



# Heat Recovery

in the bakery

ISO 9001  
Management System Certification

BUREAU VERITAS  
Certification Denmark A/S



**exodraft**



## Where does the **unused energy** go?

A lot of energy is required to generate the correct baking temperature in the oven. This is usually achieved using an oil or gas burner. The resulting hot flue gasses move through the oven to heat it up, but most of these gasses will continue unused to the outdoors via the chimney.

Dough contains a lot of water which evaporates during the baking process. Additionally, the dough is sprinkled with cold water which evaporates. This vapour contains high quantities of energy which are also expelled, untapped, through the chimney.

The combined energy loss from flue gasses and vapour is, on average, 15%. Of this, as much as 95% can be recovered with an **exodraft** heat recovery system. This translates to a potential 15-30 % reduction in fuel consumption and an equivalent reduction in CO<sub>2</sub> emissions.

### **ROI in less than 3 years**

The efficient heat recovery, combined with competitive pricing, means that the investment in an **exodraft** heat recovery solution will typically have a pay-back period of 2-3 years!

### **Latest generation**

**exodraft** uses modern plate heat exchangers which can be easily removed for cleaning, servicing or replacement. The heat exchangers are very robust, have a small form factor and consist of stainless steel plates brazed together with copper, or, for highly corrosive environments, nickel. Combined with **exodraft's** sophisticated control and monitoring systems, you are guaranteed a state-of-the-art heat recovery solution.





## Competence, knowledge and experience

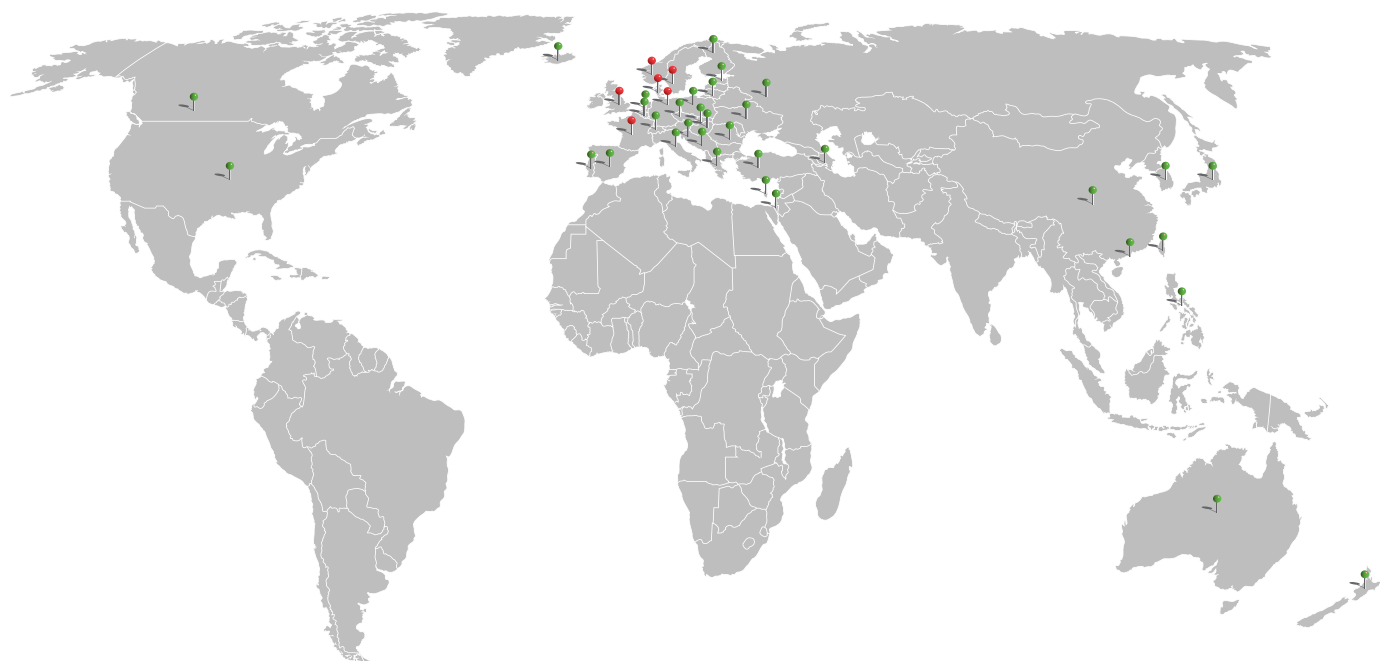
**exodraft** is a leading global supplier of chimney fans and heat recovery systems for flue gas and process air. An important prerequisite for creating efficient heat recovery is a solid understanding of the relationship between chimney draught and combustion, an understanding we have obtained and refined throughout the past 60+ years of designing mechanical draught solutions for fireplaces, ovens, boilers and other heat sources.

### **The most extensive product range**

**exodraft** offers the widest, most high-end product range of chimney fans, draught controls, heat exchangers and accessories. Our chimney fans can be used for all types of fuel and, in combination with our highly efficient heat recovery systems, ensure an optimum energy utilisation, benefitting not only your business but also the environment.

### **Uncompromising quality**

**exodraft** products are manufactured in accordance with ISO 9001 standards and are synonymous with high safety, high reliability and uncompromising quality. They comply with national and international standards and have, to date, been sold in more than 45 countries across the globe.





## High energy costs and lack of consistent quality in your baked products

Have you ever considered how much energy is truly needed to reach the high baking temperatures required for baking the water out of baked goods, and how much expensive energy is expelled via the chimney to the outdoors during the baking process?

Or have you ever asked yourself why you achieve different baking results during winter and summer?

Previous generations were already aware of these problems and, as a consequence, adapted their baking technique to the weather. In the summer, they would simply bake earlier when it was still cool outside, or not all baked goods were available, depending on the weather conditions.

However, present customer demands, the diverse range of baked goods and just-in-time deliveries for large customers no longer allow for this working method.

Also, the amount of waste energy that can be found in many bakeries is no longer acceptable with today's high energy prices and limits on CO<sub>2</sub> emissions.

### Why are you putting up with this?

An always optimal chimney draught (mechanical draught) can be combined with a modern heat recovery system to provide your bakery with not only a more consistent baking product, but also substantial energy savings.

Because **exodraft** heat exchangers are highly efficient, capable of extracting up to 95% of the waste heat in your flue system, flue resistance will invariably increase as a result of the dropping flue temperature. To counteract this, and to create fully controllable draught conditions in your chimney, we draw on 60+ years' experience as the market leader of mechanical chimney draught solutions to ensure that you get the best of both worlds – super efficient heat recovery and an always optimal chimney draught. This unique combination of know-how is ultimately what sets **exodraft** apart from other suppliers of heat recovery solutions.



# What does baking have to do with the chimney?

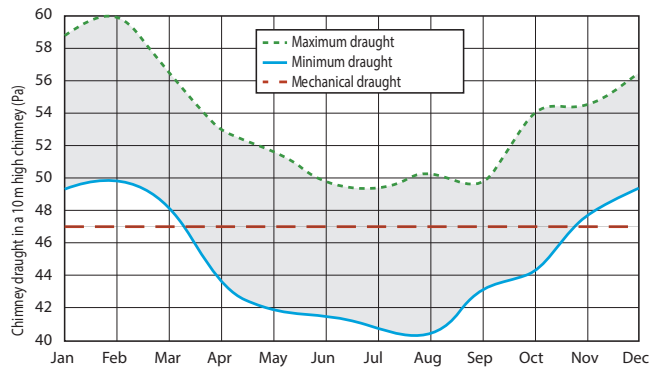
## The correct chimney draught is crucial

The chimney is the motor of any fireplace or oven. It generates a vacuum so that flue gasses and baking vapours are moved up and away.

The performance of the chimney is contingent on the draught conditions inside the chimney, and the chimney draught itself varies depending on the density difference between the warm air inside the bakery and colder air outside. As outside temperatures fluctuate considerably over the course of a year, the performance of the chimney will inevitably vary. Resistance in the chimney created by new energy-efficient ovens, aircondition systems, powerful range hoods etc. can severely hamstring any conventional chimney relying solely on natural chimney draught.

## Annual variations in chimney draught

At the maximum and minimum temperature, having an average flue gas temperature of 180 °C



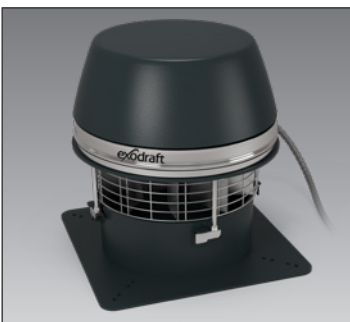
Conventional chimneys are subjected to draught fluctuations of 40 Pa over the course of a year, meaning they often have too much chimney draught in winter and insufficient draught in the summer.

What is accepted as a loss of comfort in private households is unacceptable in the context of a modern production facility, such as a bakery. A reliably functioning chimney is paramount in order to ensure a consistent and predictable end product. By installing a mechanical chimney draught system (chimney fan) from **exodraft**, issues stemming from a suboptimal chimney draught can be solved once and for all.

## Mechanical chimney draught systems

**exodraft's** extensive range of mechanical chimney draught systems covers all application types. Whether you are looking for chimney-mounted fans with vertical or horizontal discharge, wall-mounted fans or inline duct fans, we have the right solution for your needs. Some of our fans can even handle multiple ovens/boilers.

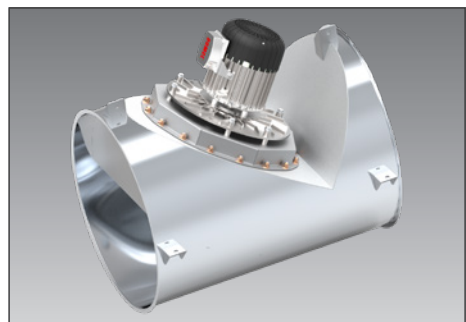
**exodraft RSHT**



**exodraft RSV**



**exodraft CFIR**



# A solution for your waste heat

## Application

Heat recovery systems are used to recover excess heat from production processes – heat which can then be used for a variety of applications, as opposed to simply going to waste (see diagram below for application examples).

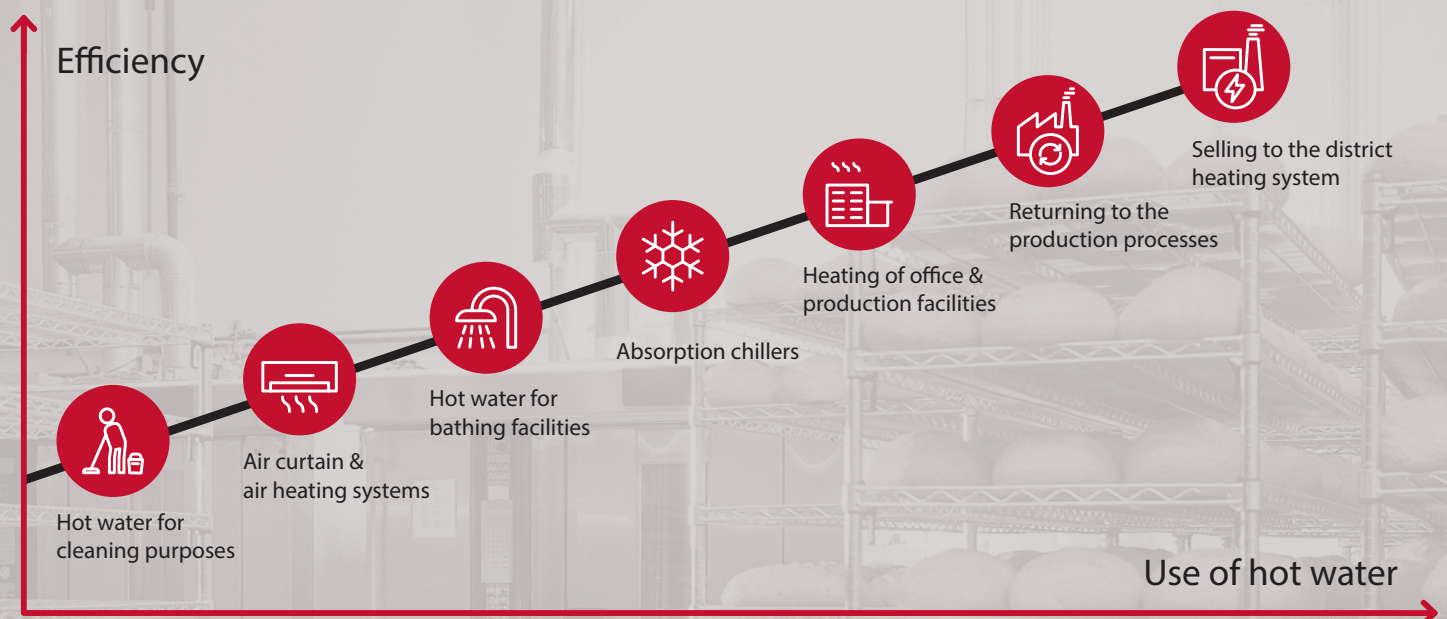
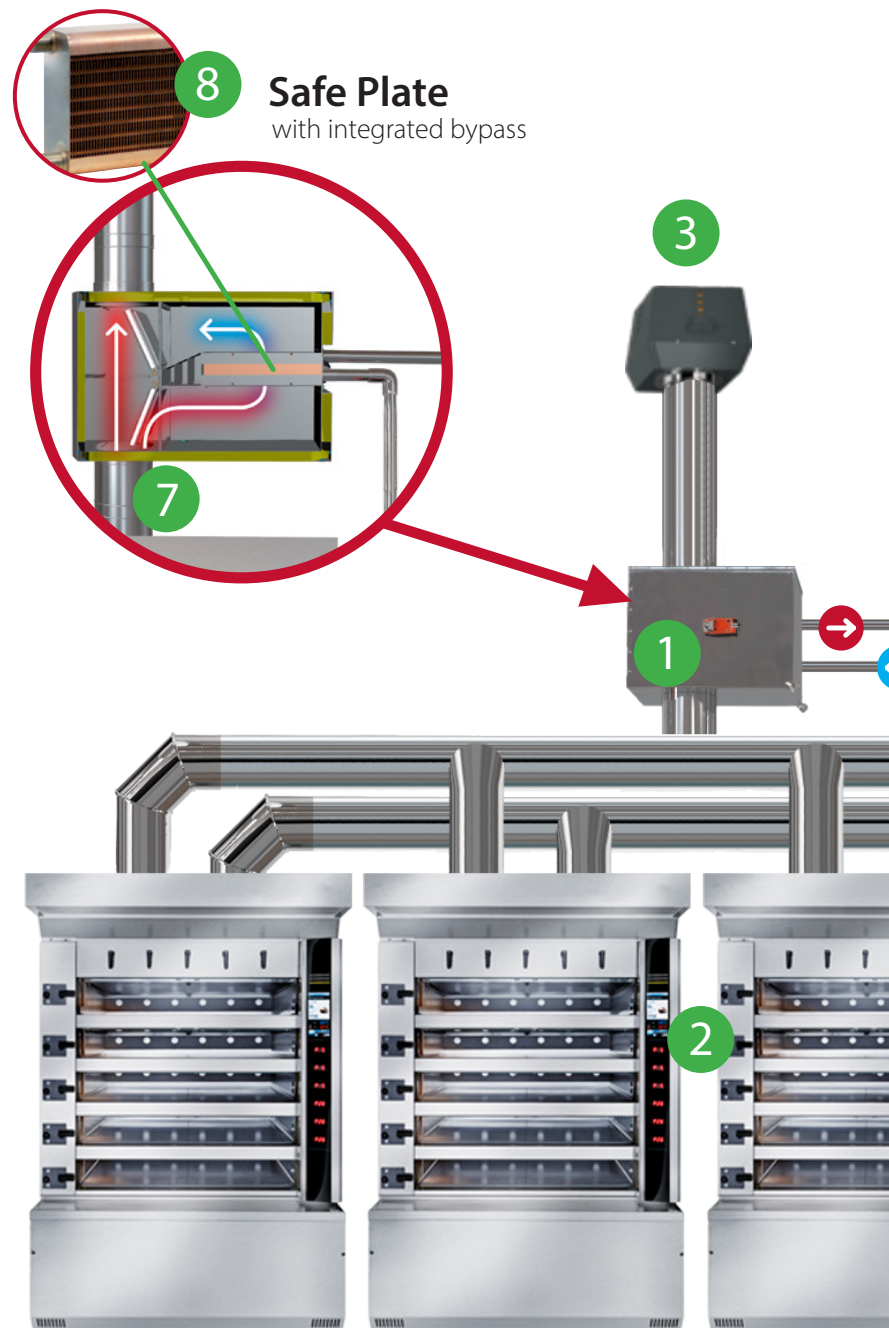
## Baking flue gasses and vapours

### Function

The heat recovery from the baking flue gasses is done using a special air-to-water heat exchanger. The recovered energy is outputted to the water carrier medium via the heat exchanger and transferred to an on-site buffer tank to be stored for later use.

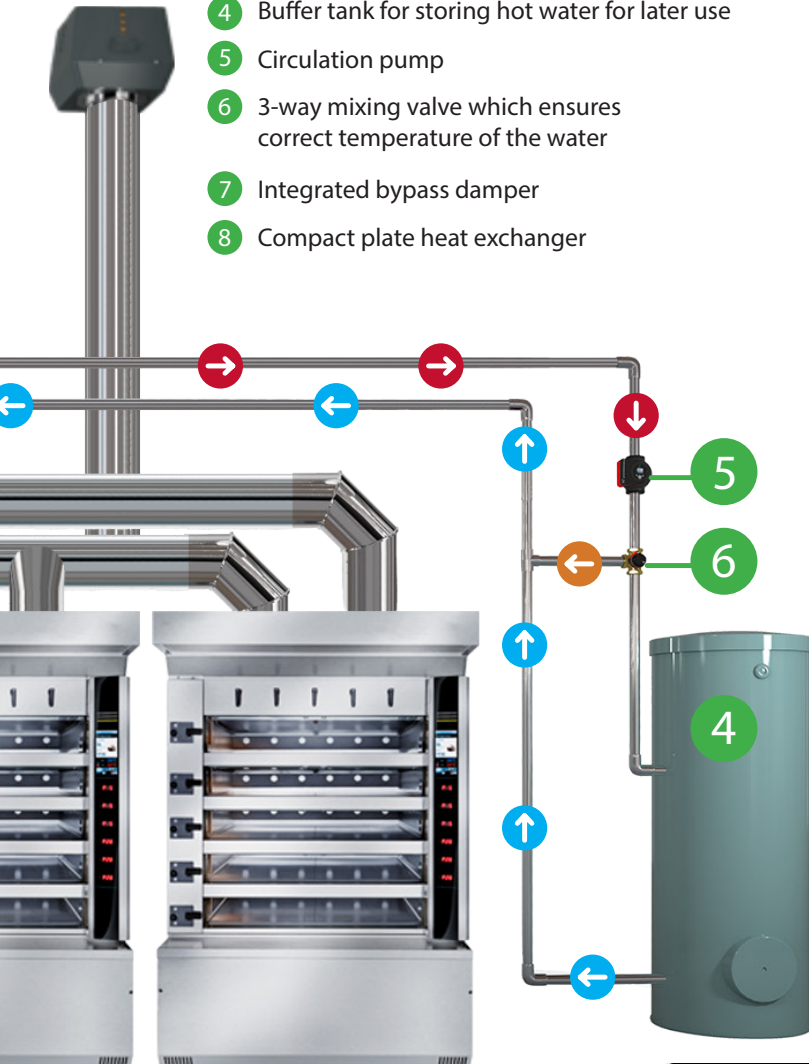
Alternatively, this can also be stored so as to be available for a later production process, for example for shower water, process water or a washer system.

If the loading capacity of the buffer storage is reached, the heat in the flue gas variant is passed over a bypass in the heat exchanger. A safety temperature limiter protects the system from overheating.



# Our system solution

- 1 **exodraft** Safe Plate heat recovery unit
- 2 Bakery oven
- 3 **exodraft** RSV fan which endures an always optimal chimney draught and consistent baking results
- 4 Buffer tank for storing hot water for later use
- 5 Circulation pump
- 6 3-way mixing valve which ensures correct temperature of the water
- 7 Integrated bypass damper
- 8 Compact plate heat exchanger



Heat is recovered from exhaust gases using a special air/water heat exchanger that is installed in the exhaust chimney.

The exhaust gases flow through, thanks to our pressure-regulated chimney fan of the compact and highly efficient plate heat exchanger and transfer the energy to the water flowing through.

The energy recovered in this way in the form of hot water is pumped into an on-site buffer storage tank. There the hot water is immediately available to support washing or heating systems.

When the loading capacity of the buffer storage tank is reached, the heat in the flue gas variant is bypassed at the heat exchanger via a bypass. A safety temperature limiter protects the system from overheating of the water circuit.

## Remote Monitoring

With **exodraft** Trendlog, you can monitor your energy savings and overall heat recovery performance online and in real-time. Trendlog data can also be used to analyse errors and find optimisation options on your system.



## WE OFFER AFTER SALES SUPPORT



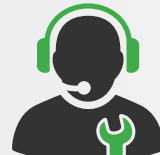
Staff training



Preventive check & optimisation



Maintenance



Professional advice



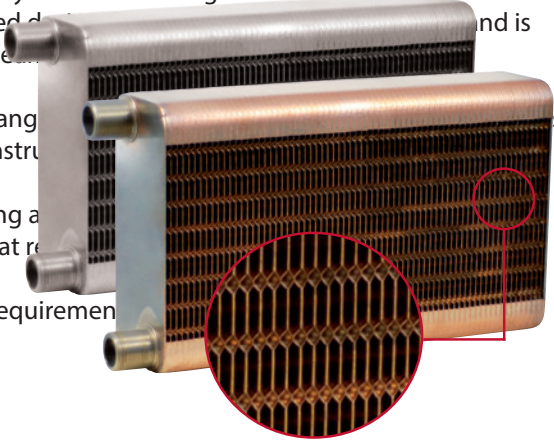
# Heat exchanger uniquely efficient, robust and small

The **exodraft** plate heat exchangers are compact air-to-water heat exchange units specifically developed to recover energy from hot flue gases, process air or steam. Consisting of steel and copper, this heat exchanger is the heart of every **exodraft** heat recovery system. It is distinguished by its robustness and efficient heat transmission. With its unique and patented design, it is also particularly suitable with condensation-forming steam.

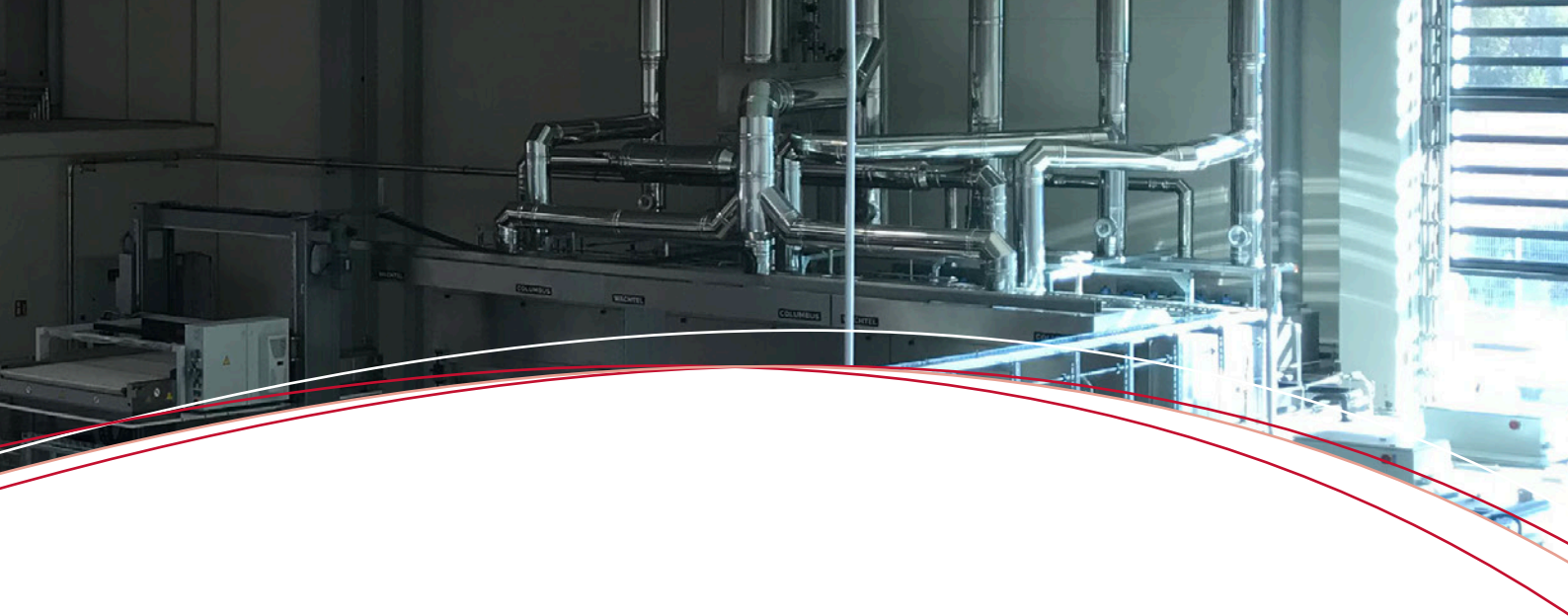
For use in acid or alkaline environments, the heat exchanger is made of stainless steel and nickel. Due to its robust and user-friendly construction, it is easy to maintain.

The heat exchanger has a durable stainless steel housing and is protected against the system from overheating and is also activated if heat recovery is required.

The **exodraft** heat exchangers have a minimal space requirement.







## Full control and safety using the EAHC21 control (PLC)

### Automatic control system

The EAHC21 is an automatic control system for up to two heat recovery units in conjunction with **exodraft** chimney fans and heat exchangers. The heart of the control system is a PLC (Programmable Logic Controller) which is controlled with various digital and analogue I/O modules connected to terminals. A touch screen allows for monitoring and configuration of the system.



### Integrated safety system

The EAHC21 control monitors and maintains specific pressures and temperatures by controlling the speed of a chimney fan and by regulating the water temperature in the hydraulic system. It also monitors the pressure loss in the heat exchanger as well as other critical values in the heat exchanger system. The different pressures in the system are measured by XTP 150 sensors and the temperatures by PT1000 sensors. If the pressure and temperature setpoints of the system reach critical levels, a warning will be shown on the display and an alarm relay will be activated.

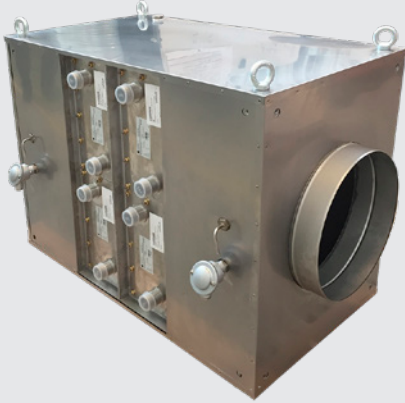
### Easy control and monitoring

The touch-enabled display gives the user the option to monitor the values of both the flue and hydraulic systems. The latest warnings and trend curves are visible for both systems. With a flow meter installed, the user can continuously monitor the production (kW) of the system and an alarm relay will be activated.



# Heat recovery

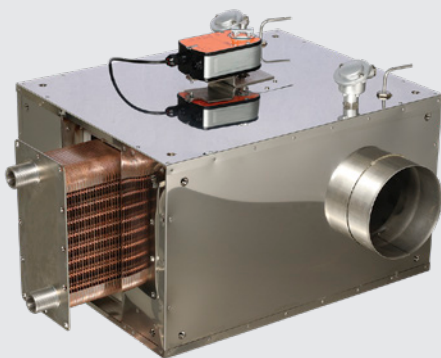
## Basic Plate Series - BP250-2000



- Maximum flue gas temperature of 600 °C on air side
- Can be combined with other Basic Plate units in a modular fashion
- All parts in connection with flue gas made in stainless steel 316 (EN 1.4404)
- All external parts made in stainless steel 304 (EN 1.4301)
- 40 mm insulation
- Maximum pressure water side of heat exchangers 12 bar
- Designed for indoor use, but can be used outdoors if the product is covered/encapsulated
- Option for nickel brazed heat exchangers for installation in corrosive environments

Model	Burner output in kW	Max. flue gas temperature in °C	Natural gas nominal flow in m <sup>3</sup> at 250 °C / λ 1.2	No. of plate heat exchangers	Chimney connection in mm (inlet / outlet)	Dimensions in mm (W x H x D)	Weight incl. heat exchangers	Weight excl. heat exchangers
BP250 [250-2]	250	600	600	1 [2]	ø250.5 o. / ø251.2 i.	893.1 x 371.4 x 551.7	64 [80]	46
BP500 [500-2]	500	600	1200	2 [4]	ø350.5 o. / ø351.2 i.	1092.1 x 696.4 x 551.7	114 [150]	80
BP750 [750-2]	750	600	1700	4 [8]	ø400.5 o. / ø401.2 i.	1092.1 x 969.4 x 1013.2	190 [250]	130
BP1000 [1000-2]	1000	600	2300	4 [8]	ø500.5 o. / ø501.2 i.	1092.1 x 696.4 x 1013.2	196 [266]	126
BP2000 [2000-2]	2000	600	4600	8 [16]	ø700.5 o. / ø701.2 i.	1795 x 1376 x 1410	550 [695]	410

## Safe Plate Series - SP80-500



- Maximum flue gas temperature of 400 °C on air side
- Integrated bypass protects the system from overheating
- All parts in connection with flue gas made from stainless steel 316 (EN 1.4404)
- All external parts made from stainless steel 304 (EN1.4301)
- 40 mm insulation
- Maximum pressure water side of heat exchangers 12 bar
- Designed for indoor use, but can be used outside if the product is covered/encapsulated
- Option for nickel brazed heat exchangers in corrosive environments

Model:	Burner output in kW	Max. flue gas temperature in °C	Natural gas nominal flow in m <sup>3</sup> at 250 °C / λ 1.2	No. of plate heat exchangers	Chimney connection in mm (inlet / outlet)	Dimensions in mm (W x H x D)	Weight incl. heat exchangers	Weight excl. heat exchangers
SP80	80	400	200	1	ø180.5 o. / ø181.2 i.	480.6 x 646.1 x 647.2	58	48
SP120	120	400	300	1	ø200.5 o. / ø201.2 i.	480.6 x 826.1 x 1044.2	90	76
SP250	250	400	600	1	ø250.5 o. / ø251.2 i.	480.6 x 826.1 x 1044.2	92	74
SP375	375	400	900	2	ø300.5 o. / ø301.2 i.	832.1 x 826.1 x 1044.2	144	118
SP500	500	400	1200	2	ø350.5 o. / ø351.2 i.	832.1 x 826.1 x 1044.2	150	116

# Mechanical draught

## Chimney fans

### exodraft RSV



- Robust and compact design
- Vertical discharge
- Highly efficient radial impeller made from cast aluminium
- Housing made from cast aluminium
- Variable fan speed
- Max. flue gas temperature of 250 °C

### exodraft RSHT

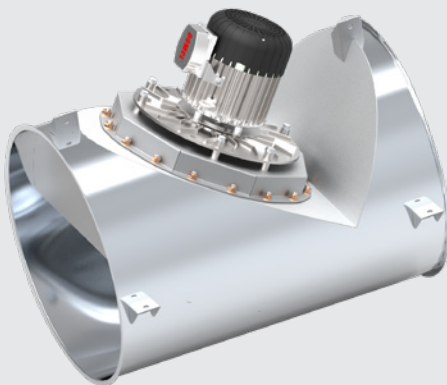


- Robust and compact design
- Horizontal discharge
- High temperature tolerance
- Patented cooling fan
- Stainless steel and cast aluminium housing
- Variable fan speed
- 500 °C in continuous operation, up to 700 °C peaks

Model:	RSV 200	RSV 250	RSV 315	RSV 400	RSV 400	RSV 450	RSHT 009	RSHT 012	RSHT 014	RSHT 016
Power supply (V)	1x230				3x400		1x230			
Max. voltage (A)	0.4	0.8	1.8	2.6	3.5	6.5	0.4	0.6	1.2	1.8
Motor capacity (kW)	0.07	0.16	0.37	0.60	0.75	1.5	0.09	0.13	0.29	0.37
Rotational speed (rpm)	1400				1720		1400			
Weight (kg)	18	27	37	47	52	58	12	15	19	22
Max. capacity (m³/h)	1250	1500	3000	4900	4900	7500	350	720	1300	2350

## Inline fan

### exodraft CFIR



- Compact, cylindrical design
- Mechanical draught for gas, oil or steam installations
- All stainless steel in accordance with EN1.4404(316L)
- Variable fan speed (frequency inverter required for operation)
- Can be installed both horizontally and vertically
- Can be installed indoors and outdoors (from -40 °C to +50 °C)
- Works at continuous flue gas temperatures up to 600°C

Model:	CFIR200	CFIR300	CFIR400	CFIR500
Power supply (V)	3x208-240 *		3x380-400 *	
Current (A)	3.0	3.7	4.8	7.3
Motor capacity (kW)	0.75	1.5	2.2	3.0
Nominal fan speed (rpm)	1750			
Weight (kg)	23	38	56	75
Temp. rating (°C)	600 (continuous)			
Max. capacity (m³/h)	2200	4200	6600	11000
Chimney conection (mm)	ø300 **	ø350 **	ø400 **	ø500 **
Dimensions WxHxD (mm)	491x568x600	599x662x700	700x784x850	802x859x1000

\* exodraft frequency inverter required for operation

\*\* exodraft adapter cones available for connecting to different chimney sizes

# Controls

## EBC24 constant pressure regulator



- Monitors and regulates the chimney draught via the rotational speed of the chimney fan
- Can be used with XTP pressure sensor
- Kiwa GASTEC-approved
- 2 versions available (for indoor og outdoor installation)

Power supply (V)	230 AC $\pm$ 10%, 50 Hz $\pm$ 1%
Max. power consumption	475 W / 3.7 Amp
Dimensions (H x W x D, mm)	175 x 175 x 110
Operating temperature ( $^{\circ}$ C)	-20 to +50
Operating range (Pa)	-500 to +500
IP classification	54
Weight (kg)	1.5

## EHC20 control for heat recovery systems



- Automatic control of all heat exchanger functions
- Temperature control of the buffer storage

Power supply (V)	240 AC
Max power consumption (W)	0.3-3
Dimensions (H x W x D, mm)	228 x 180 x 53
Operating temperature ( $^{\circ}$ C)	0-40
IP classification	40

## EAHC21 PLC control for heat recovery systems



- Automatic control of all heat exchanger functions
- Input and output to 2 heat recovery units and 2 buffer tanks
- Remote access via web server
- Integrated touch display
- Multiple bus compatible (BACnet, MODBUS/IP, KNX, MODBUS, PROFIBUS)
- Expandable I/O capacity

Model:	EAHC21 TRIAC	EAHC21 VFD+ TRIAC	EAHC21 VFD
Power supply (V)	1x230 V AC $\pm$ 10 %, 50 Hz		
Rated current	4A	20A	25A
Dimensions (H x W x D, mm)	700 x 500 x 250		
Temperature	0 to +55 $^{\circ}$ C		
IP-rating / material	IP54 /steel		
HMI	7" Resistiv Touch LCD 800x480		
Inputs	2x digital potential free, 2x digital 24-230V AC/DC, 4x XTP sensor 0-10V analog, 2x flow sensor 0-20 mA, 8x PT100/1000 temperature sensor		
Outputs	6x digital potential free (250V), 4x digital 230V, 2x general purpose (250V), 4x 0-10V analog, 2x chimney fan outputs (70-230V)		
Chimney fan output	2 x 70-230V / 4A	1 x 70-230V / 4A + 1 x 3x230V / 1.5 kW	2 x 3x400V / 1.5kW
Weight	30 kg		

# Accessories

## Accessories



- 3-way mixer
- Internal thread 3/4", 1" or 1 1/4" available



- 3-way mixer servomotor
- 230V



- Sensor for heat quantity metering
- 3/4" for 60-720 l/h (1-12l/min), 1" for 300-6000l/h (5-100l/min) or 1 1/4" for 600-12000l/h (10-200l/min)
- 0-100°C



- Storage sensor for control of an additional heat generator with thermowell



- Safety temperature limiter with T-joint connection

# Case studies

## Schwarze Bakery – exodraft heat recovery and chimney fans



The Schwarze bakery and confectionery near Leipzig, Germany was founded in 1921 by Max Schwarze. In this modern bakery, fresh and high-quality products are made from traditional recipes and time-honored craftsmanship, but modern and eco-friendly technologies have found a place here too. In 2015, for example, a more efficient heat recovery system for the gas-fired ovens was installed and put into operation.

The **exodraft** heat recovery system, aided by **exodraft** chimney fans, ensures a stable, trouble-free and future-proof production in addition to providing the Schwarze bakery with continuous energy savings.



Watch video with interview: [www.exodraft-heatrecovery.com/portfolio/schwarze-bakery](http://www.exodraft-heatrecovery.com/portfolio/schwarze-bakery)

## Schröder Landbäckerei – exodraft heat recovery and chimney fans



Bakery Schröder is located in Northern Saxony, Germany and has been family-run since 1920. It has six stores that supply the region with its award-winning products based on own recipes.

Here, modern ovens and automated processes support the traditional craftsmanship. In 2017, during an expansion of the bakery, a heat recovery system from **exodraft** was installed. It quickly showed significant energy savings.

Take advantage of the energy stored in the excess heat from your ovens and use it to warm up water for your heating systems, cleaning equipment, shower facilities and much more.



Watch video with interview: [www.exodraft-heatrecovery.com/portfolio/bakery-schroder](http://www.exodraft-heatrecovery.com/portfolio/bakery-schroder)



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