air ventilation and cooling system in the residential house. The system ensures the parameters of the internal microclimate of the individual rooms in terms of thermal comfort according to the investor's requirements and the relevant standards.

2. Initial Data

The design of individual ventilation devices is based on the following calculation data:

Latitude	50°02`N
Altitude	206.6 m elevation above sea level
Air Pressure	98,7 kPa
Dry bulb temperature in winter	-12°C
Wet bulb temperature in winter	-13°C
Air enthalpy in winter	-10 kJ.kg ⁻¹
Relative air humidity in winter	85%
Dry bulb temperature in summer	32°C
Wet bulb temperature in summer	20°C
Enthalpy of air in summer	58 kJ.kg ⁻¹
Relative humidity in summer	32%
Absolute humidity in summer	10,5 g.kg ⁻¹

3. Requirements for Air Ventilation

NOISE PROTECTION MEASURES

Air handling equipment is selected and positioned so that the maximum permissible noise levels in the indoor and outdoor environment are not exceeded. Alternatively, they are provided with silencers. Silencers are considered with low pressure loss and high insertion loss.

To prevent vibration transmission, all rotating parts will be flexibly connected to the ducts and resiliently seated.

FIRE PROTECTION MEASURES

Air ducts will be made of non-combustible materials. Fire dampers will be installed on the air-handling ducts with a clear cross-section greater than 0.04 m or the ducts passing through another fire section will be provided with a fire-resistant cladding with the required fire resistance. The type of insulation and the method of its attachment to the duct must have a valid certificate.

If EPS is installed in the building, the signal from this device will shut down all operating air conditioning.

Fire solutions and escape routes are not addressed in this section.

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4. Technical Description of Devices

The basic requirement is to ensure the removal of all pollutants from apartments and other spaces. Ventilation will be forced.

The living quarters of the apartments will be equipped with mechanical ventilation. Continuous ventilation of 0.5 h^{-1} and 25 m^3 of fresh air per person will be provided. Each apartment is equipped with a separate heat recovery unit with up to 85% efficiency. The heat losses will be fully covered by the heating system.

Ventilation of cellar cubicles, common and technical spaces is designed for forced equal pressure. Fresh air is supplied from the roof.

Air extraction will be provided by radial fans and routed on the roof or facade in the basement.

For the housing units of four highest floors of apartments a preparation for the installation of the cooling system is proposed.

DEVICE NO. 1 - VENTILATION OF HOUSING UNITS

The ventilation of the apartments is designed to be equal-pressure with mechanical air supply to the residential rooms and mechanical air removal from the toilets, bathrooms and kitchenettes. Ventilation is designed as local for each apartment. The air handling unit will be located in the corridor in ceiling. The ducts are circular.

Supply Air and End Elements:

Fresh air is supplied to the unit from the facade of the apartment. The air is further led to the living room and bedrooms. Terminal elements are grid diffusers to ductwork. The ducts are routed through the ceiling channels in the residential rooms. In the hallway, toilets and other rooms in the ceilings.

Exhaust Air and End Elements:

The air is discharged from the toilets and bathrooms through circular outlets. From the kitchens through digester. The air is led to the air handling unit, which is equipped with a heat recovery exchanger and further into a common duct, which draws air above the roof. The unit is fitted with a by-pass.

DEVICE NO. 2 – VENTILATION OF COMMON AREA – STAIRCASE, CORRIDORS

The ventilation of the flats is designed as equal-pressure with mechanical air supply and exhaust in the staircase and common corridor. The ventilation of each floor has a common vertical duct. The ducts are square.

Supply Air and End Elements:

Fresh air is fed into the common corridor and staircase by a common duct from the roof of the building through a fan. Terminal elements are grid diffusers to ductwork. The ducts are routed in the ceiling.

Exhaust Air and End Elements:

The air is led by the fan from the corridor and the staircase through the grid diffusers to ductwork. The ducts are connected to a common vertical duct that draws air out of the housing units. The ducts are routed in the ceiling.

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DEVICE NO. 3 – VENTILATION OF COMMON UNDERGROUND AREA – CORRIDORS, CELLAR CUBICLES, OTHER AND TECHNICAL ROOMS

The ventilation of the flats is designed as equal-pressure with mechanical air supply and exhaust in the common corridors, cellar cubicles technical rooms and others. The ducts are square.

Supply Air and End Elements:

Fresh air is fed into spaces by a common duct from the roof of the building through a fan. Terminal elements are grid diffusers to ductwork. The ducts are led freely under the ceiling.

Exhaust Air and End Elements:

The air is led by the fan from the spaces through the grid diffusers to ductwork. The air is discharged through a common duct to the exterior on the south facade of the basement floor. The ducts are led freely under the ceiling.

DEVICE NO. 4 - DWELLING UNITS – COOLING

It is proposed to cool the dwelling units of all apartments in the last 4 floors.

The thermal loads were calculated in the individual rooms, which were determined for an internal temperature of $26 \pm 2^\circ\text{C}$ and an outdoor temperature of 32°C . The thermal properties of the proposed structures were used for the calculation, the shielding coefficient of 0.5 (thermal insulation double glazing, protected by external blinds or other passive protection against solar radiation) was calculated for windows, the internal load are 2-4 persons per room.

For refrigeration, direct refrigerant injection systems are designed to easily measure energy consumption and low acquisition and operating costs. Outdoor units will be mounted on the roofs of buildings. The refrigerant lines lead to the air handling units where they will cool the ventilation air. The device will work with environmentally friendly refrigerant R410A.

The refrigerant will be conducted through copper pipes, this will be conducted freely in the installation shafts between the apartments and the roof. It will be thermally insulated with synthetic rubber tubes.

The condensate drain will be solved by gravity plastic piping.

5. Requirement for Following Professions

Construction

- making all ducts for ventilation ducts, grilles, blinds, etc., and filling holes after assembly and cleaning them
- execution of fire seals of all pipes and fire grids in the passage through fire separating structures
- installation of doors without thresholds, or a gap of 10-15 mm below them
- equipping the chamber doors with grids for natural ventilation of these areas to adjacent rooms
- providing adequate transport routes for the installation of the equipment and later for servicing and repairs
- ensuring proper lighting for the installation, maintenance and servicing of equipment

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Wiring, measurement and control

- ensuring power supply for individual fans, including their protection and control
- grounding of ventilation and cooling equipment
- shutting down the EPS from the EPS in case of fire

Sanitary Installations

- condensate drainage of cooling units in apartments on the last 4 floors of the building

6. Device operation test

The air supply and exhaust air elements will be adjusted so that the requirements of the decree are met, particularly in terms of flow velocity and air temperatures.

After installation, the device will be set to the design parameters, the flow rates will be set in the individual branches and the flow rates on the end elements will be set.

Furthermore, the function of chiller control will be tested and current consumption of el. fan motors or compressors.

A test run of the device is required before handing over the equipment to the user. The functionality and reliability of the equipment will be monitored during the trial run.

The contractor shall provide operator training and draw up the operating rules of the equipment.

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B1.7 Ventilation Air Calculation

VENTILATION AIR CALCULATION									
25 FRESH AIR									
NUMBER OF ROOM	NAME OF ROOM	AREA [m ²]	LIGHT HEIGHT [m ²]	VOLUME [m ³]	AIR EXCHANGE INTENSITY [h ⁻¹]	N. OF PERSON /FRESH AIR	FLOW [m ³ /h]	SUPPLY AIR [m ³ /h]	EXHAUST AIR [m ³ /h]
4F									
1441.01	HALL	6,21	2,75	17,08	0,50	0	9,00		
1441.02	WC	2,19	2,75	6,02	1,00	0	6,00		70,0
1441.03	PANTRY	1,12	3,10	3,47	0,50	0	2,00		
1441.04	LIVING ROOM + KITCH.	25,09	3,10	77,78	0,50	3	75,00	80,0	70,0
1441.05	CORRIDOR	4,13	2,75	11,36	0,50	0	6,00		
1441.06	BEDROOM	12,68	3,10	39,31	0,50	2	50,00	70,0	
1441.07	BATHROOM	6,65	2,75	18,29	1,00	0	18,00		80,0
1441.08	BEDROOM	15,73	3,10	48,76	0,50	2	50,00	70,0	
TOTAL		73,8					220,00	220,0	220,0
1442.01	HALL	10,37	2,75	28,52	0,50	0	14,00		
1442.02	PANTRY	1,22	3,10	3,78	0,50	0	2,00		
1442.03	WC	2,26	2,75	6,22	1,00	0	6,00		60,0
1442.04	LIVING ROOM + KITCH.	34,88	3,10	108,13	0,50	3	75,00	80,0	70,0
1442.05	CORRIDOR	4,94	2,75	13,59	0,50	0	7,00		
1442.06	BEDROOM	14,09	3,10	43,68	0,50	2	50,00	70,0	
1442.07	BEDROOM	14,69	3,10	45,54	0,50	2	50,00	70,0	
1442.08	BATHROOM	5	3,10	15,50	1,00	0	16,00		90,0
TOTAL		87,45					220,00	220,0	220,0
1443.01	HALL	6,04	2,75	16,61	0,50	0	8,00		
1443.02	BEDROOM	13,82	3,10	42,84	0,50	2	50,00	60,0	
1443.03	LIVING ROOM + KITCH.	24,09	3,10	74,68	0,50	2	50,00	70,0	60,0
1443.04	BATHROOM	6,41	2,75	17,63	1,00	0	18,00		70,0
TOTAL		50,36					126,00	130,0	130,0
1444.01	HALL	7,34	2,75	20,19	0,50	0	10,00		
1444.02	LIVING ROOM + KITCH.	25,74	3,10	79,79	0,50	2	50,00	70,0	60,0
1444.03	BEDROOM	12,34	3,10	38,25	0,50	2	50,00	70,0	
1444.04	CORRIDOR	3,12	2,75	8,58	0,50	0	4,00		
1444.05	PANTRY	2,18	3,10	6,76	0,50	0	3,00		
1444.06	BATHROOM	5,94	2,75	16,34	1,00	0	16,00		80,0
TOTAL		56,66					133,00	140,0	140,0
1445.01	HALL	7,23	2,75	19,88	0,50	0	10,00		
1445.02	BATHROOM	6,37	2,75	17,52	1,00	0	18,00		70,0

1445.03	LIVING ROOM + KITCH.	29,87	3,10	92,60	0,50	2	50,00	80,0	60,0
1445.04	BEDROOM	18,74	3,10	58,09	0,50	2	50,00	50,0	
TOTAL		62,21					128,00	130,0	130,0

13.NP									
14131.01	HALL	6,36	2,75	17,49	0,50	0	9,00		
14131.02	BEDROOM	15,35	3,10	47,59	0,50	2	50,00	60,0	
14131.03	LIVING ROOM + KITCH.	31,38	3,10	97,28	0,50	2	50,00	60,0	60,0
14131.04	BATHROOM	4,66	2,75	12,82	1,00	0	13,00		60,0
TOTAL		57,75					122,00	120,0	120,0
14132.01	HALL	9,17	2,75	25,22	0,50	0	13,00		
14132.02	CORRIDOR	7,13	2,75	19,61	0,50	0	10,00		
14132.03	BATHROOM	6,03	2,75	16,58	1,00	0	17,00		120,0
14132.04	BEDROOM	12,34	3,10	38,25	0,50	2	50,00	60,0	
14132.05	BEDROOM	8,29	3,10	25,70	0,50	1	25,00	40,0	
14132.06	BEDROOM	16,1	3,10	49,91	0,50	2	50,00	60,0	
14132.07	CHANGING ROOM	3,5	2,75	9,63	0,50	0	5,00		
14132.08	LIVING ROOM + KITCH.	37,54	3,10	116,37	0,50	4	100,00	120,0	100,0
14132.09	WC	2,13	2,75	5,86	1,00	0	6,00		60,0
14132.10	PANTRY	1,15	2,75	3,16	0,50	0	2,00		
TOTAL		103,38					278,00	280,0	280,0
14133.01	HALL	11,69	2,75	32,15	0,50	0	16,00		
14133.02	WC	2,58	2,75	7,10	1,00	0	7,00		50,0
14133.03	LIVING ROOM + KITCH.	35,07	3,10	108,72	0,50	3	75,00	100,0	80,0
14133.04	CHANGING ROOM	3,26	2,75	8,97	0,50	0	4,00		
14133.05	CORRIDOR	5,29	2,75	14,55	0,50	0	7,00		
14133.06	BEDROOM	14,17	3,10	43,93	0,50	2	50,00	60,0	
14133.07	BEDROOM	13,58	3,10	42,10	0,50	2	50,00	60,0	
14133.08	BATHROOM	5,12	2,75	14,08	1,00	0	14,00		90,0
14133.09	PANTRY	1,01	2,75	2,78	0,50	0	1,00		
TOTAL		91,77					224,00	220,0	220,0
14134.01	HALL	6,93	2,75	19,06	0,50	0	10,00		
14134.02	WC	1,81	2,75	4,98	1,00	0	5,00		50,0
14134.03	LIVING ROOM + KITCH.	35,13	3,10	108,90	0,50	3	75,00	90,0	80,0
14134.04	CORRIDOR	4,93	2,75	13,56	0,50	0	7,00		
14134.05	BEDROOM	13,59	3,10	42,13	0,50	2	50,00	60,0	
14134.06	BEDROOM	15,58	3,10	48,30	0,50	2	50,00	60,0	
14134.07	BATHROOM	4,8	2,75	13,20	1,00	0	13,00		80,0
14134.08	PANTRY	1,74	2,75	4,79	0,50	0	2,00		
TOTAL		84,51					212,00	210,0	210,0

01B

D01.01	CELLAR CUBICLE	178,4	3,10	553,04	0,50	0	277,00	288,00	320,00
D01.08b	COMMON ROOM	29,0	3,10	89,90	0,50	0	45,00	45,00	60,00
SD01.01	CELLAR	12,1	3,10	37,48	0,50	0	19,00		20
D01.08a	PANTRY	9,4	3,10	29,14	0,50	0	15,00	30,00	20,00
D01.08c	UTILITY ROOM	6,5	3,10	20,15	0,50	0	10,00		20,00
D01.06b	CORRIDOR	20,2	3,10	62,62	0,50	0	31,00	30,00	20,00
D01.02	HALL	23,5	3,10	72,85	0,50	0	36,00		70
D01.03	BOILER ROOM	15,1	3,10	46,81	1,00	0	47,00	50,00	
D01.04	PANTRY	4,8	3,10	14,88	0,50	0	7,00	60,00	
D01.05a	UTILITY ROOM	11,8	3,10	36,58	0,50	0	18,00		20
D01.05b	UTILITY ROOM	4,9	3,10	15,19	0,50	0	8,00		
D01.05c	UTILITY ROOM	4,8	3,10	14,88	0,50	0	7,00		20
TOTAL							520,00	503,00	570,00

COMMON CORRIDORS									
01B-11F	STAIRCASE, CORRIDOR	17,5	3,1	54,25	0,5	0	27,00	27,00	27,00
	CORRIDOR	20,2	3,1	62,62	0,5	0	31,00	31,00	31,00
12F-15F		20,2	3,1	62,62	0,5	0	31,00	31,00	31,00
		13,6	3,1	42,16	0,5	0	21,00	21,00	21,00

B1.8 Table of Cooling Loads - 13F

Flat Number	Floor:Zone	Design Capacity [kW]	Design Flow Rate [m ³ /s]	Total Cooling Load [kW]	Air Temperature [°C]	Humidity [%]	Max Op Temp in Day [°C]	Floor Area [m ²]	Volume [m ³]	Flow/Floor Area [l/s-m ²]	Design Cooling Load Per Floor Area [W/m ²]
14132	13FL:Zone4	3,52	0,21	3,06	26	42,5	29,5	107,9	318,8	1,94	32,7
14131	13FL:Zone3	2,26	0,13	1,96	26	42,5	29,2	63,3	187,2	2,11	35,6
14133	13FL:Zone5	3,33	0,2	2,9	26	42,4	29,8	94,7	279,9	2,08	35,2
14134	13FL:Zone1	2,9	0,17	2,52	26	42,5	29,3	87,8	259,4	1,96	33,1

B1.10 Table of Distribution Elements

Table of distribution elements				
Label	Flow	Size	Type	Classification
E4.1	19.4 L/s	125ø	DN 125	Exhaust air
E4.2	22.2 L/s	125ø	380x380, DN 125	Exhaust air
E4.3	19.4 L/s	125ø	DN 125	Exhaust air
E4.9	16.7 L/s	125ø	60_DN 125	Exhaust air
E4.7	25.0 L/s	125ø	90_DN 125	Exhaust air
E4.8	19.4 L/s	125ø	380x380, DN 125	Exhaust air
E4.14	16.7 L/s	125ø	380x380, DN 125	Exhaust air
E4.13	19.4 L/s	125ø	70_DN 125	Exhaust air
E4.17	22.2 L/s	125ø	80_DN 125	Exhaust air
E4.18	16.7 L/s	125ø	380x380, DN 125	Exhaust air
E4.22	16.7 L/s	125ø	380x380, DN 125	Exhaust air
E4.21	19.4 L/s	125ø	70_DN 125	Exhaust air
S4.5	19.4 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S4.6	22.2 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S4.4	19.4 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S4.10	19.4 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S4.11	19.4 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S4.12	19.4 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S4.15	16.7 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S4.16	19.4 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S4.20	19.4 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S4.19	19.4 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S4.23	13.9 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S4.24	22.2 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
E13.2	16.7 L/s	125ø	60_DN 125	Exhaust air
E13.1	16.7 L/s	125ø	380x380, DN 125	Exhaust air
S13.4	16.7 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S13.3	16.7 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
E13.6	16.7 L/s	125ø	60_DN 125	Exhaust air
E13.7	27.8 L/s	125ø	380x380, DN 125	Exhaust air
E13.5	33.3 L/s	125ø	120_DN 125	Exhaust air
S13.10	16.7 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S13.9	11.1 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S13.8	16.7 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S13.11	33.3 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
E13.13	22.2 L/s	125ø	380x380, DN 125	Exhaust air
E13.12	13.9 L/s	125ø	50_DN 125	Exhaust air
E13.14	25.0 L/s	125ø	90_DN 125	Exhaust air
S13.15	27.8 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S13.16	16.7 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S13.17	16.7 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air

E13.20	22.2 L/s	125ø	380x380, DN 125	Exhaust air
E13.19	13.9 L/s	125ø	50_DN 125	Exhaust air
E13.18	22.2 L/s	125ø	80_DN 125	Exhaust air
S13.21	16.7 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S13.22	16.7 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
S13.23	25.0 L/s	295x60	_310 x 60 connection, 250 diameter	Supply air
SB.1	20.0 L/s	310x110	310x110	Supply air
SB.2	20.0 L/s	310x110	310x110	Supply air
SB.3	20.0 L/s	310x110	310x110	Supply air
SB.4	20.0 L/s	310x110	310x110	Supply air
SB.5	8.0 L/s	310x110	310x110	Supply air
SB.6	12.0 L/s	310x110	310x110	Supply air
SB.7	14.0 L/s	310x110	310x110	Supply air
SB.8	17.0 L/s	310x110	310x110	Supply air
SB.9	8.0 L/s	310x110	310x110	Supply air
EB.1	30.0 L/s	310x110	310x110	Supply air
EB.2	30.0 L/s	310x110	310x110	Supply air
EB.3	30.0 L/s	310x110	310x110	Supply air
EB.4	16.7 L/s	310x110	310x110	Supply air
EB.5	6.0 L/s	310x110	310x110	Supply air
EB.6	20.0 L/s	310x110	310x110	Supply air
EB.7	6.0 L/s	310x110	310x110	Supply air
EB.8	10.0 L/s	310x110	310x110	Supply air
EB.9	10.0 L/s	310x110	310x110	Supply air
EB.10	10.0 L/s	310x110	310x110	Supply air
EB.11	10.0 L/s	310x110	310x110	Supply air
E13.21	7.5 L/s	210x60	210x60	Supply air
E13.23	8.6 L/s	210x60	210x60	Supply air
E13.24	7.5 L/s	210x60	210x60	Supply air
E13.25	8.6 L/s	210x60	210x60	Supply air
E13.26	7.5 L/s	210x60	210x60	Supply air
E13.27	6.5 L/s	210x60	210x60	Supply air



Technical specification

Offer no.:

Project: **VENTILATION/COOLING UNITS**

Customer: **ČVUT FSv**

phone.:
fax:
e-mail:
Company ID:
VAT code:

Made by: **Bc. David Šnajdr**

phone.:
fax:
e-mail:
Company ID:
VAT code:



Technical specification

Offer no.:

Project: VENTILATION/COOLING UNITS

Position no.: UNIT 1.01. to UNIT 1.02.

Bc. David Šnajdr		

AHU **DUPLEX 300 Easy + CPA (ČR,SR,..)** 2 pcs

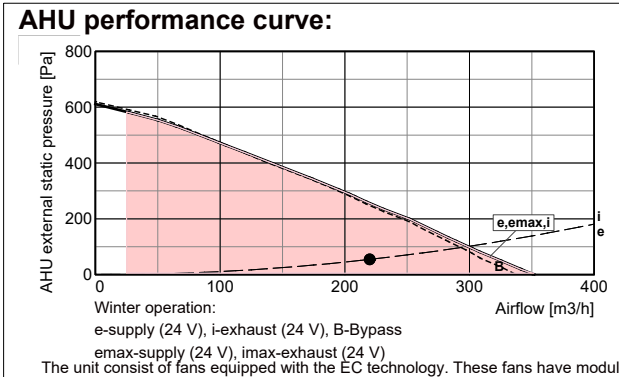
- AHU complies ErP (Ecodesign) - EU 1253/2014 and 1254/2014 regulation, valid from 1.1.2018. A

access door side view (floor plan)
Weight: approx. 21 kg, AHU supply as one piece

con.port	type	dimension	accessories
e1	e1 - outdoor air (ODA)	Ø 160 mm	
e2	e2 - supply air (SUP)	Ø 160 mm	
i1	i1 - extract air (ETA)	Ø 160 mm	
i2	i2 - exhaust air (EHA)	Ø 160 mm	
K	condensate drain	Ø 14 mm	

Manipulation space

A	door side	min. 400 mm
B	control module	min. 300 mm



Sound parameters:

Sound power level L_{WA} (dB)

Frequency [Hz]	Total dB (A)	63 dB(A)	125 dB(A)	250 dB(A)	500 dB(A)	1 k dB(A)	2 k dB(A)	4 k dB(A)	8 k dB(A)
inlet e1	42	31	35	37	35	32	30	<25	<25
outlet e2	64	39	52	61	58	54	55	48	31
inlet i1	42	31	35	37	35	32	30	<25	<25
outlet i2	64	39	52	61	58	54	55	48	31
casing to surroun.	51	<25	27	49	43	41	<25	<25	<25

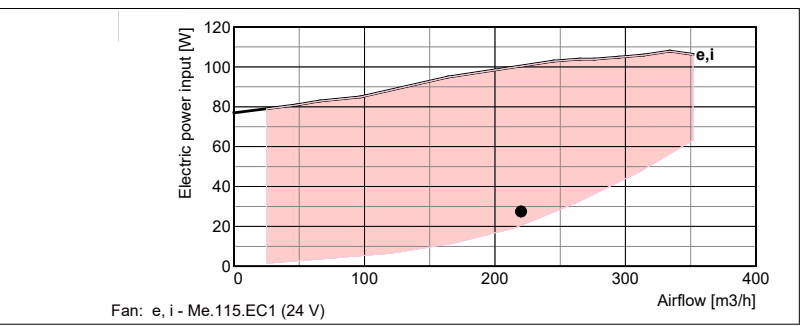
Sound power level is calculated for simultaneous operation of **both fans** and measured in accordance with **ISO 3744**. Sound power level at connection ports is measured in accordance with **ISO 5136**.

Sound pressure spectrum L_{pA} (dB)

casing to surroun.	31	<25	<25	28	<25	<25	<25	<25	<25
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Sound pressure level is measured for simultaneous operation of **both fans** at 3 m distance and measured in accordance with **ISO 3744**.

Fans	supply	exhaust
Volume flow	m3/h 220	220
AHU external static pressure	Pa 55	55
Voltage (nominal)	V 24	24
Power input (at operation point)	W 28	28
Max. power input (to make power connection)	W 50	50
Max. current (to make power connection)	A 0,4	0,4
Fan types	Me.115	Mi.115
Fan kinds (with variable speed)	EC1	EC1



Connecting components	supply	exhaust
Inlet ports e1, i1 connection	mm Ø 160 fixed	Ø 160 fixed
Outlet ports e2, i2 connection	mm Ø 160 fixed	Ø 160 fixed
Condensate drain K	mm 2 x Ø14/0	

Control and shutoff dampers	Actuator type
Bypass damper (integrated)	CM24-R



Technical specification

Offer no.:

Project: VENTILATION/COOLING UNITS

Position no.: UNIT 1.01. to UNIT 1.02.

Bc. David Šnajdr		

AHU	DUPLEX 300 Easy + CPA (ČR,SR,..)	2 pcs
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Heat recovery core		supply	exhaust
Volume flow	m3/h	220	220
Inlet temperature	°C	-12	20
Outlet temp.	°C	15	-1
Inlet relative humidity	% r.h.	90	40
Outlet relative humidity	% r.h.	11	100
Heat recovery efficiency winter (s	%	85 (78)	
Heat exch. cap. winter (summer)	kW	2,1 (0,4)	
Condensate production	l/h	0,6	
Heat recovery core type		S6.A recuperative	

Heat recovery efficiency [%] vs Airflow [m3/h]. Winter efficiency (solid line) starts at ~92% at 0 m3/h and drops to ~82% at 400 m3/h. Summer efficiency (dashed line) starts at ~85% at 0 m3/h and drops to ~75% at 400 m3/h. Data points are marked at 220 m3/h.

Filtration	supply	exhaust	Accessories (part of delivery)
Type	wire-pleated	wire-pleated	
Filtration class	G4	G4	
Number of filters	pcs 1	1	
Textile size	mm 230x420x48	230x420x48	

ErP (RVU)	
The specific energy consumption class	A
The specific energy consumption SEC - W	-16,45 kWh/(m2.a)
The specific energy consumption SEC - A	-40,35 kWh/(m2.a)
The specific energy consumption SEC - C	-77,48 kWh/(m2.a)
Maximum flow rate Qm	300 m3/h
Sound power level LwA	51 dB (A)

ENERG label: ATREA s.r.o. DUPLEx 300 Easy + CPA (ČR,SR,..). Energy class: A. Sound power level: 51 dB(A). Flow rate: 300 m3/h.

Note - caution:

The unit is suitable for normal environment with temperature range 5 to 55°C (must not be exposed to rain or snow etc !).
 In case the unit is installed in an area with ambient temperature dropping below +5 °C, it must be thermally protected:
 - condensate outlet using heating cable controlled by a thermostat

All types of control system that are built in within the unit commonly include at least two inputs, so the electrical signals from human operation of lights or other equipment, that automatically control the performance of the unit, can be connected. These inputs or other types of sensors must always be connected (e.g. CO2, VOC, rH etc.).



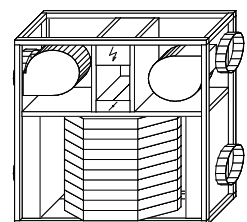
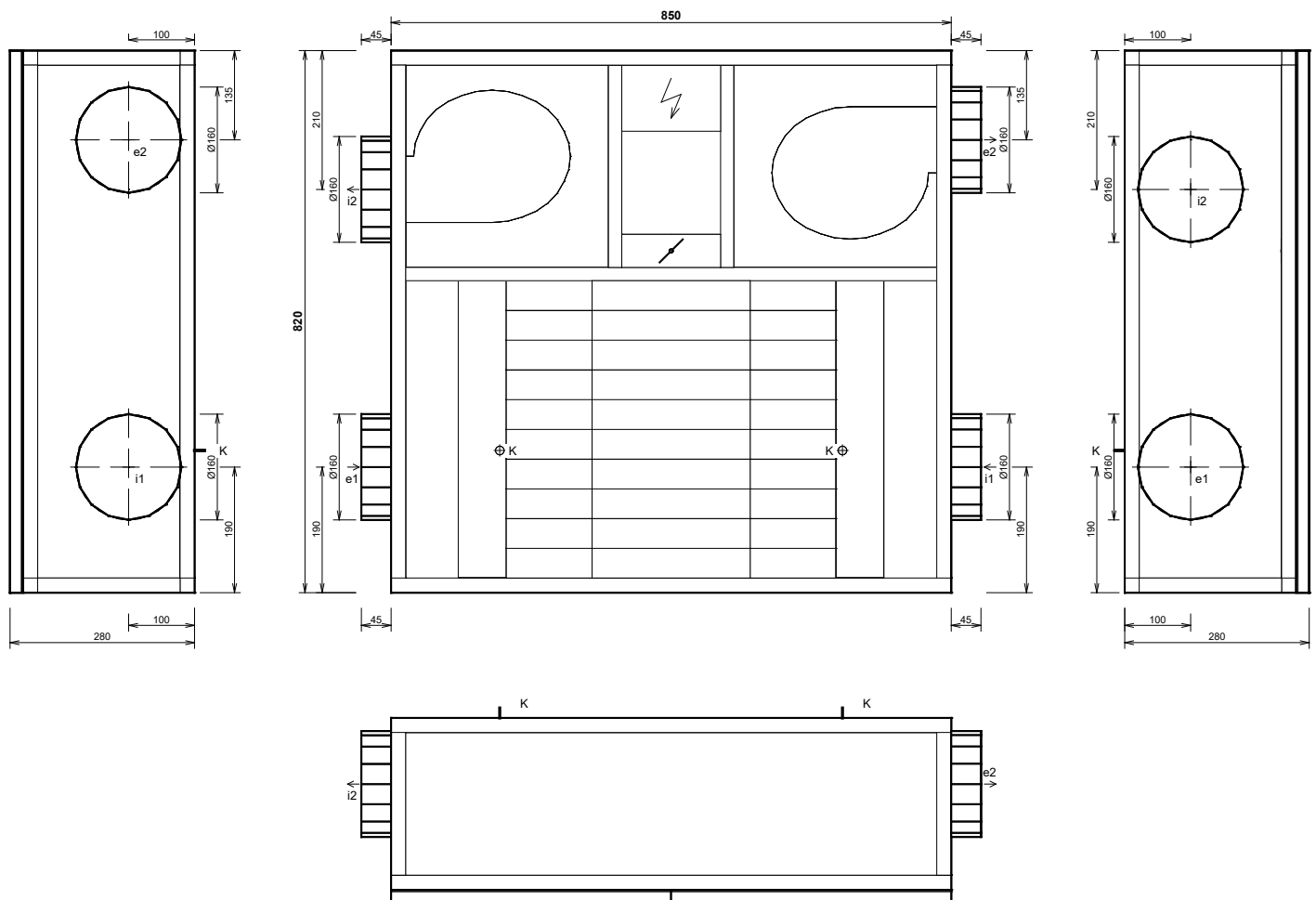
Dimensional drawing

Offer no.:
 Project: VENTILATION/COOLING UNITS
 Position no.: UNIT 1.01. to UNIT 1.02.

Bc. David Šnajdr		

AHU **DUPLEX 300 Easy + CPA (ČR,SR,..)** 2 pcs

Position **Multi-purpose**
 Weight: approx. 21 kg



Observe the min. service space during installation - see the technical description.

con.port	type	dimension	accessories
e1	e1 - outdoor air (ODA)	Ø 160 mm	
e2	e2 - supply air (SUP)	Ø 160 mm	
i1	i1 - extract air (ETA)	Ø 160 mm	
i2	i2 - exhaust air (EHA)	Ø 160 mm	
K	condensate drain	Ø 14 mm	



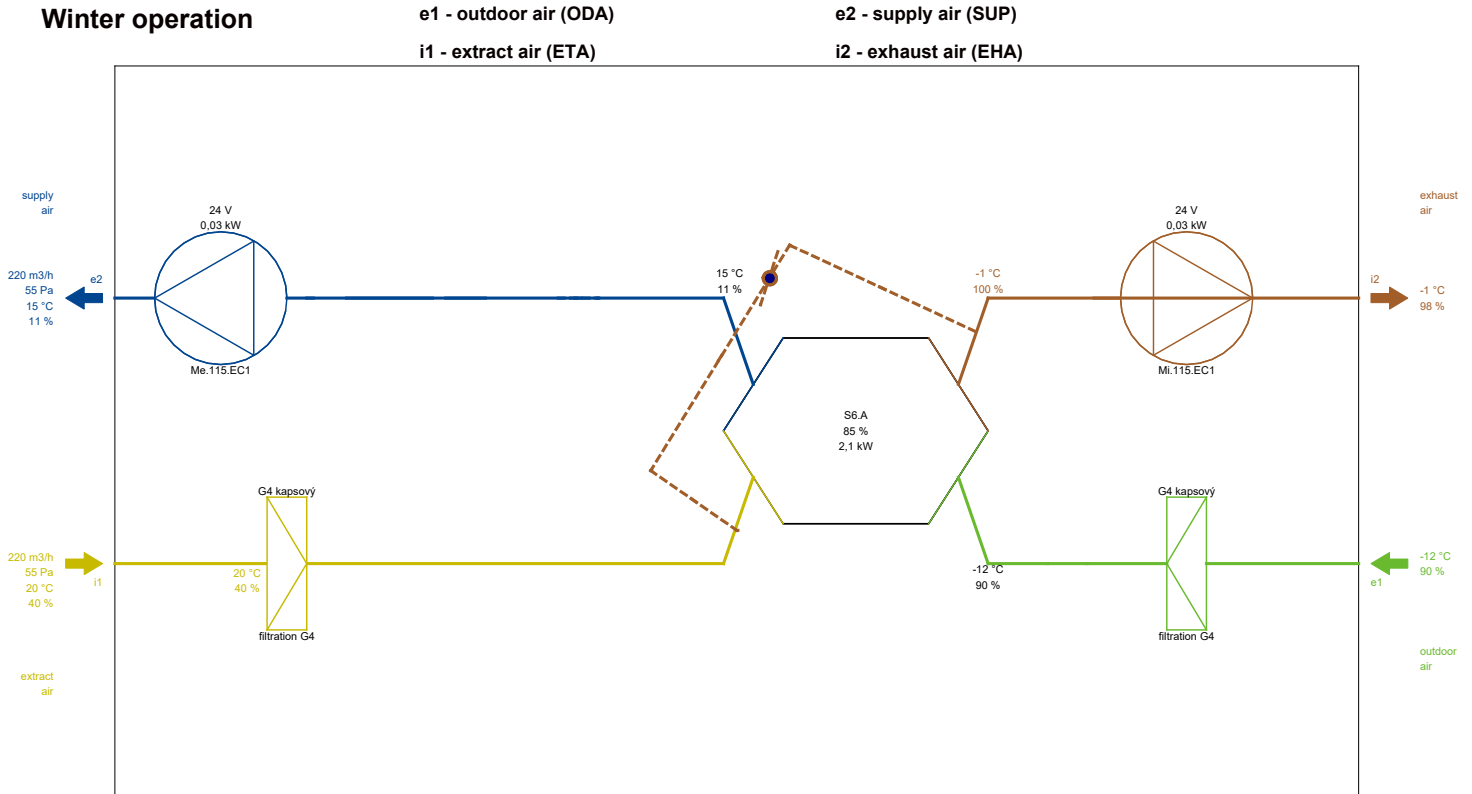
Air-side diagram

Offer no.:
 Project: VENTILATION/COOLING UNITS
 Position no.: UNIT 1.01. to UNIT 1.02.

Bc. David Šnajdr		

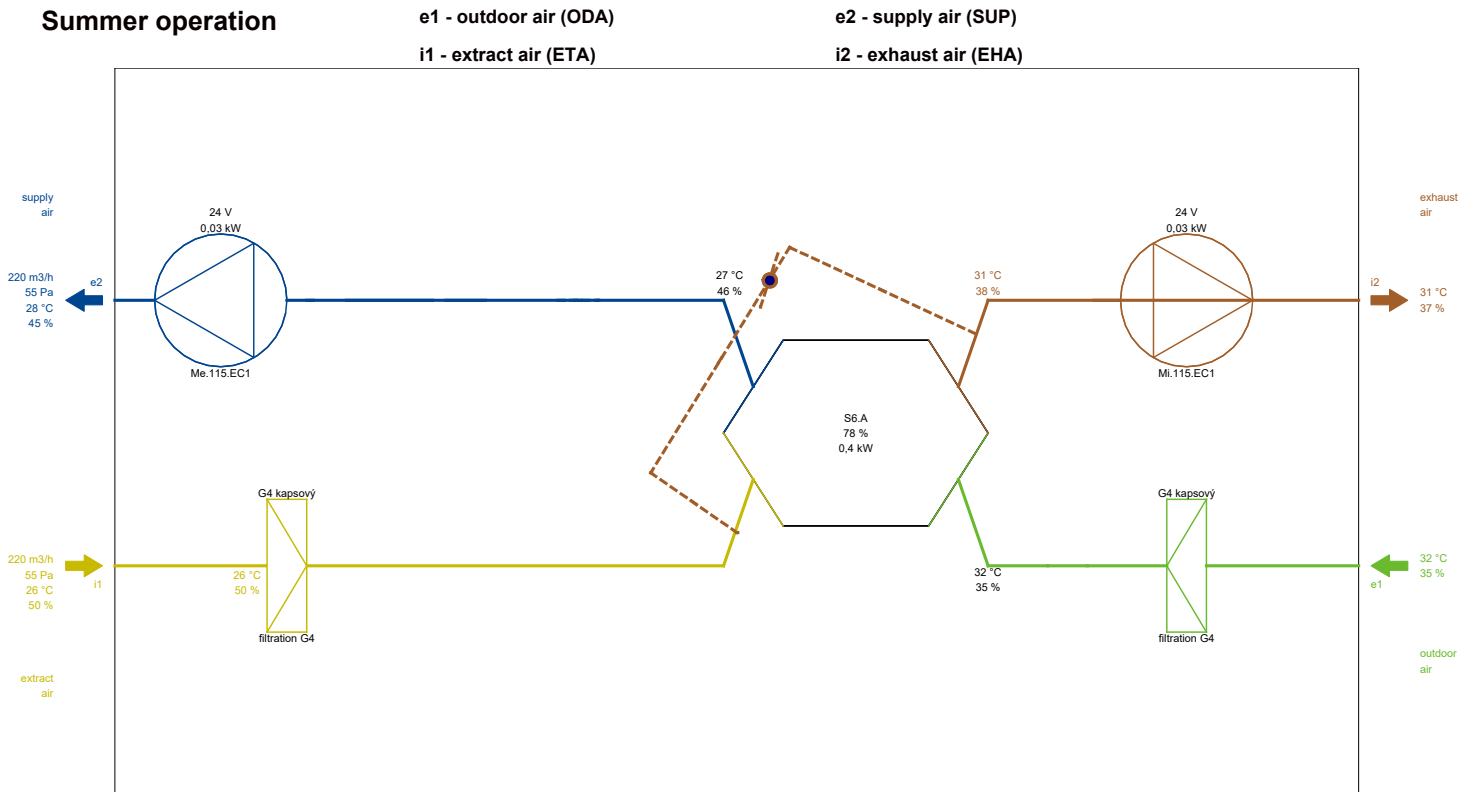
AHU **DUPLEX 300 Easy + CPA (ČR,SR,..)** 2 pcs

Winter operation



Note: AHU functions diagram. Inlet and outlet location may differ from actual position and port configuration.

Summer operation



Note: AHU functions diagram. Inlet and outlet location may differ from actual position and port configuration.



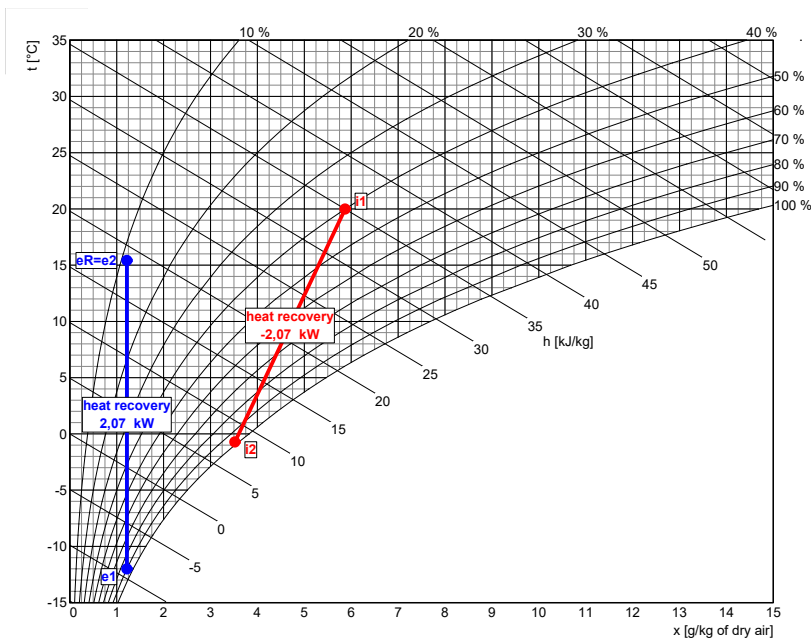
Psychrometric chart

Offer no.:
 Project: VENTILATION/COOLING UNITS
 Position no.: UNIT 1.01. to UNIT 1.02.

Bc. David Šnajdr		

AHU **DUPLEX 300 Easy + CPA (ČR,SR,..)** 2 pcs

Winter operation



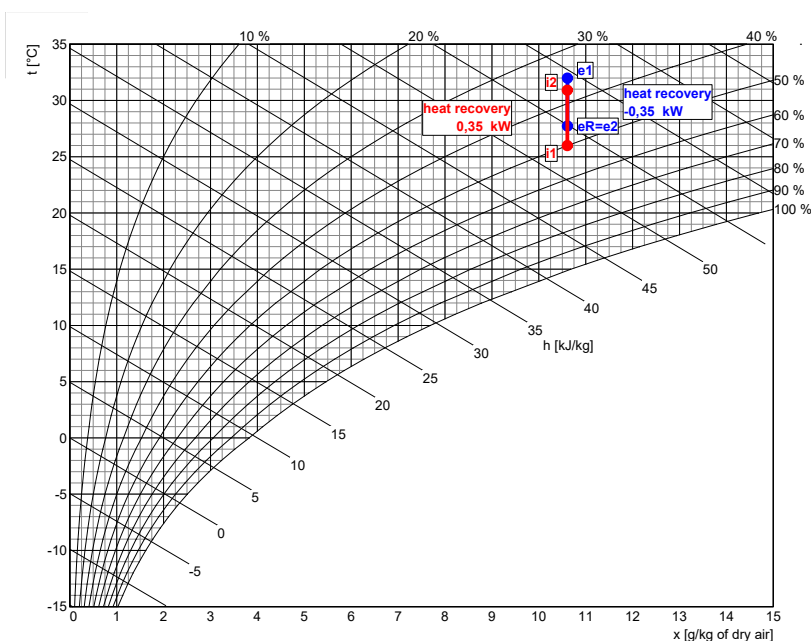
Supply

	description	t [°C]	rh [%]
e1	outdoor air	-12,0	90
eR	heat recovery	15,4	11

Exhaust

	description	t [°C]	rh [%]
i1	extract air	20,0	40
i2	heat recovery	-0,7	98

Summer operation



Supply

	description	t [°C]	rh [%]
e1	outdoor air	32,0	35
eR	heat recovery	27,7	45

Exhaust

	description	t [°C]	rh [%]
i1	extract air	26,0	50
i2	heat recovery	30,9	37



Other trades requirements for AHU installation

Offer no.:

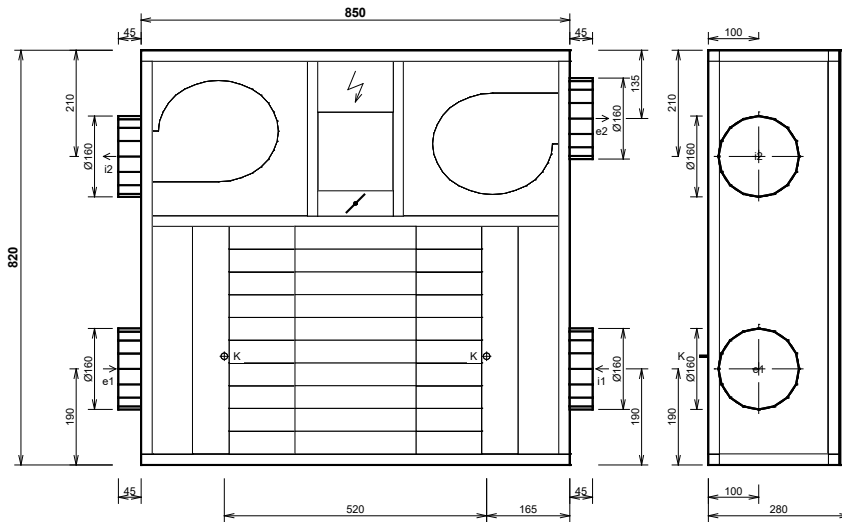
Project: VENTILATION/COOLING UNITS

Position no.: UNIT 1.01. to UNIT 1.02.

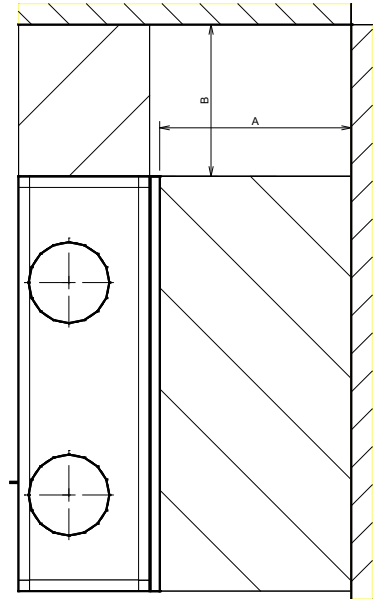
Bc. David Šnajdr		

Building site			
AHU size	length	850 mm	AHU supply as one piece
	height	820 mm	
	depth	280 mm	
Weight	approx. 21 kg		

Dimensional drawing:
Position Multi-purpose



Manipulation space

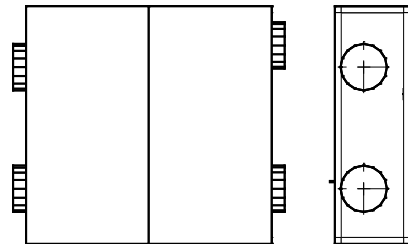


A	door side	min. 400 mm
B	control module	min. 300 mm

con.port	type	dimension	accessories
e1	e1 - outdoor air (ODA)	Ø 160 mm	
e2	e2 - supply air (SUP)	Ø 160 mm	
i1	i1 - extract air (ETA)	Ø 160 mm	
i2	i2 - exhaust air (EHA)	Ø 160 mm	
K	condensate drain	Ø 14 mm	

AHU placement method:

Position: Multi-purpose








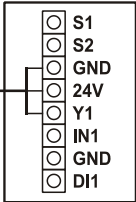
Wiring diagram

Offer no.:
 Project: VENTILATION/COOLING UNITS
 Position no.: UNIT 1.01. to UNIT 1.02.


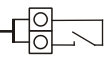

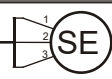






Bc. David Šnajdr		

AHU	DUPLEX 300 Easy + CPA (ČR,SR,..)	2 pcs
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AHU DUPLEX 300 Easy + CPA (ČR,SR,..)

unit terminals	cable	use of	room	check
PE N L 	length 3m part of delivery	 Supply voltage 230V / 50Hz, fusing (a flexible power input cord with a plug)	<input type="checkbox"/>
GND 24V Y1 	SYKFY 2x2x0,5 length 3m part of delivery	<div style="border: 1px solid black; padding: 5px; display: inline-block;">  </div> Controller type CPA Note - an interconnecting cable may be extended (max. 25 m)	<input type="checkbox"/>

CPA controller

controller terminals	cable	use of	room	check
CPA DI1 GND 	SYKFY 2x2x0,5	 Floating N.O. switch input (e.g. Toilet, Bathroom, kitchen)	<input type="checkbox"/>
CPA GND 24V S1 	SYKFY 2x2x0,5	 Shut-off damper servo drive at the air inlet - control voltage 24V DC, max. 200mA (actuator type: e.g. Belimo CM24, LM24A)	<input type="checkbox"/>
CPA S1 GND 	SYKFY 2x2x0,5	 Activate electric pre-heater operation (24V DC)	<input type="checkbox"/>
CPA S2 GND 	SYKFY 2x2x0,5	 Activate electric heater operation (24V DC)	<input type="checkbox"/>
CPA IN1 GND 	SYKFY 2x2x0,5	 Sensor 0-10V (CO2, humidity, differential pressure etc.)	<input type="checkbox"/>

All types of control system that are built in within the unit commonly include at least two inputs, so the electrical signals from human operation of lights or other equipment, that automatically control the performance of the unit, can be connected. These inputs or other types of sensors must always be connected (e.g. CO2, VOC, rH etc.).



Technical specification

Offer no.:

Project: VENTILATION/COOLING UNITS

Position no.: UNIT 2.01. to UNIT 2.03.

Bc. David Šnajdr		

AHU **DUPLEX 250 Easy + CPA (ČR,SR,..)** 3 pcs

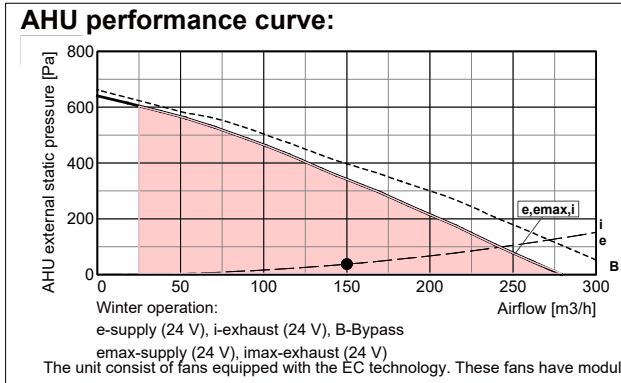
- AHU complies ErP (Ecodesign) - EU 1253/2014 and 1254/2014 regulation, valid from 1.1.2018. A

access door side view (floor plan)
Weight: approx. 20 kg, AHU supply as one piece

con.port	type	dimension	accessories
e1	e1 - outdoor air (ODA)	Ø 160 mm	
e2	e2 - supply air (SUP)	Ø 160 mm	
i1	i1 - extract air (ETA)	Ø 160 mm	
i2	i2 - exhaust air (EHA)	Ø 160 mm	
K	condensate drain	Ø 14 mm	

Manipulation space

A	door side	min. 400 mm
B	control module	min. 300 mm



Sound parameters:

Sound power level LwA (dB)

Frequency [Hz]	Total dB (A)	63 dB(A)	125 dB(A)	250 dB(A)	500 dB(A)	1 k dB(A)	2 k dB(A)	4 k dB(A)	8 k dB(A)
inlet e1	46	40	37	43	38	30	31	<25	<25
outlet e2	65	37	47	60	57	60	55	44	29
inlet i1	46	40	37	43	38	30	31	<25	<25
outlet i2	65	37	47	60	57	60	55	44	29
casing to surroun.	53	<25	32	43	51	47	44	28	<25

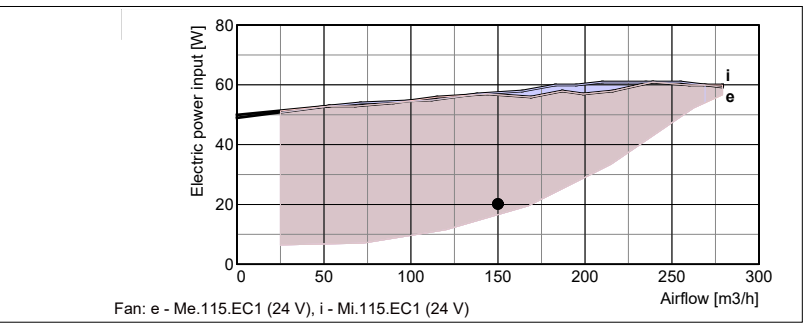
Sound power level is calculated for simultaneous operation of **both fans** and measured in accordance with **ISO 3744**. Sound power level at connection ports is measured in accordance with **ISO 5136**.

Sound pressure spectrum LpA (dB)

casing to surroun.	33	<25	<25	<25	31	26	<25	<25	<25
--------------------	----	-----	-----	-----	----	----	-----	-----	-----

Sound pressure level is measured for simultaneous operation of **both fans** at 3 m distance and measured in accordance with **ISO 3744**.

Fans	supply	exhaust
Volume flow	m3/h 150	150
AHU external static pressure	Pa 38	38
Voltage (nominal)	V 24	24
Power input (at operation point)	W 20	20
Max. power input (to make power connection)	W 50	50
Max. current (to make power connection)	A 0,4	0,4
Fan types	Me.115	Mi.115
Fan kinds (with variable speed)	EC1	EC1



Connecting components	supply	exhaust
Inlet ports e1, i1 connection	mm Ø 160 fixed	Ø 160 fixed
Outlet ports e2, i2 connection	mm Ø 160 fixed	Ø 160 fixed
Condensate drain K	mm	2 x Ø14/0

Control and shutoff dampers	Actuator type
Bypass damper (integrated)	CM24-R



Technical specification

Offer no.:

Project: VENTILATION/COOLING UNITS

Position no.: UNIT 2.01. to UNIT 2.03.

Bc. David Šnajdr		

AHU **DUPLEX 250 Easy + CPA (ČR,SR,..)** 3 pcs

Heat recovery core		supply	exhaust
Volume flow	m3/h	150	150
Inlet temperature	°C	-12	20
Outlet temp.	°C	15	1
Inlet relative humidity	% r.h.	90	48
Outlet relative humidity	% r.h.	11	100
Heat recovery efficiency winter (s)	%	85 (77)	
Heat exch. cap. winter (summer)	kW	1,4 (0,2)	
Condensate production	l/h	0,6	
Heat recovery core type		S6.A recuperative	

Airflow [m3/h]	Winter Efficiency [%]	Summer Efficiency [%]
0	~95	~85
50	~90	~80
100	~85	~75
150	85 (77)	~72
200	~82	~70
250	~80	~68
300	~78	~67

Filtration	supply	exhaust	Accessories (part of delivery)
Type	wire-pleated	wire-pleated	
Filtration class	G4	G4	
Number of filters	pcs 1	1	
Textile size	mm 230x260x48	230x260x48	

ErP (RVU)	
The specific energy consumption class	A
The specific energy consumption SEC - W	-16,06 kWh/(m2.a)
The specific energy consumption SEC - A	-39,96 kWh/(m2.a)
The specific energy consumption SEC - C	-77,10 kWh/(m2.a)
Maximum flow rate Qm	230 m3/h
Sound power level LwA	55 dB (A)

Note - caution:

The unit is suitable for normal environment with temperature range 5 to 55°C (must not be exposed to rain or snow etc !).
 In case the unit is installed in an area with ambient temperature dropping below +5 °C, it must be thermally protected:
 - condensate outlet using heating cable controlled by a thermostat

All types of control system that are built in within the unit commonly include at least two inputs, so the electrical signals from human operation of lights or other equipment, that automatically control the performance of the unit, can be connected. These inputs or other types of sensors must always be connected (e.g. CO2, VOC, rH etc.).



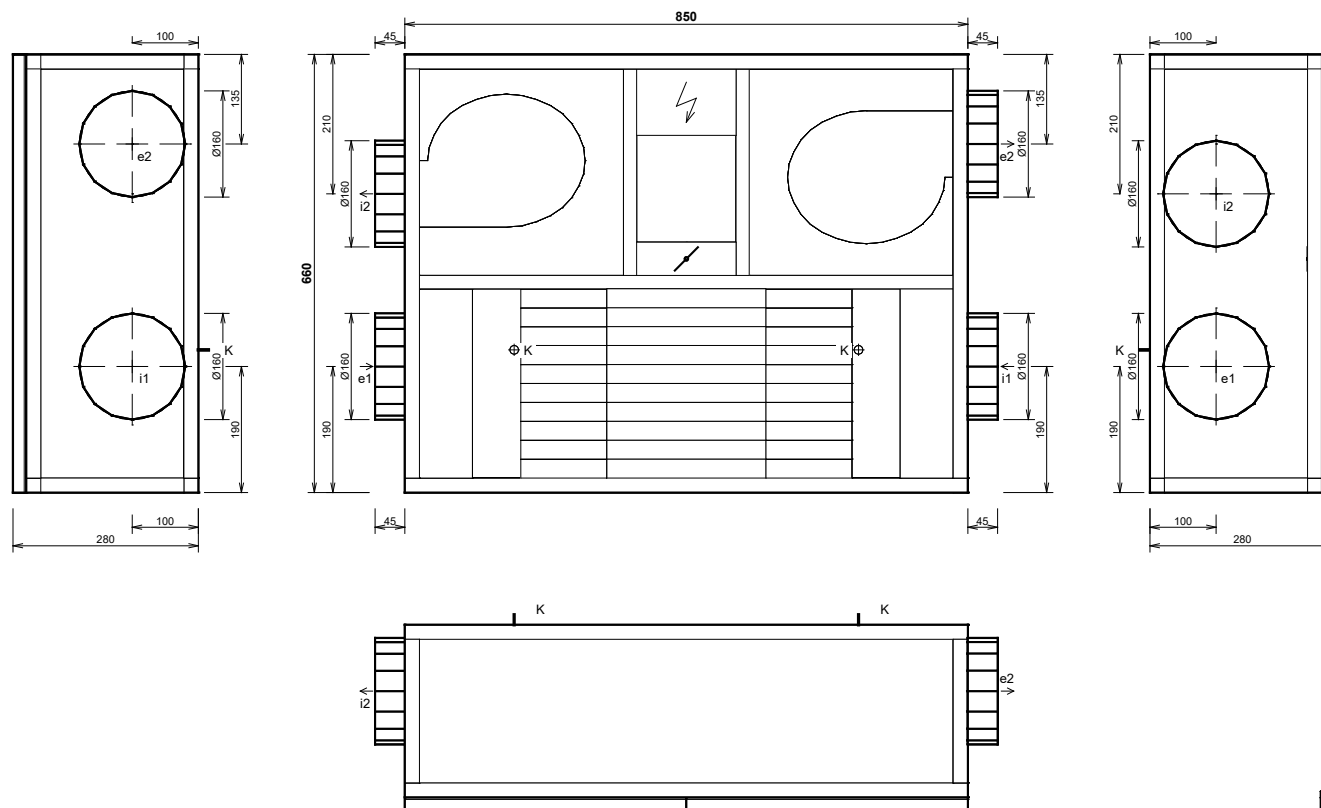
Dimensional drawing

Offer no.:
Project: VENTILATION/COOLING UNITS
Position no.: UNIT 2.01. to UNIT 2.03.

Bc. David Šnajdr		

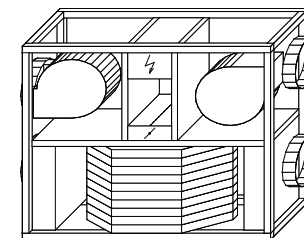
AHU **DUPLEX 250 Easy + CPA (ČR,SR,..)** 3 pcs

Position **Multi-purpose**
Weight: approx. **20 kg**



Observe the min. service space during installation - see the technical description.

con.port	type	dimension	accessories
e1	e1 - outdoor air (ODA)	Ø 160 mm	
e2	e2 - supply air (SUP)	Ø 160 mm	
i1	i1 - extract air (ETA)	Ø 160 mm	
i2	i2 - exhaust air (EHA)	Ø 160 mm	
K	condensate drain	Ø 14 mm	





Air-side diagram

Offer no.:
 Project: VENTILATION/COOLING UNITS
 Position no.: UNIT 2.01. to UNIT 2.03.

Bc. David Šnajdr		

AHU **DUPLEX 250 Easy + CPA (ČR,SR,..)** 3 pcs

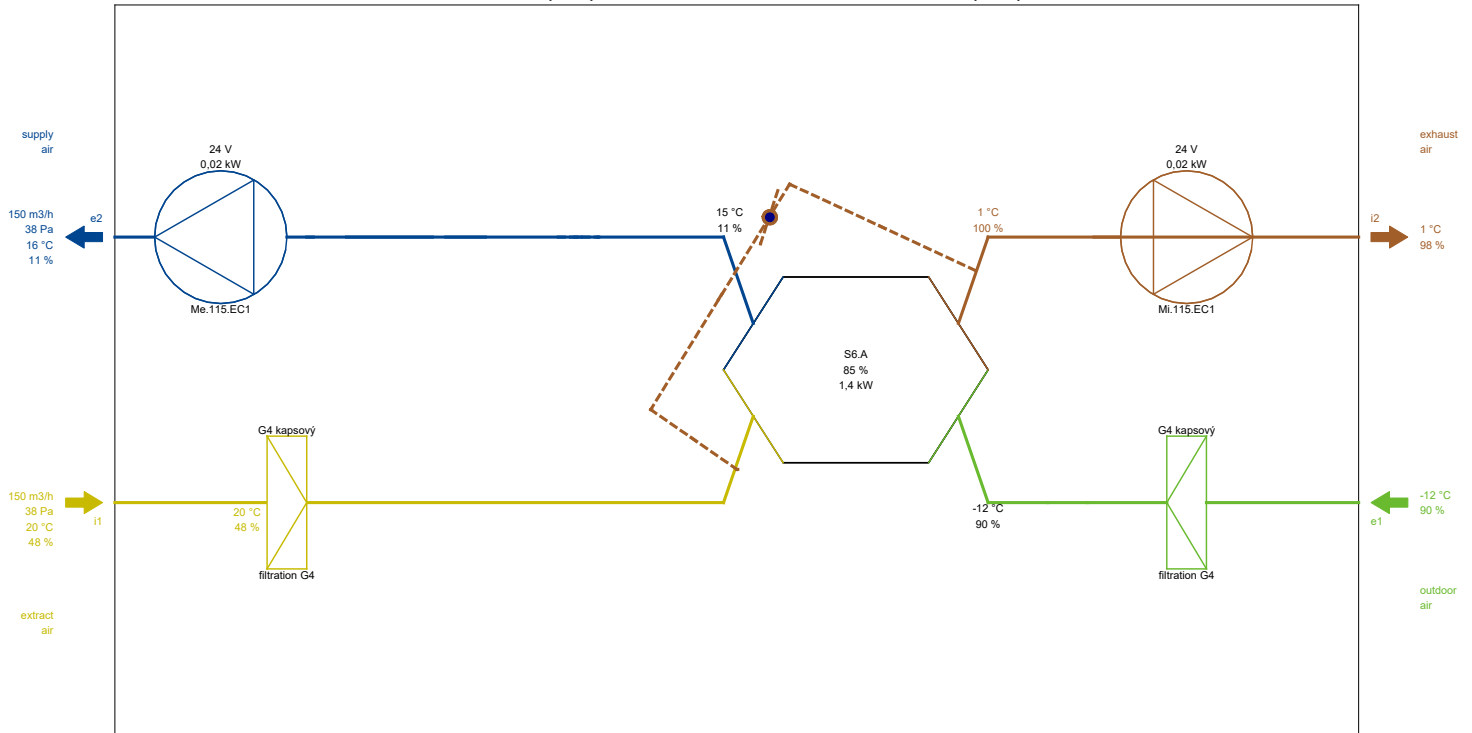
Winter operation

e1 - outdoor air (ODA)

e2 - supply air (SUP)

i1 - extract air (ETA)

i2 - exhaust air (EHA)



Note: AHU functions diagram. Inlet and outlet location may differ from actual position and port configuration.

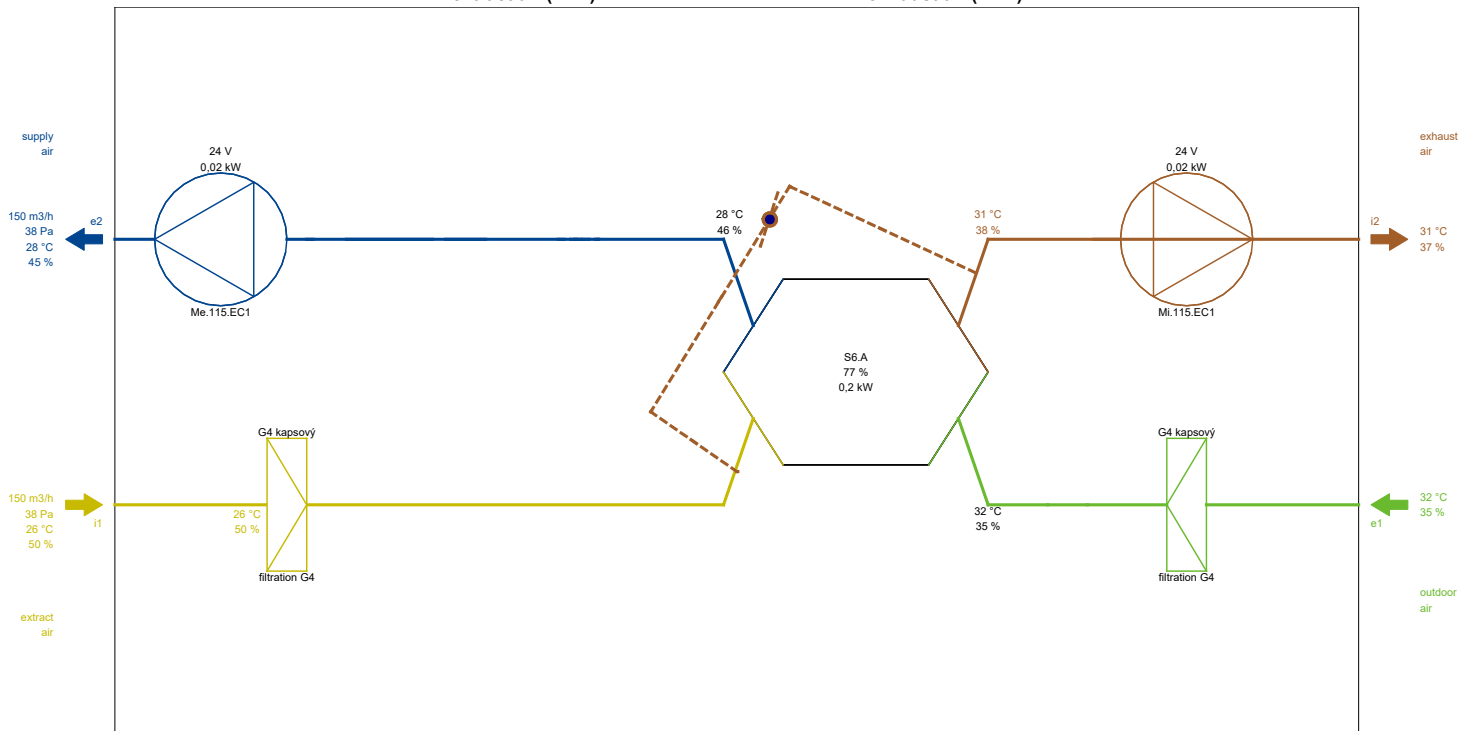
Summer operation

e1 - outdoor air (ODA)

e2 - supply air (SUP)

i1 - extract air (ETA)

i2 - exhaust air (EHA)



Note: AHU functions diagram. Inlet and outlet location may differ from actual position and port configuration.



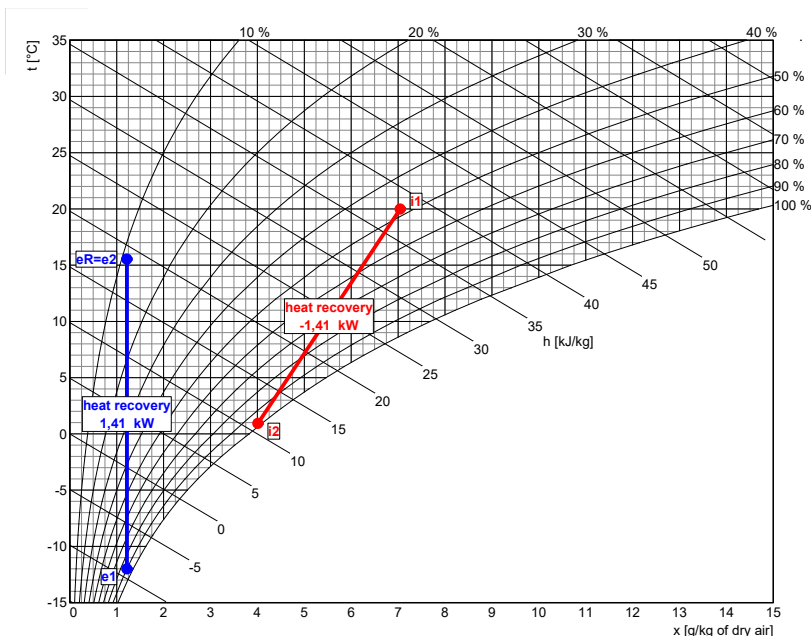
Psychrometric chart

Offer no.:
 Project: VENTILATION/COOLING UNITS
 Position no.: UNIT 2.01. to UNIT 2.03.

Bc. David Šnajdr		

AHU **DUPLEX 250 Easy + CPA (ČR,SR,..)** 3 pcs

Winter operation



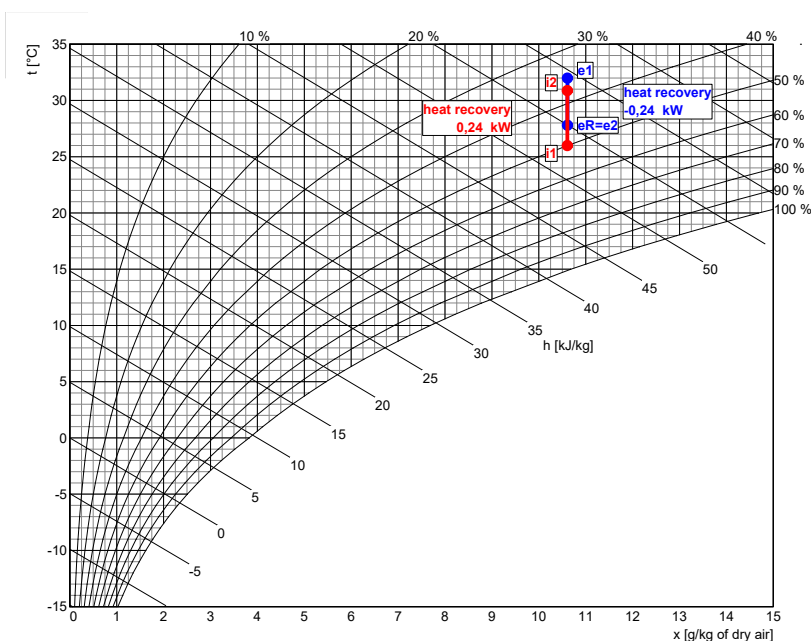
Supply

	description	t [°C]	rh [%]
e1	outdoor air	-12,0	90
eR	heat recovery	15,5	11

Exhaust

	description	t [°C]	rh [%]
i1	extract air	20,0	48
i2	heat recovery	0,9	98

Summer operation



Supply

	description	t [°C]	rh [%]
e1	outdoor air	32,0	35
eR	heat recovery	27,8	45

Exhaust

	description	t [°C]	rh [%]
i1	extract air	26,0	50
i2	heat recovery	30,9	37



Other trades requirements for AHU installation

Offer no.:

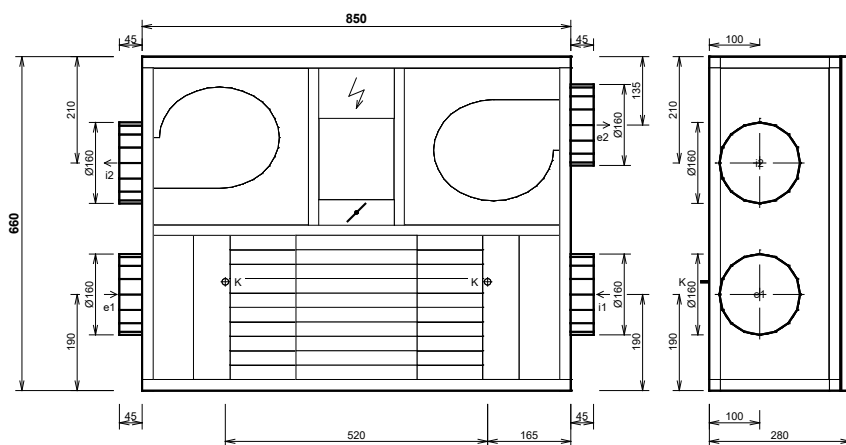
Project: VENTILATION/COOLING UNITS

Position no.: UNIT 2.01. to UNIT 2.03.

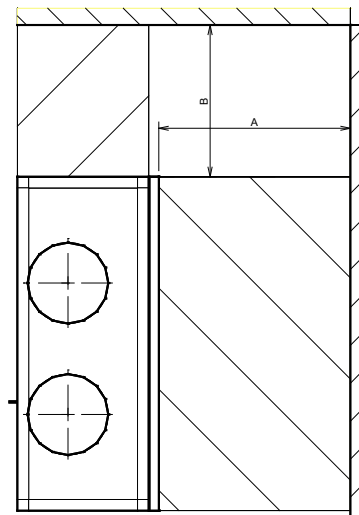
Bc. David Šnajdr		

Building site			
AHU size	length	850 mm	AHU supply as one piece
	height	660 mm	
	depth	280 mm	
Weight	approx. 20 kg		

Dimensional drawing:
Position **Multi-purpose**



Manipulation space

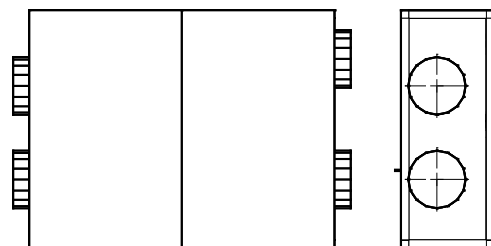


con.port	type	dimension	accessories
e1	e1 - outdoor air (ODA)	Ø 160 mm	
e2	e2 - supply air (SUP)	Ø 160 mm	
i1	i1 - extract air (ETA)	Ø 160 mm	
i2	i2 - exhaust air (EHA)	Ø 160 mm	
K	condensate drain	Ø 14 mm	

A	door side	min. 400 mm
B	control module	min. 300 mm

AHU placement method:

Position: Multi-purpose








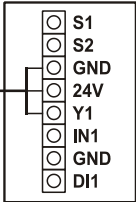
Wiring diagram

Offer no.:
 Project: VENTILATION/COOLING UNITS
 Position no.: UNIT 2.01. to UNIT 2.03.


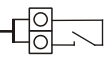

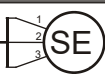






Bc. David Šnajdr		

AHU	DUPLEX 250 Easy + CPA (ČR,SR,..)	3 pcs
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AHU DUPLEX 250 Easy + CPA (ČR,SR,..)

unit terminals	cable	use of	room	check
PE N L 	length 3m part of delivery	 Supply voltage 230V / 50Hz, fusing (a flexible power input cord with a plug)	<input type="checkbox"/>
GND 24V Y1 	SYKFY 2x2x0,5 length 3m part of delivery	<div style="border: 1px solid black; padding: 5px; display: inline-block;">  </div> Controller type CPA Note - an interconnecting cable may be extended (max. 25 m)	<input type="checkbox"/>

CPA controller

controller terminals	cable	use of	room	check
CPA DI1 GND 	SYKFY 2x2x0,5	 Floating N.O. switch input (e.g. Toilet, Bathroom, kitchen)	<input type="checkbox"/>
CPA GND 24V S1 	SYKFY 2x2x0,5	 Shut-off damper servo drive at the air inlet - control voltage 24V DC, max. 200mA (actuator type: e.g. Belimo CM24, LM24A)	<input type="checkbox"/>
CPA S1 GND 	SYKFY 2x2x0,5	 Activate electric pre-heater operation (24V DC)	<input type="checkbox"/>
CPA S2 GND 	SYKFY 2x2x0,5	 Activate electric heater operation (24V DC)	<input type="checkbox"/>
CPA IN1 GND 	SYKFY 2x2x0,5	 Sensor 0-10V (CO2, humidity, differential pressure etc.)	<input type="checkbox"/>

All types of control system that are built in within the unit commonly include at least two inputs, so the electrical signals from human operation of lights or other equipment, that automatically control the performance of the unit, can be connected. These inputs or other types of sensors must always be connected (e.g. CO2, VOC, rH etc.).