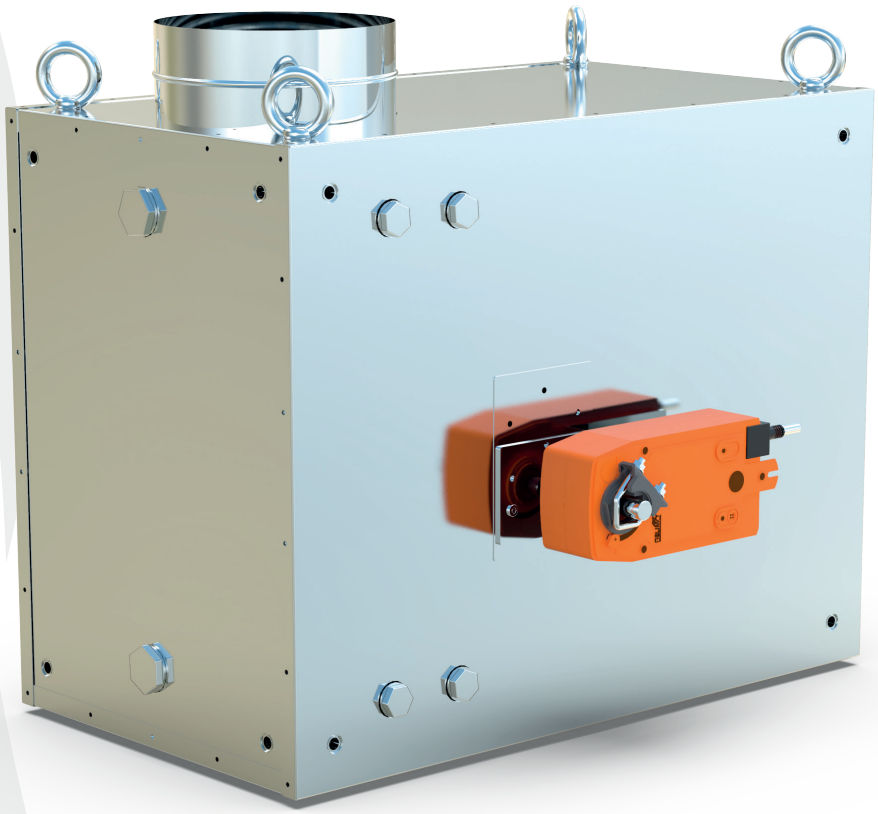
# ENERVEX HEAT RECOVERY SP

**010.4310.0525 05.25** **Installation & Operating Manual**

## Models:

**SP80**
**SP120**
**SP250**
**SP375**
**SP500**



**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

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

The exchange cassette is a compact lead-in module that recovers the passing heat (air to water).

Safe Plate is used primarily in smaller industrial and commercial plants with long operating hours and high exit temperatures (max 400°C) in flue pipes and chimneys.

Safe 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, utility water, water for heating, cleaning, or process water.

Safe Plate comes with an integrated safety and operative bypass damper and is prepared for easy installation along with standard ENERVEX automation.

Safe Plate can be used in heated process air from gas, electricity, and oil* for heated heat sources.

*May require special alloy for exchanger

**The Safe Plates limitations**

- Strictly for indoor installation
- Range of operation: 80-500 kW (nominal burner power input)
- Max. temperature 750°F / 400°C
- Process air or flue gas must be of a nature that does not clog up the exchangers in short time
- Directions for standard use must be followed

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

## 1.1 SCOPE OF SUPPLY

- Safe 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

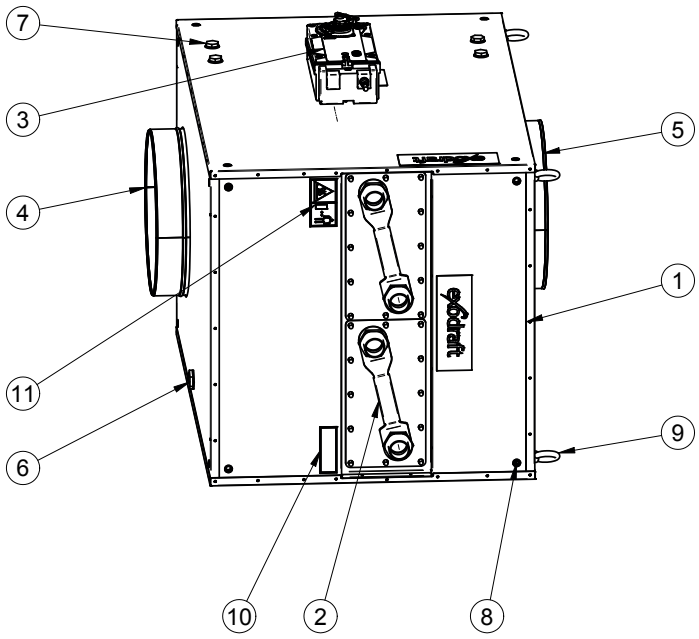
## 1.3 TECHNICAL SPECIFICATIONS

### BASIC TYPES

| ENERVEX Item Number | Type (Safe Plate) | Description | Approx. CONNECTION POWER |
|---|---|---|---|
| 431.0080.0000 | SP80 | Integrated bypass<br>GLX30 exchanger, copper brazed<br>Standard pipe connection dimensions<br>Max. 750°F / 400°C | 80 kW |
| 431.0120.0000 | SP120 | Integrated bypass<br>GLX30 exchanger, copper brazed<br>Standard pipe connection dimensions<br>Max. 750°F / 400°C | 120 kW |
| 431.0250.0000 | SP250 | Integrated bypass<br>GLX30 exchanger, copper brazed<br>Standard pipe connection dimensions<br>Max. 750°F / 400°C | 250 kW |
| 431.375.0000 | SP375 | Integrated bypass<br>GLX30 exchanger, copper brazed<br>Standard pipe connection dimensions<br>Max. 750°F / 400°C | 375 kW |
| 431.0500.0000 | SP500 | Integrated bypass<br>GLX30 exchanger, copper brazed<br>Standard pipe connection dimensions<br>Max. 750°F / 400°C | 500 kW |

### STANDARD COMPONENTS

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



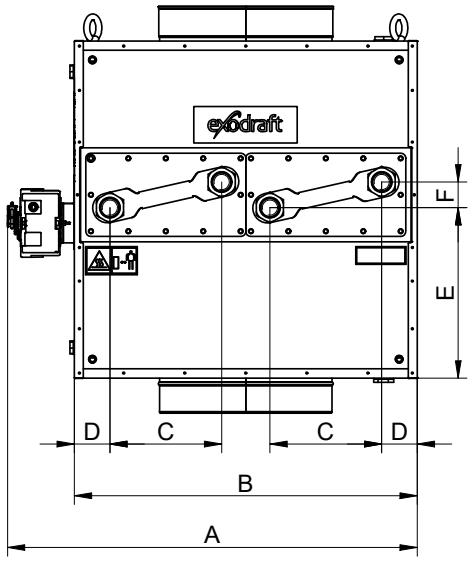

### OPTIONAL COMPONENTS

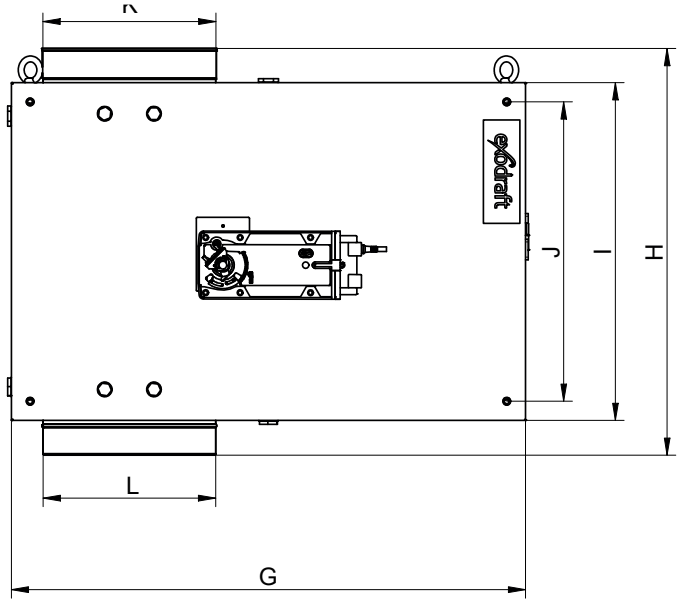
| **PT 1000 temperature transmitter** | |
|---|---|
| **SP Model** | **Length (in/mm)** |
| SP80 | 5.91 / 150 |
| SP120 | 5.91 / 150 |
| SP250 | 5.91 / 150 |
| 2P375 | 11.81 / 300 |
| SP500 | 11.81 / 300 |
| | |
| | Pressure connection for Ø 0.31/0.16 in tube / Ø 8/4 mm |
| | Double cover plate |
| | Single cover plate |
| | Silicone tube Ø 0.31/0.16 in / Ø 8/4 mm |
| | ST110 safety thermostat |
| | Damper motor auxiliary switch |

## TECHNICAL DATA

| Model | Dimensions (in/mm) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | I | J | K* | L** | M | N |
| SP80 | 18.94/ 481 | 14,61/ 371 | 8.94/ 227 | 2.83/ 72 | 9.69/ 246 | 2.05/ 52 | 25.47/ 647 | 25.43/ 646 | 19.92/ 506/ | 16.82/ 428 | 7.13/ 181.2 | 7.11/ 180.5 | 22.4/ 569 | 11.65/ 296 |
| SP120 | 18.94/ 481 | 14.61/ 371 | 8.94/ 227 | 2.83/ 72 | 9.69/ 246 | 2.05/ 52 | 41.1/ 1044 | 32.52/ 826 | 27.01/ 686 | 23.94/ 608 | 7.92/ 201.2 | 7.89/ 200.5 | 38.03/ 966 | 11.6/ 296 |
| SP250 | 18.94/ 481 | 14.61/ 371 | 8.94/ 227 | 2.83/ 72 | 9.69/ 246 | 2.05/ 52 | 41.1/ 1044 | 32.52/ 826 | 27.01/ 686 | 23.94/ 608 | 9.89/ 251.2 | 9.86/ 250.5 | 38.03/ 966 | 11.6/ 296 |
| SP375 | 32.76/ 832 | 27.4/ 696 | 8.94/ 227 | 2.83/ 72 | 9.69/ 246 | 2.05/ 52 | 41.1/ 1044 | 32.52/ 826 | 27.01/ 686 | 23.94/ 608 | 11.86/ 301.2 | 11.83/ 300.5 | 38.03/ 966 | 24.45/ 621 |
| SP500 | 32.76/ 832 | 27.4/ 696 | 8.94/ 227 | 2.83/ 72 | 9.69/ 246 | 2.05/ 52 | 41.1/ 1044 | 32.52/ 826 | 27.01/ 686 | 23.94/ 608 | 13.83/ 351.2 | 13.8/ 350.5 | 38.03/ 966 | 24.45/ 621 |

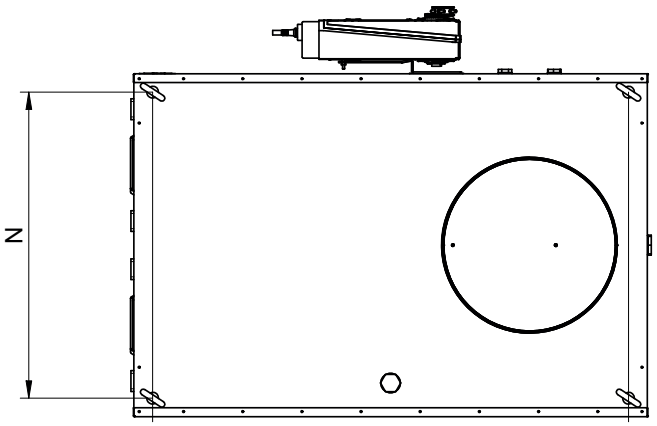
*Specifies inside sleeve dimensions
**Specifies outside adapter dimensions




## OPTIONAL COMPONENTS

| Model | Number of heat exchangers | Weight | |
|---|---|---|---|
| | | Incl. heat exchanger [lbs/kg] | Excl. heat exchanger [lbs/kg] |
| SP80 | 1 | 128 / 58 | 106 / 48 |
| SP120 | 1 | 198 / 90 | 168 / 76 |
| SP250 | 1 | 203 / 92 | 163 / 74 |
| SP375 | 2 | 317 / 144 | 260 / 118 |
| SP500 | 2 | 331 / 150 | 256 / 116 |



## 2. MECHANICAL INSTALLATION

ENERVEX products must always be installed by properly qualified personnel.

These instructions and safety procedures must be followed and must comply with applicable codes at the place of installations.

**CAUTION!**

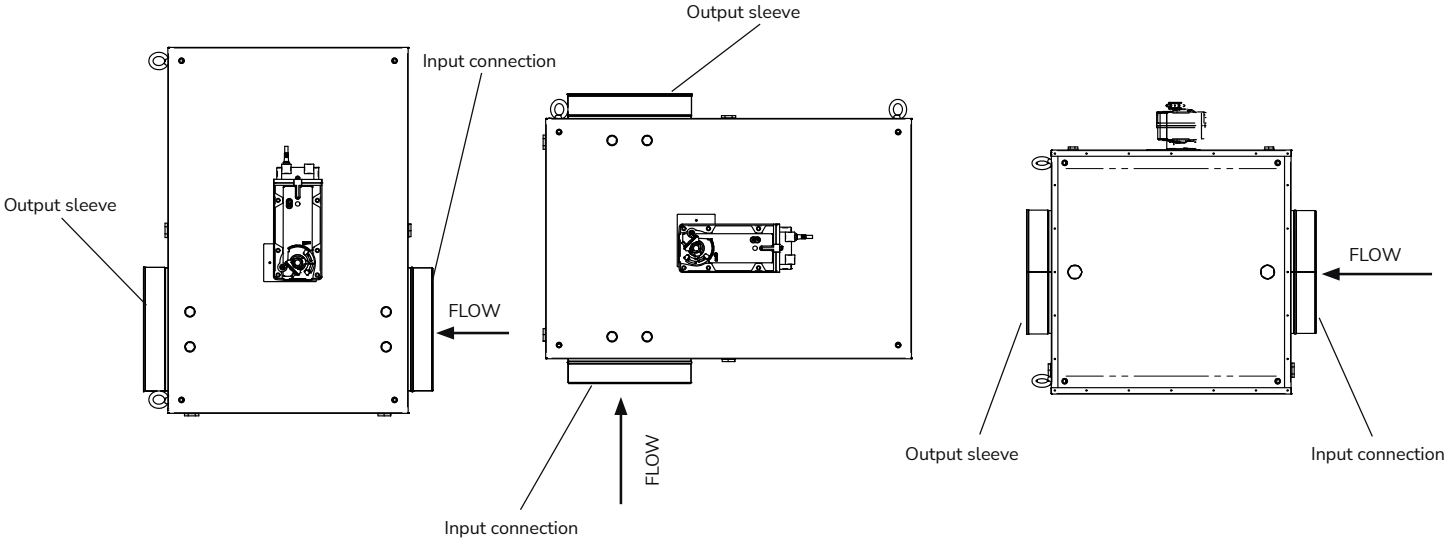
If the Safe Plate heat recovery unit is not installed, maintained, and/or operated in compliance with the manufacturer's instructions, conditions may arise which could lead to personal injury or material damage.

### 2.1 ORIENTATION

Safe Plate can be oriented in 3 different ways.

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

Safe Plate cannot be operated with the damper motor facing down, since this risks any condensation running down the damper axle.

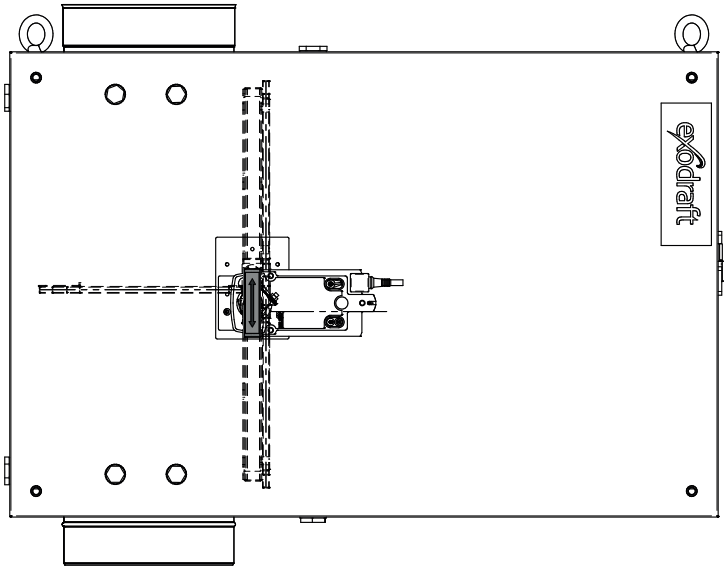


## 2.2 DIRECTION

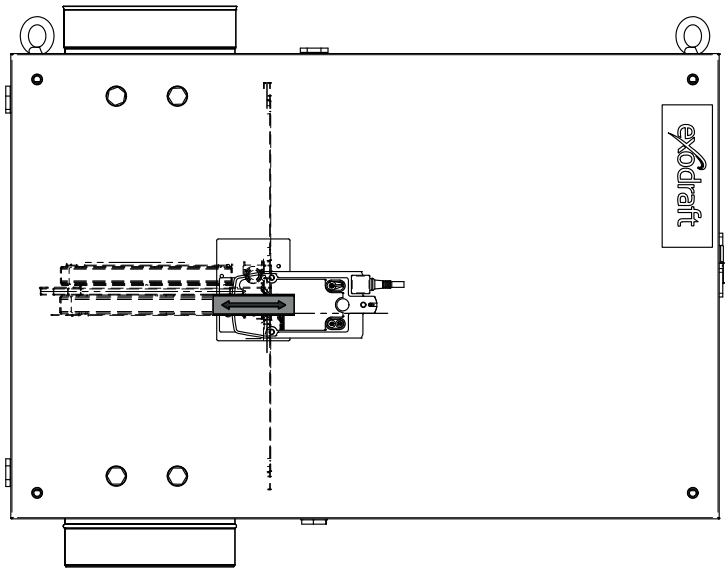
To ensure which direction the damper faces when the unit is mounted, a damper indicator is mounted at the end of the shaft. The arrow points the direction of the damper.
See examples below.

The default factory setting for the damper is CLOSED as shown in the first diagram below.

↕ Vertical damper direction and vertical flue gas direction
- Dampers are closed for heat exchanger




↔ Horizontal damper direction and vertical flue gas direction
- Dampers are open for heat exchanger

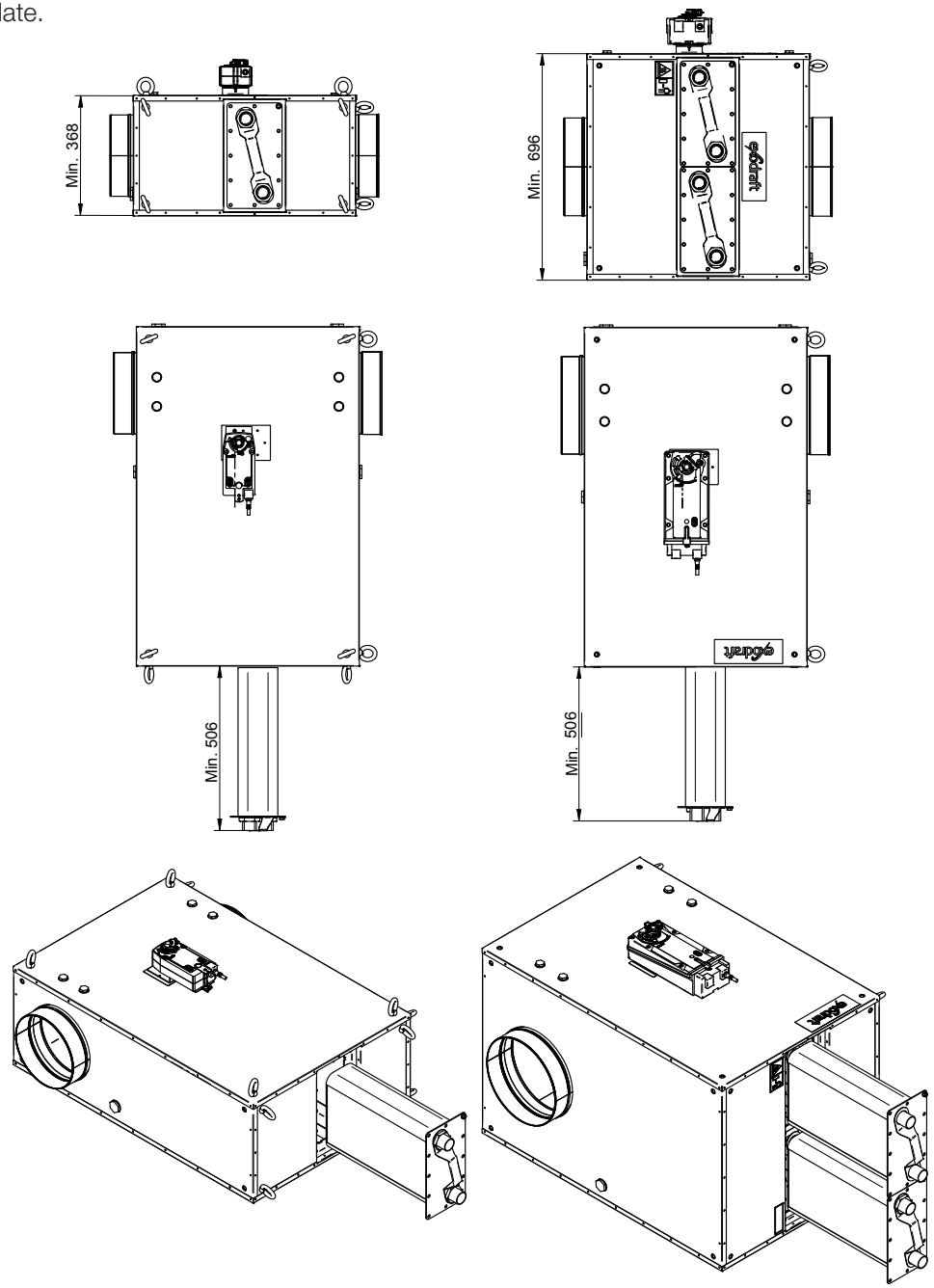


## 2.3 PLACEMENT

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

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

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

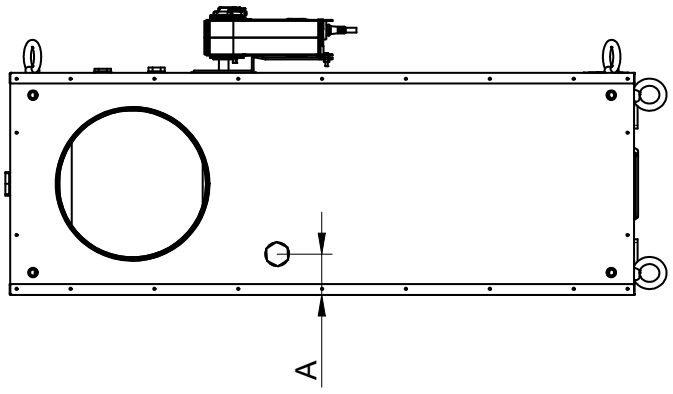



**DANGER!**
Observe local codes regarding clearance to combustibles.

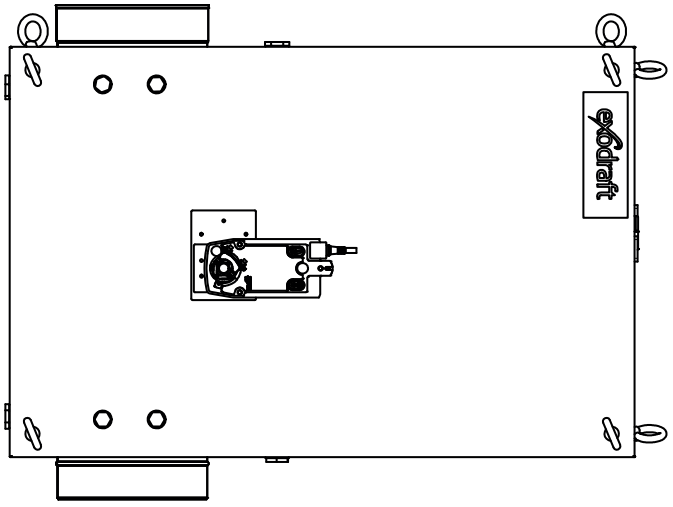
**CAUTION!**
Safe Plate must be installed in a way that accommodates pulling out the exchanger for servicing and maintenance.

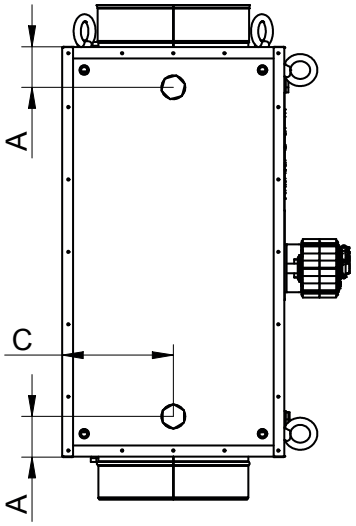
## 2.4 DRAIN CONNECTION

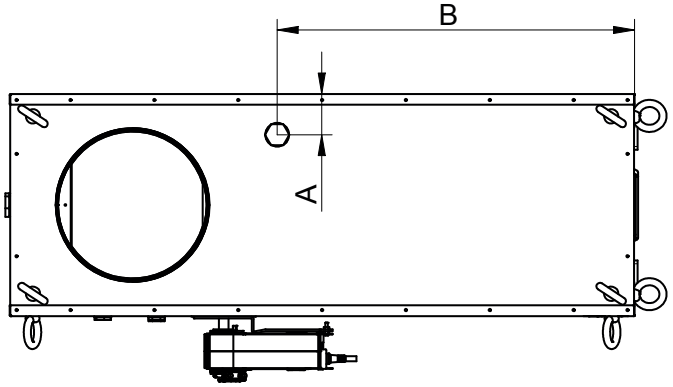
Placement of drain holes in Safe Plate




| Model | A (in/mm) | B (in/mm) | C (in/mm) |
|---|---|---|---|
| SP80 | 2.68 / 68 | 1.28 / 324 | 7.32 / 186 |
| SP120 | 2.68 / 68 | 2.35 / 597 | 7.32 / 186 |
| SP250 | 2.68 / 68 | 2.35 / 597 | 7.32 / 186 |
| SP375 | 2.68 / 68 | 2.06 / 522 | 13.70 / 348 |
| SP500 | 2.68 / 68 | 2.06 / 522 | 13.70 / 348 |



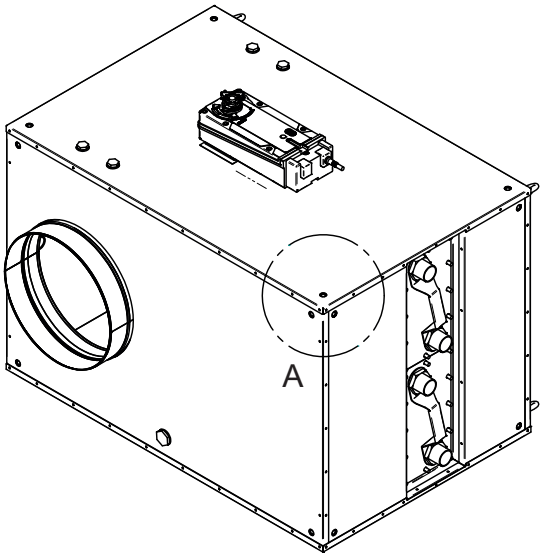
## 2.5 MOUNTING

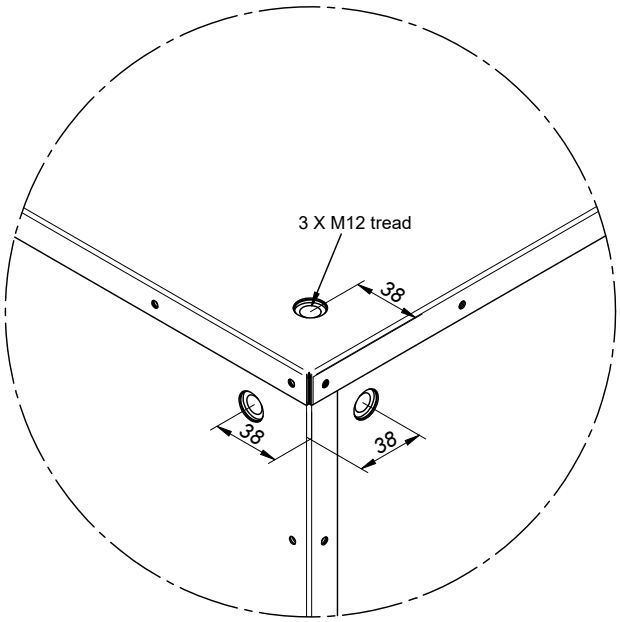
The weight must be distributed among at least 4 mounting corners (see next section – Mounting points).

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

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

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




DETAIL A

| Type (Safe Plate) | Weight incl. Heat Exchangers [lbs/kg] | Number of Heat Exchangers | Weight each Heat Exchanger [lbs/kg] |
|---|---|---|---|
| SP80 | 128 / 58 | 1 | 24 / 11 |
| SP120 | 198 / 90 | 1 | 29 / 13 |
| SP250 | 203 / 92 | 1 | 39 / 17.5 |
| SP375 | 318 / 144 | 2 | 29 / 13 |
| SP500 | 331 / 150 | 2 | 39 / 17.5 |

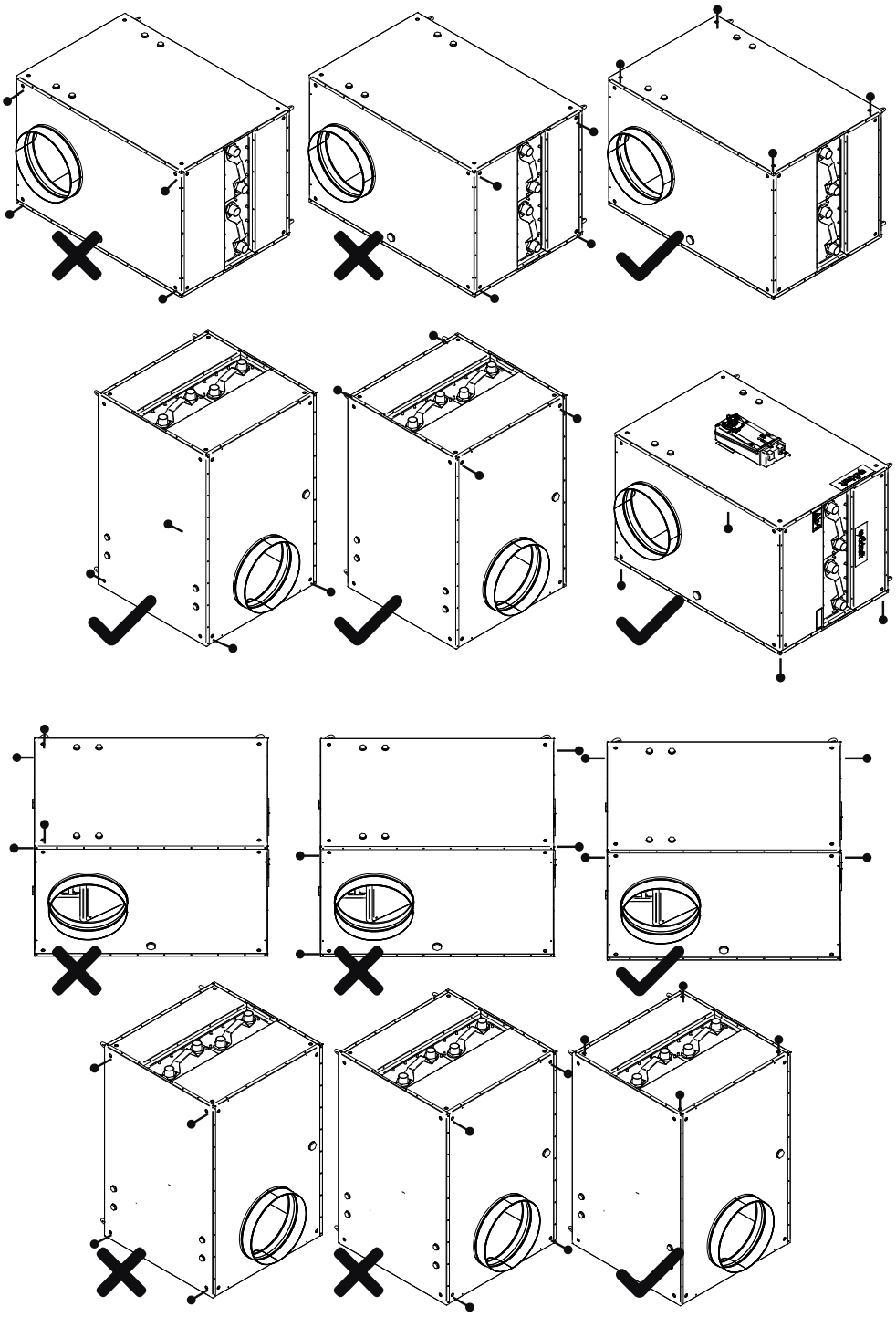
## 2.6 MOUNTING POINTS

Safe 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 show different solutions to approved and unauthorized mounting methods.

**Approved mounting methods:**



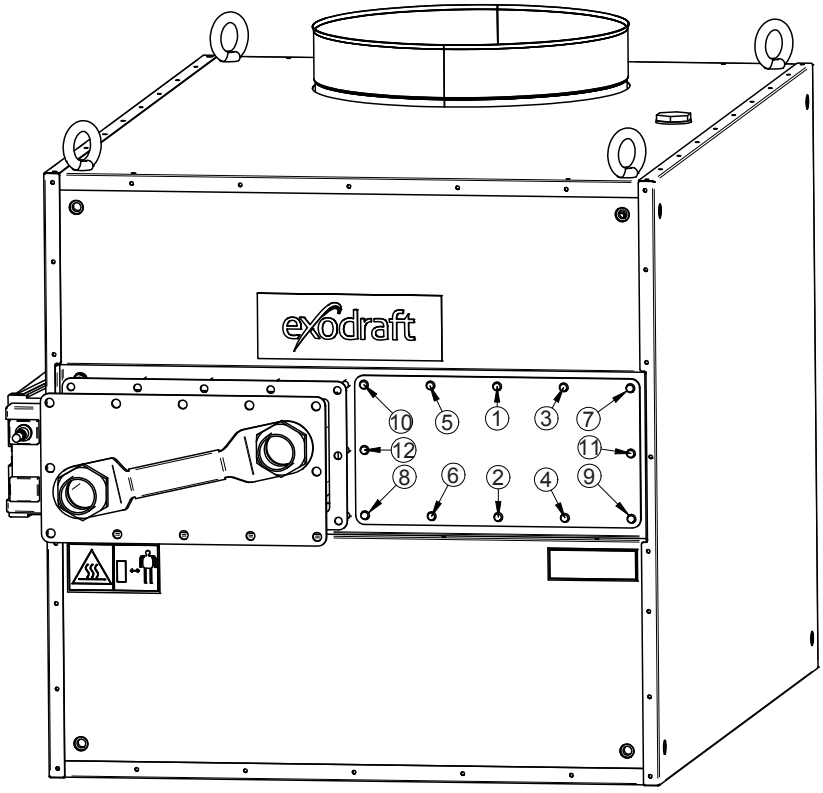
## 2.7 CONNECTION

- 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

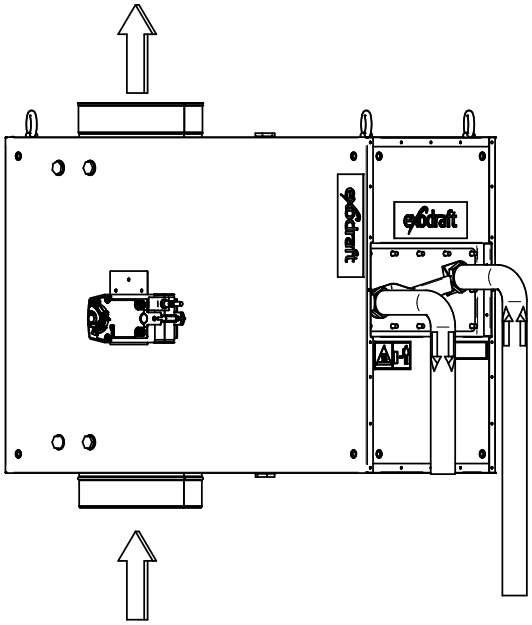
**CAUTION!**

Safe 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

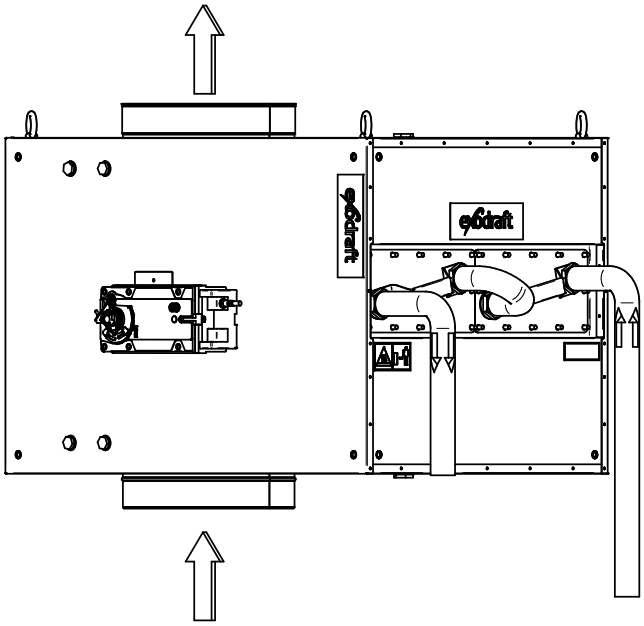
As a rule, the washer for the heat exchanger can be used only once.



**Water connection for SP80/120/250**



**Water connection for SP375/500**



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 Safe Plate to avoid the water evaporating.

**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 system pressure in section about Maintenance and Troubleshooting.

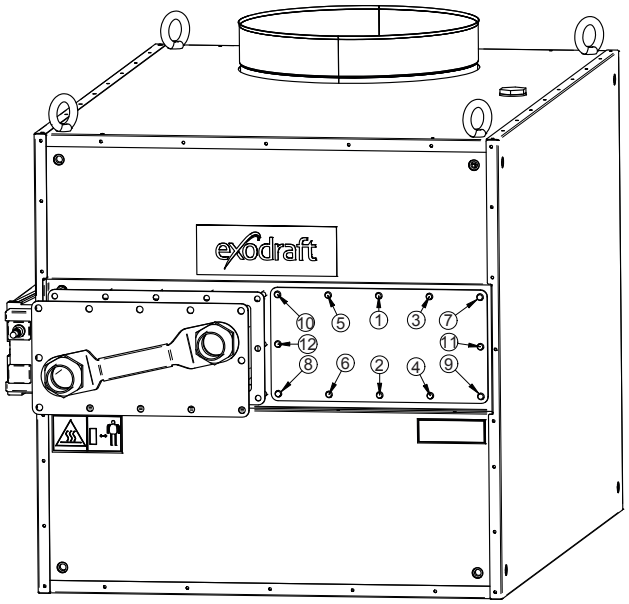
**CAUTION!**

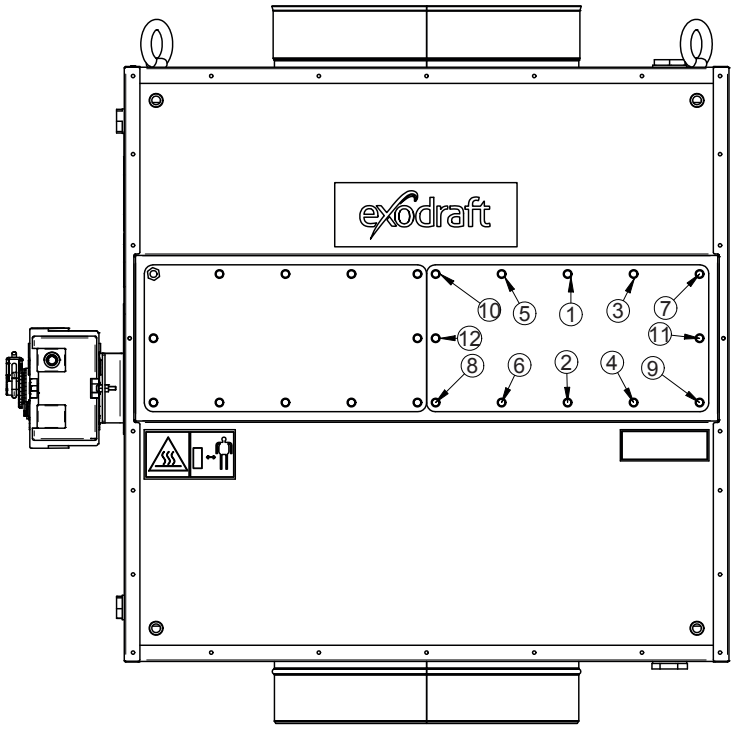
If the drain is connected to the sewer system, you must ensure that condensate complies with any emission requirements.

## 2.8 INSTALLATION WITHOUT WATER CONNECTION

If Safe 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.



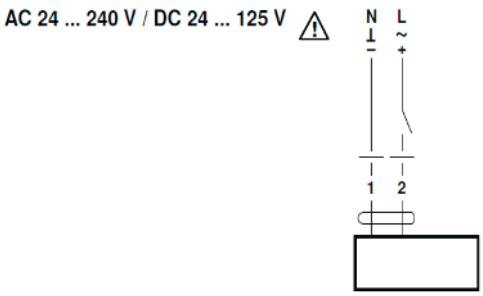
# 3 ELECTRICAL INSTALLATION

**DANGER!**
Turn off the power before working on the unit. Contact with live wires can cause electric shock or death.

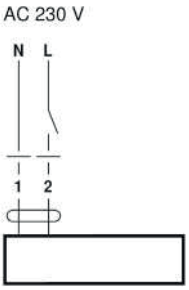
**CAUTION!**
If it becomes necessary to replace any of the original wiring that was delivered with the system, you need to use the same type of wire with the same temperature classification. If this is not done, the isolation can melt or erode, exposing the actual wire.

## 3.1 WIRING DIAGRAM / ELECTRICAL CONNECTION OF DAMPER MOTOR

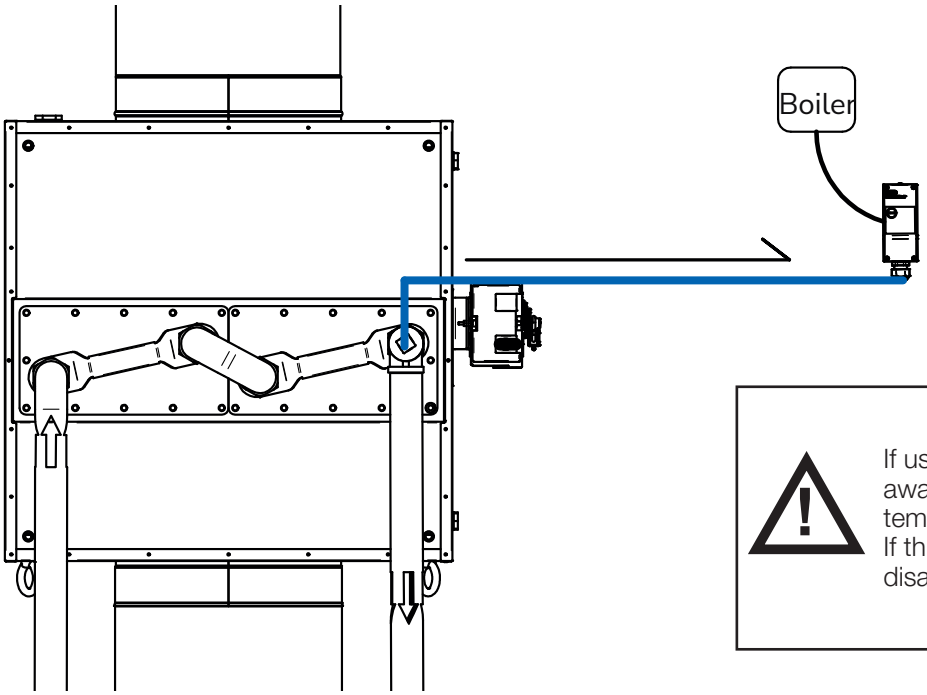
SP80 / SP120 / SP250




SP375 / SP500




## 3.2 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: 752°F / 400°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: 190° (calculated in opticalc)
- Max. media temperature is dependent on the surface temperature and the used media

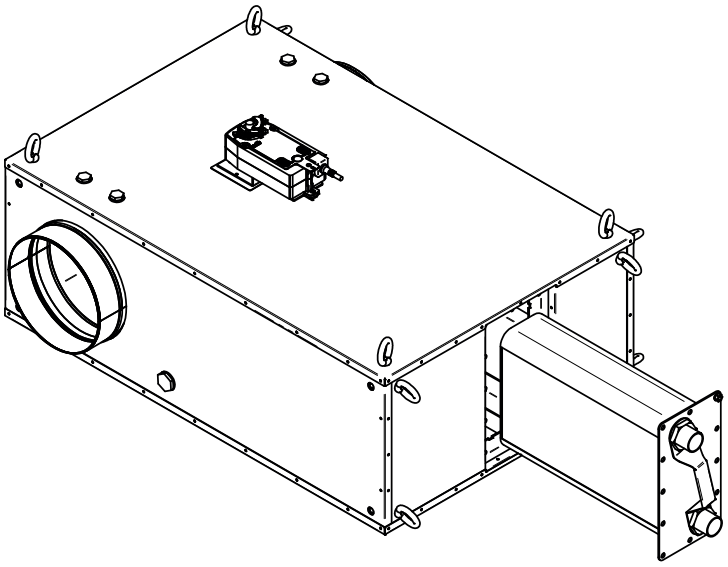
# 5 STARTUP AND CONFIGURATION

The purpose of this ENERVEX Safe 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!**
Safe 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. Check the voltage comparing it to the name plate of the damper motor
6. Check that the unit is set to bypass when the motor receives no voltage that the damper has not been bent during shipping or installation
7. Turn on the power and check that the bypass damper is working (see operating manual)
8. Do a slow and controlled warmup of the Safe Plate water recovery unit
9. Check joints and connections for any leaking



# 6 MAINTENANCE AND TROUBLESHOOTING

## 6.1 CARE AND CLEANING

**CAUTION!**
Safe 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.

**CAUTION!**
Do not open the housing unless the Safe Plate power has been disconnected from the power supply.

| ENERVEX Model Number | Number of Heat Exchangers | Weight each Heat Exchanger [lbs/kg] |
|---|---|---|
| SP80 | 1 | 24 / 11 |
| SP120 | 1 | 29 / 13 |
| SP250 | 1 | 39 / 17.5 |
| SP375 | 2 | 29 / 13 |
| SP500 | 2 | 39 / 17,5 |

## 6.2 TROUBLESHOOTING

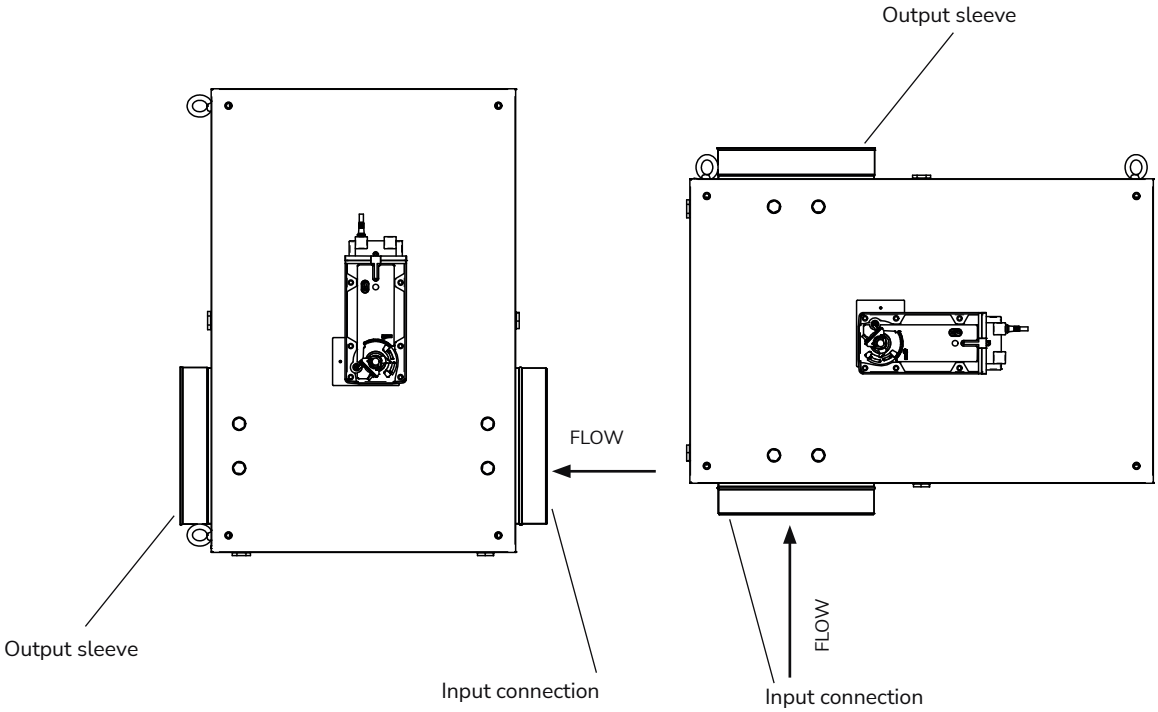
| Observation | Problem | Solution |
|---|---|---|
| The supply water temperature is low and the temperature difference between the flue gas intake and exhaust is too small | Air in the water system | The system requires bleeding |
| | The circulation pump is not operating correctly | Check the operation of the circulation pump |
| | Excessive water flow | Check the operation of the circulation pump and mixing loop |
| | The mixing valve is not operating properly | 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 damper is jammed | Clean the unit and check that the damper can move |
| 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 Safe Plate model is needed or the burner power must be reduced |
| | The damper is jammed | Clean the unit and check that the damper can move |
| Poor chimney draft | The exchanger module is dirty | Clean the unit and check that the drain is working |
| | The damper is jammed | Clean the unit and check that the damper can move |

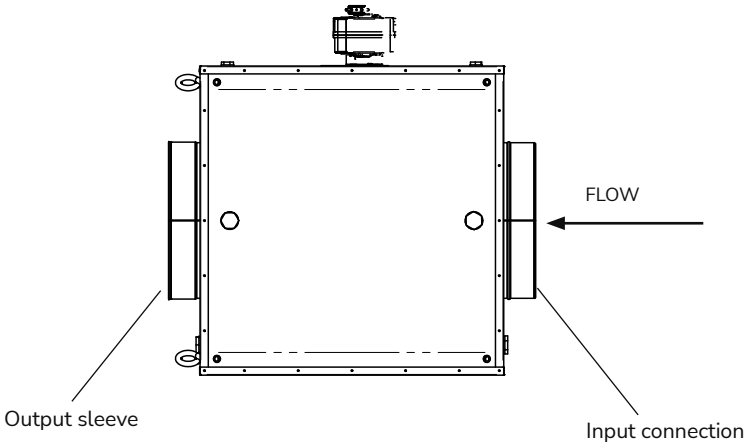
# 7 MAXIMUM OPERATING TIME IN BYPASS

## 7.1 IMPORTANCE OF ORIENTATION

The orientation of the Safe Plate is significant for how long you can stay in bypass operation without risking excessive heating of the water in the heat exchanger.

In the tables of the following sections you will find indications as to how many hours it is possible to operate in bypass without water circulation before the water temperature exceeds 221°F / 105°C (minimum system pressure 1.5 bar) and 239°F / 115°C (minimum pressure 2 bar), respectively according to orientation. In both tables, the water temperature starts at 140°F / 60°C.



## 8. WARRANTY

### 8.1 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.

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