



High Efficiency Steam Generation

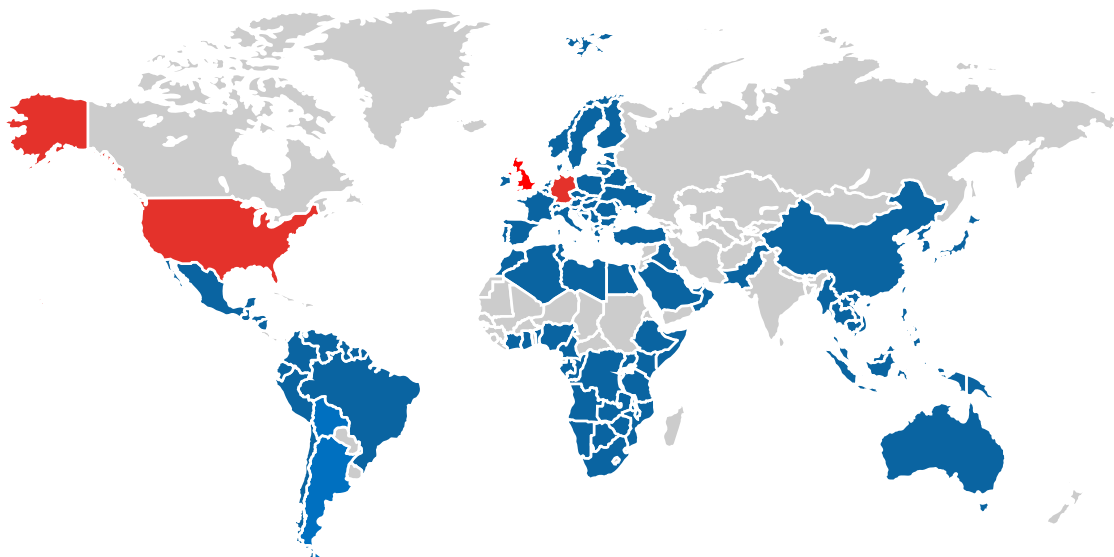
Steam is our passion.
Just steam.







- + founded in 1957 in Krefeld, Germany
- + medium sized business with 160 employees
- + more than twenty service hubs in Germany
- + more than 30% market share in Europe

**CERTUSS America***Sales, Service & Academy*

800 Marshall Phelps Rd
Building 5, Unit E
Windsor, CT 06095

**CERTUSS Headquarter**

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United Kingdom

**CERTUSS Reps***Sales & Service*

CERTUSS America
Sales, Service & Academy

800 Marshall Phelps Rd
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- + Design, Engineering & Manufacturing in Krefeld, Germany
- + manufacturing acc. to ISO 9001:2015
- + certified according to PED, ASME, DOSH, GOST, China Stamp, etc.
- + manufacturing and storage on more than 320,000ft² (30.000m²)
- + in-house R&D and production fire test facility

- 
- + currently more than 16.000 operating Steam Generators – worldwide
 - + operating in more than 130 countries
 - + working with 50 Sales & Service partners, worldwide
 - + serving in more than 80 different industries



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The CERTUSS concept

1-stop shopping

JUNIOR Models:

Frame 1:

- 80 = 5 Hp
- 120 = 8 Hp

Frame 2:

- 150 = 10 Hp
- 200 = 13 Hp

Frame 3:

- 250 = 17 Hp
- 300 = 20 Hp
- 350 = 23 Hp
- 400 = 27 Hp

Gas-fired: 2-stage burner:

- 1st stage = $\frac{3}{4}$ HP / 6kW
- 2nd stage = 100% fire
- *fewer purge cycles!*

Oil-fired: on-off burner



UNIVERSAL Models:

Frame 4:

- 500 = 33 Hp
- 600 = 40 Hp

Frame 5:

- 700 = 47 Hp
- 750 = 50 Hp
- 850 = 57 Hp

Frame 6:

- 1000 = 67 Hp
- 1300 = 87 Hp

Frame 7:

- 1500 = 100 Hp
- 1800 = 120 Hp
- 2000 = 134 Hp

Gas-fired: 2-stage burner:

- 1st stage = $\frac{3}{4}$ HP / 6kW
- 2nd stage = 50-100% fire, fully modulating
- ***fewer purge cycles!***

Oil-fired: 50% & 100%

Dual-Fuel Capable



Reduced site installation time & costs

Simple maintenance access

Compact size, reducing on-site space requirements

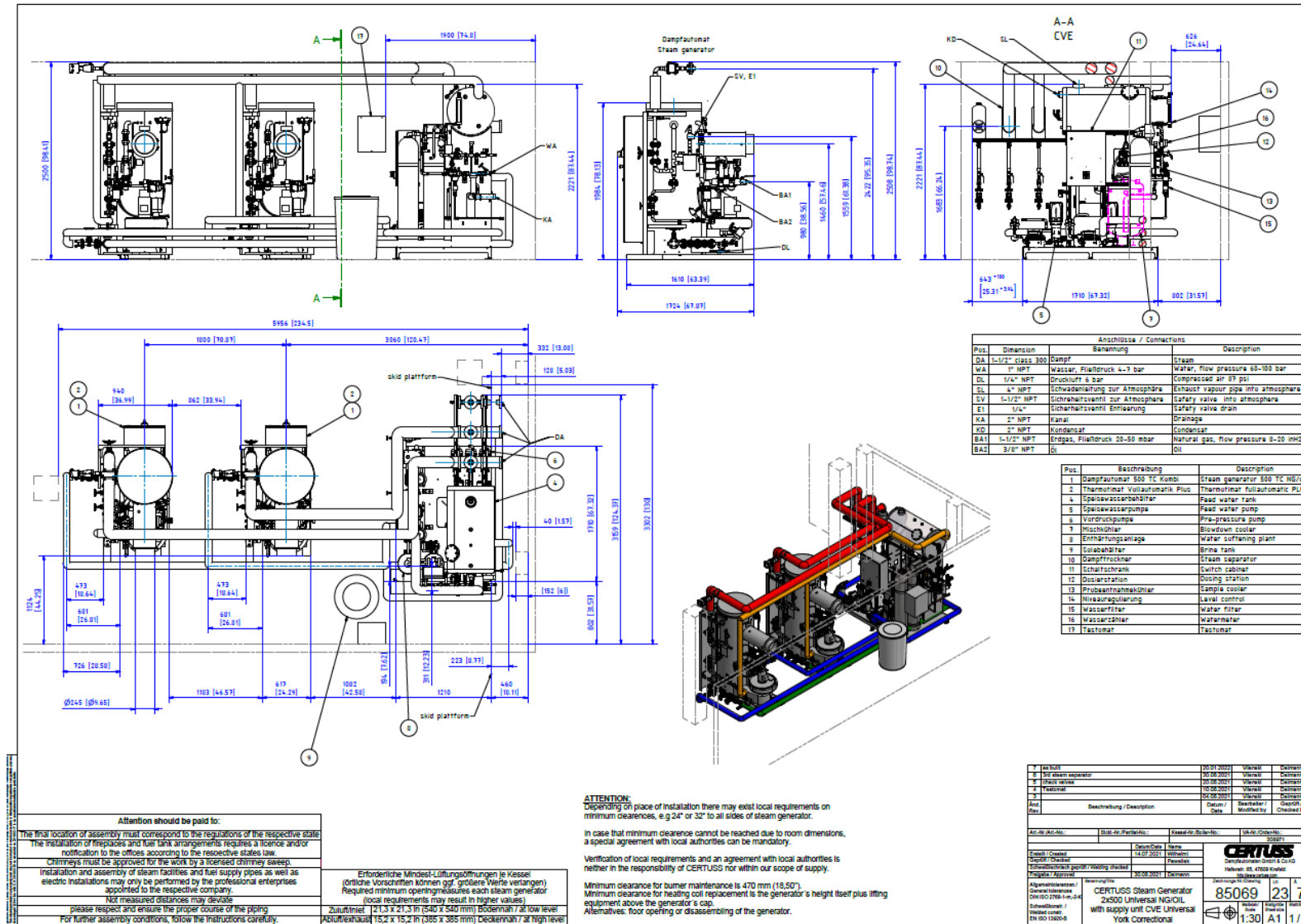
Modular design for up to four CERTUSS Steam Generators

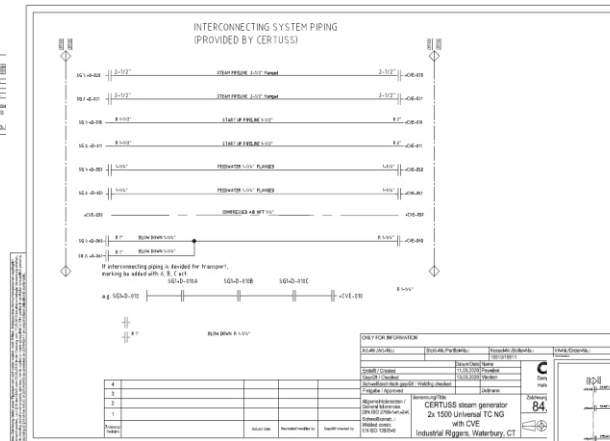
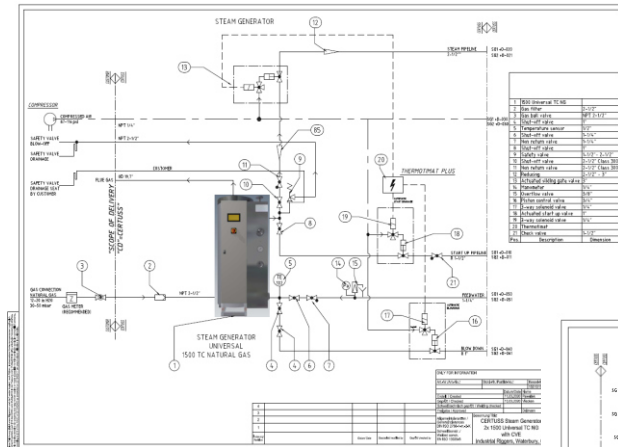
Central control panel for single on-site connection

Single source accountability

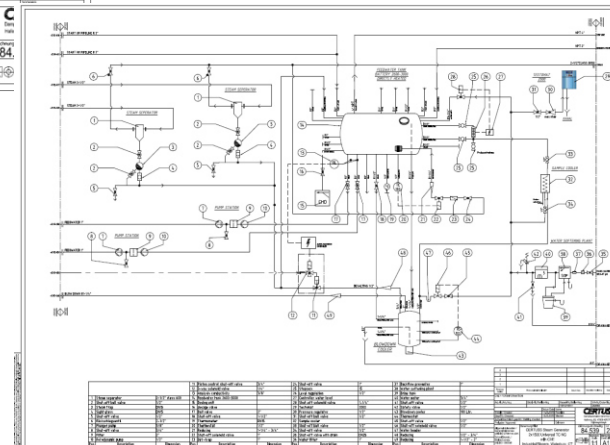
Galvanized and coated framework for durability

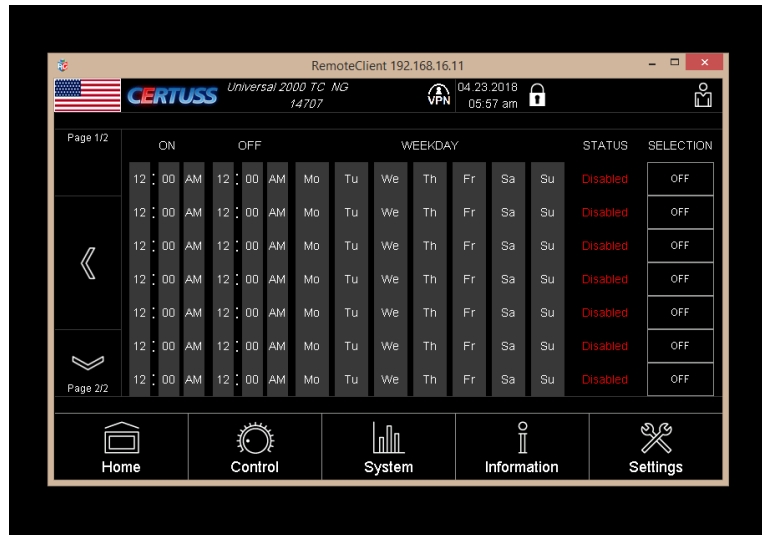






- The boiler
- The piping
- The feed system





- 7" touch control
- clear readout of operating parameters and setpoints
- easy start up/shut down graphic instructions
- pre-programmable working hours
- remote-in availability
- multilingual control interface

Local (Intranet)

The hardware and software is prepared by CERTUSS for network access
 The operator installs and configures the Viewer Software
 The Viewer Software is free of charge for the EATON control

Connection possibilities to the operator network:

The steam system is connected directly to a PC via a network cable

The steam system is integrated into the operator's network, and IP addresses of the steam system must be adapted to the operator network (on-site)

The steam system is integrated into the operator network, and the IP range of the network card is adjusted when necessary (on-site)

GSM + LAN (VPN)

Remote cloud access for trouble shooting only for CERTUSS

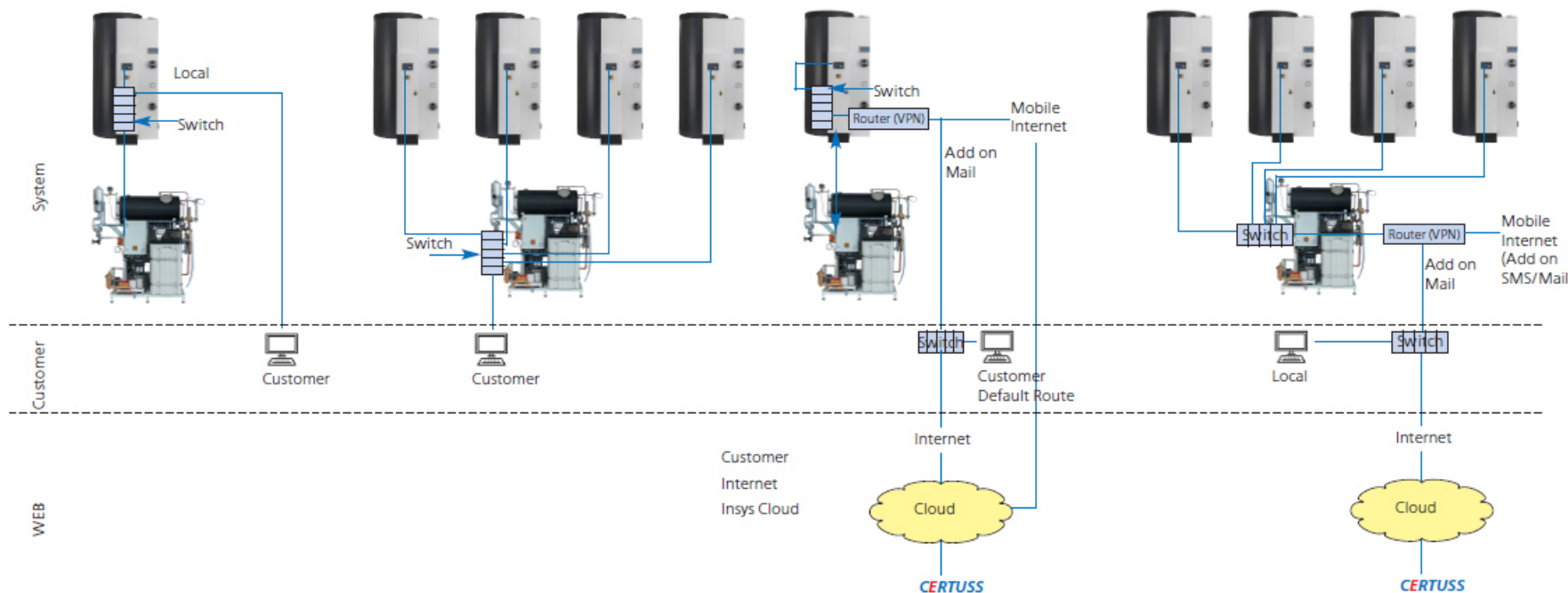
Remote software update of steam system

Access functionality as local via default route

Adjustments on site by CERTUSS

Add ons: E-mail dispatch or SMS*

*additional mobile phone card necessary





Safety

Space

Efficiency

Redundancy

Safety

Boiler Design & Code

Cooling Capacity is Determined by Pressure Vessel Architecture

Four gallons per hour per horsepower is the rule of thumb when calculating water used by a steam boiler, but 34.5 pounds of steam per hour per horsepower is more exact (source google)

1

Flexible Watertube = ~390 gal/MBTU / 5 l/kWh



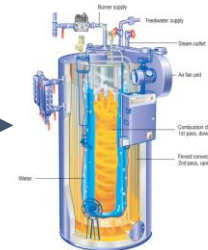
2

Scotch-Marine Firetube = ~1,700 gal/MBTU / 22 l/kWh



3

Vertical "Tubeless" = ~1,450 gal/MBTU / 19 l/kWh



4

Steam Generator = ~150 gal/MBTU / 2 l/kWh



if operating pressure & operating temperature & vessel design determine the volume of water that will flash, that means that...

=> the potential explosive power of a Boiler is based on:

- operating pressure setpoint & range (determines % flash)
- operational water volume ($\% \text{ flash} \times \text{volume} = \text{explosive volume}$)

=> higher pressure + greater water volume = BIGGER Explosion!

cause for steam boiler failures =>

not correct and regular maintenance & operation

leakages of fire tubes

gas train problems



Space

Footprint



Fire Tube Boiler (100 BHP) / 150psi

CERTUSS 1 x TC 1500
(1 x 100 BHP) / 150psi

Length

13'9"

7'7"

Width

6'9"

4'6"

Hight

6'10"

8'9"

Footprint

95.9 ft² / 9m²

35.4ft² / 3,2m²



Fire Tube Boiler (100 BHP) / 150psi



CERTUSS 1 x TC 1500
(1 x 100 BHP) / 150psi

Length

13'9"

11'6"

Width

6'9"

5'7"

Hight

6'10"

8'9"

Footprint

95.9 ft² / 9m²

64.4ft² / 5,9m²

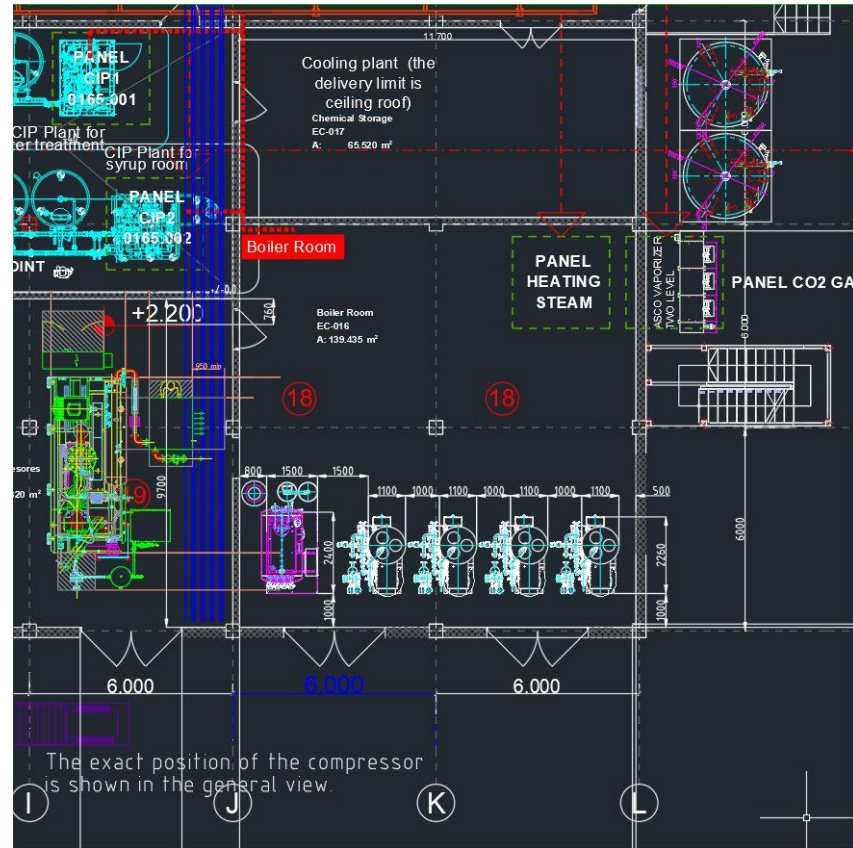


Fire Tube Boiler (100 BHP) / 150psi



CERTUSS 2 x TC 1500
(2 x 100 BHP) / 150psi

Length	13'9"	14'1"
Width	6'9"	5'7"
Hight	6'10"	8'9"
Footprint	95.9 ft ² / 9m ²	105.4ft ² / 9,8m ²



Efficiency

Combustion Efficiency & Plant Efficiency

Energy Tips – Process Heating

Process Heating Tip Sheet #1 • November 2007

Industrial Technologies Program

Payback Guidelines

Process temperature is customarily used as a rough indication of where air preheating will be cost effective. Processes operating above 1,600° F are generally good candidates, while preheated air is difficult to justify on processes operating below 1,000° F. Those in the 1,000° to 1,600° F range may still be good candidates but must be evaluated on a case-by-case basis. These guidelines are not ironclad. Financial justification is based on energy (or Btu) saved, rather than on temperature differential. If a low temperature process has a high enough exhaust gas flow, energy savings may still exist, even though the exhaust gas temperature is lower than 1,000° F.

Resources

Combustion Technology Manual. Published by Industrial Heating Equipment Association (IHEA), Arlington, Virginia 22209. Maintenance and Adjustment Manual for Natural Gas and No. 2 Fuel Oil Burners. Technical Information Center, Department of Energy. Handbook of Applied Thermal Design, edited by Eric C. Goyer. Published by McGraw Hill Book Company. U.S. Department of Energy—For additional information on process heating system efficiency, to obtain DOE's publications and Process Heating Assessment and Survey Tool (PHAST) software, or learn more about training visit the BestPractices Web site at www.eere.energy.gov/industry/bestpractices.

Preheated Combustion Air

For fuel-fired industrial heating processes, one of the most potent ways to improve efficiency and productivity is to preheat the combustion air going to the burners. The source of this heat energy is the exhaust gas stream, which leaves the process at elevated temperatures. A heat exchanger can extract a large portion of the thermal energy in the flue gases and transfer it to the incoming combustion air. Recycling heat this way will reduce the amount of the purchased fuel needed by the furnace. Many processes produce dirty exhaust gases. Some exchangers are designed to handle your process is not a clean one. When discussing it with potential suppliers, be sure to mention any troublesome materials in your exhaust gas stream. Fuel savings for different furnace types and air temperatures can be found in the table below. Reductions in energy costs.

Percent Fuel Savings Gained by Preheating Combustion Air							
Furnace Exhaust Temperature, °F	600	800	1,000	1,200	1,400	1,600	1,800
1,000	2	3	4	5	6	7	8
1,200	3	5	7	9	11	13	15
1,400	4	7	10	13	16	19	22
1,600	5	9	13	17	21	25	29
1,800	6	11	16	21	26	31	36
2,000	7	13	19	25	31	37	43
2,200	8	15	22	29	36	43	50
2,400	9	17	25	33	41	49	57

Fuel: Natural gas at 10% excess air. Source: IHEA Combustion Technology Manual (see Resources)

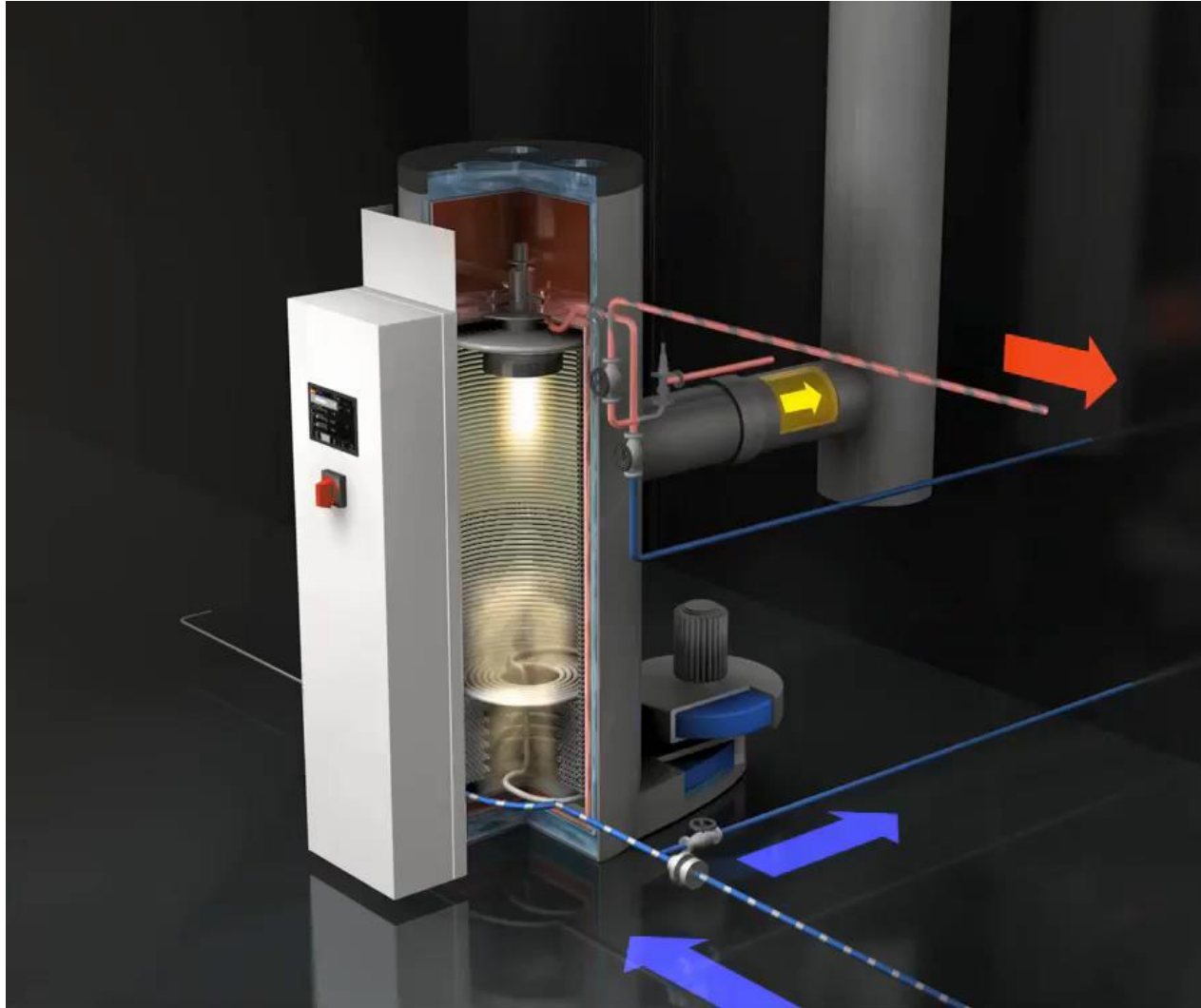
There are two types of air preheaters: recuperators and regenerators. Recuperators are gas-to-gas heat exchangers placed on the furnace stack. Internal tubes or plates transfer heat from the outgoing exhaust gas to the incoming combustion air while keeping the two streams from mixing. Recuperators are available in a wide variety of styles, flow capacities, and temperature ranges. Regenerators include two or more separate heat storage sections, each referred to as a regenerator. Flue gases and combustion air take turns flowing through each regenerator, alternately heating the storage medium and then withdrawing heat from it. For uninterrupted operation, at least two regenerators and their associated burners are required: one regenerator is needed to fire the furnace while the other is recharging.

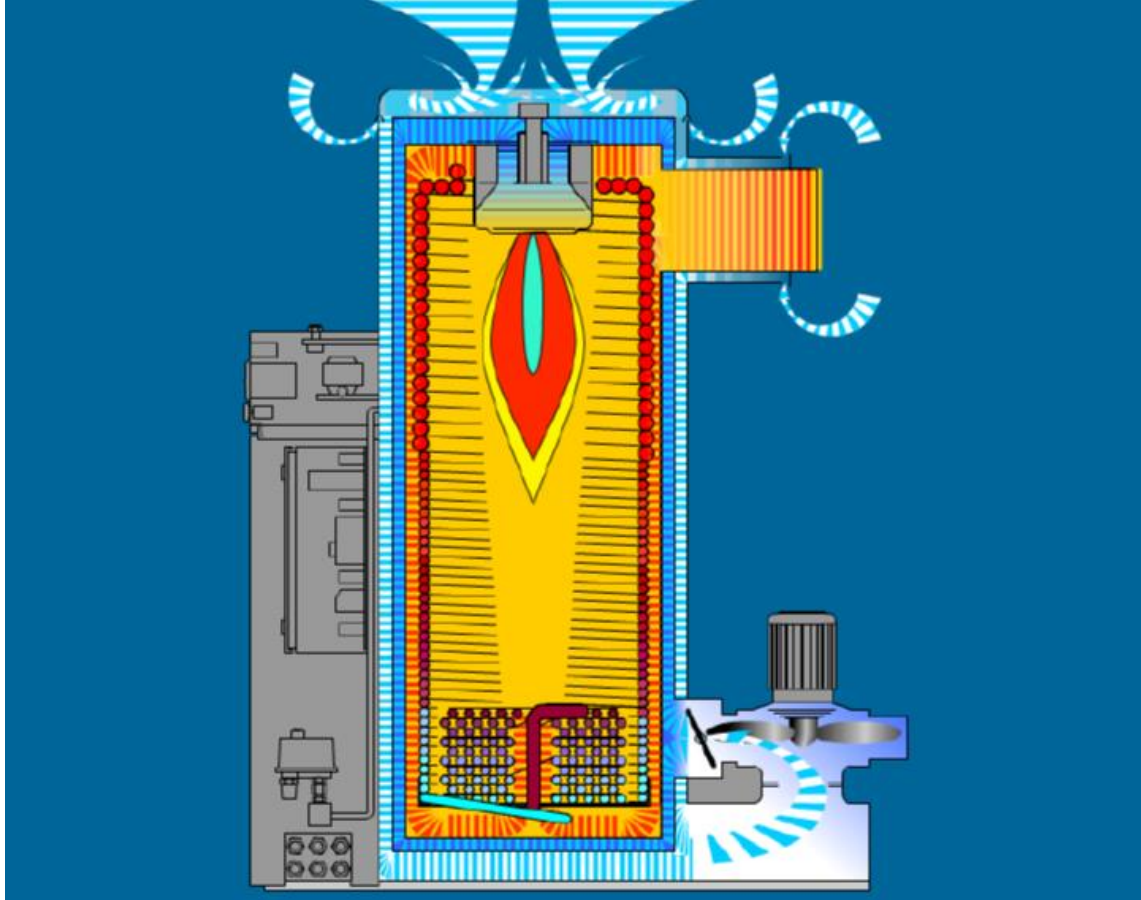
Payback Period = (Cost of combustion air preheating system, obtained from the supplier or contractor) ÷ (Reduction in fuel usage, Million Btu/hr x Number of operating hours per year x Cost of fuel per Million Btu)

Preheated Combustion Air

For fuel-fired industrial heating processes, one of the most potent ways to improve efficiency and productivity is to preheat the combustion air going to the burners. The source of this heat energy is the exhaust gas stream, which leaves the process at elevated temperatures. A heat exchanger, placed in the exhaust stack or ductwork, can extract a large portion of the thermal energy in the flue gases and transfer it to the incoming combustion air. Recycling heat this way will reduce the amount of the purchased fuel needed by the furnace.

source:
<https://www.energy.gov/eere/amo/tip-sheets-system>





Efficiency – warm to a touch – no insulation

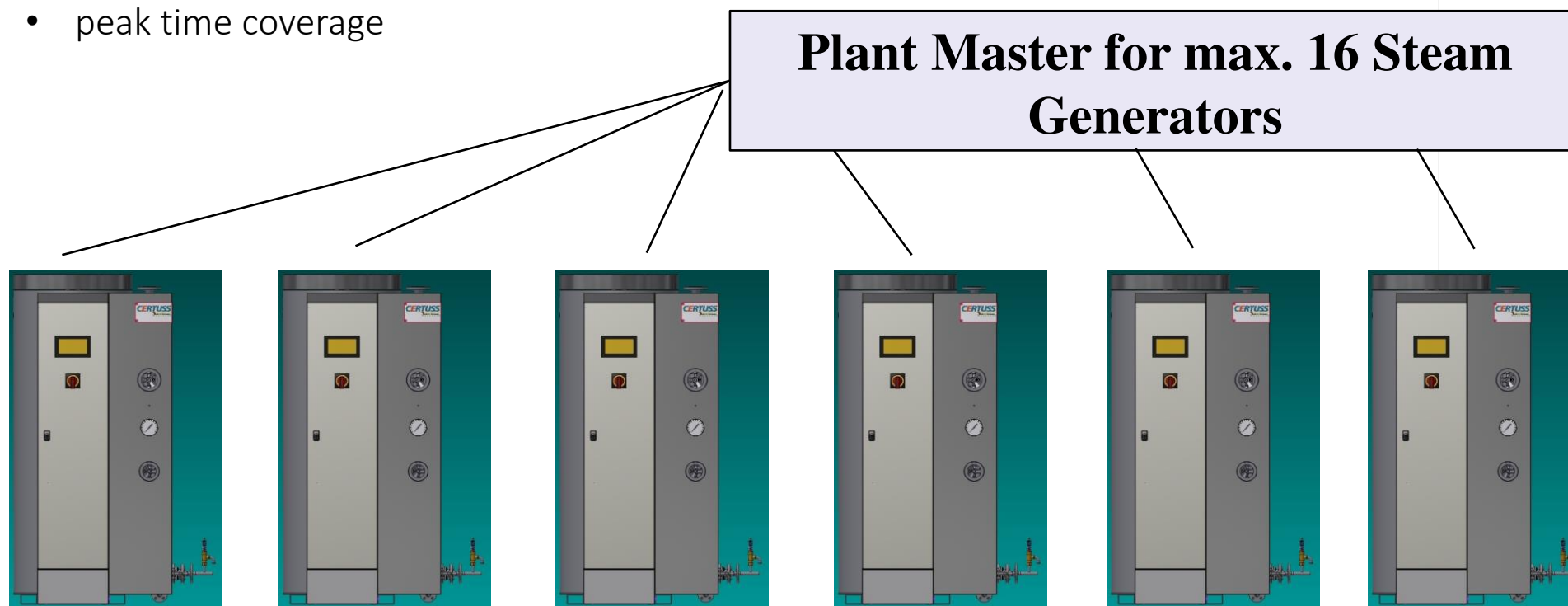


Redundancy

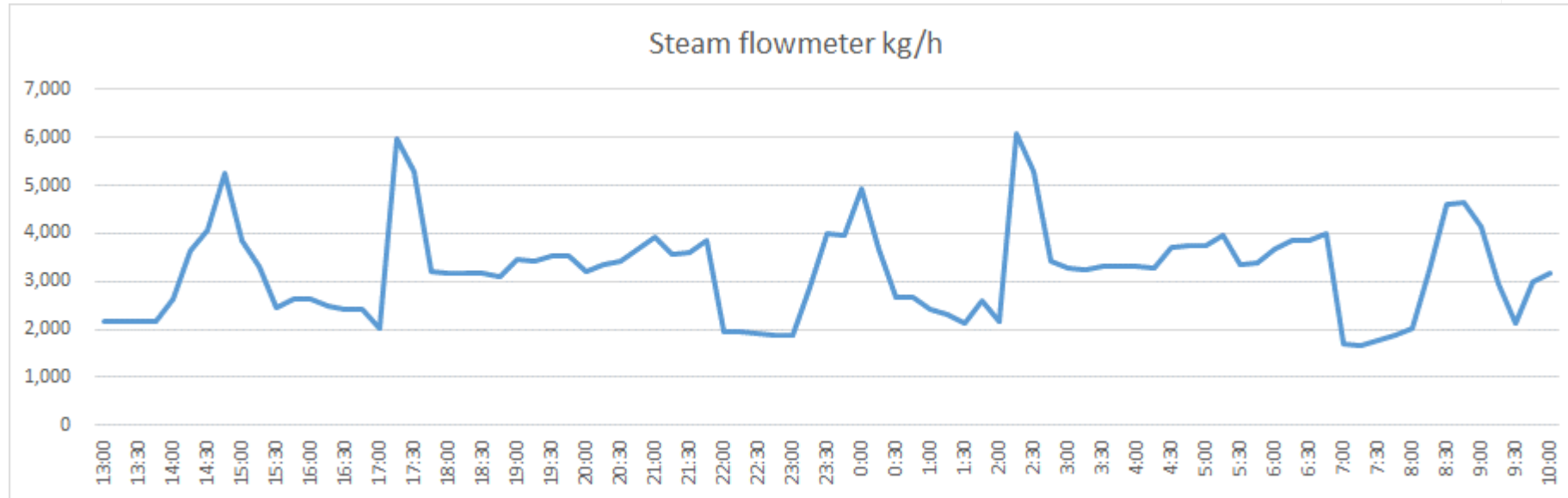
N+1 – Modular Design



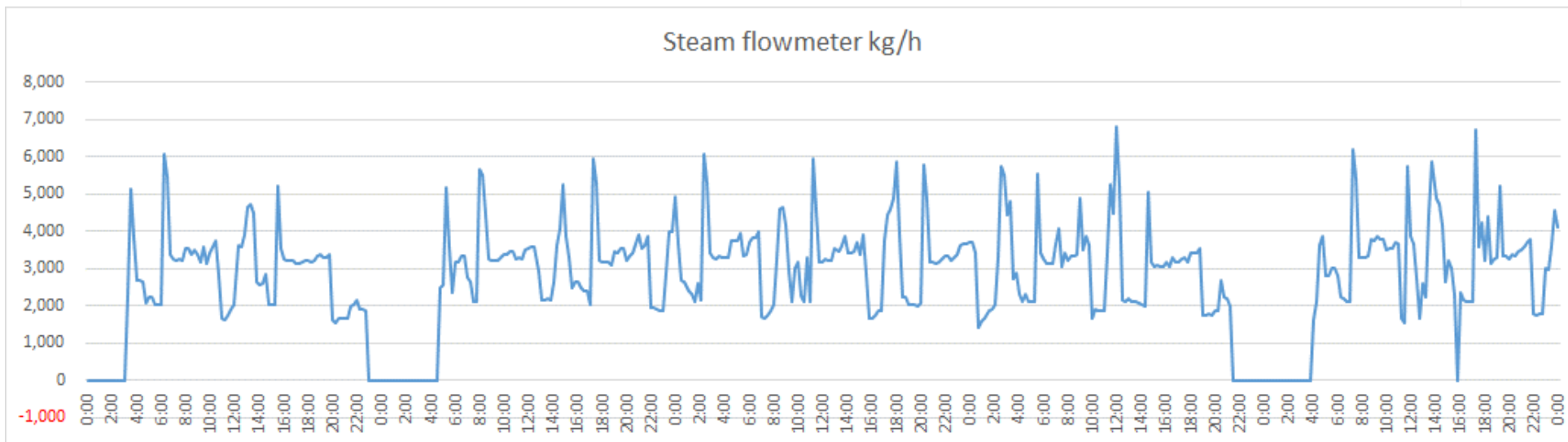
- runtime equalization
- higher turndown
- instant output adjustment
- integrated backup
- peak time coverage



Typical fluctuating steam demand at a process facility:



Typical fluctuating steam demand at a process facility incl. no demand at night:





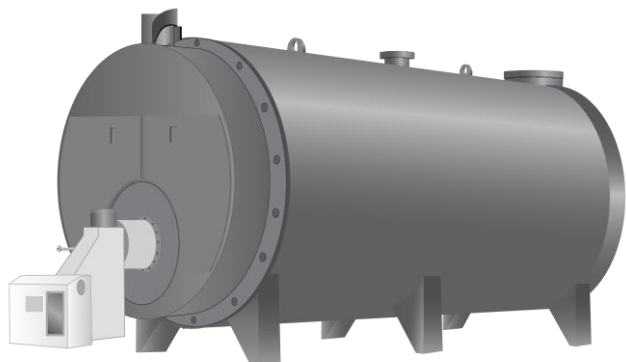
10,000 kg/h

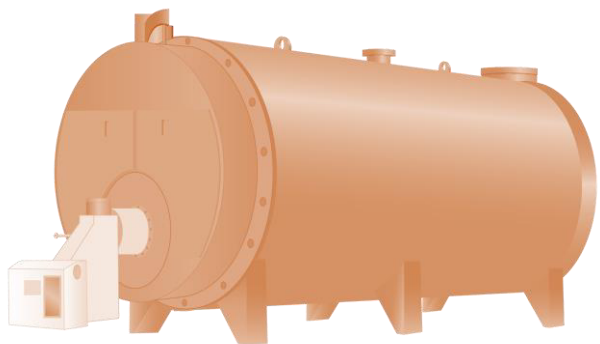
@ 92% gas-to-steam efficiency



1,000 kg/h

@ 92% gas-to-steam efficiency

ON ON ON  OFF



1 unit boiler failure
→ Production stopped

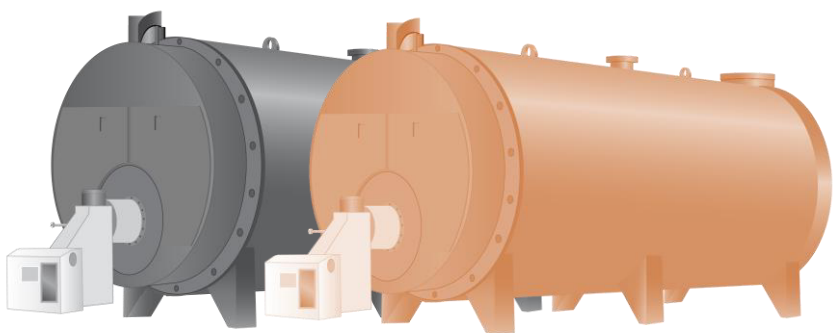


ON 



ON 

1 unit boiler failure
→ steam supply continues



ON



Long start up time
→Need to maintain pressure



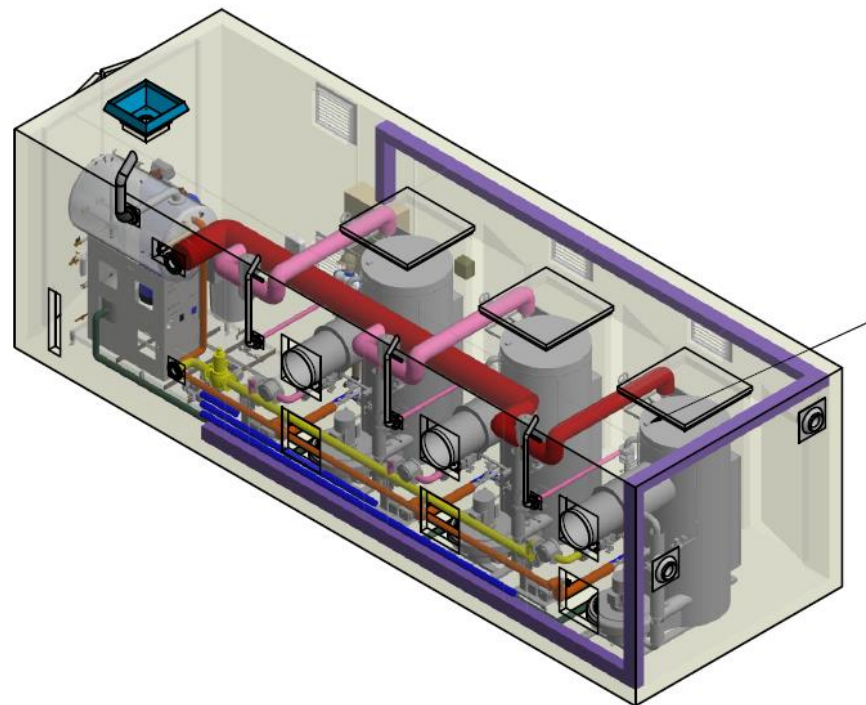
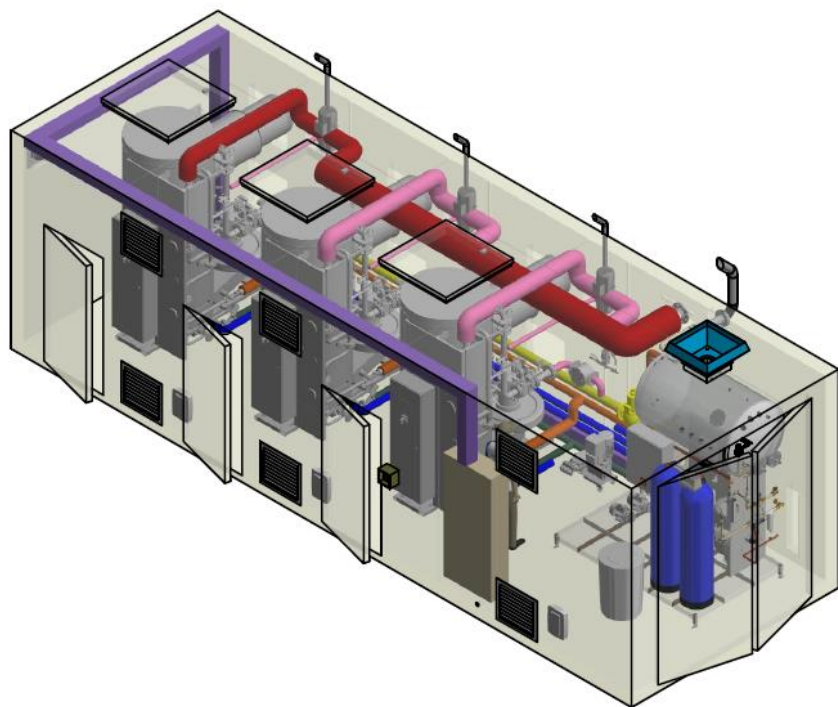
ON



ON

Short start up time
→No need to maintain pressure







- single point connections
- temporary or permanent location
- reduction of installation costs
- space saving
- no boiler room required
- roof or outside placement



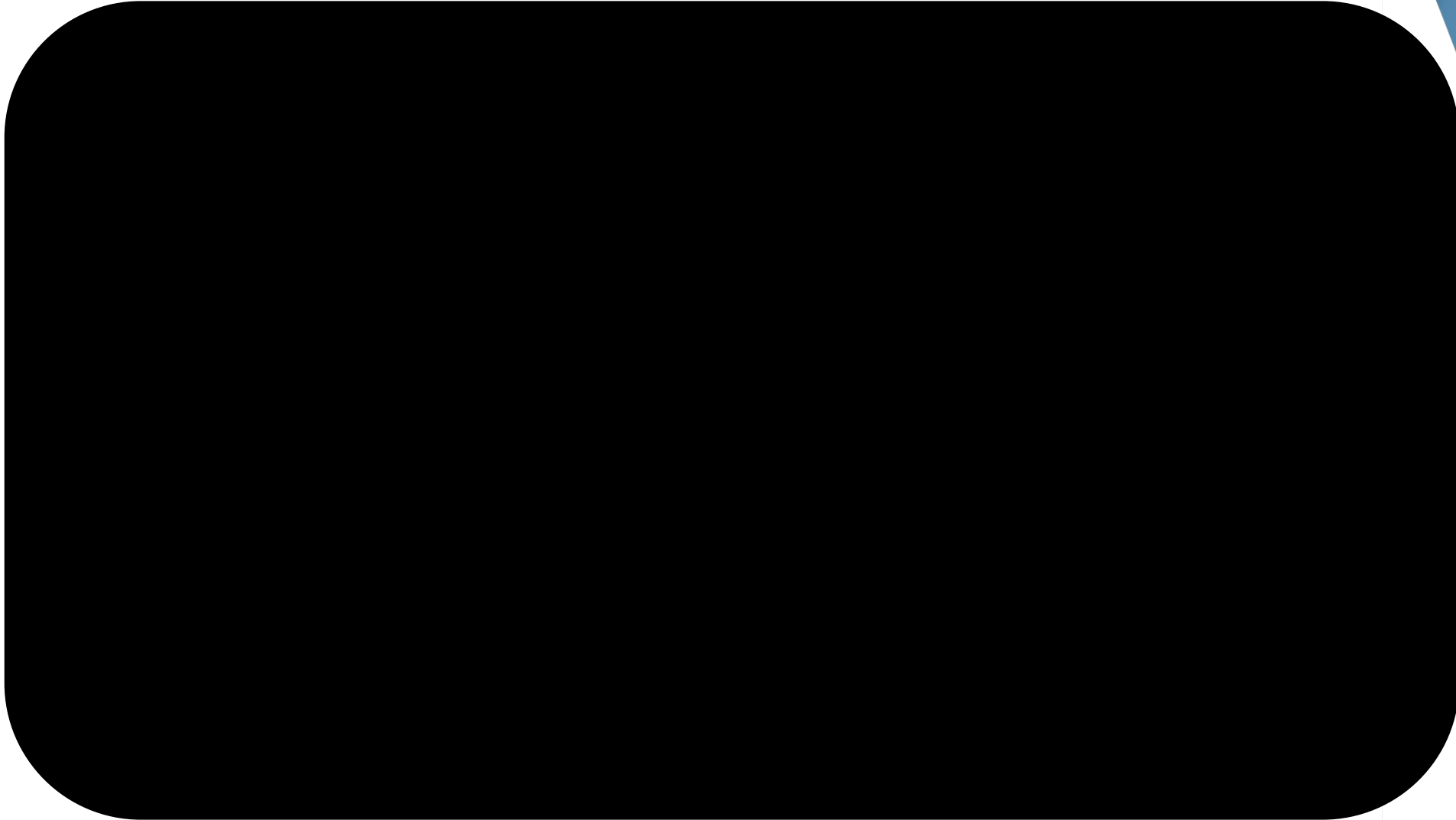
Distillery Plant, Yorkshire, UK

- 2 x Universal TC 500 steam generators with CVE feed system
- fully insulated and air conditioned incl. lighting and emergency shut offs



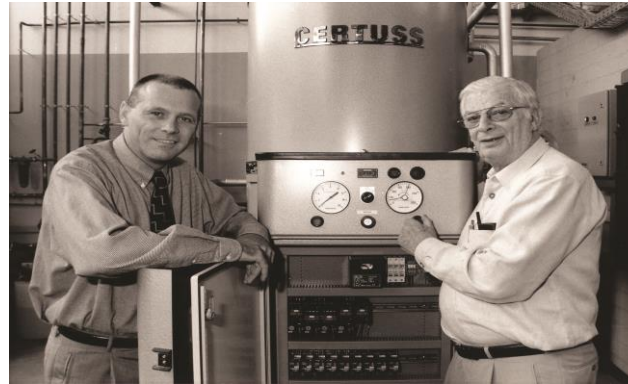
Oil & Gas Company in Algeria

- 3 x Universal TC 2000 steam generators with CVE feed system
- fully insulated and air conditioned with stacks for air inlet and flue outlet and oil tanks
- ATEX Zone 2 certified for the Oil & Gas industry



Selected References

Food & Beverage, Pharma, Biotech, Healthcare, etc.



3M**MERCK****PHILIPS***Coca-Cola***EVONIK**
KRAFT FÜR NEUES
FOUR SEASONS
Hotels and Resorts
Unilever*Kempinski*
HOTELIERS SINCE 1897**BACARDI****Levi's****B | BRAUN****SAMSUNG****HYATT***Lindt*
MAÎTRE CHOCOLATIER SUISSE
DEPUIS 1845
Nestlé
Hilton

Mercedes-Benz



Niagara Water Bottling, USA

Application for Filling line and carbon towers

Plants with CERTUSS steam generators:

- Louisville, KY
- Pittsburgh, PA
- Kansas City, KA
- Las Vegas, NV
- Mexico City, Mexico
- Hazleton, PA

Each plant has 1 x Universal TC 2000 (ea 135 BHP with 150psi) and CVE feed system

The system is operated just a few times a week. So intermittent operation and layup procedures in place for down times.





TreeHouse Brewing Co, Charlton, MA

Supplied with: 1 x Universal TC 1000 67 BHP, LPG,
150psi + CVE feed system

Completed: Spring 2021



Hong Kong University of Science & Technology

Supplied with 2 x Universal TC 1000 with ea. 67 BHP

town gas + CVE feed system

Completed Spring 2019



MAAG Food Group, Estonia

Supplied with 5 x Universal TC 2000 + 1 x Universal TC 1000, NG with ea. 134 BHP + 67 BHP with a total of 737 BHP + 2 x CVE feed system over two floors and incl. Steam Accumulator

Completed Winter 2024

La Porte Hospital, La Porte, IN, USA

La Porte Hospital belongs to the Community Health Group and is rated as one of the largest healthcare provider in the USA.

CERTUSS modular steam plants are now considered the blueprint for all new constructions of Community Health due to its high efficiency, small footprint and modular design.

3 x 48 BHP Universal TC 700, dual fuel,
150psi + CVE

Completed: August 2020





Pharmaceutical Industry – Aseptic & Sterile Animal Health, Grand Island, NE, USA

Supplied with 3 x Universal TC 2000 with ea 135
BHP, NG, 150psi

Completed Spring 2021

First Call Plus Cremation, Kent, WA, USA



CERTUSS steam is used for the new process of alkaline hydrolysis to cremate human bodies with steam and water instead of cremating them the conventional way.

The steam is injected into a resomator and the process is by far more energy efficient.

Completed: October 2020

1 x 34 BHP Universal TC 500 NG, 150psi, CVE





Yards Brewing Company – Philadelphia, Pennsylvania

Brewing Company since 1994

Production expansion with simultaneous moving into new facilities

Steam used for KEG and CIP cleaning as well as for the brewing process itself.

2 x 135 BHP + 1 x 28 BHP + CVE

Completed: July 2017





H&T Battery Production, Waterbury, CT, USA

H&T Battery Components is the world's largest manufacturer of battery components for the consumer battery market and a fast-growing supplier for the rechargeable battery industry.

2 x 100 BHP + CVE

Completed: September 2020





Steris IMS – Sterilization Services

Steam used for sterilization of surgery equipment and healthcare supplies.

Durham, NC and Chattanooga, TN are the latest plants. CERTUSS provides turn-key steam solution for 24/7 operation.

2 x 135 BHP + CVE

Completed: March 2019 & October 2019





VAM Foods, Conroe, TX

Pictures show installation and final installation inside of a shipping container

Supplied with 2 x Universal TC 700, ea. 47 BHP, LPG, 150psi

Project completed Spring 2022





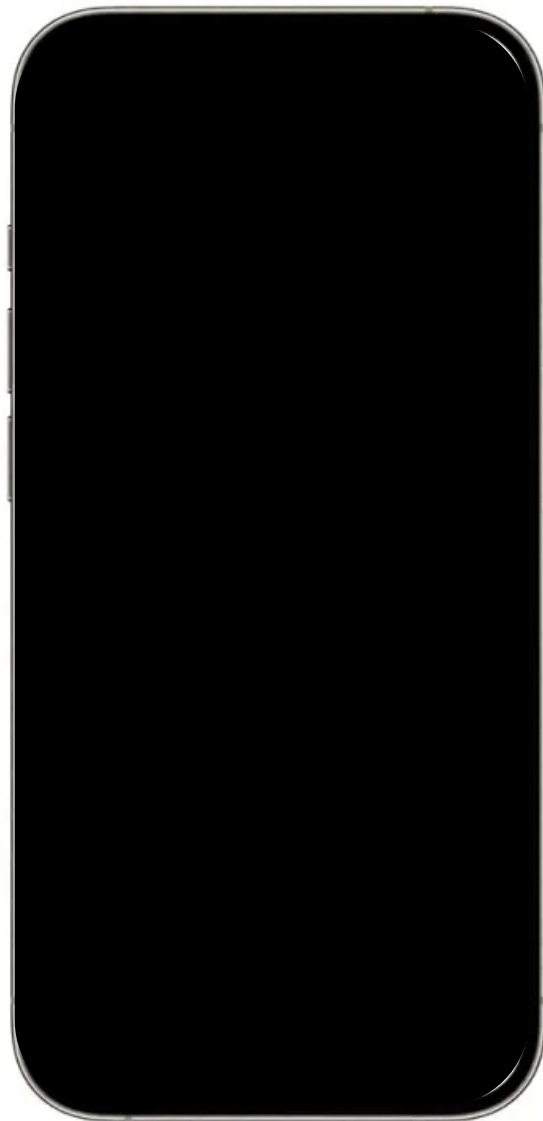
**Accra Brewery, Ghana
of AB InBev**

8 x Universal TC 2000 (total 1,080 BHP) + 2 x CVE,
dual fuel, 250psi

All brewery applications (fermentation, bottling line,
CIP, KEG cleaning, etc.)

Completed / Start-up January 2022







DryFly Distilling, Spokane, WA

2 x 58 BHP Universal TC 850 + CVE, NG, 150psi

Distillery project with CARL Stills from Germany

Completed Winter 2022





Ancient Brands Milling, Dyersville, IO

2 x Universal TC 1800, 32bar + 1 x Universal TC 700,
10bar + CVE, NG

Steam Accumulator for Puffing machine, CERFX
project

Completed Winter 2023/2024



PICK-ONE



Pick One, Chihuahua, MX

1 x Universal TC 1300, 32bar + CVE, NG

Steam Accumulator for Puffing machine, CEREX project

Completed Winter 2023/2024





Spotclean Drycleaners Kampala, UG

Full Service Laundry and largest drycleaner provider in Kampala, Uganda.

CERTUSS equipment being used for finisher, ironing, pressing and washing machines.

Project completed Spring 2019



Shanghai No. 6 Hospital, Shanghai, PRC

Sterilization Facility and expansion for animal testing

2 x Junior TC 350 + CVE, NG, 10bar

Completion: Fall 2023





Hospital Vienna, Austria

Supplied with 8 x Universal TC 2000 ea.
134bHP, dual fuel, 150psi for their
Sterilization & Humidification

Completion Spring 2016





Creekstone Farms, Arkansas City, Kansas, USA

4 x Universal TC 2000 (total 540 BHP) + CVE, NG,
10bar

Meat processing application and cooking, boiling,
packaging + expansion plans for 4 more units.

Completed / Start-up: December 2020





Recycling Plant, Indiana, USA

- 2 x Universal TC 1500 steam generators with CVE feed system on a skid
- fully installed, piped and wired incl. steam header and safety valves

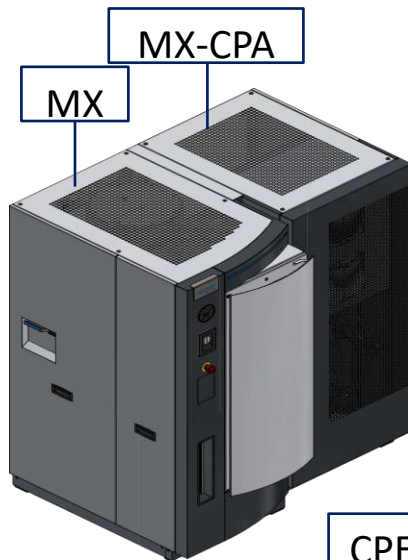




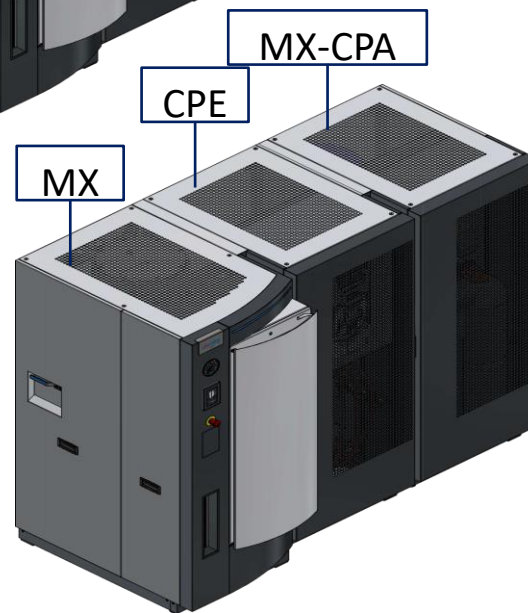
The EMX Models – 2 frame sizes



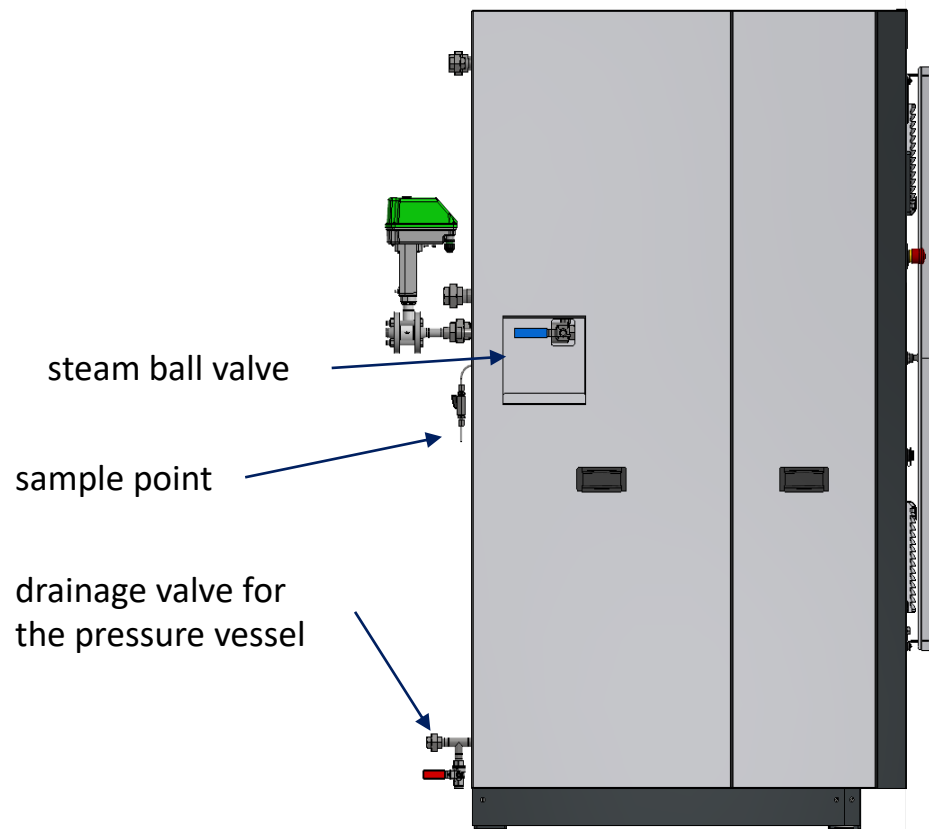
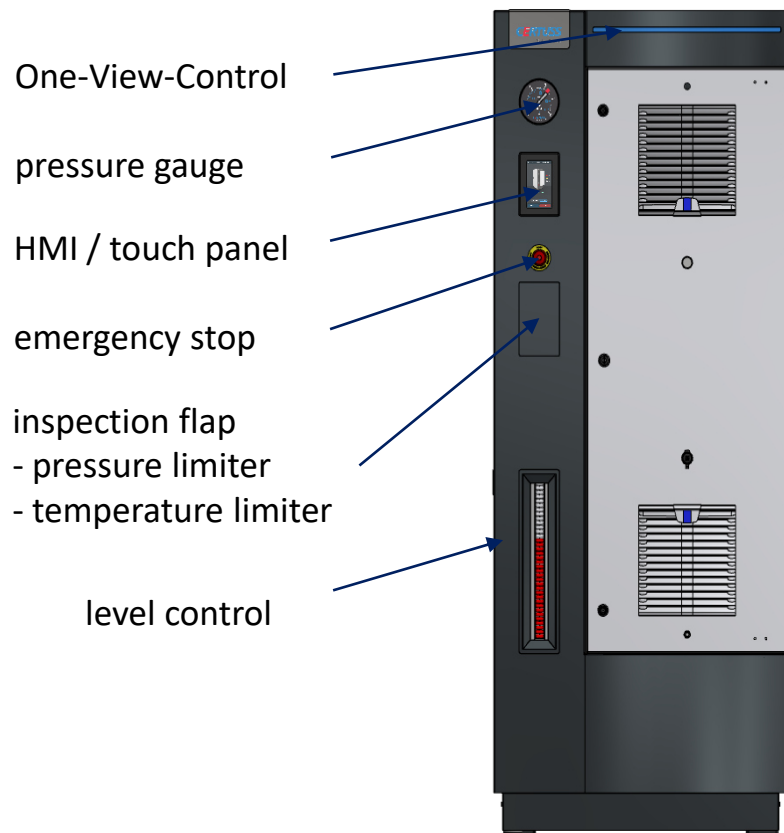
E10MX = 1 BHP
 E20MX = 2 BHP
 E40MX = 3 BHP
 E60MX = 5 BHP
 E80MX = 7 BHP
 E100MX = 8 BHP
 E130MX = 10 BHP
 E160MX = 12 BHP



E200MX = 16 BHP
 E260MX = 20 BHP
 E320MX = 25 BHP

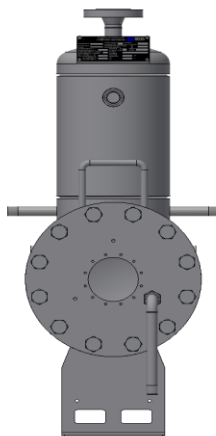


	E10MX – E40MX	E60MX – E160MX	E200MX – E320MX	EMX-CPA
Height (mm)	1900		1900	1900
Width (mm)	774		1580	770
Depth (mm)	1150		1150	1017
Weight (kg)	400	550	850	205-480
Design pressure (bar / psi)	4-16	4-16	4-16	n/a
Working pressure (bar / psi)	3-14,5	3-14,5	3-14,5	n/a
Material	media touching parts and housing in carbon steel or stainless			
Supply Voltage	voltage I: 380V/400V/415V voltage II: 440V/460V/480V frequencies: 50/60Hz protection class: IP52			



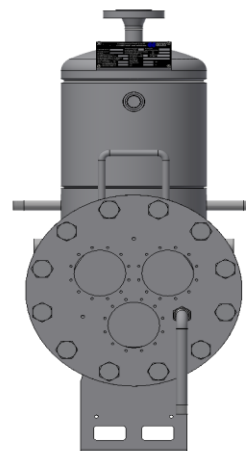
the pressure vessel of the E10MX-E40MX:

- DN200
- one (1) heating rod

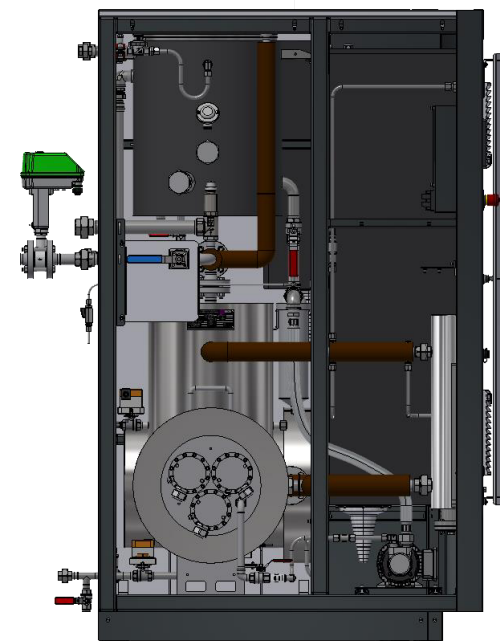


the pressure vessel of the E60MX-E320MX:

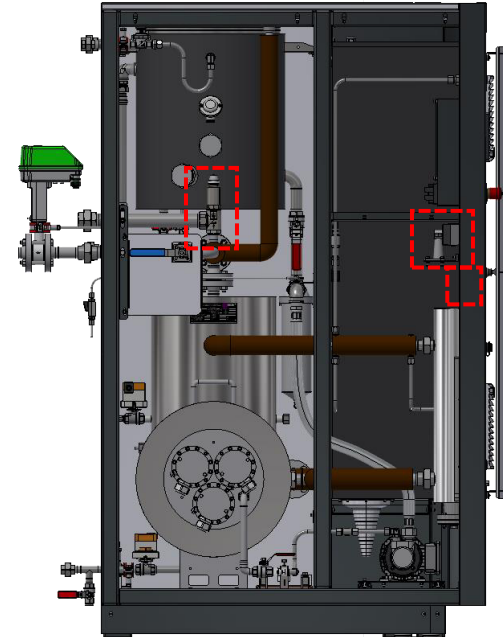
- DN250
- three (3) heating rods



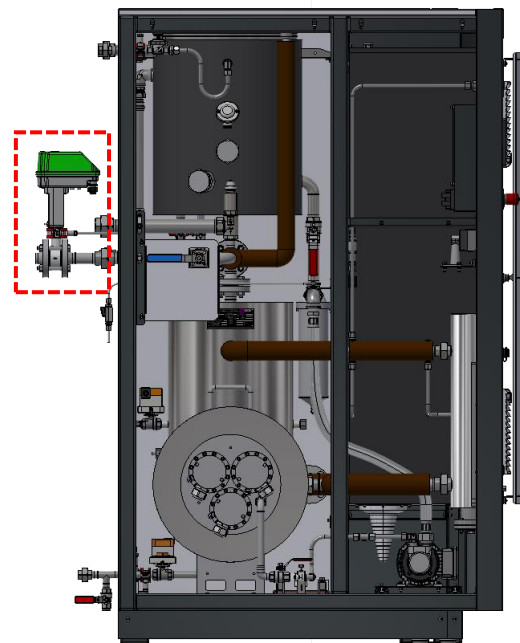
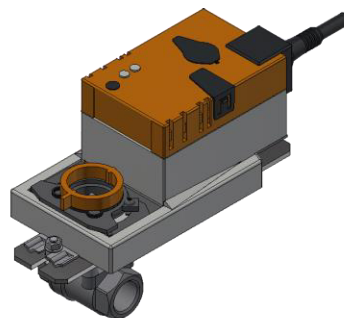
- ea. flanged heating rod with 40 kW
- control via solid state relay
- full modulation between 0% to 100%
- protection via switch-disconnectors and fuses



- steam pressure limiter
- safety valve
 - second safety valve (optional)
- temperature limiter as water level limiter



- automatic desalination valve: continuous removal of salt at the water surface
- automatic blowdown valve: continuous removal of sludge and solids from the boiler water
- fully automated operation of the steam generator thanks to the full electric sliding gate valve (maintaining steam pressure and to protect the system against steam network)
- optional air conditioning of the control cabinet
 - filter fan: $\leq 35^{\circ}\text{C}$ (ambient)
 - A/C: $> 35^{\circ}\text{C}$ (ambient)





features:

- operating mode
- current pressure
- messages
- date / time
- boiler serial number

options of external access / information:

- message set
- SMS & emails
- remote access (VNC)
- interfaces (Modbus, Profibus, etc.)



water condition modul MX-CPA

- water meter, system separator, water filter
- water softner: cabinet, CED6-CED20
- 50 ltr. mixing cooler
- Testomat 808/2000/Evo
- one- or two dosing units incl. canisters





Nurasa Food Tech Innovation Center, Singapore

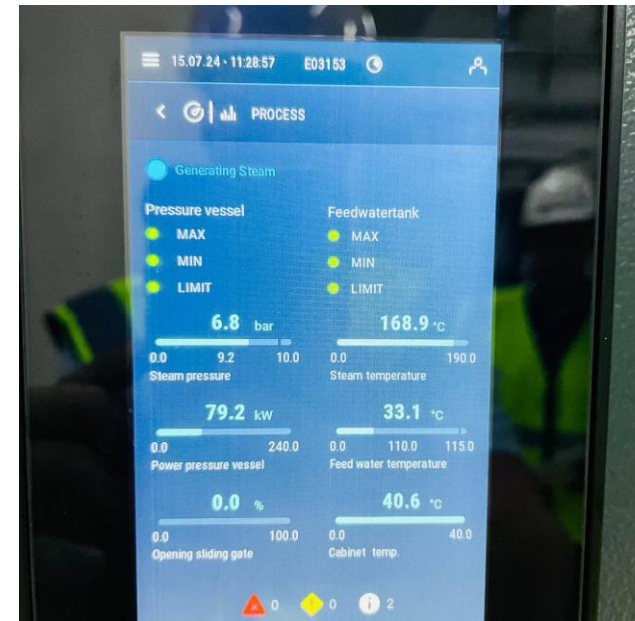
1 x E320MX + CPA, 10bar

Completed Spring 2024





HALEON
For Health. With Humanity.

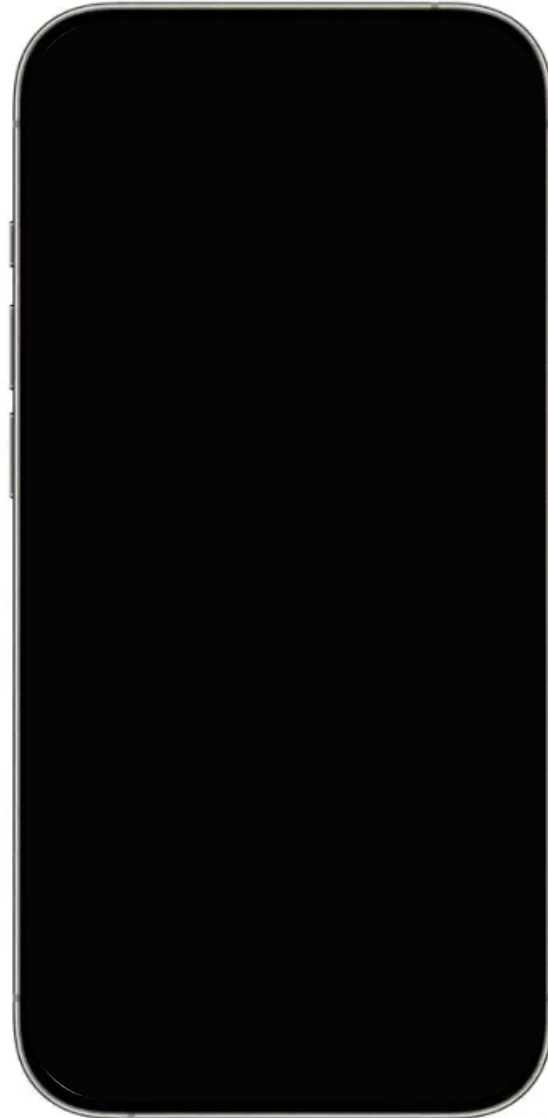


Haleon Pharmaceuticals, Jakarta, Indonesia

2 x E320MX + CPA, 10bar

Completed Summer 2024





UMX Models:

Frame 7:

- 1500 = 100 BHP
- 1800 = 120 BHP
- 2000 = 128 BHP

Gas-fired:

- 2-stage burner
- 1st stage = $\frac{3}{4}$ HP / 6kW
- 2nd stage = 20-100% fire, fully modulating
- *fewer purge cycles!*

Burner:

- NG & LPG
- Dual-Fuel Capable (NG + LPG)
- Hydrogen ready

Emissions:

- <9 ppm Nox
- hybrid solution with EMX possible

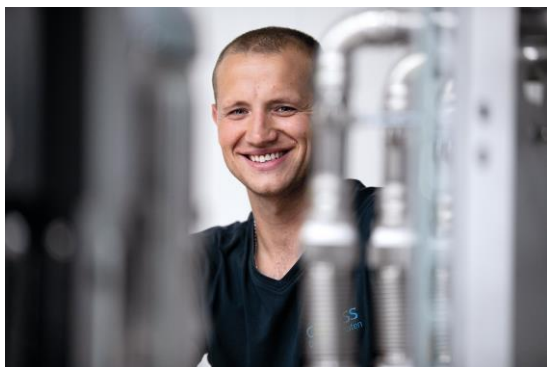




UMX – ULTRA EQUIPPED:

- 3-5 minutes cold start-up time
- smallest footprint sq ft / BHP
- less installation time & labor due:
 - integrated water pump
 - integrated steam separator
 - integrated hot water filter
 - integrated gas filter
 - integrated hoist chain & ladder
- 7" HMI
- remote ready
- PED / CE or ASME / UL certified





Safe

Footprint

Simplification of
processes (installation)



