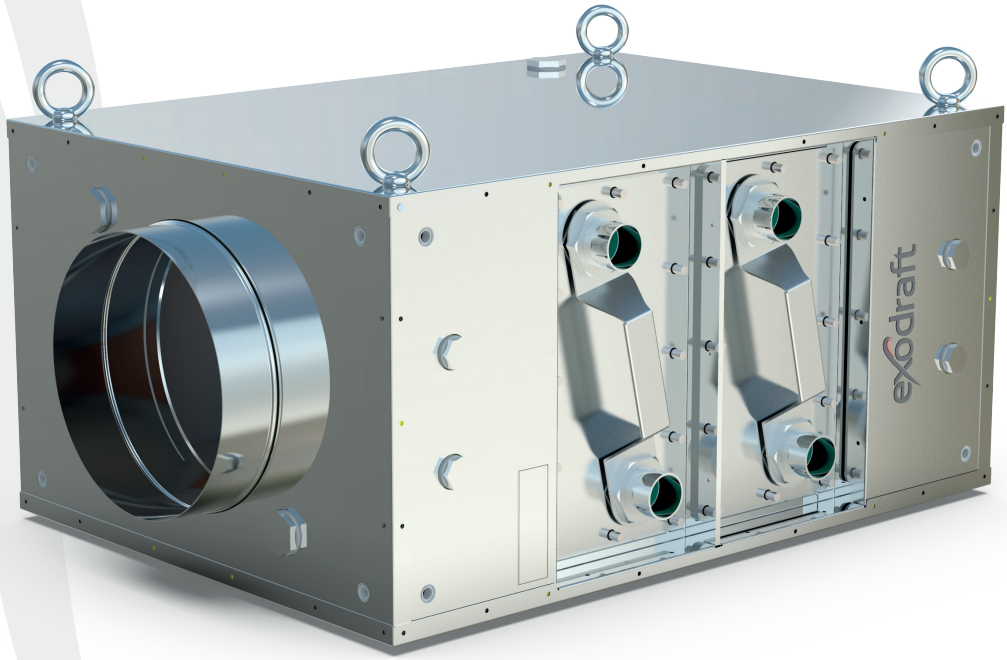
ENERVEX POWERVEX BP HEAT RECOVERY UNITS

010.4330.0525 05.25 **Installation & Operating Manual**

Models:
BP250, BP250-2
BP500, BP500-2
BP750, BP750-2
BP1000, BP1000-2
BP2000, BP2000-2



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READ AND SAVE THESE INSTRUCTIONS!

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ENERVEX®
VENTING DESIGN SOLUTIONS

HOW TO USE THIS MANUAL

This manual has been prepared based on the specific product and contains relevant technical information and installations guides.

Accessories and spare parts are not covered by this manual. Please refer to the individual manuals of these components.

This installation manual does not contain any system design documentation.

Failure to observe instructions marked with a danger symbol may result in personal injury and/or damage to the product.

Errors and omissions excepted.

DISPOSAL

Electrical and electronic equipment (EEE) often contain materials, components and substances that may harm the environment or be hazardous to your health. Products (WEEE) marked with the 'crossed-out wheeled bin' symbol should be disposed of separately from other waste at theend of its life. Though legislation may differ from country to country we strongly advise that electrical and electronic waste is separated from other waste and disposed of according to national legislation to protect the environment and personnel that may come into contact with waste.

SYMBOLS

The following symbols may be used in the manual to draw attention to danger or risk of personal injury or damage to the product.

GENERAL PROHIBITION

Failure to observe instructions marked with the prohibited symbol may result in extreme danger or serious personal injury.

GENERAL ATTENTION

Marks a dangerous situation that, in the worst-case scenario, can cause serious personal injury or significant damage to the product.

GENERAL WARNING

Failure to observe instructions marked with a danger symbol may result in personal injury and/or damage to the product.

ELECTRICITY HAZARD/HIGH VOLTAGE

Marks a situation in which caution is advised due to the risk of high voltage electric shock which can cause serious personal injury or significant damage to the product.

CONNECT AN EARTH TERMINAL TO THE GROUND

Failure to observe instructions marked with a danger symbol may result in personal injury and/or damage to the product.

PERMITTED AND APPROVED

Permitted and approved method of installation.

PROHIBITED AND NOT APPROVED

Prohibited and not approved method of installation.

WARNING
TO MINIMIZE THE RISK OF FIRE, ELECTRIC SHOCK, PERSONAL INJURY AND/OR DAMAGE TO THE PRODUCT PLEASE OBSERVE THE FOLLOWING:

- Please always read the manual and only use the product in accordance with the manufacturer's instructions. If in doubt, contact ENERVEX.
- All installations must be carried out by properly qualified personnel in accordance with national legislation and regulations.
- Prior to servicing the product, the heat source must be shut off and cooled down.
- Please ensure that the heat source is not turned back on inadvertently.

Content

1 PRODUCT INFORMATION

Basic Plate is a compact heat recovery unit for use in ENERVEX system solutions.

The heat exchanger is a compact module that utilizes the passing heat (air to water).

Basic Plate is used primarily in industrial and commercial plants with long operating hours and high exit temperatures (max. 1112°F / 600°C) in flue pipes and chimneys.

Basic Plate is easy and fast to maintain and clean.

Typically, it is used in bakeries, the food processing industry, and in metal processing.

The recovered and stored energy may be used for production of utility water, water for heating, cleaning, or process water.

Basic Plate can be used in heated process air and flue gas from gas, electricity, and oil (may require a special alloy for the exchanger) or heated water sources.

Several Basic Plate units can be combined modularly.

All parts affected by flue gas are made of stainless steel 316L (EN 1.4404).

All exterior parts are made of stainless steel 304 (EN 1.4301).

The Basic Plates limitations

- Strictly for indoor installation
- Range of operation: 250-1000 kW (nominal burner power input)
- Max. temperature 1112°F /600°C
- Process air or flue gas must be of a nature that does not clog up the exchangers in short time

To find out more about heat recovery visit www.enervex.com

1.1 SCOPE OF SUPPLY

- Basic Plate
- Installation manual and user instructions
- Pallet*
- Straps*
- Screws*
- Transportation safety brackets*

*For transportation only. Be aware to disconnect these parts before installation.

1.2 WARRANTY

All ENERVEX products are covered by a 2-year guarantee.

The warranty and liability does not cover instances regarding personal injury or damage to property or the product that can be ascribed to one or more of the following causes:

- Failure to follow this installation and operation manual
- Incorrect installation, start-up, maintenance or servicing
- Improper repairs
- Unauthorised structural modifications made to the product
- Installation of additional components that have not been tested/approved with the product
- Any damage resulting from continued use of the product despite an evident defect
- Failure to use original spareparts and accessories
- Failure to use the product as intended
- Exceeding or failure to meet the limit values in the technical data
- Force majeure

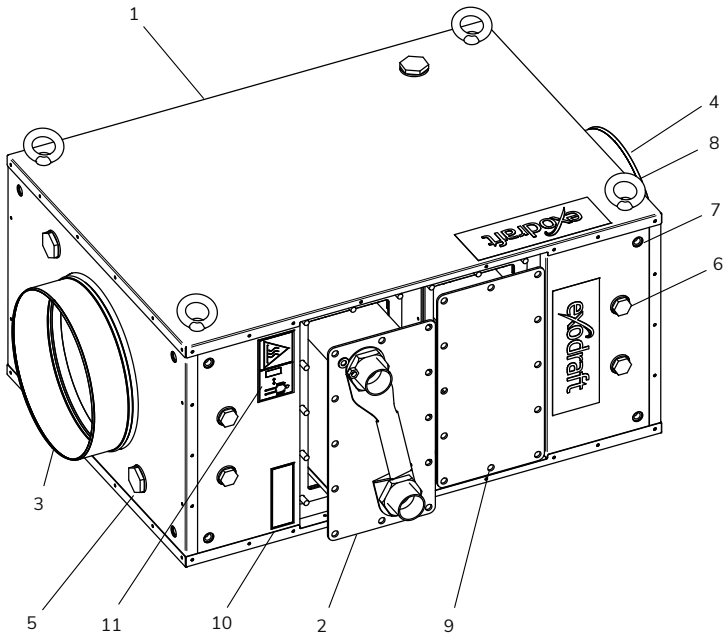
1.3 TECHNICAL SPECIFICATIONS

BASIC TYPES

ENERVEX Item Number	Type (Basic Plate)	Description	Approx. CONNECTION POWER	Natural Gas Nominal Flow 482°F/250°C λ 1.2
433.0250.0000	BP250	Basic housing GLX30 exchanger (Plate), Copper brazed Standard pipe connection dimensions Max. 1112°F / 600°C 1 step on air side	250 kW	21,190 cuft 600 m^3
433.0250.0001	BP250-2	Basic housing GLX30 exchanger (Plate), Copper brazed Standard pipe connection dimensions Max. 1112°F / 600°C 2 steps on air side	250 kW	21,190 cuft 600 m^3
433.0500.0000	BP500	Basic housing GLX30 exchanger (Plate), Copper brazed Standard pipe connection dimensions Max. 1112°F / 600°C 1 step on air side	500 kW	42,380 cuft 1200 m^3
433.0500.0001	BP500-2	Basic housing GLX30 exchanger (Plate), Copper brazed Standard pipe connection dimensions Max. 1112°F / 600°C 2 steps on air side	500 kW	42,390 cuft 1200 m^3
433.0750.0000	BP750	Basic housing GLX30 exchanger (Plate), Copper brazed Standard pipe connection dimensions Max. 1112°F / 600°C 1 step on air side	750 kW	60,035 cuft 1700 m^3
433.0750.0001	BP750-2	Basic housing GLX30 exchanger (Plate), Copper brazed Standard pipe connection dimensions Max. 1112°F / 600°C 2 steps on air side	750 kW	60,2035 cuft 1700 m^3
433.1000.0000	BP1000	Basic housing GLX30 exchanger (Plate), Copper brazed Standard pipe connection dimensions Max. 1112°F / 600°C 1 step on air side	1000 kW	81,225 cuft 2300 m^3
433.1000.0001	BP1000-2	Basic housing GLX30 exchanger (Plate), Copper brazed Standard pipe connection dimensions Max. 1112°F / 600°C 2 steps on air side	1000 kW	81,225 cuft 2300 m^3
433.2000.0000	BP2000	Basic housing GLX30 exchanger (Plate), Copper brazed Standard pipe connection dimensions Max. 1112°F / 600°C 1 step on air side	2000 kW	162,450 cuft 4600 m^3
433.2000.0001	BP2000-2	Basic housing GLX30 exchanger (Plate), Copper brazed Standard pipe connection dimensions Max. 1112°F / 600°C 2 steps on air side	2000 kW	162,450 cuft 4600 m^3

STANDARD COMPONENTS

1	Cabinet
2	Heat exchanger
3	Inlet connection
4	Outlet connection
5	1" drain (all 1" connections are drains)
6	½" measuring point (all ½" connections are measuring points)
7	M12 thread for fastening (there is a total of three mounting points in each corner of Basic Plate, each with M12 thread)
8	Lifting eye
9	Cover
10	Nameplate
11	Danger/Caution sign



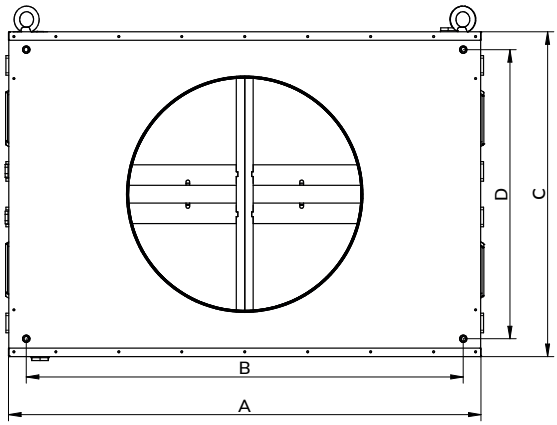
OPTIONAL COMPONENTS

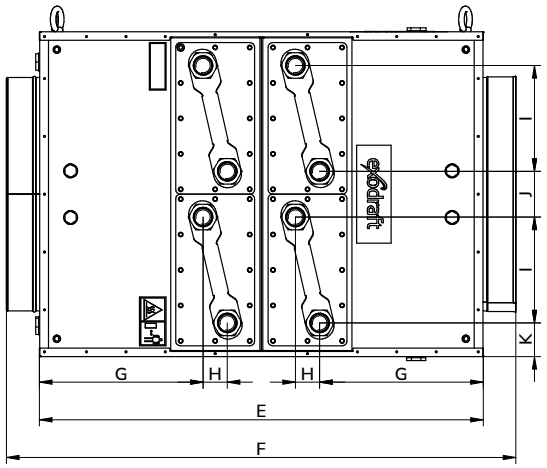
PT 1000 temperature transmitter	
BP Model	**Length**
BP250	11.81 in/300 mm
BP500	11.81 in/300 mm
BP750	15.75 in/400 mm
BP1000	15.75 in/400 mm
BP2000	15.75 in/400 mm
	Pressure connection for Ø 0.31/0.16 in hose / Ø 8/4 mm
	Double cover plate
	Single cover plate
	Silicone hose Ø 0.31/0.16 in / Ø 8/4 mm
	ST110 safety thermostat

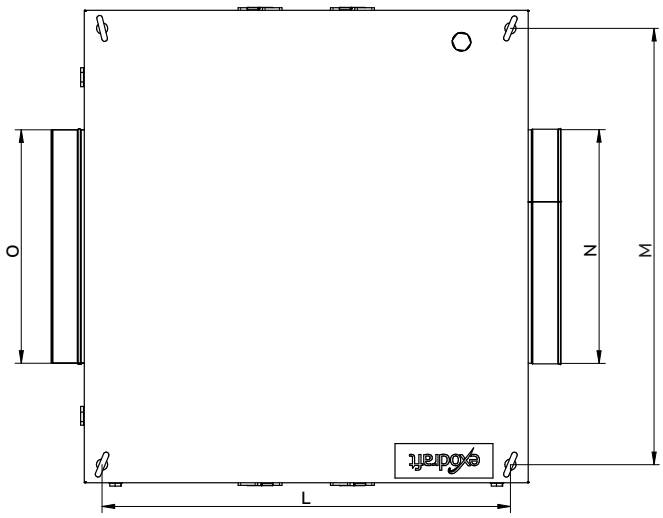
TECHNICAL DATA

Model	Dimensions (in/mm)														
	A	B	C	D	E	F	G	H	I	J	K	L	M	N*	O**
BP250/-2	21.73/ 552	18.7/ 475	14.61/ 371	11.61/ 295	29.65/ 753	35.16/ 893	9.88/ 251	2.05/ 52	8.94/ 227	-	2.83/ 72	26.61/ 676	18.66/ 474	9.89/ 251.2	9.86/ 250.5
BP250/-2	21.73/ 552	18.7/ 475	27.4/ 696	24.41/ 620	37.48/ 952	42.99/ 1092	13.82/ 351	2.05/ 52	8.94/ 227	3.86/ 98	2.83/ 72	26.61/ 676	18.66/ 474	13.83/ 351.2	13.80/ 350.5
BP750/-2	39.88/ 1013	36.89/ 937	27.4/ 696	24.41/ 620	37.48/ 952	42.99/ 1092	13.82/ 351	2.05/ 52	8.94/ 227	3.86/ 98	2.83/ 72	34.49/ 876	36.81/ 935	15.80/ 401.2	15.77/ 400.5
BP1000/-2	39.88/ 1013	36.89/ 937	27.4/ 696	24.41/ 620	37.48/ 952	42.99/ 1092	13.82/ 351	2.05/ 52	8.94/ 227	3.86/ 98	2.83/ 72	34.49/ 876	36.81/ 935	19.73/ 501.2	500.5/ 19.70
BP2000/-2	1376/ 54.17	937/ 36.89	1014/ 39.92	620/ 24.41	952/ 37.48	1795/ 70.67	351/ 13.82	52/ 2.05	227/ 8.94	98/ 3.86	72/ 2.83	876/ 34.49	935/ 36.81	27.61/ 701.2	27.58/ 700.5

*Specifies inside sleeve dimensions **Specifies outside adapter dimensions

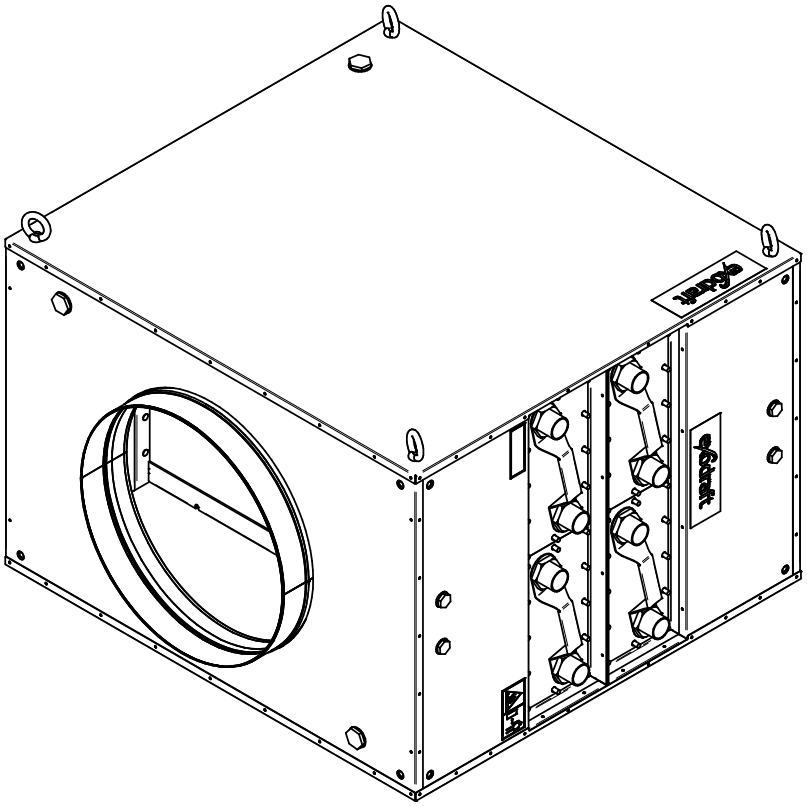






OPTIONAL COMPONENTS

Model	Number of heat exchangers	Weight	
		Incl. heat exchanger [lbs/kg]	Excl. heat exchanger [lbs/kg]
BP250	1	141.1 / 64	101.4 / 46
BP500-2	2	176.4 / 80	101.4 / 46
BP500	2	251.3 / 114	176.4 / 80
BP500-2	4	330.7 / 150	176.4 / 80
BP750	4	418.9 / 190	286.6 / 130
BP750-2	8	551.2 / 250	286.6 / 130
BP1000	4	432.1 / 196	277.8 / 126
BP1000-2	8	586.4 / 266	277.8 / 126
BP2000	8	1212.5 / 550	903.9 / 410
BP2000-2	16	1532.4 / 695	903.9 / 410



2. MECHANICAL INSTALLATION

ENERVEX products must always be installed by properly qualified personnel.

These instructions, applicable standards and relevant safety procedures from the manufacturer must be followed and at the same time the official provisions in force in the country, where the product is installed,must be observed.

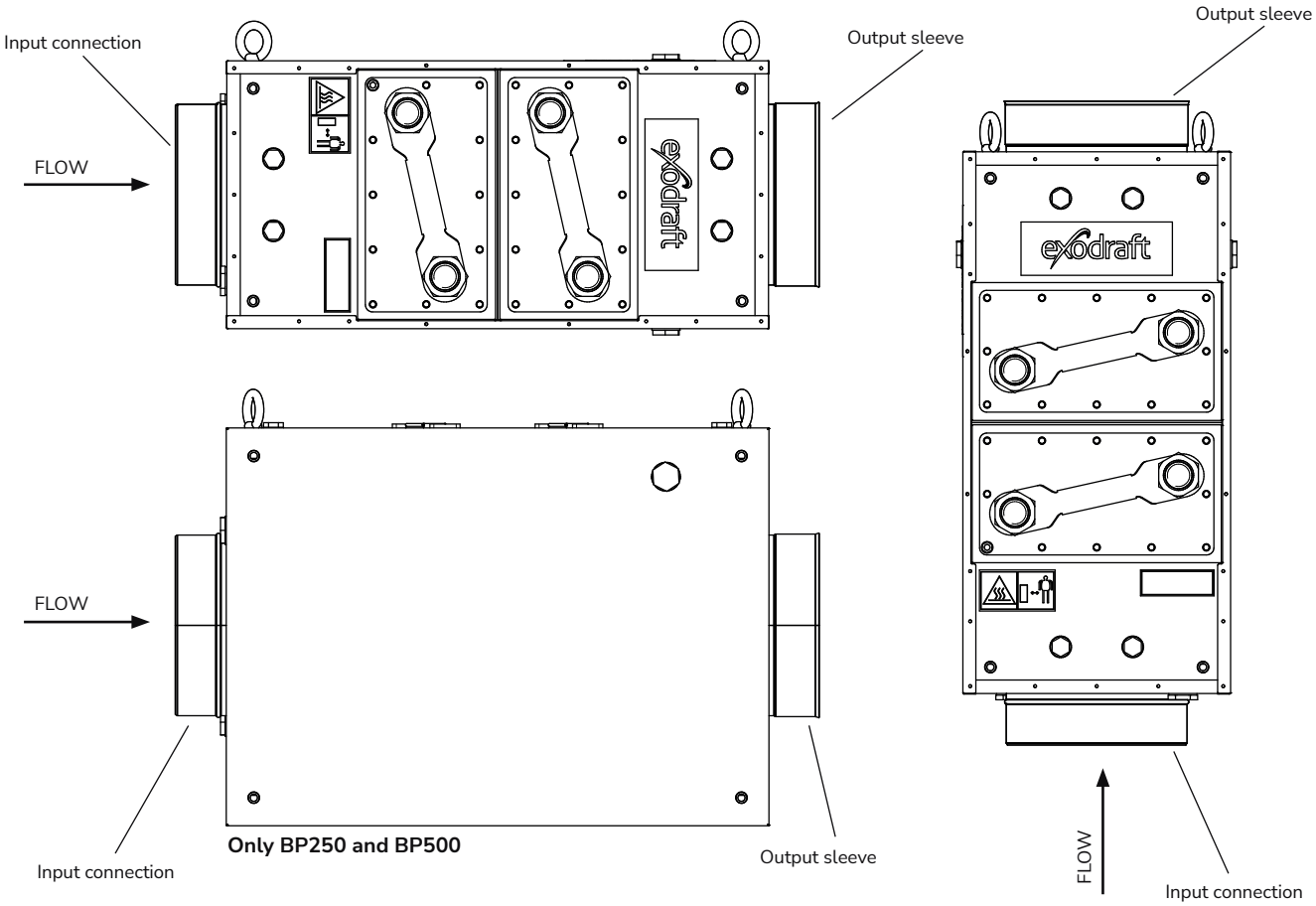
2.1 ORIENTATION

The BP250 and BP500 can be oriented in 3 different ways, and BP750, BP1000 and BP2000 in two different ways.

When orienting Basic Plate heat recovery units, it is important to consider placement of drain connections as well as options for ventilating the heat exchangers.

CAUTION!

If the Basic Plate heat recovery unit is not installed, maintained, and/or operated in compliance with the manufacturer's instructions, conditions may arise which could lead to personal injury or material damage.

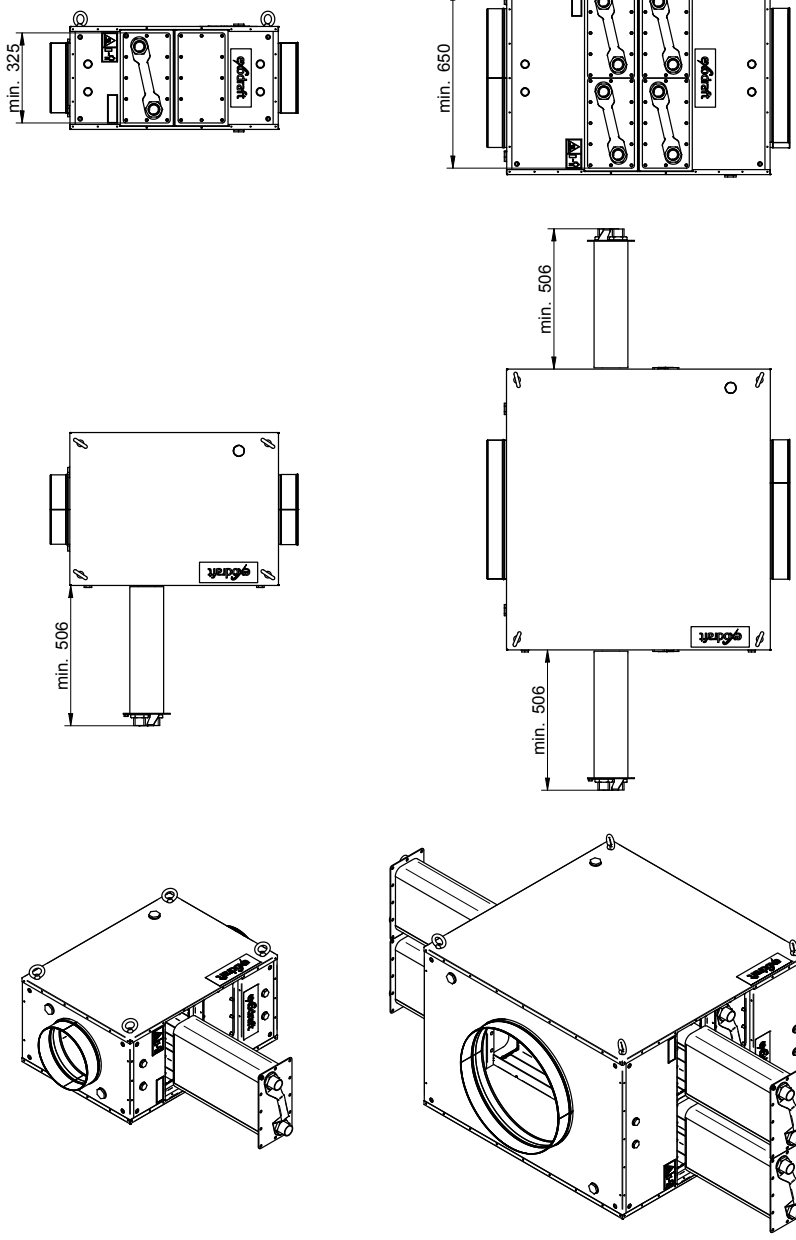


2.2 PLACEMENT

Placement of the Basic Plate heat recovery unit must be considered carefully.

We recommend placing the Basic Plate as close to the heat source as possible. Furthermore, you must allow for hot surfaces on the Basic Plate.

If Basic Plate is placed where it is easily accessible, it must be shielded to avoid inadvertent touch and any risk of collision.

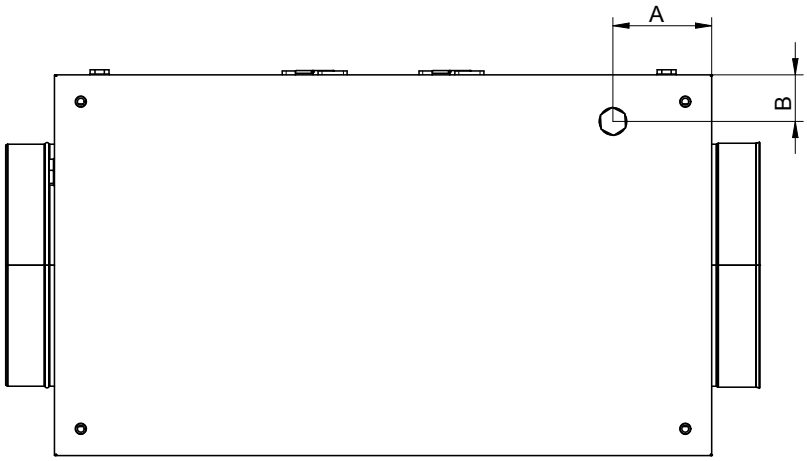


DANGER!
Observe local codes regarding distance from flammable materials.

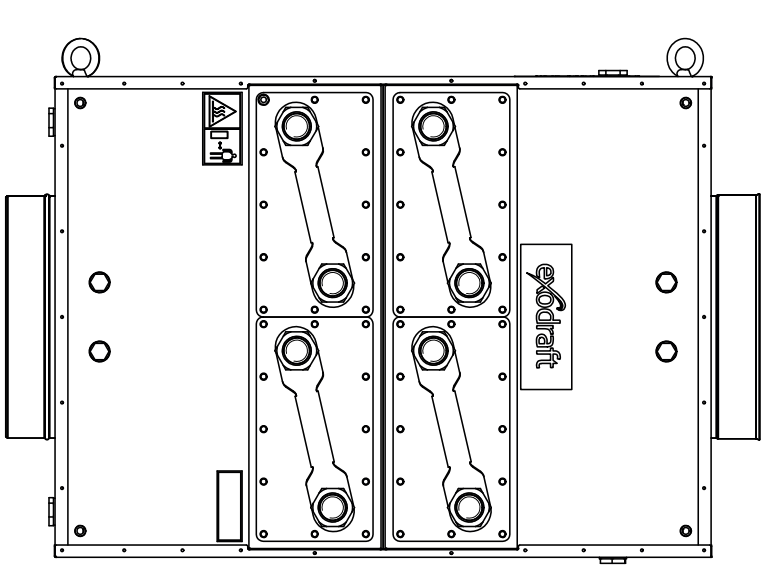
CAUTION!
Basic Plate must be installed in a way that accommodates pulling out the exchanger for servicing and maintenance.

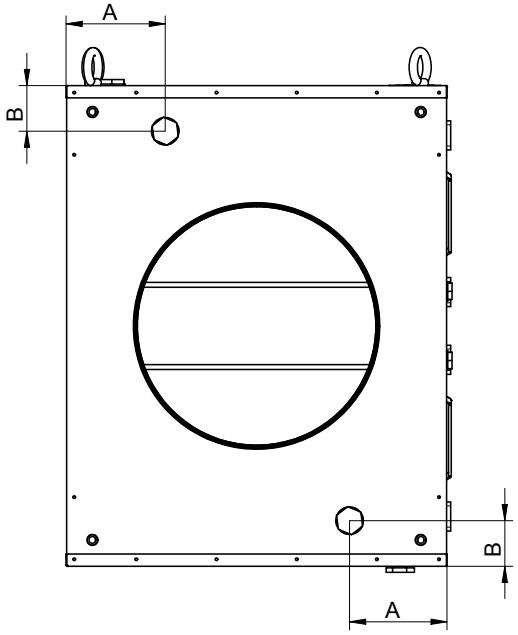
2.3 DRAIN CONNECTION

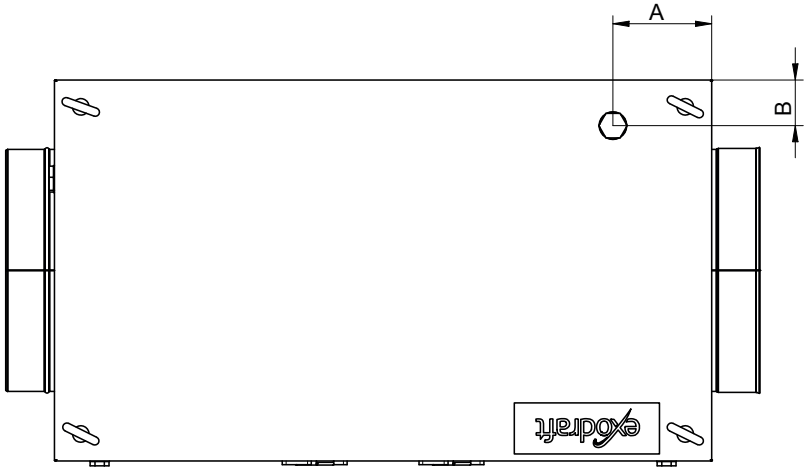
Placement of drain holes in Basic Plate.



Model	A (in/mm)	B (in/mm)
BP250	5.63 / 143	2.62 / 66.5
BP500	5.63 / 143	2.62 / 66.5
BP750	5.63 / 143	2.62 / 66.5
BP1000	5.63 / 143	2.62 / 66.5
BP2000	5.63 / 143	2.62 / 66.5







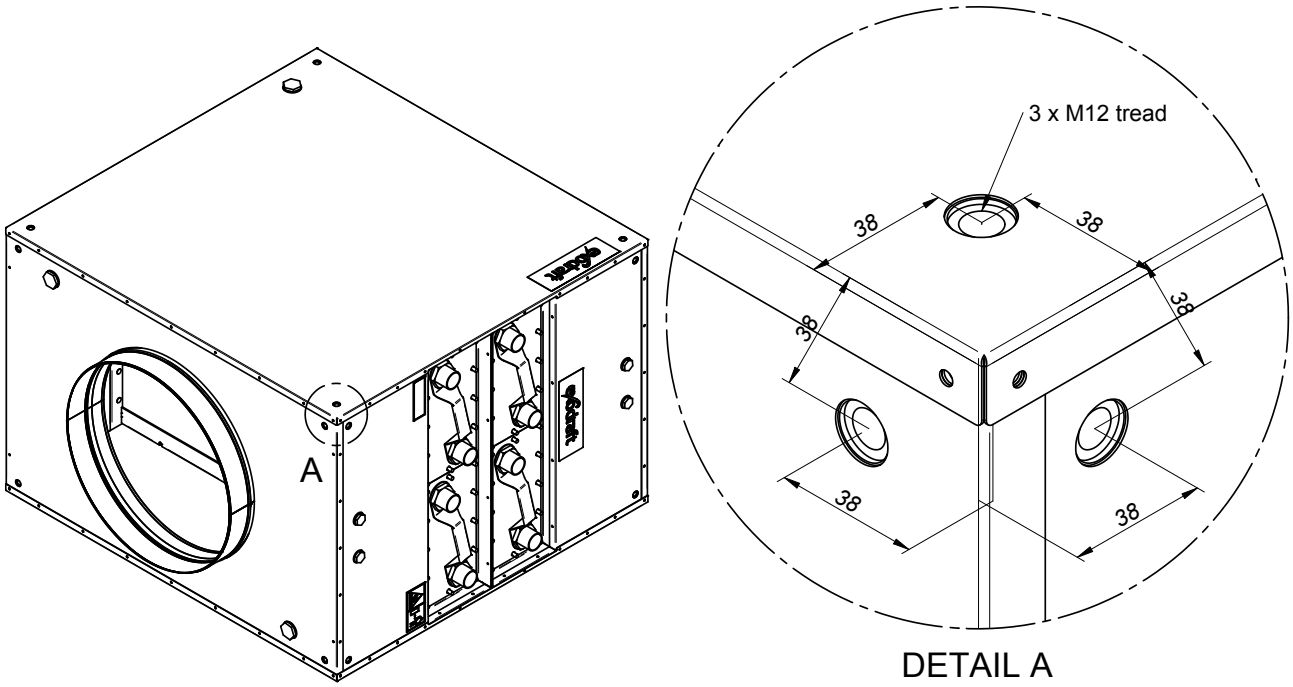
2.4 MOUNTING

The weight must be distributed among at least 4 mounting corners (see next section – Mounting points).

Mounting points are only intended to support the weight of the product itself.

Basic Plate is not built to support the weight of any chimney.

DANGER!
Max. load on mounting corner
220 lbs / 100 kg



DETAIL A

Type (Basic Plate)	Weight incl. Heat Exchangers [lbs/kg]	Number of Heat Exchangers	Weight each Heat Exchanger [lbs/kg]
BP250	141 / 64	1	38.6 / 17.5
BP250-2	176 / 80	2	38.6 / 17.5
BP500	251 / 114	2	38.6 / 17.5
BP500-2	331 / 150	4	38.6 / 17.5
BP750	419 / 190	4	33.1 / 15
BP750-2	551 / 250	8	33.1 / 15
BP1000	432 / 196	4	38.6 / 17.5
BP1000-2	586 / 266	8	38.6 / 17.5
BP2000	1213 / 550	8	38.6 / 17.5
BP2000-2	1533 / 695	16	38.6 / 17.5

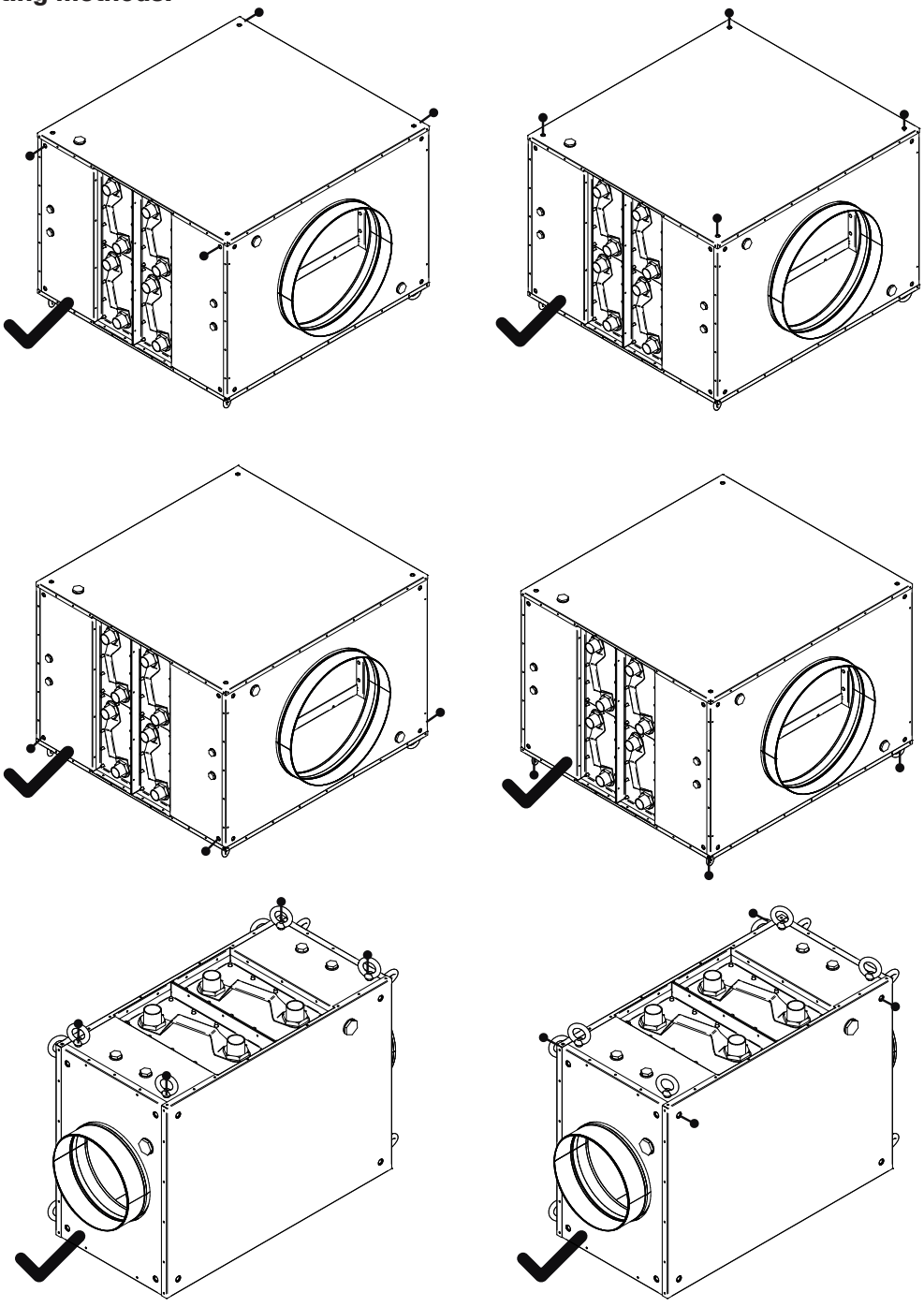
2.5 MOUNTING POINTS

Basic Plate must be fitted in at least four different corners of the product.

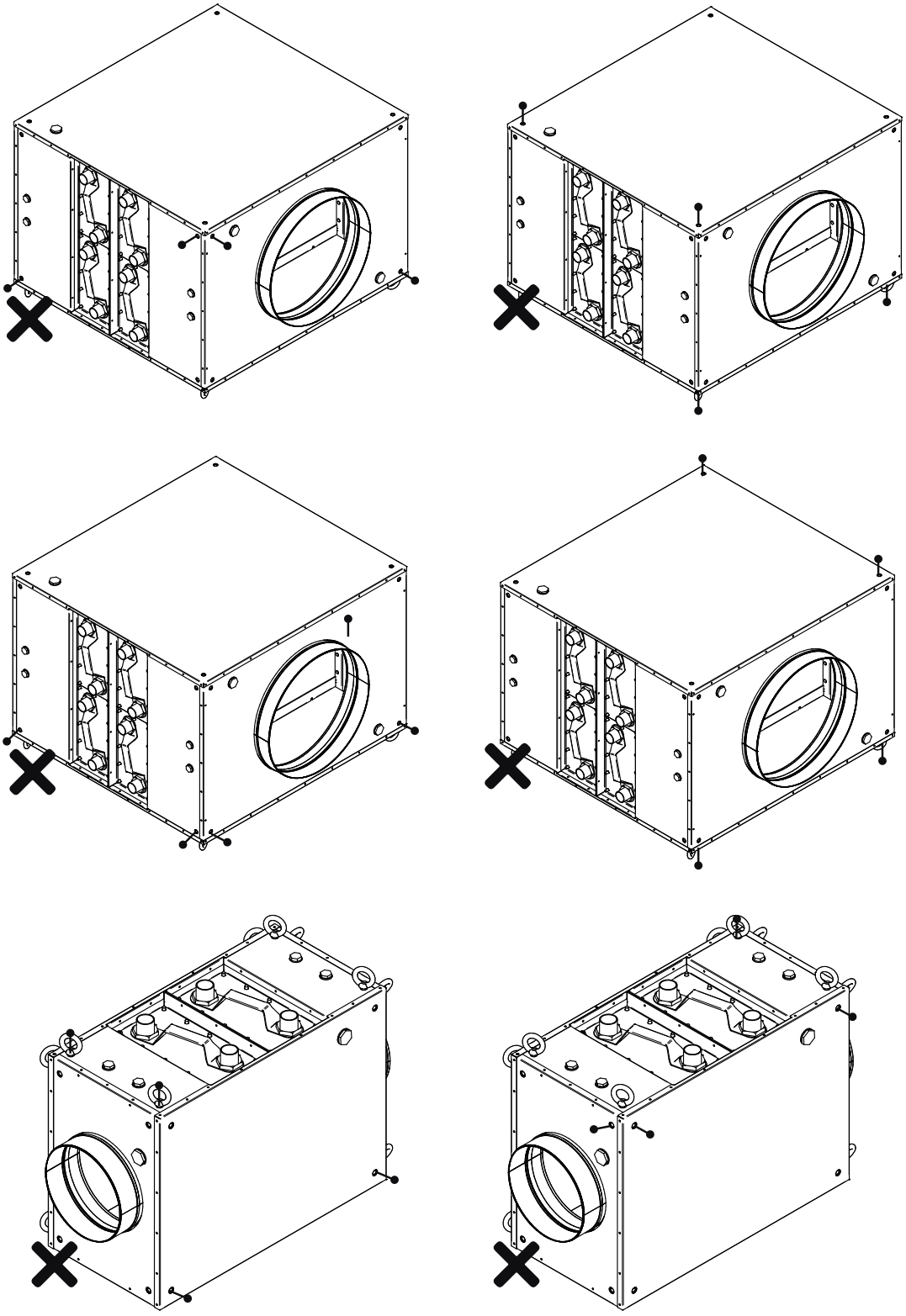
For safety reasons, it must be ensured that the weight of the product is evenly distributed over all four assembly points.

The following examples of this and next page show different solutions to approved and unauthorized mounting methods.

Approved mounting methods:



Unapproved mounting methods:

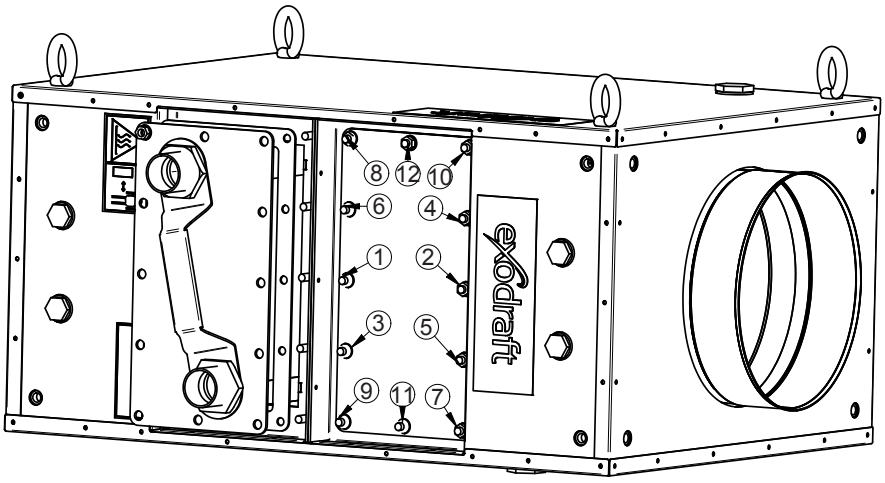


2.6 CONNECTION

- Connection on heat exchangers is 1 1/4” outside thread
- Connection to drain is 1” inside thread
- Connection to measuring points is ½” inside thread

CAUTION!
Basic Plate comes with heat exchangers temporarily mounted for shipping. When installing, the included gaskets, nuts, and washers must be fitted. Tightening the exchanger is done as shown on the illustration below. Nuts are tightened crosswise to 14.75 ft-lbs.

As a rule, the washer for the heat exchanger can be used only once.



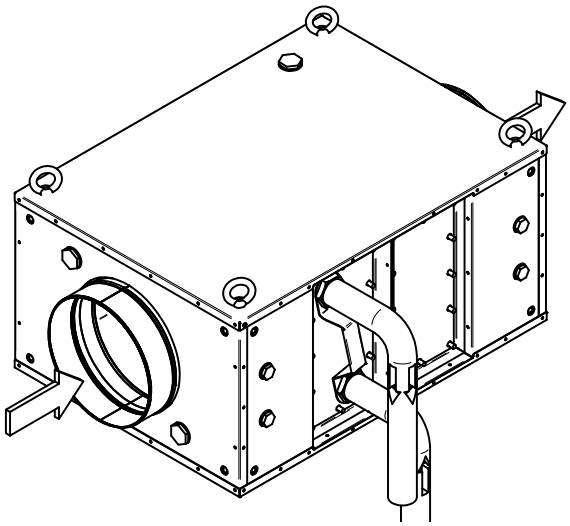
When selecting gasket material, keep in mind that the temperature for drains and measuring points can be the same as the temperature of the flue gas.

We recommend installing a water trap on the drain connection. The water trap should be placed a good distance from the Basic Plate to avoid the water evaporating.

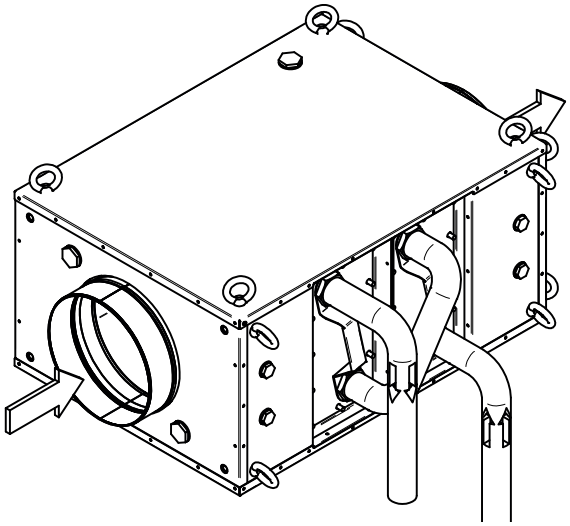
CAUTION!
If the drain is connected to the sewer system, you must ensure that condensate complies with any emission requirements.

DANGER!
The safety thermostat must be must be fitted on the supply side. Pressure relief valve must be fitted to the water circuit. See recommended systempressure in section about Maintenance and Troubleshooting.

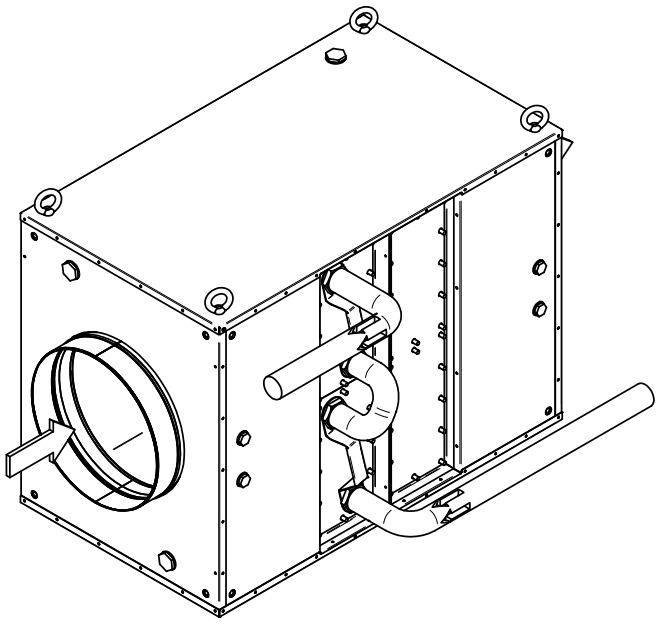
Water connection for BP250



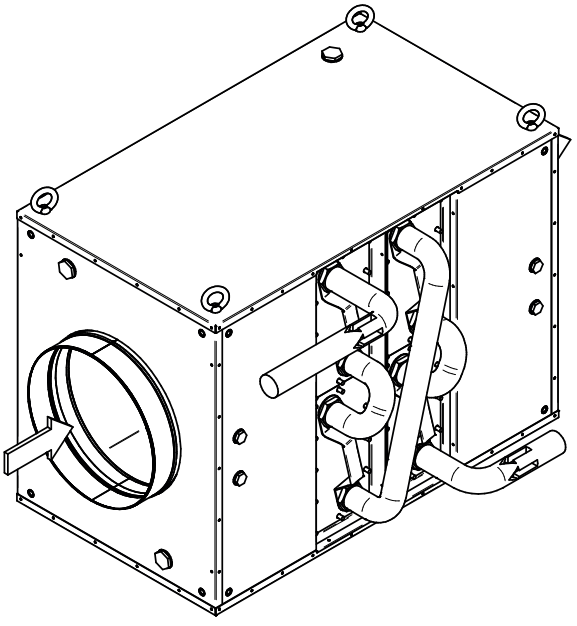
Water connection for BP250-2



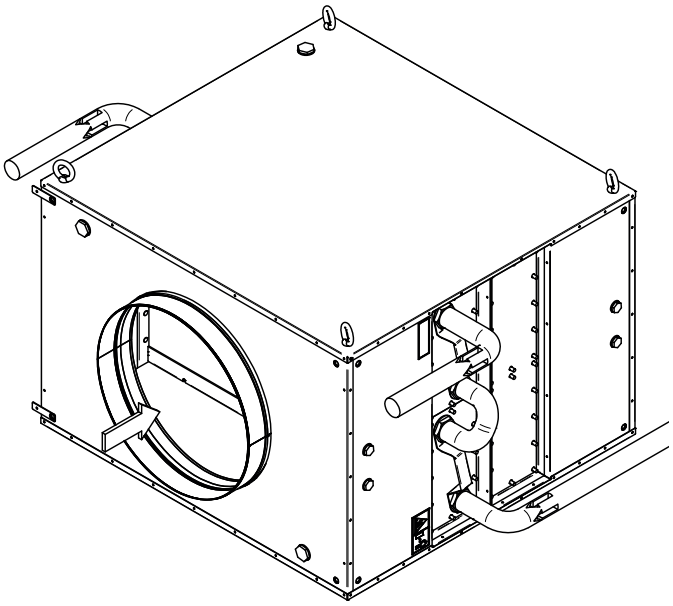
Water connection for BP500



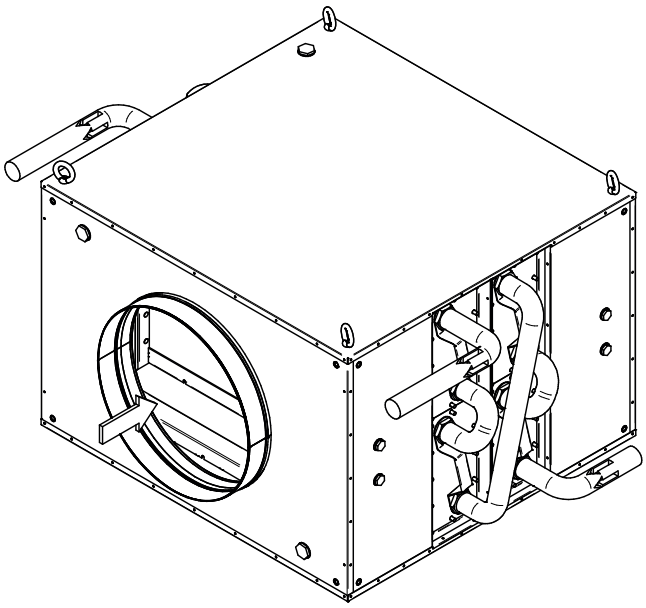
Water connection for BP500-2



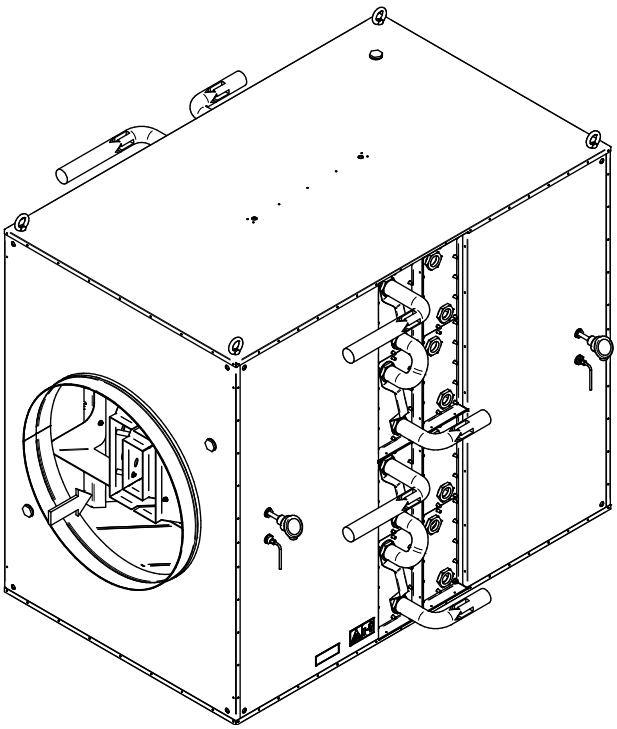
Water connection for BP750/1000



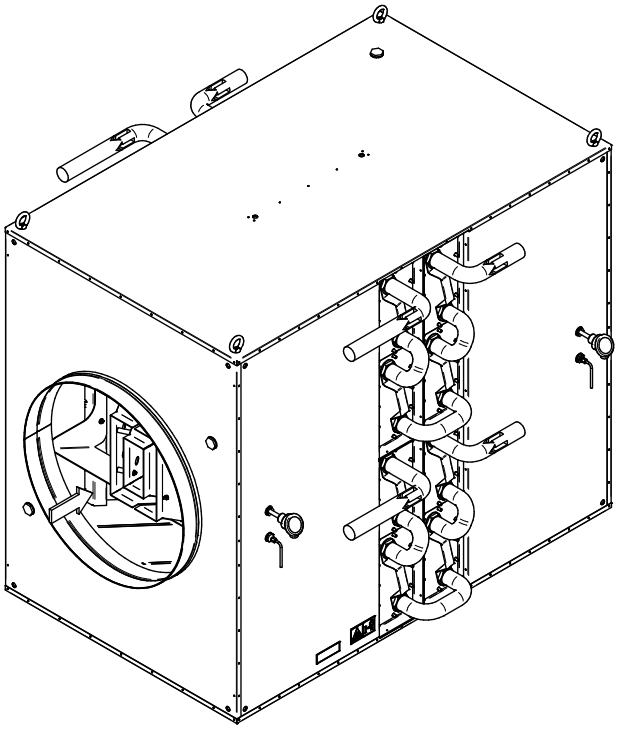
Water connection for BP750/1000-2



Water connection for BP2000



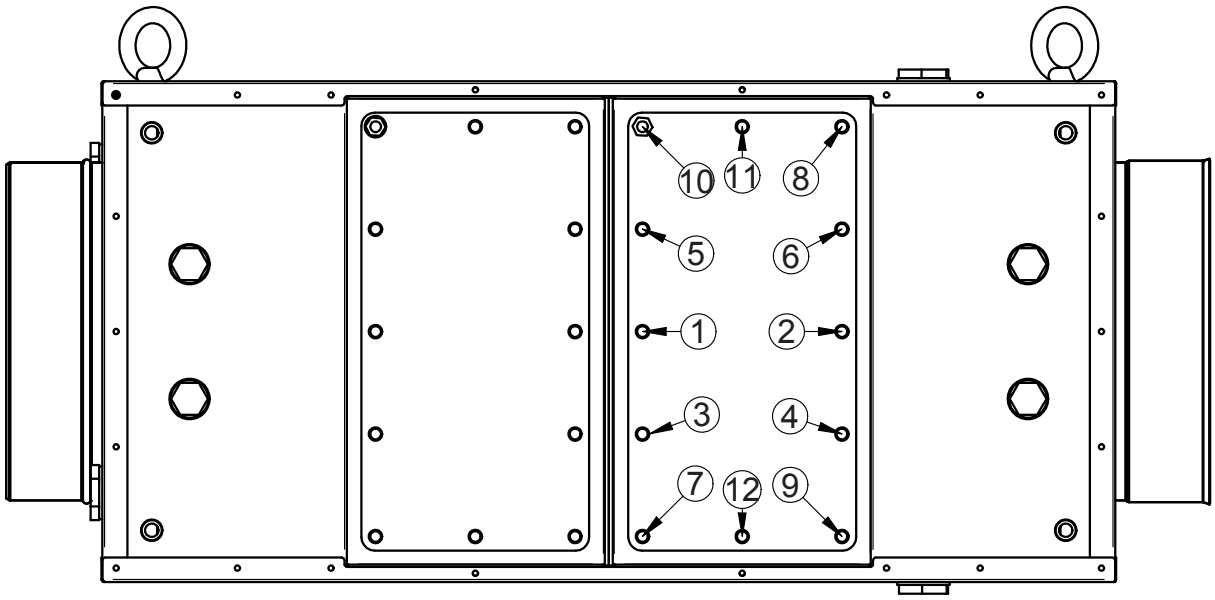
Water connection for BP2000-2



2.7 INSTALLATION WITHOUT WATER CONNECTION

If Basic Plate is installed without water connection, the exchanger must be pulled out and a cover plate installed (if needed see section about Optional Components).

Tightening of the exchanger cover plate is done as shown in the illustration. Nuts are tightened crosswise to 14.75 ft-lbs.

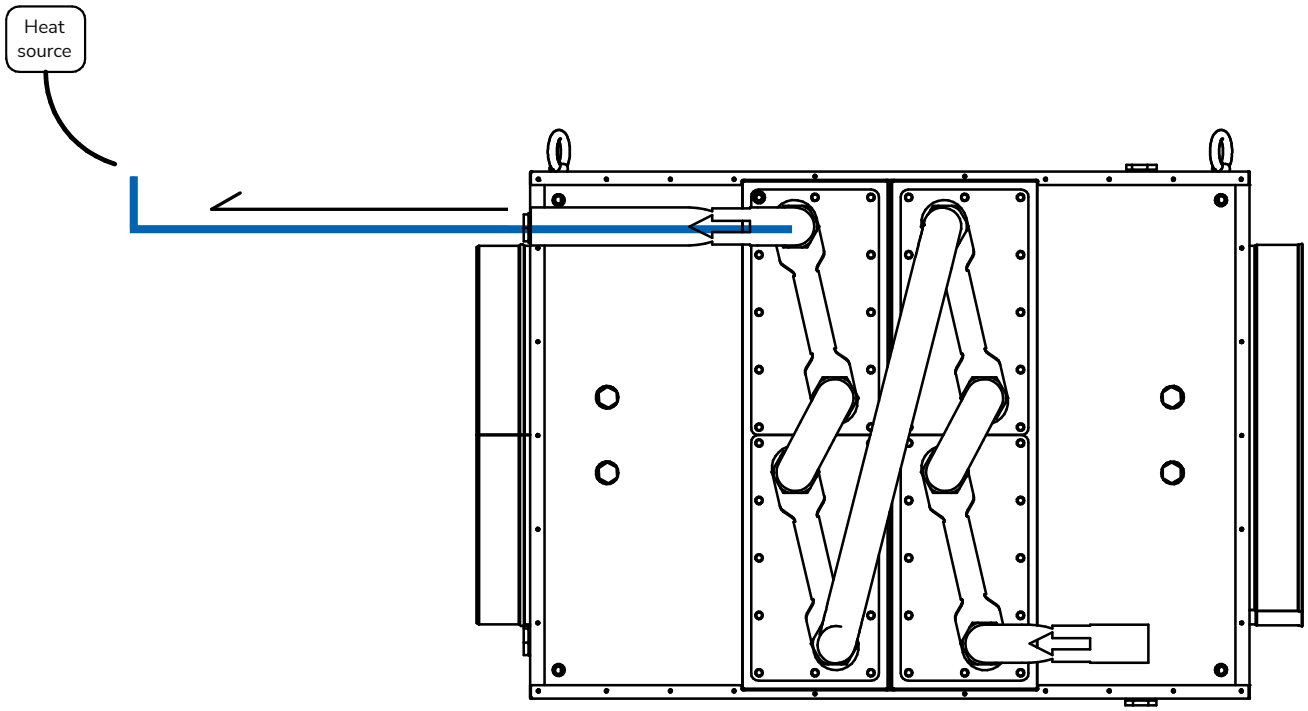


3 ELECTRICAL INSTALLATION

3.1 PLACEMENT OF SAFETY THERMOSTAT

CAUTION!

If using safety thermostat, it must be placed away from the heat source, so the ambient temperature of the sensor is as low as possible. If this is not complied with, the boiler may be disabled inadvertently.



4 OPERATING CONDITIONS

4.1 PRIMARY-/FLUE GAS SIDE

- Max. flue gas temperature: 1112°F / 600°C
- Max. working pressure: 20 inWC / 5 kPa
- Min. working pressure: -20 inWC /-5 kPa
- Max. temperature on surface of heat exchanger: 406°F / 190°C (calculated in Opticalc)
- Flue gas quality: check that the flue gas is not corrosive for exchanger (option of other types of exchangers upon request)
- The chemical composition and pH of the condensate shall be checked before disposal

4.2 SECONDARY-/LIQUID SIDE

- Max. working pressure: copper brazed Heat Exchanger 174 psi/12 bar nickel brazed Heat Exchanger 87 psi/6 bar.
- Min. working pressure: recommended system pressure 22 psi / 1.5 bar. See recommended system pressure in the section about System Pressure.
- Max. temperature on surface of heat exchanger: 406°F / 190°C (calculated in opticalc).
- Max. media temperature is dependent on the surface temperature and the used media.

5 STARTUP AND CONFIGURATION

The purpose of this Basic Plate heat recovery unit is to recover surplus energy from flue gasses and process air. The unit is environmentally friendly, economical, and compact.

5.1 SYSTEM STARTUP

CAUTION!
Basic Plate should not be put into operation before being properly installed.
Danger of contact with hot components.

1. Connect the water and bleed the system
2. If condensation is a possibility, connect the drain to an appropriate outlet
3. Activate the circulation pump (not supplied by ENERVEX) and check that it's running
4. Check that system pressure is consistent with system pressure tables in section about System pressure
5. Do a slow and controlled warmup of the Basic Plate water recovery unit
6. Check joints and connections for any leaking

6 MAINTENANCE AND TROUBLESHOOTING

6.1 CARE AND CLEANING

CAUTION!
Basic Plate should be cleaned at regular intervals depending of the level of dirt in the passing air. The unit should be checked for leaks, corrosion, and wear at least once a year.

To ensure maximum flow through the exchanger modules, itis important to clean them.

The cleaning interval will depend on how much dirt the unit is exposed to.

CLEANING OF EXCHANGER

1. Drain the water from the exchanger modules
2. Disconnect hose/pipe connections to exchanger
3. Loosen all nuts on the exchanger and pull the exchanger out by the handle
4. When cleaning the exchanger, you can use compressed air, soaking, or pressure washing
5. After cleaning, the exchanger is refitted. (Note that as a rule, the gasket can only be used once)
6. Nuts on the exchanger should be tightened crosswise to 14.75 ft-lbs.
7. Reconnect hose/pipe connections to exchanger
8. Follow directions from the point about Secondary-/Liquid Side as far as restarting the system

CAUTION!
Use gloves and protective glasses when cleaning the exchanger.
Note: The exchangers are heavy – see weight table below.

ENERVEX item number	Number of Heat Exchangers	Weight each Heat Exchanger [lbs/kg]
BP250	1	38.6 / 17.5
BP250-2	2	38.6 / 17.5
BP500	2	38.6 / 17.5
BP500-2	4	38.6 / 17.5
BP750	4	33.1 / 15
BP750-2	8	33.2 / 15
BP1000	4	38.6 / 17.5
BP1000-2	8	38.6 / 17.5
BP2000	8	38.6 / 17.5
BP2000-2	16	38.6 / 17.5

6.2 TROUBLESHOOTING

Observation	Problem	Solution
The supply water temperature is low and the temperature difference between the flue gas intake and exhaust is too small	Air in the water system	The system requires bleeding
	The circulation pump is not operating correctly	Check the operation of the circulation pump
	Excessive water flow	Check the operation of the circulation pump and mixing loop
	The mixing valve is not operating proberly	Check the operation of the controller
	The unit is in bypass mode	Check the motor voltage and connection
	The water connections have been switched	Correctly connect the supply and return sides (see section about connection)
	The exchanger modules is blocked by debris	Clean the unit and check that the drain is working
The burner is disabled at low water temperatures	The safety thermostat is OPEN (turning off)	Check the operation of the safety thermostat
		Check the safety thermostat setting
		The system requires bleeding
		Check the operation of the circulation pump
The burner is disabled at high water temperatures	Air in the water system	The system requires bleeding
	The circulation pump is not operating properly	Check the operation of the circulation pump
	The mixing valve is not operating properly	Check the operation of the controller
	The burner is operating at excessively high power	A larger Basic Plate model is needed or the burner power must be reduced
Poor chimney draft	The exchanger module is dirty	Clean the unit and check that the drain is working

7. WARRANTY

7.1 STANDARD 2-YEAR WARRANTY

ENERVEX Inc. (“ENERVEX”) warrants the heat recovery system system and components against functional failure due to defects in material and workmanship for a period of two years from date of delivery to the construction site. Functional failure is defined as any failure of the system or component to perform its intended function of recovering heat, without adverse leakage, combustion by-products from heating equipment. During this period, any system or component supplied by ENERVEX failing to perform its intended function will be repaired or replaced at the manufacturer’s option, following determination by a factory-authorized inspector that a functional failure has occurred. This warranty is limited to repair or replacement of the product plus shipping cost to the failure location. This warranty does not cover any labor costs for removal or replacement of the defective product, nor does this warranty cover any system components not furnished by ENERVEX and installed as part of the system.

This limited warranty is extended to the purchaser subject to the satisfaction of the following conditions:

1) Generally accepted engineering practices have been followed to determine that sizing and material specifications are suitable for the application and environment involved.
2) The undamaged components have been correctly installed in accordance with the installation instructions published by ENERVEX at the time of shipment.
3) Damage is not a result of burning garbage, waste oil, #6 oil or any other prohibitive material in the appliance served by the heat recovery system.

Disclaimer:

ENERVEX assumes no liability for incidental or consequential damages of any kind or for any damages resulting in whole or in part from misuse, improper installation, or inadequate maintenance of the system or any component part thereof.

This warranty is in lieu of all other express warranties or guarantees of any kind. All implied warranties, including merchantability and fitness, are limited to the duration of the express warranty contained herein. ENERVEX neither assumes nor does it authorize any other person to assume on its behalf any other liability in connection with the sale of its products.

ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS LIMITED IN DURATION TO THE WARRANTY PERIOD SPECIFIED ABOVE. WE DISCLAIM ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES AND ANY LOSS OR EXPENSE(S), NOT SPECIFIED ABOVE. SOME STATES MAY NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, OR HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE EXCLUSIONS OR LIMITATIONS MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE LEGAL RIGHTS WHICH VARY FROM STATE TO STATE OR PROVINCE TO PROVINCE.

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