

- raadman -
Burner

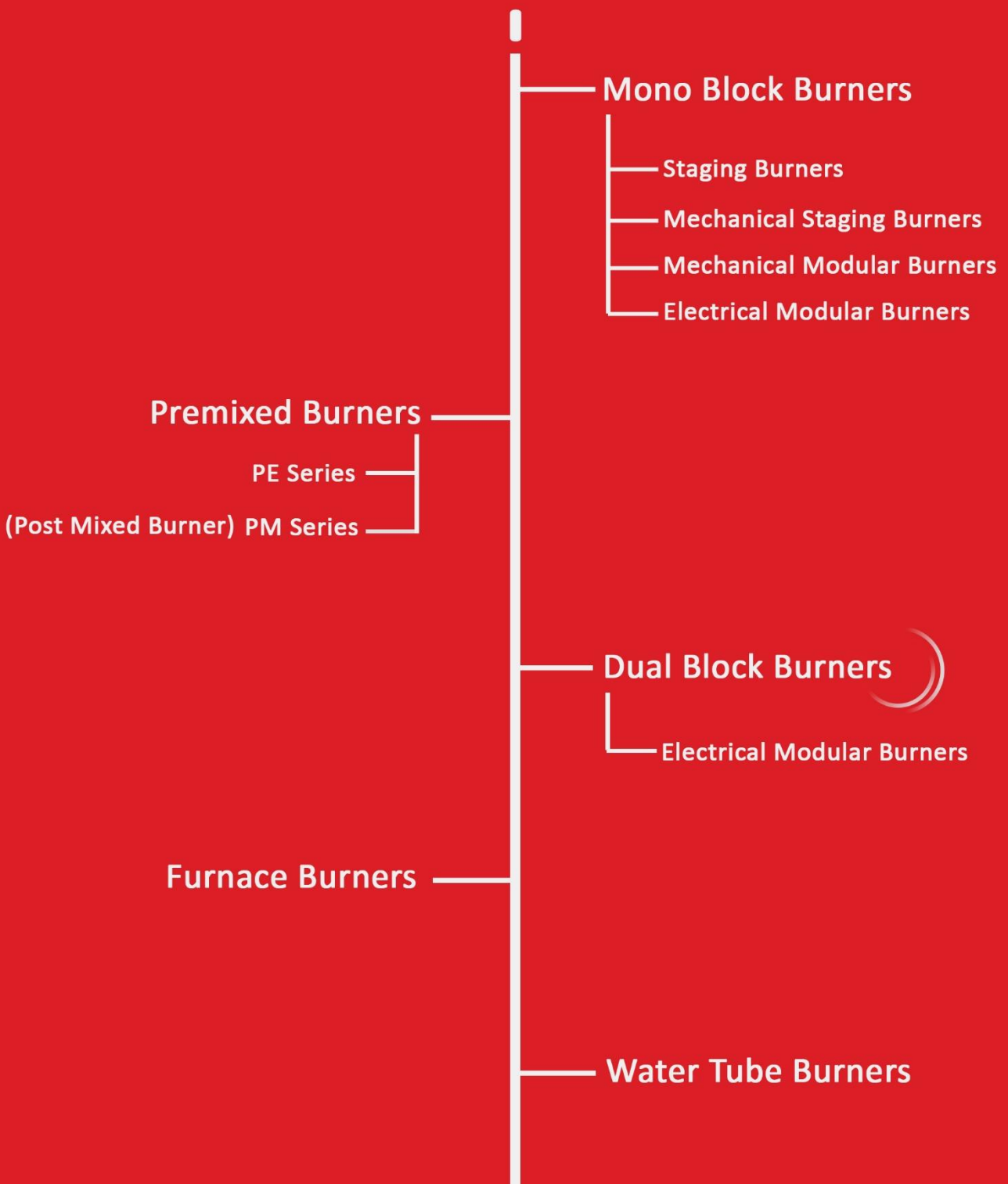


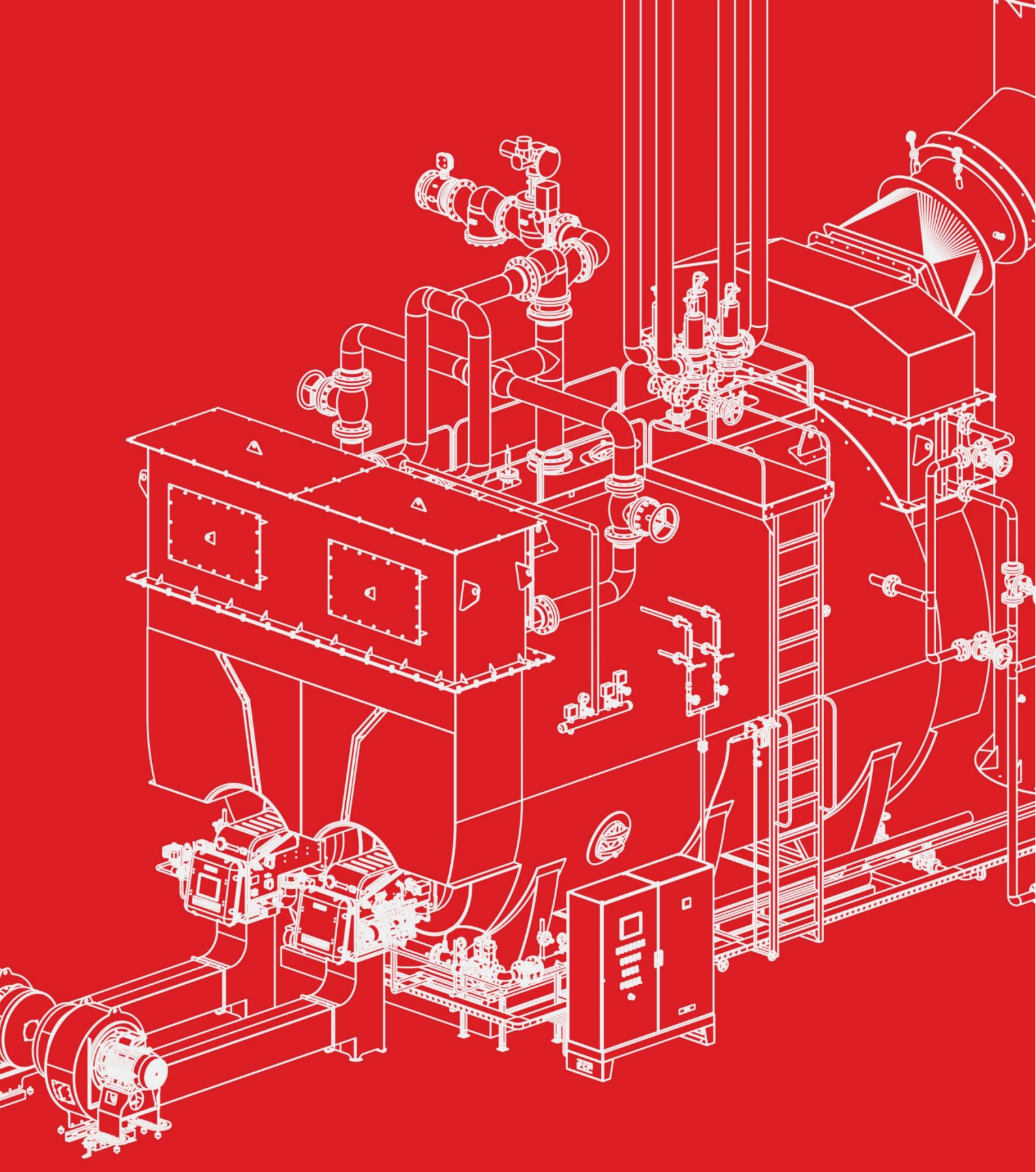
Electrical Modular Burners
Dual - Block Type

Last Update
March 2024

raadman

Product Range





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• Intelligent Burner Control



- r a a d m a n —

- SMILE INTO THE FUTURE —

History

PACKMAN Company was established in February 1975. This company started its activity in the field of construction of High-Pressure Vessels such as Hot-Water Boilers, Steam Boilers, Pool Coil Tanks, Softeners and Heat Exchangers from 1984. PACKMAN, as the pioneer in supplying high-quality hot water boilers with standard marks, has commenced exporting its products to various countries including Uzbekistan, the United Arab Emirates, and other nations within the region. Presently, PACKMAN proudly stands as one of the leading manufacturers of hot water and steam boilers in the Middle East.

After 40 years of experience in the heating industry, especially boilers and burners, this group started his activity in January 2011 specializing in burners under the brand name raadman. The primary goal of this group was to improve and develop industrial burners to produce high-quality and highly efficient industrial burners with optimum operation in the Middle East. Based on technical knowledge and engineering design of industrial burners, PACKMAN Corporation started the production of small and medium sized industrial burners. Thanks to the diligent work of the R&D department engineers, there was a notable enhancement in burner combustion, resulting in rapid advancement in burner production. Gas, light oil, and dual-fuel burners with different firing ranges were successfully manufactured and tested. Nowadays, the company's burners cover a firing range of 100 to 60000 kW. Single stage, double stage, modular and Low NOx burners (generally lower than 80 mg/kWh and individually lower than 40 mg/kWh) are available for various domestic and industrial application. The production of Raadman burners has always prioritized high quality, optimal operation, and customer satisfaction. With a diverse range and exceptional quality, coupled with easy installation and maintenance, Raadman burners are the ideal choice for customers seeking reliability and performance.

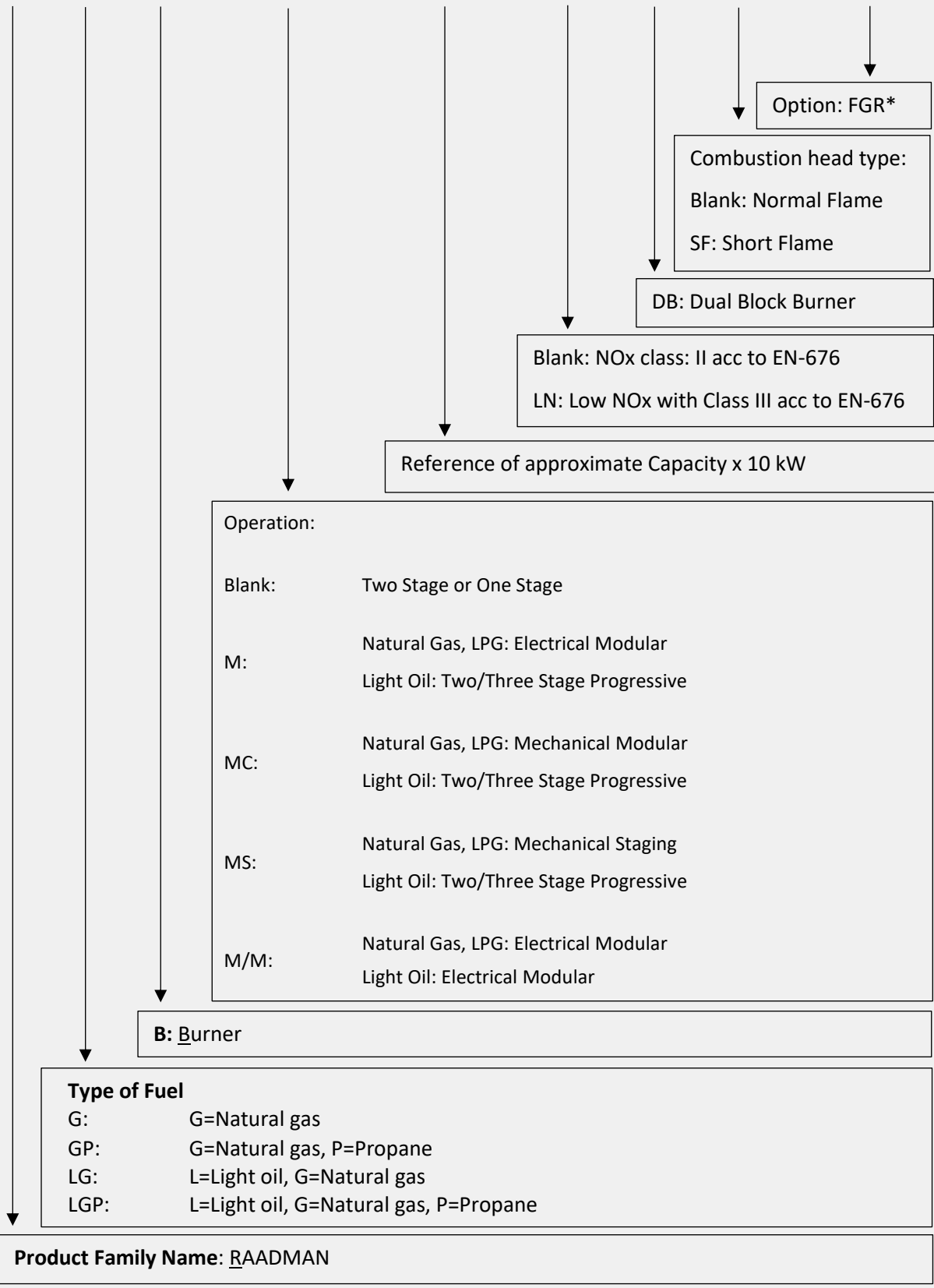
- 1- Mono block staging burners, from 100 – 6200 kW
- 2- Mono block mechanical staging burners (MS series), from 300 – 6200 kW
- 3- Mono block mechanical modular burners (MC series), from 300 – 6200 kW
- 4- Mono block electrical modular burners (MB series), from 160 – 25000 kW
- 5- Dual block burners (DB-Series), form 1000 – 45000 kW
- 6- Premixed and post mixed burners (PE and PM Series): From 100 – 4000 kW
- 7- Water tube burners (WT series), From 3200-60000 kW

A dual block burner is shown in operation, with a bright blue flame emanating from a circular burner head. The burner is mounted on a red metal frame. A yellow gas pipe is connected to the burner. In the background, several people are visible, and the setting appears to be an indoor laboratory or workshop with large windows. A white text box with the label "Dual Block Burner" is positioned in the upper right area of the image.

Dual Block Burner

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R LG B- M/M-805 / * -DB-SF-FGR



*FGR=Flue Gas Recirculation

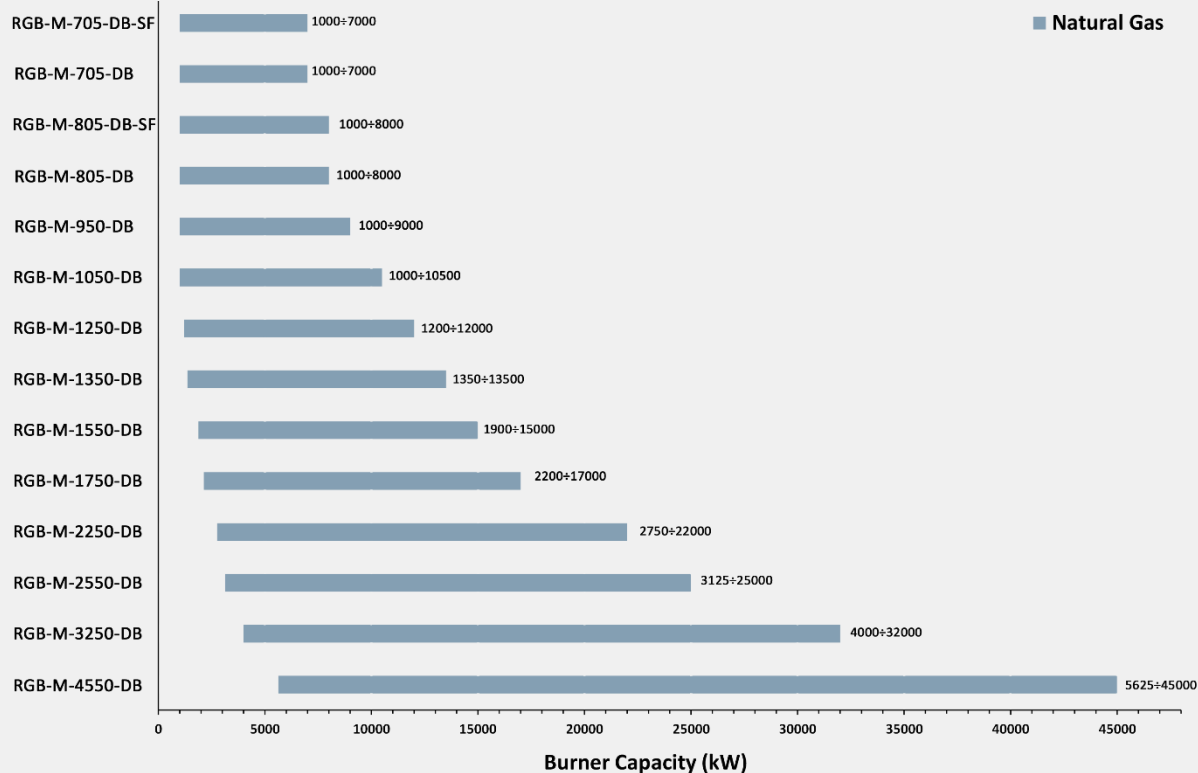


Training Courses- raadman Burner Factory

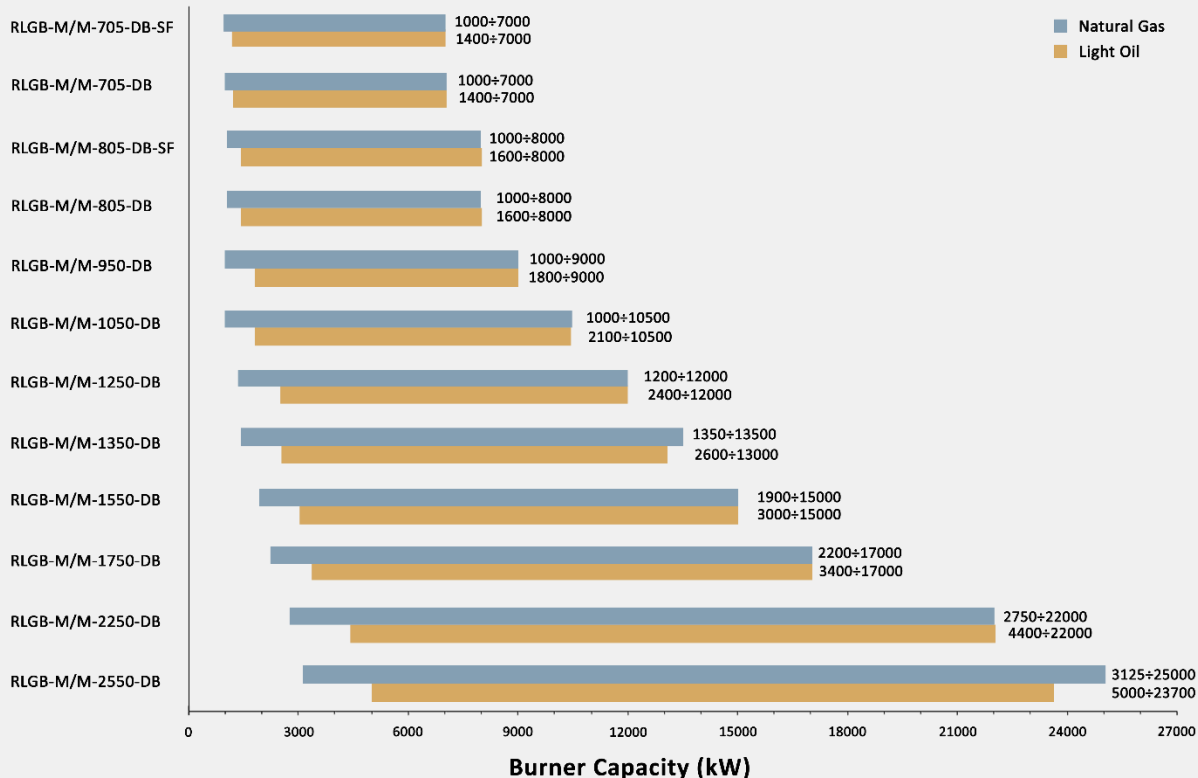
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Firing rate

Gas Burners (RGB-M-X-DB series)



Dual-Fuel Burners (RLGB-M/M-X-DB series)



Special note: High turn-down ratio are only accessible for burners with heads actuator. Otherwise they would cover a firing range with 1:5 or 1:6 turn-down ratio.

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Electrical Modular Operation

Full electronic modulating burners are designed to safely operate throughout its firing range from high fire to low fire. The most common turndown ratios in **DB-Series** burner are 1:8 up to 1:10. High turndown is used to reduce the burner cycling and maintain a consistent temperature or pressure in the boiler. This is crucial if the boiler is used in an industrial process that requires a consistent temperature or pressure. **DB-Series** burners are equipped with an electronic microprocessor management panel, which controls the air damper servomotor, fuel servomotors as well as head regulating sleeve. Using electronic modulation, hysteresis is prevented by the precise control of the separated in independent servomotors and the software linked by CANBUS. The AUTOFLAME, combustion managers or Siemens LMV51/52, as the most popular brands, are frequently used in **DB-Series** Radman Modular burners. This burner Control System combines the benefits of an electronic fuel/air ratio controller with an electronic burner control unit. Up to five motorized actuators can be assigned to modulate air and fuel drives with the option of an additional module to add variable speed drive control for the combustion air fan.

Additional modules are available for field bus interfacing, load control and dual fuel operation.

These modular systems include many standard burner functions as standard; these include: integrated valve proving, ambient temperature compensation, flame monitoring and operating hours and system start-up counters. Oxygen trim, CO control, load control and dual fuel functionality are all available options that are used to further enhance system benefits, flexibility and efficiency. These controllers particularly suited for use on mono-block and dual block burners.

Key features and advantages include:

- Integrated linkage-less control, burner flame safeguard and modulation PID control
- Single or dual fuel (or multi fuel) application
- Controls up to 5 independent actuators for optimal efficiency in low NOx burner application
- Integrated PID temperature/ pressure controller with auto tune for extremely accurate process control
- Variable Speed Drive control with actual RPM speed sensor provides reliable, efficient and safe control of the combustion air blower
- Optional O₂-CO trim in LAMTEC and Siemens and Simultaneous & continuous sampling of up to 6 exhaust gases: O₂, CO₂, CO, NO, NO₂, SO₂ in AUTOFLAME.
- Integrated gas valve proving system that checks for leak on every burner cycle for increased safety
- Up to 10 programmable points per fuel-air ratio curve for greater flexibility and tighter control
- 999 highly repeatable actuator position for precise control
- Digital positioning feedback from actuators ensure unmatched repeatability
- Independent ignition position
- Ability of being connected to building management system using different type of protocols
- World-wide approvals and technical supports
- Fuel/Air ratio control



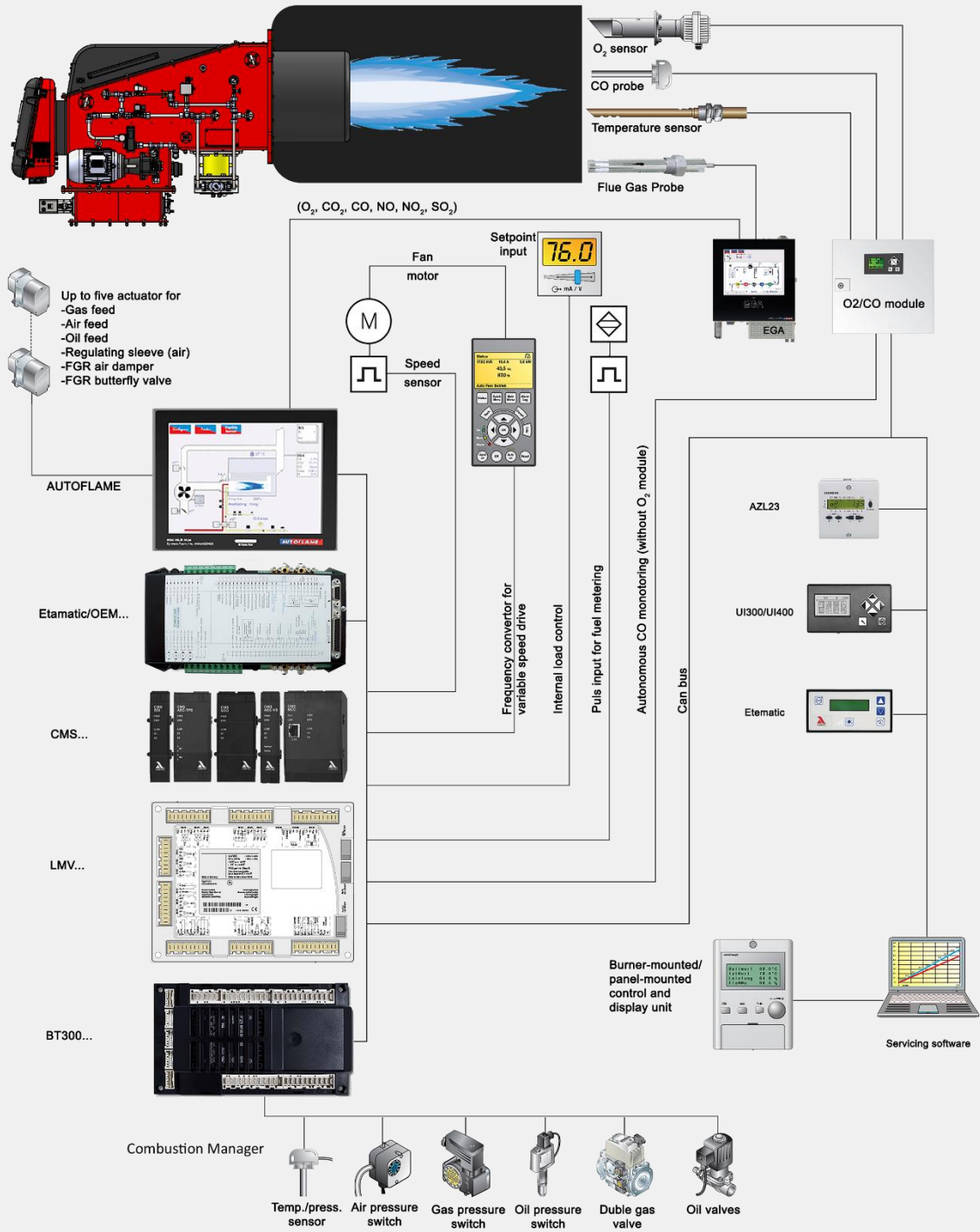
- Full colour touch screen in AUTOFLAME
- Fully adjustable PID load control for temperature or pressure
- Internal flame safeguard – full flame supervision with self-check UV, IR and ionisation
- Gas valve train leak supervision and high/low gas pressure monitoring in AUTOFLAME
- Air pressure proving and monitoring in Mini MK8
- User definable optimum ignition position – golden start in AUTOFLAME
- User definable flue gas recirculation start position
- External voltage load control
- Outside temperature compensation of boiler setpoint
- Second setpoint with run times
- Various boiler load detectors available
- Fuel flow metering capability – instantaneous and totalised
- Password protection of all safety related functions in AUTOFLAME
- Infra-red port for upload/download of commissioning data
- Fully adjustable user options within the system to tailor sequencing operation to the application
- System control for isolation of valves or pumps (2 port valve operation)
- Standby setpoint and warming for lag boilers via a standby pressure and timing sequence aqua-stat
- Download all commissioning data from an MM module to a PC via Download Manager

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Burner Management System



A new natural gas burner with 45 MW capacity

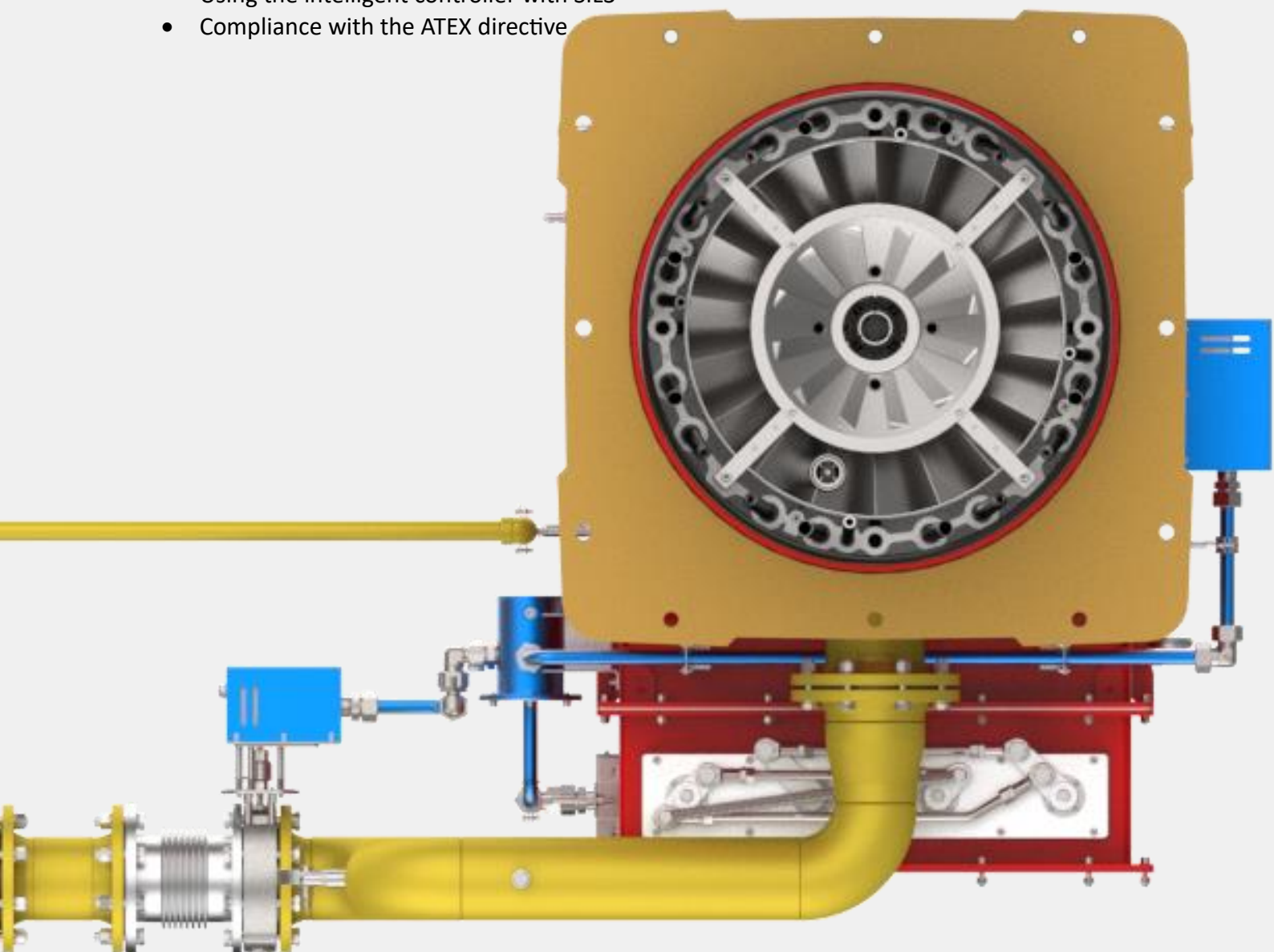
Raadman burner company is developing its new product, a 45 MW natural gas burner. The boilers are used for generating hot water in an industrial site.

For years, raadman has been a prominent burner manufacturer in Iranian market, specializing in the production of a diverse range of industrial burners, primarily designed for fire-tube boilers.

In an effort to broaden its product range, raadman has started the development of a new natural gas burner with 45 MW capacity. This burner can be installed in all directions.

Considering the aforementioned specifications, the following issues must be taken into account in designing the burner:

- Achieving a 45 MW capacity while maintaining CO and NOx emissions at levels compliant with strict standard restrictions
- Reaching the optimum performance and flame shape
- Compatibility with water tube boilers
- Ensuring the instruments' capability to function effectively and withstand the high-temperature of hot zone above the boiler
- Designing a suitable cooling system to keep the temperature of the sensitive instruments and actuators below the specified limits
- Compliance with the NFPA-85 standard
- providing features for easy maintenance of the burner such as the ability to remove the burner head just by opening the burner back door
- Using the intelligent controller with SIL3
- Compliance with the ATEX directive



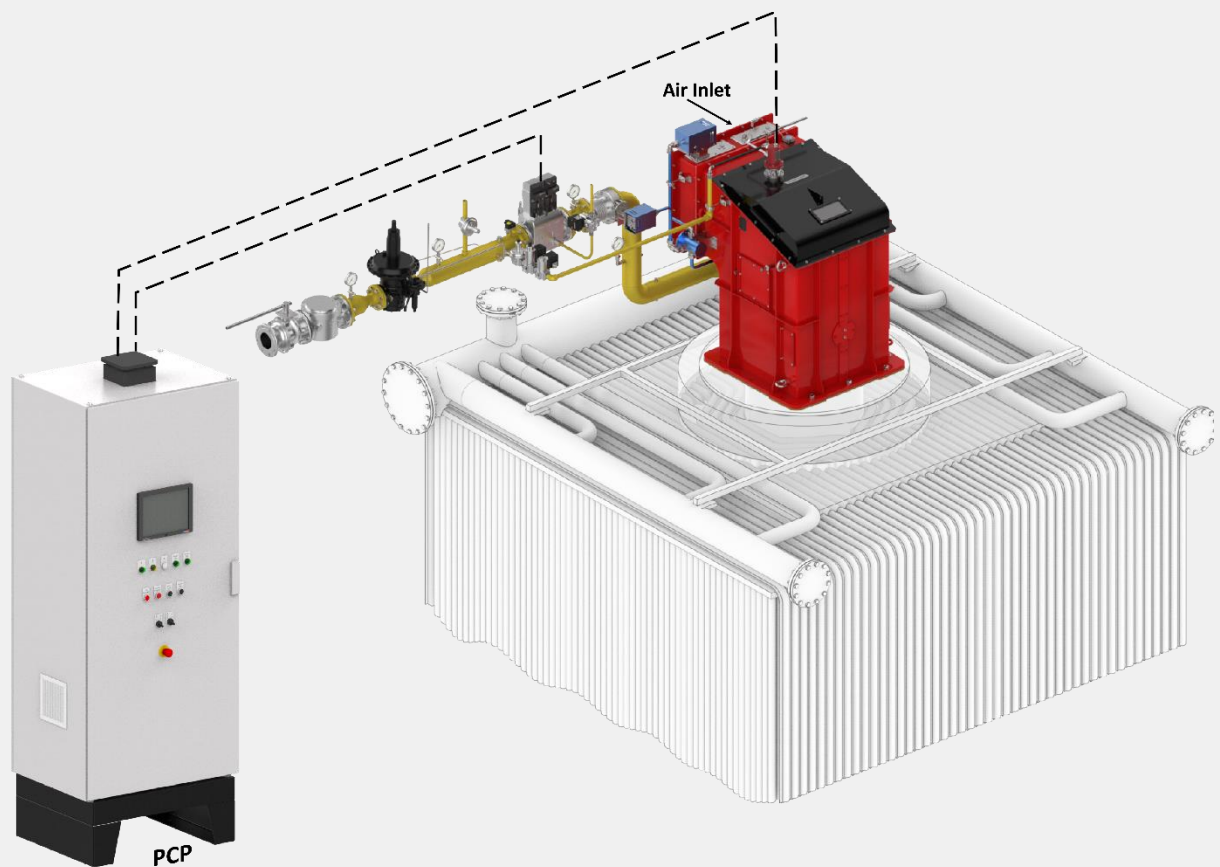
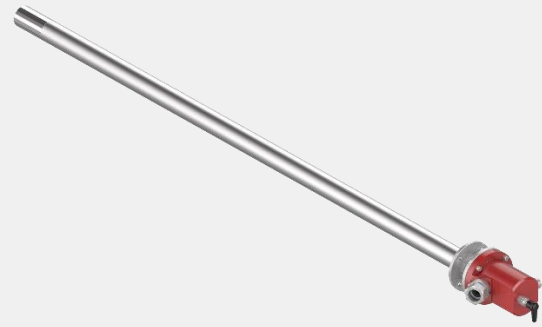


In addition, the burner design has other remarkable features such as: smart Autoflame control system, optional flue gas recirculation (FGR) system, and raadman ignition system. These features ensure the safe, automatic, and efficient operation of the burner system.

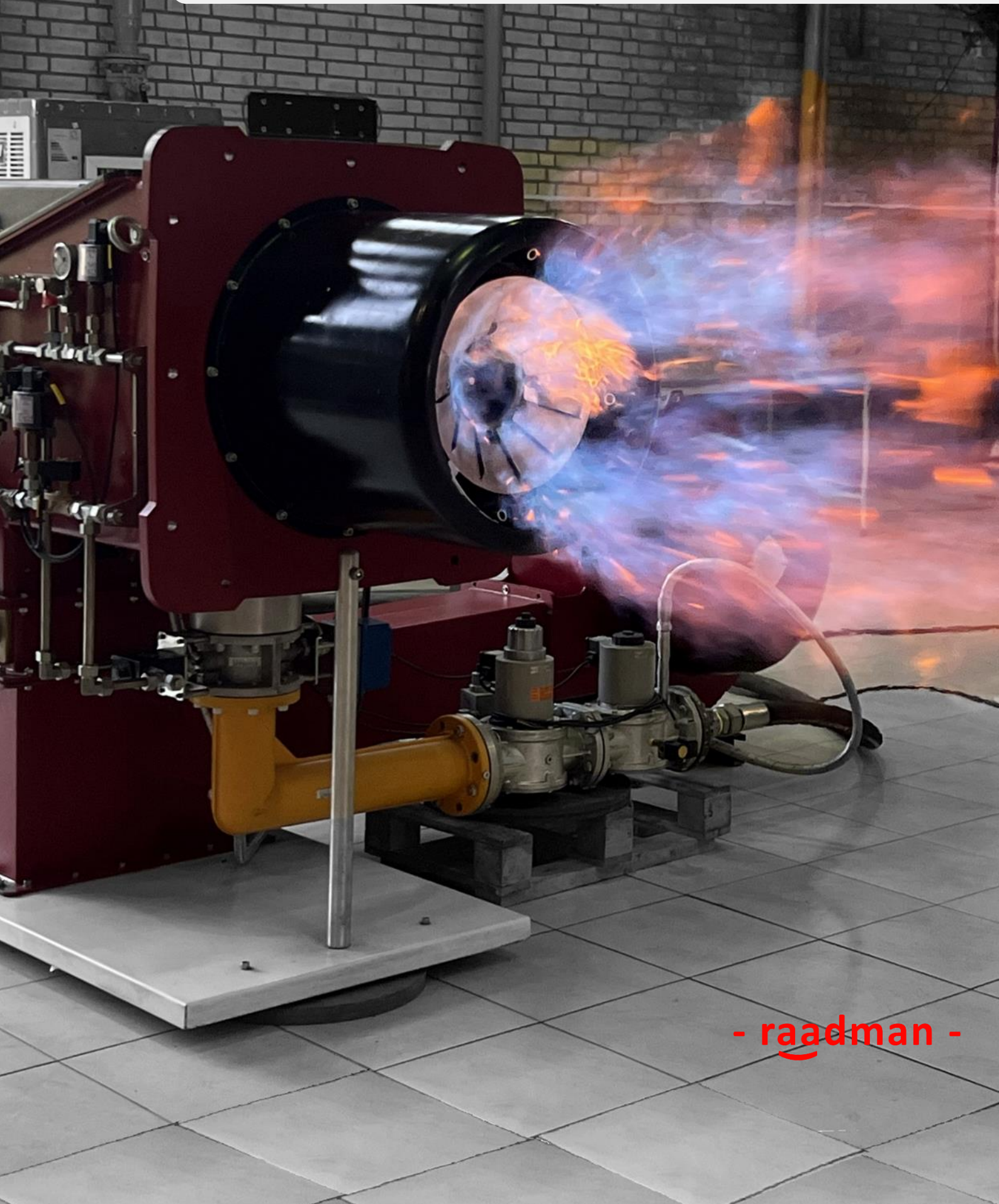
Raadman pilot burners play a crucial role in the safe operation of large industrial burners utilized in boilers and various firing systems. They ensure the secure ignition of main burners, capable of providing continuous support to the main burner flame or intermittently igniting it when heat is required. Water tube raadman burner can be equipped with raadman Pilot burners to meet specific customer requirements.

For instance, the RGB-M-4550-DB burner is equipped with a pilot burner with 2123 mm length, specifically engineered for use in down-firing burners. It intermittently ignites the burner when it is needed to be turned on. Detection of its flame is facilitated by an Autoflame MK8, integrated into the main burner to ensure the detection of the main flame. Upon successful ignition of the main flame, the pilot burner deactivates, while keeping continuous air flow to cool it.

To accomplish these goals, raadman's R&D and Engineering departments have started developing the new burner, using expertise and engineering tools such as computational fluid dynamics (CFD) and finite element analysis (FEM). Although the burner is expected to be introduced to the market by mid-2024.



Superiority of combustion by distinctive design and manufacturing processes.



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Dual Block Burners

Heat Rated Output: 1000-45000 kW



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www.raadmanburner.com

raadman RGB-M-X-DB series burner

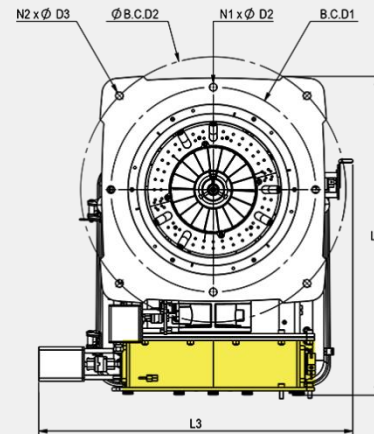
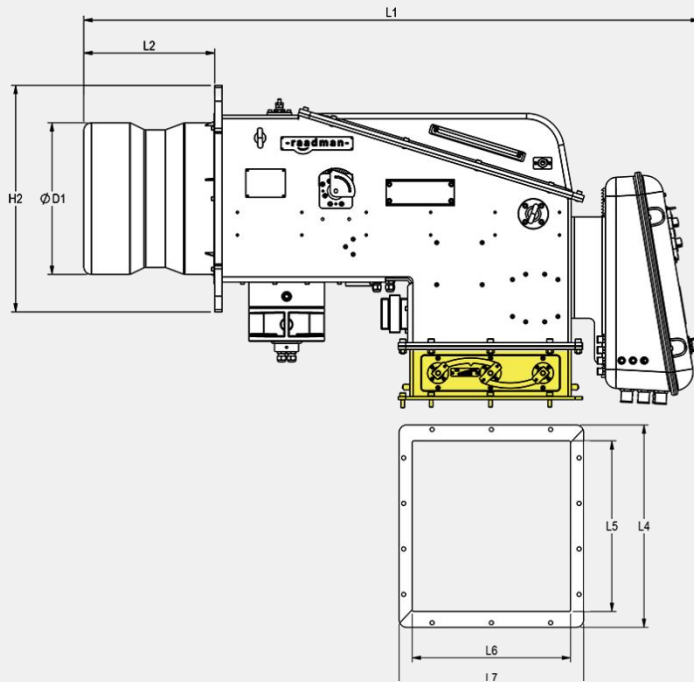
raadman dual block gas burners cover a firing range of 7000 to 45000 kW, and they are designed for a wide range of domestic and industrial applications. The dual block gas burners model and capacity are indicated in the table.

*Special note: Turn-down ratio higher than (1:8, 1:9, 1:10, etc.) are accessible for the burner with the head actuator. Otherwise, without a head actuator, the maximum turn-down ratio is 1:6.

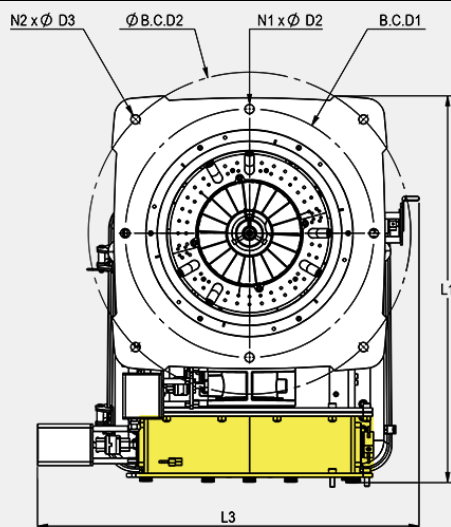
Burner	Capacity (kW)	Turn down*
RGB-M-705-DB-SF	NG:1000-7000	1:7
RGB-M-705-DB	NG:1000-7000	1:7
RGB-M-805-DB-SF	NG:1000-8000	1:8
RGB-M-805-DB	NG:1000-8000	1:8
RGB-M-950-DB	NG:1000-9000	1:9
RGB-M-1050-DB	NG:1000-10500	1:10
RGB-M-1250-DB	NG:1200-12000	1:10
RGB-M-1350-DB	NG:1350-13500	1:10
RGB-M-1550-DB	NG:1900-15000	1:8
RGB-M-1750-DB	NG:2200-17000	1:8
RGB-M-2250-DB	NG:2750-22000	1:8
RGB-M-2550-DB	NG:3150-25000	1:8
RGB-M-3250-DB	NG:4000-32000	1:8
RGB-M-4550-DB	NG:5625-45000	1:8



General dimension: RGB-M-X-DB series



Burner Type	L1	L2	L3	L4	L5	L6	L7	H1	H2	D1
RGB-M-705-DB-SF	1606	345	860	534	450	418	487	833	598	400
RGB-M-705-DB	1676	415	860	534	450	418	487	833	598	400
RGB-M-805-DB-SF	1606	345	860	534	450	418	487	833	598	400
RGB-M-805-DB	1676	415	860	534	450	418	487	833	598	400
RGB-M-950-DB	1845	427	881	584	500	418	487	881	660	480
RGB-M-1050-DB	1845	427	881	584	500	418	487	881	660	480
RGB-M-1250-DB	1783	367	908	584	500	418	487	920	660	480
RGB-M-1350-DB	1783	367	908	584	500	418	487	920	660	480
RGB-M-1550-DB	2196	510	999	650	556	556	650	1256	872	590
RGB-M-1750-DB	2196	510	999	650	556	556	650	1256	872	590
RGB-M-2250-DB	2196	508	1076	650	556	556	650	1256	872	590
RGB-M-2550-DB	2196	508	1076	650	556	556	650	1256	872	590
RGB-M-3250-DB	2192	500	1071	650	556	556	650	1256	872	618
RGB-M-4550-DB	2170	507	1115	940	850	750	660	1450	1073	800

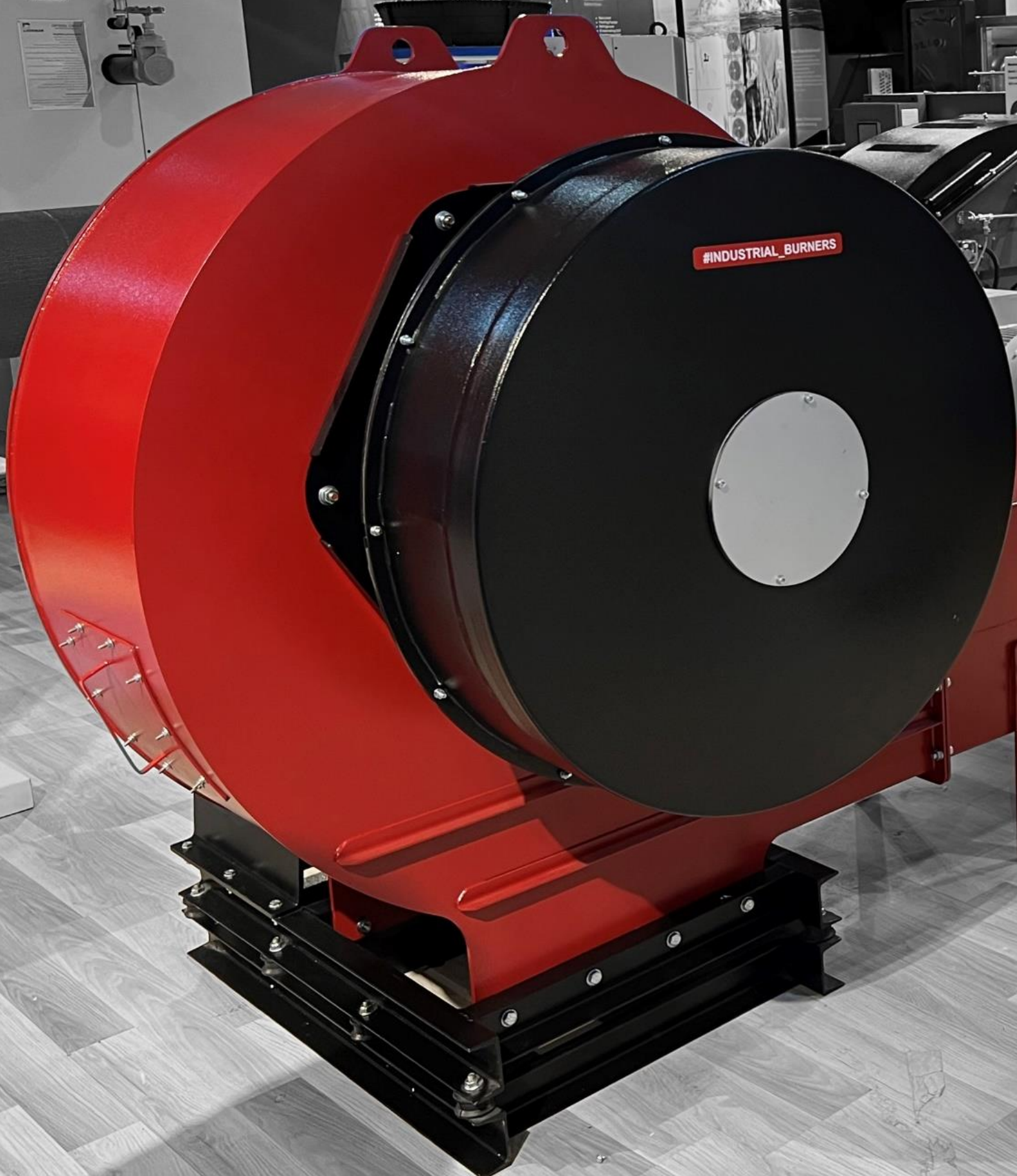


Burner Type	D2	D3	N1	N2	B.C.D1	B.C.D2
RGB-M-705-DB	21	21	4	4	540	700
RGB-M-805-DB	21	21	4	4	540	700
RGB-M-950-DB	20	20	4	4	590	790
RGB-M-1050-DB	20	20	4	4	590	790
RGB-M-1250-DB	20	20	4	4	590	790
RGB-M-1350-DB	20	20	4	4	590	790
RGB-M-1550-DB	20	20	4	8	770	940
RGB-M-1750-DB	20	20	4	8	770	940
RGB-M-2250-DB	20	20	4	8	770	940
RGB-M-2550-DB	20	20	4	8	770	940
RGB-M-3250-DB	20	20	4	8	770	940
RGB-M-4550-DB	24	24	4	8	985	1200

Note:

Since the DB-Series burners are project-based, we strongly recommend to contact us for exact dimensions for superior plant arrangements.

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#INDUSTRIAL_BURNERS

CHILLMAN
Coolest HVAC Around

CHILLMAN
Chiller Calculations & Selection Equipment Handbook
چگونگی محاسبات و انتخاب تجهیزات یخچال سرد

Advanced
Commissioning





RLGB-M/M-X-DB series raadman burner

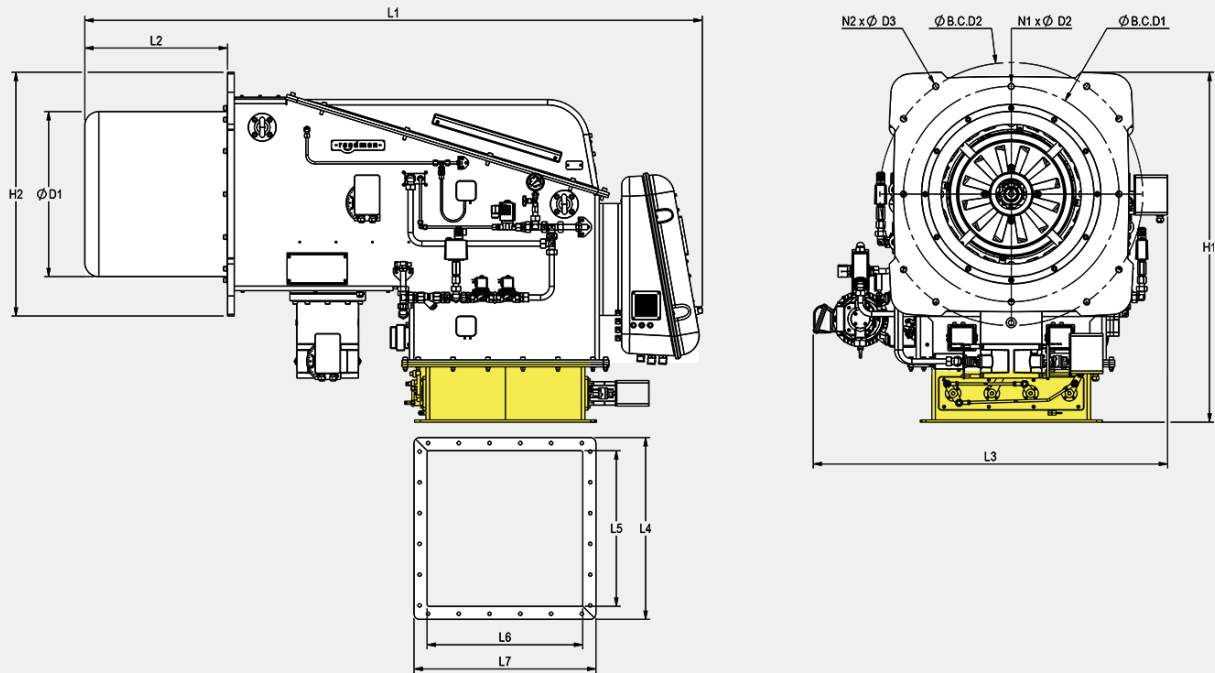
raadman dual block dual fuel burners cover a firing range of 7000 to 25000 kW and the model and capacity of dual block dual fuel burners are presented in the table.

* Special note: Turn-down ratio higher than (1:8, 1:9, 1:10, etc.) are accessible for the burner with the head actuator. Otherwise, without a head actuator, the maximum turn-down ratio is 1:6.

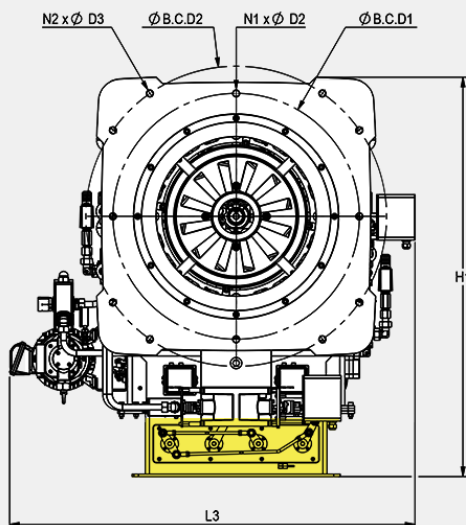
Burner	Capacity (kW)	Turn down*
RLGB-M/M-705-DB-SF	NG:1000-7000	1:7
RLGB-M/M-705-DB	LFO: 1400-7000	
RLGB-M/M-805-DB-SF	NG:1000-8000	1:8
RLGB-M/M-805	LFO:1600-8000	
RLGB-M/M-950-DB	NG:1000-9000 LFO: 1800-9000	1:9
RLGB-M/M-1050-DB	NG:1000-10500 LFO:2100-10500	1:10
RLGB-M/M-1250-DB	NG:1200-12000 LFO:2400-12000	1:10
RLGB-M/M-1350-DB	NG:1350-13500 LFO:2600-13000	1:10
RLGB-M/M-1550-DB	NG:1900-15000 LFO:3000-15000	1:8
RLGB-M/M-1750-DB	NG:2150-17000 LFO:3400-17000	1:8
RLGB-M/M-2250-DB	NG:2200-22000 LFO:4400-22000	1:8
RLGB-M/M-2550-DB	NG:2200-25000 LFO:5000-23700	1:8



General dimension: RLGB-M/M-X-DB series



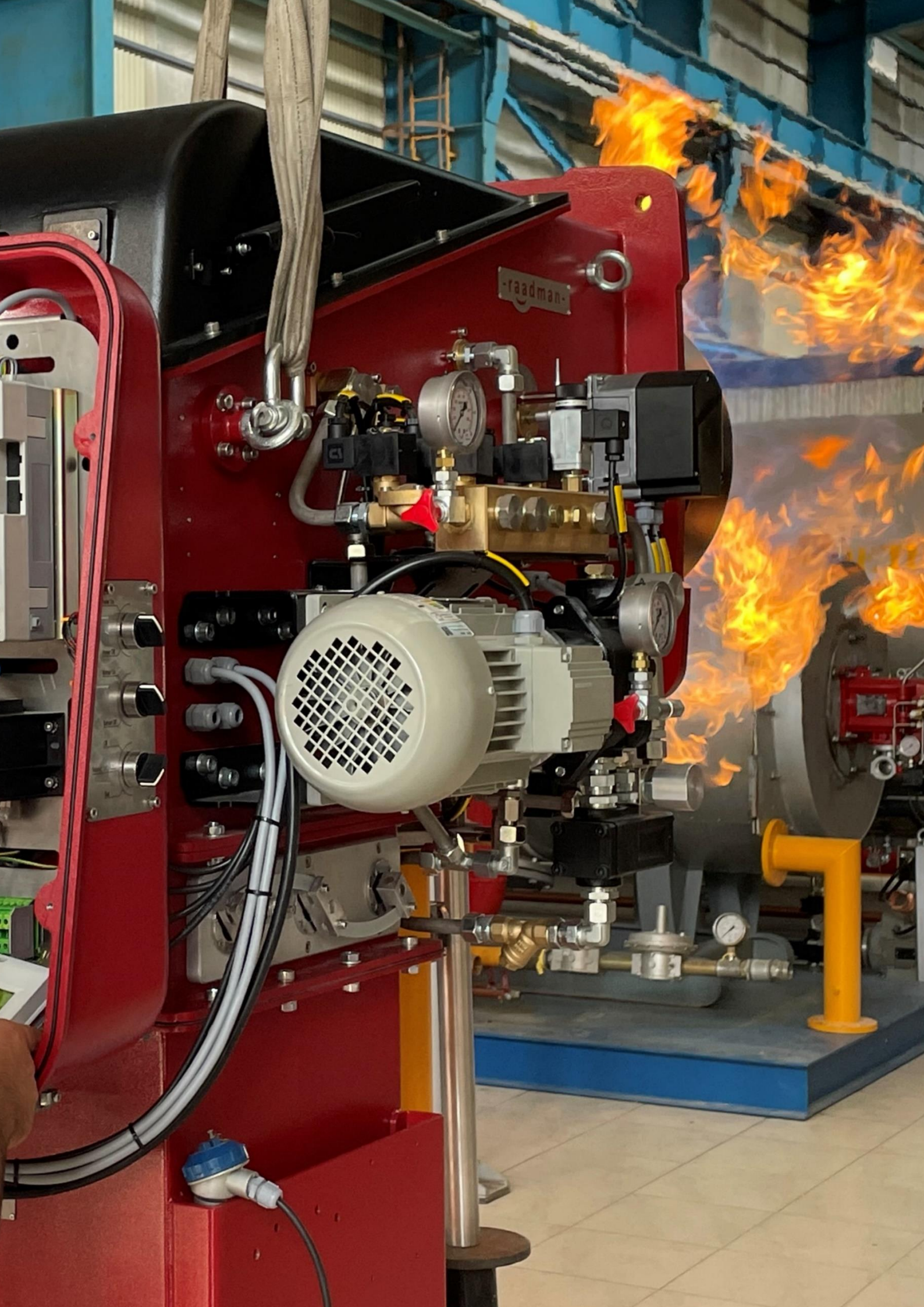
Burner Type	L1	L2	L3	L4	L5	L6	L7	H1	H2	D1
RLGB-M/M-705-DB-SF	1606	345	948	534	450	418	487	833	598	400
RLGB-M/M-705-DB	1676	415	948	534	450	418	487	833	598	400
RLGB-M/M-805-DB-SF	1606	345	948	534	450	418	487	833	598	400
RLGB-M/M-805-DB	1676	415	948	534	450	418	487	833	598	400
RLGB-M/M-950-DB	1845	427	1095	584	500	418	487	874	660	480
RLGB-M/M-1050-DB	1845	427	1095	584	500	418	487	874	660	480
RLGB-M/M-1250-DB	1800	367	1047	584	500	418	487	920	660	480
RLGB-M/M-1350-DB	1800	367	1047	584	500	418	487	920	660	480
RLGB-M/M-1550-DB	2196	510	1266	650	556	556	650	1256	872	590
RLGB-M/M-1750-DB	2196	510	1266	650	556	556	650	1256	872	590
RLGB-M/M-2250-DB	2196	508	1345	650	556	556	650	1256	872	590
RLGB-M/M-2550-DB	2196	508	1345	650	556	556	650	1256	872	590



Burner Type	D2	D3	N1	N2	B.C.D1	B.C.D2
RLGB-M/M-705-DB	21	21	4	4	540	700
RLGB-M/M-805-DB	21	21	4	4	540	700
RLGB-M/M-950-DB	20	20	4	4	590	790
RLGB-M/M-1050-DB	20	20	4	4	590	790
RLGB-M/M-1250-DB	20	20	4	4	590	790
RLGB-M/M-1350-DB	20	20	4	4	590	790
RLGB-M/M-1550-DB	20	20	4	8	770	940
RLGB-M/M-1750-DB	20	20	4	8	770	940
RLGB-M/M-2250-DB	20	20	4	8	770	940
RLGB-M/M-2550-DB	20	20	4	8	770	940

Note:

Since the DB-Series burners are project -based, we strongly recommend to contact us for exact dimensions for superior plant arrangements.



Gas Train Components

Pressure reduction and regulation units allow to bring gas pressure available in the line to values suited to the specific application. Gas trains include a series of safety and control devices for gas feeding to the burner. They are constructed and supplied with two different selection options (separated or assembled units). The selection has to be made on the specific application (available pressure, installation chances,...). This permits to reach the best flexibility using pre-assembled units, which are also tested in the factory according to existing norms designed for easy installation.

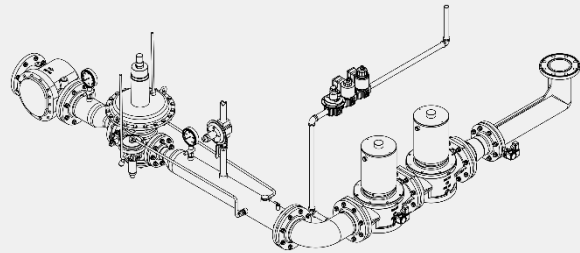
Gas train selection

High-pressure gas supply, standard version

Used when:

Input pressure is between 500 mbar and 4 bar.

The total pressure loss in gas valves, Butterfly valve and combustion chamber resistance does not exceed 200 mbar.

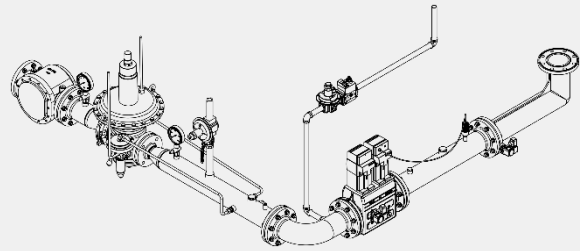


High-pressure gas supply, Multi bloc version

Used when:

Input pressure is between 360 mbar and 4 bar.

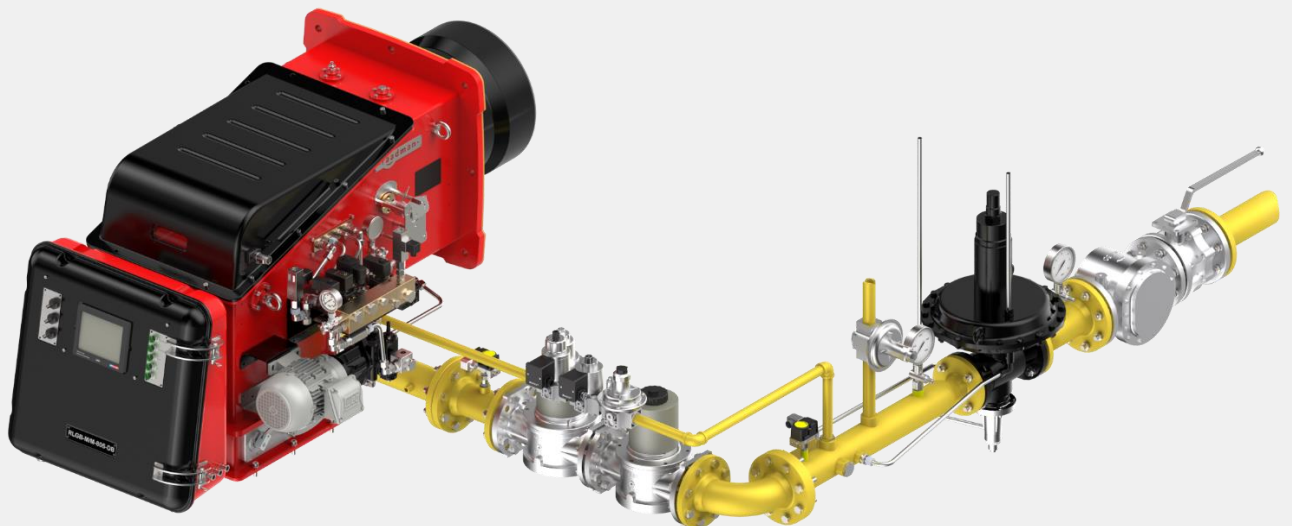
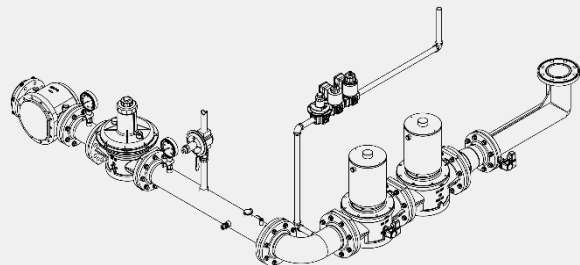
The total pressure loss in gas valves, Butterfly valve and combustion chamber resistance does not exceed 450 mbar.



Low-pressure gas supply

Input pressure is < 500 mbar

The total pressure loss in gas valves, Butterfly valve and combustion chamber resistance does not exceed 200 mbar.



Ball valve: To isolate the system from any other train in boiler room (Excluded from the burner gas train)

Filter: To protect rest of the system from any debris or dust that may be carried with gas stream. Debris may for example consist of parts accidentally left in the pipe during construction.

Regulator: To keep the input pressure of a fluid to a desired value at its output. Based on the input pressure of the gas line, they are divided in two categories: Low pressure regulator, High pressure regulator.

Safety Valve: Single-stage solenoid valve, normally when closed, fast opening, fast closing, manual limitation of flowing gas volume by adjusting main volume.

Main valve: Single-stage solenoid valve, normally when closed, slow opening, fast closing. Opening time adjustment with fast stroke range, Main volume adjustment.

Note:

According to the BS-EN 676, valve proving system shall be used in burners with capacity above 1.2 MW. Consequently, MADAS-MTC10 or DungsVDK200 valve proving systems are highly recommended.

Layout of the valve train

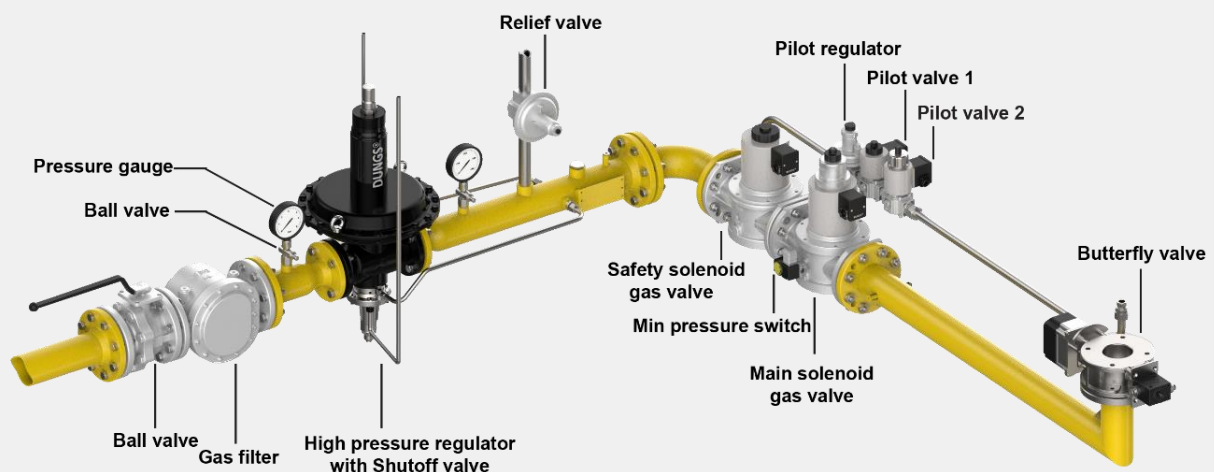
On boilers with hinged doors, the valve train must be mounted on the opposite side to the boiler door hinges.

Break points in the valve train

Break points in the valve train should be provided to enable the door of the heat generator to be swung open. The main gas line is best separated at the compensator.

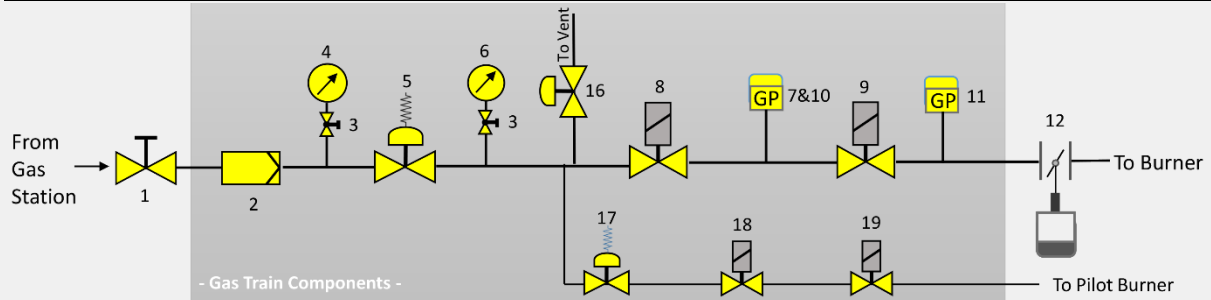
Support of the valve train

The valve train should be properly supported in accordance with the site conditions. See the radman accessories list for various valve train support components.

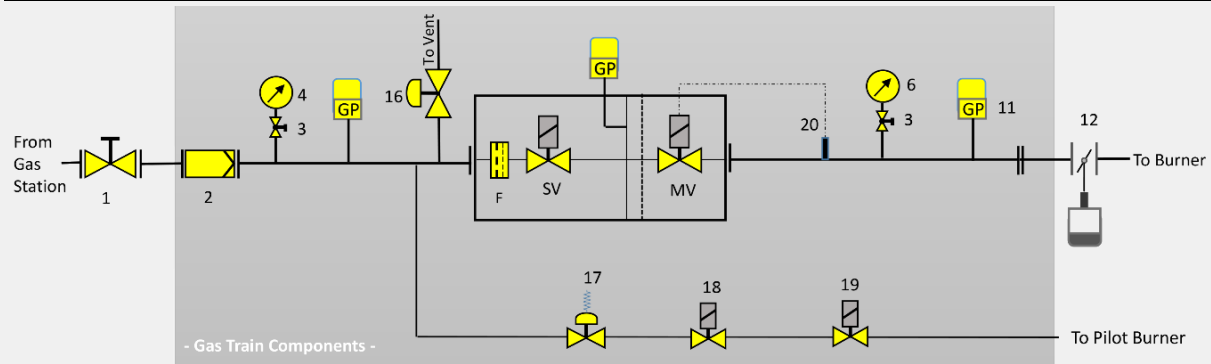


Gas train selection

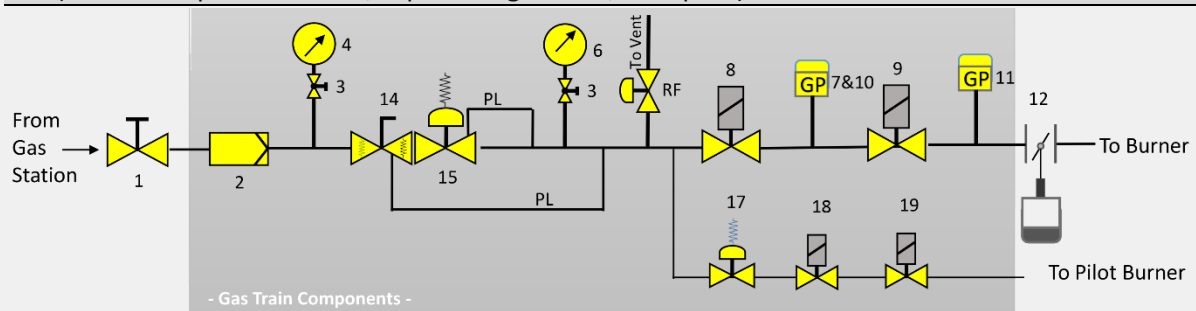
GT1 (Pressure input < 360 mbar, separated gas train, with pilot)



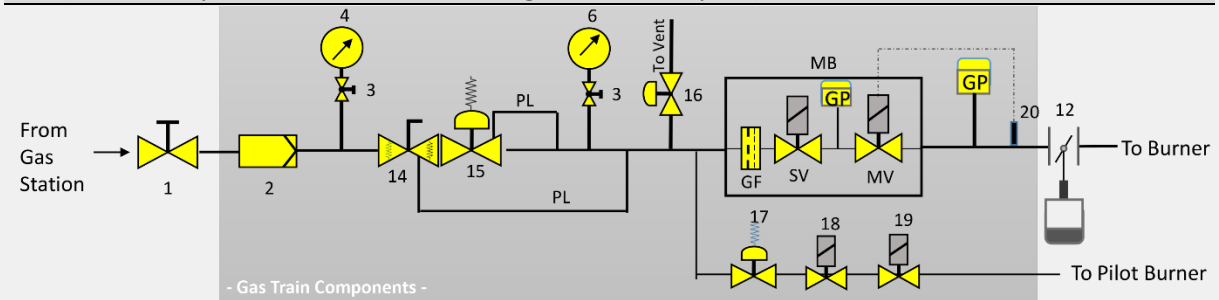
GT2 (Pressure input < 360 mbar, multi block gas train, with pilot)



GT3 (Pressure input > 360 mbar, separated gas train, with pilot)



GT4 (Pressure input > 360 mbar, multi block gas train, with pilot)



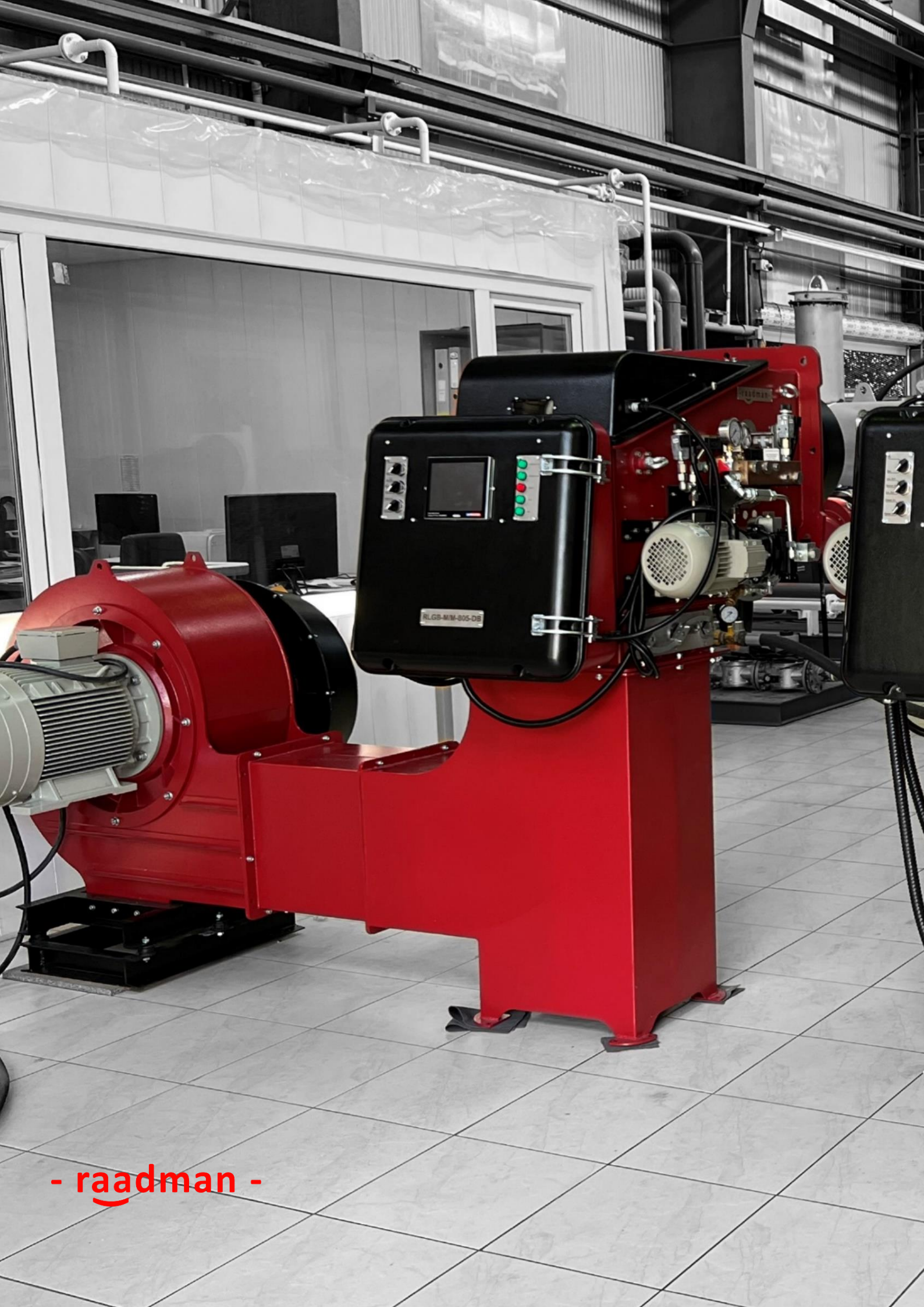
- | | | |
|--------------------------------------|-----------------------------------|-----------------------------|
| 1: Ball valve | 8: Safety gas valve | 15: High pressure regulator |
| 2: Gas filter | 9: Main gas valve | 16: Relief valve |
| 3: Push button valve | 10: Leak Test gas pressure switch | 17: Pilot regulator |
| 4: Pressure Gauge | 11: Max. gas pressure switch | 18: Pilot valve 1 |
| 5: Pressure regulator (Low-pressure) | 12: Butterfly valve | 19: Pilot valve 2 |
| 6: Pressure gauge | 13: Multi-Block Solenoid Valve | 20: Pressure transmitter |
| 7: Min. gas pressure switch | 14: Shut-off valve | |

RGB-M-X-DB Series				
Burner	Gas Model	Gas Trian Size	ΔP B. V	ΔP C.H* (mbar)
RGB-M-705-DB-SF	GT-1	DN80	4	78
	GT-2	DN65		
	GT-3	DN80		
	GT-4	DN65		
RGB-M-705-DB	GT-1	DN80	4	85
	GT-2	DN65		
	GT-3	DN80		
	GT-4	DN65		
RGB-M-805-DB-SF	GT-1	DN100	5	90
	GT-2	DN80		
	GT-3	DN80		
	GT-4	DN80		
RGB-M-805-DB	GT-1	DN100	5	95
	GT-2	DN80		
	GT-3	DN80		
	GT-4	DN80		
RGB-M-950-DB	GT-1	DN100	5	85
	GT-2	DN80		
	GT-3	DN80		
	GT-4	DN80		
RGB-M-1050-DB	GT-2	DN100	5	110
	GT-3	DN100		
	GT-4	DN100		
RGB-M-1250-DB	GT-2	DN100	5	85
	GT-3	DN100		
	GT-4	DN100		
RGB-M-1350-DB	GT-2	DN100	6	100
	GT-3	DN100		
	GT-4	DN100		
RGB-M-1550-DB	GT-2	DN100	7	110
	GT-3	DN100		
	GT-4	DN100		
RGB-M-1750-DB	GT-2	DN100	7	125
	GT-3	DN100		
	GT-4	DN100		
RGB-M-2250-DB	GT-2	DN125	15	165
	GT-4	DN100		
RGB-M-2550-DB	GT-2	DN125	17	155
	GT-4	DN100		
RGB-M-3250-DB	GT-2	DN125	27	145
	GT-4	DN125		



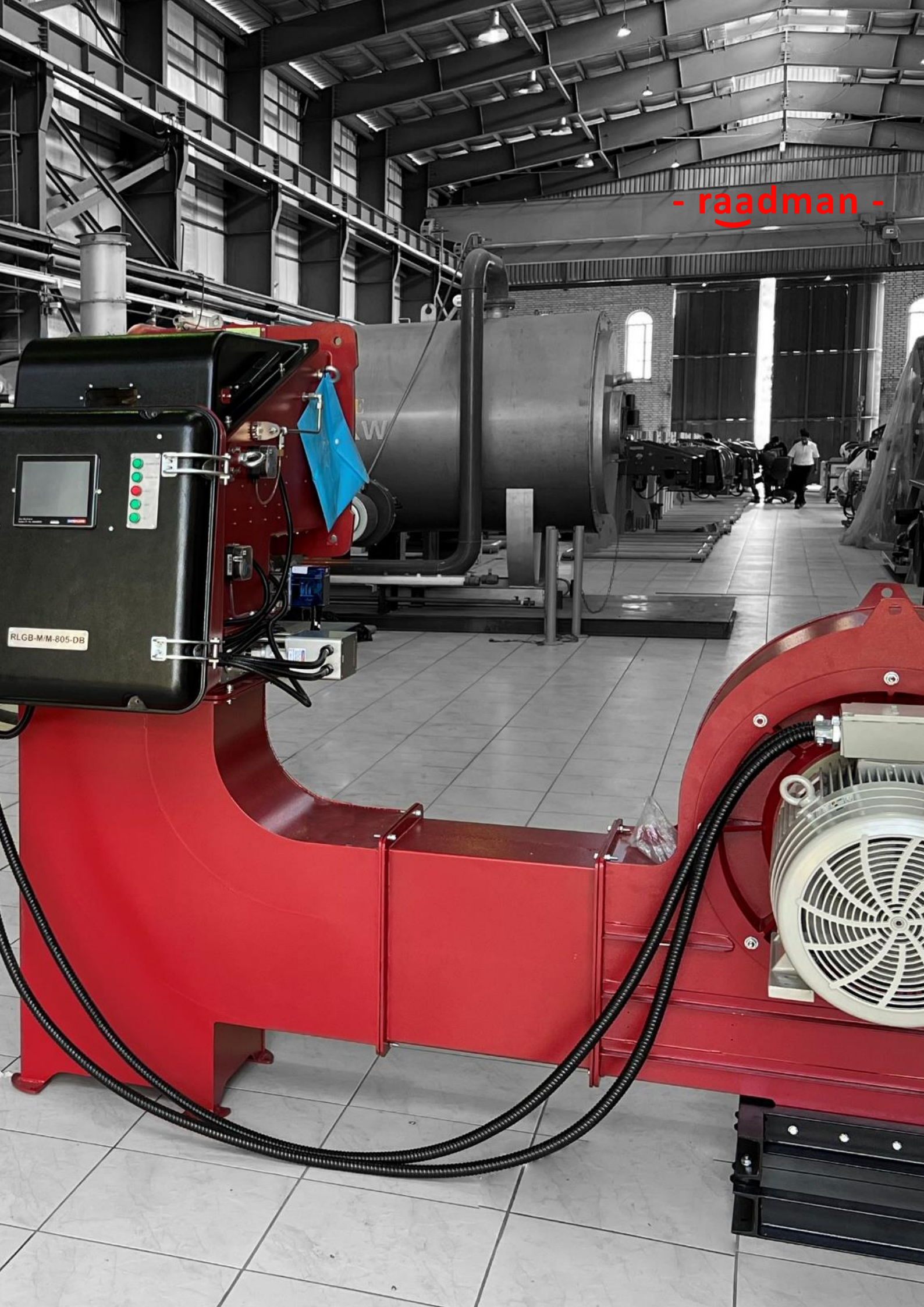
RGLB-M/M-X-DB Series

Burner	Gas Model	Gas Trian Size	$\Delta P B. V$	$\Delta P C.H^*$ (mbar)
RLGB-M/M-705-DB-SF	GT-1	DN80	4	78
	GT-2	DN65		
	GT-3	DN80		
	GT-4	DN65		
RLGB-M/M-705-DB	GT-1	DN80	4	85
	GT-2	DN65		
	GT-3	DN80		
	GT-4	DN65		
RLGB-M/M-805-DB-SF	GT-1	DN100	5	90
	GT-2	DN80		
	GT-3	DN80		
	GT-4	DN80		
RLGB-M/M-805-DB	GT-1	DN100	5	95
	GT-2	DN80		
	GT-3	DN80		
	GT-4	DN80		
RLGB-M/M-905-DB	GT-1	DN100	5	85
	GT-2	DN80		
	GT-3	DN80		
	GT-4	DN80		
RLGB-M/M-1050-DB	GT-2	DN80	5	110
	GT-3	DN80		
	GT-4	DN80		
RLGB-M/M-1250-DB	GT-2	DN100	5	85
	GT-3	DN100		
	GT-4	DN100		
RLGB-M/M-1350-DB	GT-2	DN100	6	100
	GT-3	DN100		
	GT-4	DN100		
RLGB-M/M-1550-DB	GT-2	DN100	7	110
	GT-3	DN100		
	GT-4	DN100		
RLGB-M/M-1750-DB	GT-2	DN100	7	125
	GT-3	DN100		
	GT-4	DN100		
RLGB-M/M-2250-DB	GT-2	DN125	15	165
	GT-4	DN125		
RLGB-M/M-2550-DB	GT-2	DN125	17	155
	GT-4	DN100		



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RLGB-M/M-805



RLGB-M/M-805



Burner Ventilation System

Air Flow Rate: 8000-37000 m³/h



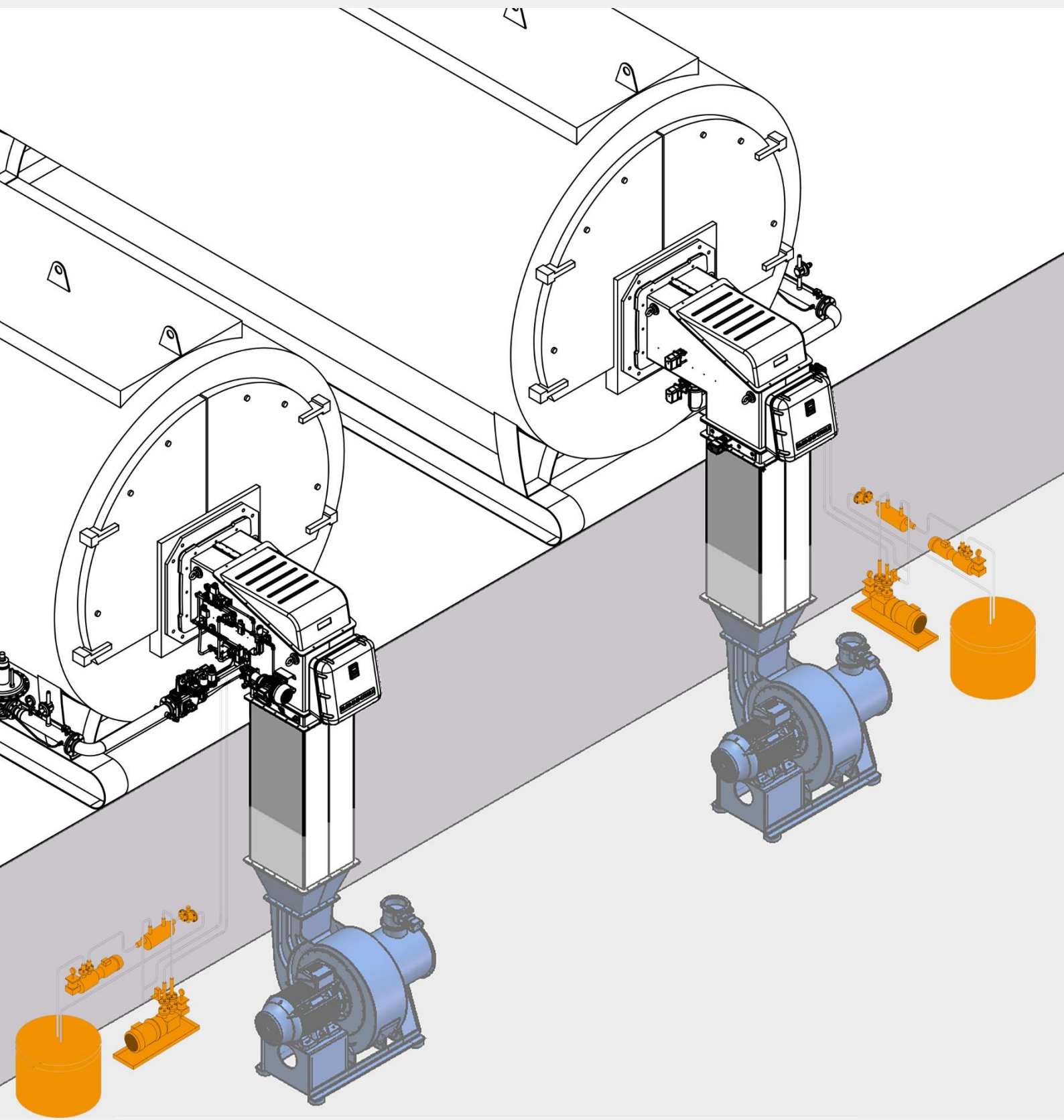
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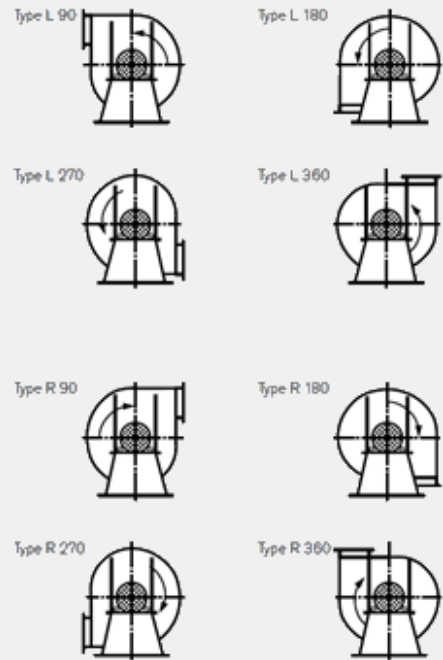
Burner Ventilation system

The Fan blade design is the result of extensive research and analysis resulting in high-performing and efficient centrifugal fans. Our R&D team will ensure the fans are complied with all safety certifications at the design stage regarding stability, reliability and safety.

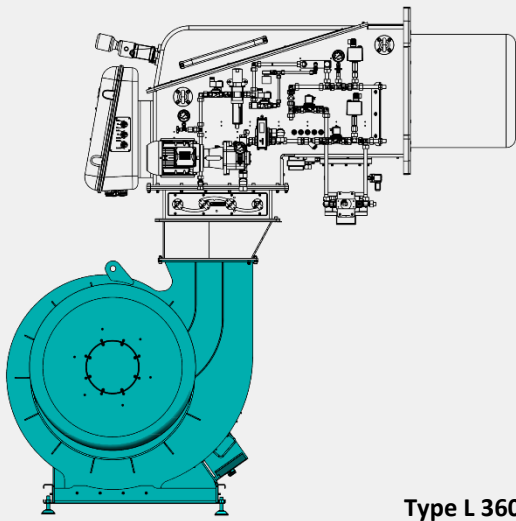
Thanks to improved CFD simulations and FEM analysis, blade design simultaneously is optimized from structural and aerodynamic point of view. It also helps to provide customized solutions for market requirements. Our team surveys cover a complex step-by-step analysis of a centrifugal fan from its design to an advanced CFD & FEA simulation, including FSI and modal analysis.



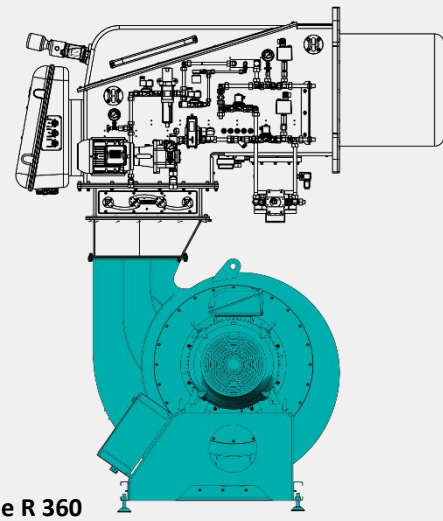
Air block



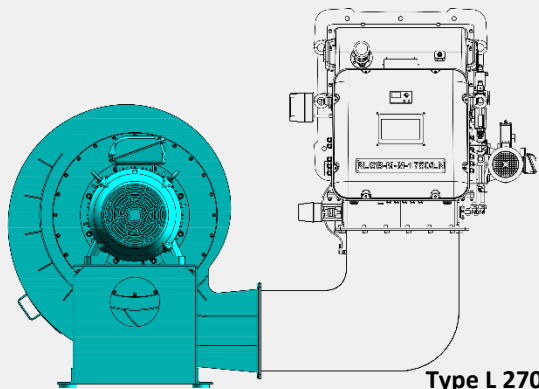
Note: The housing arrangement is to be considered as viewed from the drive side of the fan. Subsequent alteration of alignment of the fan to its base is not possible, as the two parts are welded together during manufacturing.



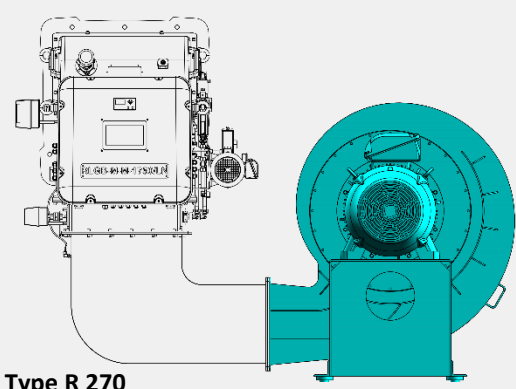
Type L 360



Type R 360



Type L 270



Type R 270

BVS series range

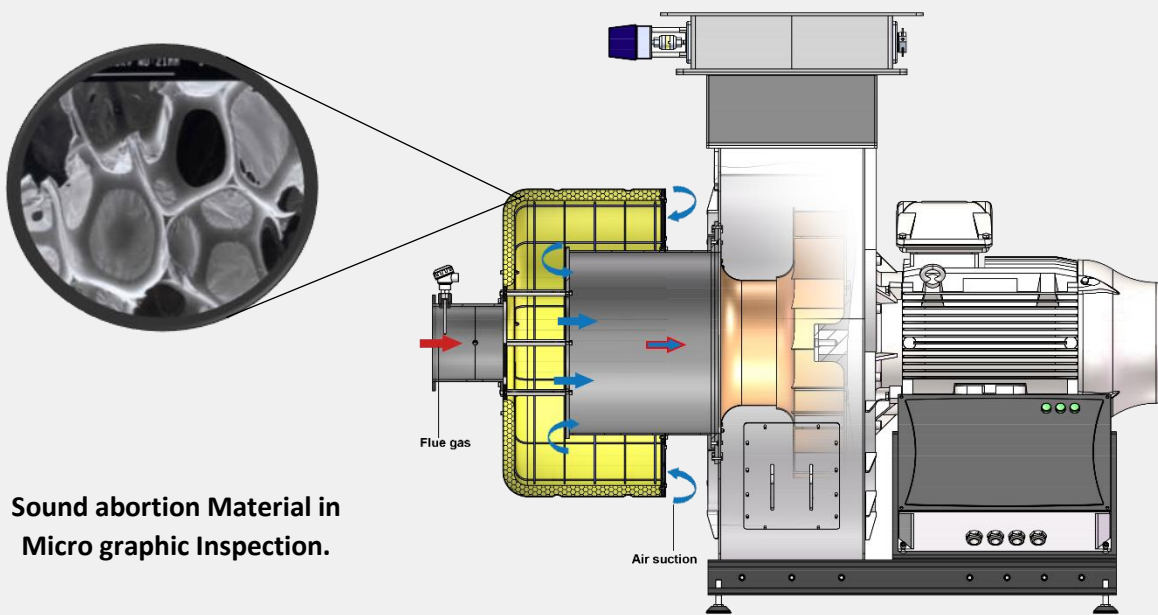
In order to obtain a complete industrial combustion system, raadman burner is able to offer various components to be matched with the combustion heads of DB-Series, such as the centrifugal air fans. The fans supply the airflow to the combustion head through the adduction channel, with the appropriate technical features required from the application. The delivered air processed from the fan is in a correct proportion to the fuel in order to guarantee the required burner output with a safe operation.

BVS Model	Burner firing rate (kW)	Air flow rate (m ³ /h)	Air pressure drop (mbar)	Real power consumption (kW)	Available motor in market (kW)
BVS-800/55/22	7000	8000	55	18	22
BVS-800/60/22	7000	8000	60	19	22
BVS-920/55/22	8000	9200	55	19	22
BVS-920/60/22	8000	9200	60	19	22
BVS-1030/60/30	9000	10300	60	28	30
BVS-1200/60/30	10500	12000	60	28	30
BVS-1380/65/37	12000	13800	65	33	37
BVS-1550/60/45	13500	15500	60	40	45
BVS-1720/60/45	15000	17200	60	41	45
BVS-1940/65/55	17000	20000	65	51	55
BVS-2580/65/75	22000	25800	65	70	75
BVS-2900/65/75	25000	29000	65	74.3	75
BVS-3700/90/132	32000	37000	90	130.3	132

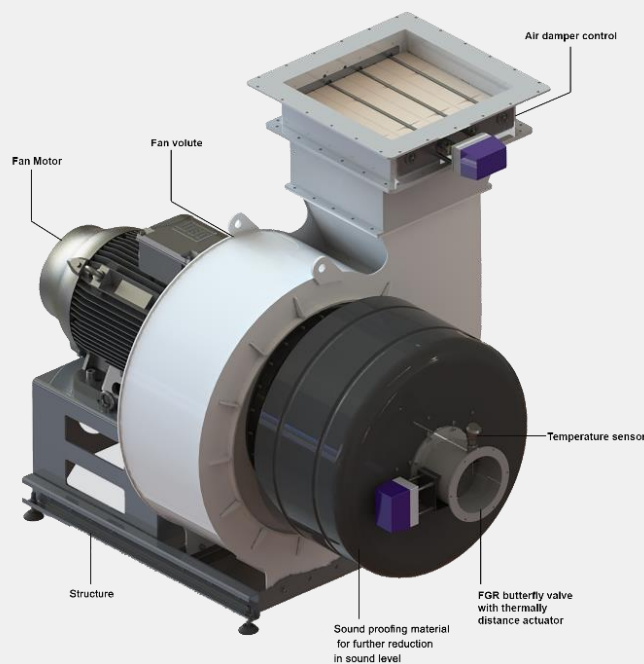
Noise suppression

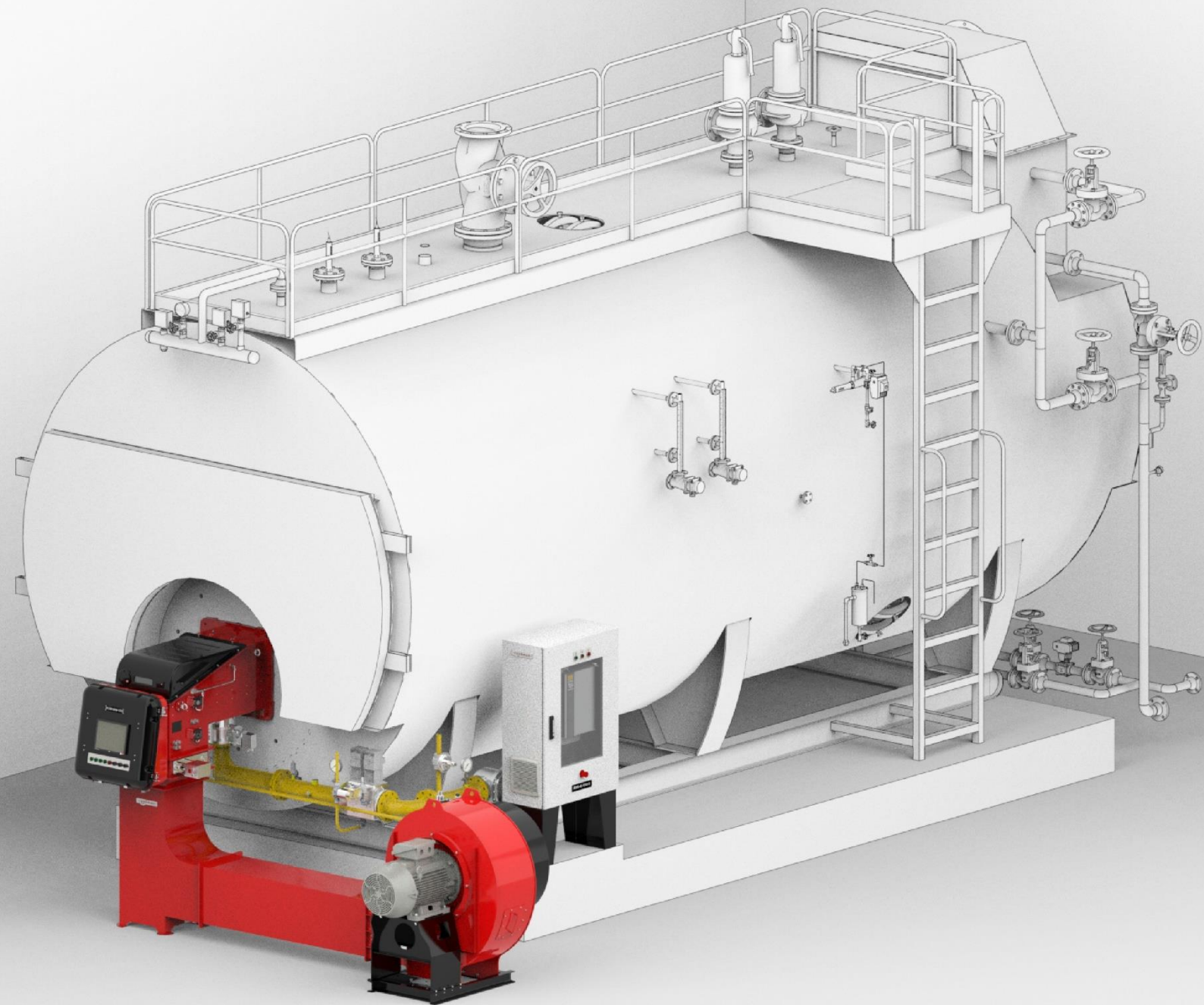
Acoustic absorption refers to the process by which a material, structure, or object takes in sound energy when sound waves are encountered, as opposed to reflecting the energy. Some of the absorbed energy is transformed into heat and some is transmitted through the absorbing body. The energy transformed into heat is said to have been 'lost'.

When sound from a loudspeaker collides with the walls, the sound's energy is reflected, one part is transmitted, and the other part is absorbed into the walls. Just as the acoustic energy was transmitted through the air as pressure differentials (or deformations), the acoustic energy travels through the material which makes up the wall in the same manner. Deformation causes mechanical losses via converting part of the sound energy into heat, resulting in acoustic attenuation, mostly due to the wall's viscosity. Similar attenuation mechanisms apply for the air and any other medium through which sound passes.



Sound absorption Material in Micro graphic Inspection.





A good power system can increase the device operation and lifespan, prevent consecutive failures, reduce repair and maintenance costs, and provide superior customer comfort.

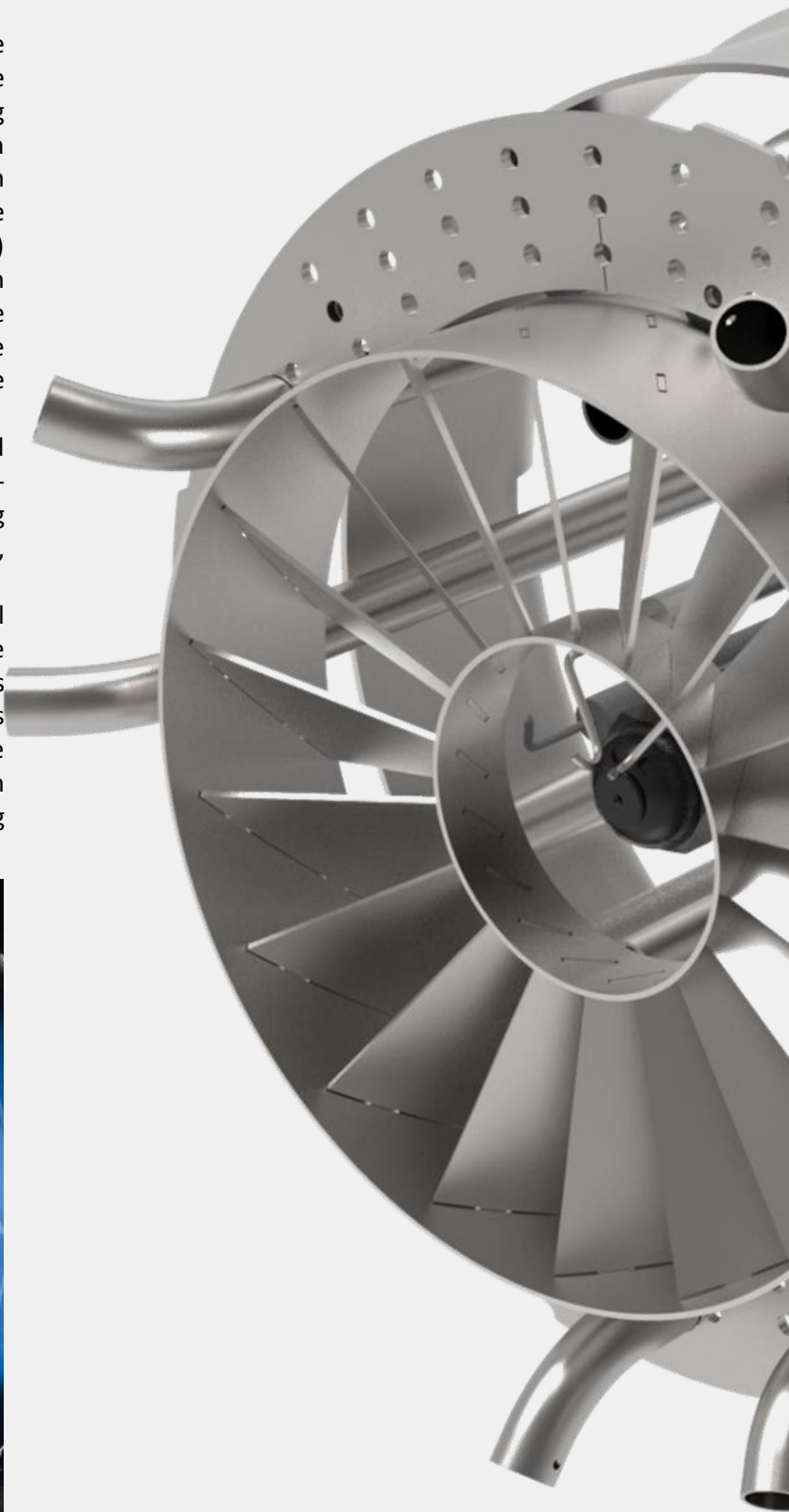
A look to the future:

With Low-NOx burners

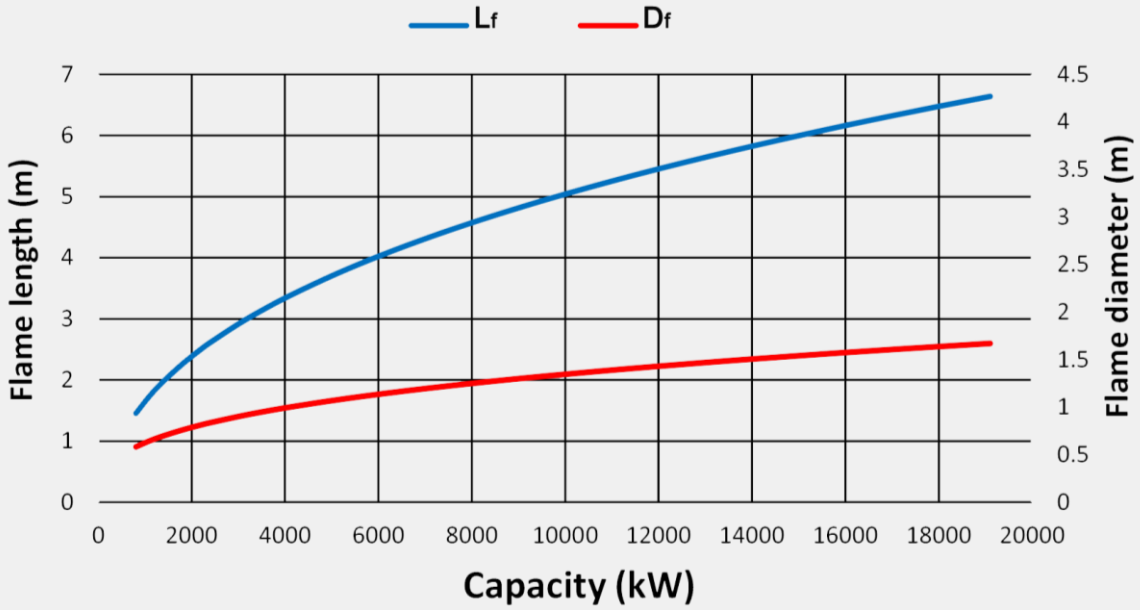
NOx gases play an important role in the formation of smog, producing the brown haze often observed over cities, particularly during the summer. When exposed to the UV rays in sunlight, NOx molecules break apart and form ozone (O₃). The problem is exacerbated by the presence of volatile organic compounds (VOCs) in the atmosphere, which also interact with NOx to form dangerous molecules. Ozone at the ground level is a serious pollutant, unlike the protective ozone layer much higher up in the stratosphere.

Nitrogen oxides form when oxygen and nitrogen from the air interact during a high-temperature combustion event. Heating industry and industrial burners, in particular, produce large amounts of nitrogen oxides.

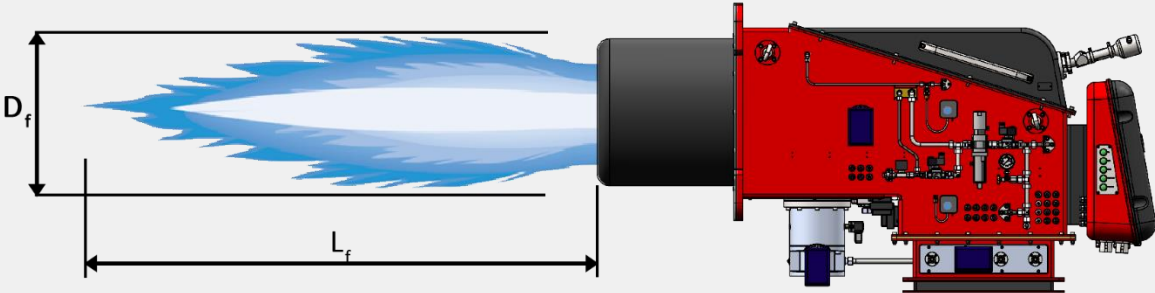
The idea behind Low NOx burners is to control fuel and air mixing at each burner to create larger and more branched flames. This reduces the peak flame temperature, resulting in less NOx formation. The improved flame structure also reduces the amount of oxygen available in the hottest part of the flame, thereby improving burner efficiency.



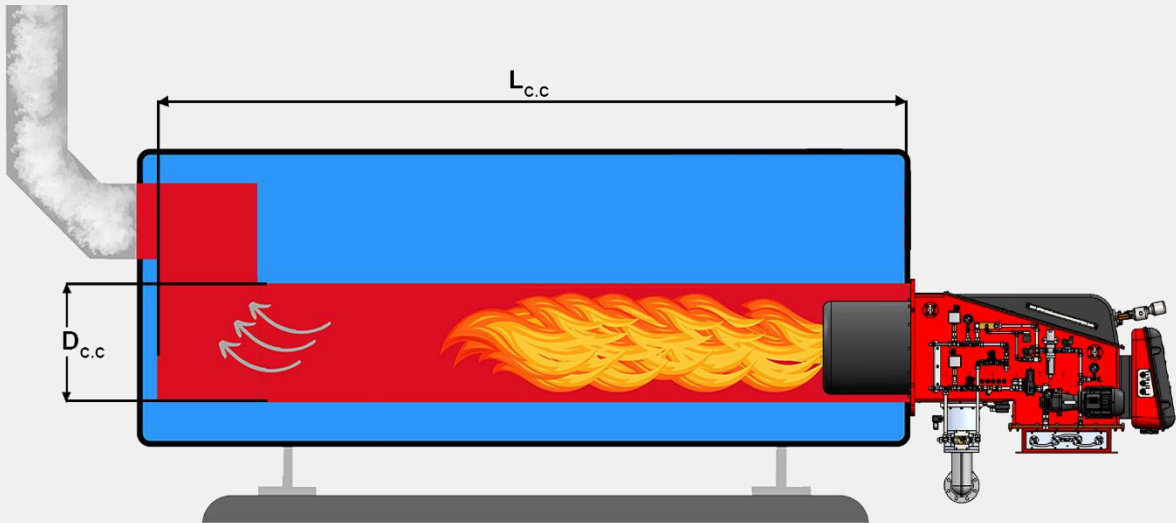
Flame dimension



The flame dimensions which play an effective role in the burner efficiency and influence their compatibility with the boiler combustion chamber geometry, are presented in the above diagram.



Suggested combustion chamber dimension:
raadman burners can be appropriately selected for all boilers that comply with BS-2790, BS-855, EN-303, BS-EN 12953-3 standards.

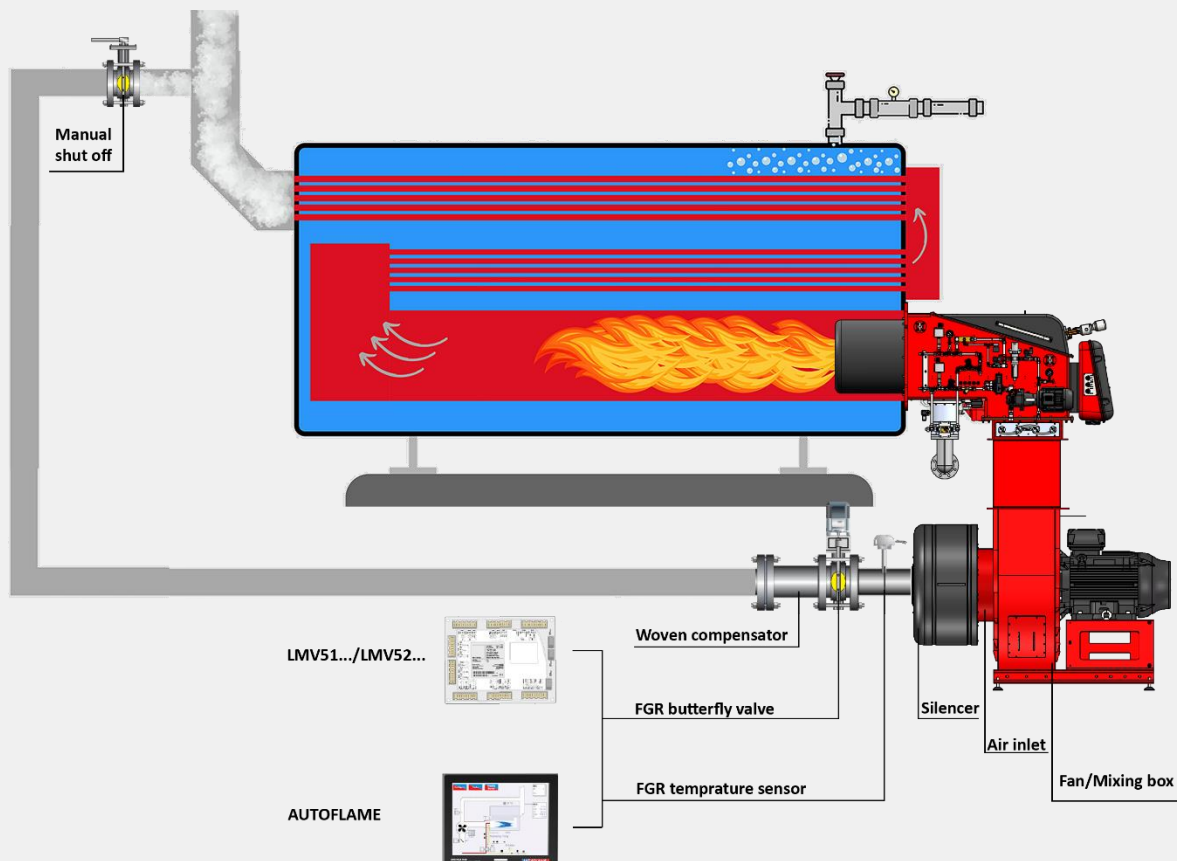
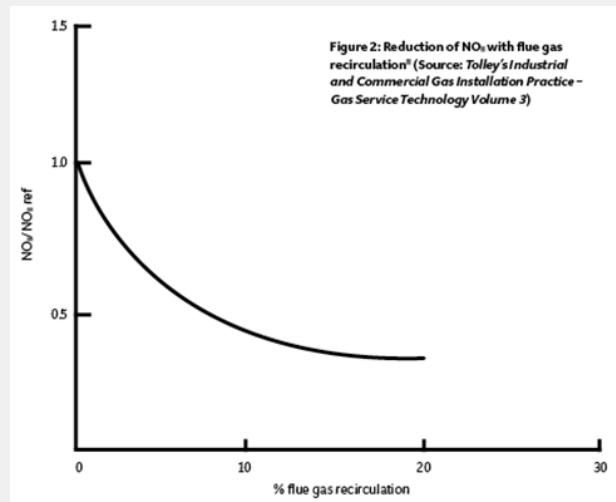


FGR technology

Flue gas recirculation (FGR) can be a highly effective technique for lowering NO_x emissions from burners, and it's relatively inexpensive to apply. Most of the early FGR work was conducted on boilers, and investigators found that recirculating up to 25% of the flue gases through the burner could lower NO_x emissions to as little as 25% of their normal levels.

With FGR technology, which consists of a temperature sensor and a flue gas damper with an actuator both connected to a flange, a portion of the exhaust (flue) gas circulates back into the combustion zone to decrease the flame temperature and reduce nitrogen-oxide (NO_x) emissions.

When FGR is used, due to the reduction in radiation heat transfer, boiler efficiency may decrease, typically in the range of 0.25 percent to 1 percent, depending on the amount of FGR added. Plant experience shows that the combination of low NO_x burners with re-burning using FGR system, reduces the NO_x level to approximately less than 40 mg/kWh.

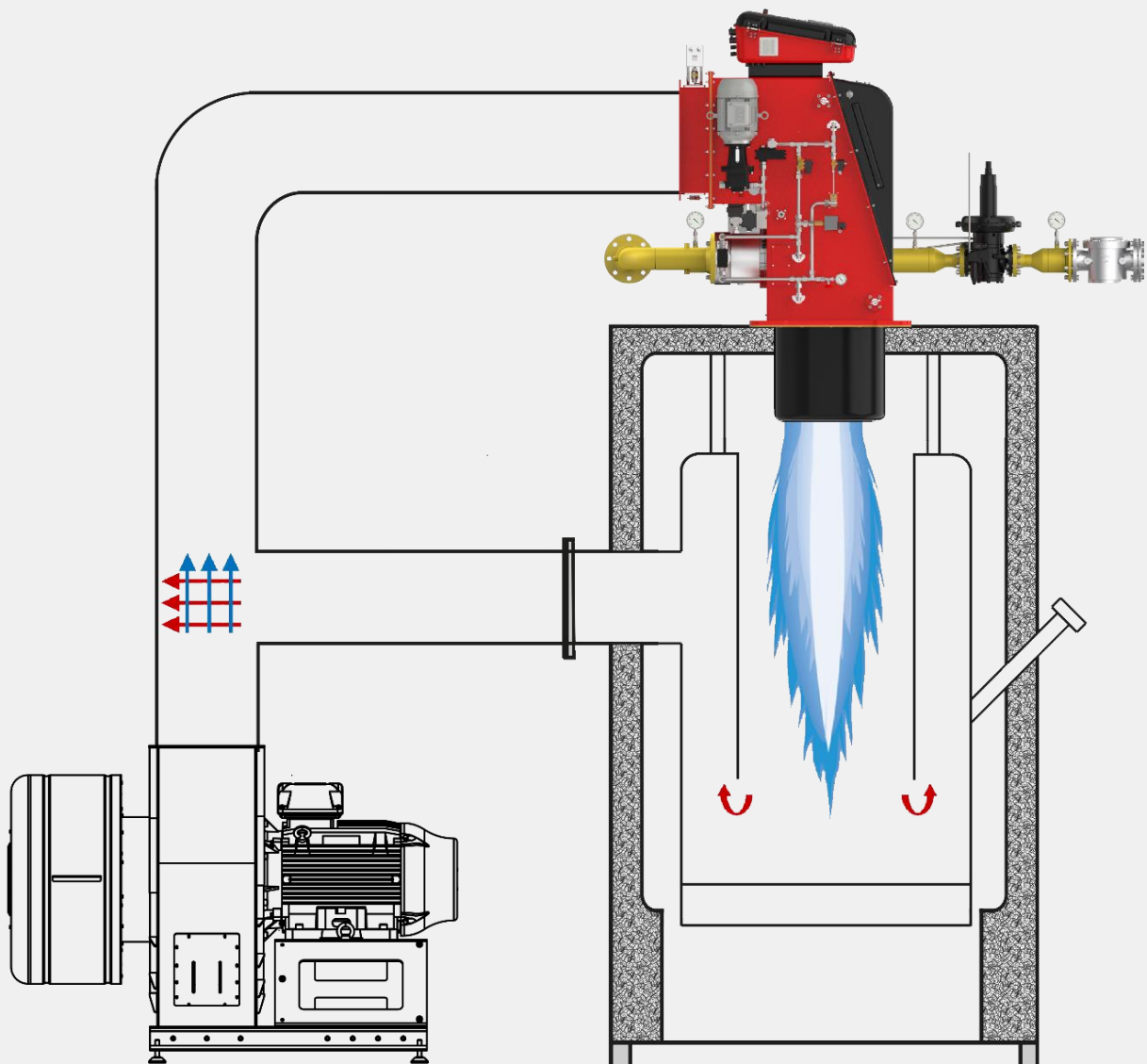
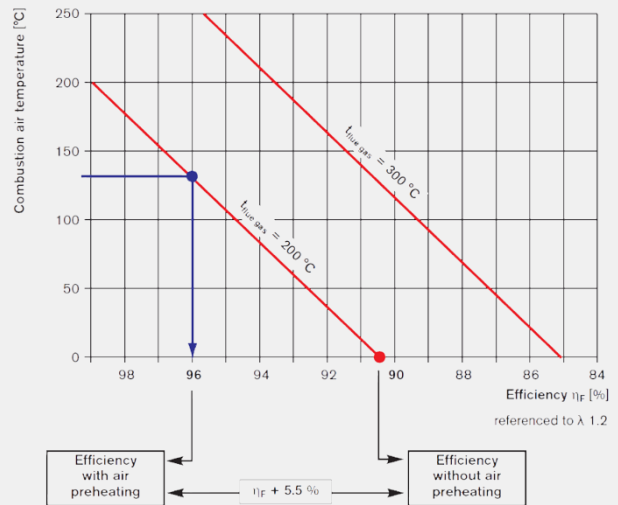


Heat generators with very high medium temperatures can exploit less heat from the flue gases. Consequently, flue gas temperatures are always higher than the medium temperature. Without additional heat exchangers, a significant amount of energy will be lost to the atmosphere and wasted. One way to utilize this energy is through the use of hot-air versions of the DB-series dual-bloc burners.

A cross-flow heat exchanger between the combustion air duct and the flue gas system draws heat from the hot flue gas and transfers it to the combustion air. Using this method, combustion air can be heated to temperatures of up to 250 °C, potentially increasing efficiency by up to 10 percent .

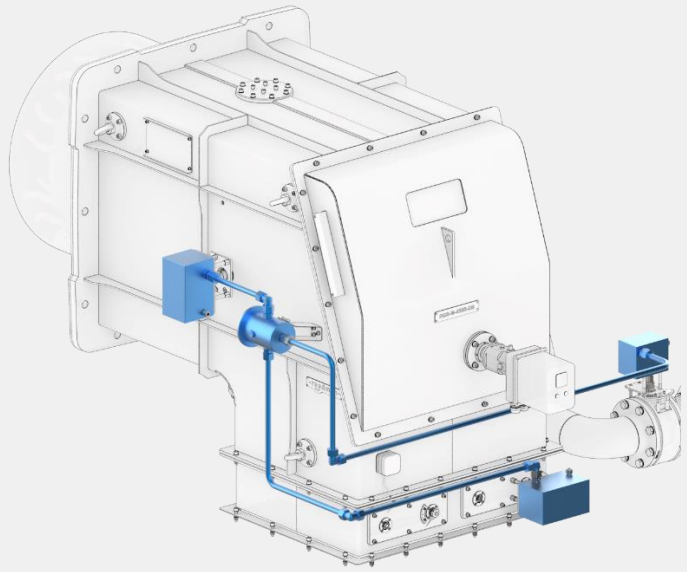
Despite these extreme conditions, the burners can achieve NOx values in the range of 100–150 mg/Nm³.

Efficiency increases up to 10 percent with 250 °C hot-air in DB-Series burners



Cooling Air (Optional)

Cooling systems are an optional Feature that can be used to protect burner actuators from the heat emitted by the boiler. The cooling system works by circulating a cooling fluid around the actuator, which helps to reduce its temperature and prevent it from overheating. The cooling fluid is typically air, and the system must be regularly monitored to ensure it is functioning properly. The picture below shows the burner cooling system.

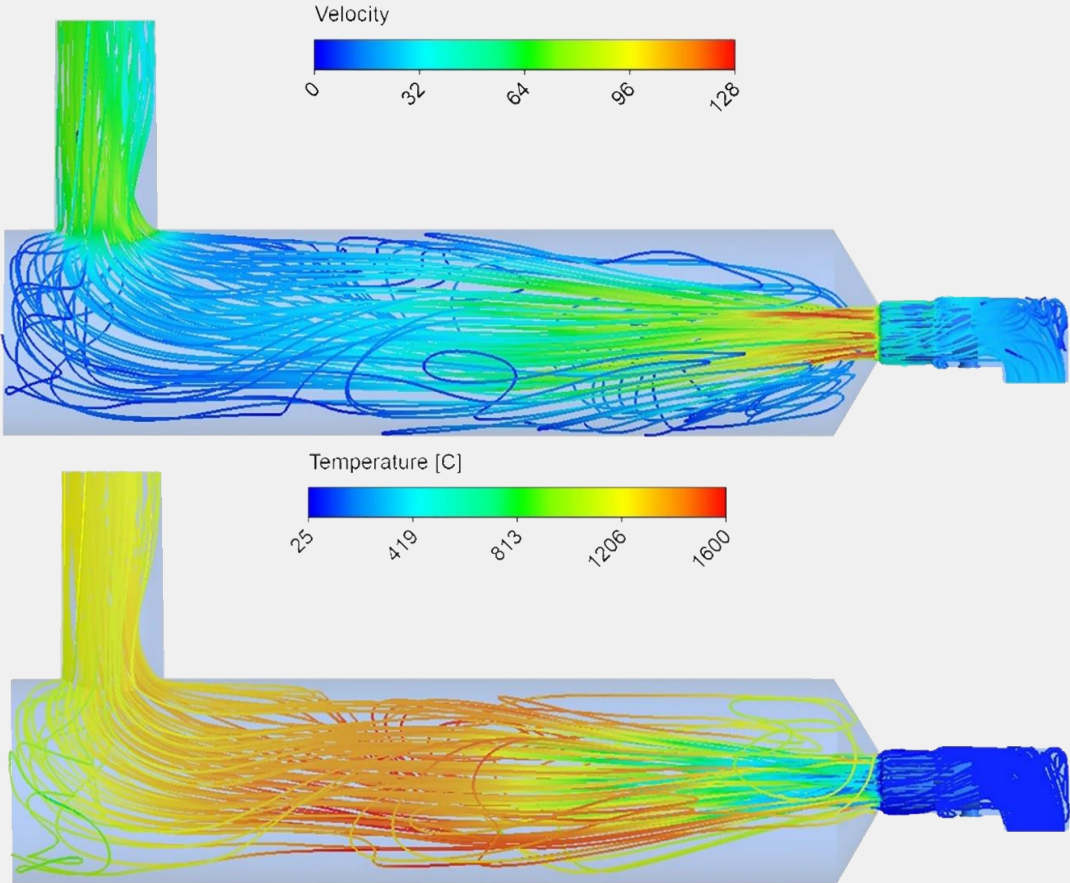


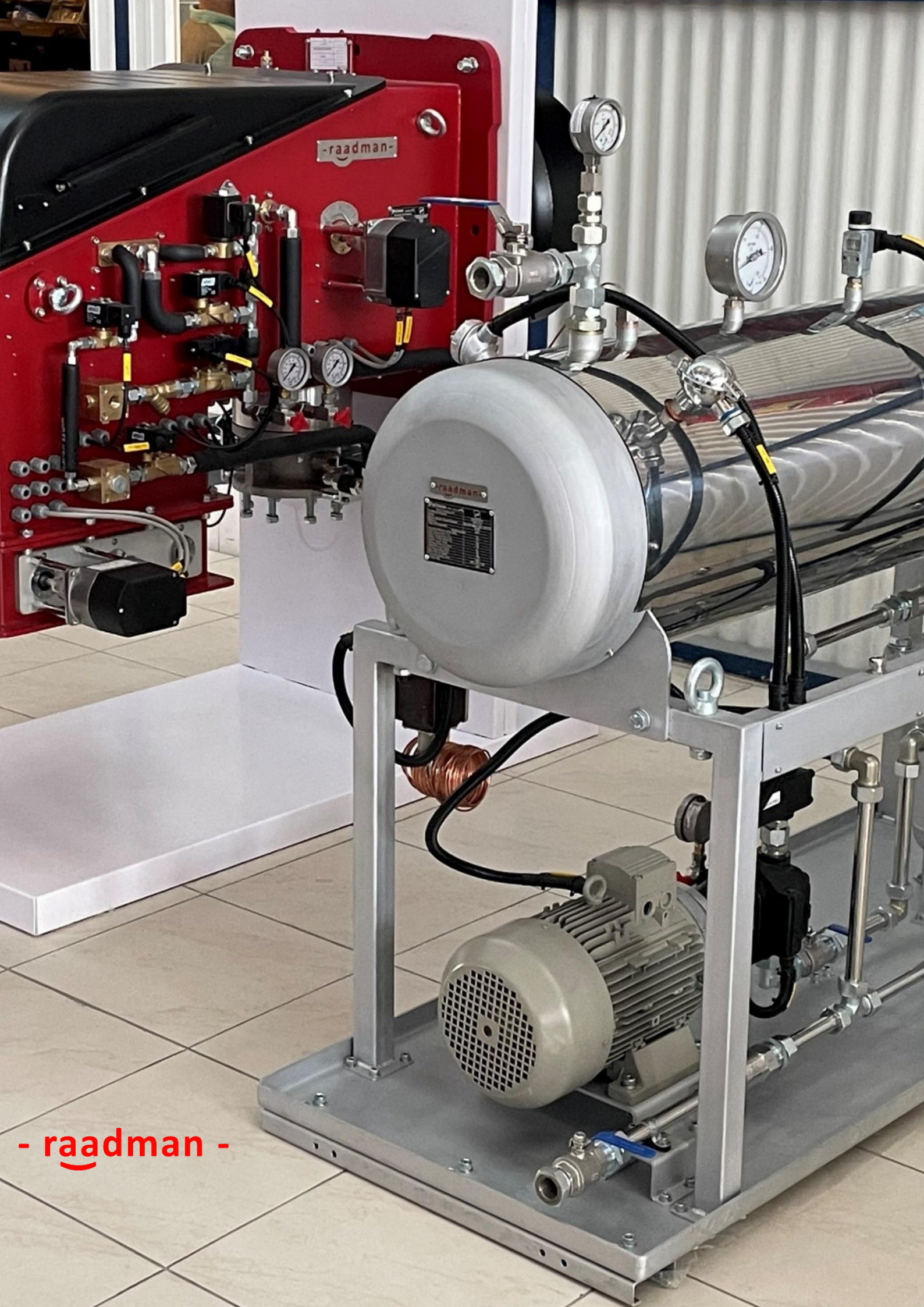
CFD experts in R&D department

Industry relies on heat from the burners in all combustion systems. Optimizing burner performance is critical for complying with stringent emissions requirements and improving industrial productivity. Engineers involved in designing and building advanced combustion equipment for the hydrocarbon process industries routinely use Advanced CFD to advance new burner technology. The science and technology of CFD have matured to the point where performance predictions are made with a degree of confidence from models covering a wide range of complex furnace, burner, and reactor geometries. While tremendous advances have been made in understanding the fundamentals of combustion, the remaining challenges are complex. To make improvements, it is critical to understand the dynamics of fuel fluid flow and the flame and its characteristics. Computational Fluid Dynamics offers a numerical modelling methodology that helps in this regard.

Commercial CFD codes utilize a standard approach to simulate chemical kinetics, which approximate the consumption and production of chemical species. This requires the engineer to make simplifying assumptions about the chemistry considered in the simulation. While this simplified chemistry provides adequate information to predict flow patterns and local heat transfer, these models lack sufficient detail to accurately predict NOx and CO production. Alternatively, NOx chemistry is decoupled from the main calculation and obtained using post-processing techniques. CFD coupled with cold-flow physical modeling and hot-flow burner tests provides a powerful analytical tool for developing accurate, timely, and cost-effective burner designs.

Packman R&D Department is experienced in developing custom engineered solutions, and our sales applications and thermofluidic engineering department are prepared to assist with complex applications. As part of our design and engineering process, we have the capability to use Computational Fluid Dynamics (CFD) modeling to predict product performance or refine product design before burners are installed in the field.





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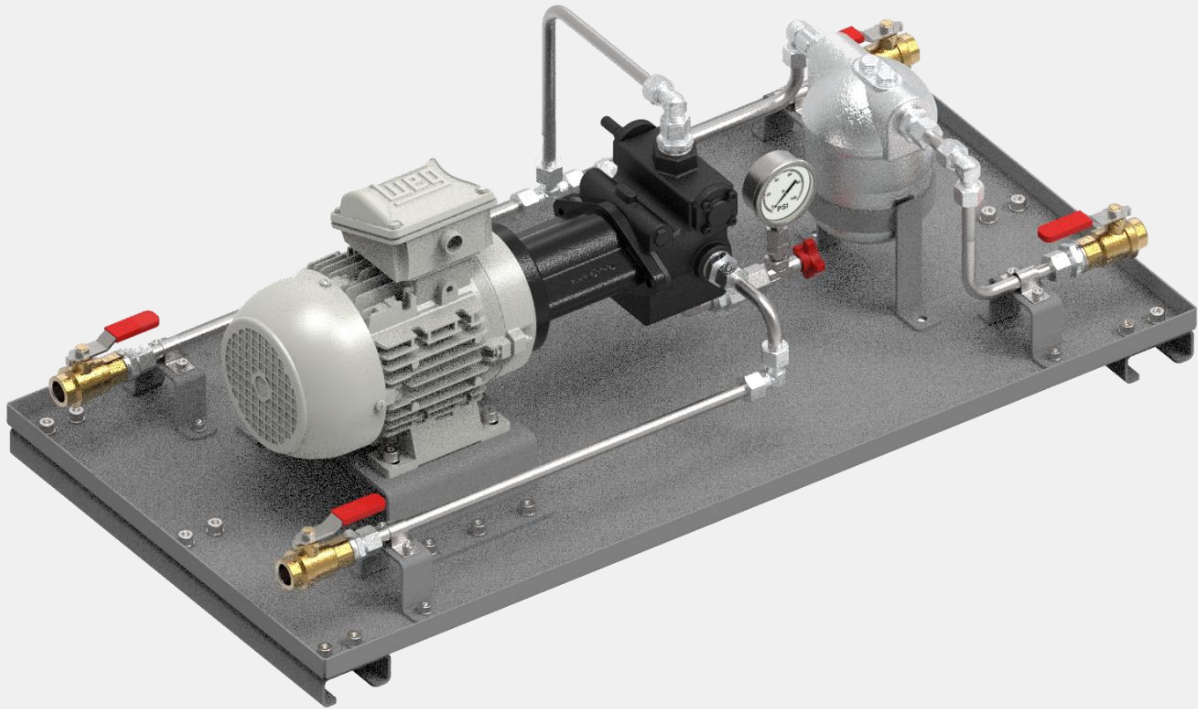
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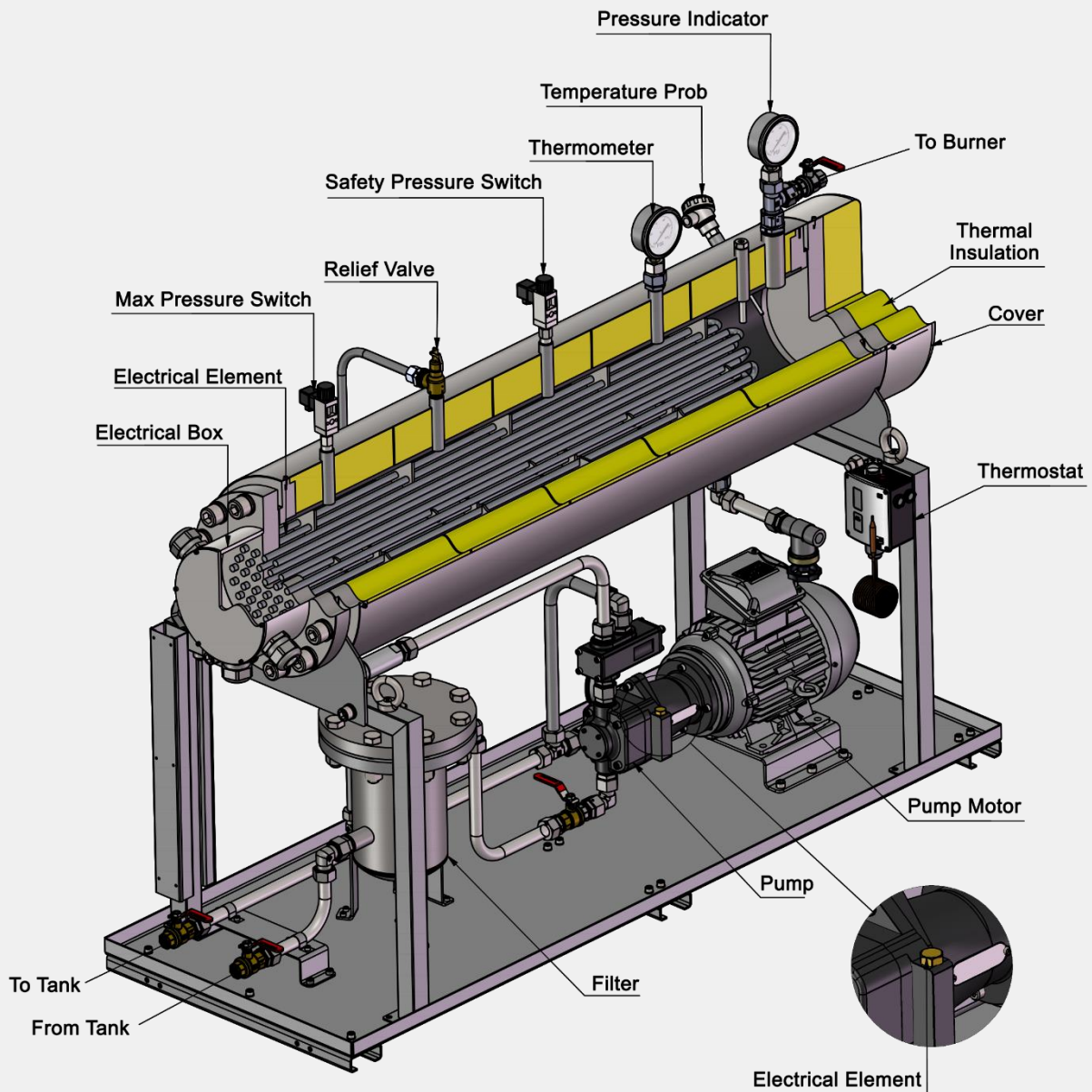
Oil station

The Oil Stations are designed to treat and prepare light oil; they mainly consist of a filter, a pump and a motor.

The Oil Station can independently be prepared, assembled, tested and installed. The wide range of available models makes the system suitable for many different applications.



Heavy oil heater



Packman heavy fuel oil preheaters are designed to heat heavy oil efficiently to adjust the proper viscosity for the burner. The design is based on the general conditions such as the type and properties of the heavy fuel oil, pressure requirements of the pump and temperature as well as the desired operating points in the process. Electrical heavy fuel oil heater directly heats fuel by converting electrical energy in the heating elements to thermal energy. The thermal energy is then transferred from the heating electrical elements to the fluid.

The unit skids are designed in order to prepare heavy fuel oil with max viscosity 10 cSt at 130°C and outlet pressure of 25 mbar.

Modular oil delivery system

Generally, two types of atomizing principles are utilized in raadman modular oil burners:

Pressure based spill back lances/atomizers

All raadman pressure based atomizing modular oil burners are equipped with a burner lance and a fly-back oil atomizer. The burner-lance is particularly suitable for use in or on an oil burner and is designed to operate spill back atomizers with integrated shut-off needle. The strong spring on the actuating rod pushes the needle in closed position. This ensures a reliable shut-off under all circumstances.

Fuel, branched off from the supply line actuates the piston for opening. This can be controlled by two external solenoid valves or by one 3/2 solenoid valve. The piston has a fixed travel. While opening, the needle inside the atomizer is retracted in the correct position by means of a spring at the back of the atomizer against a fixed stop on the needle itself.

During the pre-purge period of the burner, the needle is keeping the orifice closed and the fuel circulates through the lance at pre-set supply and return pressure. On energizing both solenoid valves and the 3/2 solenoid valve, even after long idle intervals, there is immediate atomization guaranteeing perfect ignition.

The burner-lance is suitable to supply pressures from 20 up to 40 bar and fuel temperatures up to 140°C.



Air or Steam lances/atomizers

All raadman air/steam atomizing modular oil burners are equipped with a special burner lance and an air/steam atomizer. The burner-lance is designed to operate 32-Y atomizers with compressed air or steam.

The strong spring on the actuating rod pushes the needle in closed position. Compressed air, controlled by an external 3/2 solenoid valve, actuates the piston for opening. The piston has a fixed travel, pulling the needle in the correct position when it opens.

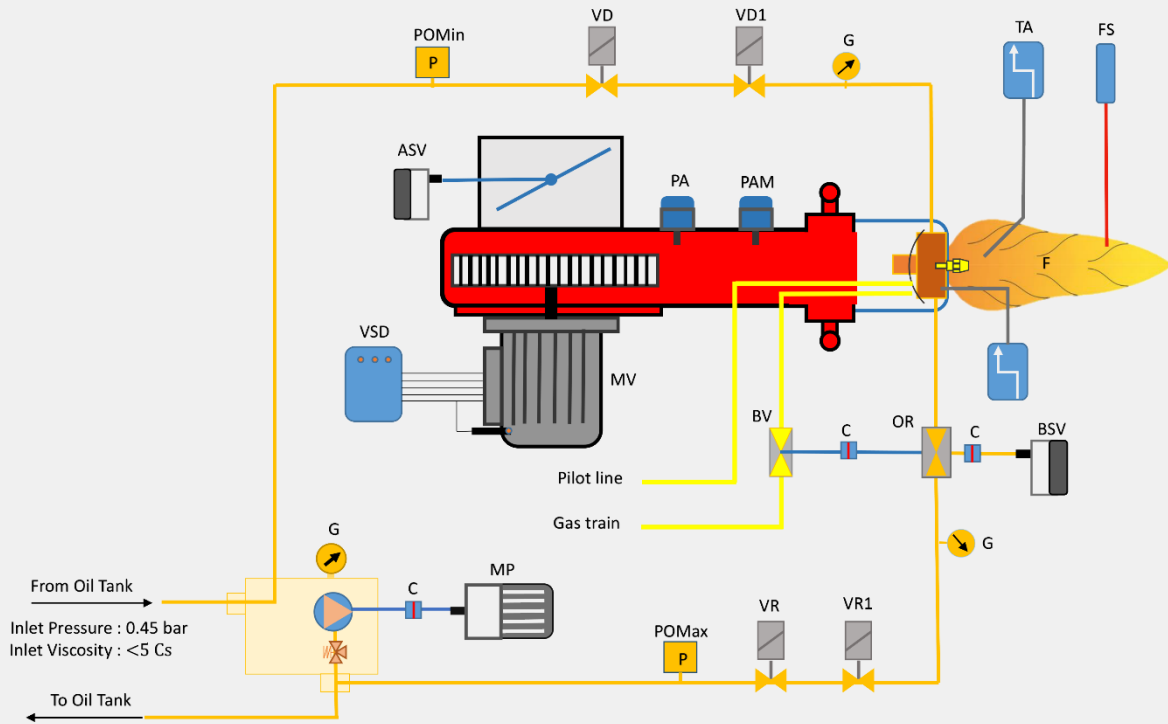
During the pre-purge period of the burner, the needle is keeping the central orifice in the reverse disc closed. On energizing the 3/2 solenoid valve, even after long idle intervals, there is immediate atomization guaranteeing perfect ignition.

The burner-lance is suitable to supply pressures up to 16 bar and fuel temperatures up to 140°C.

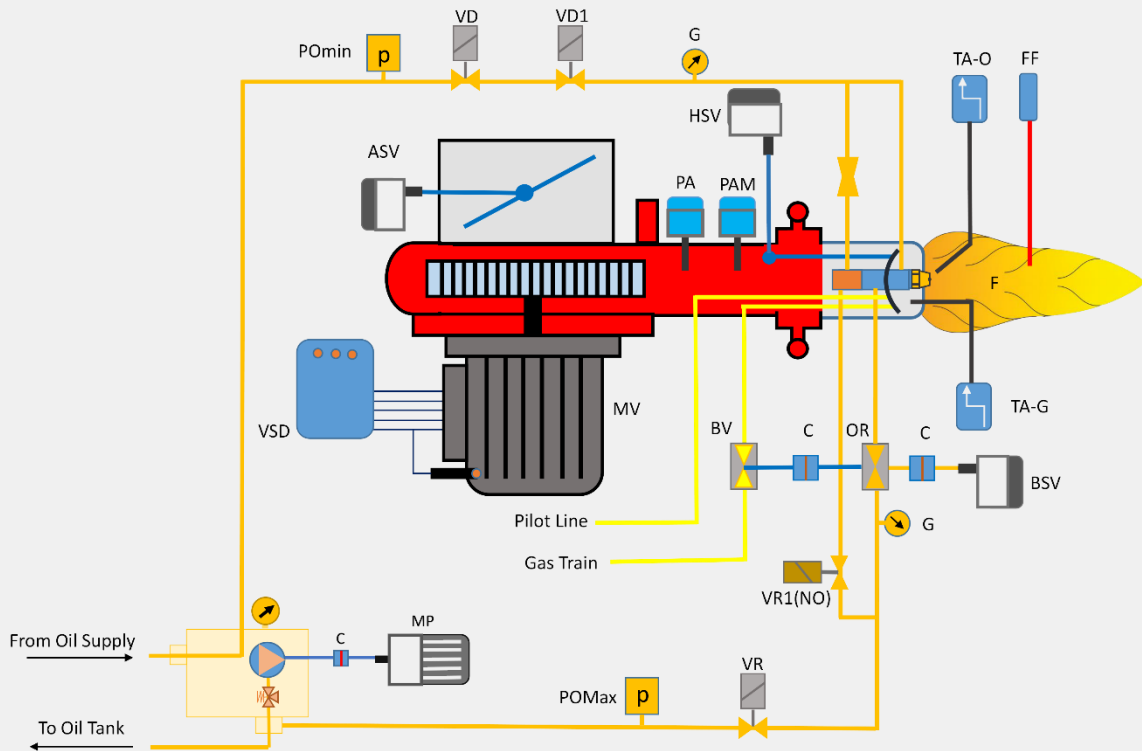


Modulating dual fuel burner type

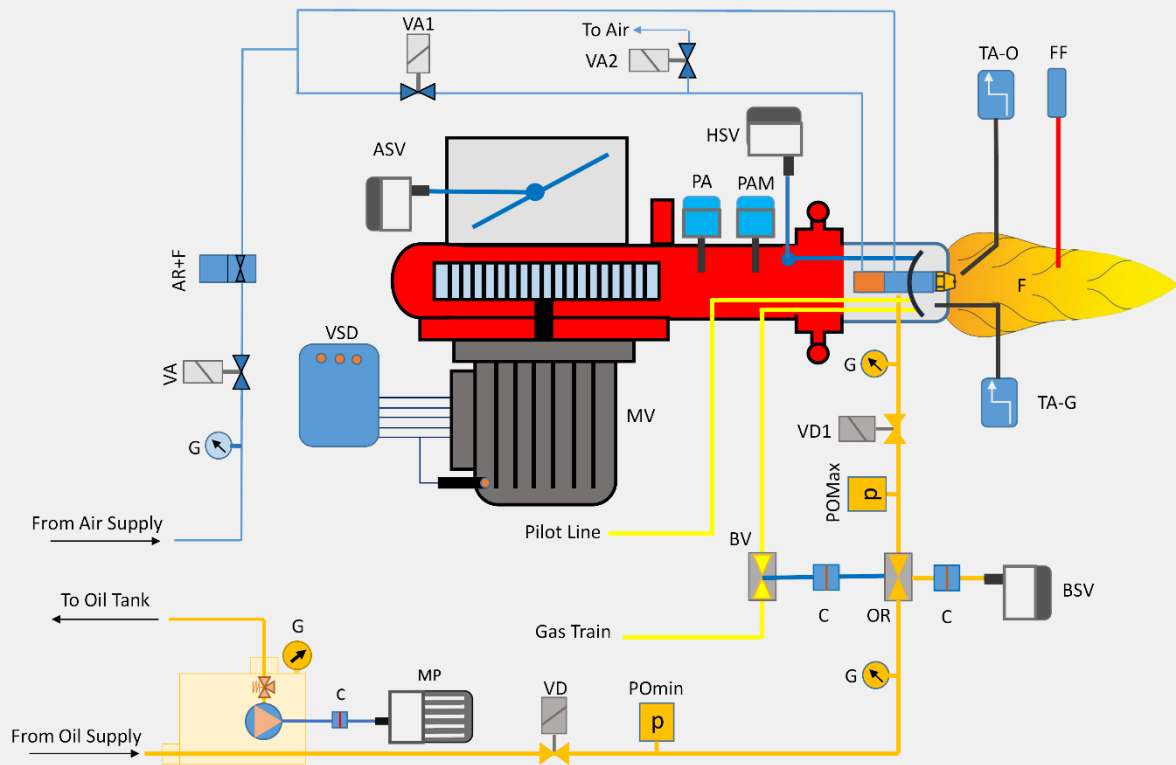
Type OL-I: (Pressure based atomizer – without closing needle)



Type OL-II: (Pressure based atomizer with closing needle)



Type OL-III: (Air/Steam Atomizing technology with closing needle)



MP: Pump motor

FF: Flame sensor

VR: Return solenoid valve

VR1: Return solenoid valve

VR1(NO): Return solenoid valve (N.O)

VD: Light oil safety valve (N.C)

VD1: Light oil delivery valve (N.C)

VA1: Air solenoid valve1

VA2: Air solenoid valve2

PA: Min. Air pressure switch

PAM: Max. air pressure switch

POmin: Min oil pressure switch

POMax: Max oil pressure switch

VA: Air Valve

AR+F: Air regulator and filter

TA: Flame Scanner

FS: Flame Sensor

F: Gas or oil flame

TA-O: Oil ignition transformer

TA-G: Gas ignition transformer

BSV: Butterfly valve servomotor

ASV: Air damper servomotor

HSV: Head servomotor (Optional)

BV: Butterfly valve

OR: Oil Regulator

MV: Fan motor

VSD: Variable speed

drive(optional)

C: Coupling

G: Gauge

Additional Options Available for Order with us

Panel Exhaust Gas Analyzer (PEGA)

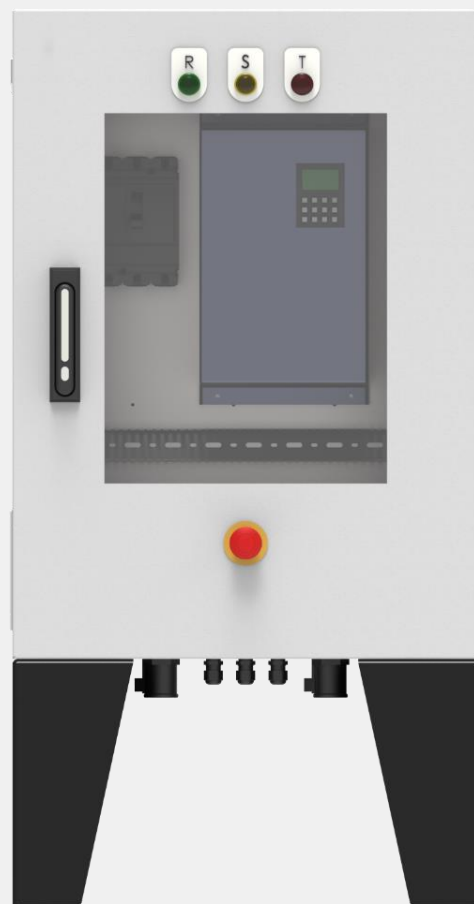
The panel can operate both as a continuous and independent monitoring system, or it can be setup to feed back its readings to the boiler/burner panel or PCP that has MK8 MM or Mini MK8 MM controllers. This proves to be an efficient method for combustion trim.

Optimizing the efficiency and operation of EGA system works by extracting a wet sample from the exhaust gas continuously using a sampling probe. This sample is cooled down in the chiller in the EGA to extract the sample moisture, then the sample passes through filters to remove the moisture and extract the remaining particles before passing through a series of cells. Finally, by passing through a set of separate cells, it is used to analyze the content of the exhaust gas in the sample.



Variable Speed drive (VSD)

A variable speed drive (VSD) is a type of motor drive used in electro-mechanical drive systems. It controls AC motor speed and torque by adjusting the motor input frequency and, depending on the topology, also manages associated voltage or current variation. VFDs may also be known as 'VFDs' (variable-frequency drive), 'AFDs' (adjustable-frequency drives), 'ASDs' (adjustable-speed drives), 'AC drives', 'micro drives', 'inverter drives' or, simply, 'drives'. Using this speed controller can reduce the electrical energy consumption up 35 %.



Raadman Ventilation Motor Starter (RMS)

In burners with ventilation motor capacity of 22kW and above, the power circuit and control circuit need to be installed separately due to destructive effects of electrical noise that power circuit or high voltage has on the control devices. With Regard to this reason, raadman motor starter (RMS) in which the power circuit is embedded, is introduced.

* The burner ventilation motor starter (RMS Series) must be ordered with ventilation motor capacity of 30kW and larger than.



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International sales

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Email: Sales@raadmanburner.com

Support center

Mobile Phone (Telegram & Whatsapp): (+98) 913 429 4981

Email: support@raadmanburner.com



Registration Certificate

This is to certify that the

QUALITY MANAGEMENT SYSTEM

of

Packman Co.

Head Office: 4th Floor, No. 2, 10th St., Bokharest Ave., Tehran-Iran

1st Manufacturing Site : Packman St., Khomeinishahr, Esfahan-Iran

2nd Manufacturing Site: Montazeryeh Industrial Zone, Vilashahr, Esfahan-Iran

for

Design, manufacturing, installation and after sales services of steam and hot water boilers as well as other relevant products including water softeners, sand filters, deaerators, heat exchangers, industrial gas & oil burners, condensing boilers, water desalination systems and CO2 dosing packages

has been assessed and registered against the provisions of

ISO 9001:2015

Registration Number: **1810715**

NACE Code: **DJ28.51 & L74.30**

Assessment Date: **30 August, 2022**

Exclusion: **None**

Date of Registration: **31 August, 2022**

Date of Expiry: **14 Feb., 2024**

Chief Executive Officer
Concord Certification Corporation



Although this certificate has an expiry date on it, this is pertinent to mention that the three years validity of certificate is subject to on time performing of surveillance visits. Should surveillance audits not take place when required, registration shall be removed. This certificate is the property of Concord Certification Corp. and must be returned upon request.



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ریاست جمهوری
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تاریخ صدور اولیه: ۱۳۹۷/۱۲/۰۵
تاریخ تجدید: ۱۴۰۰/۱۲/۰۵



پروانه کاربرد علامت استاندارد اجباری

براساس قانون تقویت و توسعه نظام استاندارد، مصوب سال یک هزار و سیصد و نود و شش و در اجرای مصوبات شورای عالی استاندارد؛ به موجب این پروانه اجازه داده می‌شود: شرکت ماسیساتی ساختمانی پاکمن (سهامی خاص) با رعایت قوانین و مقررات مربوطه و استاندارد ملی شماره ۷۵۹۵ از علامت استاندارد ایران برای محصول: مثلثی گازسوز با توان ۷۰ تا ۱۲۰ کیلووات و مثلث گازسوز با توان بیشتر از ۱۲۰ کیلووات با نام یا علامت تجاری ثبت شده به شماره ۲۹۵۴۴۲ مورخ ۱۳۹۶/۱۲/۱۴ (پاکمن PACKMAN) استفاده نماید.

محمد فرمانی
رئیس سازمان ملی استاندارد ایران
هدی اسلام‌ناه
محمود فرمانی

واحد تولیدی یا خدماتی یا حداقل ۳ ماه قبل از پایان اعتبار پروانه، اقدامات لازم را به منظور تجدید پروانه و به روز رسانی مستندات عمل آورد.
نشانی واحد تولیدی / خدماتی: استان تهران، شهر تهران، خیابان شهید بهشتی، پلاک ۱۲، واحد ۱۲، طبقه مشرف شرقی، خیابان دکتور
رعایت مندرجات پشت پروانه برای دولتمداران الزامی است.
مدت اعتبار این پروانه از تاریخ صدور سه سال است (۱۴۰۳/۱۲/۰۵)



جمهوری اسلامی ایران

بیاست جمهوری

سازمان ملی استاندارد ایران

شماره پروانه: ۶۳۷۴۹۱۵۱۷۵

تاریخ صدور اولیه: ۱۳۹۷/۱۲/۰۵

تاریخ تمدید: ۱۴۰۰/۱۲/۰۵



پروانه کاربرد علامت استاندارد اجباری

براساس قانون تقویت و توسعه نظام استاندارد، مصوب سال یک هزار و سیصد و نود و شش و در اجرای مصوبات شورای عالی استاندارد؛ به موجب این پروانه اجازه داده می‌شود: شرکت تاسیساتی ساختمانی پاکمن (سهامی خاص) با رعایت قوانین و مقررات مربوطه و استاندارد ملی شماره ۷۵۹۴ از علامت استاندارد ایران برای حصول: مثل همی کازونیل سوز دمنده دار با ویژگی مثل همی با گذر کازونیل کتیریا مساوی ۱۰۰ کیلوگرم بر ساعت، مثل همی با گذر کازونیل میش از ۱۰۰ کیلوگرم بر ساعت با نام یا علامت تجاری ثبت شده به شماره ۲۹۵۴۴۲ مورخ ۱۳۹۶/۱۲/۱۴ (پاکمن PACKMAN) استفاده نماید.

همدی اسلام‌ناه

رئیس سازمان ملی استاندارد ایران

محمودفرمانی



واحد تولیدی یا خدماتی باید حداقل ۳ ماه قبل از پایان اعتبار پروانه، اقدامات لازم را به منظور تمدید پروانه در روز رسانی مستندات عمل آورد. نشانی واحد تولیدی / خدماتی: همدان - شهرستان - نبش بلوک شرکت صنعتی نظیر - خیابان ۱۷۱ - دروازه شرقی خیابان دگر رعایت مندرجات پشت پروانه برای دلنیزه آن الزامی است.

مدت اعتبار این پروانه از تاریخ صدور سه سال است (۱۴۰۳/۱۲/۰۵)

ЕВРАЗИЙСКИЙ ЭКОНОМИЧЕСКИЙ СОЮЗ



СЕРТИФИКАТ СООТВЕТСТВИЯ

№ ЕАЭС RU C-IR.БЛ08.В.01522/22

Серия **RU** № **0378484**

ОРГАН ПО СЕРТИФИКАЦИИ Орган по сертификации "ИВАНОВО-СЕРТИФИКАТ" Общества с ограниченной ответственностью "Ивановский Фонд Сертификации": Место нахождения (адрес юридического лица): 153032, Россия, Ивановская область, город Иваново, улица Станкостроителей, дом 1, помещение 169, этаж 4; Адрес места осуществления деятельности: 153032, Россия, Ивановская область, город Иваново, улица Станкостроителей, дом 1; Телефон: +7 (4932) 77-34-67; Адрес электронной почты: info@i-f-s.ru; Аттестат аккредитации № RA.RU.11БЛ08 от 24.03.2016 г.

ИЗГОТОВИТЕЛЬ Фирма "РАСКМАН", Место нахождения (адрес юридического лица) и адрес места осуществления деятельности: ИСЛАМСКАЯ РЕСПУБЛИКА ИРАН, г. Тегеран, ул. Бохарэст, 10-й переулок, № 2, 4-й этаж. Адрес места осуществления деятельности по изготовлению продукции: ИСЛАМСКАЯ РЕСПУБЛИКА ИРАН, обл. Исфahan, г. Вилашахр, промышленный парк, Монтазерия, ул. 102, № 5.

ПРОДУКЦИЯ Горелки газовые блочные промышленные, типы: RGB-M, RPB-M.

Изготовлена в соответствии с Национальным стандартом BS.EN.676

Серийный выпуск

КОД ТН ВЭД ЕАЭС 8416201000

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ ТР ТС 016/2011 "О безопасности аппаратов, работающих на газообразном топливе"

СЕРТИФИКАТ СООТВЕТСТВИЯ ВЫДАН НА ОСНОВАНИИ

Протокол испытаний

№ 3337/2022 от 05.10.2022 г. – Испытательная лаборатория ООО "ТЕСТ-ИНЖИНИРИНГ" (Аттестат аккредитации № RA.RU.21MP40). Акт анализа состояния производства № 22090902/ТРТС/РА от 14.09.2022 г., выдан ОС "ИВАНОВО-СЕРТИФИКАТ" ООО "Ивановский Фонд Сертификации" (Аттестат аккредитации № RA.RU.11БЛ08). Инструкции по монтажу, техническому обслуживанию и эксплуатации горелки б/н от 01.09.2022 г. Схема сертификации 1с

СРОК ДЕЙСТВИЯ С 07.10.2022 ПО 06.10.2023
ВКЛЮЧИТЕЛЬНО

Руководитель (уполномоченное
лицо) органа по сертификации

Эксперт (эксперт-аудитор)
(эксперты (эксперты-аудиторы))



Иванов Александр Вениаминович
(Ф.И.О.)

Жин Сергей Александрович
(Ф.И.О.)

ЕВРАЗИЙСКИЙ ЭКОНОМИЧЕСКИЙ СОЮЗ



СЕРТИФИКАТ СООТВЕТСТВИЯ

№ ЕАЭС RU C-IR.БЛ08.В.01521/22

Серия **RU** № **0378483**

ОРГАН ПО СЕРТИФИКАЦИИ Орган по сертификации "ИВАНОВО-СЕРТИФИКАТ" Общества с ограниченной ответственностью "Ивановский Фонд Сертификации"; Место нахождения (адрес юридического лица): 153032, Россия, Ивановская область, город Иваново, улица Станкостроителей, дом 1, помещение 169, этаж 4; Адрес места осуществления деятельности: 153032, Россия, Ивановская область, город Иваново, улица Станкостроителей, дом 1; Телефон: +7 (4932) 77-34-67; Адрес электронной почты: info@i-f-s.ru; Аттестат аккредитации № RA.RU.11БЛ08 от 24.03.2016 г.

ИЗГОТОВИТЕЛЬ Фирма "РАСКМАН", Место нахождения (адрес юридического лица) и адрес места осуществления деятельности: ИСЛАМСКАЯ РЕСПУБЛИКА ИРАН, г. Тегеран, ул. Бохарэст, 10-й переулок, № 2, 4-й этаж. Адрес места осуществления деятельности по изготовлению продукции: ИСЛАМСКАЯ РЕСПУБЛИКА ИРАН, обл. Исфahan, г. Вилашахр, промышленный парк, Монтазерия, ул. 102, № 5.

ПРОДУКЦИЯ Горелки комбинированные блочные промышленные, типы: RLGB-M, RLGB-M/M. Изготовлена в соответствии с Национальным стандартом BS.EN.676
Серийный выпуск

КОД ТН ВЭД ЕАЭС 8416202000

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ ТР ТС 016/2011 "О безопасности аппаратов, работающих на газообразном топливе"

СЕРТИФИКАТ СООТВЕТСТВИЯ ВЫДАН НА ОСНОВАНИИ

Протокол испытаний

№ 3338/2022 от 05.10.2022 г. – Испытательная лаборатория ООО "ТЕСТ-ИНЖИНИРИНГ" (Аттестат аккредитации № RA.RU.21MP40). Акт анализа состояния производства № 22090903/ТРТС/РА от 14.09.2022 г., выдан ОС "ИВАНОВО-СЕРТИФИКАТ" ООО "Ивановский Фонд Сертификации" (Аттестат аккредитации № RA.RU.11БЛ08). Инструкции по монтажу, техническому обслуживанию и эксплуатации горелки б/н от 01.09.2022 г. Схема сертификации 1с

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ (см. Приложение – бланк № 0923100).

СРОК ДЕЙСТВИЯ С 07.10.2022 ПО 06.10.2023
ВКЛЮЧИТЕЛЬНО

Руководитель (уполномоченное
лицо) органа по сертификации

Эксперт (эксперт-аудитор)
(эксперты (эксперты-аудиторы))

(Подпись)
(Подпись)



Юров Александр Вениаминович

(Ф.И.О.)

М.П. Каролина А. Иванов

(Ф.И.О.)

ПРИЛОЖЕНИЕ

К СЕРТИФИКАТУ СООТВЕТСТВИЯ № ЕАЭС RU C-IR.БЛ08.В.01521/22

Серия **RU** № **0923100**

Стандарты, в результате применения которых на добровольной основе обеспечивается соблюдение требований Технического регламента Таможенного союза

Обозначение стандарта	Наименование стандарта
ГОСТ 21204-97	Горелки газовые промышленные. Общие технические требования
ГОСТ Р 50591-2013	Агрегаты тепловые газопотребляющие. Горелки газовые промышленные. Предельные нормы концентраций NOx в продуктах сгорания

Анализ состояния производства проведен посредством дистанционной оценки.
Условия хранения конкретного изделия, срок хранения (службы) указываются в прилагаемой к продукции товаросопроводительной и/или эксплуатационной документации.

Руководитель (уполномоченное
лицо) органа по сертификации

Эксперт (эксперт-аудитор)
(эксперты (эксперты-аудиторы))





Зов Александр Вениаминович

(Ф.И.О.)

М.П.

РА, RU, ИЕЛ08

ИВАНОВО

Уткин Сергей Александрович

(Ф.И.О.)



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