

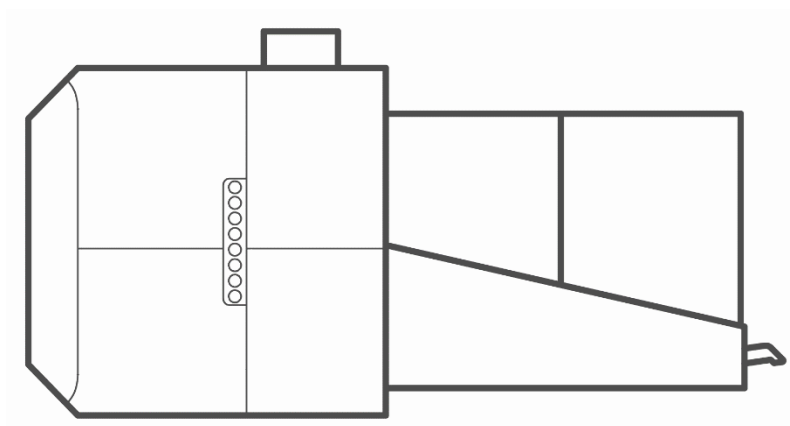


## User Manual

### Pellet burners

### **M50-130** line

2023/04





## CONTENTS

1. GENERAL INFORMATION .....	3
1.1. Transport .....	3
1.2. Storage.....	4
1.3. Inspection of burner delivery .....	4
1.4. Free space around the burner .....	4
2. PRODUCT DESCRIPTION.....	5
2.1. Technologies employed .....	5
2.2. Design of M50, M70, M100, M130 burners.....	7
2.3. Pellet quality requirements .....	8
2.4. Burner dataplate example .....	9
2.5. Burner specifications.....	10
2.6. Burner safety systems .....	12
2.7. STB protection .....	12
2.8. Boiler temperature sensor .....	12
2.9. Controller specifications, description of functions and burner settings .....	13
3. INSTALLATION.....	13
3.1. Stack.....	13
3.2. Boiler / oven.....	14
3.3. Fuel hopper .....	15
3.4. Screw feeders.....	16
3.4.1. Screw feeder, type 1.....	16
3.4.2. Screw feeder, type 2.....	17
3.5. Feeder setting.....	18
4. INSTALLATION OF BURNER AND FEEDER .....	18
4.1. Connecting the feeder.....	19
4.2. Fixing the burner in the boiler.....	20
4.3. Connecting the controller .....	21
5. FIRST START-UP .....	22
5.1. Preparing for the first start-up .....	22
5.2. External feeder calibration procedure.....	23
6. OPERATION AND SAFETY REGULATIONS .....	25
6.1. Operation .....	25
6.2. Maintenance of the furnace plate.....	25
6.3. Specification of inspection intervals .....	28
6.4. Scope of operations .....	28
6.5. Safety regulations for burner installation and operation.....	28
6.6. Warranty .....	29
7. SERVICING THE EQUIPMENT .....	29
7.1. Flame sensor .....	30
7.2. Replacing the igniter.....	30
7.3. Cleaning the feeder tube .....	31

7.4. Cleaning the burner.....	31
8. CAUSES OF MALFUNCTION .....	31
9. WIRING DIAGRAMS .....	34
9.1. PellasX controller wiring diagram.....	34
9.2. Wiring diagram of M50, M70, M100, M130 burners .....	34
10. REPORTS.....	35
10.1. Initial start-up report.....	35
10.2. Inspection report .....	35
11. LIST OF FIGURES AND TABLES .....	37
12. NOTES .....	38

Dear User

Thank you for choosing our product. As a manufacturer with many years of experience, we guarantee that every day of our work, research and constant striving to improve production technology is reflected in the quality of our burners. Our mission is to produce ecological and environmentally friendly equipment. We believe that your choice is a conscious one and is associated with certain expectations, so we make every effort to meet them using the best available technologies. Years of experience in the adaptation of burners ranging from residential heating applications through industry and agriculture to manufacturing have taught us that in order to meet the most diverse conditions of burner operation, it is necessary to apply the principle of an uncompromising approach to the quality of components and materials used. We do this for your comfort, and enjoy the ever-increasing number of satisfied users who have put their trust in the PellasX.

**Author of this User Manual is ISOL Sp. z o.o.**

**It is possible to use it in whole or in part in any publications only after a prior written consent of the author.**

## 1. GENERAL INFORMATION

### **READ THIS MANUAL CAREFULLY BEFORE STARTING THE BURNER.**

It is required that the PellasX burner be installed in accordance with this manual. Following the recommendations of this manual will guarantee the safe operation and installation of the device.

Any doubts and ambiguities, regarding the various functions of the burner components and its equipment, should be reported to the dealer for clarification.

**Burner installation should be performed by a service technician authorized and trained by the Manufacturer.**

#### **Improper installation may void the warranty!**

**Any user of boiler heating equipment, should know and comply with all related local laws, especially before putting the heating system into operation, in accordance with the construction law.**

**The burner manufacturer shall not be held liable for failure to comply with the applicable provisions of the Construction Law and regulations harmonized with it, execution of the heating system, improperly installed or improperly selected boiler. If the burner installed in a manner inconsistent with the recommendations of PellasX it shall not be covered by the manufacturer's warranty, and any repairs to remove the consequences of failure resulting from such an installation will be carried out against payment.**

### **1.1. Transport**

PellasX burners are packed in cardboard boxes (burner with mounting flange and feeder), electronic devices (controller, sensors) are additionally protected in a separate cardboard box. The device should be transported in packaging, according to the marking on the box. Protect the burners, during transportation, from adverse environmental conditions (snow, rain, dust), damage to packaging, and do not expose them to shocks and impacts.

Loading and unloading should be carried out in such a way that the device is not exposed to shocks. Improper loading, unloading and transportation (throwing, violent moving, pressing with heavy products) can cause damage to the product.

If the packaging or product is damaged, the device should be inspected for functionality. If you find the fan or feeder motor not working properly (noisy operation, rubbing), or other malfunctions e.g. of electronic components (missing characters on the liquid crystal display screen), report this fact to the PellasX service centre for verification. The service department will individually and meticulously examine your notification and take appropriate steps to solve the problem.

**Shipments delivered by forwarding companies should be checked with the courier at the time of receipt, and if any discrepancies are found, a protocol should be drawn up stating the extent of the damage.**

## 1.2. Storage

PellasX burners should be stored under environmental conditions consistent with the following recommendations:

- Dry and ventilated rooms, free from substances such as gases, liquids and corrosive fumes, oily vapours that are harmful to the burner. Do not store the burner and feeder in rooms where fertilizers, chlorinated lime, acids, chemicals, etc. are stored.
- The storage temperature of the burner should be between +5°C and +40°C, and the relative humidity should not exceed 70%.
- During storage, the device must not be in direct contact with the ground. The burner to be finally installed in the boiler should be stored in a cardboard box or on a pallet. Equipment can be stored and transported in up to three layers.
- If the burner is stored more than 2 years from the date of manufacture or in environmental conditions that do not comply with the above provision, it should be subjected to a commissioning test by an authorized service technician before installation. As a proof of proper quality and safety of the burner, the above test should be documented in the warranty card.
- The correct functioning of all electrical and mechanical components of the burner, such as drives, fan, igniter, light and temperature sensors should be checked. Any identified problems in operation or incorrect sensor indications will disqualify the device from being put into operation.



### **CAUTION!**

**The burner manufacturer is not responsible for equipment put into operation despite malfunctions or defects found which were caused by damage due to improper storage and transportation.**

## 1.3. Inspection of burner delivery



### **CAUTION!**

**To reduce the risk of fire, do not store flammable materials near the burner (minimum distance of 1m).**

Before proceeding with assembly operations, check the condition of the packaging and make sure that there is no visible damage to it and that the shipment is complete and undamaged. Any reservations and problems should be reported immediately to the supplier, who is responsible for the insurance of the goods.

## 1.4. Free space around the burner

Follow the local safety regulations for boiler heating equipment and provide a free space of at least 1 meter around the boiler and space for burner maintenance. The required service space around the burner must not be limited in any way by the requirements of the boiler manufacturer that uses PellasX burners as a standard equipment for its products. Failure to provide access to the burner may cause difficulties in its normal use and maintenance, which may result in charging additional service costs resulting from the need to completely dismantle the burner for maintenance and repair work.

The boiler room should be clean, dry and well ventilated. The amount of air supplied to the boiler room should be equal to or greater than the amount of flue gas exhausted through the chimney.



#### **CAUTION!**

**The controller and all associated devices should be mounted on or around the boiler in areas where they are not exposed to high temperatures (below 50°C). Electronic devices operating at high temperatures may be damaged or not function properly.**

## **2. PRODUCT DESCRIPTION**

PellasX is a brand under which biomass burners have been manufactured since 2001. They are characterized by infinite adjustment of settings allowing them to be used in any type of stove or boiler. PellasX burners are successfully used in modernized boilers, i.e. in those where the heat source has been changed from an oil, gas or coal burner to a pellet burner. The advanced burner controller used by PellasX has a wide range of control options for the heating system, which means that the boiler modernization does not result in the need for changes in the existing installation. Also, the application of PellasX burners for the production of technological heat in industry or agriculture has been prepared for easy configuration and cooperation with the control devices of industrial systems which use the heat produced by the pellet burner. Firing up, keeping the fire burning after the set temperature has been reached and fuel feeding are performed automatically. Wide possibilities of defining the operation modes make the burner very flexible in adapting to the conditions in which it is to be used, both in terms of its operation and the operation of the systems to be managed by its controller.

The MOTION line burners are designed for demanding conditions such as continuous industrial and manufacturing operations, constantly changing pellet quality, including the use of various alternative additives to the raw material it is made from. MOTION lines burners are characterized by a unique grate design made of highly durable high chromium cast iron alloy providing extraordinary durability and resistance to the aggressive environment of high temperatures and fumes. Its design allows for constant, smooth cleaning of the furnace during operation. This design makes the burner ideal for continuous operation under constant high loads.

### **2.1. Technologies employed**

The innovative MOTION lines represents a range of equipment with a multi-stage, movable grate. It is the very essence of the best technologies and materials used in the previous designs of the brand. The combination of proven and reliable mechanisms used in low-power burners with super-strong materials used in industrial burners resulted in a design with extremely high operating culture and compact size.

1. **GRATE TYPE AND MATERIAL**
  - Multi-stage – movable
  - InCroX<sup>®</sup> high chromium alloy cast plates
2. **GRATE DRIVE AND MOTION**
  - Synchronous motor with reducer
  - No position control
  - Sectional, reciprocating motion
  - Cleaning during operation
  - Main cleaning

3. **REFRACTORIES**

- Polyurethane fibre reinforcement
- Dispersed reinforcement made of heat-resistant wire
- High resistance to temperature and mechanical damage
- Modular design and quick installation

4. **HYBRID DRIVE**

- Combination of blower fan and internal feeder
- Precise metering of fuel and air
- Energy saving
- Additional protection in the form of Hall sensor

5. **IGNITER**

- Steel 300 W
- Quick flame injection
- Easy replacement

6. **SAFETY**

- Shut-off flap system at the fuel inlet
- Flexible feed tube - if the flame backs up, it melts to prevent fuel from entering the burner
- Overpressure combustion technology
- Burner temperature sensor
- Fan rotation and internal feeder control system
- External feeder malfunction indication
- Mechanics and electronics located away from the high temperature zone

7. **FUELS**

- Wood pellets Ø 6-8 mm
- Industrial pellets Ø 6-8 mm
- Agricultural pellets Ø 6-8 mm

8. **MAINTENANCE AND SERVICE**

- Easy to remove refractories to provide access to the entire grate
- Grate plate quick removal system
- Quick and easy access to all mechanical components with the casing removed

9. **CONTROL**

- Wide range of heating system configuration options
- Remote control
- Infinite (electronic) burner power control
- Fully compatible with oil and gas boiler and bakery oven automatic control systems
- Expandable with additional heating circuits
- Ability to operate in ON / OFF mode using a thermostat
- Can be configured for use in industrial applications

**All the above systems that we used in the M-series burner add up to high reliability, which is characterized by:**

- Automatic start after power failure with last settings memory
- Furnace made of the highest quality high chromium alloy
- Automatic operation: firing up, cleaning, flame control
- Low CO and CO<sub>2</sub> emissions.
- Low electricity consumption
- High durability of refractory parts
- High combustion efficiency - up to 99%
- Flame sensor, precisely detecting the flame level
- Compatible with the automation of oil and gas boiler and baking oven
- Ability to operate a draft fan (exhaust system works cyclically, does not cool the boiler).



## 2.2. Design of M50, M70, M100, M130 burners

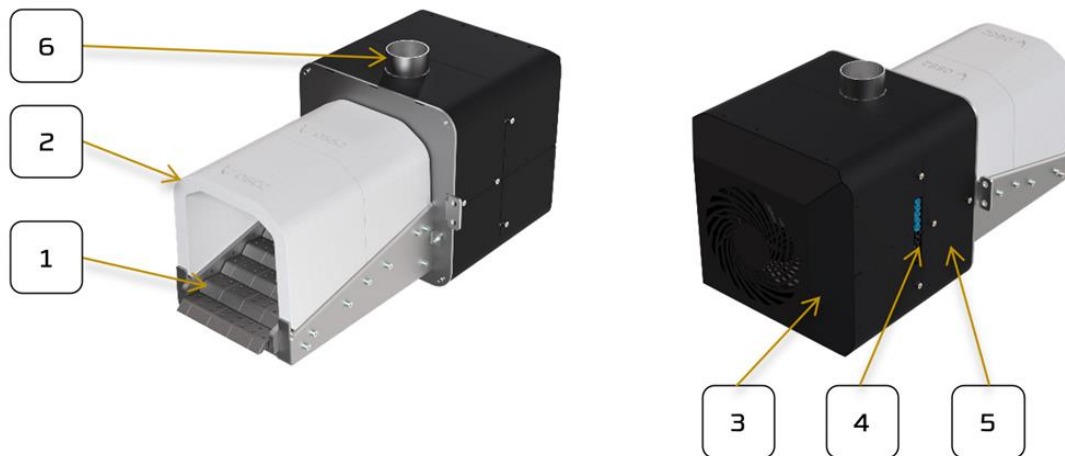


Fig. 1. Design of M50, M70, M100, M130 burners.

Burner is composed of the following sub-assemblies:

- Combustion chamber – the combustion chamber includes a multi-stage furnace (1) made of the highest quality high-chromium alloy and a furnace casing part made of two-part refractory (2);
- Blowing assembly – consisting of a steel housing (3) and an X.Board electrical socket (4) located on the right side of the burner, into which the plug of the controller cable is plugged;
- Blowing chamber – (5) located between the blowing assembly and the combustion chamber. In the upper part of the chamber there is a fuel feeding chimney with a barrier and counterweight (6) to which a polyurethane pipe connected to the fuel feeder is screwed;
- All mechanical and electronic components of the burner are located under the steel housing (3).

The burner housing has no protruding, sharp parts and does not pose a risk to human health. The temperature of the housing when the burner is in operation should not exceed 60°C, unless the device is operated at elevated temperatures, such as in a bakery.



### CAUTION!

**The manufacturer reserves the right to make exclusive changes to the design of the burner and feeder, its software and wiring, otherwise the manufacturer will be released from any liability to the purchaser.**

## 2.3. Pellet quality requirements

The following table contains the individual requirements for fuel (pellet) quality. The use of fuel certified to **DIN 51731** or **DIN PLUS**, or fuel that meets the EN-14961-2 standard, will extend the trouble-free operation of the burner. The storage place for pellets should be dry and airy, it is important that the pellets are at boiler room temperature before being put into the tank.

Table 1. Pellet quality requirements.

Wood pellets	Units	CERTIFICATE	
Quality criteria		DIN plus	DIN 51731
Diameter	mm	$4 \leq d < 10(6)$	$4 \leq d < 10(6)$
Length	mm	$5 \times D(3)$	$< 50$
Density	kg/dm <sup>3</sup>	1.12	$1.0 < \text{density} < 1.4$
Ash	%	$< 0.5(1); (7)$	$< 1.50$
Moisture content	%	$< 10$	$< 12$
Moisture content on delivery	%	not determined	not determined
Calorific value	MJ/kg	$> 18(1)$	$17.5 < HW < 19.5(2)$
Sulphur	%	$< 0.04(1)$	$< 0.08$
Nitrogen	%	$< 0.3(1)$	$< 0.3$
Chlorine	%	$< 0.02(1)$	$< 0.03$
Fines	%	$< 2.3$	-
Pressing additives	%	$< 2(8)$	(4)
Ash melting point	-	not determined	not determined
Arsenic	mg/kg	$< 0.08$	$< 0.08$
Lead	mg/kg	$< 10$	$< 10$
Cadmium	mg/kg	$< 0.5$	$< 0.5$
Chromium	mg/kg	$< 8$	$< 8$
Copper	mg/kg	$< 5$	$< 5$
Mercury	mg/kg	$< 0.05$	$< 0.05$
Zinc	mg/kg	$< 100$	$< 100$
Halides	mg/kg	$< 3$	$< 3$
(1)	of dry mass		
(2)	Free from water and ash		
(3)	Not more than 20% of the pellets can be up to 7.5 x diameter in length		
(4)	DIN prohibits the use of additives. This ban is not valid for small heating systems.		
(5)	In the manufacture's warehouse		
(6)	Tolerance in diameter differences $\pm 10$ %		
(7)	An ash content of up to 0.8% may be allowed if it is naturally higher, specific to the wood species in question.		
(8)	Only natural biomass additives are allowed		



#### ATTENTION!

Changing the diameter of the pellets during the use of the burner (for example, from Ø6 to Ø8), requires that the external feeder calibration procedure be repeated. This process should be repeated each time the pellets are changed (change of type, diameter or manufacturer). A detailed description of the procedure can be found in section. 5.2 (see page 23).

#### 2.4. Burner dataplate example

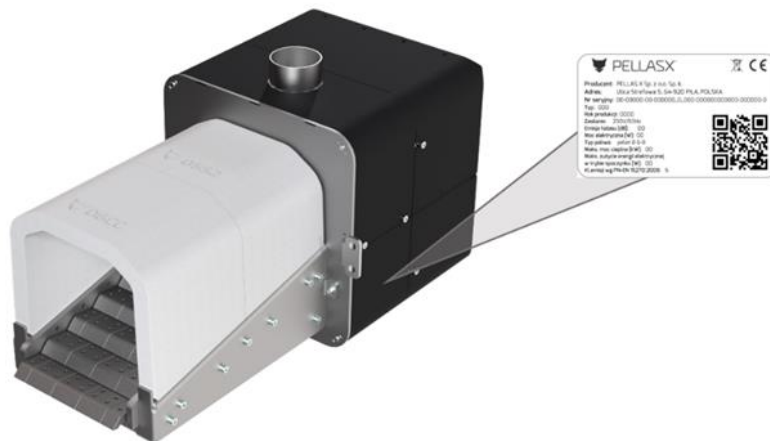
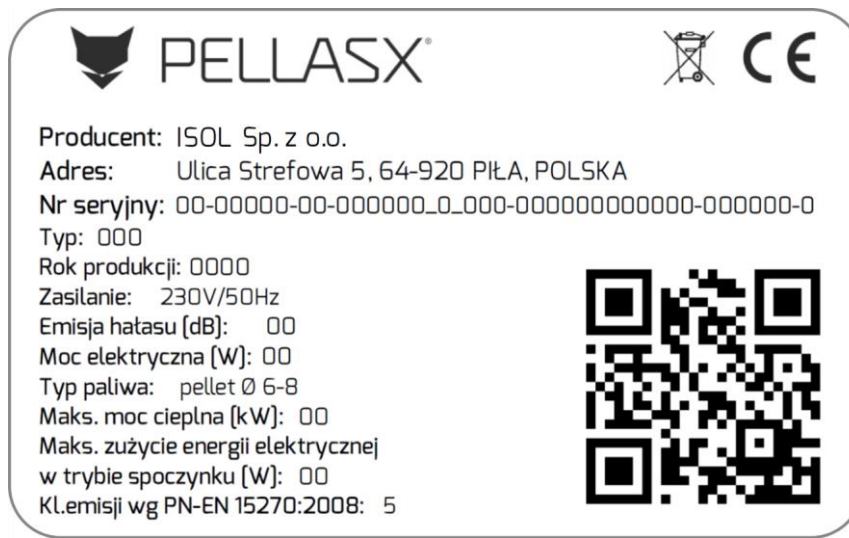


Fig. 2. Example of burner dataplate.

The plate is located on the side of the burner housing. In accordance with the current warranty terms and conditions, only burners commissioned by an authorized service confirmed by an entry in the warranty book will be covered by the manufacturer's warranty. Service actions on burners without original documentation, i.e. warranty book, identical with the nameplate will be carried out only against payment.

Details of the warranty conditions are provided in the burner warranty book.

## 2.5. Burner specifications

Table 2. Specifications of M50, M70, M100, M130 burners.

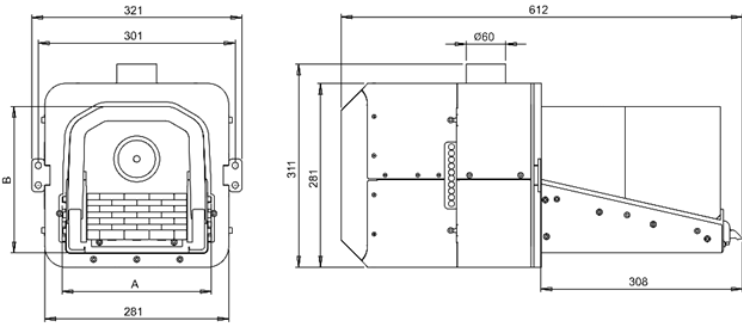
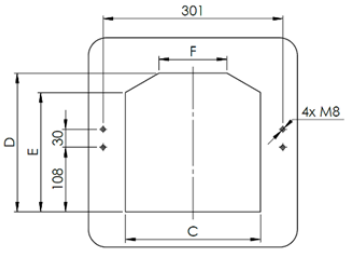
Type	M50	M70	M100	M130
Power	10 - 50 kW	20 - 70 kW	30 - 100 kW	40 - 130 kW
Power supply	230 V AC / 50Hz	230 V AC / 50Hz	230 V AC / 50Hz	230 V AC / 50Hz
Maximum power consumption during firing	355 W	390 W	390 W	480 W
Maximum power consumption during operation	50 W	85 W	85 W	85 W
Weight	30 kg	31 kg	35 kg	39 kg
Noise emissions	63 dB	63 dB	63 dB	63 dB
Feeder length	2 m	2 m	2 m	2 m
Fuel types	pellet Ø 6-8mm	pellet Ø 6-8mm	pellet Ø 6-8mm	pellet Ø 6-8mm
	alternative fuels*	alternative fuels*	alternative fuels*	alternative fuels*
	dry stone	dry stone	dry stone	dry stone
Combustion efficiency	up to 99 %	up to 99 %	up to 99 %	up to 99 %
Boiler efficiency	up to 96 %	up to 96 %	up to 96 %	up to 96 %
Power adjustment	YES	YES	YES	YES
Oxygen sensor	YES (option)	YES (option)	YES (option)	YES (option)
Hot water pump control	YES	YES	YES	YES
Domestic hot water pump control	YES	YES	YES	YES
Mixer control	YES	YES	YES	YES
Buffer control	YES (option)	YES (option)	YES (option)	YES (option)
Additional feeder (silo) control	YES (option)	YES (option)	YES (option)	YES (option)
Room temp. control	YES (option)	YES (option)	YES (option)	YES (option)
Return line temp. sensor	YES (option)	YES (option)	YES (option)	YES (option)
Exhaust gas temperature sensor	YES (option)	YES (option)	YES (option)	YES (option)
Weather control	YES (option)	YES (option)	YES (option)	YES (option)

\* Use of alternative fuel (not certified wooden pellet) can cause variety of problems, loss of power or lack of effectiveness. When alternative fuels has been burned (oats, sunflower pellets or other agropellets) please be aware of high content of ashes that force users to clean the burner and boiler more frequently.

**Please make sure that all alternative fuels used are not exceeding 15% of the moisture. Each time the fuel has been changed please proceed with outside feeder calibration procedure in [section 5.2](#) (see page 23). When the calibration has been executed, please insert correct value into the controller.**

The burners of the MOTION PellasX line feature a simple and consistent design, characterized by easy installation in the boiler door. Below are the overall dimensions, as well as drawings of the mounting holes for each type of burner.

Table 3. Dimensions of M50, M70, M100, M130 burners.

Burner type	Dimensions	Drawing of mounting holes
	 <p>Technical drawings of the burner assembly. The front view shows a rectangular burner with dimensions: overall width 321, mounting hole width 301, burner body width A, burner body height B, and base width 281. The side view shows the burner's profile with dimensions: overall height 612, mounting hole diameter Ø60, burner body height 311, burner body width 281, and base width 308.</p>	 <p>Technical drawing of the mounting holes. It shows a rectangular plate with dimensions: overall width 301, mounting hole width F, burner body width C, burner body height D, burner body height E, and base height 108. There are 4x M8 mounting holes.</p>
M50	A – 187 B – 224	C – 197 D – 234 E – 296 F – 72
M70	A – 187 B – 224	C – 197 D – 234 E – 296 F – 72
M100	A – 229 B – 224	C – 239 D – 234 E – 296 F – 114
M130	A – 267 B – 228	C – 277 D – 238 E – 203 F – 156

## 2.6. Burner safety systems

Burners of the MOTION PellasX line are equipped with the following safety systems, which effectively protect the user from flashbacks:

### 1. Burner temperature sensor

When the sensor detects a temperature above 90°C, it switches from operating mode to extinguishing mode, and turns off the external feeder and sets the fan to 100% blowing power. The alarm temperature setting can be modified depending on the conditions, in which the device is to work, e.g. in baking ovens or drying rooms. It should be mentioned that such changes can be made only by qualified and authorized service personnel.

### 2. Overpressure combustion technology

Overpressure combustion is based on a physical phenomenon created in the burner's internal feeder. Air is supplied centrally to the combustion chamber which results in increased flame swirl and reduces the risk of flashback.

### 3. Fuel feeding chimney with barrier and counterbalance

Feeding chimney, equipped with a steel damping flap with a counterbalance. In the event of a flashback, the barrier closes the fuel inlet hole and at the same time prevents the fire from entering the fuel tank.

**It is important that the counterweight is not blocked in any way.**

### 4. Flexible feeding pipe

The flexible feed pipe is a flexible connector between the external feeder and the burner itself. Its main task is to deliver fuel to the burner., in addition, it also serves as a protection against flashback. Under the influence of high temperatures, the tube will begin to deform and expand to prevent the supply of fuel to the burner.

## 2.7. STB protection

If the furnace or boiler is not equipped with its own STB protection, a mechanical temperature fuse is added to the kit. The capillary sensor should be permanently installed in the boiler's water jacket. When the critical boiler temperature (95°C) is exceeded, the fuel feeder is cut off. In order to restart the burner, the cause of the shutdown caused by overheating of the boiler should be checked, evaluated, and appropriate measures should be taken to remove the cause. Then reset the circuit breaker on the housing. Reset the fuse only after the reduction of the boiler shell temperature to a safe level.

## 2.8. Boiler temperature sensor

The burner is supplied together with a boiler temperature sensor. Its task is to control the temperature of water in the heating boiler. The sensor should be installed according to the boiler manufacturer's recommendations. Usually, such a place is a recessed sleeve that ensures proper reading of the boiler water temperature. Ensure that the sensor is installed in a way that prevents it from slipping out of the recessed sleeve. If the burner is operated in a boiler with an improperly positioned boiler temperature sensor, there is a risk of overheating. According to the boiler temperature sensor, the controller controls the operation of the fuel and air feeding system by increasing and decreasing its output in relation to the heat output demand. The sensor is also the main protection against boiler overheating.

**Not applicable to burners designed for baking ovens.**

For inspection of safety systems, see section 6.2 *Specification of inspection intervals*.

## 2.9. Controller specifications, description of functions and burner settings

All safety conditions regarding the methods of connection to the mains, wiring diagrams of the controller board, description of functionality and methods of operation are described in the manual of the controller supplied with each PellasX burner. Meeting all the requirements for the controller connection ensures safe operation of the burner. Keep in mind that the controller controls the operation of the heating system in a defined manner (described in the controller's manual), this triggers the need to follow the recommendations for dedicated hydraulic diagrams presented, together with the description, in the controller's manual.

The use of hydraulic solutions inconsistent with those suggested by the manufacturer of the controller may cause difficulties in the proper functioning of the heating systems.



### ATTENTION!

**The manufacturer of the burner is not responsible for incorrect installation, improper configuration of the controller settings that determine the operation of the fittings in the heating system.**

## 3. INSTALLATION

### 3.1. Stack

The parameters of the chimney should be adapted to the requirements of the heating appliance in which the burner is to be installed. The stack can be made of ceramic or steel; it should be clean and its draught should be sufficient for the PellasX burner operating with the heating appliance within the set power range. In case of inadequate draught, it is necessary to install a mechanical fume extractor. Before operation, the chimney should be inspected and approved by an authorized chimney sweep.

Note that a tall stack with high flue gas throughput needs more heat and the internal temperature of the stack should not be less than 80°C 1m below the top to avoid condensation at the top of the stack. In order to reduce the internal cross section of the chimney, a steel pipe of appropriate diameter can be installed. Any advice on the flue should be sought from a chimney sweep company. Strong winds, excessively high or excessively low chimney affect the efficiency of the burner and its setting. It is recommended in such cases to install a stack draught stabilizer to ventilate the stack and help adjust the flow. If the stack is too small, the burner may not work properly. In such a case, it is necessary to install a mechanical fume extractor.

Table 4. Minimum stack draught.

BURNER TYPE	MINIMUM STACK DRAUGHT [Pa]
M50	25
M70	25
M100	30
M130	30

The value of the minimum stack draft should be determined when the stack is cold.



Fig. 3. Location of burner with respect to the direction of the flame.

In the room where the burner is operated, it is necessary to ensure an adequate supply of fresh air, as well as exhaust ventilation. The air supply (air grille) should be located at the floor, while the exhaust ventilation grille should be located under the ceiling of the room.

A high risk of carbon monoxide poisoning occurs when the boiler is located in a room with an inadequate supply of fresh air.

### 3.2. Boiler / oven

MOTION PellasX line burners with a power of 50-130 kW can be installed in most boilers. The power of the burner must be selected by the installer depending on the power of the boiler or oven. It is recommended to install the burner in the boiler door, using four M8 screws (dimensions shown in [Table 3](#)). If the boiler chamber is too small, the burner may work incorrectly.

Strictly comply with the recommendations for the minimum required distances from the interior walls of the boiler. Distances specific to MOTION lines burners are shown in [Tables 5, 6 and 7](#). If the burner is located in a chamber whose walls are too close to the working part of the burner, they may cause excessive heat load on the burner. This may lead to faster wear of components working at high temperatures, and can also lead to heat radiation to mechanical and electronic components. A burner that does not have the proper boiler chamber volume required for its power may generate unstable levels of waste gas emissions, as well as will not provide the expected heat flux transferred to the receiver (oven/boiler).

Following the installation recommendations is a guarantee of proper burner operation.

Table 5. Minimum dimensions of the furnace chamber.

BURNER TYPE	MINIMUM DIMENSIONS OF THE FURNACE CHAMBER	
	MIN. VOLUME OF THE FURNACE CHAMBER [m <sup>3</sup> ]	MIN. LENGTH OF THE FURNACE CHAMBER L [mm]
M50	0,040	550
M70	0,070	790
M100	0,099	790
M130	0,114	950



Table 6. Examples of minimum dimensions of a rectangular furnace chamber.

BURNER TYPE	EXAMPLES OF MINIMUM DIMENSIONS OF A RECTANGULAR FURNACE CHAMBER		
	WIDTH A [mm]	HEIGHT H [mm]	LENGTH L [mm]
M50	324	388	550
M70	324	388	790
M100	324	388	790
M130	324	388	950

Table 7. Examples of minimum dimensions of a cylindrical furnace chamber.

BURNER TYPE	EXAMPLES OF MINIMUM DIMENSIONS OF A CYLINDRICAL FURNACE CHAMBER.	
	MIN. CHAMBER DIAMETER D [mm]	MIN. LENGTH OF THE FURNACE CHAMBER L [mm]
M50	400	550
M70	400	790
M100	400	790
M130	400	950

Table 8. Pressure values in the combustion chamber.

BURNER TYPE	PRESSURES IN THE COMBUSTION CHAMBER [Pa]
M50	25
M70	25
M100	25
M130	30

### 3.3. Fuel hopper

The fuel hopper can be made of any non-flammable material, such as steel sheet of any capacity, and should be located at an appropriate distance from the burner ([Figure 7](#)). A spiral feeder in a casing pipe is mounted to the fuel hopper in its lower part. The inclination of the feeder should not be more than 45° to the ground. The hopper must be covered from the top with a lid. Any manipulation on the bottom of the hopper during feeder operation is forbidden, as it poses a risk of injury to the body - fingers of the hand. Remember to refill the hopper with pellet fuel before starting the burner. Do not fill the hopper with damp or decaying fuel. This may cause difficulties in burner operation by blocking the feeder.

Please note that there should be sufficient space around the pellet hopper to perform service work on the external feeder, or to empty the feeder of pellets using the cleanout at the bottom of the feeder.

### 3.4. Screw feeders

Table 9. Feeder types.

M50	M70	M100	M130
TYPE 1	TYPE 1	TYPE 1	TYPE 2

#### 3.4.1. Screw feeder, type 1

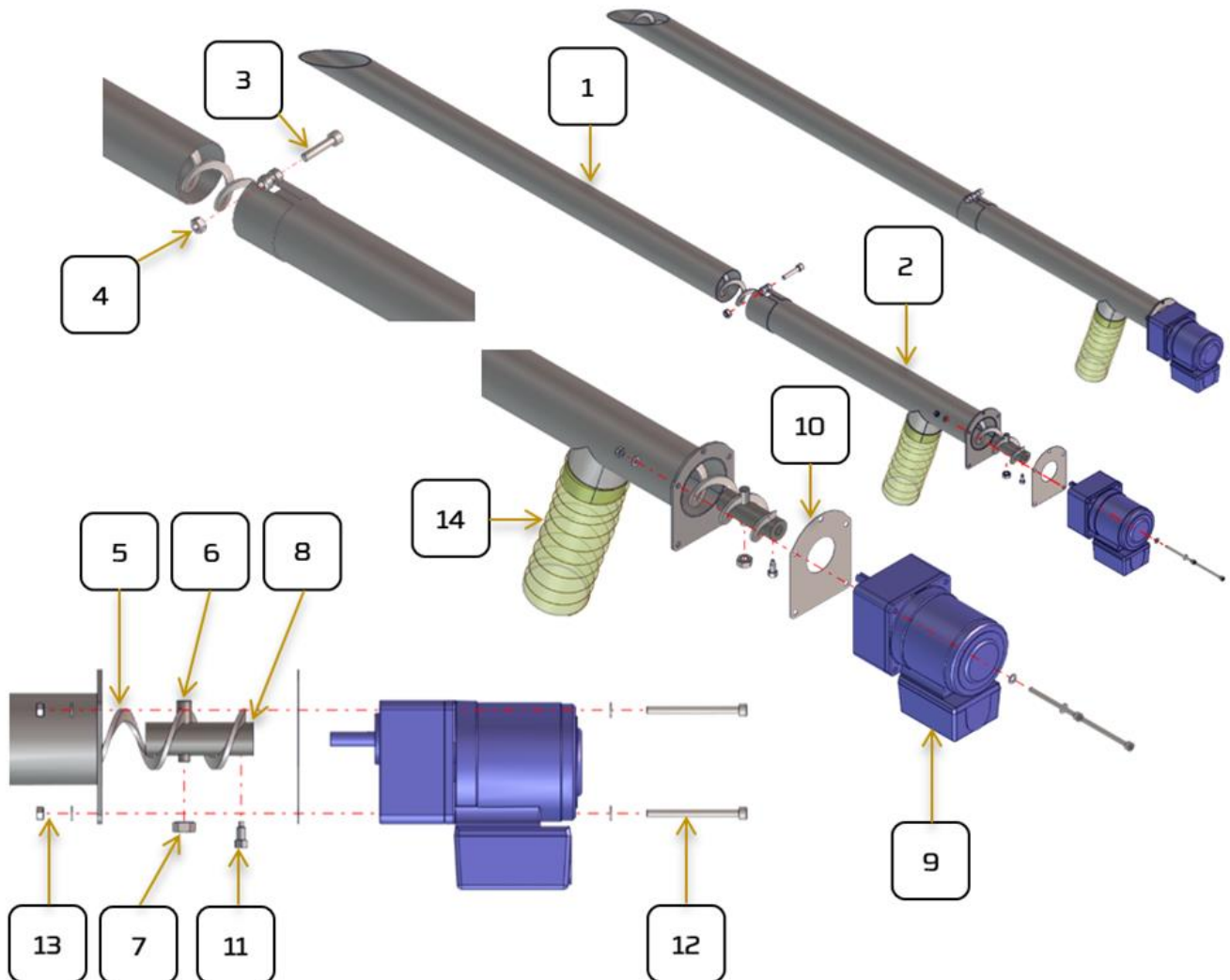


Fig. 4. Type 1 feeder design.

The fuel feeder connects the fuel hopper to the burner. It is made of galvanized steel pipes (1) (2) with a diameter of 60.3 mm. Inside the tube is a steel spiral (5) driven by a 230V AC electric motor with gearbox (9). The motor is connected via a power cord to a suitable socket located on the burner controller. The lower part of the feeder is mounted in the lower part of the fuel hopper and the upper part is connected to the burner with a flexible polyurethane pipe (14).

**Feeder installation diagram (Fig. 4):**

1. Connect the two pipes (1) and (2) using M8 bolt (3) and M8 nut with washers (4);
2. Place the mandrel (6) in the shaft hole (8), then screw the spiral (5) onto the mandrel (6) and tighten with the M8 nut (7);
3. Put the feeder cap (10) on the motor spindle (9);
4. Slide the shaft (8), together with the screwed spiral, onto the motor spindle (9) and secure with the set screw (11);
5. Slide the spiral (5) inside the pipes. Use bolts (12) and nuts (13) to screw the motor (9) to the pipe flange.

### 3.4.2. Screw feeder, type 2

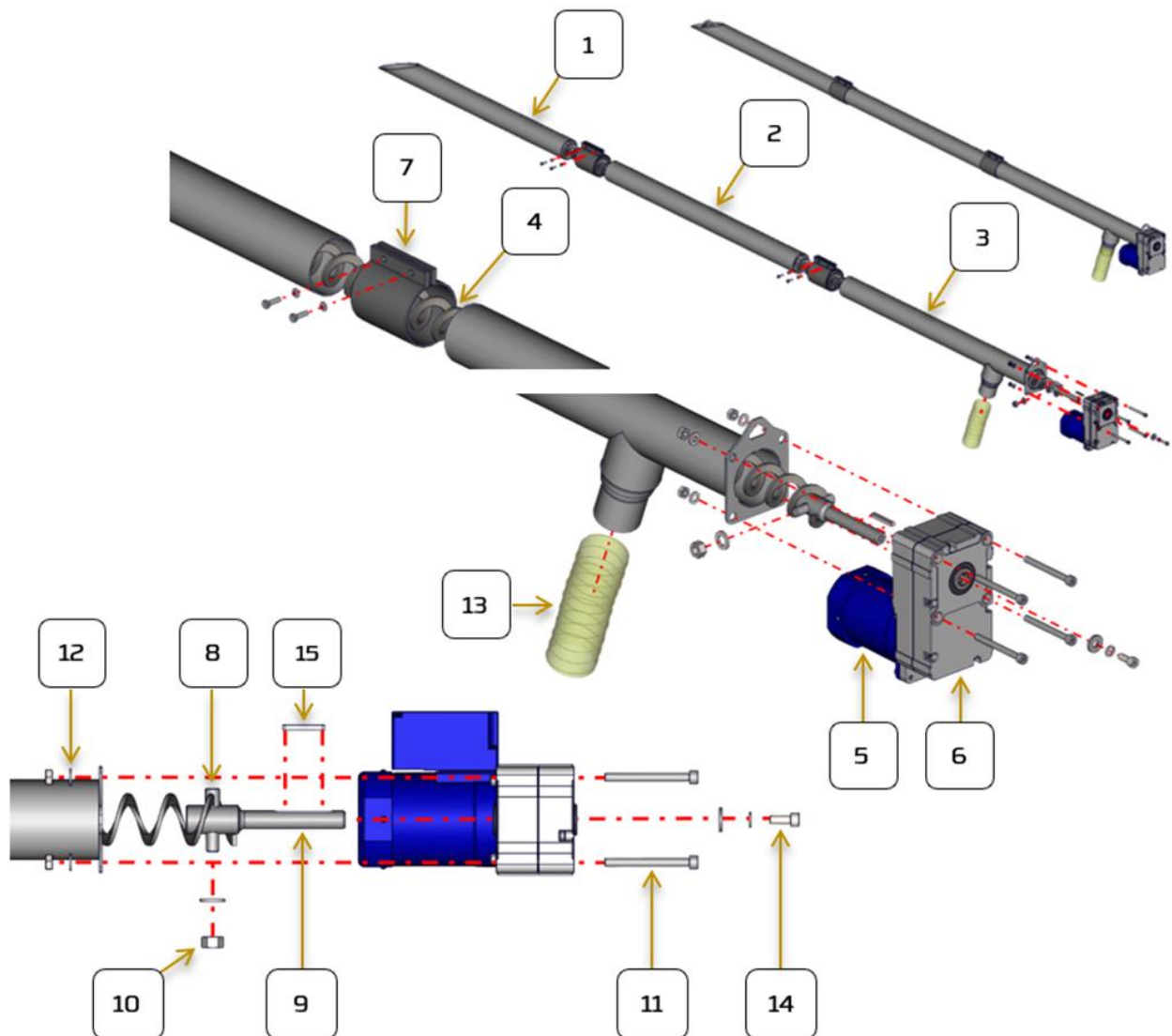


Fig. 5. Type 2 feeder design.

The fuel feeder connects the fuel hopper to the burner. It is made of three galvanized steel pipes (1, 2, 3) with diameters of 76.1 mm each. Inside the tube is a steel spiral (4) driven by a 230V AC electric motor (5) coupled to a gearbox (6). The motor is connected via a power cord to a suitable socket located in the burner control cabinet (see the electrical diagram). The lower part of the feeder is mounted in the lower part of the fuel hopper and the upper part is connected to the burner with a flexible polyurethane pipe (13).

### Feeder installation diagram (Fig. 5):

1. Connect the three pipes (1), (2) and (3) using connectors (7) and tighten the fixing screws.
2. Place the mandrel (8) in the shaft hole (9), then screw the spiral (4) onto the mandrel (8) and tighten with the M12 nut with a washer (10);
3. Place the keyway (15) in the groove of the shaft (9). Slide the shaft into the hole in the gearbox (6), and then tighten the M8 bolt with washers (14) to the repositioned shaft;
4. Slide the spiral into the pipe. Use M8x80 bolts (11) and M8 nuts with washers (12) to screw the gears (6) to the pipe flange.

**NOTE: The end of the feeder spiral should be in 2/3 of the length inlet opening (Fig. 6). If the spiral is too long, cut it to the required length.**

### 3.5. Feeder setting

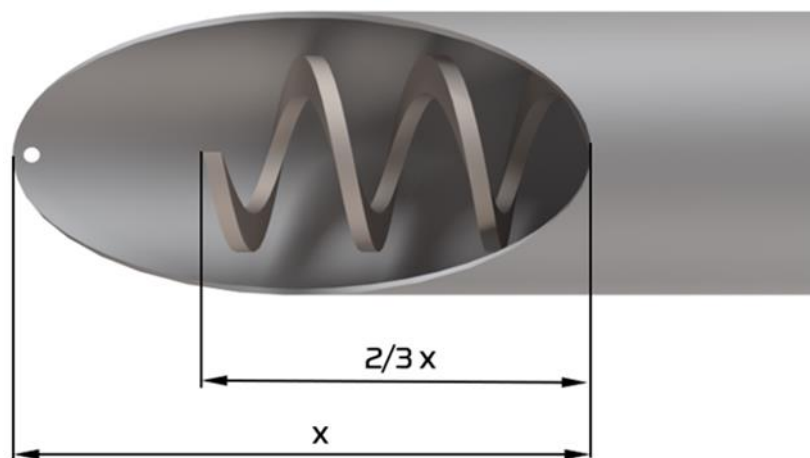


Fig. 6. Feeder spiral installation.

Fuel dosing is performed automatically. Feeder operation is cyclic and controlled by the burner controller. The feeder must be set at an angle (maximum 45°) to the ground. The flexible anti-static polyurethane pipe must be moved away from the burner axis by a minimum of 30 cm. If the pipe overheats (flashback) and melts, pellets will not pour into the burner. Lack of fuel will cause the burner to go out. This prevents the fire from spreading to the fuel hopper and starting a fire in the boiler room.

**NOTE: Before starting the burner, fill the hopper with pellets and fill the feeder until the pellets begin to fall into the burner.**

## 4. INSTALLATION OF BURNER AND FEEDER

The burner and feeder are delivered ready for installation. The kit is packed in a cardboard box which should be transported according to the markings. The set is intended for self-assembly.



**ATTENTION!**  
**Disconnect all power to the boiler and burner before installation or removal.**

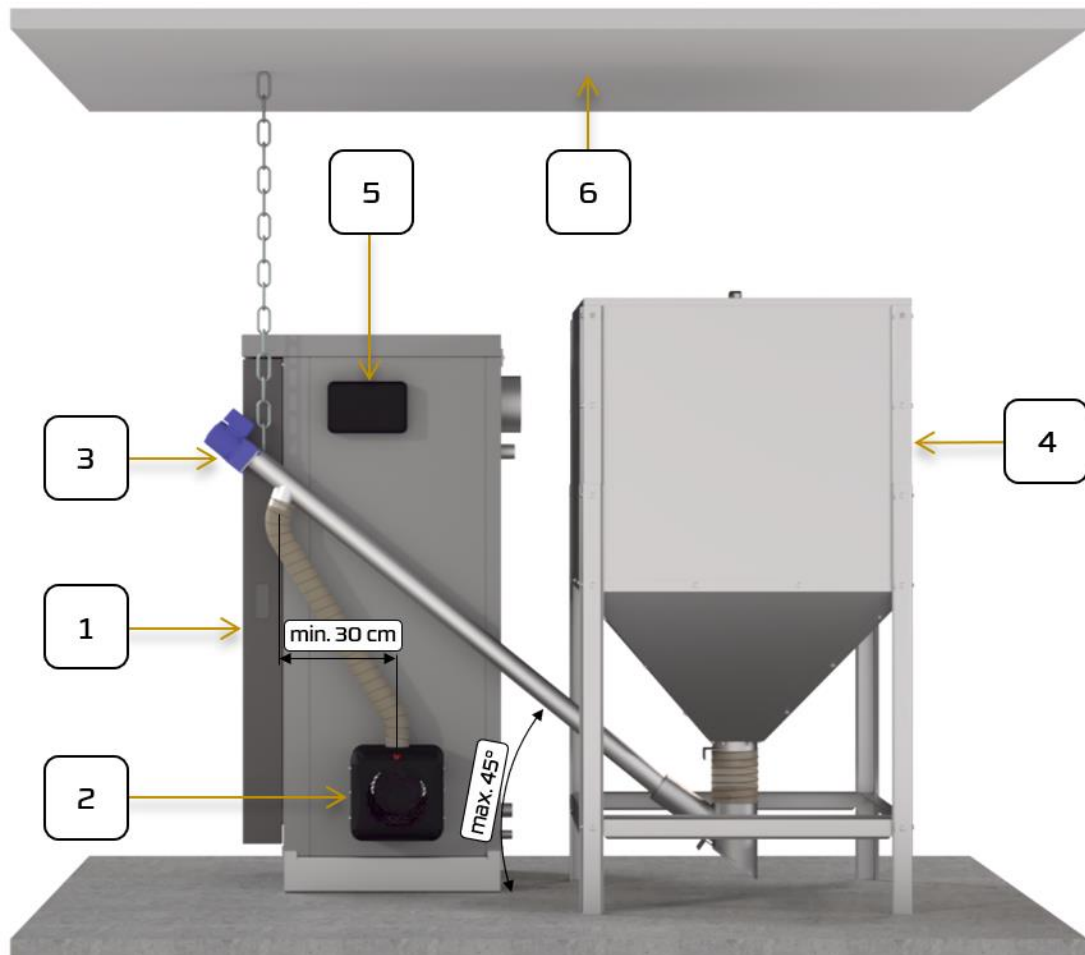


Fig. 7. Diagram of the boiler room installation: 1 – boiler, 2 – burner, 3 – feeder, 4 – hopper, 5 – controller, 6- ceiling.

Continuity of the combustion process requires periodic refilling of the fuel hopper. The frequency of refilling depends on the intensity of the combustion process and should be determined individually according to needs. Refuelling should be done with the controller (boiler) turned off. Do not start the boiler when the fuel level in the hopper is below the minimum level. Lack of fuel causes a permanent interruption of the combustion process and requires re-ignition in the boiler.

The hopper should be filled only with dry fuel. The fuel should not contain solid impurities such as nails, screws, stones, pieces of wood, wires, strings, bags, etc. When refilling the fuel in the hopper, visually assess whether there are any of the above-mentioned impurities in the pellets, if you notice any, remove them immediately. Otherwise, malfunctions may occur leading to frequent blockage of the external screw feeder.

#### 4.1. Connecting the feeder

- Attach a flexible feed pipe to the feeder discharge, with a length that allows you to place the top of the feeder, but no less than 30 cm from the vertical axis of the burner feed. Slide the other part of the flexible pipe onto the vertical pipe of the burner's feeding chimney and clamp it with a clamp;
- Place the lower part of the feeder tube in the fuel container, making sure that the pellet intake hole faces upward;



#### ATTENTION!

**The feeder should be set at an angle of not more than 45° to the floor.**

- Fill the container with fuel. The fuel certificate should be made available by the vendor. The fuel specification is included in [Table 1](#);
- Connect the feeder to the burner using the electrical cable that supplies the feeder by placing the plug in the appropriate socket on the controller. Make sure the burner housing neutral wire is undamaged and tightened firmly to the housing;
- If the furnace or boiler does not have its own STB protection, a snap-in capillary thermostat is added to the kit. The capillary sensor should be permanently installed in the boiler water jacket, together with the boiler temperature sensor.

#### 4.2. Fixing the burner in the boiler

##### **M50, M70, M100, M130 burners installation diagram:**

- Install an insulating layer (1) between the mounting plate and the boiler door (**PellasX recommends using a non-combustible insulating layer between the burner and the mounting window, regardless of whether the boiler manufacturer has used an insulating layer for the partition or door where the burner is to be installed**);
- Place the burner feeder. cover in the boiler mounting hole and fasten with M8 screws with washers (2);
- To remove the burner from the boiler, unscrew the M5 screws (3) on the side of the burner.

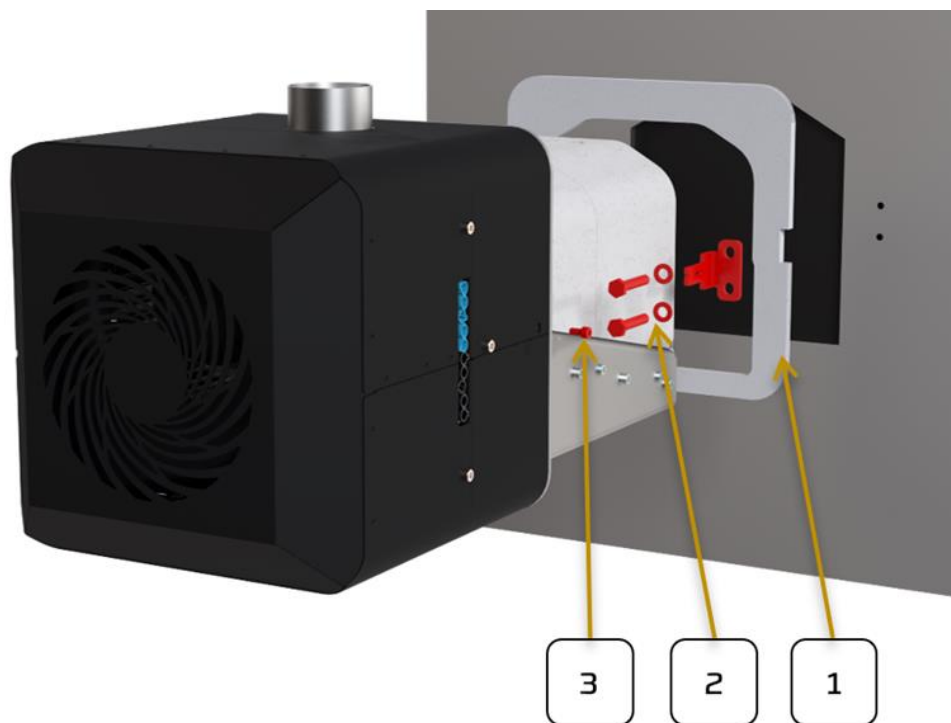


Fig. 8. Installation of M50, M70, M100 and M130 burners in the boiler door.



#### **ATTENTION!**

**When installing a burner in a boiler not equipped with external thermal insulation at the point of attachment, use an insulation pad to protect the burner from temperature transfer from the boiler.**

### 4.3. Connecting the controller



#### **ATTENTION!**

**Before installing and connecting the controller, it is absolutely necessary to read its manual, which is included in the PellasX burner kit.**

**A detailed description of the safety rules for connecting and operating the controller, as well as all cooperating modules and devices dedicated to PellasX burners can be found in the controller's manual. Please note that it is required to strictly follow the wiring diagram described by the manufacturer of the controller, and the connection should be made by an authorized service technician.**

Screw the controller housing to a flat mounting surface (horizontal or vertical), e.g., boiler housing, wall. You need to use the four indicated mounting points.

After installation, make sure that the device is fixed securely and cannot be detached from the mounting surface.

Opening the boiler door or leaking flue pipes must not expose the controller to direct exposure to hot gases and fire from the furnace.

For safety reasons, it is imperative that the controller be connected to the ~230 V power supply, observing the order in which the phase L and neutral N wires are connected. Make sure that the L and N wires are not interchanged within the building's electrical system, e.g. in an electrical socket or distribution box!

The controller is designed to be powered by ~230 V, 50 Hz. The electrical system should be:

- three-wire (with PE protective conductor);
- compliant with the regulations in force;
- equipped with a residual current circuit breaker with a tripping current of  $I_{\Delta n} \leq 30\text{mA}$  to protect against electric shock and limit damage to the device, including protection against fire.

**Connecting the mains voltage to the wrong terminals of the controller will result in damage to the controller and pose a risk of electric shock.**

After the controller is permanently fixed in the target location that ensures its safe operation, connect the burner cable to the socket located on the right-side wall of the burner.

After switching on the controller, an authorized factory service technician should perform a comprehensive check of the functionality of all burner components, as well as fittings which operate with the controller.

Do not start firing the burner without checking the correct functionality of its electronic and mechanical components.

## 5. FIRST START-UP

### 5.1. Preparing for the first start-up

#### 1. Make sure that all necessary documents are attached to the boiler

- Boiler manual;
- Burner manual;
- Controller manual;
- Warranty books (of the boiler and the burner);
- The burner has the original nameplate with serial number and date of manufacture.

Read the contents of the manual of the controller - it is the controller that is responsible for the operation of the burner and the entire installation. In the manual you will find an example of an installation diagram that you can use based on the algorithm of the controller factory-attached to the burner and boiler, as well as an electrical diagram of the device, which will allow you to safely connect the fittings to the controller.

#### 2. Carefully analyse the suggested hydraulic solutions (diagrams located in the manual of the controller) and choose the right type of installation you want to build.

If you are not building the installation - verify it according to these guidelines before deciding to attempt the first start-up. **Exercise extreme caution.**

#### 3. Install the boiler with the burner according to the guidelines of diagram No. 1.

Follow the guidelines of the diagram also when modifying an existing installation. Remember that meeting all the guidelines of the diagram is required during the first start-up.

**CAUTION! The order in which pumps and valves are connected is important.**

#### 4. Remember that the PELLASX factory service that performs the first start-up is not obliged to connect components or sensors to the controller.

Also, do not interfere with the hydraulic and combustion system. Additional operations performed by the factory service may result in a financial charge to the person reporting the boiler for firing.

If you are doing the installation yourself, stick to the PELLASX guidelines, and remember that **100% of boiler manufacturers recommend to use protection of the return line** - its absence will most often void the warranty.

#### 5. Before starting the boiler up for the first time, make sure that:

- The heating system is tight and contains water;
- The boiler/burner controller is securely connected to the electrical network;
- You have properly assembled and installed the main feeder and hopper (the angle of the feeder to the ground should not exceed 45°);
- Check that the flexible pellet feed tube is taut, twisted with clamps, and has no kinks because of which the pellets may get stuck in it;
- There are pellets in the hopper and that the feeder pipe is filled - use the **Manual Control** menu and fill the feeder;
- The boiler room is provided with ventilation (inlet at the floor and exhaust at the ceiling);
- You have properly connected all components (pumps, valves, sensors) - use the **Manual Control** menu and check that they work;
- The boiler and burner are accompanied by the necessary documentation including warranty card.



The 5 verification points described above are worth using not only when inspecting the installation work performed by yourself, but also as a form of preliminary verification of the boiler room, boiler and burner at the customer who reports readiness for the first start-up of the boiler.

Factory and authorized service technicians should always verify the documents described in **point. 1** - on each visit to the customer (start-up / repair / inspection).

## 5.2. External feeder calibration procedure

Why is it so important?

An uncalibrated feeder can lead to many failures and improper operation of the burner. Examples of the consequences of an uncalibrated external feeder are.:

- Excessive fuel consumption;
- Burner overheating;
- Improper fuel/air ratio resulting in excessive fouling of the boiler chamber;
- Shortage of heat in relation to the demand.

**NOTE! The following procedure must be carried out in the order described without missing any point!**

### IF YOU ARE ASSEMBLING A NEW SET

1. Fold the feeder and insert it into the hopper according to the burner manual;
2. Pour pellets into the hopper;
3. Connect the feeder to the controller (according to the wiring diagram provided in the in the controller's manual);

### IF YOU ARE STARTING THE BURNER

4. Use MAIN MENU → MANUAL CONTROL → FEEDER → to start the external feeder;
5. The motor should remain on until a steady stream of fuel comes out of the feeder tube. This means that the feeder tube has filled completely;



#### ATTENTION!

**The controller automatically shuts down equipment running in MANUAL CONTROL mode after 2 minutes - to continue filling the feeder tube, the feeder must be turned back on until the external feeder tube is completely full.**

6. After filling the feeder with pellets, prepare the stopwatch.

Place an empty bag under the polyurethane tube and go to MAIN MENU → MANUAL CONTROL → FEEDER to turn on the feeder. When starting the feeder, start counting down the time of 6 minutes.

**Remember - the controller automatically shuts down the feeder after 2 minutes the process must be repeated 3 times;**

7. After 6 minutes, turn off the feeder on the controller;

8. Weigh the pellets that were poured into the bag during the 6-minute feeder operation.

**Note: If you use a bucket or other container, remember to weigh the net weight of the pellets (i.e. subtract the weight of the bucket or container from that of the pellets).**

9. The weight of pellets should be multiplied x 10, and the value should be entered into the controller.

**Example:** during 6 minutes the feeder discharged 1.2 kg of pellets → enter the value:  
 $1.2 \times 10 = 12 \text{ kg/h}$

10. Enter the calorific value of the pellets into the controller according to the information placed on the bag by the manufacturer.

Table 10. Tips for entering data into the controller.

Heating value of the fuel (calorific value of pellets)	Feeder capacity
MAIN MENU → BOILER SETTINGS → → POWER MODULATION → → CALORIFIC VALUE [kWh]	MAIN MENU → BOILER SETTINGS → → POWER MODULATION → → FEEDER CAPACITY [kg/h]

Please note that with each change of pellets (change of supplier / diameter / grade / change of feeder setting) it is necessary to calibrate the feeder to ensure optimal fuel consumption and ensure proper operation of the burner. If there are no changes, calibration should be performed at least once per heating season.



**ATTENTION!**

**Record the actual calorific value of the pellets declared by the manufacturer, expressed in kWh (about 4.9 kWh on average) in the controller.**

- **By entering too low calorific value, the feeder feeds more pellets.**
- **By entering too high calorific value, the controller feeds less pellets.**

**The first start-up must be performed by an authorized installer trained at ISOL Sp. z o.o. (Manufacturer), and this operation should be recorded in the warranty book with written confirmation by the service technician, who performed the start-up.**

## 6. OPERATION AND SAFETY REGULATIONS

### 6.1. Operation



#### ATTENTION!

**PellasX burners should only be operated by adults. Before operating the burner, it is absolutely necessary to read the user manual.**

Before starting the burner, check all connections including those of the burner with the feeder. Check the bolts securing the burner to the boiler and the thermal seal between the burner and the boiler.

The burner is started according to the instructions after connection to the mains, using a power cord with a grounded plug. To ensure proper operation of the burner, the furnace interior should be cleaned of carbon deposit and slag.

### 6.2. Maintenance of the furnace plate

Burners of the MOTION PellasX line with a power of 50-130 kW are equipped with a removable furnace in the form of plates. Before pulling out the furnace, it should be thoroughly cleaned so that ash does not enter the blowing chamber during pulling out. Then you can remove the furnace and unclog the blowing holes. After removing the furnace, remove the ash from the space under it. After maintenance is completed, the furnace should be properly reinserted into the burner. The diagram of the removal and installation of the furnace is shown in the figures below.



#### ATTENTION!

**Always perform burner maintenance on a cold burner. Refractory components may still be hot after extinguishing.**

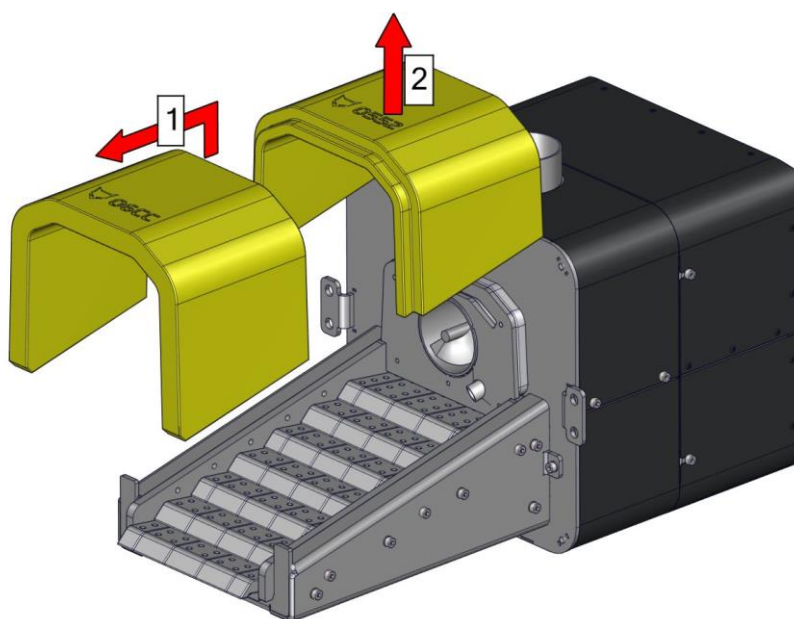
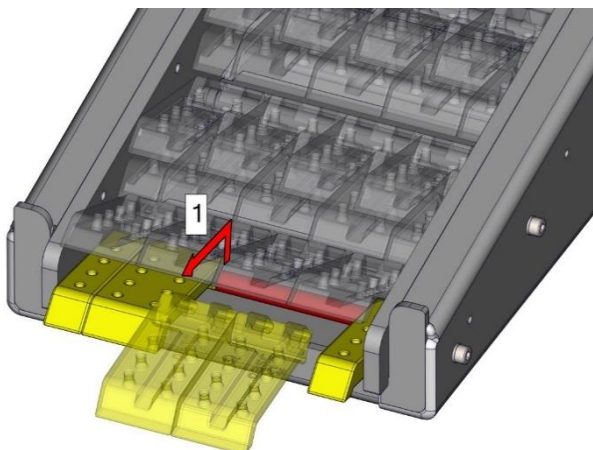


Fig. 9. Removal of refractory cover.

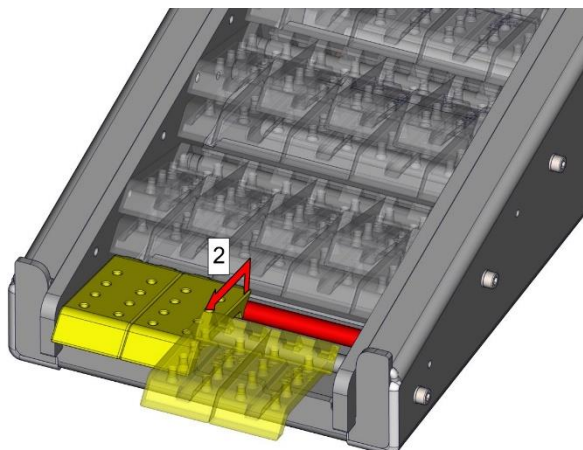
### Step 1

Lift and pull out the 1st row of furnace tiles (left and right halves of the plate on the sides).



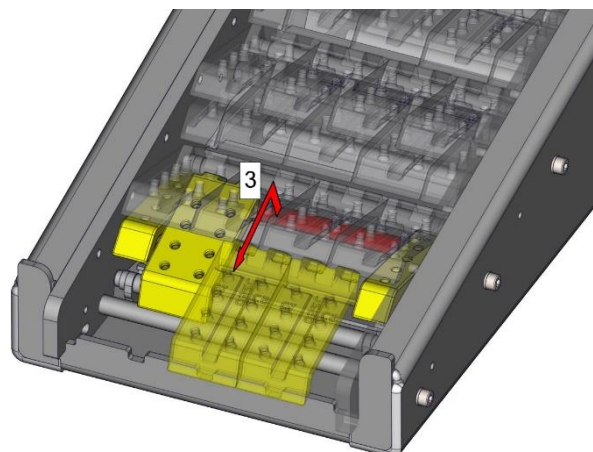
### Step 2

Lift and pull out the 2nd row of furnace tiles (all full-size tiles).



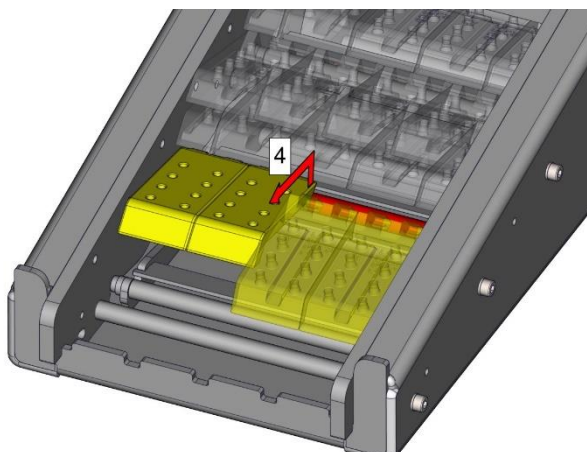
### Step 3

Lift and pull out the 3rd row of furnace tiles (left and right halves of the plate on the sides).



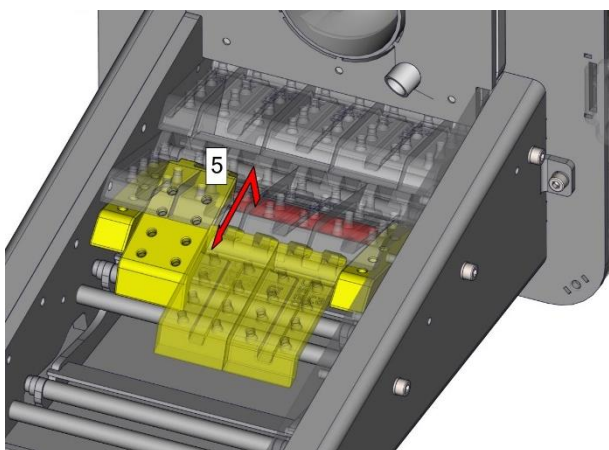
### Step 4

Lift and pull out the 4th row of furnace tiles (all full-size tiles).



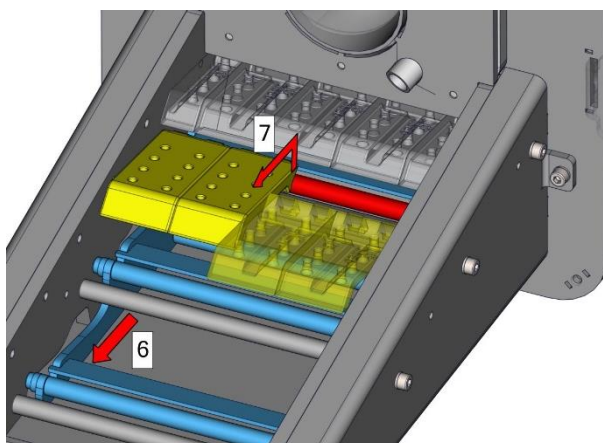
### Step 5

Lift and pull out the 5th row of furnace tiles (left and right halves of the plate on the sides).



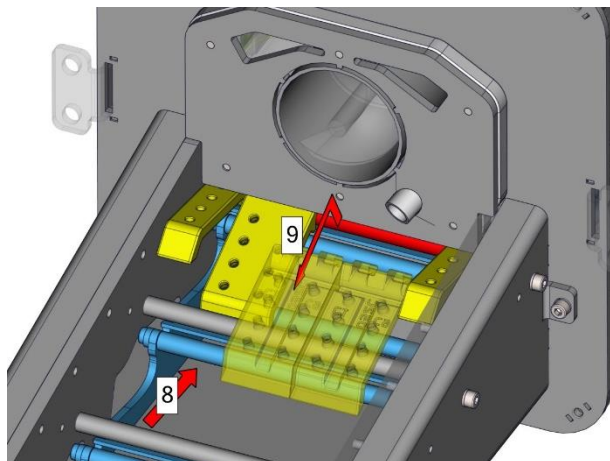
### Steps 6 and 7

Use the controller (MANUAL CONTROL →  
→ MOVABLE GRATE / CLEANING) to move the grate  
as far forward as possible  
Lift and pull out the 6th row of furnace tiles.



### Steps 8 and 9

Use the controller (MANUAL CONTROL →  
→ MOVABLE GRATE / CLEANING) to move the grate  
as far backward as possible.  
Lift and pull out the 7th row of furnace tiles.



### Step 10

After cleaning, install the grate in reverse order.  
Pay attention to the halves of the tiles.  
After installation, check that the tiles are in place -  
each row should form a single surface and the tiles  
should be flush.

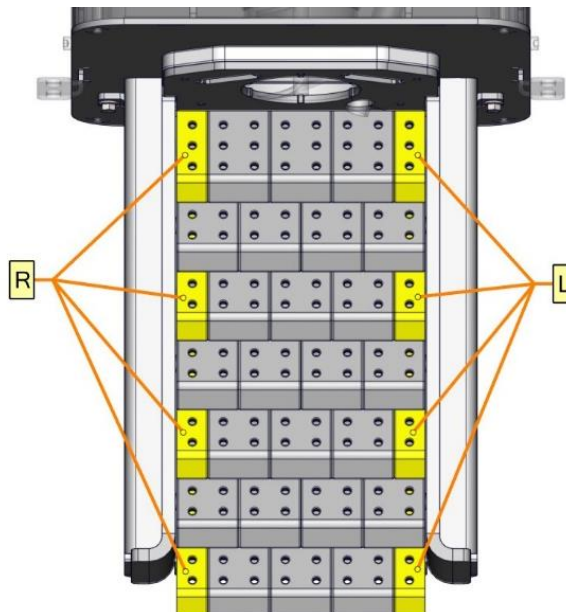


Fig. 10. Furnace removal and installation.



### ATTENTION!

The furnace may still be hot after the burner is turned  
off, so always use tools such as pliers to remove it.

After the warranty period, and once a year thereafter, have the technical condition of  
the burner checked by an authorized service technician.



### 6.3. Specification of inspection intervals

Table 11. Specification of inspection intervals.

Power rating of the burner	12 months from the installation date	24 months from the installation date	36 months from the installation date
50 – 130 kW	1.extended	2. extended	3. extended

The inspection date is counted from the time of installation and commissioning of the device by an authorized service company, certified by the manufacturer. Inspections should be performed no earlier than one month before, but no later than one month after that date.

### 6.4. Scope of operations

- Scope of the basic maintenance:
  - Inspection of automation equipment settings;
  - Inspection of safety devices (STB, boiler and burner temperature sensors);
  - Inspection and cleaning of the flame sensor;
  - Checking the condition of the counterbalance flap (if present);
  - Flue gas analysis and stack draft measurement;
  - Recording the readings of service counters;
  - Cleaning of blowing nozzles and burner furnace;
  - Checking the fixing mechanism and condition of the furnace;
  - Oxygen sensor calibration (if present).
- Additional scope of the extended maintenance:
  - Testing the relays;
  - Checking the burner for leaks
  - Checking the condition of electrical connections;
  - Checking the condition of the igniter.

### 6.5. Safety regulations for burner installation and operation

Before installing and operating the burner, thoroughly clean the stack pipe and the boiler (see page 13) to which the burner is to be connected; check that there is sufficient water in the heating system and that the overflow vessel is functioning properly.

- **The burner can be operated only by adults, after they have read the user manual;**
- **It is forbidden for children to stay near the burner;**
- **You must not put your hand into the feeder tube and burner feed tube as it may cause injury;**
- **It is prohibited to open the boiler door during burner operation;**
- **Opening the boiler door is allowed only after the burner is turned off and the power supply is disconnected;**
- The burner is designed to burn dry biomass such as pellets in boilers operating in a central heating system;
- The burner must absolutely be electrically earthed and connected to a socket with a 230V AC earthing pin;

- The wiring system must be made in accordance with the regulations and safety rules in force. The electrical installation feeding the burner must be made in the TN-S system and protected with a 6A/30mA residual current fuse. A licensed electrician must be responsible for the installation.
- **Burner installation must be performed by an authorized installer trained at ISOL Sp. z o.o. (Manufacturer), who is obliged to prepare the Acceptance Report found in the manual.**
- Performing any work and repairs to the burner or feeder must be done with the power cord disconnected from the outlet;
- The room in which the burner operates must be well and constantly ventilated;
- Operation must not take place in inappropriate environmental conditions, such as excessive temperature exceeding 45°C, the presence of aggressive compounds, dirt, poor ventilation, etc.;
- The following equipment must be absolutely connected to the boiler: STB capillary safety sensor and boiler temperature sensor;
- The burner cannot operate without the refractory cover or when the cover is damaged.

**Failure by the burner user/owner to comply with the above-mentioned SAFETY PROVISIONS relieves the Producer - ISOL Sp. z o.o. from liability for improper burner operation and will result in voiding the warranty.**

**If the user installs the burner inconsistently with the manufacturer's instructions and guidelines, or does not have the "Acceptance Report" prepared at the time of the first burner start-up by an authorized installer and confirmed by the user's signature, then the user will lose the right to warranty for burner defects with simultaneous voiding of the warranty.**

## 6.6. Warranty

See the details in the WARRANTY BOOK attached to this manual.

## 7. SERVICING THE EQUIPMENT



### ATTENTION!

**The equipment can be serviced only with the power supply of the burner and the boiler turned off.**

### 7.1. Flame sensor

The flame sensor in the burner should be cleaned from time to time with a damp soft cloth, as it is done in oil or gas burners. After removing the burner housing, remove the flame sensor from its socket (1), then clean and reinstall it. After performing the above steps, install the burner housing.

Flame sensor cleaning intervals:

- Bakeries – every month
- Boiler houses – every 3 months

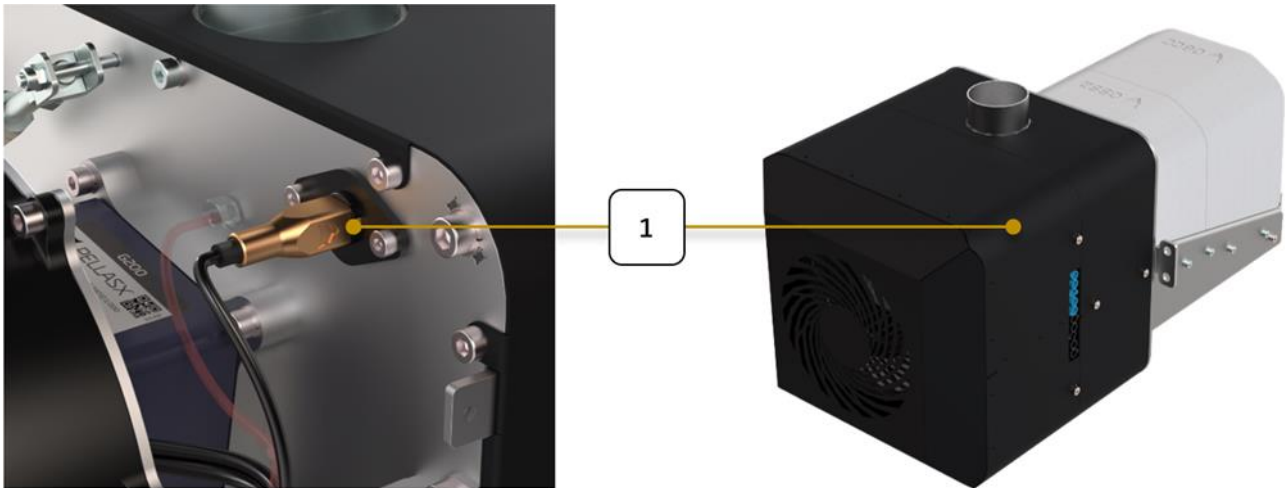


Fig. 11. Flame sensor location (1) in M50, M70, M100, M130 burners.

### 7.2. Replacing the igniter

If the igniter does not heat despite the "firing" message, it can be assumed that it is defective. To replace the igniter, unscrew and remove the burner housing. Next, disconnect the electrical wires of the igniter from the electrical block of the communication module. Detach the damaged igniter from the casing tube. In reverse order, install the new igniter, connect the wires and install the burner housing.

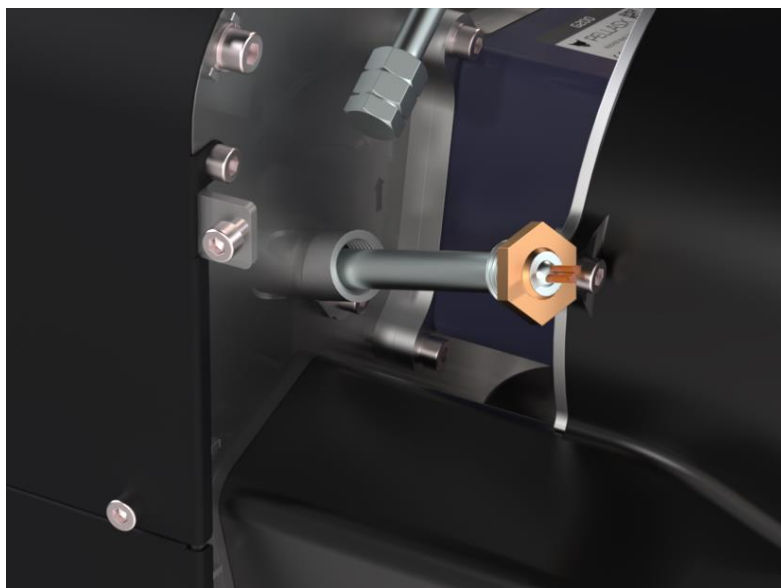


Fig. 12. Igniter location in M50, M70, M100, M130 burners.



### 7.3. Cleaning the feeder tube

If a string from a fuel bag or any other object that blocks the feeder enters the feeder tube, the feeder motor will overheat and the fuse will be deactivated by the thermal sensor in the motor.

To remove the object from the feeder tube, unplug the controller's power cord from the mains socket, unscrew the screws securing the drive gear to the feeder tube (installation diagram in [section 3.4](#)), slide the spring out of the tube and remove the object that caused the blockage.

After the problem is solved, assemble the feeder according to [Fig. 4](#) or [Fig. 5](#) and the attached diagram, connect it to the mains and check whether it works.

This type of service operation requires the full external feeder calibration procedure to be performed again - see the description in [section 5.2 External feeder calibration procedure](#).

### 7.4. Cleaning the burner

One of the reasons for the burner's failure to ignite may be carbon and/or slag deposited in the burner chamber. The igniter will not light the fuel bed when the slag blocks the flow of hot air generated by the igniter and fan. When you are not sure about the quality of the fuel, you should remove slag and ash from the furnace tube every day for the first few weeks. The most effective method is to use a wire brush or a small poker. All cleaning tools should be handled carefully so as not to cause mechanical damage to the refractory components.

A common cause of slag build-up is shutting down the burner with the main switch or direct power supply shut-off. Sudden stoppage of air (oxygen) inflow into the furnace causing a failure to enter the [extinguishing mode](#) results in the underburning of residual fuel, which will be deposited on the surface of the grate. When restarting the burner without prior removal of dirt from it, the burner may produce smoke. Reasons for this may be the slag blocking the burner's oxygenation holes, which supply air to the furnace in the right amount.

**Before cutting off the supply to the burner, it is necessary to carry out the extinguishing process.**

In the burner, the operation of the grate (forward and backward movement of segments) occurs both during burner operation and during basic cleaning. Thanks to this mechanism, the burner effectively cleans the combustion surface of sludge and ash. The movement of the grate during operation occurs cyclically and is dependent on the cycle of the fuel feeder. Basic cleaning, on the other hand, takes place before firing up and during extinguishing.

**The automatic furnace cleaning system in the operation and basic cleaning mode does not relieve the user of the obligation to regularly clean the burner of slag and ash. In particular, care should be taken to ensure the lack of obstruction of any blow holes in the furnace, the back plate of the light sensor sight glass and the igniter hole.**

## 8. CAUSES OF MALFUNCTION

### 1. Burner fails to ignite fuel.

Causes:

- No fuel - check if there are pellets in the tank, check if the feeder is filled and if it is not blocked;
- Defective external feeder drive motor / incorrect motor connection - use the MENU MAIN → MANUAL CONTROL to check the operation of the external feeder;
- Starting dose too low - calibrate the external feeder according to the procedure described in [section 5.2](#) (see page 23);
- Defective igniter - check the connection of the igniter, use the MENU MAIN → → MANUAL CONTROL to check if the igniter is heating up;
- Open STB - check if the boiler was overheated as a result of which the main feeder contact was opened. Wait until the boiler temperature drops below 60°C and reset the STB.

## **2. Burner ignites, but does not go into stabilization and operation.**

Causes:

- No feeder calibration - calibrate the external feeder according to the procedure described in [section 5.2](#) (see page 23);
- Dirty or faulty flame sensor - clean or replace flame sensor;
- Burner power set too low - check the MENU MAIN → POWER MODULATION and set the desired power;
- Defective external thermostat in oil boilers or baking ovens.

## **3. Burner does not read flame brightness level - check flame sensor.**

Measurement reading:

- In darkness: 0-5%;
- In full light: 100%;
- When the measurements other than the two above are noted, check the connection of the sensor in the burner board (GND pin).

## **4. Burner overheating.**

CAUTION - Safe operating temperature of the burner should not exceed.

Causes:

- Burner soiled with slag - clean the burner;
- Dirty boiler flue ducts - clean the boiler;
- Low chimney draught - use exhaust system;
- Incorrect fuel/air ratio - check the settings, calibrate the external feeder according to the procedure described in [section 5.2](#) (see page 23).

## **5. Temperature sensor failure - alarm cannot be cancelled.**

Causes:

- The most common cause of the fault is a damaged temperature sensor, resulting in overheating of the measuring element. If the fault cannot be cleared despite the burner cooling down, the temperature sensor must be replaced. You can verify the damage of the sensor using the control MENU MAIN → INFORMATION and check the temperature readings - when the burner is extinguished, the temperature should be close to the ambient temperature;
- Check the connection of the sensor in the burner plate terminals;
- Check that the burner cable plug is firmly (fully) seated in the socket.

## **6. Locking the internal feeder**

The internal feeder is designed to mix and feed fuel in a uniform manner. The speed at which the internal feeder screw rotates depends on the rotational speed of the burner blow fan. The faster the speed of the fan, the faster the internal feeder screw rotates.

Causes:

- Wrong adjustment of the external feeder with respect to the speed of the screw of the internal feeder (the internal feeder receives too much fuel and is not able to push it to the furnace) - calibrate the external feeder according to the procedure described in [section 5.2](#) (see page 23);
- Defective hybrid drive - (hybrid drive - fan/gearbox connection) - replacement of hybrid unit.

## 7. Blower blocked / malfunctioning

Causes:

- Blower blades blocked - unscrew the blower cover screws and check for mechanical blockage;
- Blocked screw of the inner feeder connected to the hybrid drive (hybrid drive - combination of fan and gearbox) - check whether the screw of the inner feeder has not been mechanically blocked by some external element e.g. a screw or a nail.

## 8. Burner does not fire up despite "Start boiler" command

Causes:

- Active boiler schedule - check weekly program settings for central heating (CH) and domestic hot water (DHW);
- Active operation in SUMMER mode, DHW temperature reached - in SUMMER mode boiler operation to heat DHW heating will start only when DHW temperature drops below the pre-set value + hysteresis. If you want to switch to heating the CH system, change the operation mode to WINTER.

## 9. Controller does not turn on

Causes:

- Fuse – Check the fuse in the run-time module of the controller. If blown, replace **(Note: Before checking the fuse, disconnect the controller from the power supply)**;
- Main fuse – check the system fuse in the boiler room;
- Power cable of the controller - check the connection of the controller to the mains, check the connection of the wires in the power block of the main module of the controller;
- Display screen - check the connection of the screen communication cable to the controller motherboard (RJ connector).



### ATTENTION!

**Remove the power plug before working on the burner.**

Depending on the type of controller, the terms: "MANUAL CONTROL", "EQUIPMENT TEST", "MANUAL OPERATION" - denote access to the function of switching on and off individual components of the burner and the system. This function is used to verify the connection and functioning of the subassembly.

**Using the "MANUAL CONTROL" menu requires the boiler to be turned off (extinguished).**

## 9. WIRING DIAGRAMS

### 9.1. PellasX controller wiring diagram

See the controller's User Manual.

### 9.2. Wiring diagram of M50, M70, M100, M130 burners

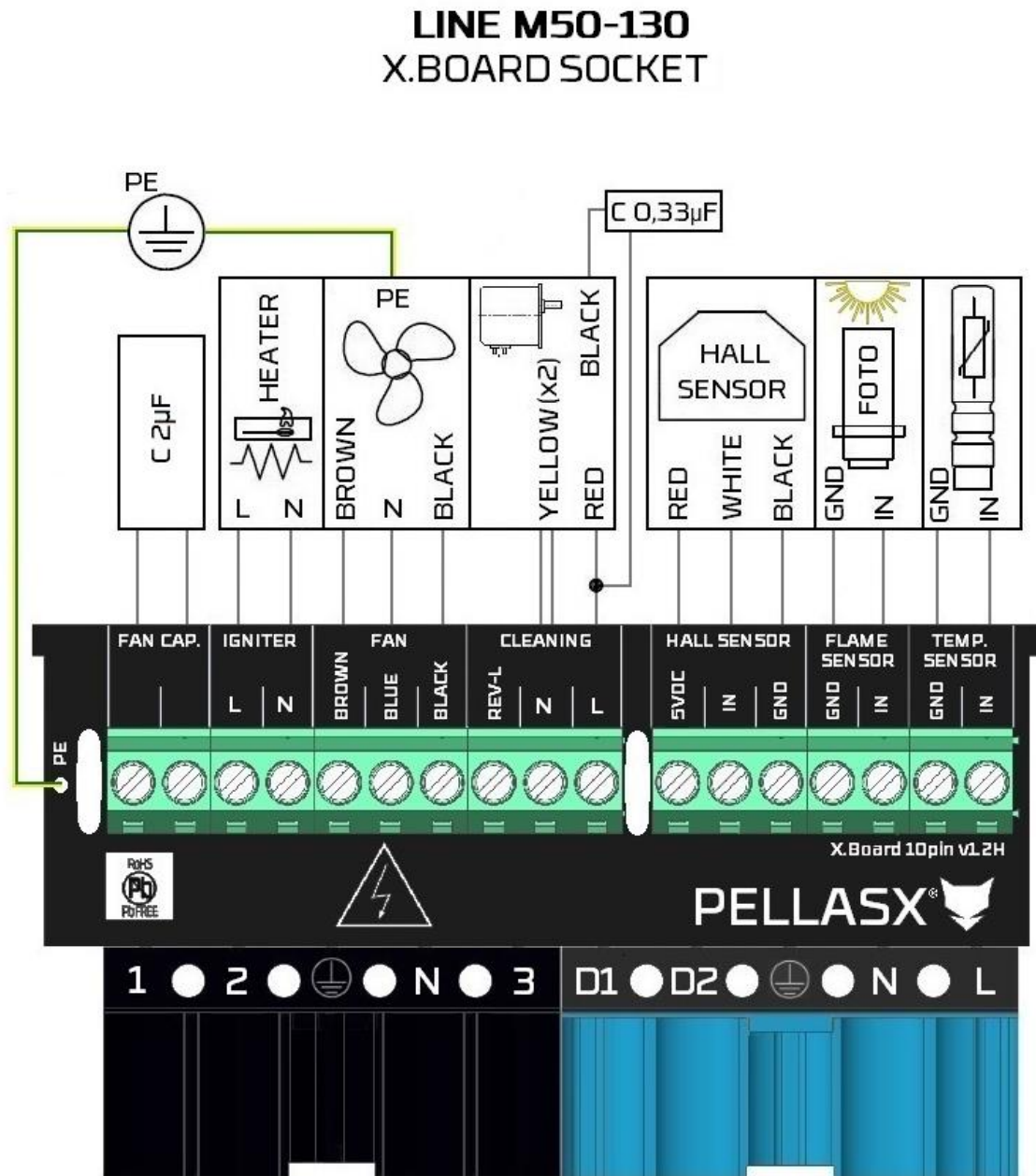


Fig. 13. Wiring diagram of M50, M70, M100, M130 burners, X.Board sockets.

## 10. REPORTS

### 10.1. Initial start-up report

Table 12. Sample form of the initial start-up report.

#### FIRST START-UP (to be re-sent to PELLAS X company)

First start-up was carried by company\*:

**10.2.** Installation was carried by company\*:

Name: .....

Name: .....

Street: .....

Street: .....

Town: .....

Town: .....

Tel.: .....

Tel.: .....

\*filling this data is a condition of accepting guarantee claims.

Diagnostics of R.Control settings								
power 30% (power 1)		power 50% (power 2)		power 100% (power 3)				
feeder operation [s]	fan power [%]	feeder operation [s]	fan power [%]	feeder operation [s]	fan power [%]			
firing-up		work		supervision (pause/maintaning)				
starting dose [s]	firing-up time [min]	burner feeder fill [%]	operation in thermostat mode	supervision time [min]	feeding time [s]			
			<input type="checkbox"/> YES <input type="checkbox"/> NO					
Diagnostics of S.Control settings								
minimum power		middle power		maximum power				
minimum burner power [kW]	blowing correction min. power [%]	middle burner power [kW]	blowing correction middle power [%]	maximum burner power [kW]	blowing correction max. power [%]			
firing-up		work		supervision (pause/maintaning)				
stabilization time [min]	firing-up time [min]	burner feeder fill [%]	operation in thermostat mode	supervision time [min]	boiler power [kW]			
			<input type="checkbox"/> YES <input type="checkbox"/> NO					
fumes analysis (by maximum power)				operation with lambda probe	feeder efficiency [kg/h]	ventilation of boiler room	burner temp. by oper. 100% [°C]	fuel type
CO [ppm]	O <sub>2</sub> [%]	chimney draft [Pa]	fumes temp. [°C]					
				<input type="checkbox"/> YES <input type="checkbox"/> NO		<input type="checkbox"/> poor <input type="checkbox"/> average <input type="checkbox"/> good		<input type="checkbox"/> wooden pellet <input type="checkbox"/> agripellet <input type="checkbox"/> 6mm <input type="checkbox"/> 8mm <input type="checkbox"/> pits <input type="checkbox"/> oats
REMARKS AFTER INSTALLATION:								

Hereby I declare that the device was installed and started according to PN, technical rules and constructional directions of ISOL Sp. z o.o. company. All operational parameters and protections were checked. The device works correctly.

CONFIRMED BY AUTHORISED COMPANY

Customer's data: .....

Installer's authorization number:

Street: .....

date: .....

\_\_\_/\_\_\_/\_\_\_

City: .....

Tel./ e-mail: .....

.....  
Serial No.

.....  
stamp and signature

## Inspection report

Table 13. Sample form of the initial inspection report.

### FIRST INSPECTION (to be re-sent to ISOL Sp. z o.o. company)

#### BASIC

- ☐ control over settings of automatics (fill in the table)
- ☐ control over protecting devices (STB, boiler and burner temperature sensors)
- ☐ control and cleaning of flame sensor
- ☐ control over valve with counterweight (if equipped)
- ☐ fumes analysis and chimney draft measurement (fill in the table)
- ☐ service counters status recording (fill in the table)
- ☐ blowing nozzles and burning chamber cleaning
- ☐ mounting mechanism check and burning chamber check
- ☐ lambda probe calibration (if equipped)

#### EXTENDED

- ☐ relays check
- ☐ burner tightness check
- ☐ electrical connections check
- ☐ igniter check

Replaced parts:

.....

.....

.....

.....

Diagnostics of R.Control settings									
power 30% (power 1)			power 50% (power 2)			power 100% (power 3)			
feeder operation [s]		fan power [%]	feeder operation [s]		fan power [%]	feeder operation [s]		fan power [%]	
firing-up			work			supervision (pause/maintaining)			
starting dose [s]		firing-up time [min]	burner feeder fill [%]		operation in thermostat mode	supervision time [min]		feeding time [s]	
					<input type="checkbox"/> YES <input type="checkbox"/> NO				
Diagnostics of S.Control settings									
minimum power			middle power			maximum power			
minimum burner power [kW]		blowing correction min. power [%]	middle burner power [kW]		blowing correction middle power [%]	maximum burner power [kW]		blowing correction max. power [%]	
firing-up			work			supervision (pause/maintaining)			
stabilization time [min]		firing-up time [min]	burner feeder fill [%]		operation in thermostat mode	supervision time [min]		boiler power [kW]	
					<input type="checkbox"/> YES <input type="checkbox"/> NO				
fumes analysis (by maximum power)				operation with lambda probe	feeder efficiency [kg/h]	ventilation of boiler room	burner temp. by oper. 100% [°C]	fuel type	
CO [ppm]	O <sub>2</sub> [%]	chimney draft [Pa]	fumes temp. [°C]					<input type="checkbox"/> wooden pellet <input type="checkbox"/> agripellet <input type="checkbox"/> 6mm <input type="checkbox"/> 8mm <input type="checkbox"/> pits <input type="checkbox"/> oats	
				<input type="checkbox"/> YES <input type="checkbox"/> NO		<input type="checkbox"/> poor <input type="checkbox"/> average <input type="checkbox"/> good			
SERVICE COUNTER:					REMARKS AFTER DIAGNOSTICS:				
operation with max. power 100%									
operation with middle power 50%									
operation with min. power 30%									
number of fire-ups									
feeder work									
burnt fuel									
number of resets									

CONFIRMED BY AUTHORISED COMPANY

Customer's data: .....

Installer's authorization number:

Street/City: .....

date: .....

\_\_\_/\_\_\_/\_\_\_

Tel./ e-mail: .....

.....  
Serial No.

.....  
stamp and signature

## 11. LIST OF FIGURES AND TABLES

### List of figures:

Fig. 1.	Design of M50, M70, M100, M130 burners. ....	7
Fig. 2.	Example of burner dataplate. ....	9
Fig. 3.	Location of burner with respect to the direction of the flame. ....	14
Fig. 4.	Type 1 feeder design. ....	16
Fig. 5.	Type 2 feeder design. ....	17
Fig. 6.	Feeder spiral installation. ....	18
Fig. 7.	Diagram of the boiler room installation. ....	19
Fig. 8.	Installation of M50, M70, M100 and M130 burners in the boiler door. ....	20
Fig. 9.	Removal of refractory cover. ....	25
Fig. 10.	Furnace removal and installation. ....	27
Fig. 11.	Flame sensor location in M50, M70, M100, M130 burners. ....	30
Fig. 12.	Igniter location in M50, M70, M100, M130 burners. ....	30
Fig. 13.	Wiring diagram of M50, M70, M100, M130 burners, X.Board sockets. ....	34

### List of tables:

Table 1.	Pellet quality requirements. ....	8
Table 2.	Specifications of M50, M70, M100, M130 burners. ....	10
Table 3.	Dimensions of M50, M70, M100, M130 burners. ....	11
Table 4.	Minimum stack draught. ....	13
Table 5.	Minimum dimensions of the furnace chamber. ....	14
Table 6.	Examples of minimum dimensions of a rectangular furnace chamber. ....	15
Table 7.	Examples of minimum dimensions of a cylindrical furnace chamber. ....	15
Table 8.	Pressure values in the combustion chamber. ....	15
Table 9.	Feeder types. ....	16
Table 10.	Tips for entering data into the controller. ....	24
Table 11.	Specification of inspection intervals. ....	28
Table 12.	Sample form of the initial start-up report. ....	35
Table 13.	Sample form of the initial inspection report. ....	36

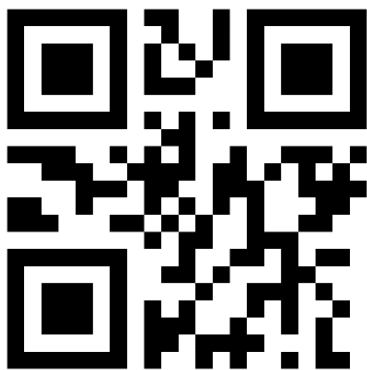
## 12. NOTES



## NOTES

## NOTES

## NOTES



## PRODUCER

ISOL Sp. z o.o.

Poland, 64-920 Piła

Strefowa 5

T. +48 67 213 80 40

NIP: 764-266-44-90

[info-pl@pellasx.eu](mailto:info-pl@pellasx.eu)

[www.pellasx.pl/en](http://www.pellasx.pl/en)