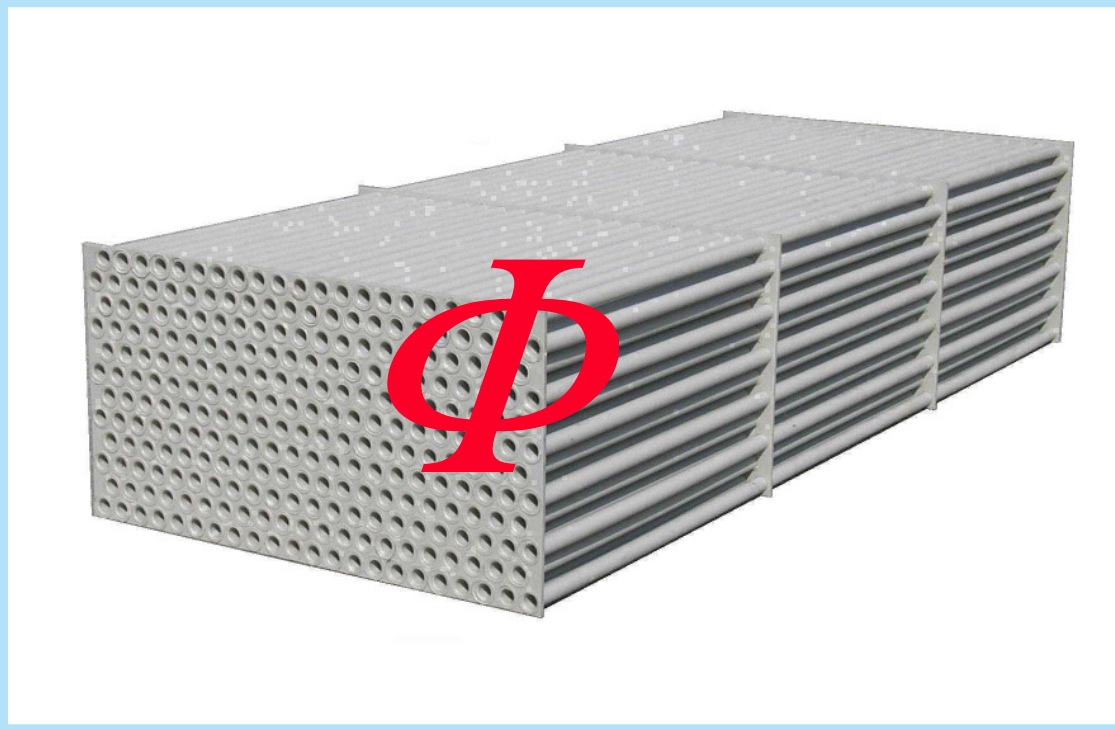
MIETZSCH

GmbH Lufttechnik Dresden

INFORMATION FOR USERS

HEAT EXCHANGERS

WR SERIES



Ausgabe 08/13

Heat exchangers
WR Series

Heat transfer from moisture-containing or aggressive outgoing air

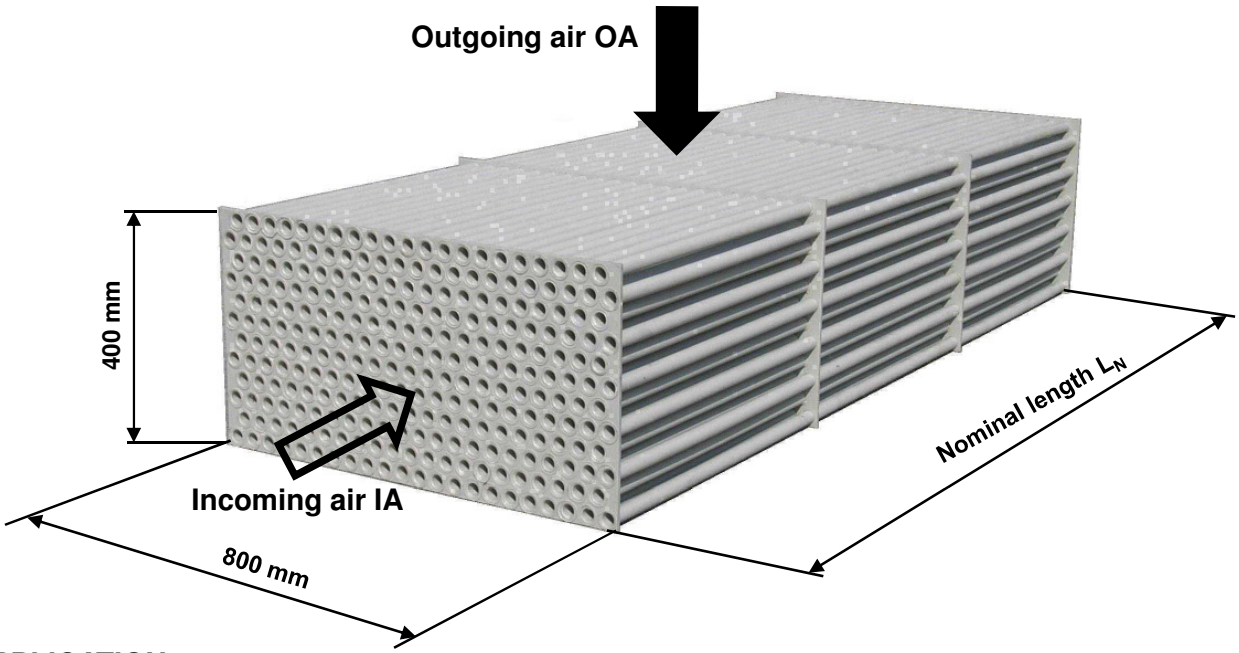
Made of plastic for high resistance to chemicals

Complete separation of incoming and outgoing air streams

Uses cross-flow principle

Wide application range due to modular design

Comprehensive range of accessories

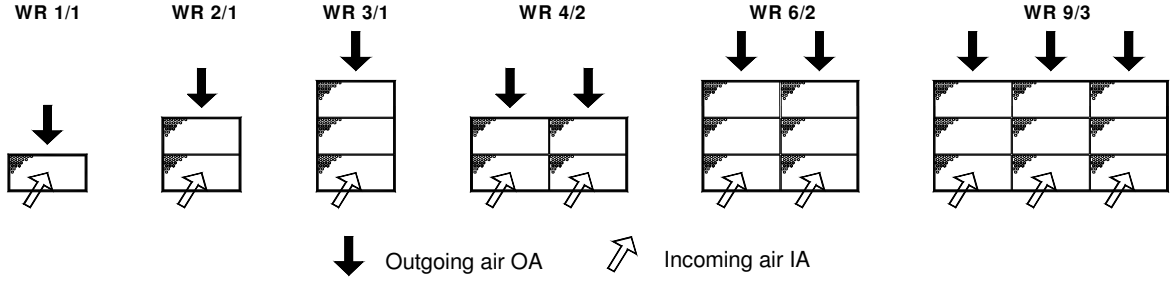


APPLICATION

These heat exchangers are particularly suitable for heat recovery from moisture-containing and/or aggressive outgoing air streams at temperatures between -20 °C and + 50 °C.
Because they are made of plastic and thus have a high corrosion resistance, these heat exchangers are particularly suitable for applications such as fume extraction of process gases in the chemical/pharmaceutical industry as well as for the ventilation of laboratories, pickling baths, scrubbers, electroplating units and agricultural facilities, etc.
Heat recovery rates of up to 0.50 are possible, depending on the system's design. This means that about 50 % of the energy of the outgoing air stream is transferred to the incoming air as heating energy.

TECHNICAL DESCRIPTION

The basic element of this series is a module (see above picture) with nominal dimensions 800 x 400 x nominal length L_N . This module, which is also the smallest unit size, consists of 258 plastic tubes that are secured in plates at both ends.
The heat exchanger uses the cross-flow principle. The hot and possibly contaminated outgoing air (OA) is sent past tubes carrying cold incoming air (IA). The two air streams are completely separate.
The modules are assembled as building blocks to produce the required size and then installed in a housing.
This leads to the following standard layouts (looking into the tubes):



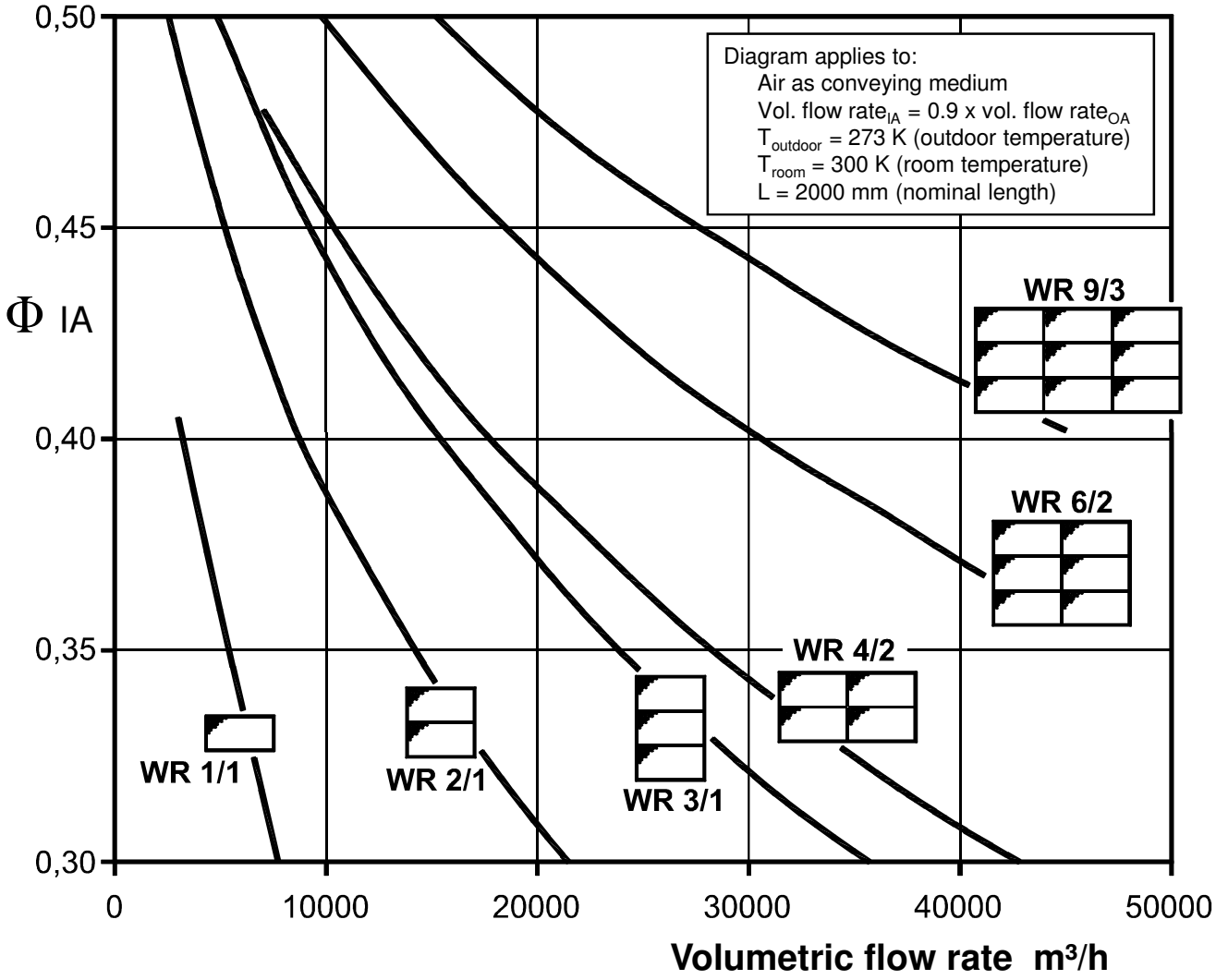
These diagrams correspond to type V (vertical flow of outgoing air). The type H modules are rotated by 90° so that the outgoing and incoming air streams flow horizontally through the heat exchanger.
There are 4 nominal lengths L_N (effective tube length) 1200, 1600, 2000, 2500mm and thus 36 standard versions. Customised layouts and dimensions are available on request.

Designation: **WR no. of modules x no. of module rows** (in outgoing air direction) **x nominal length**

OPERATING CONDITIONS

Volumetric flow rate range		approx. 3000 to 40000 m³/h
permissible temperature range	of conveying medium	-20 °C to + 50 °C
	of the surroundings	0 °C to + 40 °C (outdoor installation not permitted)

The construction materials provide good **corrosion resistance** to many chemicals. Nevertheless, every plastic is susceptible to attack by certain substances.
In order to select a suitable material, the intended use of the heat exchanger and the type of flowing medium must always be stated for queries or when placing an order.



DESIGN

The above diagram can be used as a rough guide for selecting the module layout. The optimum heat exchanger is selected using a computer program in order to minimise the payback period. The following data are required by the manufacturer for the design:

- Volumetric flow rates of incoming and outgoing air streams
- Temperature of outgoing air at the heat exchanger inlet (room temperature)
- Temperature of incoming air at the heat exchanger inlet (mean outdoor temperature)
- Details of the conveying medium, such as moisture content, contaminants, etc.
- Operating time, place of installation

To calculate the utilisation, the amount of energy saved per year by the heat exchanger is determined. It depends on the thermal characteristics and the respective operating parameters (operating time, room temperature, outdoor temperature). The additional energy consumed by the fans is subtracted.

However, a comprehensive estimation of the utilisation must also include the following:

- total additional investment costs (heat exchanger, additional system components, fans)
- possible savings on investments for heating and associated construction costs

The payback time is generally about 2 years for normal room temperatures, particularly if the air volumes are large and with multi-shift operation.

DESIGN / Example

Requirements: Volumetric flow rate of outgoing air 14000m³/h, volumetric flow rate of incoming air 12600m³/h room temperature 22°C, outdoor temperature 4.3°C (mean temperature between October and April for Dresden)

The optimum solution is calculated to be WR 4/2 - 2000.
The transferred heat capacity is approx. 33kW. For a monthly operating time of 320 hours (2-shift operations), approx. 73,000 kWh thermal energy can be extracted during the heating period (October to April).
For an energy price of 0.10 EUR/kWh, this corresponds to cost savings of about 7,300 EUR/year.

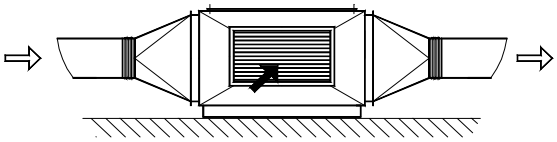
INSTALLATION / MAINTENANCE

The following recommendations should be followed when installing the system:

- The incoming air duct should be equipped with a suitable dust filter to prevent soiling inside the tubes.
- The outgoing air fan should be installed downstream of the heat exchanger to prevent entrainment of contaminants in the incoming air in the event of a possible leakage (due to underpressure in the system).
- An unobstructed condensate drain must be installed in the outgoing air section.
- The strong thermal expansions of the plastic must be equalised with compensators.

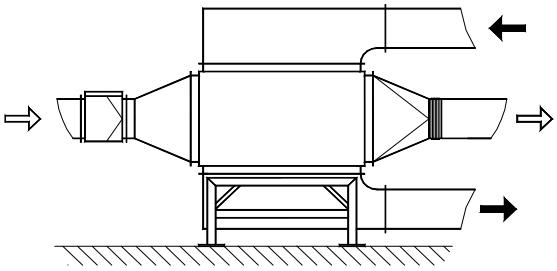
The layout of heat exchanger is selected on the basis of the local construction requirements. Type V models (vertical flow of outgoing air) require a steel frame on which the heat exchanger is mounted. Type H models (horizontal flow of outgoing air) can be mounted directly on a flat floor.
Suitable connection fittings for incoming and outgoing air ducts are available as accessories.
Maintenance work amounts to regular cleaning with rinsing water, particularly the outgoing air section.
During very cold weather, it is possible that ice may collect on the outgoing air section. This can be removed by reducing the flow of incoming air.

Installation examples (outgoing air ➡ incoming air ⇨)



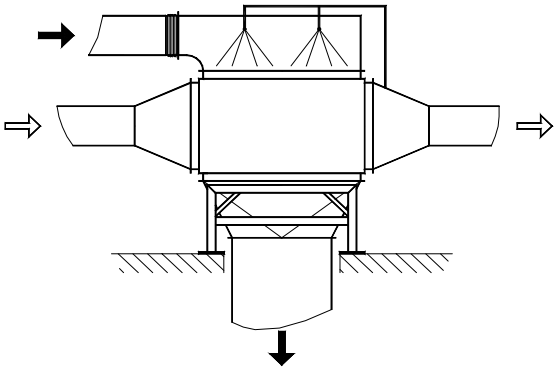
Example 1: Heat exchanger type H

Installed directly on the floor
Cleaning hatch on the top face
Duct transitions for outgoing air
Pipe transitions with compensators for incoming air



Example 2: Heat exchanger type V

Mounted on a steel frame
Angle transitions for outgoing air
Filter installed upstream of the incoming air inlet, (duct) transition
Pipe transition with compensator for the incoming air outlet

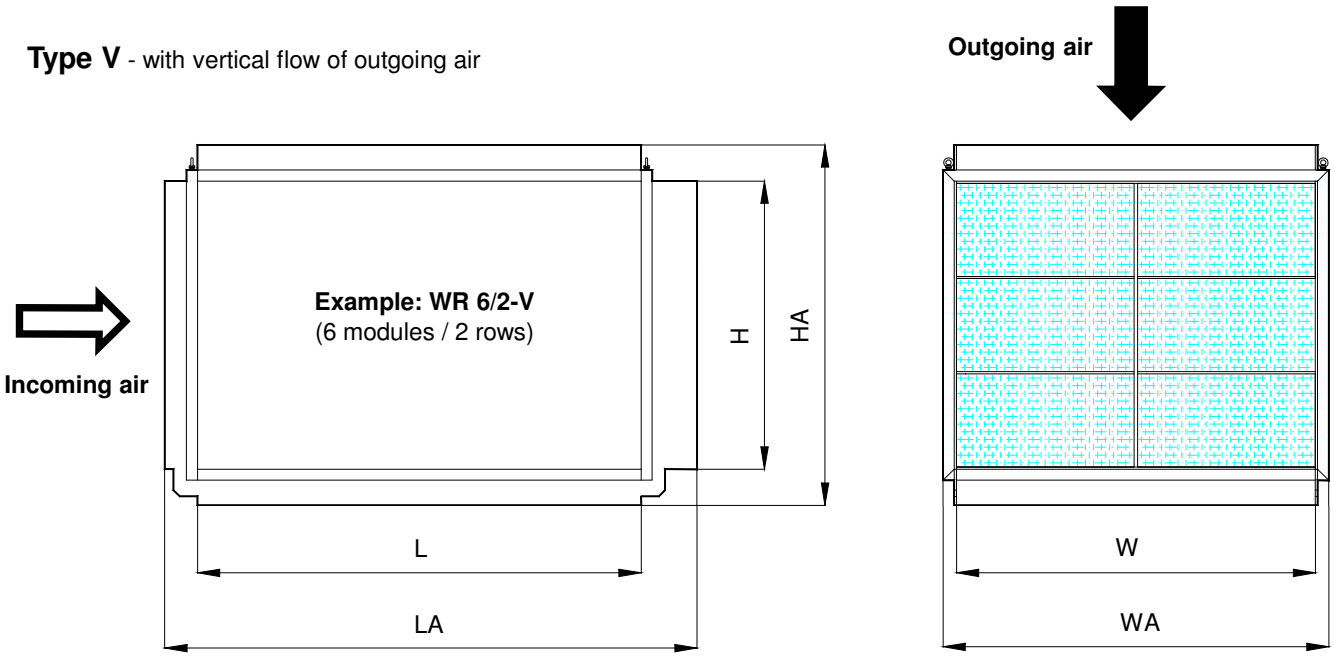


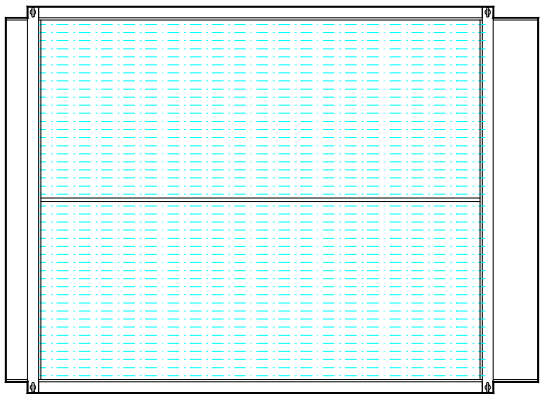
Example 3: Heat exchanger type V

Mounted on a steel frame
Spray modules at the outgoing air inlet for cleaning
Angle transition with expansion compensator for the outgoing air inlet
Pipe transition downwards for outgoing air outlet
Duct transitions for the incoming air

Main dimensions

Type V - with vertical flow of outgoing air





The modules are installed in the housing in the positions shown on page 1.

The outgoing air flows from top to bottom past the horizontally installed tubes. The incoming air flows horizontally through the tubes.

The customer must install the heat exchanger on a steel frame.
In general, the outgoing air duct at the bottom is routed away to the side via corresponding connection fittings with a deflector.

Any condensate in the outgoing air can simply drain away downwards. Spray modules to clean the outside of the tubes can be installed at the outgoing air inlet.

Dimensions depend on the module layout						
HE type (module layout)	No. modules	No. rows	Overall dimensions		Connection dimensions	
			WA	HA	W	H
	n_M	n_R	mm	mm	mm	mm
WR 1/1	1	1	922	764	822	439
WR 2/1	2	1	922	1193	822	868
WR 3/1	3	1	922	1622	822	1297
WR 2/2	2	2	1739	764	1639	439
WR 4/2	4	2	1739	1193	1639	868
WR 6/2	6	2	1739	1622	1639	1297
WR 3/3	3	3	2556	764	2456	439
WR 6/3	6	3	2556	1193	2456	868
WR 9/3	9	3	2556	1622	2456	1297

Dimensions depend on the nominal length			
HE type (nominal length = effective tube length)	Nominal length L_N mm	LA mm	L mm
WR n_M / n_R x 1200	1200	1600	1200
WR n_M / n_R x 1600	1600	2000	1600
WR n_M / n_R x 2000	2000	2400	2000
WR n_M / n_R x 2500	2500	2850	2450

Connection dimensions for the outgoing air duct W x L

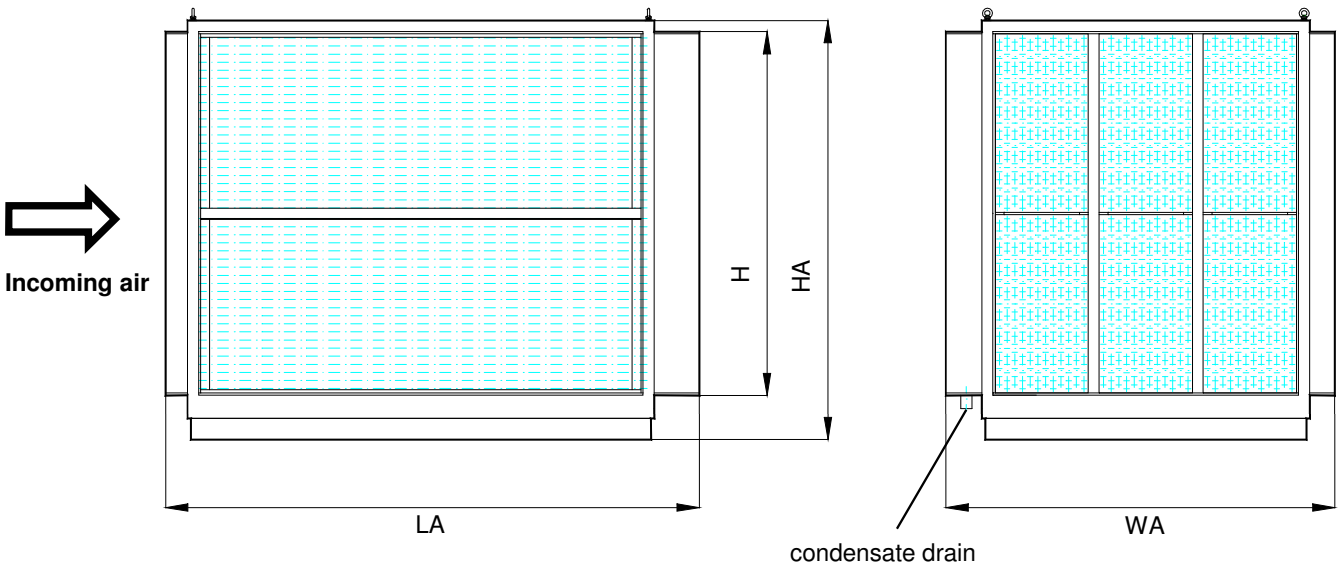
Connection dimensions for the incoming air duct W x H

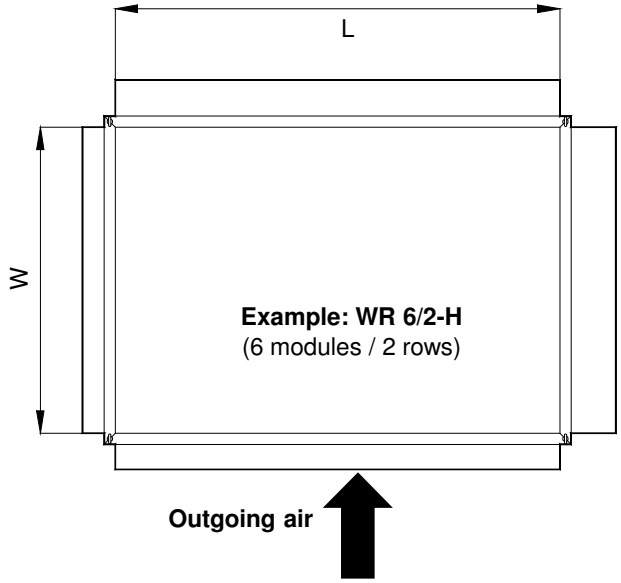
Example calculation: Heat exchanger with 6 modules, 2 rows of modules, vertical type, nominal length 2000mm, material PPs

WR 6/2 - V - 2000 - PPs

Main dimensions

Type H - with horizontal flow of outgoing air





The modules are installed in the housing at a 90° angle to those in type V models.

The outgoing air flows horizontally past the tubes, and the incoming air flows horizontally through the tubes.

The customer must install the heat exchanger on a foundation or a base.

All connecting ducts are installed horizontally. This means that the overall height of the system is smaller than for type V.

Any condensate in the outgoing air is discharged via a drain after the air has passed through the heat exchanger. A cleaning hatch can be installed on the top face of the housing in order to clean the outsides of the tubes.

Dimensions depend on the module layout						
HE type (module layout)	No. modules n_M	No. rows n_R	Overall dimensions WA mm	HA mm	Connection dimensions W mm	H mm
WR 1/1	1	1	834	1072	439	822
WR 2/1	2	1	1302	1072	907	822
WR 3/1	3	1	1770	1072	1375	822
WR 2/2	2	2	834	1884	439	1634
WR 4/2	4	2	1302	1884	907	1634
WR 6/2	6	2	1770	1884	1375	1634
WR 3/3	3	3	834	2696	439	2446
WR 6/3	6	3	1302	2696	907	2446
WR 9/3	9	3	1770	2696	1375	2446

Dimensions depend on the nominal length			
HE type (nominal length = effective tube length)	Nominal length L_N mm	LA mm	L mm
WR n_M / n_R x 1200	1200	1600	1200
WR n_M / n_R x 1600	1600	2000	1600
WR n_M / n_R x 2000	2000	2400	2000
WR n_M / n_R x 2500	2500	2850	2450

Connection dimensions for the outgoing air duct L x H

Connection dimensions for the incoming air duct W x H

Example calculation: Heat exchanger with 6 modules, 2 rows of modules, horizontal type, nominal length 2000mm, material PPs

WR 6/2 - H - 2000 - PPs

No.	Qty	Object	Unit price EUR	Total price EUR

Plastic heat exchanger

Mietzsch Lufttechnik - WR Series

Plain tube heat exchanger using the cross-flow principle for gaseous media

High resistance to chemicals due to the use of plastic, complete separation of incoming and outgoing air streams

Optimum configuration of output capacity by means of a modular design and adjustment of the tube length

Module comprising tube bundles welded into end plates, with integrated expansion compensator, all components made of either PVC or PPs

All connections are female (as standard)

WR _ _ / _ _ - _ - _ _ _ _ - _ _ _ _

no. of modules
no. of rows
type
nominal length
material

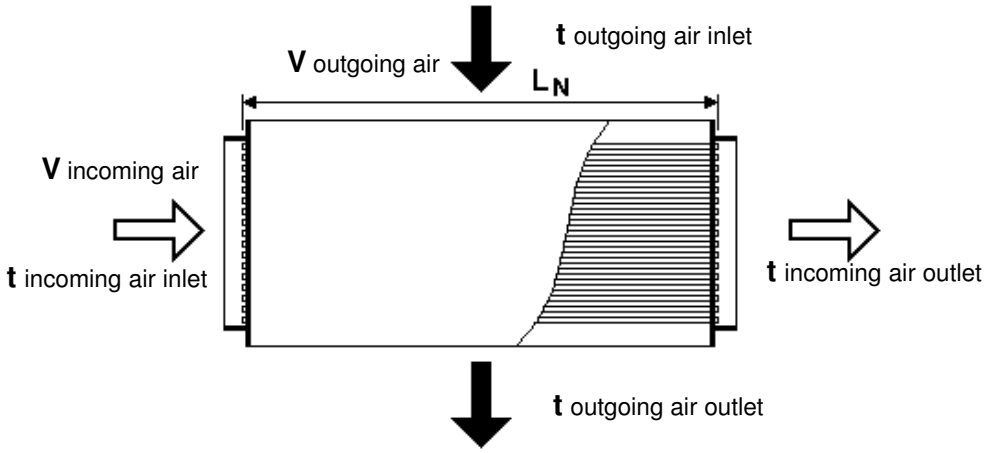
	Outgoing air	**Incoming air**
Volumetric flow rate	: _____ m^3/h	_____ m^3/h
Inlet temperature	: _____ °C	_____ °C
Outlet temperature	: _____ °C	_____ °C
Pressure loss	: _____ Pa	_____ Pa

Energy transfer : _____ kW
Max. temperature : _____ °C

Overall dimensions WAxHAxLA : _____ mm
(for vertical / horizontal flow of outgoing air)

Weight : _____ kg

Flowing medium/intended use:



Accessories and special equipment

- Welded frame; no holes, hole pattern 1, hole pattern 2
- Connecting fittings for incoming and outgoing air
- Cleaning device (spray module), cleaning hatch
- Pre-filter for incoming air
- Steel frame for installation
- Miscellaneous