ENVIRONMENTALLY FRIENDLY TECHNOLOGIES

OPERATION AND MAINTENANCE MANUAL OF PPSM-TYPE SOLID FUEL FEEDER WITH FINE COAL BURNING OPTION

BUSINESS
FAIR PLAY

Registered Design No. 116838

DECLARATION
of conformity of the products
with standards introduced for obligatory compliance
as well as requirements defined with applicable regulations

MACHINES / Art. 215, 216 Par. 1 & 2 KP

CONSTRUCTION TYPE OF THE DEVICE

Name: PPSM-TYPE SOLID FUEL FEEDER - 17, PPSM - 25, PPSM - 50
QUANTITY: ..... pcs.
Manufacturer: PANCERPOL S.c. - ul. Szałasowizna 22, 42-530 Dąbrowa Górnicza

The following national standards have been complied with:

PN87/M-82302	PN-EN 418	PN-EN 1050	PN-EN 60310-3
PN71/H-97053	PN-EN 547-2	PN-EN ISO 3747	PN-EN 60529
PN88/H-84020	PN-EN 547-3	PN - EN ISO 9614-1	PN-EN 60691
PN75/H-84019	PN-EN 563	PN-EN 12809	PN - EN 60695-1-1
PN84/E-01200	PN-EN 614-1	PN-EN 34452	PN-EN 60799
PN77/H-85023	PN-EN 614-2	PN-EN 50081-1	PN-EN 60947
PN86/M-82175	PN-EN 617	PN-EN 50082-1	PN - EN 61000-3-2
PN78/M-82005	PN-EN 618	PN-EN 50347	PN - EN 61000-3-3
PN 70/M-02001	PN-EN 746-1	PN-EN 60034-5	PN - EN 61000-6-1
PN74/M-82105	PN-EN 746-2	PN-EN 60034-6	PN-EN 61029-1
PN72/H-84018	PN-EN 842	PN-EN 60034-7	PN-EN 61140
PN75/M-82144	PN-EN 894-1	PN-EN 60034-8	PN-EN 61310-1
PN86/M-82175	PN-EN 894-2	PN-EN 60034-9	PN-EN 61310-2
PN89/M-01134	PN-EN 894-3	PN - EN 60034-12	PN-EN 61310-3
PN-EN 292-1	PN-EN 954-1	PN-EN 60204-1	PN-EN 1561:2000
PN-EN 292-2	PN-EN 981	PN-EN 60310-1	PN - 89/H - 01565
PN-EN 303-5	PN-EN 1037	PN-EN 60310-2	PN-ISO 8062:199

PN - ISI 8062:1997/Apl:1998

Buyer: **Signature**
Order No.: **dated**
Invoice No.: **dated**

CE

OPERATION AND MAINTENANCE MANUAL OF PPSM-TYPE SOLID FUEL FEEDER WITH FINE COAL BURNING OPTION, 17-50 KW

1. Manufactured feeder variations.

Depending on the boiler thermal power, four basic variations of the fuel feeder may be specified:

•PPS 17 KW

•PPS 25 KW

•PPS 50 KW

2. The feeder scope of use and characteristics.

The PPS-type solid fuel feeders are designed to operate with certain types of fuel. Guidelines for the parameters of the fuel used must be strictly kept to under risk of losing the guarantee for the device!

2.1. Guidelines for the fuel used (pea coal).

2.1.1. Fuel graining upper limit

The maximum size of coal grains is limited to **25 mm.**

2.1.2. Coal coking capacity.

Coal of low or medium coking capacity may be used, such as **type 31 or type 32,** with the volatile matter content over 30%. **It is not recommended to use coal type 33 (coking capacity) or 34 type (high coking capacity).** Also, using other fuels, such as coke, hard coal, briquetted coal or brown coal is forbidden without consulting the manufacturer (in such a case the feeders must be of a special construction). **Each type of coal used should be of less than 25 mm granulation!**

2.1.3. Maximum amount of fine coal is limited to the following:

Maximum amount of fine coal passing through a 1/8" screen is:

• for type 31 (only for classified types of coal)	up to 20%
• for type 32 (only for classified types of non-coking coal)	up to 20%
• other types of coal	up to 10%
2.1.4. Maximum humidity	**up to 10% !**

This is an absolutely key parameter of the fuel used. Combustion of coal with too high a proportion of wet fine coal is very difficult. If the wet content of the coal is above 10% (up to 15%), the percentage content of the fine coal should not be higher than 15%.

NOTE: Coal containing over 30% of fine coal and over 10% of moisture is absolutely not recommended.

2.1.5. Percentage content of ash	up to 15%
2.1.6. Ash melting temperature (pouring point)	
• for type 31 and some of type 32/1	not less than 1200^0C
• for some of type 32/2	not less than 1250^0C

2.2. General requirements for the selection of the type of coal.

2.2.1. Correct selection of coal type and sort ensures:

• failure-free operation of the feeder and boiler

• higher operational efficiency of the retort and fuel economy up to 15%, compared with the lower quality fuel

• limitation of harmful chemical compounds emission to atmosphere.

2.2.2. Recommended coal producers and coal sorts:

•KWK „Kazimierz Juliusz”, address - 41-215 Sosnowiec, ul. Ogrodowa 1, tel. 032/368 10 51 type 31-2

•ZG „Piekary” sp. z o.o., address - 41-940 Piekary Śl., ul. Gen. J. Ziętka, tel. 032/287 10 51 type 31-2

2.1.M. Guidelines for the fuel used (fine coal).

2.1.1.M. Fuel graining upper limit

The maximum size of coal grains is limited to **30 mm.**

2.1.2.M. Coal coking capacity.

Coal of low or medium coking capacity may be used, such as **type 31 or type 32,** with the volatile matter content over 30%. **It is not recommended to use coal type 33 (coking capacity) or 34 type (high coking capacity).** Also, using other fuels, such as coke, hard coal, briquetted coal or brown coal is forbidden without consulting the manufacturer (in such a case the feeders must be of a special construction). **Each type of coal used should be of less than 30 mm granulation!**

2.1.3.M. Max. humidity 10% !

This is an absolutely key parameter of the fuel used. Combustion of coal with too a high proportion of wet fine coal is very difficult. Using wet fuel makes it difficult to pour the fuel from the container and creates excessive wear of subassemblies which may lead to the guarantee loss!

NOTE: Coal containing over 10% of moisture is absolutely not recommended.

2.1.4.M. Percentage content of ash	up to 4-12%
2.1.5.M. Ash melting temperature (pouring point)	
• for type 31 and some of type 32/1	not less than 1200^0C
• for some of type 32/2	not less than 1250^0C
• for other groups	not less than 1350^0C
2.1.6.M. Caking Properties - RI	up to 20
2.1.7.M. Graining	0-30 mm
2.1.8.M. Content of grains smaller than 0.5 mm	up to 10%

2.2.M. General requirements for the selection of the type and sort of coal.

2.2.1.M. Correct selection of coal type and sort ensures:

• failure-free operation of the feeder and boiler

• higher operational efficiency of the retort and fuel economy up to 15%, compared with the lower quality fuel

• limitation of harmful chemical compounds emission to atmosphere.

2.2.2.M. Recommended coal producers and coal sorts:

•EKO-FINS - Katowicki Węgiel Sp. z o.o., address 40-205 Katowice, ul. Księdza Franciszka Ścigały 14, tel. (032) 203 97 48

3. Technical details.

4. Description of the feeder.

4.1. Construction of the gear motor and worm

Outer parts of the gear motor (casing), as well as the engine casing, are made of aluminium. The gear motors are filled with synthetic oil in the factory; the oil does not require replacing throughout the lifespan of the machine. The gear motor is connected with the feeding screw via a coupling in which the mechanism protecting against damage in event the worm is blocked is delivered as a protective taper key (M5 screw with incomplete thread, galvanized in 5.8 hardness class). Using other protective taper keys may lead to gear motor or electrical motor damage and causes the **guarantee loss!**

The worm is used to transport coal from the container to the lower part of retort.

4.2. Construction of the retort.

The retort, with primary air tuyeres placed in a particular way is one monolithic node. The retort tuyeres, through which primary air is blown, are made of grey cast iron. The retort is driven via the worm and turns around inside the furnace flange.

4.3. Deflector.

The height at which the deflector is hung is defined by the boiler manufacturer. Usually, the deflector is installed in the following locations:

- for retort 17 kW & 25 kW min 20 cm
- for retort 50 kW min 20 cm
- for retort 75 kW min 30 cm
- for retort 100 kW min 30 cm

over the upper edge of the retort.

The deflector should be hung on a hit-resisting rod Ø 10.

The deflector has the following functions:

- to maintain flame in the retort
- to divide the flame to the heat exchanger's shell.

4.3.1.

NOTE: Use of coking coal causes quick wear of the deflector and other cast iron elements of the feeder (loss of guarantee).

5. Feeder installation in the boiler and start-up.

Note! Before installation, please watch the instruction film available at www.pancerpol.com.pl

5.1. Feeder installation (version with alignment bolts).

The feeder may be installed only by an installation team authorised to install or repair electrical power equipment or installations. Feeder installation by unauthorised parties may cause losing the guarantee rights. During installation, the following issues should be borne in mind:

5.1.1. The feeder pipe should be precisely levelled and stayed with a foot (the foot should touch the floor when the container is empty)

5.1.2. Connect the electric motor correctly and before installing the coal container check whether the worm turning direction has been properly chosen.

5.1.3. Before installing the feeder on the boiler, start it up outside the boiler and, as it works, check whether the turning flange is aligned with the retort outer disk, Picture 10 (page 12) / under no condition is it allowed to tighten the alignment bolts, Picture 11 (page 12).

5.1.4. Check whether the turning part lies completely on the cast iron knee and the retort outer disk accurately adheres the air chamber along its whole circumference, Picture 8 (page 12).

5. Feeder installation in the boiler and start-up.

5.1. Feeder installation (version without alignment bolts).

The feeder may be installed only by an installation team authorised to install or repair electrical power equipment or installations. Feeder installation by unauthorised parties may cause losing the guarantee rights. During installation, the following issues should be borne in mind:

5.1.1. The feeder pipe should be precisely levelled and stayed with a foot (the foot should touch the floor when the container is empty)

5.1.2. Connect the electric motor correctly and before installing the coal container check whether the worm turning direction has been properly chosen.

5.1.3. Before installing the feeder on the boiler, start it up outside the boiler and, as it works, check whether the turning ring is aligned with the retort outer disk, Picture 10 (page 12).

5.1.4. Check if the turning part lies completely on the cast iron knee and the retort outer disk accurately adheres the air chamber along its whole circumference, Picture 8 (page 12).

5.1.5. Installation and replacement of the overload coupling safety device.

The overload coupling safety device which limits the torque down to 125 Nm is a standard steel galvanized screw.
The screw material: M5 screw (quality 8.8)
The gear motor comes with 2 screws **Picture 1 (page 10)**.

5.2. The feeder start-up operations.

NOTE: Commissioning of the boiler may be carried out only by the service team certified with appropriate qualifications and under the condition that a detailed entry to the boiler guarantee card is made. An exception to this rule is permissible with mutual agreement confirmed in writing.

5.2.1. Checking the coal feeding by the feeder with the use of the controller setting at the boiler start-up, until the retort is filled up.
5.2.2. Experimental checking whether the fed amount of coal corresponds with the boiler thermal power.
5.2.3. Checking operation of the control panel – setting proper fuel feeding time (t1) and fuel burning-out time (t2) when the feeder is switched-off. Proper selection of these quantities allows for economical coal burning in the retort.
5.2.4. Familiarizing the user with the device operation.
5.2.5. Confirmation of commissioning with an entry to the boiler guarantee card.

NOTE:

A) It is recommended to set the excess air number during commissioning to avoid uneconomical operation of the installation and premature wear of feeder elements, such as cast iron tuyeres, end of the worm (at too much excessive air – shallow flame). Details of adjustment are in each boiler's instruction manual.

B) Parameters set with the use of an exhaust-gas analyser should be controlled taking into account the changing parameters of the coal delivered. Adjust the boiler operation in compliance with the boiler's instruction manual.

5.3.3. Corrections of the furnace abnormal operation.

5.3.3.1. Too low fuel bed – too little coal in the furnace (Picture 1 page 11).
Manifestation – very shallow flame in the retort with white, remarkably light yellow flame, clinker at tuyeres, low CO2 readings at the gauge. Cause – percentage setting of the coal stream, too low in proportion to the air blow setting. Preventive measures – increase the coal stream, and possibly reduce the primary air flow by choking the air blow.
5.3.3.2. Too high fuel bed – too much coal in the furnace (Picture 1 page 11).
Manifestation – very deep bed – counted from the base, some deeply-lying clinker. Cause – excess coal feeding in proportion to the air blow setting, insufficient periodical cleaning of the furnace.
Preventive measures:

- reduce the coal feeding setting by 5-10 %, remove clinker and level the fire base with the burning coal
- if the correction does not help, return previous settings
- if the situation repeats, increase air blowing, i.e. increase the primary air flow.

NOTE: Settings should be corrected by a maximum of 5-10% each time, so that the proper settings are put out of adjustment.

5.3.3.3. Open fire but no burnt pieces of coal.
Manifestation – good "open" fire but the level of burning coal bed rather low, low readings at CO2 gauge, clinker with small red coal pieces (inclusions).
Cause – too frequent cleaning of the stoker.
Preventive measures – reduce the cleaning frequency to allow for creation of greater volume of burning coal and increase the burning bed height (20-30cm).

5.4. Operation of the feeder.

During the feeder operation, pay attention to the following issues.
5.4.1. Amount of air delivered by the blow-in fan should be adjusted to the intensity of coal burning in the retort.
5.4.2. First of all, the state and appearance of fire in the furnace should be monitored:
• red smoking fire indicates the air delivery is too low
• light white fire indicates the air delivery is too much
• A correct fire is when it is possible to observe clear, intense yellow flame

6. Feeder user's maintenance manual.

6.1. Weekly maintenance
6.2.1. Open the firing door and check the flame state. Follow the guidelines mentioned in chapter 5.3. "Operation of the feeder" in order to recognise abnormal states.
6.2.2. From time to time, remove slag if it appears heavily in the boiler furnace, bearing in mind the previous guidelines and the necessity for proper adjustment of the proportion between the coal mass and the air blow. If slag appears permanently, check if the type of coal is compliant to the recommended characteristics.
6.2.3. Check the coal level in the bunker.
NOTE: If the operator wants to make any remarks on the feeder operation, they should contact the company PANCERPOL in Dąbrowa Górnicza, at ul. Szałasowizna 22, tel. (032) 261 04 15

6.2. Monthly maintenance

Perform the activities of weekly maintenance and additionally:
6.2.1. Check accumulation of slag residues in the retort; alternatively shut-down the boiler and clean the retort.
6.2.2. Check there is no accumulation of coal dust or other waste in the coal bunker or protective pipe of the coal feeder and remove it.
6.2.3. Check the state of air tuyeres and check that the outlet holes are unobstructed.
NOTE: Activities of item 6.2.1 and 6.2.2 should also be necessarily conducted after the end of each heating season or if CWU is heated once a year.

6.3. Maintenance every 6 months.

6.3.1. It is necessary to perform the feeder maintenance after the end of each heating season or if CWU is heated once a year **(guarantee condition).**
6.3.2. Start the worm every three months for 15 minutes. This way you avoid blocking the worm inside the pipe.
6.3.3. Clean the pipe of the coal residues, empty the container, clean the retort, unscrew the lower lid, remove ash **Picture 2 (page 10)**.
6.3.4. Remove the rotary flange from the furnace plate, Picture 3 (page 10), remove the furnace plate from the feeder, Picture 4 (page 11), remove the feeder unscrewing 4 M10 bolts, Picture 5 (page 11) which fix the feeder to the boiler, disassemble the gear motor with the "worm" (by unscrewing the four M8 bolts), Picture 9 (page 12), detach the gear motor from the "worm" taking out the safety cotter pin), lubricate the "worm" spindle and internal tube of the gear motor with bearing grease to prevent seizing of both elements (gear motor with the "worm"). In order to assemble the feeder, repeat the above actions in reverse order, paying special attention to centre the rotary flange inside the furnace plate, Picture 10 (page 12) (for centering, use 4 M10 bolts shown in Picture 11 (page 12). NOTE – once the furnace plate is installed, the bolt must not be tightened.

NOTE! PERFORM CENTERING ON A SWITCHED-ON FEEDER ONLY!

7. Maintenance of the feeder.

The feeder is constructed so that it does not require expensive maintenance. From time to time the feeder should be cleaned of coal residues or ash. **Pay particular attention to the furnace rotary part at which carbon deposit may settle. Accumulation of carbon deposit may cause blocking or rising of the rotary part of the furnace – remove the rotary part of the furnace and clean it thoroughly.** Clean the motor casing regularly. As the reducers are filled with synthetic oil and are designed for the lifetime of the device, generally, they do not require any particular maintenance apart from external cleaning. Do not use any solvents as they may damage the sealing flanges and seals. Motor maintenance according to the motor Maintenance Instructions.

8. Instructions for disposal of feeder after the end of its life.

Disposal of particular parts of the boiler for which metals are used should be conducted by authorised companies providing metal recycling.

9. Failures and the ways to repair them.

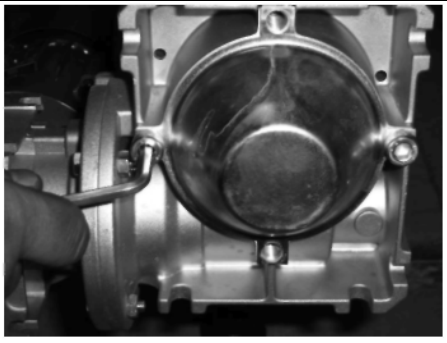
Possible failures and ways to repair them are presented in Table 4.

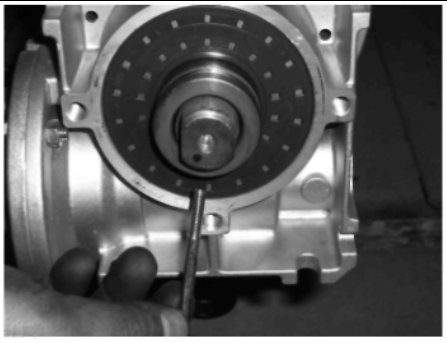
10. Standardizing regulations.

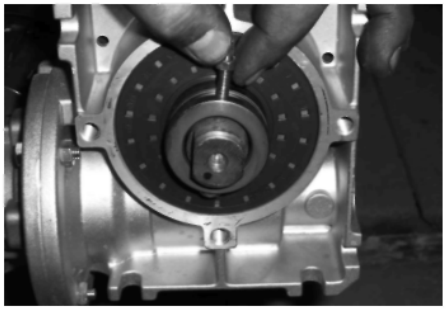
1. PPS 17 – 300 kW type coal feeders, as devices designed for technological purposes, are not subject to certification obligations (Order of PCBA Director of 23.03.1997).
2. The manufacturer provides the product's declaration of conformity with harmonized standards, in compliance to the Act of 29.08.2003 on amendment to the act on the system of assessing conformity and amendments to some other acts (Journal of Law No. 170 item 1652, of 30.09.2003).
3. The motor driving the feeder is quality certified 2.1, which allows for marking it with the B safety mark.

Table 4. Analysis of problems with the coal feeder proper operation.

Defect	List of possible reasons to analyse										
Coal feeder to the retort does not start	No power supply or the boiler controller switched-off	Gear drive safety device has been actuated	Overload switch has been actuated	Motor thermal switch has been actuated							
Feeding screw is empty (without coal)		Gear drive safety device has been actuated	Overload switch has been actuated		No coal in the bunker or the coal has suspended over the feeder	Gear motor protective taper key has been cut-off	Clutch between the feeding screw and gear motor is uncoupled				
Worm feeding coal to the retort is not turning but gear motor operates						Gear motor protective taper key has been cut-off	Clutch between the feeding screw and gear motor is uncoupled	worm not cleaned before operation finish			
Taper key protecting the worm is often cut-off						Pipe flange bent or fixing screws loosened				Improper alignment of the gear motor bearer with the worm	Gear motor bearer unstably fixed to the ground
Smoke from the container									Holes in the retort column which supply sealing air are blocked		
Burnt tip of the worm in the retort											Improper burning adjustment
Preventive measures	Check power supply and main switch at the control panel	Reset or replace if necessary	Reset the overload relay	Check the switch, locate the reason for its actuation	Check the coal level in the bunker and over the holes for taking coal	Reset or replace if necessary	Replace the clutch insert and couple the clutch again	Remove the motor. clean it and inform the manufacturer	Clean the retort, and the holes	Check alignment of assembly and centre it	Correct and provide durable mounting



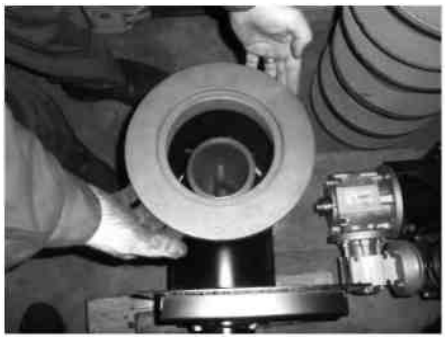




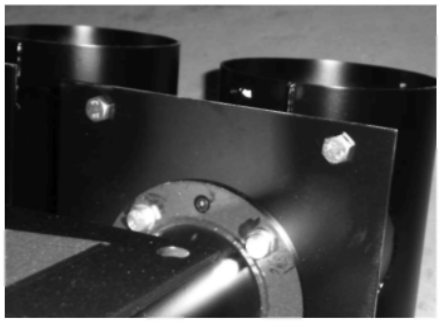
Picture 1.

Picture 2.

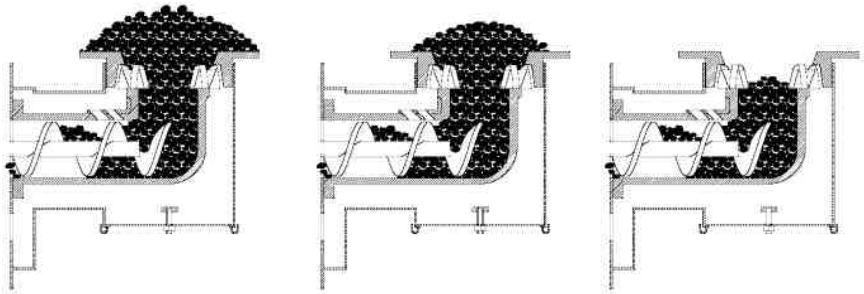
Picture 3.



Picture 4.



Picture 5.



WRONG

Too much coal

RIGHT

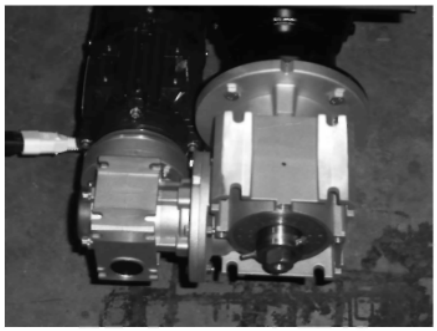
Proper level of coal bed

WRONG

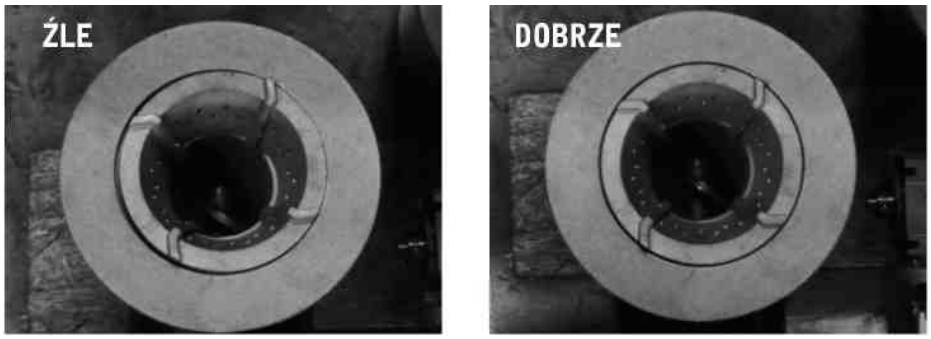
Too little coal

Figure 1.

Picture 8.



Picture 9.



Picture 10.

Picture 11.

Do not tighten these bolts!

Term	Translation
ŹLE	WRONG
DOBRZE	RIGHT

GUARANTEE CARD

Feeder .....

Feeder No. .....

Date of manufacture .....

Date of sale .....

Seller’s stamp .....

Date of repair	Scope of repair	Signature

.....

Signature of the party assembling the device

.....

Signature and stamp of the party connecting the device to the electrical system

Terms and conditions of guarantee and liability for the product faults

1. The feeder is covered by a 24-month guarantee from its first start-up, performed by an authorised fitter, but not longer than 32 months from the date of manufacture.
2. The guarantee service is provided by PANCERPOL; the feeder start-up is reported by the installation company which has assembled and started-up the feeder. The guarantee does not cover bolts, nuts, rope and the deflector over the furnace. These elements wear naturally and their replacement is payable.
3. The guarantee covers feeders which have been installed in compliance with this instruction manual and applicable regulations.
4. The guarantee covers repair or replacement of the feeder part recognised as faulty.
5. The guarantee does not cover damage or improper feeder operation resulting from:
• improper transport (including transport directly to the boiler room);
• improper installation;
• maintenance conducted contrary to the instructions;
• operation conducted contrary to the instructions;
• using the overload clutch safety device other than the one described in sec. 5.1.5 of the Operation Manual and Operation of PPS solid fuel feeder.
6. Any repairs and changes to the feeder construction may only be conducted by authorised installation and service companies.
7. Any unauthorised changes to the feeder construction invalidate the guarantee.
8. Materials sealing the feeder, damaged due to improper operation or maintenance, or wrong quality of fuel, are not covered by the guarantee.
9. A guarantee card without the date, entries, signatures, stamps and factory number is invalid.
10. The guaranteed rights may be exercised only on the basis of the guarantee card signed by an authorised fitter who started-up the device.

NOTE: Before installation of the feeder in the boiler, please watch the instruction film available at www.pancerpol.com.pl

NOTE: Adhering to the above instruction manual guarantees reliable operation of the feeder for many years. Information on any manufacturing defects must be provided as soon as they are detected and always in written form. In the event the above rules are not followed, the repair will not be treated as covered by the guarantee. The manufacturer has the right to introduce changes to the construction of the feeder, as product modernisation, and the changes do not need to be taken into account in this Instruction Manual.

NOTE: Use of dry fuel is required. The fuel should be stored in conditions which allow for its drying. Chemical compounds in the coal, combined with water and temperature are the main reason for "worm" damage. The "worm" damaged due to the use of wet fuel or incompliance to sec. 6 of this maintenance manual is not covered by the guarantee.

NOTE: In order to protect the feeding system against fuel inflammation in the container, it is necessary to use the boiler controller with the option of working with the feeder pipe temperature gauge.

Place the stamp here

If you fill in and send the following form, you will have the right to get 5% discount for the purchase of the feeder spare parts, as well as for service. You may also fill in the form at www.pancerpol.com.pl

Postal code	
Voivodeship	
Contact telephone number	
E-mail	
FEEDER	
Type of feeder	
Serial number	
Date of manufacture	
BOILER	
Manufacturer of the boiler	
Type of boiler	
Boiler date of purchase	
Invoice No.	
What fuel do you use	

Pancerpol Spółka Jawna

ul. Szałasowizna 22

42-530 Dąbrowa Górnicza

The serial number of the feeder is given on the sticker placed on the feeder pipe and in the Maintenance Manual.