AIR HANDLING UNITS MANDÍK

EUROVENT CERTIFIED PERFORMANCE
AHU N° 17.04.016
Range AHU MANDÍK
www.eurovent-certification.com

TÜV SÜD EN 1886

RLT Raumlufttechnische Geräte Herstellerverband e.V.

ErP ready 2018

MANDÍK®

CONTENT

COMPANY PROFILE

Established in 1990, MANDÍK, a. s. is a pure Czech, family owned company. At present it is one of the most significant manufacturers of air-handling and firefighting components, air handling units and industrial heating systems.

The company wins recognition on the European market above all by its focus on high quality, flexibility and services to support the delivered products. The current level of the company's technical ability is documented by supplies for subways, tunnels and nuclear power plants in many European countries.

The company observes the rules of quality management according to ISO 9001, KTA 1401, 10CFR50, and is a member of RLT, the German association of air-handling equipment manufacturers. The company has all the required certificates according to European standards, and has been certified by TÜV SÜD Industrie Service GmbH according to EN 1886.

In addition to the domestic market, the sales activities of MANDÍK, a. s. also cover a number of other European countries, where its products are delivered in collaboration with our foreign partners.

At everyday work the company places emphasis on environment protection and occupational safety. Observance of strict European environmental and OHS standards is a common rule, which is uncompromisingly required by the company management. The company contributes to environment protection also by operating its own renewable energy resources and by the widest possible use of energy-saving appliances.

Our objective is maximum satisfaction of our customers, and last but not least creating comfortable working environment for our employees.

Certificates

Eurovent certificate

Energy efficiency certificate RLT-TÜV-01


Testing protocol TÜV SÜD

AHU – Product certificate


Declaration of Conformity

Hygienic Certificate according to ÖNORM H 6020

Certificate of electrical safety AHUs, including control system

Certificate of electromagnetic compatibility in residential and industrial buildings


Declaration of Conformity AHUs in Atex design

ISO 9001

KTA 1401

10 CRF50

1. PERFORMANCE RANGE OF THE UNITS

KJM Mandík units should be designed with Eurovent and RLT certification (M, P, T marking) or without these certificates (M+, P+, T+ marking).
Except these standardized sizes should be designed in **Dynamic** sizes where you can choose exact profile.

- Performance range of the units according to EN 12 7001.
- Height of the foundation frame:
  - up to the size of M16/P16 – 120 mm,
  - up to the size of M20/P20 – 150 mm.

Sizes of MANDÍK unit of M series – square cross-section

size	size A x B [mm]	nominal flow of the air [m³/hour]	size	size A x B [mm]	nominal flow of the air [m³/hour]
M 2	550 x 550	2 000	M 20	1500 x 1500	20 000
M 2.2	570 x 570	2 200	M 22	1600 x 1600	22 000
M 2.5	600 x 600	2 500	M 25	1700 x 1700	25 000
M 2.8	630 x 630	2 800	M 28	1750 x 1750	28 000
M 3.15	650 x 650	3 150	M 31.5	1900 x 1900	31 500
M 3.5	700 x 700	3 500	M 34	1950 x 1950	34 000
M 4	730 x 730	4 000	M 36	2000 x 2000	36 000
M 4.5	770 x 770	4 500	M 40	2100 x 2100	40 000
M 5	800 x 800	5 000	M 45	2200 x 2200	45 000
M 5.6	850 x 850	5 600	M 48	2250 x 2250	48 000
M 6.3	900 x 900	6 300	M 50	2300 x 2300	50 000
M 7.1	950 x 950	7 100	M 53	2400 x 2400	53 000
M 8	1000 x 1000	8 000	M 56	2500 x 2500	56 000
M 9	1050 x 1050	9 000	M 63	2600 x 2600	63 000
M 10	1100 x 1100	10 000	M 67	2700 x 2700	67 000
M 11	1150 x 1150	11 000	M 75	2800 x 2800	75 000
M 12.5	1200 x 1200	12 500	M 80	2900 x 2900	80 000
M 14	1300 x 1300	14 000	M 90	3100 x 3100	90 000
M 16	1350 x 1350	16 000	M 100	3250 x 3250	100 000
M 18	1450 x 1450	18 000			

* *Exact airflow in section depends on the need for Ecodesign*
** *Dimensions are valid for panel thickness 50 mm, for T1/TB1 it is necessary to add 100 mm*

Size of MANDÍK unit of P series – rectangular cross-section

size	size A x B [mm]	nominal flow of the air [m³/hour]	size	size A x B [mm]	nominal flow of the air [m³/hour]
P 1	450 x 400	1 000	P 18	1800 x 1150	18 000
P 2	750 x 400	2 000	P 20	1900 x 1200	20 000
P 2.2	770 x 430	2 200	P 22	2000 x 1250	22 000
P 2.5	800 x 460	2 500	P 25	2100 x 1350	25 000
P 2.8	850 x 480	2 800	P 28	2200 x 1450	28 000
P 3.15	900 x 500	3 150	P 31.5	2300 x 1500	31 500
P 3.5	950 x 530	3 500	P34	2400 x 1550	34 000
P 4	1000 x 550	4 000	P 38	2500 x 1600	36 000
P 4.5	1000 x 600	4 500	P 40	2600 x 1700	40 000
P 5	1000 x 650	5 000	P 45	2600 x 1900	45 000
P 5.6	1100 x 650	5 600	P 48	2600 x 2000	48 000
P 6.3	1100 x 730	6 300	P 50	2600 x 2100	50 000
P 7.1	1150 x 770	7 100	P 53	2700 x 2150	53 000
P 8	1200 x 800	8 000	P 56	2800 x 2200	56 000
P 9	1300 x 850	9 000	P 63	2900 x 2300	63 000
P 10	1350 x 900	10 000	P 67	3000 x 2400	67 000
P 11	1400 x 950	11 000	P 75	3150 x 2500	75 000
P 12.5	1500 x 1000	12 500	P 80	3250 x 2600	80 000
P 14	1600 x 1050	14 000	P 90	3500 x 2700	90 000
P 16	1700 x 1100	16 000	P 100	3600 x 2900	100 000

* *Exact airflow in section depends on the need for Ecodesign*
** *Dimensions are valid for panel thickness 50 mm, for T1/TB1 it is necessary to add 100 mm*

Size of MANDÍK unit of T series – rectangular cross-section

size	size A x B [mm]	nominal flow of the air [m³/hour]	size	size A x B [mm]	nominal flow of the air [m³/hour]
T 56	2400 x 2500	56 000	T 80	2400 x 3450	80 000
T 63	2400 x 2750	63 000	T 90	2450 x 3600	90 000
T 67	2400 x 2900	67 000	T 100	2450 x 4050	100 000
T 75	2400 x 3250	75 000			

* *Exact airflow in section depends on the need for Ecodesign*
** *Dimensions are valid for panel thickness 50 mm, for T1/TB1 it is necessary to add 100 mm*

MANDÍK, a. s., Dobříšská 550, 267 24 Hostomice, www.mandik.cz

2. DESCRIPTION OF THE UNIT

2.1 Terminology

Chamber – metal box fitted with thermal insulation and in-built element for air treatment or an aggregate unit to be used for air transfer. You may set up compacts (or unit) by using several separated chambers.
Air conditioning unit – the unit resulting from chamber assembly; it is intended for treatment and transport of the air (hereinafter referred to as the unit). Individual chambers may be assembled by using connection elements, then it is possible to create special design according to customer´s requirements.
Supporting frame – the installed structure with the height of 120 mm, or also 150 mm, which includes a separated chamber or compact block.
Adjustable foot (leg) – component mounted to the base frame of the chamber, allowing to eliminate minor roughness of the base (alignment of the unit in horizontal position).
Supporting leg – component mounted to the base frame of the chamber. It allows to increase the overall height of the unit by the maximum of 600 mm.
Solid panel – supporting element of the chamber providing its walls and sheathing.
Service panel – removable panel which is fitted with closing elements and handles.
Assembly panel – removable panel attached with bolts.
Doors – panels fitted with closing elements and hinges.

2.2 Use and working conditions

Air ventilation and air conditioning units of MANDÍK, series M (square cross section) and P (rectangular cross section) are intended for central distribution and treatment of the air in venting and conditioning systems. The air transferred by the unit must be absolutely free of mechanical impurities and gaseous additives that could result in clogging of the built-in elements or corrosion of material the unit is made of. The units are intended for the non-explosive environments, with the ambient temperatures ranging from –30 °C to +40 °C. The outdoor units are fitted with the elements or construction measures which allow location in the outdoor environment (e.g. shelters, dampers inside chambers).
The units must be placed on a solid horizontal surface to which they have to be firmly anchored. It is advisable to place buffer material (rubber, cork) under the base frame of the unit, at the place of installation. There shall be free space on the side of the operator, according to the type and size of units (see the installation and operation regulations).

Air handling units Mandík can be designed in different "energy efficiency classes" and marked with official label according to the Eurovent certification or RLT-association.

2.3 Parameters of the unit´s casing

Parameters of the unit´s casing in accordance to EN 1886. Tests carried out in laboratory: TÜV SÜD Munich:
Class of mechanical strength of the sheathing: D1 (M)
Variants of casing:

Thermal isolation	Thermal bridges	Tightness
T3	TB2	L1
T2	TB1	L1
T1*	TB1*	L2*

Tightness of filters: < 0,5 % – F9 (M)
Casing attenuation in band:

Hz:	125	250	500	1000	2000	4000	8000
dB:	15.8	23.6	31.3	37.3	39.5	39.7	43.2

** In this variant have panels 100 mm thick*

2.4 Description of the structure

The chambers are assembled by using the separated sandwich-type panels made of steel galvanized metal sheet with the thickness of 0.8 mm – Z275 EN10346. The panels are interconnected by screws. Upon special request, we can use stainless steel metal sheet (AISI 304, EN 17240) or lacquered metal sheet with any colour tone, according to the scale of RAL. The panels are filled with therřmal and acoustic insulation. There are service, assembly or door panels fitted on the service side of the unit, according to the type of chamber. Sealing between the panels is performed by self-sticking EPDM sealing with closed pores. In standard versions, chambers are placed on a galvanized base frame. Upon request, we can supply adjustable feet or fixed feet made of galvanized steel.
Discharge and suction openings of the units are fitted with elastic inserts of standard sizes to provide connection to the pipelines.
There are no materials containing silicone used in the whole structure of the unit.

2.5 Servicing side of the chamber and side of connecting necks of the exchangers and drain of the condensate

Servicing side of the chamber is the side on which the service doors or removable panels allowing access to the chamber for inspection, maintenance or installation; or other elements used to operate the unit (e.g. MaR devices) are located. It is being determined by looking in the direction of the air stream as right, left, top or bottom. Interconnecting the chambers may result in a unit having the same side of the operator as a whole, or some chambers in the unit or parts of the unit that may have different side of operation. A side used for connection of exchangers and discharge of condensate is the side on which necks of exchangers are located (or condensate discharges). It is being determined by looking in the direction of the air stream as right or left. The side of exchangers connection and condensate discharge may and need not be identical to the side of operation.

Servicing side RIGHT

Servicing side LEFT

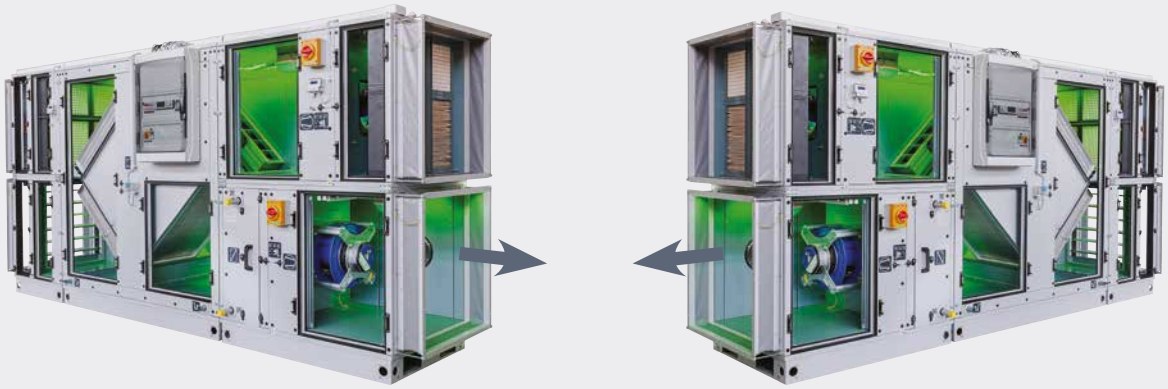


Fig. 2.5.1: *Servicing side of the unit*

2.6 Accompanying technical documentation includes the following items:

- installation and operation regulations,
- conditions for commissioning air conditioning and air conditioning units by service technicians of Mandík, a. s.
- declaration of conformity,
- diagram of the unit,
- technical information – installation and operating regulation of gas burners (if the burner is supplied in the delivery), installation and operating regulation of humidifier (if supplied in the delivery),
- installation of MaR system (if supplied in the delivery of MaR) and a wiring diagram.

2.7 Standards

EN 13053 – Ventilation of buildings – Air conditioning units – Evaluation and implementation unit's elements and parts
EN 13779 – Ventilation of residential buildings – Basic requirements for ventilation and air conditioning equipment.
EN 1886 – Ventilation of the building – Duct elements – Mechanical properties
VDI 6022 – Ventilation and quality of indoor air – Hygiene requirements for ventilation and air conditioning systems and equipment

3. TRANSPORT, HANDLING, STORAGE

3.1 The units are transported as individual chambers or compact blocks. Roofs for the outdoor units are supplied as pre-assembled together with the unit.

3.2 Units are supplied as packed ones in plastic foil; larger chambers and units intended for export are placed and wrapped on pallets. Ways of packaging may be consulted individually.
WARNING: Plastic foil is a transport packaging material intended for protecting the chambers during transport. They must not be used for long term storage of the chambers. Any changing temperature during transport can result in condensation of water vapours inside the package and consequently there may occur conditions suitable for corrosion of materials used on the chambers (e.g. white rust on the galvanized elements). Therefore it is necessary to remove this transport wrap immediately after finishing the transport in order to allow air coming to the chambers and in order to allow drying of the surface of the chambers.

3.3 During transport and movement, the individual chambers must only be transported by using forklifts or conveyor belts. It is necessary to comply with the relevant safety regulations (ISO 8792). Chambers may only be lifted up from the bottom side. When lifting them by a crane, you must use belts which are put under the unit. Regarding larger items, you should strut their belts at the top side to prevent the chambers from deformation. When using a forklift, chambers should be supported across the width to prevent the chamber bottom side from getting damaged.

3.4 When taking the product over, it is necessary to check whether the product has been delivered in design and scope agreed and whether it has not been damaged during transport. If it was damaged during transport, then the transferee must record the extent of the damage while using a delivery note of the carrier. Failure to do so may result in risk of rejection of any reclamation claim for damage caused by the transport.

3.5 Units should be stored in dry, dust-free areas which are protected against rain and snow and whose ambient temperature never drops below +5 °C. They must be protected against mechanical damage, contamination and corrosion caused by continuous condensation of water vapour on the surface.

4. INSTALLATION, COMMISSIONING AND MAINTENANCE

All information related to installation, commissioning and maintenance of air-handling and air-conditioning units Mandík, they can be found in the manual on page:
http://www.mandik.com/getattachment/2a88f6e5-2817-4353-8620-259422158ed1/088_12_en_AHU.aspx

4.1 CONDITIONS FOR COMMISSIONING OF AIR-HANDLING AND AIR-CONDITIONING UNITS BY SERVICE TECHNICIANS OF MANDÍK, A. S.

If this service is ordered, the customer must unconditionally meet the following points **(otherwise, if the conditions stipulated below are not met, the commissioning-related costs shall be charged!)**:

1) Send a regular order of this service in written to e-mail: service@mandik.cz, stating in the e-mail heading: **"ORDER – COMMISSIONING, order number (e.g. KCZ40000)"**.
2) The order shall specify, among other things: the exact address of the unit location and the contact person (name, phone, e-mail) who:
   a) Will notify the service engineer of the requirements on operation and functions of the HVAC unit for the purpose of its correct settings.
   b) Will accept the HVAC unit by signing the commissioning report.
   c) Will be trained for operation and maintenance of the HVAC unit.
   d) Will sign the service report to the service engineer.
3) Before starting the commissioning service, the customer shall submit a report of the initial inspection of general wiring (control – MaR system and electrical devices) and the report of the initial inspection of the gas device, if the HVAC unit is equipped with it, to the service engineer.
4) The customer shall arrange the access to the place of installation – parking close to the place of installation, free access to the unit to be commissioned.
5) The customer shall arrange adequate working conditions – workplace safety, lighting, elimination of any other activities that would complicate or make impossible the work at the HVAC unit to be commissioned, and provide for the necessary assembling equipment (lifting platforms, etc.).
6) The customer shall arrange the building preparation to be made by the customer for the HVAC unit commissioning, i.e.:
   a) The HVAC unit shall be installed and completely assembled according to the accompanying technical documentation and the installation manual of Mandík, a. s.
   (see http://www.mandik.cz/produktova-rada/klimatizacni-jednotky/klimatizacni-jednotka-mandik, "KIM – Instructions for installation" document).
   b) The HVAC unit shall be connected to the piping network with all integrated items (fire dampers, regulating flap valves, ...) and with all end elements (induction units, air distribution elements, louvers, ...).
   c) The HVAC unit shall be connected to the necessary technological piping – heat and cold sources for water heaters/coolers, evaporators/capacitors, glycol circuits, ..., including regulation items (mixing nodes of heaters / coolers, pumps and valves of glycol circuits, ...) and to the gas piping, respectively.
   d) The MaR components (sensors, servo drives, manostats, anti-freeze thermostats, remote controls, ...), electrical equipment (fans, frequency convertors, electric heaters, drives of rotary regeneration heat exchangers, ...) and piping items (fire dampers, ...) shall be connected by cables with the switchboard box of the HVAC unit according to the drawing documentation of the MaR project.
   e) There shall be a functional main power supply to the switchboard box of the HVAC unit.

Note:

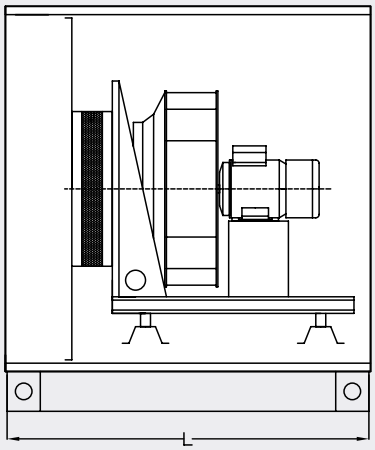
All service actions, extra works, surcharges and travel costs shall be billed according to the valid price list of service works, unless agreed otherwise.
The service of commissioning by the service engineers of Mandík, a.s. can be ordered only in case of simultaneous delivery of the HVAC unit and the MaR system from Mandík, a. s.

5. TYPES OF BUILT-IN UNITS USED

5.1 FAN CHAMBERS WITH FREE IMPELLER

They are used for air transport in the unit and in the attached ventilation pipeline.

View from the side of servicing staff



size	length of the chamber L [mm]	size	length of the chamber L [mm]
M 2	725–765	M 20	765–1445
M 2.2	725–765	M 22	765–1445
M 2.5	725–765	M 25	765–1605
M 2.8	725–890	M 28	765–2145
M 3.15	725–890	M 31.5	765–2145
M 3.5	725–890	M 34	785–2165
M 4	725–985	M 36	785–2165
M 4.5	725–985	M 40	785–2165
M 5	725–985	M 45	785–2165
M 5.6	725–985	M 48	785–2165
M 6.3	725–1145	M 50	785–2165
M 7.1	725–1145	M 53	825–2205
M 8	725–1145	M 56	825–2205
M 9	725–1255	M 63	825–2205
M 10	725–1255	M 67	825–2205
M 11	725–1255	M 75	825–2205
M 12.5	725–1255	M 80	865–2245
M 14	765–1295	M 90	865–2245
M 16	765–1295	M 100	865–2245
M 18	765–1445		

size	length of the chamber L [mm]	size	length of the chamber L [mm]
P 1	740–740	P 18	765–1295
P 2	740–740	P 20	765–1295
P 2,2	740–740	P 22	765–1295
P 2,5	740–780	P 25	765–1445
P 2,8	740–780	P 28	765–1445
P 3,15	740–905	P 31,5	785–1465
P 3,5	740–905	P 34	785–1465
P 4	740–905	P 36	785–1625
P 4,5	740–905	P 40	785–1735
P 5	725–890	P 45	785–2165
P 5,6	725–890	P 48	785–2165
P 6,3	725–985	P 50	825–2205
P 7,1	725–985	P 53	825–2205
P 8	725–985	P 56	825–2205
P 9	725–985	P 63	825–2205
P 10	725–1145	P 67	825–2205
P 11	725–1145	P 75	825–2205
P 12,5	765–1185	P 80	865–2245
P 14	765–1295	P 90	865–2245
P 16	765–1295	P 100	865–2245

size	length of the chamber L [mm]	size	length of the chamber L [mm]
T 56	825–2205	T 80	865–2245
T 63	825–2205	T 90	865–2245
T 67	825–2205	T 100	865–2245
T 75	825–2205		

Design

- The fan impeller with backward curved blades (fitted with a hub) is attached directly on the motor shaft.
- The impeller is statically and dynamically balanced (intensity of vibration is lower than 2.8 mm/s, according to DIN ISO 14694).
- Fans with the motor are stored on common frame which is secured to the casing of chamber via the vibration isolators.
- Access to the fan´s aggregate unit is allowed through the servicing door.
- Probes for measuring static pressure or airflow.
- Motor is controlled by a frequency inverter, protection IP20 – inverter attached.
- The motor includes PTC thermistor.

Non-standard equipment (according to customer´s requirements)

- Chamber lighting system
- Service visor
- Service switch
- Protective perforated cover behind the servicing door
- Frequency converter with protection IP54 or IP20
- Motors with higher thermal resistance
- Thermocontact

Design recommendation

- Due to the thermal resistance of the electric motor, the temperature of air transported through the fan must not exceed +40 °C
- The electric motor must be controlled by a frequency converter (except EC and PMblue fans) of the rotation speed, due to ensuring proper starting and stopping times of individual fans, see the installation and operating instructions

Motors used:

- Three-phase asynchronous motors with short rotor, in aluminium or cast iron frame, according to DIN-IEC and EN 60034-1
- Efficiency class IE2, IE3, IE4 (EC and PMblue)
- Rated voltage up to 3 kW: 230 VD / 400 VY, 50 Hz // 460 VY
- Nominal voltage over 3 kW: 400 VD / 690 VY, 50 Hz // 460 VD
- Number of poles: 2, 4, 6, 8
- Temperature class of the insulation F
- Grade of protection IP55 according to DIN EN 60529
- Motors are shipped together with terminal plate
- All the motors are equipped with lifetime bearings (lifetime of the bearings at the maximum load equals 20 000 working hours at least)
- Motors of the types from the axial height of 315 up are fitted with open bearings with lubrication device
- All the motors are balanced according to DIN EN 6034-14
- Temperature resistance: -20 / +40 °C

Fans used – free impellers:

Composite impeller

- Impellers with the diameter of 250 to 630 mm, fitted with hubs and inlet diffuser with a measuring nozzle
- The impellers are balanced according to DIN ISO 8821
- Temperature resistance: -20 / +80 °C

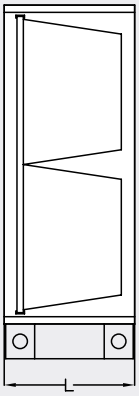
Steel impeller

- Impellers in sizes from 225 to 1120 mm, fitted with hubs and inlet diffuser with a measuring nozzle
- The impellers are powder coated (RAL 5002)
- The impellers are balanced according to DIN ISO 8821
- Temperature resistance: max. +80 °C

5.2 FILTRATION CHAMBERS WITH BAG FILTERS

They are used for separation of the solid polluting additives out of the transferred air.

View from the side of servicing staff



size	length of the chamber L [mm]*	length of the chamber L [mm]**	length of the chamber L [mm]***	size	length of the chamber L [mm]*	length of the chamber L [mm]**	length of the chamber L [mm]***
M 2	445	585	715	M 20	485	625	755
M 2.2	445	585	715	M 22	485	625	755
M 2.5	445	585	715	M 25	485	625	755
M 2.8	445	585	715	M 28	485	625	755
M 3.15	445	585	715	M 31.5	505	645	775
M 3.5	445	585	715	M 34	505	645	775
M 4	445	585	715	M 36	505	645	775
M 4.5	445	585	715	M 40	505	645	775
M 5	445	585	715	M 45	595	645	775
M 5.6	445	585	715	M 48	595	645	775
M 6.3	445	585	715	M 50	645	645	775
M 7.1	445	585	715	M 53	685	685	815
M 8	445	585	715	M 56	685	685	815
M 9	445	585	715	M 63	685	685	815
M 10	445	585	715	M 67	1045	1185	1315
M 11	445	585	715	M 75	1045	1185	1315
M 12.5	445	585	715	M 80	1085	1225	1355
M 14	445	585	715	M 90	1085	1225	1355
M 16	445	585	715	M 100	1085	1225	1355
M 18	485	625	755				

* chamber with the pocket filter, length 360 mm
** chamber with the pocket filter, length 500 mm
*** chamber with the pocket filter, length 630 mm

size	length of the chamber L [mm]*	length of the chamber L [mm]**	length of the chamber L [mm]***	size	length of the chamber L [mm]*	length of the chamber L [mm]**	length of the chamber L [mm]***
P 1	445	585	715	P 18	445	585	715
P 2	445	585	715	P 20	485	625	755
P 2,2	445	585	715	P 22	485	625	755
P 2,5	445	585	715	P 25	575	625	755
P 2,8	445	585	715	P 28	575	625	755
P 3,15	445	585	715	P 31,5	595	645	775
P 3,5	445	585	715	P 34	595	645	775
P 4	445	585	715	P 36	595	645	775
P 4,5	445	585	715	P 40	595	645	775
P 5	445	585	715	P 45	645	645	775
P 5,6	445	585	715	P 48	645	645	775
P 6,3	445	585	715	P 50	645	645	775
P 7,1	445	585	715	P 53	1045	1185	1315
P 8	445	585	715	P 56	1045	1185	1315
P 9	445	585	715	P 63	1045	1185	1315
P 10	445	585	715	P 67	1045	1185	1315
P 11	445	585	715	P 75	1045	1185	1315
P 12,5	445	585	715	P 80	1085	1225	1355
P 14	445	585	715	P 90	1085	1225	1355
P 16	445	585	715	P 100	1085	1225	1355

size	length of the chamber L [mm]*	length of the chamber L [mm]**	length of the chamber L [mm]***	size	length of the chamber L [mm]*	length of the chamber L [mm]**	length of the chamber L [mm]***
T 56	725	725	855	T 80	1085	1225	1355
T 63	1085	1225	1355	T 90	1085	1225	1355
T 67	1085	1225	1355	T 100	1085	1225	1355
T 75	1085	1225	1355				

Filtration classes used

Eurovent	EU3	EU4	EU5	EU6	EU7	EU8	EU9
EN 779:2011	G3	G4	M5	M6	F7	F8	F9
Length of inserts [mm]	360	360	500/630	630	630	630	630

Design

- Filters comply with standards according to EN 779:2011
- Filtration chamber is fitted with clothing pocket filters, filtration class G3 to F9
- Lengths of the chambers vary according to the filtration class used
- Plastic frame of the filter – temperature resistance up to 75 °C
- The filter elements are mounted on skids or in storage frames. They may be removed through the door from the service side of the chamber.

Non-standard equipment (according to customer´s requirements)

- Metal frame of the filters – temperature resistance up to 100 °C
- Differential manometer
- Liquid manometer with inclined tube intended for visual check of filter clogging
- Service visor
- Higher classes of filtration according to EN 1822:2010 – E10 to H13, they should be consulted with a manufacturer

Design recommendation

- The second grade of filtration shall be located behind the fan chamber
- You may use chamber modification for the frame and bag filters, containing both the filtration grades

Composition of filtration inserts

Square-type cross section

size	composition of filtration inserts								
M 2	1 × 440 × 440								
M 2.2	1 × 440 × 440								
M 2.5	1 × 490 × 490								
M 2.8	1 × 520 × 520								
M 3.15	1 × 540 × 540								
M 3.5	1 × 592 × 592								
M 4	1 × 592 × 592								
M 4.5	1 × 270 × 270	1 × 270 × 390	1 × 390 × 270	1 × 390 × 390					
M 5	1 × 287 × 287	1 × 287 × 402	1 × 402 × 287	1 × 402 × 402					
M 5.6	2 × 287 × 370	2 × 440 × 370							
M 6.3	1 × 490 × 490	1 × 490 × 287	1 × 287 × 490	1 × 287 × 287					
M 7.1	2 × 287 × 490	2 × 540 × 420							
M 8	4 × 440 × 440								
M 9	1 × 440 × 490	1 × 440 × 440	1 × 490 × 490	1 × 490 × 440					
M 10	4 × 490 × 490								
M 11	1 × 440 × 592	1 × 440 × 440	1 × 592 × 592	1 × 592 × 440					
M 12.5	1 × 592 × 592	1 × 592 × 490	1 × 490 × 592	1 × 490 × 490					
M 14	4 × 592 × 592								
M 16	4 × 592 × 592								
M 18	1 × 402 × 897	1 × 402 × 440	1 × 440 × 440	1 × 490 × 897	1 × 490 × 440				
M 20	1 × 402 × 897	1 × 402 × 490	2 × 490 × 897	2 × 490 × 490					
M 22	1 × 402 × 897	1 × 402 × 592	1 × 490 × 897	1 × 490 × 592	1 × 592 × 897	1 × 592 × 592			
M 25	2 × 592 × 897	2 × 592 × 592	1 × 402 × 897	1 × 402 × 592					
M 28	2 × 440 × 592	1 × 440 × 440	4 × 592 × 592	2 × 592 × 440					
M 31.5	9 × 592 × 592								
M 34	1 × 440 × 790	1 × 440 × 592	1 × 440 × 440	1 × 592 × 790	1 × 592 × 592	1 × 592 × 440	1 × 790 × 790	1 × 790 × 592	1 × 790 × 440
M 36	2 × 490 × 897	4 × 490 × 490	1 × 897 × 897	2 × 897 × 490					
M 40	4 × 490 × 897	4 × 490 × 592	4 × 490 × 490						
M 45	3 × 490 × 897	6 × 490 × 592	1 × 592 × 897	2 × 592 × 592					
M 48	1 × 440 × 897	2 × 440 × 592	1 × 490 × 897	2 × 490 × 592	2 × 592 × 897	4 × 592 × 592			
M 50	2 × 592 × 897	4 × 592 × 592	2 × 490 × 897	4 × 490 × 592					
M 53	2 × 490 × 897	1 × 490 × 402	6 × 592 × 897	3 × 592 × 402					
M 56	8 × 592 × 897	4 × 592 × 490							
M 63	20 × 490 × 592								
M 67	16 × 592 × 592								
M 75	1 × 592 × 592	4 × 592 × 490	4 × 490 × 592	16 × 490 × 490					
M 80	16 × 592 × 592	4 × 592 × 287	4 × 287 × 592	1 × 287 × 287					
M 90	16 × 592 × 592	4 × 592 × 490	4 × 490 × 592	1 × 490 × 490					
M 100	25 × 592 × 592								

Rectangular cross-section

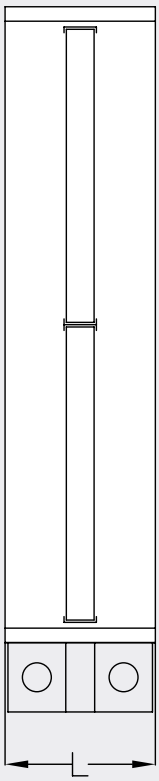
size	composition of filtration inserts			
P 1	1 × 340 × 290			
P 2	1 × 640 × 290			
P 2,2	1 × 660 × 320			
P 2,5	2 × 340 × 350			
P 2,8	1 × 287 × 370	1 × 440 × 370		
P 3,15	2 × 390 × 390			
P 3,5	1 × 287 × 420	1 × 540 × 420		
P 4	2 × 440 × 440			
P 4,5	2 × 440 × 490			
P 5	2 × 440 × 540			
P 5,6	2 × 490 × 540			
P 6,3	2 × 490 × 592			
P 7,1	1 × 440 × 370	1 × 440 × 287	1 × 592 × 370	1 × 592 × 287
P 8	1 × 592 × 402	1 × 592 × 287	1 × 490 × 402	1 × 490 × 287
P 9	4 × 592 × 370			
P 10	3 × 402 × 490	3 × 402 × 287		
P 11	2 × 402 × 420	4 × 440 × 420		
P 12,5	1 × 402 × 287	1 × 402 × 592	2 × 490 × 287	
P 14	3 × 490 × 490	3 × 490 × 440		
P 16	4 × 592 × 490	2 × 402 × 490		
P 18	1 × 490 × 592	1 × 490 × 440	2 × 592 × 592	1 × 592 × 440
P 20	3 × 592 × 592	3 × 592 × 490		
P 22	2 × 490 × 592	2 × 490 × 540	1 × 897 × 592	1 × 897 × 540
P 25	8 × 490 × 592			
P 28	3 × 490 × 897	3 × 490 × 440	3 × 592 × 897	1 × 592 × 440
P 31,5	2 × 592 × 897	2 × 592 × 490	2 × 490 × 897	2 × 490 × 490
P 34	1 × 490 × 897	1 × 490 × 540	3 × 592 × 897	3 × 592 × 540
P 36	4 × 592 × 897	4 × 592 × 592		
P 40	4 × 592 × 897	4 × 592 × 592		
P 45	12 × 592 × 592			
P 48	4 × 592 × 897	8 × 592 × 490		
P 50	4 × 592 × 897	4 × 592 × 592	4 × 592 × 402	
P 53	4 × 592 × 592	8 × 592 × 490	4 × 592 × 287	
P 56	4 × 592 × 490	16 × 490 × 490		
P 63	12 × 592 × 592	4 × 592 × 287	3 × 287 × 592	1 × 287 × 287
P 67	6 × 592 × 592	6 × 592 × 490	4 × 490 × 592	4 × 490 × 490
P 75	12 × 592 × 592	4 × 592 × 490	3 × 490 × 592	1 × 490 × 490
P 80	20 × 592 × 592			
P 90	15 × 592 × 490	15 × 490 × 490		
P 100	8 × 592 × 592	12 × 592 × 490	4 × 490 × 592	6 × 490 × 490

size	composition of filtration inserts			
T 56	8 × 592 × 897	48 × 592 × 490		
T 63	10 × 592 × 490	10 × 490 × 490		
T 67	4 × 592 × 592	6 × 592 × 490	4 × 490 × 592	6 × 490 × 490
T 75	10 × 592 × 592	10 × 490 × 592		
T 80	4 × 592 × 592	8 × 592 × 490	4 × 490 × 592	8 × 490 × 490
T 90	8 × 592 × 592	4 × 592 × 490	8 × 490 × 592	4 × 490 × 490
T 100	12 × 592 × 592	12 × 490 × 592		

5.3 FILTRATION CHAMBERS WITH FRAME FILTERS (pre-filters)

They are used for separation of the solid polluting additives out of the air transferred.

View from the side of servicing staff



size	length of the chamber L [mm]	size	length of the chamber L [mm]
M 2	260	M 20	500
M 2.2	260	M 22	500
M 2.5	260	M 25	500
M 2.8	260	M 28	500
M 3.15	260	M 31.5	520
M 3.5	260	M 34	520
M 4	260	M 36	520
M 4.5	260	M 40	620
M 5	260	M 45	620
M 5.6	260	M 48	620
M 6.3	260	M 50	670
M 7.1	260	M 53	710
M 8	260	M 56	710
M 9	260	M 63	710
M 10	260	M 67	860
M 11	260	M 75	860
M 12.5	300	M 80	900
M 14	300	M 90	900
M 16	300	M 100	900
M 18	500		

size	length of the chamber L [mm]	size	length of the chamber L [mm]
P 1	260	P 18	500
P 2	260	P 20	500
P 2,2	260	P 22	500
P 2,5	260	P 25	600
P 2,8	260	P 28	600
P 3,15	260	P 31,5	620
P 3,5	260	P 34	620
P 4	260	P 36	620
P 4,5	260	P 40	620
P 5	260	P 45	670
P 5,6	260	P 48	670
P 6,3	260	P 50	670
P 7,1	260	P 53	860
P 8	260	P 56	860
P 9	260	P 63	860
P 10	460	P 67	860
P 11	460	P 75	860
P 12,5	500	P 80	900
P 14	500	P 90	900
P 16	500	P 100	900

size	length of the chamber L [mm]	size	length of the chamber L [mm]
T 56	710	T 80	900
T 63	860	T 90	900
T 67	860	T 100	900
T 75	860		

Filtration classes used

Eurovent	EU3	EU4	EU5
EN 779:2011	G3	G4	M5
Length of inserts [mm	48	48	48

Implementation

- Filters comply with standards according to EN 779:2011
- The filter elements are mounted on skids or in storage frames. They may be removed through the door from the service side of the chamber.
- A chamber is fitted with frame filters (pre-filters) of filtration class G3 to F9
- Cardboard frame of the filter – temperature resistance up to 80 °C

Non-standard equipment (according to customer´s requirements)

- Plastic frame of the filters – temperature resistance up to 80 °C
- Differential manometer
- Liquid manometer with inclined tube intended for visual check of filter clogging

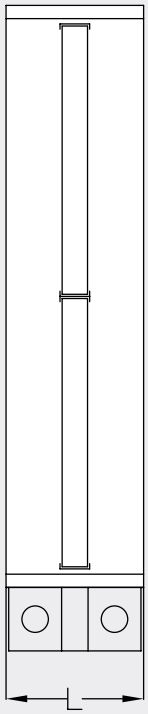
Design recommendation

- They are used as the first stage of filtration

5.4 FILTRATION CHAMBERS WITH METAL FILTERS

They are used for separation of outdoor and circular air from oil and grease aerosols or for detection of high concentrations of the coarsest dust particles.

View from the side of servicing staff



size	length of the chamber L [mm]	size	length of the chamber L [mm]
M 2	260	M 20	500
M 2.2	260	M 22	500
M 2.5	260	M 25	500
M 2.8	260	M 28	500
M 3.15	260	M 31.5	520
M 3.5	260	M 34	520
M 4	260	M 36	520
M 4.5	260	M 40	620
M 5	260	M 45	620
M 5.6	260	M 48	620
M 6.3	260	M 50	670
M 7.1	260	M 53	710
M 8	260	M 56	710
M 9	260	M 63	710
M 10	260	M 67	860
M 11	260	M 75	860
M 12.5	260	M 80	900
M 14	260	M 90	900
M 16	260	M 100	900
M 18	500		

size	length of the chamber L [mm]	size	length of the chamber L [mm]
P 1	260	P 18	460
P 2	260	P 20	500
P 2,2	260	P 22	500
P 2,5	260	P 25	600
P 2,8	260	P 28	600
P 3,15	260	P 31,5	620
P 3,5	260	P 34	620
P 4	260	P 36	620
P 4,5	260	P 40	620
P 5	260	P 45	670
P 5,6	260	P 48	670
P 6,3	260	P 50	670
P 7,1	260	P 53	860
P 8	260	P 56	860
P 9	260	P 63	860
P 10	460	P 67	860
P 11	460	P 75	860
P 12,5	460	P 80	900
P 14	460	P 90	900
P 16	460	P 100	900

size	length of the chamber L [mm]	size	length of the chamber L [mm]
T 56	750	T 80	900
T 63	900	T 90	900
T 67	900	T 100	900
T 75	900		

Filtration classes used

Eurovent	EU3
EN 779:2011	G3
Length of inserts [mm]	25

Implementation

- Filters comply with standards according to EN 779:2011
- A chamber is fitted with metal filters – filtration class G3 (regenerative)
- Aluminium frame of the filters – temperature resistance up to 200 °C
- The filter elements are mounted on skids or in storage frames. They may be removed through the door from the service side of the chamber.

Non-standard equipment (according to customer´s requirements)

- Stainless steel design
- Chambers may be fitted with a bath, aiming to collect grease and fat
- Differential manometer
- Liquid manometer with inclined tube intended for visual check of filter clogging

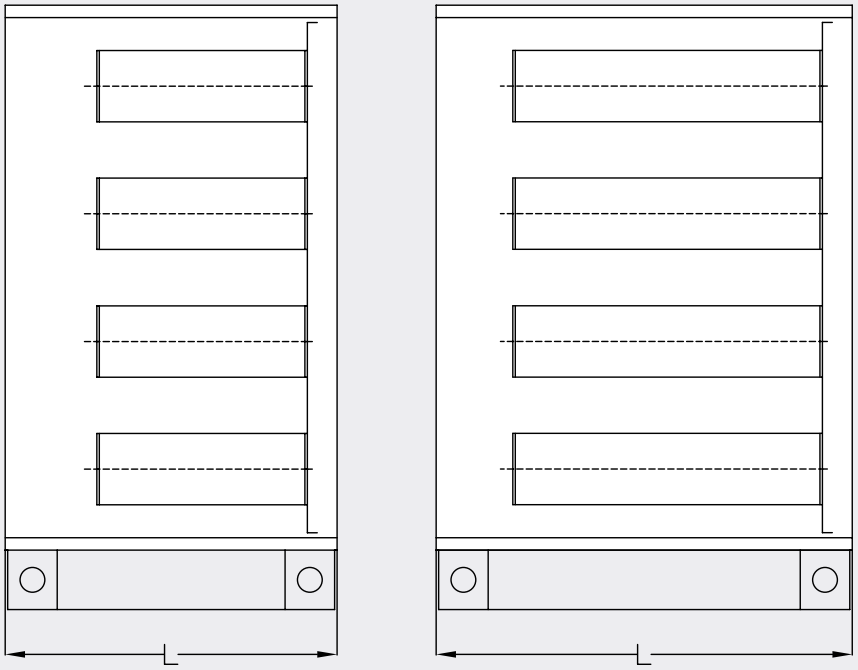
Design recommendation

- It is used to capture grease and oil aerosols in the exhaust from kitchens, baking rooms, smoke houses or cookeries
- Capture of the coarsest dust particles in foundries, smelters and in steel processing industry

5.5 FILTRATION CHAMBERS WITH ACTIVE COAL

They are used for separation of molecular pollution of the transferred air.

View from the side of servicing staff



size	length of the chamber L [mm]*	length of the chamber L [mm]**	size	length of the chamber L [mm]*	length of the chamber L [mm]**
M 2	670	835	M 20	710	875
M 2.2	670	835	M 22	710	875
M 2.5	670	835	M 25	710	875
M 2.8	670	835	M 28	710	875
M 3.15	670	835	M 31.5	730	895
M 3.5	670	835	M 34	730	895
M 4	670	835	M 36	730	895
M 4.5	670	835	M 40	730	895
M 5	670	835	M 45	730	895
M 5.6	670	835	M 48	730	895
M 6.3	670	835	M 50	730	895
M 7.1	670	835	M 53	770	935
M 8	670	835	M 56	770	935
M 9	670	835	M 63	770	935
M 10	670	835	M 67	770	935
M 11	670	835	M 75	770	935
M 12.5	670	835	M 80	810	975
M 14	670	835	M 90	810	975
M 16	670	835	M 100	810	975
M 18	710	875			

* chamber with short cartridge [450 mm]

** chamber with long cartridge [625 mm]

size	length of the chamber L [mm]*	length of the chamber L [mm]**	size	length of the chamber L [mm]*	length of the chamber L [mm]**
P 1	670	835	P 18	670	835
P 2	670	835	P 20	710	875
P 2,2	670	835	P 22	710	875
P 2,5	670	835	P 25	710	875
P 2,8	670	835	P 28	710	875
P 3,15	670	835	P 31,5	730	895
P 3,5	670	835	P 34	730	895
P 4	670	835	P 36	730	895
P 4,5	670	835	P 40	730	895
P 5	670	835	P 45	730	895
P 5,6	670	835	P 48	730	895
P 6,3	670	835	P 50	730	895
P 7,1	670	835	P 53	770	935
P 8	670	835	P 56	770	935
P 9	670	835	P 63	770	935
P 10	670	835	P 67	770	935
P 11	670	835	P 75	770	935
P 12,5	670	835	P 80	810	975
P 14	670	835	P 90	810	975
P 16	670	835	P 100	810	975

size	length of the chamber L [mm]*	length of the chamber L [mm]**	size	length of the chamber L [mm]*	length of the chamber L [mm]**
T 56	810	975	T 80	810	975
T 63	810	975	T 90	810	975
T 67	810	975	T 100	810	975
T 75	810	975			

* chamber with short cartridge [450 mm]
** chamber with long cartridge [625 mm]

Cartridges, length 450 mm:

size	number of cartridges [pieces]	filling [kg]	flow [m³/h]	size	number of cartridges [pieces]	filling [kg]	flow [m³/h]
				P1	4	8	750
M2	9	18	1650	P2	8	16	1500
M2,5	9	18	1650	P2,5	8	16	1500
M3,15	9	18	1650	P3,15	10	20	1870
M4	16	32	3000	P4	15	30	2800
M5	16	32	3000	P5	15	30	2800
M6,3	25	50	4650	P6,3	24	48	4500
M8	25	50	4650	P8	28	56	5250
M10	36	72	6750	P10	40	80	7500
M12,5	49	98	9150	P12,5	45	90	8400
M16	64	128	12 000	P16	60	120	11 250
M20	81	162	15 150	P20	77	154	14 400
M25	100	200	18 750	P25	96	192	18 000
M31,5	121	242	22 650	P31,5	117	234	21 900
M40	144	288	27 000	P40	130	260	24 350
M50	196	392	36 750	P50	192	384	36 000
M53	196	392	36 750	P53	192	384	36 000
M56	196	392	36 750	P56	192	384	36 000
M63	256	512	48 000	P63	221	442	41 400
M67	256	512	48 000	P67	221	442	41 400
M75	256	512	48 000	P75	221	442	41 400
M80	256	512	48 000	P80	300	600	56 250
M90	256	512	48 000	P90	300	600	56 250
M100	289	578	54 150	P100	300	600	56 250

size	number of cartridges [pieces]	filling [kg]	flow [m³/h]	size	number of cartridges [pieces]	filling [kg]	flow [m³/h]
T56	196	392	36 750	T80	266	532	49 850
T63	210	420	39 350	T90	280	560	52 500
T67	224	448	42 000	T100	308	616	57 750
T75	252	504	47 250				

Cartridges, length 625 mm:

size	number of cartridges [pieces]	filling [kg]	flow [m³/h]	size	number of cartridges [pieces]	filling [kg]	flow [m³/h]
				P1	4	10	900
M2	9	22,5	2000	P2	8	20	1800
M2,5	9	22,5	2000	P2,5	8	20	1800
M3,15	9	22,5	2000	P3,15	10	25	2250
M4	16	40	3600	P4	15	37,5	3350
M5	16	40	3600	P5	15	37,5	3350
M6,3	25	62,5	5600	P6,3	24	60	5400
M8	25	62,5	5600	P8	28	70	6300
M10	36	90	8100	P10	40	100	9000
M12,5	49	123	11 000	P12,5	45	113	10 000
M16	64	160	14 400	P16	60	150	13 500
M20	81	203	18 200	P20	77	193	17 300
M25	100	250	22 500	P25	96	240	21 600
M31,5	121	303	27 200	P31,5	117	293	26 300
M40	144	360	32 400	P40	130	325	29 250
M50	196	490	44 100	P50	192	480	43 200
M53	196	490	44 100	P53	192	480	43 200
M56	196	490	44 100	P56	192	480	43 200
M63	256	640	57 600	P63	221	553	49 700
M67	256	640	57 600	P67	221	553	49 700
M75	256	640	57 600	P75	221	553	49 700
M80	256	640	57 600	P80	300	750	67 500
M90	256	640	57 600	P90	300	750	67 500
M100	289	723	65 000	P100	300	750	67 500

size	number of cartridges [pieces]	filling [kg]	flow [m³/h]	size	number of cartridges [pieces]	filling [kg]	flow [m³/h]
T56	196	490	44 100	T80	266	665	59 800
T63	210	525	47 250	T90	280	700	63 000
T67	224	560	50 400	T100	308	770	69 300
T75	252	630	56 700				

Implementation

- Cartridges with active coal are mounted in storage frames fitted with bayonet mount
- The cartridges are removable through a door
- Non-impregnated active coal, granules (regenerative)
- Iodine value, minimum 1,050 mg/g
- Length of cartridges 425 or 625 mm

Non-standard equipment (according to customer´s requirements)

- Impregnated active coal (no regeneration)
- Service /access door

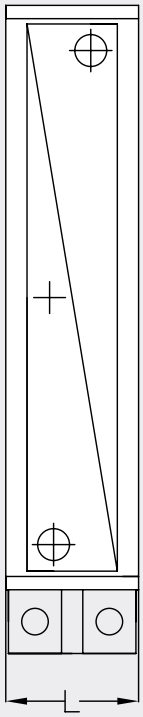
Design recommendation

- Non-impregnated active coal is suitable for adsorption of organic hydrocarbons, odours and harmful gases
- Impregnated active coal is applied for adsorption of such gases and vapours which are very little or not at all adsorbed by standard active coal. These are low molecular and polar substances with low concentration and toxic effects.
- Use of a right kind of active coal should be consulted with the manufacturer (concentration and type of contaminants)
- The maximum temperature if the air being filtered must not exceed 40 °C and 70 % of relative humidity
- Before entering the chamber with the active coal, it is necessary to filter the air by using a filter of the class at least F7
- To ensure required separation of pollutants, the air flow through cartridges with active coal is limited. The maximum flow in different sizes is listed in the tables, according to number of the cartridges in use.

5.6 HEATING CHAMBERS – WATER

They are used for heating the air (pre-heating and post-heating).

View from the side of servicing person



size	length of the chamber L [mm]*	length of the chamber L [mm]**	length of the chamber L [mm]***	size	length of the chamber L [mm]*	length of the chamber L [mm]**	length of the chamber L [mm]***
M 2	185–395	265–475	630–840	M 20	285–435	365–515	1000–1150
M 2.2	195–425	275–505	640–870	M 22	285–465	365–545	1000–1180
M 2.5	185–395	265–475	630–840	M 25	285–435	365–515	1000–1150
M 2.8	195–425	275–505	640–870	M 28	285–465	365–545	1000–1180
M 3.15	185–395	265–475	630–840	M 31.5	305–455	385–535	1020–1170
M 3.5	195–425	275–505	640–870	M 34	305–485	385–565	1020–1200
M 4	215–395	295–475	660–840	M 36	305–485	385–565	1020–1200
M 4.5	195–425	275–505	640–870	M 40	325–455	405–535	1040–1170
M 5	215–395	295–475	660–840	M 45	305–485	385–565	1020–1200
M 5.6	195–425	275–505	640–870	M 48	325–485	405–565	1040–1200
M 6.3	215–395	295–475	760–940	M 50	325–455	405–535	1070–1200
M 7.1	195–425	275–505	740–970	M 53	365–525	445–605	1110–1270
M 8	215–395	295–475	760–940	M 56	365–525	445–605	1110–1270
M 9	195–425	275–505	740–970	M 63	365–525	445–605	1110–1270
M 10	215–395	295–475	760–940	M 67	365–525	445–605	1110–1270
M 11	195–425	275–505	740–970	M 75	365–525	445–605	1110–1270
M 12.5	245–395	325–475	790–940	M 80	405–565	485–645	1150–1310
M 14	195–425	275–505	740–970	M 90	405–565	485–645	1150–1310
M 16	245–395	325–475	790–940	M 100	405–565	485–645	1150–1310
M 18	285–435	365–515	830–980				

size	length of the chamber L [mm]*	length of the chamber L [mm]**	length of the chamber L [mm]***	size	length of the chamber L [mm]*	length of the chamber L [mm]**	length of the chamber L [mm]***
P 1	190–420	270–500	635–865	P 18	255–425	335–505	830–1000
P 2	190–420	270–500	635–865	P 20	285–435	365–515	1030–1080
P 2,2	195–425	275–505	640–870	P 22	295–465	375–545	1040–1210
P 2,5	190–420	270–500	635–865	P 25	285–435	365–515	1030–1080
P 2,8	195–425	275–505	640–870	P 28	285–465	365–545	1030–1210
P 3,15	190–420	270–500	635–865	P 31,5	305–455	385–565	1050–1200
P 3,5	195–425	275–505	640–870	P 34	305–485	385–565	1050–1230
P 4	215–395	295–475	660–840	P 36	305–485	385–565	1050–1230
P 4,5	195–425	275–505	640–870	P 40	325–455	405–535	1070–1200
P 5	215–395	295–475	660–840	P 45	305–485	385–565	1050–1230
P 5,6	195–425	275–505	640–870	P 48	325–485	405–565	1070–1230
P 6,3	215–395	295–475	760–940	P 50	325–455	405–535	1070–1200
P 7,1	195–425	275–505	740–970	P 53	365–525	445–605	1110–1270
P 8	215–395	295–475	760–970	P 56	365–525	445–605	1110–1270
P 9	195–425	275–505	770–1000	P 63	365–525	445–605	1110–1270
P 10	245–395	325–475	820–970	P 67	405–525	485–605	1150–1270
P 11	195–425	275–505	770–1000	P 75	405–525	485–605	1150–1270
P 12,5	245–395	325–475	820–970	P 80	445–565	525–645	1190–1310
P 14	195–425	275–505	770–1000	P 90	445–565	525–645	1190–1310
P 16	245–395	325–475	820–970	P 100	445–565	525–645	1190–1310

size	length of the chamber L [mm]*	length of the chamber L [mm]**	length of the chamber L [mm]***	size	length of the chamber L [mm]*	length of the chamber L [mm]**	length of the chamber L [mm]***
T 56	405–565	485–645	1150–1310	T 80	385–565	465–645	1130–1310
T 63	405–565	485–645	1150–1310	T 90	405–565	485–645	1150–1310
T 67	385–565	465–645	1130–1310	T 100	405–565	485–645	1150–1310
T 75	385–565	465–645	1130–1310				

* chamber with 1 to 8 line exchanger
** chamber with 1 to 8 line exchanger, including capillary frame
*** chamber with 1 to 8 line exchanger, including a free chamber

Implementation

- Chambers contain an exchanger fitted with finned heat transfer surface in the version of Cu/Al (Cu tubes and Al lamellas)
- Inlet and outlet necks are threaded (they are fitted with a plastic cover plug intended for transport purposes)
- There is a vent valve in the upper neck of the exchanger. There is a drain valve installed in the lower neck.
- Neck outfall into the service side of the unit or to the lateral sides of the unit
- If necessary (servicing, cleaning), the exchanger may be removed to the service side, together with the front panel
- Operational temperature of water is 150 °C, operational pressure is 0.8 MPa (exchangers are tested at the pressure of 2 MPa)
- As option is possibility to do chamber for place mixing set

Design recommendation

- To make installation and check of features of the freezing protection easier, we recommend placing a frame for capillary just behind the heater.

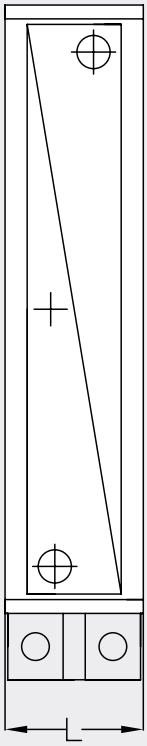
Non-standard equipment (according to customer´s requirements)

- Stainless steel

5.7 HEATING CHAMBERS – STEAM

They are used for heating the air (pre-heating and post-heating).

View from the side of servicing person



size	length of the chamber L [mm]*	length of the chamber L [mm]**	size	length of the chamber L [mm]*	length of the chamber L [mm]**
M 2	215	290	M 20	285	360
M 2.2	225	300	M 22	305	380
M 2.5	215	290	M 25	305	380
M 2.8	255	330	M 28	305	380
M 3.15	215	290	M 31.5	325	400
M 3.5	225	300	M 34	325	400
M 4	245	300	M 36	325	400
M 4.5	225	300	M 40	365	440
M 5	245	320	M 45	365	440
M 5.6	225	300	M 48	365	440
M 6.3	245	320	M 50	365	440
M 7.1	225	300	M 53	405	480
M 8	245	320	M 56	405	480
M 9	225	300	M 63	415	490
M 10	245	320	M 67	415	490
M 11	225	300	M 75	415	490
M 12.5	245	320	M 80	455	530
M 14	225	300	M 90	445	520
M 16	245	320	M 100	445	520
M 18	285	360			

size	length of the chamber L [mm]*	length of the chamber L [mm]**	size	length of the chamber L [mm]*	length of the chamber L [mm]**
P 1	245	320	P 18	265	340
P 2	245	320	P 20	305	380
P 2,2	245	320	P 22	305	380
P 2,5	245	320	P 25	305	380
P 2,8	245	320	P 28	305	380
P 3,15	245	320	P 31,5	325	400
P 3,5	245	320	P 34	325	400
P 4	245	320	P 36	365	440
P 4,5	225	300	P 40	365	440
P 5	245	320	P 45	365	440
P 5,6	225	300	P 48	365	440
P 6,3	245	320	P 50	365	440
P 7,1	225	300	P 53	405	480
P 8	245	320	P 56	405	480
P 9	225	300	P 63	415	490
P 10	245	320	P 67	415	490
P 11	225	300	P 75	415	490
P 12,5	245	320	P 80	455	530
P 14	225	300	P 90	455	530
P 16	245	320	P 100	506	580

size	length of the chamber L [mm]*	length of the chamber L [mm]**	size	length of the chamber L [mm]*	length of the chamber L [mm]**
T 56	455	530	T 80	405	480
T 63	455	530	T 90	445	520
T 67	405	480	T 100	445	520
T 75	405	480			

* chamber with 2 line exchanger
** chamber with 2 line exchanger, including capillary frame

Implementation

- Chambers contain an exchanger fitted with finned heat transfer surface in the version of Cu/Al (Cu tubes and Al lamellas)
- Inlet and outlet necks are threaded (they are fitted with a plastic cover plug intended for transport purposes)
- There is a vent valve in the upper neck of the exchanger. There is a drain valve installed in the lower neck.
- Neck outfall into the service side of the unit or to the lateral sides of the unit
- If necessary (servicing, cleaning), the exchanger may be removed to the service side, together with the front panel
- Operational temperature of steam 150 °C, operational pressure 1,5 MPa (exchangers are tested at the pressure of 3 MPa)

Non-standard equipment (according to customer´s requirements)

- Threaded flanges on inlet and outlet necks of the exchanger – according to EN 1092-1.

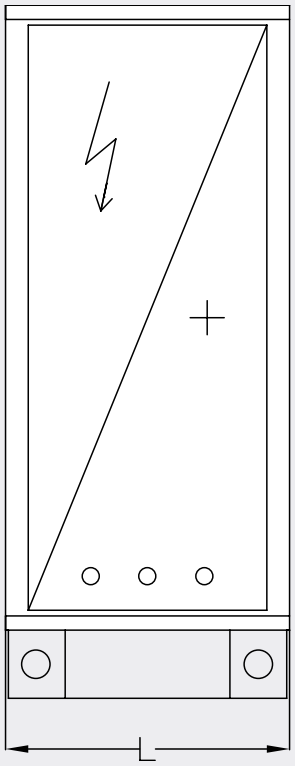
Design recommendation

- To make installation and check of features of the freezing protection easier, we recommend selecting a frame for capillary directly behind the heater
- Regarding the outdoor design, the steam pipes must be protected against freezing by using suitable insulation or heating cable

5.8 HEATING CHAMBERS – ELECTRIC

They are used for heating the air (pre-heating and post-heating).

View from the side of servicing person



size	length of the chamber L [mm]*	size	length of the chamber L [mm]*
M 2	505	M 20	495
M 2.2	505	M 22	495
M 2.5	395	M 25	495
M 2.8	395	M 28	495
M 3.15	395	M 31.5	515
M 3.5	395	M 34	515
M 4	395	M 36	515
M 4.5	395	M 40	515
M 5	395	M 45	515
M 5.6	395	M 48	515
M 6.3	395	M 50	515
M 7.1	395	M 53	555
M 8	395	M 56	555
M 9	395	M 63	555
M 10	455	M 67	555
M 11	455	M 75	555
M 12.5	515	M 80	595
M 14	515	M 90	595
M 16	395	M 100	595
M 18	435		

size	length of the chamber L [mm]*	size	length of the chamber L [mm]*
P 1	515	P 18	455
P 2	455	P 20	555
P 2,2	455	P 22	555
P 2,5	455	P 25	555
P 2,8	455	P 28	555
P 3,15	455	P 31,5	515
P 3,5	455	P 34	515
P 4	455	P 36	515
P 4,5	455	P 40	515
P 5	455	P 45	515
P 5,6	455	P 48	515
P 6,3	515	P 50	515
P 7,1	515	P 53	555
P 8	515	P 56	555
P 9	515	P 63	555
P 10	455	P 67	555
P 11	455	P 75	555
P 12,5	455	P 80	595
P 14	455	P 90	595
P 16	455	P 100	595

size	length of the chamber L [mm]*	size	length of the chamber L [mm]*
T 56	595	T 80	595
T 63	595	T 90	595
T 67	595	T 100	595
T 75	595		

Implementation

- Length of the chamber, according to performance required
- Heating bars are interconnected to several sections inside the chamber. Heating power of the heater is controlled by switching individual sections, respectively by thyristor continuous feature of power control.
- Access to the terminal after removing the cover on the operating side of the chamber
- Possibility to set up any power of the heater (230 V or 400 V)

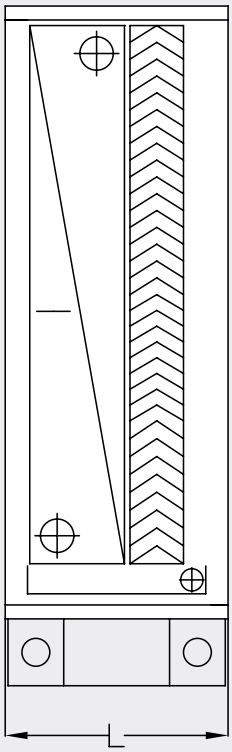
Design recommendation

- The minimum air flow rate 1 m/s, through the heater.
- Regulation feature must ensure blocking of electrical heater operation if the air flow through the unit and run-out of the fan do not last at least 3 minutes after turning the electric heater off.
- We recommend placing the electric heating feature to the end of the unit due to thermal resistance of the fan motor (up to 40 °C) and other components of the unit
- If there is a component containing flammable material mounted in the close vicinity to the heater, the minimum distance of 150 mm from any heating appliances must be maintained

5.9 COOLING CHAMBERS – WATER

They are used for cooling and moistening the air.

View from the side of servicing person



size	length of the chamber L [mm]*	size	length of the chamber L [mm]*
M 2	400–580	M 20	470–620
M 2.2	410–610	M 22	440–620
M 2.5	400–580	M 25	470–620
M 2.8	410–610	M 28	470–620
M 3.15	400–580	M 31.5	510–640
M 3.5	410–610	M 34	510–640
M 4	400–580	M 36	510–640
M 4.5	410–610	M 40	510–640
M 5	400–580	M 45	510–670
M 5.6	410–610	M 48	510–670
M 6.3	430–580	M 50	550–640
M 7.1	410–610	M 53	550–710
M 8	430–580	M 56	550–710
M 9	410–610	M 63	590–710
M 10	430–580	M 67	590–710
M 11	410–610	M 75	590–710
M 12.5	430–580	M 80	630–750
M 14	400–580	M 90	590–750
M 16	430–580	M 100	630–750
M 18	440–620		

size	length of the chamber L [mm]*	size	length of the chamber L [mm]*
P 1	410–605	P 18	440–610
P 2	410–605	P 20	470–620
P 2,2	410–610	P 22	470–650
P 2,5	410–605	P 25	470–620
P 2,8	410–610	P 28	470–650
P 3,15	410–605	P 31,5	510–640
P 3,5	410–610	P 34	510–670
P 4	400–580	P 36	510–670
P 4,5	410–610	P 40	510–640
P 5	400–580	P 45	510–670
P 5,6	410–610	P 48	550–670
P 6,3	400–580	P 50	550–640
P 7,1	410–610	P 53	550–710
P 8	430–580	P 56	590–710
P 9	410–610	P 63	590–710
P 10	430–580	P 67	590–710
P 11	410–610	P 75	590–710
P 12,5	430–580	P 80	630–750
P 14	410–610	P 90	630–750
P 16	430–580	P 100	630–750

size	length of the chamber L [mm]*	size	length of the chamber L [mm]*
T 56	590–750	T 80	590–750
T 63	630–750	T 90	590–750
T 67	590–750	T 100	590–750
T 75	590–750		

* chamber with 1 to 8 line exchanger

Design

- Chambers contain an exchanger fitted with finned heat transfer surface in the version of Cu/Al (Cu tubes and Al lamellas)
- Water is used as cooling liquid (the minimum operational temperature of the water must be chosen in such the ways that the water does not freeze). It is possible to use antifreeze blend with ethylene glycol or propylene glycol at the concentration of 10–60 %.
- Inlet and outlet necks are threaded (they are fitted with a plastic cover plug intended for transport purposes)
- There is a vent valve in the upper neck of the exchanger. There is a drain valve installed in the lower collector.
- The outlet of the necks towards the service side of the unit
- If necessary (servicing, cleaning), the exchanger may be removed to the service side, together with the front panel
- Operational temperature corresponds to a medium used, operational pressure is 1.5 MPa (exchangers are tested at the pressure of 2 MPa)
- There is a stainless steel bath fitted with the outlet for discharging a condensate (DN32), installed in the chamber
- The delivery includes a trap for discharging a condensate – it is enclosed with the assembly kit
- A chamber is equipped with a plastic flap eliminator

Non-standard equipment (according to customer´s requirements)

- Other antifreeze blends must be consulted with the manufacturer
- Threaded flanges for inlet and outlet necks of the exchanger – according to EN 1092-1
- A heat exchanger for higher operating pressures must be consulted with the manufacturer
- Service visor

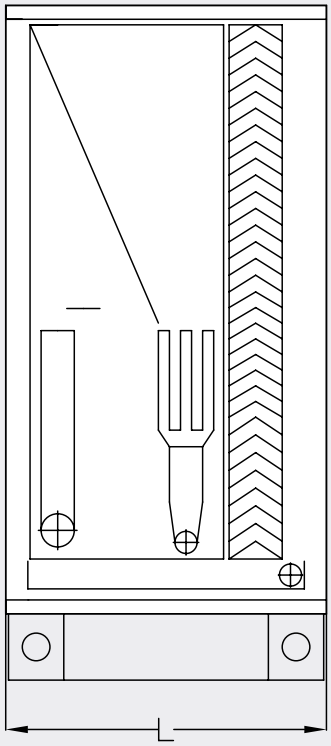
Design recommendation

- WARNING: During installation, you must connect a condensate outlet leading through the trap

5.10 COOLING CHAMBERS WITH DIRECT EVAPORATOR

They are used for cooling and moistening the air.

View from the side of servicing person



size	length of the chamber L [mm]*	size	length of the chamber L [mm]*
M 2	580	M 20	620
M 2.2	580	M 22	620
M 2.5	580	M 25	620
M 2.8	580	M 28	620
M 3.15	580	M 31.5	640
M 3.5	580	M 34	640
M 4	580	M 36	640
M 4.5	580	M 40	640
M 5	580	M 45	640
M 5.6	580	M 48	640
M 6.3	580	M 50	640
M 7.1	580	M 53	700
M 8	580	M 56	720
M 9	580	M 63	740
M 10	580	M 67	760
M 11	580	M 75	780
M 12.5	580	M 80	840
M 14	580	M 90	860
M 16	580	M 100	880
M 18	620		

size	length of the chamber L [mm]*	size	length of the chamber L [mm]*
P 1	605	P 18	620
P 2	605	P 20	620
P 2,2	605	P 22	620
P 2,5	605	P 25	620
P 2,8	605	P 28	620
P 3,15	605	P 31,5	640
P 3,5	605	P 34	640
P 4	580	P 36	640
P 4,5	580	P 40	640
P 5	580	P 45	640
P 5,6	580	P 48	640
P 6,3	580	P 50	640
P 7,1	580	P 53	700
P 8	580	P 56	720
P 9	580	P 63	740
P 10	580	P 67	760
P 11	580	P 75	780
P 12,5	580	P 80	840
P 14	580	P 90	860
P 16	580	P 100	880

size	length of the chamber L [mm]*	size	length of the chamber L [mm]*
T 56	760	T 80	840
T 63	780	T 90	860
T 67	800	T 100	880
T 75	820		

* chamber with 1 to 8 line exchanger

Implementation

- Chambers contain an exchanger fitted with finned heat transfer surface in the version of Cu/Al (Cu tubes and Al lamellas). The used types of coolants: R407c, R410a.
- Both inlet and outlet necks are made of copper, they are ready for soldering
- The outlet of the necks towards the service side of the unit
- Distributor is located inside the chamber
- If necessary (servicing, cleaning), the exchanger may be removed to the service side, together with the front panel
- Operational pressure according to medium used (exchangers are tested at the pressure of 3.1 MPa)
- There is a stainless steel bath fitted with the outlet for discharging a condensate (DN32), installed in the chamber
- The delivery includes a trap for discharging a condensate – it is enclosed with the assembly kit
- A chamber is equipped with a plastic flap eliminator

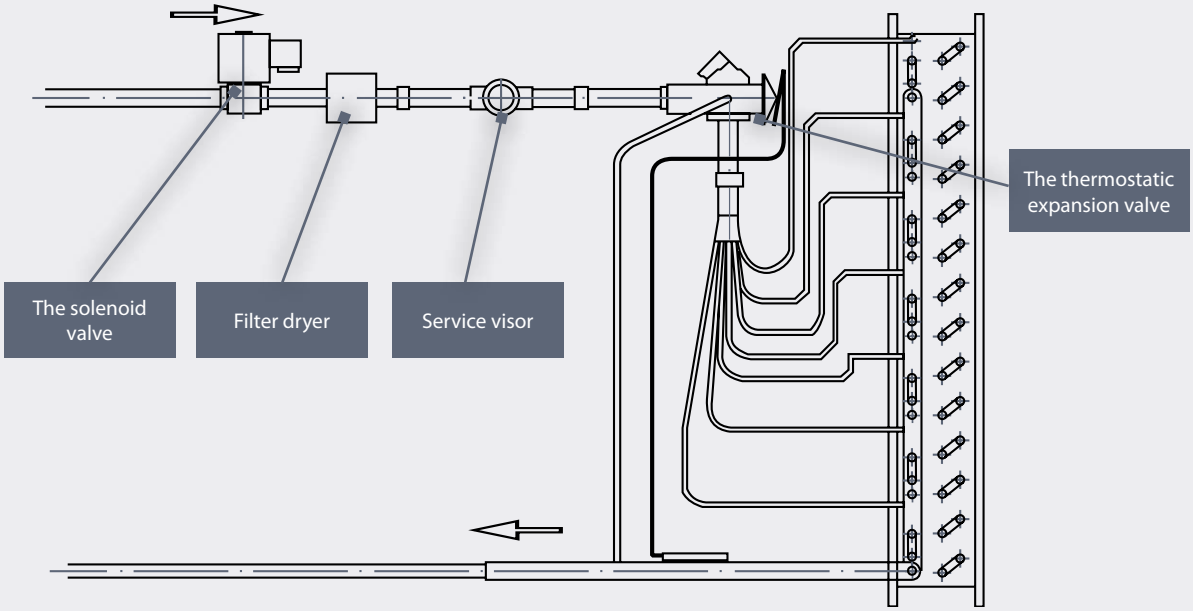


Fig. 4.10.1: Components of fluid section related to the cooling circuit before the evaporator. The cooling circuit is not included in the delivery of Mandík, a. s.!!!

Non-standard equipment (according to customer´s requirements)

- Coolants R134a, R404a, R507 and others must be consulted with the manufacturer
- Service visor

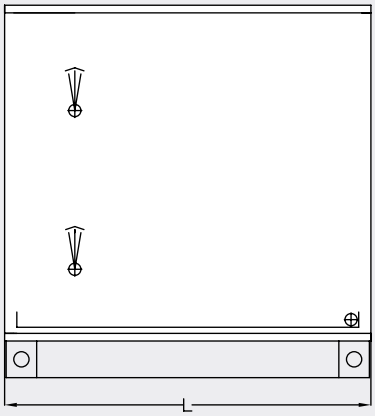
Design recommendation

- WARNING: During installation, you must connect a condensate outlet leading through the trap

5.11 HUMIDIFIER CHAMBERS

The chamber is used for moistening the air by using water steam, direct water or recirculated water.

View from the side of servicing person



size	length of the chamber L [mm]	size	length of the chamber L [mm]
M 2	1200	M 20	1200
M 2.2	1200	M 22	1200
M 2.5	1200	M 25	1200
M 2.8	1200	M 28	1200
M 3.15	1200	M 31.5	1200
M 3.5	1200	M 34	1200
M 4	1200	M 36	1200
M 4.5	1200	M 40	1200
M 5	1200	M 45	1200
M 5.6	1200	M 48	1200
M 6.3	1200	M 50	1200
M 7.1	1200	M 53	1200
M 8	1200	M 56	1200
M 9	1200	M 63	1200
M 10	1200	M 67	1200
M 11	1200	M 75	1200
M 12.5	1200	M 80	1200
M 14	1200	M 90	1200
M 16	1200	M 100	1200
M 18	1200		

size	length of the chamber L [mm]	size	length of the chamber L [mm]
P 1	1200	P 18	1200
P 2	1200	P 20	1200
P 2,2	1200	P 22	1200
P 2,5	1200	P 25	1200
P 2,8	1200	P 28	1200
P 3,15	1200	P 31,5	1200
P 3,5	1200	P 34	1200
P 4	1200	P 36	1200
P 4,5	1200	P 40	1200
P 5	1200	P 45	1200
P 5,6	1200	P 48	1200
P 6,3	1200	P 50	1200
P 7,1	1200	P 53	1200
P 8	1200	P 56	1200
P 9	1200	P 63	1200
P 10	1200	P 67	1200
P 11	1200	P 75	1200
P 12,5	1200	P 80	1200
P 14	1200	P 90	1200
P 16	1200	P 100	1200

size	length of the chamber L [mm]	size	length of the chamber L [mm]
T 56	1200	T 80	1200
T 63	1200	T 90	1200
T 67	1200	T 100	1200
T 75	1200		

Implementation

- There is a stainless steel bath fitted with the outlet for discharging a condensate (DN32), installed in the chamber
- A chamber located on the servicing side is fitted with a removable panel

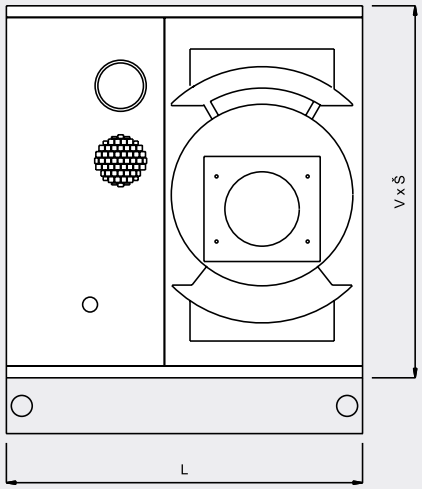
Non-standard equipment (according to customer´s requirements)

- Service visor
- Steam humidifier
- Adiabatic humidifier
- High-pressure humidifier
- Humidifiers for outdoor environment

5.12 HEATING GAS CHAMBERS – MONZUN

Chambers are used for indirect heating the air by using an exchanger of the type gas-air.
Heating performance 15–60 kW

View from the side of servicing person



Size	Length of chamber L (mm)	Width of chamber S (mm)	Height of chamber V (mm)	Size	Length of chamber L (mm)	Width of chamber S (mm)	Height of chamber V (mm)
M 2	820–870	1015–1095	830–880	M 20	780–910	1500–1650	1500–1500
M 2.2	820–870	1015–1095	830–880	M 22	780–910	1600–1650	1600–1600
M 2.5	820–870	1015–1095	830–880	M 25	780–910	1700–1700	1700–1700
M 2.8	820–870	1015–1095	830–880	M 28	780–910	1750–1750	1750–1750
M 3.15	820–1050	1015–1260	830–1060	M 31.5	780–910	1900–1900	1900–1900
M 3.5	820–1050	1015–1260	830–1060	M 34	780–910	1950–1950	1950–1950
M 4	820–1050	1015–1260	830–1060	M 36	780–910	2000–2000	2000–2000
M 4.5	820–1050	1015–1260	830–1060	M 40	780–910	2100–2100	2100–2100
M 5	820–1100	1015–1650	830–1060	M 45	780–910	2200–2200	2200–2200
M 5.6	720–1060	1015–1650	850–1060	M 48	780–910	2250–2250	2250–2250
M 6.3	720–1050	1015–1650	900–1060	M 50	780–910	2300–2300	2300–2300
M 7.1	720–1050	1015–1650	950–1060	M 53	780–910	2400–2400	2400–2400
M 8	720–1050	1015–1650	1000–1060	M 56	780–910	2500–2500	2500–2500
M 9	720–1050	1050–1650	1050–1060	M 63	780–910	2600–2600	2600–2600
M 10	760–890	1100–1650	1100–1100	M 67	780–910	2700–2700	2700–2700
M 11	760–890	1150–1650	1150–1150	M 75	780–910	2800–2800	2800–2800
M 12.5	760–890	1200–1650	1200–1200	M 80	780–910	2900–2900	2900–2900
M 14	760–890	1300–1650	1300–1300	M 90	780–910	3100–3100	3100–3100
M 16	760–890	1350–1650	1350–1350	M 100	780–910	3250–3250	3250–3250
M 18	760–890	1450–1650	1450–1450				

Size	Length of chamber L (mm)	Width of chamber S (mm)	Height of chamber V (mm)	Size	Length of chamber L (mm)	Width of chamber S (mm)	Height of chamber V (mm)
P 1	820–820	1015–1015	830–830	P 18	760–890	1800–1800	1150–1150
P 2	820–990	1015–1095	830–880	P 20	780–910	1900–1900	1200–1200
P 2,2	820–870	1015–1095	830–880	P 22	780–910	2000–2000	1250–1250
P 2,5	820–870	1015–1095	830–880	P 25	780–910	2100–2100	1350–1350
P 2,8	820–870	1015–1095	830–880	P 28	780–910	2200–2200	1450–1450
P 3,15	820–1070	1015–1260	830–1060	P 31,5	780–910	2300–2300	1500–1500
P 3,5	820–1050	1015–1260	830–1060	P 34	780–910	2400–2400	1550–1550
P 4	820–1050	1015–1260	830–1060	P 36	780–910	2500–2500	1650–1650
P 4,5	820–1050	1015–1260	830–1060	P 40	780–910	2600–2600	1700–1700
P 5	820–1050	1015–1660	830–1060	P 45	780–910	2600–2600	1900–1900
P 5,6	820–1050	1100–1660	830–1060	P 48	780–910	2600–2600	2000–2000
P 6,3	820–1050	1100–1650	830–1060	P 50	780–910	2600–2600	2100–2100
P 7,1	820–1050	1150–1650	830–1060	P 53	780–910	2700–2700	2150–2150
P 8	820–1050	1200–1650	830–1060	P 56	780–910	2800–2800	2200–2200
P 9	720–1050	1300–1650	850–1060	P 63	780–910	2900–2900	2300–2300
P 10	760–1090	1350–1650	900–1060	P 67	780–910	3000–3000	2400–2400
P 11	760–1090	1400–1650	950–1060	P 75	780–910	3150–3150	2500–2500
P 12,5	760–1090	1500–1650	1000–1060	P 80	780–910	3250–3250	2600–2600
P 14	760–890	1600–1650	1050–1060	P 90	780–910	3500–3500	2700–2700
P 16	760–890	1700–1700	1100–1100	P 100	780–910	3600–3600	2900–2900

Size	Length of chamber L (mm)	Width of chamber S (mm)	Height of chamber V (mm)	Size	Length of chamber L (mm)	Width of chamber S (mm)	Height of chamber V (mm)
T 56	780–910	2400–2400	2500–2500	T 80	780–910	2400–2400	3450–3450
T 63	780–910	2400–2400	2750–2750	T 90	780–910	2450–2450	3600–3600
T 67	780–910	2400–2400	2900–2900	T 100	780–910	2450–2450	4050–4050
T 75	780–910	2400–2400	3250–3250				

Implementation

- Fuel natural gas ZP (G20), Propane-butane – PB (G30/ G31), Propane – P (G31).
- Heating sections are equipped with atmospheric burner and a complete control system to ensure safe operation.
- Continuous power control from min. to max. values – modulating.
- Double blast boiler in stainless steel.
- On the side of servicing person is fed out the extension line to the media and venting, including the service door.
- On the side of servicing person are located the alarm functions – feed, start/power block, operation, overheating.
- Product is equipped with operational and emergency thermostats.
- Compulsory combustion gases exhaust
- The possibility of indoor and outdoor designs
- Design with by-pass or without by-pass.
- In cases, where the cross section has different size comparing the cross section of the heating chamber, the transition is solved by appropriated construction solution

Non-standard equipment (according to customer´s requirements)

- Product could include exhaust system

Design recommendation

- We recommend placing the chamber behind the fan at the end of the unit.

Performance overview and operational parameters can be found in AHU designing software Mandík

5.13 HEATING GAS CHAMBERS – GHM

Starting with 2018 Mandík Company markets new gas/oil condensing air heaters GM/OHM in stainless steel design with heating outputs 95–600 kW designed for use in MANDÍK air condition units. The combination of quality and reliable air heaters fully adapted to M and P dimensional lines brings with innovative utilisation of heat condensing component a totally new quality to the sector of modular air condition units.
Based on intensive research, testing and certification the excellent technical parameters of Mandík condensing boilers offer efficiency which, in optimal condensing conditions, may exceed 100 %.

- Heating chamber boiler in stainless steel version resistant to high temperatures.
- 10 power sizes up to 600 kW.
- Operator's side, fluid connections and flue gas exhaust – all at one place and from one side.
- Fuel natural gas (ZP) or light fuel oil (LTO).
- Selection of burners from two manufacturers-Weishaupt and RIELLO.
- Continuous regulation from min. 35 % to max. 100 % of nominal output – modulation version.
- Gas connection pressure 15–100 (500) mbar
- Total system efficiency 92–94 % in non-condensing mode.
- Maximum heat AT 45 Kelvin.
- Obligatory content of the supply is the box with emergency thermostat preset to 90 °C.
- Flue gas exhaust necks with diameters 110/450 mm.
- Can be supplied including flue gas ducting.
- Heating units can be furnished with complete regulation and automatics.
- Version with and without by pass in chamber upper or bottom parts.
- Can be in indoor or outdoor version.
- Outdoor version with thermal insulated burner cover (sandwich panels) in frame free design with service doors, air suction grills, own subframe and heating for fixtures.
- Outside surface treatment with powder coating in any RAL colour.
- Emphasize on easy access to unit components for maintenance and service.

Excellent shell parameters according to EN 1886 – certified by TUV SUD Munich MB583

Mechanical stability: D1 (M)
Box leakage: L1 (M)
Leakage between filter and frame: < 0,5 % – F9 (M)
Cold bridges: TB2

Thermal insulation: T3
Shell attenuation dB in range 125 Hx – 8 kHz:

Hz	125	250	500	1000	2000	4000	8000
dB	14	23	26	36	38	40	47

Table of offered air heater power lines:

Heater type	GHM 95	GHM 120	GHM 150	GHM 188	GHM 240	GHM 300	GHM 375	GHM 473	GHM 540	GHM 600
Minimal heating power [kW]	95	120	150	188	240	300	375	473	540	600
Nominal air flow (m^3/h)	6300*	8000*	10000*	12500*	16000*	20000*	25000*	31500*	36000*	40000*

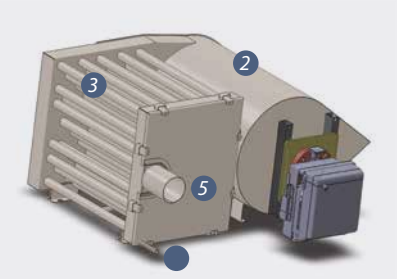
* nominal air flow is mentioned for particular size of condensing exchanger only, not for given unit. Residual air can be led through exchanger by pass and it is subsequently mixed with heated air.

Optimal conditions for operating in condensing mode:

- The lower input temperature in front of the heater the more probable vapour condensing in flue gas.
- With higher cross-sectional velocity of air passing through the heater, it is easier to obtain condensing mode.
- The lower current heating power of the heater in proportion to its nominal output (or even when occurs burner cyclic switching on and off at its min. output), the more frequently water vapour condenses in flue gas.


CERTIFIKÁT ES PŘEZKOUŠENÍ TYPU
EC TYPE-EXAMINATION CERTIFICATE

Heater basic parts:
1. burner
2. tube flue
3. tube sheet
4. condensation removal
5. flue gas exhaust



Types of offered burners:

Weishaupt

- Manufacturer in Schwendi, Germany Founded in 1932, 29 branches in Germany and 21 subsidiaries within the Concern. Represented in 38 countries, over 3400 employees.
- Gas burners (WG and WM) with two-stage or modulated regulation, electronically controlled air shutter, fan speed control, low emissions, integrated leakage control of gas and magnetic valves.
- Oil burners with one or two-stage power regulation low NO_x emissions, electronically controlled air shutter, tight nozzle.

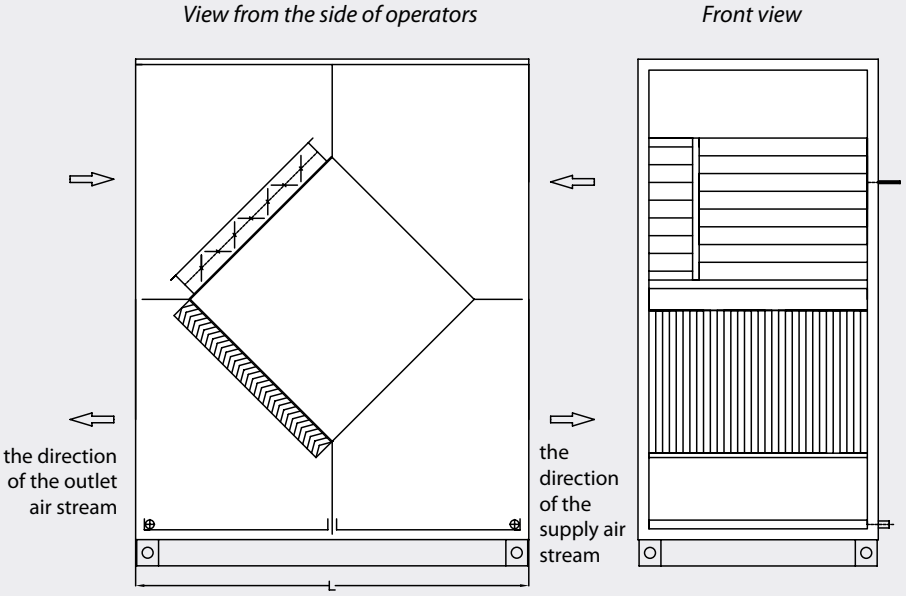
RIELLO

- Manufacturer in Legnaco, Italy Founded in 1920, 9 production plants, over 2000 employees, represented in more than 60 countries.
- Gas burners (BS and RS) with low emission burner with two-stage modulated regulation, microprocessor automatics, stainless steel burning head resistant to high temperatures, air shutter with servodrive.
- Oil burners (RG and RL) with one or two-stage power control, flame electronic-control, stainless steel burning head.

5.14 CHAMBERS WITH PLATE HEAT EXCHANGER FOR RETROACTIVE ACQUISITION OF HEAT

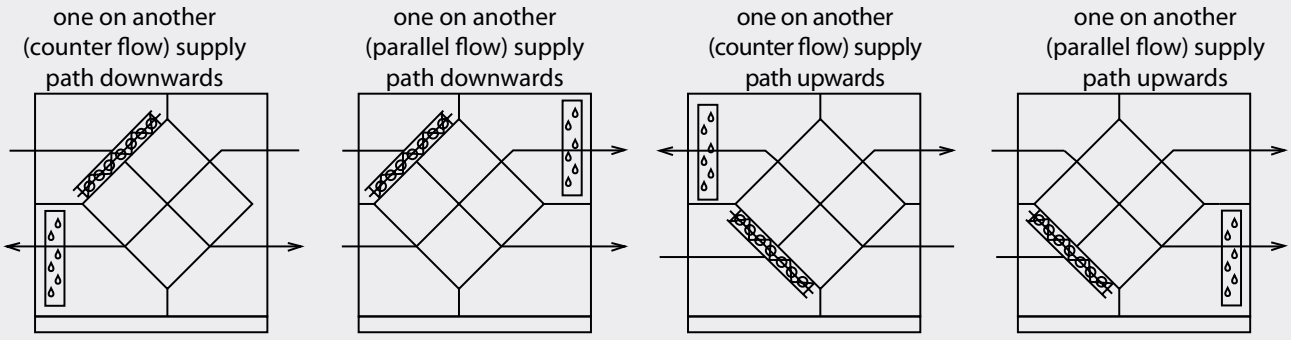
It is used for heat recovery from the exhaust air. Fresh air being supplied and the exhaust air are separated from each other.

Vertical chambers ("ONE ON ANOTHER")



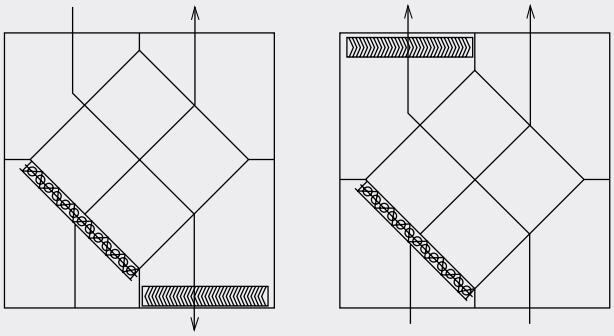
Horizontal chambers ("ONE NEXT TO THE OTHER")

GROUND PLAN



Options for arrangement of tabular heat exchangers – vertical design

One next to the other (counter flow) *One next to the other (parallel flow)*



Options for arrangement of tabular heat exchangers – horizontal design

size	length of the chamber L [mm]* inlet/outlet = over each other	length of the chamber L [mm]* inlet/outlet = next to each other	size	length of the chamber L [mm]* inlet/outlet = over each other	length of the chamber L [mm]* inlet/outlet = next to each other
M 2	850–995	890–1175	M 20	1735–2570	1740–2750
M 2.2	850–995	890–1175	M 22	1735–3155	1740–2750
M 2.5	850–1135	890–1175	M 25	1735–3155	1740–3175
M 2.8	995–1135	890–1175	M 28	2035–3155	1740–3175
M 3.15	995–1135	1035–1350	M 31.5	2035–3720	2025–3740
M 3.5	995–1310	1035–1350	M 34	2035–3720	2025–3740
M 4	995–1310	1035–1350	M 36	2035–3720	2025–3740
M 4.5	1135–1310	1035–1350	M 40	2075–3760	2025–3740
M 5	1135–1520	1175–1560	M 45	2075–3760	2025–3740
M 5.6	1135–1520	1175–1560	M 48	2075–3760	2025–3740
M 6.3	1135–1735	1175–1775	M 50	2075–3760	2025–3740
M 7.1	1135–1735	1175–1775	M 53	2345–3760	2025–3740
M 8	1135–1735	1175–2055	M 56	2345–3760	2025–3740
M 9	1310–2015	1175–2055	M 63	2610–3760	2025–3740
M 10	1310–2015	1350–2055	M 67	2610–3760	2025–3740
M 11	1310–2015	1350–2055	M 75	2770–3760	2025–3740
M 12.5	1310–2295	1350–2335	M 80	2790–3780	2025–3740
M 14	1520–2295	1350–2335	M 90	2790–3780	2025–3740
M 16	1520–2550	1560–2750	M 100	2790–3780	2025–3740
M 18	1735–2550	1560–2750			

size	length of the chamber L [mm]* inlet/outlet = over each other	length of the chamber L [mm]* inlet/outlet = next to each other	size	length of the chamber L [mm]* inlet/outlet = over each other	length of the chamber L [mm]* inlet/outlet = next to each other
P 1		890–890	P 18	1310–2015	1560–3175
P 2		890–1560	P 20	1330–2315	1740–3740
P 2,2		890–1560	P 22	1330–2315	1740–3740
P 2,5	850–850	890–1560	P 25	1330–2570	1740–3740
P 2,8	850–850	890–1560	P 28	1540–2730	1740–3740
P 3,15	850–850	890–1775	P 31,5	1540–2730	2025–3740
P 3,5	850–995	890–1775	P 34	1755–2730	2025–3740
P 4	995–995	1035–2055	P 36	1755–3155	2025–3740
P 4,5	995–1135	1035–2055	P 40	1795–3195	2025–3740
P 5	995–1135	1175–2055	P 45	1795–3760	2025–3740
P 5,6	995–1135	1175–2055	P 48	1795–3760	2025–3740
P 6,3	995–1310	1350–2055	P 50	1795–3760	2325–3740
P 7,1	995–1310	1350–2055	P 53	2075–3760	2325–3740
P 8	995–1520	1350–2335	P 56	2075–3760	2325–3740
P 9	995–1520	1350–2335	P 63	2345–3760	2325–3740
P 10	995–1735	1560–2750	P 67	2345–3760	2325–3740
P 11	1135–1735	1560–2750	P 75	2345–3760	2325–3740
P 12,5	1135–1735	1560–2750	P 80	2630–3780	2325–3740
P 14	1135–2015	1560–2750	P 90	2630–3780	2325–3740
P 16	1135–2015	1560–3175	P 100	2630–3780	2325–3740

size	length of the chamber L [mm]* inlet/outlet = over each other	length of the chamber L [mm]* inlet/outlet = next to each other	size	length of the chamber L [mm]* inlet/outlet = over each other	length of the chamber L [mm]* inlet/outlet = next to each other
T 56	2345–3760	2025–3740	T 80	2630–3780	2025–3740
T 63	2345–3760	2025–3740	T 90	2790–3780	2025–3740
T 67	2630–3780	2025–3740	T 100	2790–3780	2025–3740
T 75	2630–3780	2025–3740			

* chamber length according to a recuperator used

Design

- Different recuperations efficiency choice
- Aluminium or epoxy fins
- There are stainless steel baths fitted with the outlet for discharging a condensate (DN32), installed in the chamber
- Removable panels located on the operating side for the purpose of easy cleaning
- Bypass flap on the side of air inlet
- The delivery includes a trap for discharging a condensate – it is enclosed with the assembly kit
- 3 types of recuperators with various efficiencies
- Cross flow or counterflow design available

Non-standard equipment (according to customer´s requirements)

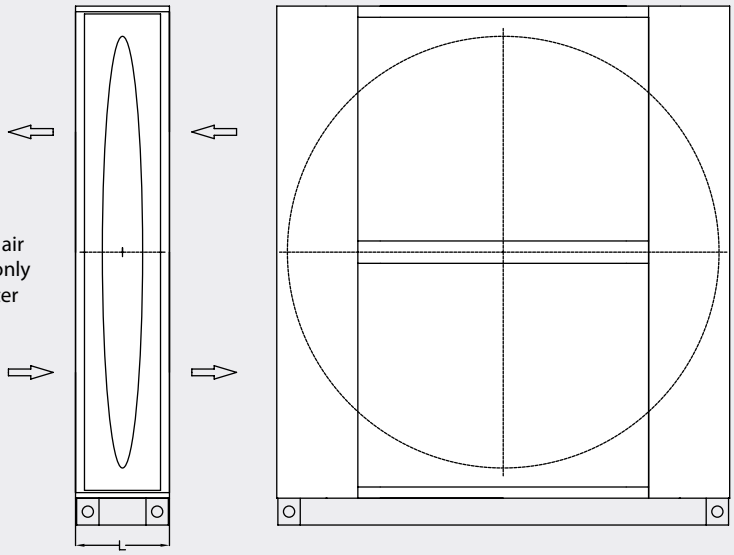
- Mixing damper
- Design fitted with flap eliminator
- Chamber lighting system
- Aluminium tabular recuperator with epoxy paint, intended for the aggressive environment
- Differential manometer

5.15 CHAMBERS WITH ROTATIONAL EXCHANGER FOR RETROACTIVE ACQUISITION OF HEAT

It is used for leading heat (or moisture) from the air discharged to the transferred air

View from the side of servicing staff *Front view*

location and directions of the supply and outlet air are arbitrary, the only condition is counter



size	length of the chamber L [mm]	size	length of the chamber L [mm]
M 2	420	M 20	430–655
M 2.2	420	M 22	430–655
M 2.5	420	M 25	430–655
M 2.8	420	M 28	430–655
M 3.15	420	M 31.5	430–655
M 3.5	420	M 34	430–655
M 4	420	M 36	430–655
M 4.5	420	M 40	430–655
M 5	420	M 45	430–655
M 5.6	420	M 48	430–655
M 6.3	420	M 50	430–655
M 7.1	420	M 53	430–655
M 8	460	M 56	430–655
M 9	460	M 63	430–655
M 10	480	M 67	430–655
M 11	480	M 75	430–655
M 12.5	480	M 80	430–655
M 14	480	M 90	430–655
M 16	480	M 100	430–655
M 18	480		

size	length of the chamber L [mm]	size	length of the chamber L [mm]
P 1	420	P 18	480
P 2	420	P 20	430–655
P 2,2	420	P 22	430–655
P 2,5	420	P 25	430–655
P 2,8	420	P 28	430–655
P 3,15	420	P 31,5	430–655
P 3,5	420	P 34	430–655
P 4	420	P 36	430–655
P 4,5	420	P 40	430–655
P 5	420	P 45	430–655
P 5,6	420	P 48	430–655
P 6,3	420	P 50	430–655
P 7,1	420	P 53	430–655
P 8	420	P 56	430–655
P 9	420	P 63	430–655
P 10	420	P 67	430–655
P 11	420	P 75	430–655
P 12,5	460	P 80	430–655
P 14	460	P 90	430–655
P 16	480	P 100	430–655

size	length of the chamber L [mm]	size	length of the chamber L [mm]
T 56	430–655	T 80	430–655
T 63	430–655	T 90	430–655
T 67	430–655	T 100	430–655
T 75	430–655		

Design

- Different recuperators efficiency choice
- Exchanger´s rotor is made of aluminum foil
- Rotors up to the size of M16/P16 are located in a cabinet. You can slide them sidewards
- Regarding the sizes from M20/P20 up, the box frame is made of steel profiles
- Rotor powered by electric motor 3× 400 V, with gear and belt transmission
- Rotor of the exchanger in the version of "TEMPERATURE" (for heat transfer only) or "ENTHALPIC" (for transferring heat and humidity)
- There is a frequency converter in protection IP20 of regulation 0 – 10 V or 4 – 20 mA
- 0 – 10 V or 4 – 20 mA

Non-standard equipment (according to customer´s requirements)

- Separated recuperator

Design recommendation

- Inlet and outlet air must flow through the chamber in opposite directions
- Chambers allowing free access to the exchanger´s rotor itself should be located on all sides. They shall be used for revision and cleaning (revision chamber may be formed by any chamber, e.g. free continuous chamber, filtration chamber, etc.).
- Temperature of the flow of the air-volume transported must not exceed 55 °C
- The maximum permitted rotation speed of the rotor is 13 RPM
- Before entering the recuperator, it is necessary to filter the air by using the filter of the class at least EU3

5.16 CHAMBERS FOR HEAT RECOVERY – GLYCOLIC CIRCUIT

The glycolic circuit is used for heat recovery from the exhaust air by using two separate heat exchangers, heater located in the feed line and the cooler located in the outlet line. There are usual heating and cooling chambers used in the circuit. There is a pump-circulated heat transfer fluid between these exchangers. The advantage of the glycolic circuit is a complete separation of supply air from exhaust air. Delivery is carried out by a heater chamber and cooler without elements of the circuit.

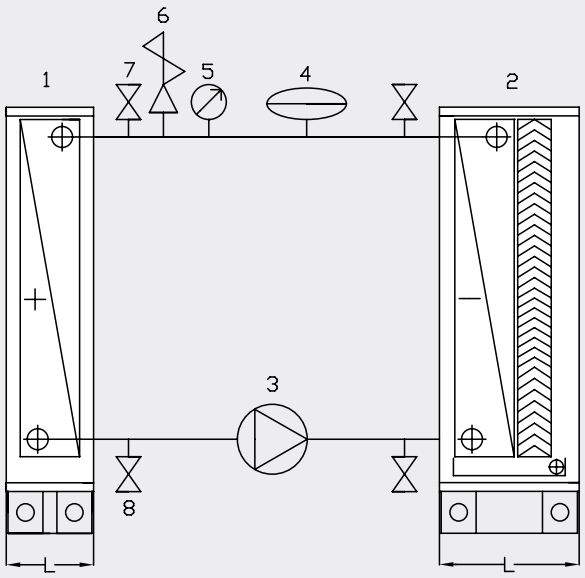


Fig. 4.16.1: *Glycolic circuit diagram*

Glycolic circuit description:

1 – heating exchanger in inlet branch
2 – cooling exchanger in outlet branch fitted with eliminator
3 – circulation pump
4 – expansion vessel
5 – pressure gauge
6 – safety valve
7 – vent valves
8 – drain valves

Heat-carrying medium:

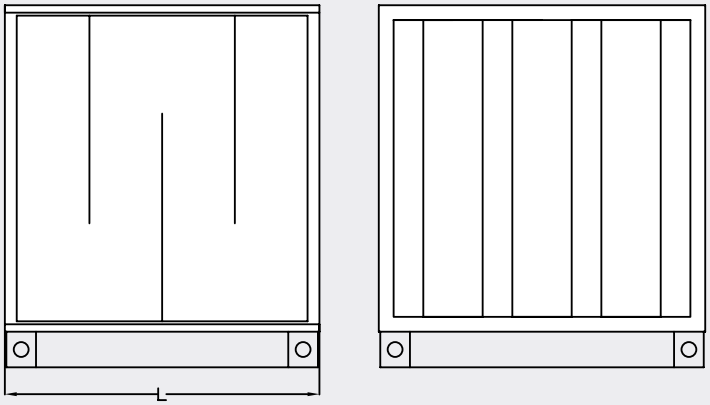
- Ethylen glycol or propylen glycol in 15–50 % of concentration

Company Mandík a. s. is deliver only coils for this system, other elements depend on exact place of supply part and exhaust and cannot be dimensioned by specialist of company Mandík a. s.

5.17 ATTENUATOR CHAMBERS

They are used for inhibition of noise emitted into the suction or discharge part of the unit.

View from the side of servicing staff *Front view*



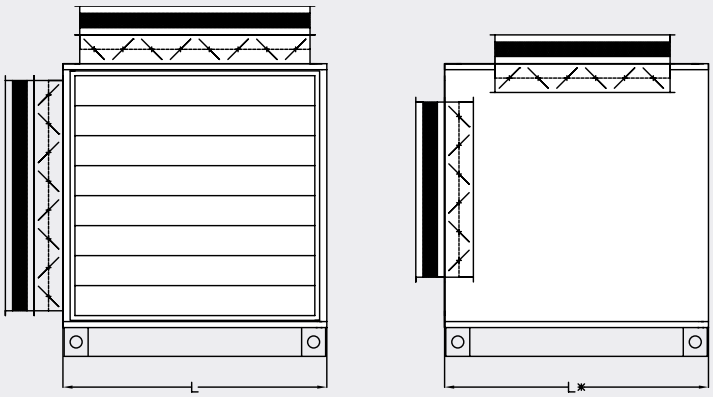
Design

- Background walls of noise silencers made of galvanized sheet and filled with sound-absorbing material
- A chamber is fitted with removable panel on the operating side, enabling easy access to the chamber during cleaning. The background walls are removable to the operator´s side.
- Length of the Attenuator chamber (up to the size of unit P and M25): 660 mm; 1,060 mm; 1,260 mm; 1,560 mm
- Length of the Attenuator chamber (from the size of unit P and M31.5): 720 mm; 1,120 mm; 1,320 mm; 1,620 mm

5.18 DAMPER CHAMBERS

They are used to regulate air flow or blend two or more air streams.

View from the side of servicing person



size	length of chamber L [mm] with upper flap	length of chamber L [mm] with lower flap	length of chamber L [mm] with front/back flap	size	length of chamber L [mm] with upper flap	length of chamber L [mm] with lower flap	length of chamber L [mm] with front/back flap
M 2	565	575	640	M 20	905	915	980
M 2.2	565	575	690	M 22	905	915	980
M 2.5	565	575	740	M 25	905	915	1030
M 2.8	565	575	790	M 28	905	915	1030
M 3.15	565	575	690	M 31.5	1025	1035	1100
M 3.5	565	575	740	M 34	1025	1035	1100
M 4	565	575	790	M 36	1025	1035	1150
M 4.5	565	575	690	M 40	1025	1035	1200
M 5	565	575	740	M 45	1125	1135	1250
M 5.6	565	575	690	M 48	1125	1135	1250
M 6.3	565	575	740	M 50	1125	1135	1300
M 7.1	665	675	740	M 53	1265	1275	1340
M 8	665	675	790	M 56	1265	1275	1340
M 9	665	675	740	M 63	1265	1275	1340
M 10	665	675	790	M 67	1265	1275	1440
M 11	665	675	790	M 75	1365	1375	1490
M 12.5	765	775	840	M 80	1405	1415	1580
M 14	765	775	840	M 90	1505	1515	1630
M 16	765	775	890	M 100	1605	1615	1680
M 18	805	815	930				

size	length of chamber L [mm] with upper flap	length of chamber L [mm] with lower flap	length of chamber L [mm] with front/back flap	size	length of chamber L [mm] with upper flap	length of chamber L [mm] with lower flap	length of chamber L [mm] with front/back flap
P 1	465	475	490	P 18	765	775	990
P 2	365	375	640	P 20	805	815	1130
P 2,2	465	475	690	P 22	805	815	1130
P 2,5	465	475	740	P 25	805	815	1130
P 2,8	465	475	790	P 28	905	915	1180
P 3,15	465	475	690	P 31,5	925	935	13000
P 3,5	465	475	740	P 34	925	935	1300
P 4	565	575	790	P 36	925	935	1350
P 4,5	565	575	840	P 40	925	935	1400
P 5	665	675	740	P 45	1025	1035	1350
P 5,6	565	575	790	P 48	1125	1135	1350
P 6,3	665	675	740	P 50	1125	1135	1350
P 7,1	665	675	790	P 53	1165	1175	1390
P 8	665	675	890	P 56	1165	1175	1440
P 9	665	675	840	P 63	1265	1275	1540
P 10	665	675	890	P 67	1265	1275	1540
P 11	665	675	840	P 75	1365	1375	1590
P 12,5	665	675	940	P 80	1405	1415	1680
P 14	665	675	940	P 90	1405	1415	1780
P 16	765	775	990	P 100	1505	1515	1830

size	length of chamber L [mm] with upper flap	length of chamber L [mm] with lower flap	length of chamber L [mm] with front/back flap	size	length of chamber L [mm] with upper flap	length of chamber L [mm] with lower flap	length of chamber L [mm] with front/back flap
T 56	1405	1415	1330	T 80	1905	1915	1330
T 63	1605	1615	1330	T 90	2005	2015	1430
T 67	1705	1715	1380	T 100	2205	2215	1380
T 75	1805	1815	1330				

* length of the chamber may vary depending on number and mutual position of the flaps

Design

- Chambers fitted with regulation dampers located inside and outside the chamber. The maximum temperature resistance of regulation flaps is 60 °C.
- There is a flexible buffer element mounted outside the chamber for connection to pipeline
- On the operating side of the chamber, the chamber is fitted with a removable panel for easy access in case of maintenance of dampers and actuators

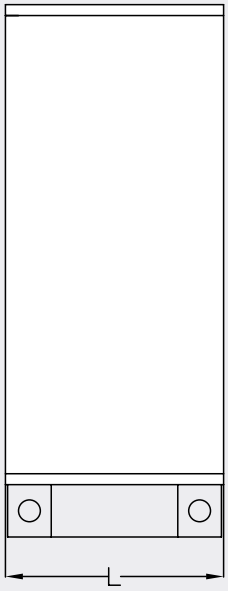
Non-standard equipment (according to customer´s requirements)

- Buffering inserts with temperature resistance up to 200 °C
- Manual control of the dampers
- The regulation dampers are fitted with actuators units
- Chamber lighting system
- Stainless steel batch fitted with the outlet for discharging a condensate (DN32)

5.19 FREE CHAMBERS

They allow revisions, service, maintenance and installation.

View from the side of servicing person



Design

- A free chamber is most often a part of compact block together with another chamber
- Any length of a chamber is possible
- Free chambers can be fitted with service panel or door on the operating side
- Possibility of stainless steel batch fitted with the outlet for discharging a condensate (DN32)

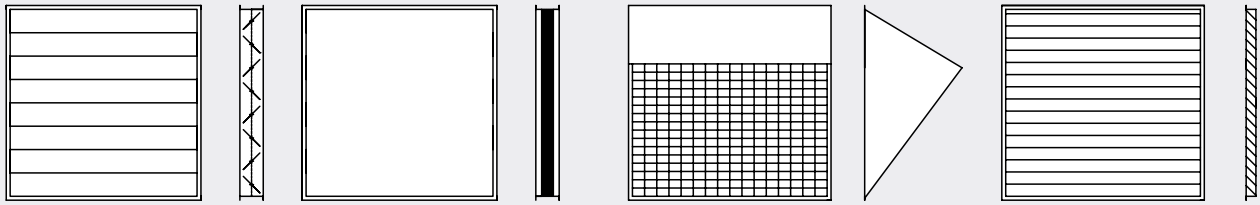
Design recommendation

- Free chambers are used for the following items:
  - padding the upper floors of the unit,
  - extension of length of selected chambers, as required,
  - change in the air stream axis by 90°,
  - location of various elements,
  - service access, for instance the access to exchangers.

5.20 END WALLS

They are used for connecting the unit to the pipeline or to protect the unit from the weather impacts. They are mounted either in the beginning or at the end of the unit.

Regulation valve *Buffering insert* *Rain cover* *Rain louver*



Design

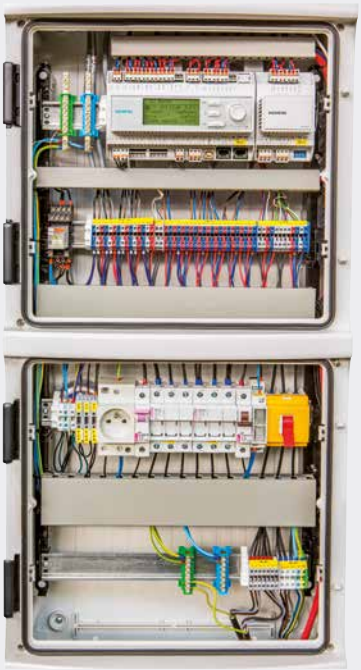
- Length of buffering insert: 160 mm
- Length of regulation valve: 125 mm
- Buffering insert with temperature resistance 80 °C
- The maximum temperature resistance of regulation dampers is 60 °C
- Regarding the outdoor use, the regulation damper is installed inside the chamber or actuators is protected by a cover
- Rain cover is made of galvanized sheets
- Rain louver is made of galvanized sheets

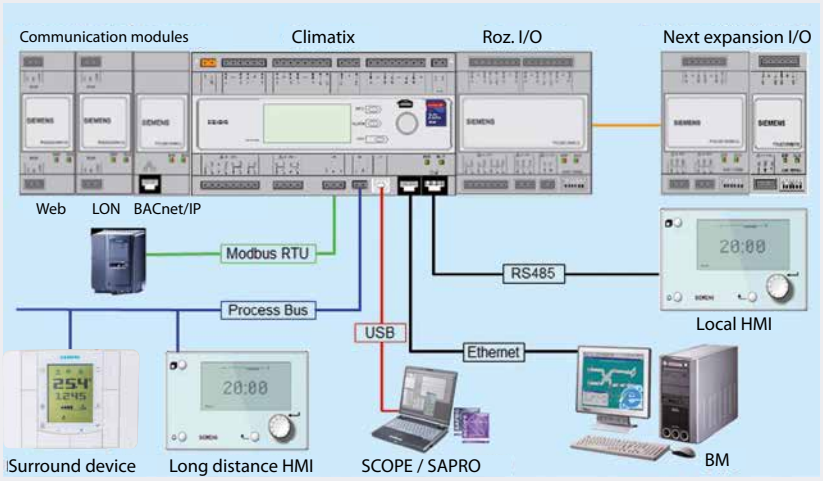
Non-standard equipment (according to customer´s requirements)

- Buffering insert with temperature resistance 200 °C
- Rain cover made of lacquered metal (RAL scale) or stainless steel
- Rain louver made of lacquered metal (RAL scale) or stainless steel

6. System of Measurement and Regulation

It is possible to add a system of measuring and regulation to each variant of the assembly design of the air ventilation unit of MANDÍK. Due to high variability of different versions and possible methods of regulation there is the MaR project prepared for specific custom version of MANDÍK unit. The project includes technological diagram of system MaR connection, including indication of types of wires used as well as the wiring diagram (included in documentation supplied on specific order). Deliveries include all components of the MaR system needed for a particular order (description of all possible components is listed below), except of connecting cables.
To control the air handling unit is used freely programmable PLC controller Climatix from Siemens, which meets the new requirements arising from the economic, ecological and social needs. This regulator is among best rated regulators intended to control the air handling units. Providing a comfortable, safe, and energy control operation of the air conditioning equipment and perfect adaptability to the final solution to the customer´s requirements. The indispensable quality of the communication options is wide allowing possibilities for easy control and cooperation with most of the patent systems and systems integration to buildings technology.
Power switchboards with implemented Climatix regulator including short circuit protection are manufactured in various sizes in metal and plastic, depending on the configuration of the air conditioning unit, operating environment and overall power.



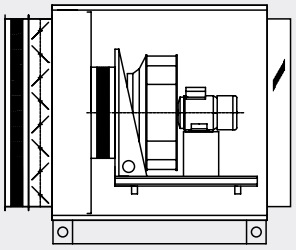


Control system (Measurement and Regulation) with Climatix regulator offers:

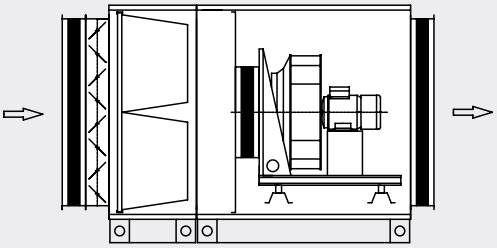
- Excellent ratio price/performance.
- Easy installation.
- Easy to operate in several variants.
- Local and remote control.
- Annual and weekly timer program.
- Text display with a clear data view.
- Screen choice in any European language (default Czech).
- Choice of multiple operationg modes.
- Temperature regulation and humidity in the supply line or space. Automatic detection of the needs of heating or cooling.
- Comprehensive, accurate management of air conditioning.
- Comprehensive listing of alarm information including history.
- Important changes to parameters after entering the password (more levels).
- Connect all ventilation components into a single regulatory system.
- It controls all the standard components of the heating and cooling.
- Uniformed marking of terminal connectors.
- Control from PC using an Internet browser (standard delivery) and subsequently from anywhere on the internet.
- Possibility of visualization interfaces.

7. Examples of Mandík units assemblies

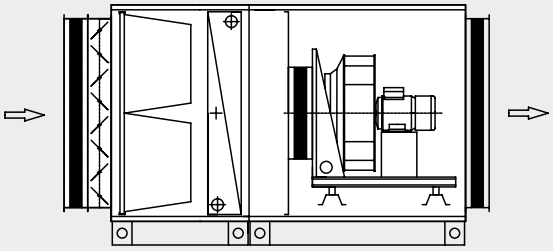
1) *Unit for inlet or outlet of the air fitted with the fan with free impeller*



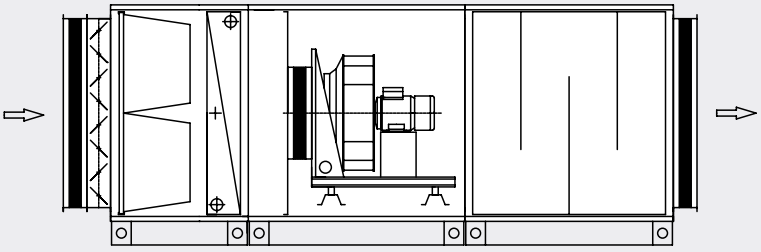
2) *Unit for inlet or outlet of the air with filtration system and the fan with free impeller*



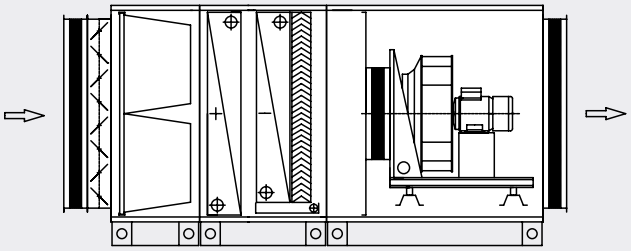
3) *Unit for inlet of the air with filtration system, water heating system and the fan with free impeller*



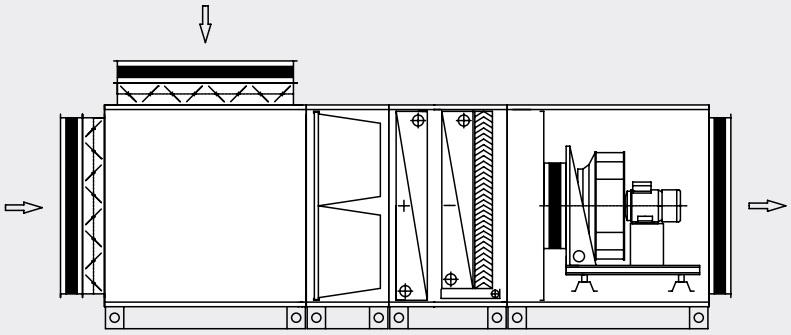
4) *Unit for inlet of the air with filtration system, water heating system, fan with free impeller and noise buffer on discharge*



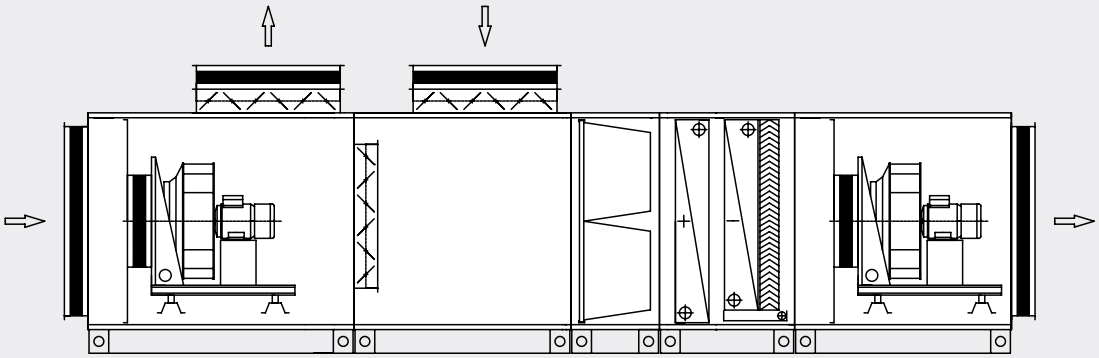
5) *Unit for inlet or outlet of the air with filtration system, water heating system, cooling system and the fan with free impeller*



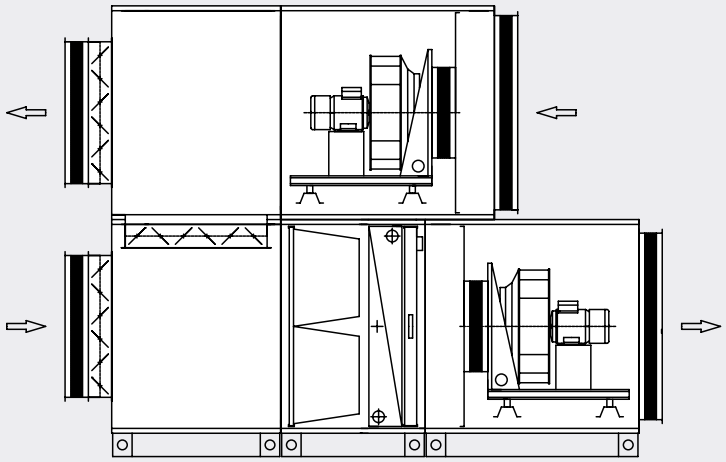
6) *Unit for inlet of the air with blending, filtration system, water heating system and cooling*



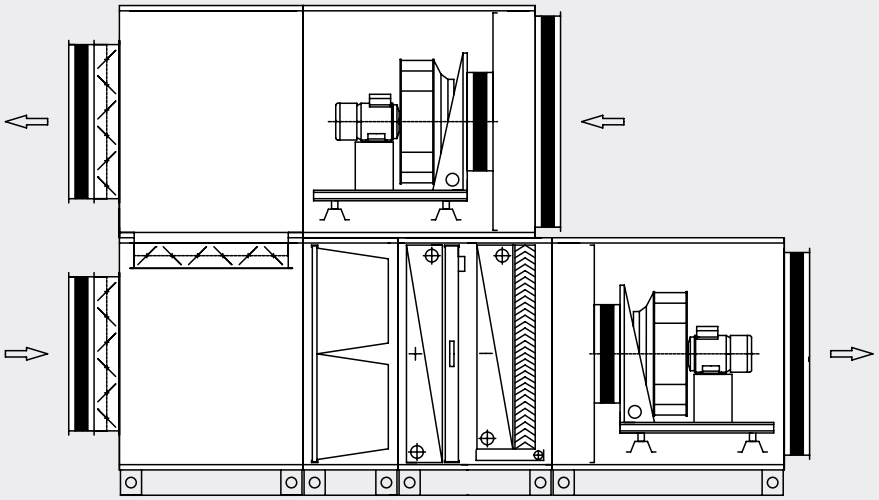
7) *Unit for both inlet and outlet of the air with filtration system, water heating system, cooling system, blending (consecutive) and fans with free impellers*



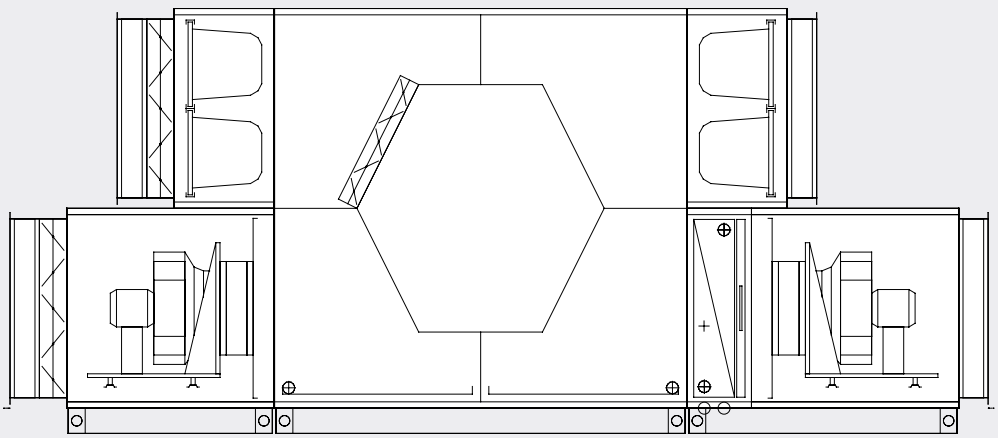
8) *Unit for both inlet and outlet of the air with filtration system, water heating system, antifreeze protection, blending (one above another) and fans with free impeller*



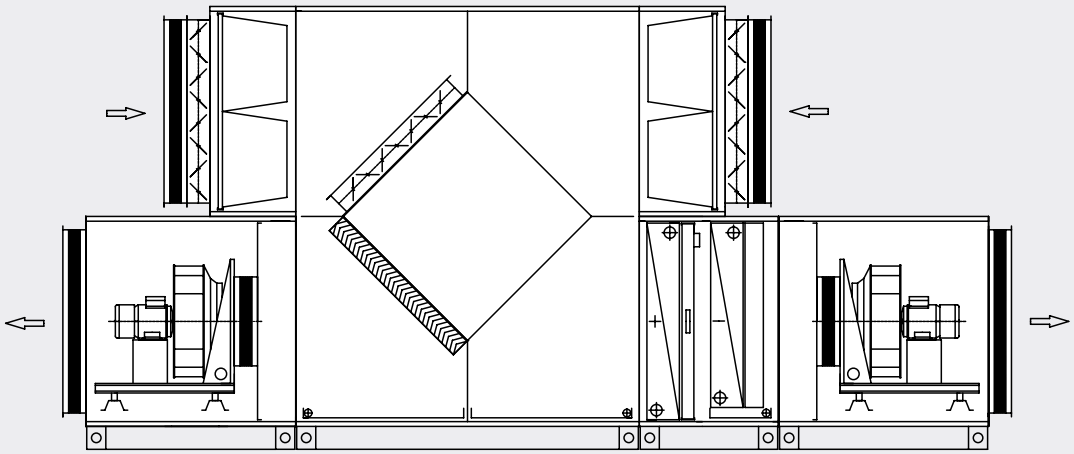
9) *Unit for both inlet and outlet of the air with filtration system, water heating system, cooling system and blending (one above another)*



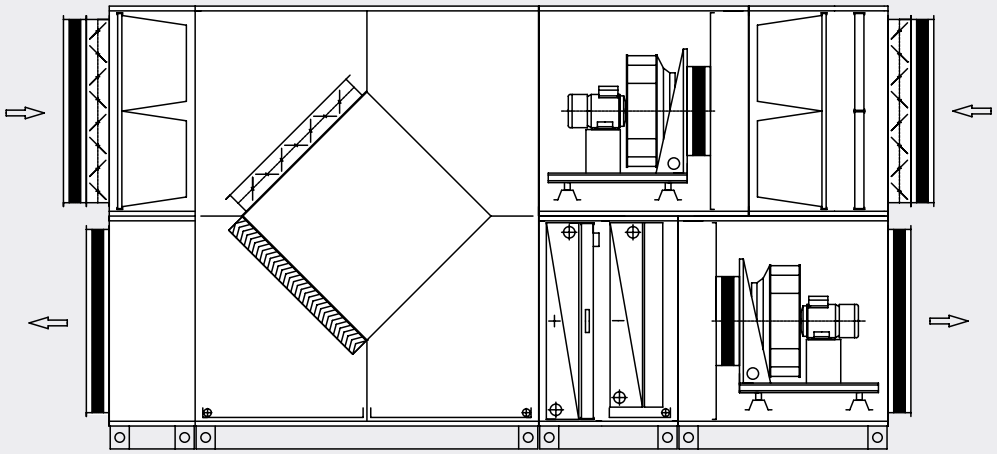
10) *Unit for inlet and outlet of the air with plate heat exchanger, water heating system, and the fan with free impeller*



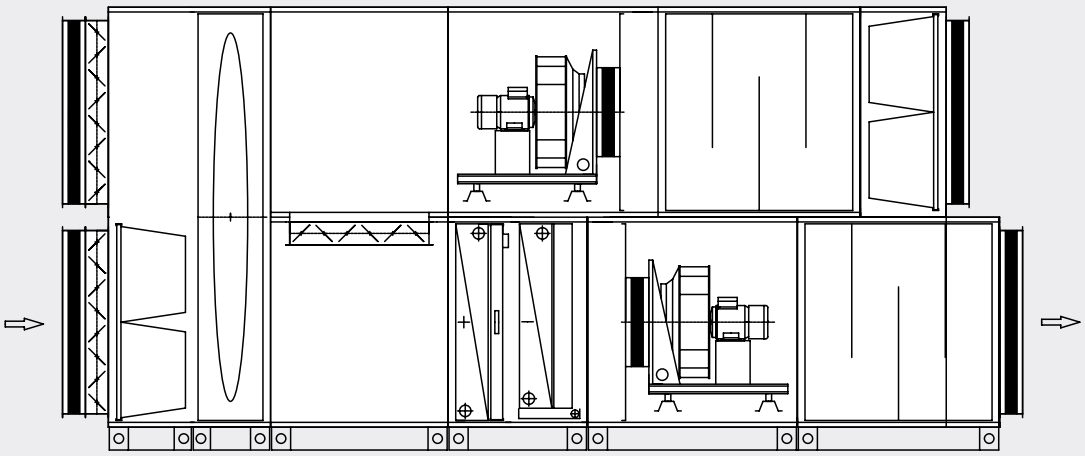
11) *Unit for inlet and outlet of the air with plate heat exchanger, water heating system, cooling system and the fans with free impeller*



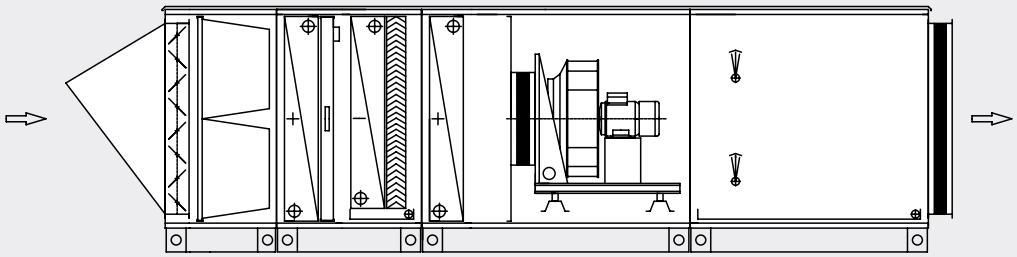
12) *Unit for inlet and outlet of the air with plate heat exchanger, fat filter at the outlet, water heating system, cooling system and the fans with free impeller*



13) *Unit for inlet and outlet of the air with rotational recuperator, mixing system, water heating system, cooling system and the fans with free impeller as well as the air buffers*



14) *Outside unit for inlet of the air fitted with pre-heater, cooler and post-heater, fan with free impeller and chamber for steam moistener*



The assemblies are used only as an example of variability of MANDÍK units. They are not considered as binding. Due to high variability of the units, it is not possible to mention all possible assemblies.

Note:

Installation, commissioning and maintenance technical manual for Mandík Air-handling units is separate technical document.

The document can be found on www.mandik.com
or please contact Mandík sales/technical representative.

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