

marathon burner courier

A white silhouette of a runner in mid-stride, positioned behind the word 'burner' in the main title.

Hot topics

First dreizler marathon® men
on legendary tracks

Who invented it?
Commissioning at
Ricola Switzerland

Forum Feuerungstechnik
Effect of hydrogen admixture
in natural gas on gas forced
draught burners

Dates

**Technical seminar
Spaichingen
24th June 2020**

Imprint

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First dreizler marathon® men!

mainova
FRANKFURT
MARATHON
27.10.2019



Christophe Vissers and Jimmy de Cock

“The last 3 months before the Frankfurt marathon we increased the distance and running volume in weekly intervals. The last month we ran about 50km by the week. We both exceeded our expectations by finishing about 15 minutes faster.”



A very special sporting challenge: **marathon®** service specialists at Olympic distance on legendary tracks. A total of 14196 runners from 110 nations took part in the 28th Frankfurt Marathon 2019. Among them the **marathon®**-runners Jimmy de Cock and Christophe Vissers, experienced service specialists from our French customers. The two friends ran under great applause across the finishing line in fantastic times with less than 4 hours.

Jimmy and Christophe grew up near Antwerp in Belgium and have been friends for more than 20 years. Early sporting activities in soccer, kickboxing and in the gym were followed by the first typical start-to-run lessons. At the age of 22, Jimmy and Christophe started intensive running training.

Jimmy: „The running fever really caught us.”

Because of a yearly 10 km run in their hometown, they trained a bit harder and longer to participate and finish. Additionally to the running, they now went biking a few times a week. By training very hard, the two constantly improved their condition and endurance. They did a lot of short and mid distance triathlon races and also ran their first marathon. In the meantime a coach supports with training schedules and swimming lessons.

Jimmy: “Looking back there was at first no real reason to start running. It looked fun to do. But after each training and event, you see your own progress and you feel very well about it, even with the smallest progress. By running a few times a week, I felt myself getting fitter, more relaxed and healthier in common. It helped me to bring more order and quality in my personal and professional life; a different way of living.”

The triathlon goal for now is to finish a complete Ironman event in 2020. Long distance: 3,8 km swimming, 180 km cycling, 42,195 km running. Whoever reaches the goal can call himself Ironman.

Good to know:

A **marathon®** burner also follows continuously the legendary Olympic tracks and makes even more than 42,195 kilometers.



We are very proud of the two athletic service technicians from Belgium and their sporting achievement on the longest Olympic run and congratulate them on this great performance.

Who invented it?



Technical data:

marathon®

Burner

Gas burner [marathon® M 10001.1 ARZ](#)

Mixed firing

Fuels natural gas/biogas

Burner capacity

Natural gas ca. 5,4 MW, Biogas ca. 0,78 MW

Version LOW-NOx

with internal flue gas recirculation [ARZ](#)

NOx ≤ 70 mg/Nm³

Oxygen control [oxygen](#)

Speed control [frequency](#)

Boiler

Three-pass flame tube steam boiler

astebo THSD-I 90/80 E-S 16 bar

Boiler capacity ca. 5,9 to

Ricola

Ricola AG in Laufen in Switzerland is a well-known manufacturer of herbal teas and sweets. The family-owned enterprise export their herbal specialties to more than 50 countries worldwide. More than one hundred Swiss mountain farmers supply 1400 tonnes fresh herbs annually, which are processed at the Laufen production facility. The production process requires the generation of saturated steam.

For the expansion and modernization of the existing steam plant, Ricola together with the engineering office Regioplan Nordwestschweiz GmbH defined a comprehensive requirement profile: Replacement of an existing 4to-boiler with an 8to-boiler and simultaneous combustion of the two fuels natural gas/biogas without interrupting the burner's operation, thus without loss of power for production.

A challenging task for the partners Debag Industriautomations AG, BACHMANN-PPE (astebo representation in Switzerland) and PSB Feuerungstechnik, who have jointly developed the best project concept for plant retrofitting.

One of the two existing boilers was replaced by an astebo steam boiler with a capacity of 8 to/h and an operating pressure of 13,5 bar. The project-specific optimal solution for the simultaneous combustion of natural gas/biogas is guaranteed by the dreizler gas burner [marathon® M 10001.1 ARZ](#) with electronic linkage and combustion manager FMS4 from Lamtec, which allows a variable mixing ratio for the two fuels without power loss. The combination of speed control [frequency](#) with oxygen control [oxygen](#) also ensures efficient burner operation.

Ricola and the specialist planners are enthusiastic about the technical and economic optimization of the steam power plant.



Ricola

„We thank all involved for the trusting cooperation. Many thanks to Ricola and their decision for the [marathon®](#) burner technology.



Mixed firing operation of marathon[®] burner with FMS

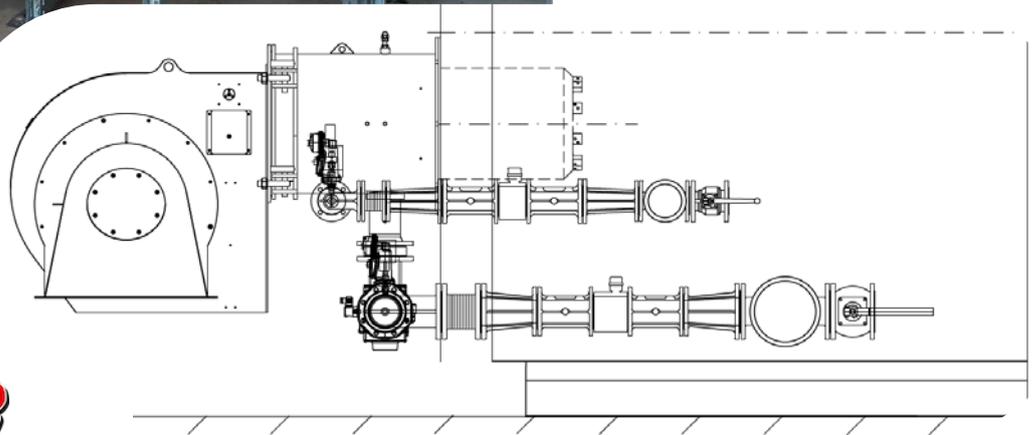
The two fuels natural gas and biogas are fed separately to the front to the stabilizing disc in the mixing device of the burner head. The combustion management system FMS processes the requirements of the combustion plant.

The combustion manager is equipped with 4 curves. The **marathon[®]** burner operates by natural gas on curve 1. Three more curves are available for different quantities of biogas. For each set of curves, a constant biogas throughput was set independent of the load. Thus, the operator can easily vary between 20 m³, 40 m³ or 80 m³ biogas

consumption per hour. The natural gas volume is automatically adjusted by the combustion manager.

The FMS receives the signal for switching from the biogas storage, which has a fill level signal. All other settings are made by the combustion manager on its own.

During the switching process, the burner output is constantly available. By combining the **marathon[®]** burner with the FMS combustion management system, an inefficient use of energy due to shutdown is avoided.



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„The PSB Feuerungstechnik AG is official distribution partner of Dreizler GmbH in Spaichingen – we are very proud of this. We would like to thank the dreizler team for the great support.“

Armin Heiniger

Hightech Highlights

Heating plant Berlin Treptow

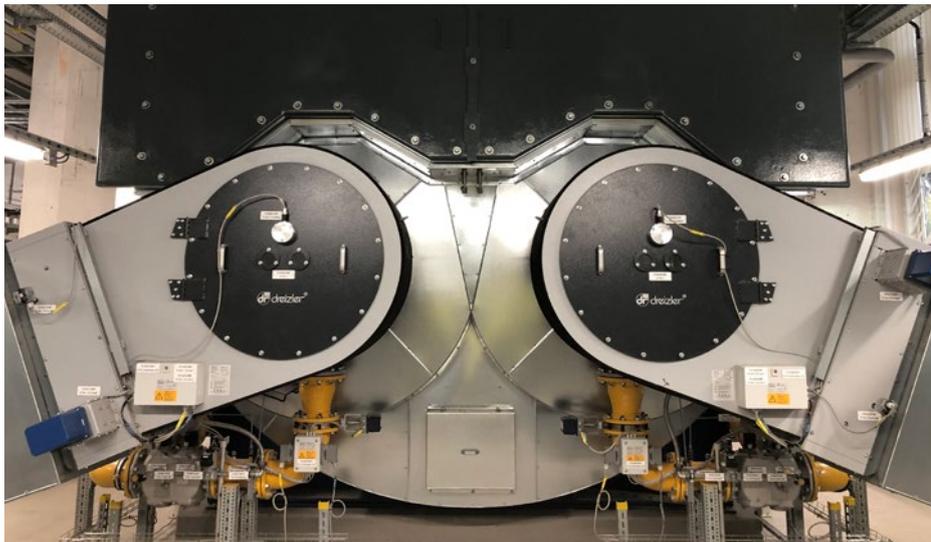
European standards for limiting emissions apply to industrial combustion plants. The basis for this is the Industrial Emissions Directive 2010/75/EU. The approval of environmentally relevant industrial plants is based on the best available techniques. The aim is to achieve harmonized highest possible environmental standards in Europe with fairer conditions of competition. To limit an imbalance in industrial emissions in

the European Union, the specifications for power plants and large combustion plants are laid down in the BAT leaflets and BAT conclusions which are subject to regular revision and amendment.

The term „**best available techniques**“ BAT is defined according to the IE guideline as follows:

„best available techniques‘ means the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing the basis for emission limit values and other permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole.”

Source: Directive 2010/75/EU Article 3, No.10



Technical data:

Burner

2 x gas burner **marathon**[®] M 10003.6 ARZ + ARF
DUObloc

Version LOW-NOx
with internal flue gas recirculation **ARZ** and external flue gas recirculation **ARF**

Oxygen control **oxygen**
Speed control **frequency**

Natural gas
NOx ≤ 60 mg/Nm³ at 3% O₂
CO ≤ 15 mg/Nm³ at 3% O₂

Boiler

1 x double flame tube boiler
astebo THWZ-IZ

Completely installed firing capacity → ca. 40 MW

Meets the requirements for „Best available techniques“ according to 2010/75/
EU IED-BAT

marathon[®]

Successful teamwork

The challenges increase with individual customer requirements. At the beginning of the plant planning, specific solutions with clear specifications and use of the best available techniques were worked out together. All partners were involved in the various project phases right from the start. The project proceeded smoothly thanks to the close coordination of all activities. All project-specific objectives were implemented promptly and the project was successfully completed.

Many thanks to our customer astebo and the project partners Vattenfall and Zauner Anlagentechnik GmbH for the great cooperation based on partnership.

Heating plant Berlin Wilmersdorf

In Berlin, two powerful best practice plants were handed over to the operator this year. The Berlin district heating network is one of the largest in Western Europe. Due to the increased heat demand, a decommissioned heating plant was reactivated in Berlin Treptow and a new heating plant with a completely installed firing capacity of ca. 120 MW was built in Wilmersdorf.

All **marathon**[®] DUObloc gas burners supplied by dreizler are LOW-NOx versions and have a patented internal flue gas recirculation system ARZ for particularly low NOx emissions.

The **marathon**[®] mixing device guarantees optimal combustion and maximum fuel utilization.

Well proven in practice the high-tech technologies for continuous combustion monitoring and control get the maximum out of the gas.

- Oxygen control **oxygen** sustainably reduces the flue gas loss of the boiler
- Speed control **frequency** enables saving of consumption of electricity up to 80%
- The external flue gas recirculation ARF achieves in combination with the internal flue gas recirculation ARZ particularly low NOx emissions

Compliance with project standards and best practices is guaranteed. Reliable, efficient and clean district heating with **marathon**[®] burners from dreizler. A real economic miracle.

Technical data:

marathon[®]

Burner

6 x gas burner **marathon**[®] M 10003.6 ARZ + ARF
DUObloc

Version LOW-NOx
with internal flue gas recirculation **ARZ** and external
flue gas recirculation **ARF**

Oxygen control **oxygen**
Speed control **frequency**

Natural gas
NOx ≤ 60 mg/Nm³ at 3% O₂
CO ≤ 15 mg/Nm³ at 3% O₂

Boiler

3 x double flame tube boiler
astebo

Completely installed firing capacity → ca. 120 MW
Meets the requirements for „Best available techniques“
according to 2010/75/EU IED-BAT



By using the high-tech **marathon**[®] burner technology, excellent emission values can be maintained in Wilmersdorf and Treptow. Our information sheet „NOx emissions caused by combustion plants“ is available upon request.



Full speed ahead with 170 MW

From the EnBW project diary:
The Stuttgart-Gaisburg cogeneration plant after the modernization and completion of the entire plant in April 2019.

Climate-friendly and efficient: The new gas-fired power plant in Stuttgart-Gaisburg serves EnBW as an important peak-load and reserve heating plant for the district heating region Stuttgart/Mittlerer Neckar and provides a thermal output of 205 MW and 30 MW of electricity. A 260-kilometer district heating network provides environmentally friendly households, companies and public institutions in the region with heat. The core elements of the power plant are the district heating accumulators, five shell boilers and three gas engines.

The new boiler plant currently consists of two gas-fired boilers and three additional boilers with bivalent oil and gas firing. A total of 10 powerful gas and dual fuel burners **marathon**[®] M/MC 10003.5 with electronic linkage make their valuable contribution to reducing emissions. The use of external flue gas recirculation ARF in combination with internal flue gas recirculation ARZ results in an additional reduction in NOx emissions by lowering the flame temperature.

The shell boilers can be switched on indi-

vidually depending on the heat requirement and thus cover the peak demand. This ensures heat supply even in winter.

Stuttgart says goodbye to coal. In the course of a sustainable modernization, the old coal heating plant was shut down. The new gas-fired power plant has been in operation since the end of 2018. The fuel change and modern, innovative technologies save around 60.000 tons CO₂ per year. An important contribution to climate protection.

Technical data:



Burner

4 x gas burner **marathon**[®] M 10003.5 ARZ
6 x dual fuel burner **marathon**[®] MC 10003.5 ARZ+ ARF

Version LOW-NOx
with internal flue gas recirculation **ARZ** and external flue gas recirculation **ARF**

Oxygen control **oxygen**
Speed control **frequency**

NOx natural gas ≤ 80 mg/Nm³
NOx heating oil EL ≤ 150 mg/Nm³

Boiler

5 x double flame tube boiler
Viessmann Vitomax D-HW






In the service of energy efficiency. The design and implementation of the plant was carried out by Caliqua AG. We thank Caliqua for the good and trusting cooperation.



Source: <https://www.enbw.com/unternehmen/konzern/energieerzeugung/neu-bau-und-projekte/heizkraftwerk-stuttgart-gaisburg/projekttagbuch-und-terme.html>

Modernization of the heating system



Technical data:

marathon®

Burner

Gas burner MONObloc
marathon® M 5001.4 ARZ
Burner capacity → ca. 6,08 MW

Version LOW-NOx with internal flue
gas recirculation ARZ

oxygen control oxygen
speed control frequency
NOx < 80 mg/kWh

Boiler

Three-pass boiler Stein Fasel DFS 8000
Boiler capacity ca. 8 t/h

Endurance, durability and high capacity are special characteristics of dreizler burners with marathon® technology. For the MONObloc series, the packaging company in France uses a compact power pack with high firing capacity.

As part of the modernization of the heating center, a gas burner marathon® M 5001.4 MONObloc was installed. The oxygen-controlled burner with speed control continuously ensures efficient and reliable operation.

The professional commissioning was carried out by our customer and partner BACM with the support of dreizler® France.



Breaking new ground – Heating systems in container



Technical data:

marathon®

Burner

Gas burner [marathon® M 1501 ARZ](#)

Burner capacity → ca. 2,23 MW

Version LOW-NOx
with internal flue gas recirculation ARZ

oxygen control [oxygen](#)
speed control [frequency](#)
NOx < 80 mg/kWh

Boiler

Three-pass boiler Bosch UL-S

If there is not enough space for a heating system or if the heat or steam supply is temporarily out of order, the use of a flexible heating container is ideal.

Suitable for temporary use or for peak coverage, the mobile power station can be put into operation within a short time. Thereby a modernization of the heating system without interrupting the heat supply is possible.

The mobile steam plant of our French customer is equipped with everything that is necessary for steam generation, boiler, burner, water supply and boiler pump.

dreizler supplied the gas ramp, the [marathon®](#) gas burner with internal flue gas recirculation ARZ, oxygen control [oxygen](#) and frequency inverter [frequency](#).



**Our ambitious team
from dreizler France**



Antonio Rodrigues



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Small but powerful



Zuckermühle Rapperswil AG has been supplying Switzerland with sugar for over 100 years. In 2009, a new high-bay warehouse with 4400 pallet spaces was realized at the headquarters. The energy requirement was ensured with two oil boilers of 400 kW each and high medium temperatures in redundancy. This demand appears to be rather small and yet there was an enormous saving potential in energy and a strong reduction in emissions by renewing the heat generation.

Temperatures were measured over a long period of time and the heat distribution and production depth of the individual machines were analysed. The fuel was converted to natural gas H, a condensing boiler with a downstream flue gas heat exchanger and a modulating dreizler gas burner **marathon**® M 301 ARZ was installed

A new SPS-based control system with intelligent software was also used. The **marathon**® gas burner reliably modulates from 74 – 318 kW.

The customer benefits from high energy savings.

The modernization was professionally planned and carried out by Häner GmbH and their partners Debag Industriautomations AG and PSB Feuerungstechnik.

Technical data:

marathon®

Burner

Gas burner **marathon**® M 301 ARZ
Burner capacity → ca. 318 kW

Version LOW-NOx
with internal flue gas recirculation ARZ
NOx ≤ 60 mg/kWh

Boiler

Three-pass boiler Ygnis LRPK 10
Boiler capacity ca. 303 kW



Zuckermühle Rapperswil



Good by experience



Technical data:

marathon®

Burner

2 x gas burner

marathon® M 1501 F2 ARZ

Burner capacity → ca. 1,78 MW

Version LOW-NOx

with internal flue gas recirculation ARZ

Oxygen control oxygen

NOx ≤ 80 mg/kWh

Boiler

Three-pass boiler Ygnis LRK 30

Boiler capacity ca. 1,7 MW

A powerful and resource-saving heating system was put into operation at the cable manufacturer Brugg Kabel AG in Switzerland. Two existing steam boilers were replaced by two Ygnis hot water boilers with directly mounted heat exchangers. 2 x dreizler marathon® gas burners work modulating and depending on the load with an intelligent boiler sequence control. The network temperature could be reduced from more than 150°C to 95°C. This extremely reduces energy consumption and significantly decreases CO₂ emissions.

Within five months, the complete refitting with all interfaces was carried out during ongoing operation and was implemented adeptly by the Nanotech CAS engineering company together with the partners.

The still young company PSB Feuerungstechnik AG is based on more than 100 years of experience in combustion technology.

PSB
Feuerungstechnik AG
Brennend für Feuer & Flamme

Effect of hydrogen admixture in natural gas on gas forced draught burners



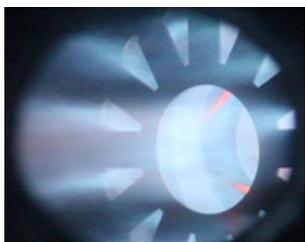
At the 6th forum of firing technique at TÜV Süd in Munich on November 19, 2019, Dipl.-Ing. Daniel Dreizler presented the effects of hydrogen mixed with natural gas on forced draught burners to interested experts from Germany.

Background of the talk is the federal government's directional decision to promote hydrogen as a CO₂-neutral fuel for industry, transport and the heating industry. This intention in a size similar to the German energy transition should ensure climate neutrality. The current priorities are assigned to the supply of the industry with hydrogen in inland networks and to the mobility sector. The supply of the heating industry should follow much later. Nevertheless, many individual projects in the field of heat economy and gas distribution are working on the introduction of hydrogen with variable percentage into hydrogen islands and real laboratories to gain experience.

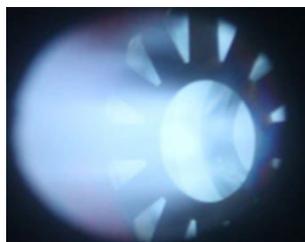
dreizler has over 50 years of experience with hydrogen since the beginning of town gas. The town gas that was produced by coal gasification was composed of up to 60 Vol.% hydrogen in addition to carbon monoxide, methane and nitrogen.

In the eighties in Berlin, dreizler gas forced draught burners in megawatt size were still operated with gas reformed from gasoline with 50 Vol.% methane and 50 Vol.% hydrogen.

Flame pictures with natural gas and natural gas/hydrogen mixture 30 Vol.% H₂



Natural gas low load



Natural gas full load



30 Vol.% H₂ low load



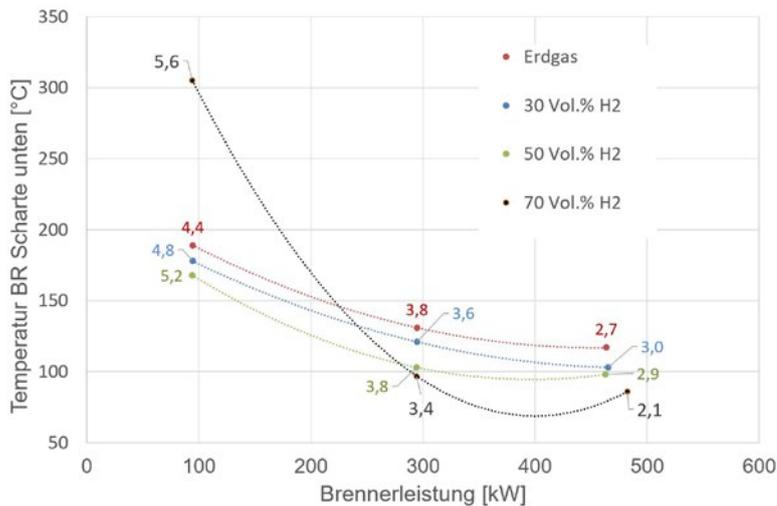
30 Vol.% H₂ full load

In order to verify the hydrogen capability of the low emission **marathon**[®] burners with ARZ exhaust gas recirculation, tests were carried out at the Gas- und Wärme-Institut e.V. (GWI) in Essen. For this purpose, the behaviour and the combustion characteristics of a burner with a thermal output of 500 kW with natural gas-hydrogen mixtures with a hydrogen content of up to 70 Vol.% were examined. As expected, the results show an increase in NO_x emissions with increasing hydrogen content over the entire performance range. The increase is due to the increased formation of the thermal NO_x caused by the higher flame temperatures of hydrogen.

Furthermore, the increasing percentage of hydrogen leads to higher flame speeds and lower ignition delay times and thus to a shorter heat release zone.

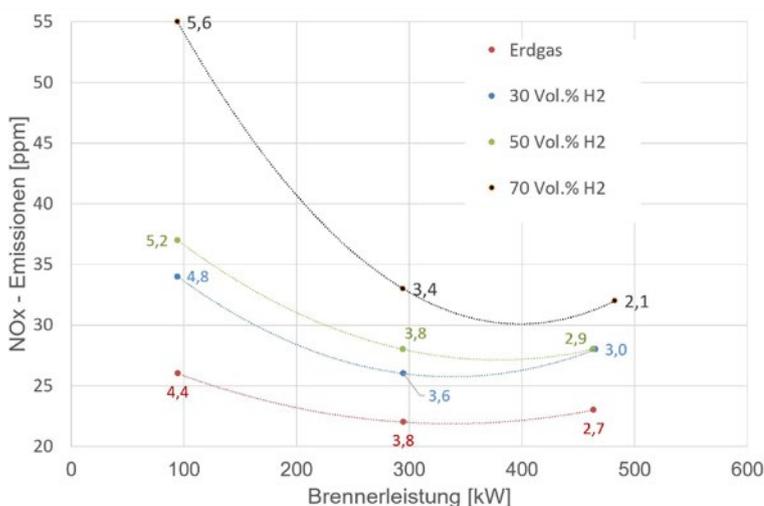
Temperatures of the mixing device in relation to the H₂ content

(Numerical values of the O₂ content in the exhaust gas)



NO_x emissions in relation to the H₂ content

(Numerical values show O₂ content in the exhaust gas)



The significantly stronger and disproportionate increase in NO_x emissions at low loads can essentially be explained by a lower internal exhaust gas recirculation due to the shorter flame and the shorter fuel/air mixing section.

As expected, no change in CO emissions in relation to pure natural gas combustion was observed.

In the case of high turn down ratios, the addition of hydrogen can also increase the thermal load on the mixing device, particularly at low loads. In the medium and base load case, on the other hand, the component temperature drops with increasing hydrogen content. The reason for this is the increase in the fuel volume flow that cools the mixing device.

Due to the different fuel characteristics of hydrogen in relation to natural gas, such as density and calorific value, a higher gas nozzle pressure is required to maintain the thermal output as the hydrogen content increases. This must be taken into account in the control of the complete system and in the design of the gas train.

In summary, the following conclusions can be drawn from the test results:

- The tests confirmed the hydrogen suitability of the gas forced draught burners from dreizler.
- With the current LOW NO_x mixing device and the corresponding combustion management system, hydrogen admixtures in natural gas of up to 10 Vol.% are possible with minor adjustments. However, an O₂ control is required.
- Higher admixtures of hydrogen lead to increased NO_x emissions and higher wear. Furthermore, higher-quality combustion management systems and possibly additional NO_x reduction measures such as exhaust gas recirculation are required.
- If the hydrogen content in the gas network fluctuates over time, additional measures are necessary to ensure the safe function, efficiency and emission of the gas forced draught burner and of the boiler system.

Spaichingen

Company messenger for dreizler® service

In the recently launched messenger app, all dreizler service technicians and the team in Spaichingen are networked with each other. Important information can thus be made available to all relevant participants at the same time.

Different chats can be created for any project-related groups. External participants can be added to the groups for quick communication with the customer or plant operator on site. Faults, troubleshooting or technical questions can be clarified directly and easily.

For the transfer of important, plant-specific documents a securely protected cloud is available. Technical documents such as drawings, wiring diagrams or service reports can be made easily accessible.



The messenger app creates an effective and time-saving connection. Our service team can be reached quickly.

The app can be installed on smartphones and as a desktop version.

 dreizler® service

There for you.

Reliable. Efficient. Clean.