Centrometal
HEATING TECHNIQUE

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ENG

TECHNICAL INSTRUCTIONS

for installation, use and maintenance of hot water boiler and installation of additional equipment

CE

THE FIRST START-UP MUST BE DONE BY AUTHORIZED PERSON, OTHERWISE PRODUCT WARRANTY IS NOT VALID.

EKO-CKS P UNIT

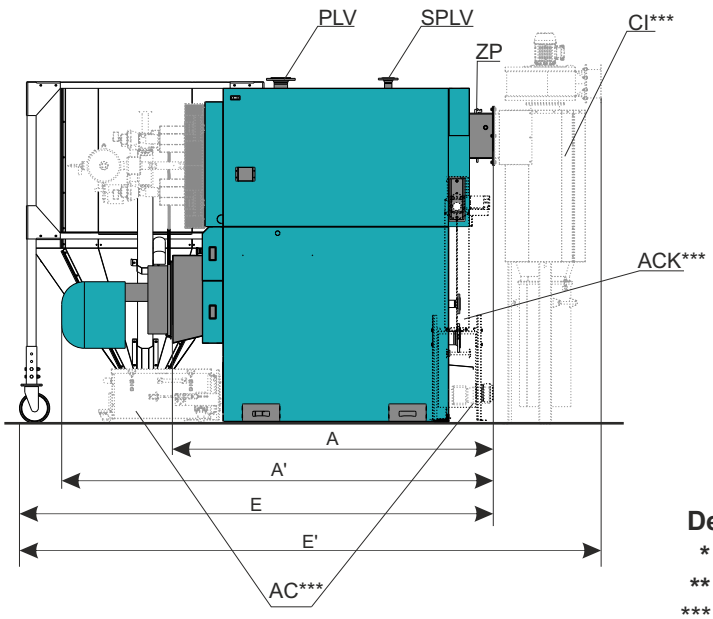
TU-CKSP-9-2023-ENG

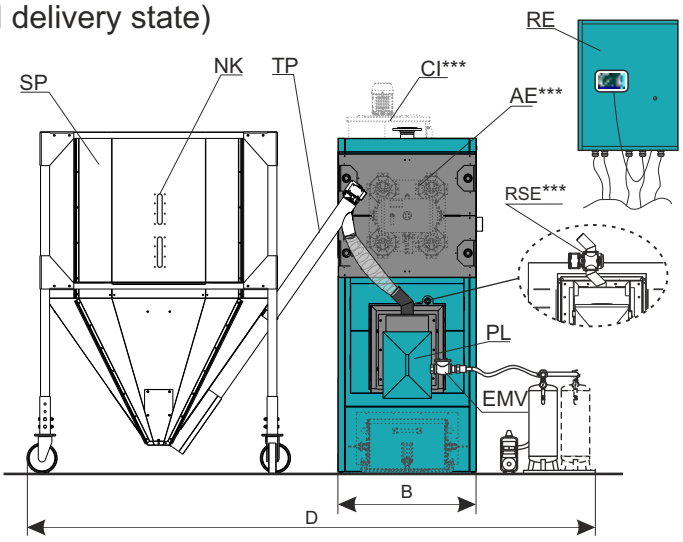
TECHNICAL DATA

EKO-CKS P UNIT			140	180	230	280	320	430	499	560
Boiler body			EKO-CKS P 150	EKO-CKS P 200	EKO-CKS P 250	EKO-CKS P 300	EKO-CKS P 380	EKO-CKS P 500	EKO-CKS P 550	EKO-CKS P 600
Cm Pelet set			200	200	300	300	350	600	600	600
Burner			CPPL-200 inv	CPPL-200 inv	CPPL-300 inv	CPPL-300 inv	CPPL-350 inv	CPPL-600 inv	CPPL-600 inv	CPPL-600 inv
Nominal heat output		(kW)	140	180	230	280	320	430	499	560
Heat output range		(kW)	42-140	54-180	69-230	84-280	96-320	129-430	149-499	168-560
Boiler class			5	5	5	5	5	5	5	5
Required chimney underpressure ***1**		(mbar)	0,25	0,25	0,25	0,25	0,25	0,25	-	-
Required chimney underpressure ***2**		(mbar)	0	0	0	0	0	0	0	0
Water amount in boiler		(l)	380	520	790	963	1155	1700	1770	2040
Exhaust gas temperature at nominal heat output		(°C)	120	120	120	120	120	120	120	100
Exhaust gas temperature at minimal heat output		(°C)	70	75	75	80	80	75	75	70
Exhaust mass flow at nominal heat output		(kg/s)	0,107	0,138	0,176	0,215	0,245	0,330	0,382	0,429
Exhaust mass flow at minimal heat output		(kg/s)	0,046	0,059	0,075	0,091	0,104	0,140	0,163	0,183
Minimum operating time at rated power		(h)	6,0							
Advised cleaning intervals for boiler		(h)	48	48	48	48	48	48	48	48
Boiler resistance on water side at nominal output		(mbar)	4	5	8	12	17	18	24	29
Fuel type			Wood pellets (C1 by EN 303-5:2012, A1 by ISO 17225-2:2014)							
Maximum heat input		(kW)	161,7	200,6	249,3	297,9	343,1	467,4	545,4	614,3
Fuel moisture content		(%)	max. 12							
Fuel size			f 6 x max. 50							
Firebox volume		(l)	268	390	658	805	964	1535	2011	2245
Combustion chamber dimensions		(mm)	480x865x690	468x1265x690	683x1265x790	648x1615x790	648x1615x945	715x1860x1192	715x2360x1192	816x2360x1192
Combustion chamber volume		(l)	426	661	1035	1119	1509	1746	2011	2295
Combustion chamber type			Overpressure							
Required minimum accumulation next to boiler			by EN 303-5:2012 point 4.4.6.							
Nominal electrical power input		(W)	1440	1440	1440	1440	1440	1990	3090	3090
Max. additional electrical power		(W)	800	800	800	800	800	800	800	800
Supply voltage ***3**		(V~)	230 / 400							
Frequency		(Hz)	50							
Current type			~							
Dimensions (for import into boiler room)	Lenght(A) / with burner (A')	(mm)	1775 / 2490	2175 / 2890	2140 / 2860	2485 / 3210	2485 / 3205	2890 / 3750	3390 / 4250	3390 / 4240
	Width (B)	(mm)	815	815	915	915	1065	1315	1315	1315
	Height (C)	(mm)	1875	1875	2300	2300	2370	2550	2550	2890
Boiler body mass		(kg)	962	1211	1741	2073	2343	2920	3186	3420
Total mass - (boiler with casing and accessories) ***4**		(kg)	1190	1435	1870	2220	2500	3710	4825	5760
Max. operating overpressure		(bar)	3,0							
Test pressure		(bar)	6,0							
Max. operating temperature		(°C)	90							
Min. temperature of outlet line		(°C)	60							
Flue gas tube - external diameter ***5**		(mm)	250	300	300	300	300	300	-	-
Flue gas tube - external diameter ***6**		(mm)	Ø182	Ø182	Ø182	Ø182	Ø202	Ø202	Ø202	Ø202
Boiler connections	Flow and return line (male thread)	(R)/(DN)	2"	2"	80	80	80	100	100	100
	Charge / discharge (female thread)	(R)	1"	1"	1"	1"	1"	5/4"	6/4"	6/4"
	Safety line	(R)/(DN)	6/4"	6/4"	40	40	40	40	50	50
Total boiler dimensions with burner	Total lenght(E) / lenght with cyclone (E')	(mm)	2590 / 3300	2960 / 3670	2960 / 3690	3280 / 4015	3280 / 4105	3790 / 4650	4420 / 5280	4360 / 5220
	Total width (D)	(mm)	3105	3210	3210	3210	3350	3600	4300	4300
	Total height(F) / height with cyclone (F')	(mm)	1875 / 2215	1875 / 2210	2290 / 2585	23030 / 2585	2370 / 2720	2555 / 2885	2550 / 2870	2890 / 3255
Flue g. connect. height (G) / height with cyclone (G')		(mm)	1555 / 1885	1570 / 1885	1905 / 2255	1905 / 2260	1980 / 2350	2170 / 2520	2500	2890

***1** - boiler without CCP cyclone and CVX fan
***2** - boiler with CCP cyclone and CVX fan.
***3** - for boilers with cyclone and CVX fan supply voltage is 400 V.
***4** - mass without cyclone and CVX fan for boilers EKO-CKS P UNIT 140-430 and with cyclone and CVX fan for boilers EKO-CKS P UNIT 499-560.
***5** - flue gas tube - external diameter - for boilers without cyclone and CVX fan
***6** - flue gas tube - external diameter - for boilers with installed cyclone and CVX fan - diameter on CVX fan output

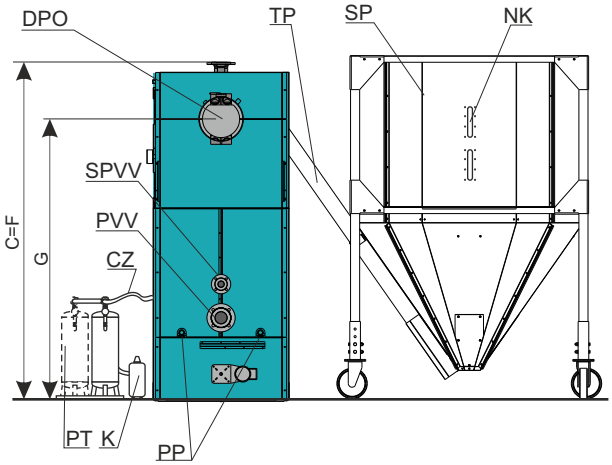
Pellet tank on the left side of the boiler (standard delivery state)



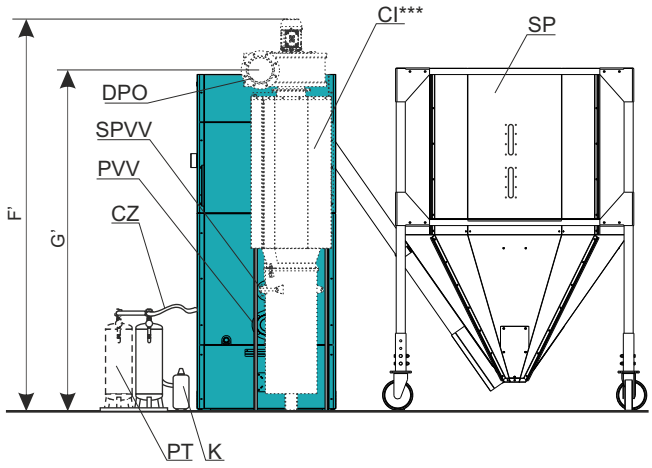


Delivery state only by order:

* Installation of pellet tank on the right side of the boiler
** Installation two boilers on the one pellet tank
*** Additional equipment



Version without cyclone
Boilers: EKO-CKS P UNIT 140-430



Version with cyclone
Boilers: EKO-CKS P UNIT 499-560;
Additional equipment for boilers EKO-CKS P UNIT 140-430

*The following should be done: install lower boiler door that opens from right to left, el.-magnetic valve to the burner left side, position the pressure vessel compressor on the left tank side
**The following should be done: position a pellet tank with possibility of installation of two feeders between boilers (available angles between pellet feeders are 90° and 180°)

LEGEND:

TP - Feeder screw
OCD - Opening for cleaning a flue gas box
T - Thermometer
REG - Boiler control unit
PT - Pressed air acumullation tank 50 l (on CPPL-600 inv - 2 x 50 l)
K - Air compressor
PL - Pellet burner CPPL
EMV - Magnetic valve (for CPPL-600 inv 2 pcs.)

PLV - Boiler flow line
SPLV - safety flow line
DPO - Flue gas tube connection
ZP - Underpressure regulator lid
SPVV - safety return line
PVV - Boiler return line
PP - Charge / Discharge
SP - Pellet tank
NK - Fuel level indicator
CZ - Supply pipe
RE - Junction box with boiler control unit

***** ADDITIONAL EQUIPMENT**

AC - Automatic ash removal system out of the boiler combustion chamber
AE - Automatic cleaning system of the heat exchanger's flue gas tubes (passages) by air (pneumatic)
RSE - Rotary dosing valve RSE (return flame protection)
ACK - automatic removal of ash from the flue chamber by a spiral
CI - Cyclone with with fan (standard delivery for EKO-CKS P UNIT 499 and EKO-CKS P UNIT 560)

COMPONENTS

EKO-CKS P UNIT (140-560 kW)

	Basic equipment (OO)				Obligatory equipment		Additional equipment involved into the configurations		
	Cm Pelet-set		Boiler	Power range (kW)			CIK	AC-K	AC+K
EKO-CKS P UNIT 140	**Cm Pelet-set 200:** - pellet burner CPPL-200 inv (with automatic cleaning) - pressure vessel 50 lit. - compressor Michelin	- Electrical enclosure with controller and control unit - electromagnetic valve - air feeding tube 1"	EKO-CKS P 150	42 - 140	- pellet conveyor CPPT-200	- pellet tank - boiler return protection with 3-way mixing valve and actuator and boiler pump - accumulation tank (min. 10 l/kW) or hydraulic crossover - set of safety elements min/max boiler water pressure	- cyclone - fan - addition to regulation for fan control	- automatic ash removal from the combustion chamber - automatic ash removal from the flue gas chamber - automatic (pneumatic) cleaning of flue gas tubes of thermal protection with compressor set, but without the compressor - DHW tank steering	- automatic ash removal from the combustion chamber - automatic ash removal from the flue gas chamber - automatic (pneumatic) cleaning of flue gas tubes of thermal protection with compressor (instead of 'Compressor Michelin' from the basic delivery, it is delivered 'Compressor Kaeser with compressor set). - DHW tank steering
EKO-CKS P UNIT 180			EKO-CKS P 200	54 - 180					
EKO-CKS P UNIT 230	**Cm Pelet-set 300:** - pellet burner CPPL-300 inv (with automatic cleaning) - pressure vessel 50 lit. - compressor Michelin	- Electrical enclosure with controller and control unit - electromagnetic valve - air feeding tube 1"	EKO-CKS P 250	69 - 230	- pellet conveyor CPPT-300/350				
EKO-CKS P UNIT 280			EKO-CKS P 300	84 - 280					
EKO-CKS P UNIT 320	**Cm Pelet-set 350:** - pellet burner CPPL-350 inv (with automatic cleaning) - pressure vessel 50 lit. - compressor Michelin	- Electrical enclosure with controller and control unit - electromagnetic valve - air feeding tube 1"	EKO-CKS P 380	96 - 320					
EKO-CKS P UNIT 430	**Cm Pelet-set 600:** - pellet burner CPPL-600 inv (with automatic cleaning) - 2 pressure vessels 50 lit. - compressor Michelin	- Electrical enclosure with controller and control unit - 2 electromagnetic valves - air feeding tube 1" - air feeding tube ½"	EKO-CKS P 500	129 - 430	- pellet conveyor CPPT-600				
	Configuration CIK		**Boiler**	**Power range (kW)**					
EKO-CKS P UNIT 499	**Cm Pelet-set 600:** - pellet burner CPPL-600 inv (with automatic cleaning) - 2 pressure vessels 50 lit. - compressor Michelin	- Electrical enclosure with controller and control unit - 2 electromagnetic valves - air feeding tube 1" - air feeding tube ½" - cyclone, fan CVX200	EKO-CKS P 550	149 - 499					
EKO-CKS P UNIT 560	**Cm Pelet-set 600:** - pellet burner CPPL-600 inv (with automatic cleaning) - 2 pressure vessels 50 lit. - compressor Michelin	- Electrical enclosure with controller and control unit - 2 electromagnetic valves - air feeding tube 1" - air feeding tube ½" - cyclone, fan CVX200	EKO-CKS P 600	168 - 560					

Other additional equipment (all power ranges): - CMNET cascade manager, CM-GSM communication module, CAL alarm module, CM2K module for two heating circuits via outdoor temperature (max 4x CM2K), CSK room corrector (possible installation with CM2K module), CM WiFi-box system for boiler monitoring over PC, tablet or mobile phone, feeding transporters from other tanks, silo for pellets, rotary dosing valve (RSE), ash removal from the flue gas chamber

1.0. GENERAL

EKO-CKS P UNIT is a special steel boiler for central heating systems. It has been constructed on the basis of a long term experience and design for wood pellets firing.The steel body of the boiler is welded according to modern technology, produced out of high quality materials. Atested in compliance with EN-303-5 norm and fulfil all special request for the connection on the installation of a central heating system. It is constructed for a maximum operating pressure of 3,0 bar. The entire surface inside the boiler which comes in touch with fire or with smoke is in contact with water and its tubing net has water cooling. Flue gases are streaming through three passages of exchanging surfaces: combustion chamber, first bundle of boiler flue exhaust and the second bundle of boiler flue exhaust tubes. Boiler body is equipped with a pellet burner CPPL inv, accessories for automatic burner cleaning, digital control regulation and wood pellet feeder CPPT. All mentioned parts make one functional unit.
The upper boiler door enables the access to the first and second bundle of the boiler flue exhaust tubes and their cleening. There is also free access to all other doors and openings when the boiler has to be cleaned. The boiler is equipped with all necessary connections for the connection to the central heating system.

IMPORTANT:
Connection of the boiler to the chimney and to the central heating system as well as the start-up has to be performed by the authorized person licensed on behalf of Centrometal d.o.o. company.

1.1. CM PELET SET DESCRIPTION

1.1.1. BURNER DESCRIPTION

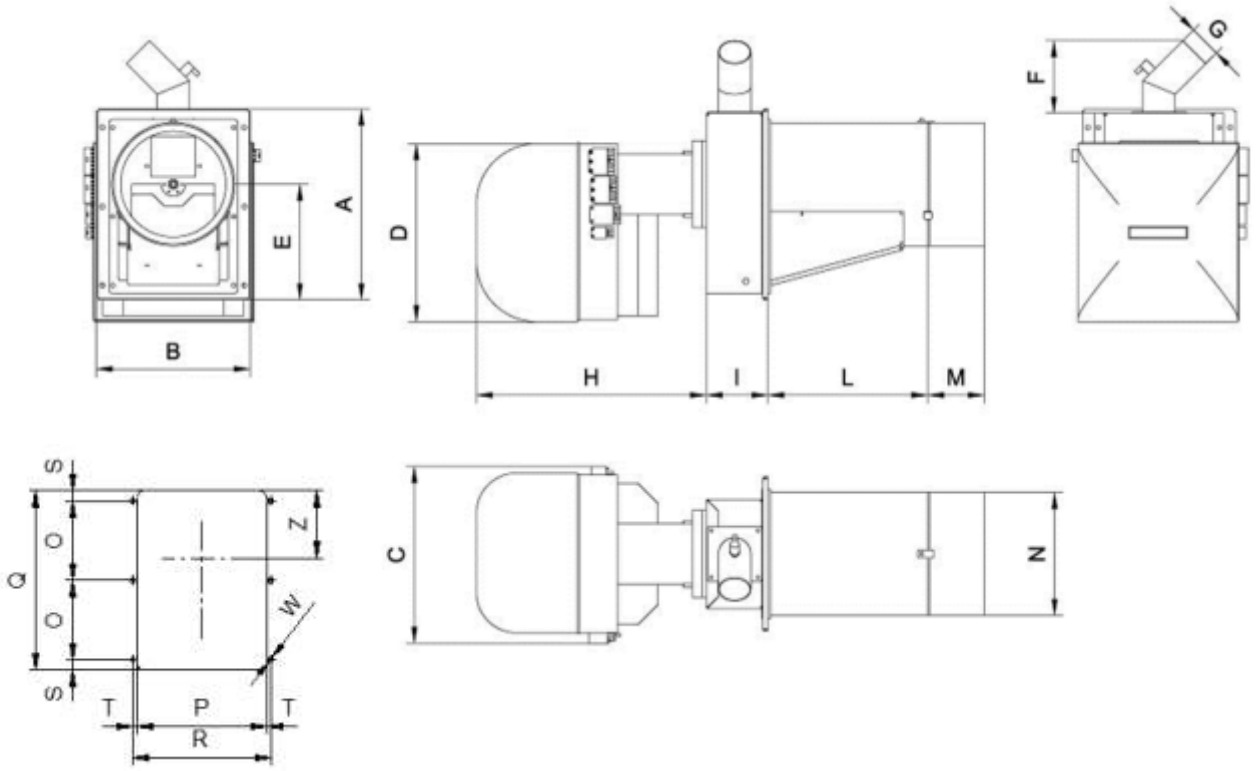
The CPPL burner is completely automatic and it works on EKO-CKS P boilers. It has an high power centrifugal fan and it dev elops horizontal flame like traditional burners. All fire exposed components are made of steel which is resistant to high temperatures.
The burner fluid dynamics permits an homogeneus mixture of fuel/combustive agent with an high burning output so the burner can work with low air level, the same levels which are normally used for liquid fuels The Archimedean screw grants the pellets supply.
The regulation can be all/nothing two staged or multistage, a programming system allows selection of the type of regulation.
The fan speed allows to change the air quantity according to the burner power.
The fuel quantity changes according to the feed screw electrical pulses. On the burner there aren't any mechanical devices or moving components. The ignition system is totally automatic and reliable.

TECHNICAL DATA AND DIMENSIONS OF CPPL BURNERS

MODEL	POWER [kW]		FAN [W]	ELECTRIC HEATER [W]	FEEDER SCREW [W]	POWER SUPPLY
	MIN.	MAX.				
CPPL-200 inv	100	200	370	600	90	230V, 50 Hz
CPPL-300 inv	150	280	370	600	90	230V, 50 Hz
CPPL-350 inv	90	350	370	600	90	230V, 50 Hz
CPPL-600 inv	168	600	650	900	90	230V, 50 Hz

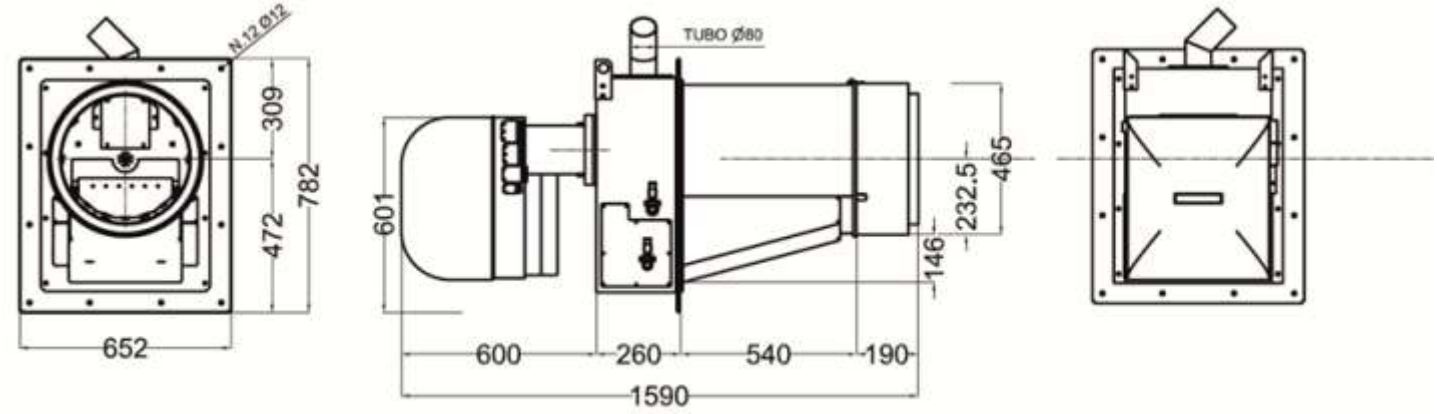
DIMENSIONS:

CPPL-200 inv, CPPL-300 inv, CPPL-350 inv



MODEL	A	B	C	D	E	F	G	H	I	L	M	N	O	P	Q	R	S	T	W	Z
CPPL-200 inv	391	306	440	440	236,5	180	80	570	150	351	130	253	150	255	350	277	25	11	M10	134
CPPL-300 inv	471	381	440	440	285,5	180	80	570	150	396	312	312	195	330	440	352	25	11	M10	165
CPPL-350 inv	501	381	440	440	315	180	80	570	150	496	135	312	195	330	440	352	25	11	M10	165

CPPL-600 inv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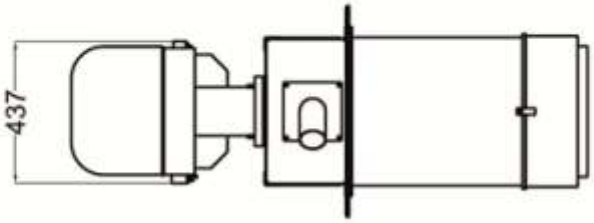
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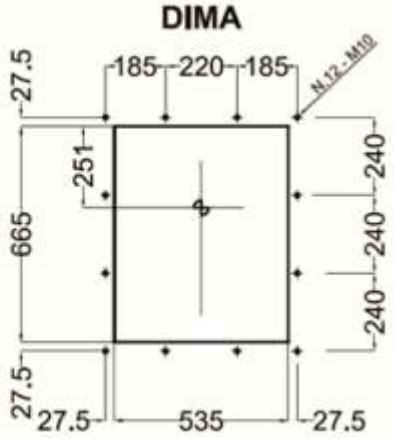
DIMA
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185
220
185
N.12 - M10
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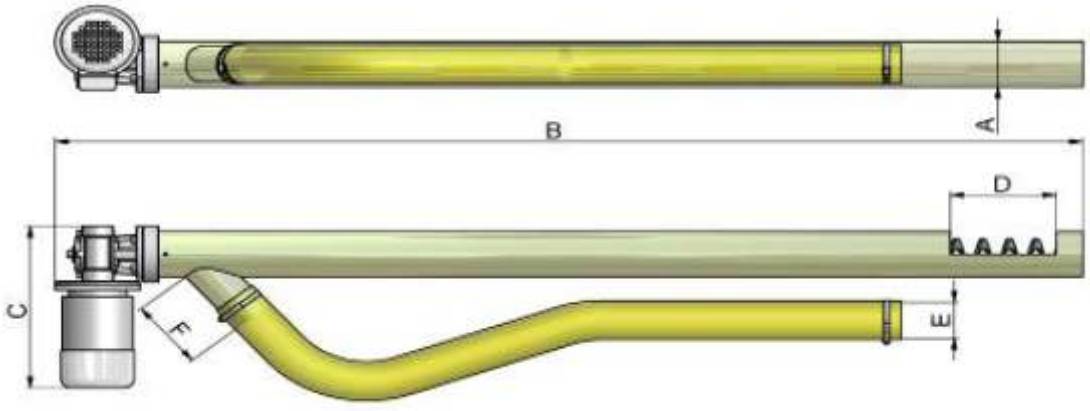
665
240
240
240
27.5
27.5
535
27.5

1.1.2. FEEDER SCREW DESCRIPTION

The pellets feed system is granted by a screw and it is composed by:

- Motor device with gearbox, with an high starting torque
- Cable with electrical connection with the connector
- Steel spiral
- Motor device support with gearbox
- Steel pipes
- Flexible pipes for connection of the screw/burner
- Clamping bands

DIMENSIONS:



MODEL	A	B	C	D	E	F
CPPT 200-350	102	2075	160	200	80	150
CPPT 600	102	2625	160	200	80	150

2.0. DELIVERY STATE

The basic boiler delivery (OO (basic equipment)) consists of:

- boiler with thermal insulation
- Cm Pelet-set 200-600, which includes:
  - the pellet burner with preparation for burner air cleaning and pressure vessel (50 l for 140-320 kW, 2x50 l for 430-560 kW).
  - compressor Michelin for the pellet burner air cleaning. If there is own source of compressed air, the price for 'Compressor Michelin' has to be excluded from the price calculation
  - electrical enclosure with digital boiler controller and touch screen, which manages the boiler and burner operation, burner air cleaning, feeding conveyor for pellet supply from the pellet tank (placed by the boiler) into the burner, return flow protection by a 3 way mixing valve with actuator, accumulation tank and a possible start of an alternative boiler.
- 1 boiler temperature sensor, 1 return flow sensor, 2 accumulation tank sensors, 1 external temperature sensor

Note:

- the boiler EKO-CKS P Unit 499 and EKO-CKS P Unit 560 are always delivered with the cyclone and fan and also with addition to regulation for the fan steering (CIK)

2.1. OBLIGATORY EQUIPMENT

- pellet feeding conveyor (CPPT- XX)
- pellet tank (CentroPelet Box) or feeding conveyor for pellet supply from the seasonal tank into the pellet burner according to the Centrometal's recommendation
- the boiler return flow protection by a 3-way mixing valve with actuator and boiler pump
- accumulation tank CAS or hydraulic crossover
- set of safety elements min/max boiler water pressure

Boiler configuration with additional equipment set:

- **CIK** (cyclone with a fan and addition to regulation)
- **AC-K** (automatic ash removal from the combustion chamber, automatic ash removal from the flue gas chamber, automatic (pneumatic) cleaning of flue gas tubes of thermal protection exchanger without compressor, DHW tank steering)
- **AC+K** (automatic ash removal from the combustion chamber, automatic ash removal from the flue gas chamber, automatic (pneumatic) cleaning of flue gas tubes of thermal protection exchanger with compressor, DHW tank steering), instead of 'Compressor Michelin' from basic delivery it has to be installed 'Compressor Kaeser with compressor set' and the price for 'Compressor Michelin' has to be excluded from the price calculation.

2.2. ADDITIONAL EQUIPMENT

- backfire protection by rotary dosing valve (RSE) (available only in AC-K and AC+K configurations)
- CMNET - cascade manager
- CM-GSM - communication module
- CAL - alarm module
- CM2K - module for two heating circuits (max. 4xCM2K modules)
- CSK - room corrector (possible installation only with CM2K module)
- CSK-Touch - digital room corrector (possible installation only with CM2K module)
- CM WiFi-box - system for monitoring the boiler by PC, tablet or smartphone
- pellet feeding conveyor from the seasonal tank into the CentroPelet Box tank
- pellet feeding conveyor with mixer from the seasonal tank to the CentroPelet Box tank
- pellet silo and pellet feeding conveyor to CentroPelet Box tank near the boiler

3.0. FUEL

Hot water boiler **EKO-CKS P UNIT** can be fired with **wood pellets (C1** by EN 303-5:2012; **A1** by ISO 17225-2:2014).

FUEL CHARACTERISTICS

- heating value: >= 5 kWh/kg (18 MJ/kg)
- diameter: <= 6 mm
- max. moisture content: <= 12 %
- max. dust content: <= 1,5 %.

4.0. ASSEMBLAGE OF THE BOILER

The boiler has to be put on the previously prepared concrete fundament which minimum height is 200-300 mm. The upper fundament surface has to be smooth and exactly horizontal.
The room has to be frost proof and adequately ventilated. The boiler has to be situated in order its connection to the chimney can be performed correctly; its cleaning and handling should be convenient. If there is planned an cyclone and fan connection, the boiler has to be situated to have all its parts easily accessible. The casing has to be assembled after the boiler has been connected to the chimney and to the central heating system, according to the instructions attached. Before connecting to the instalation the boiler has to be put exactly in the horizontal position.

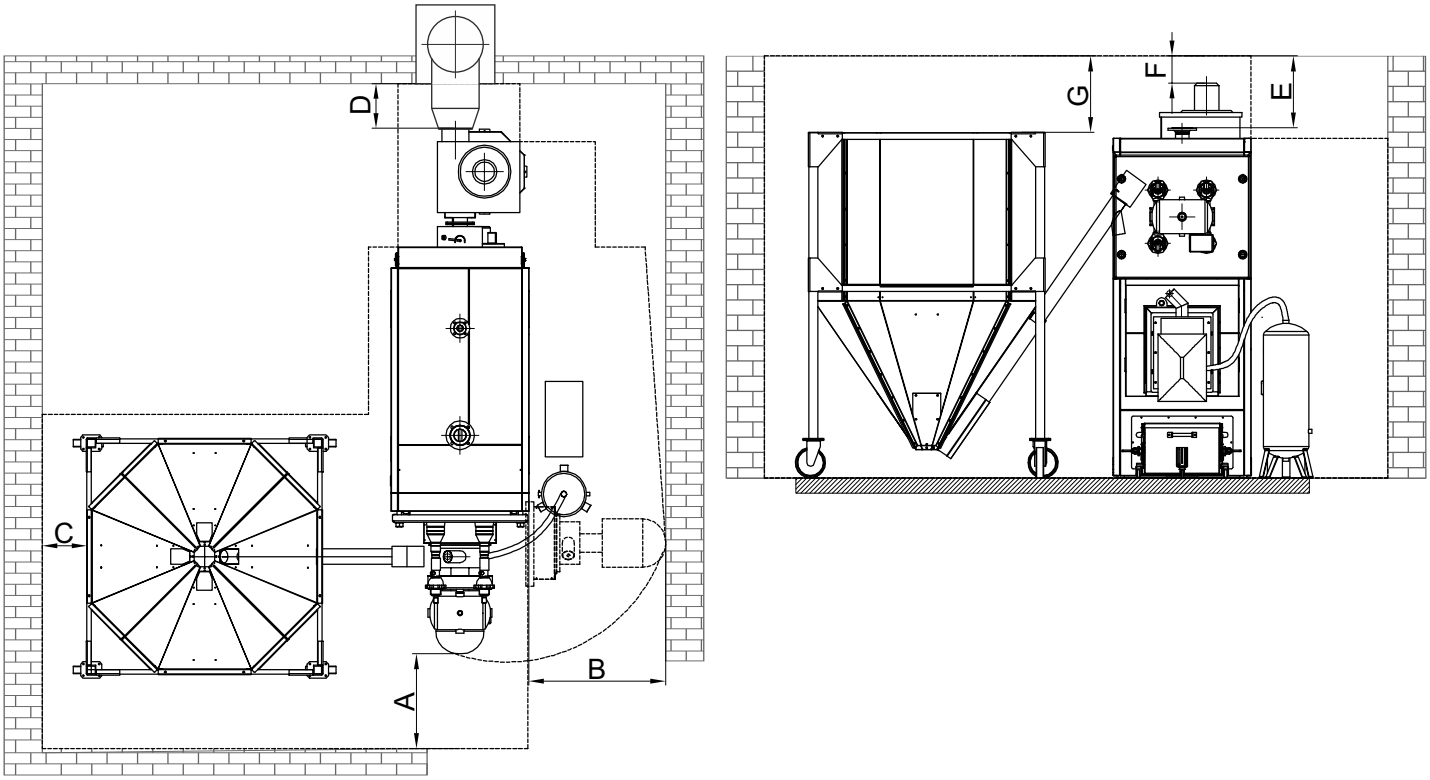
4.1. BOILER ROOM

Ensure the boiler room complies with the requirements in these technical instructions. Boiler room must be frost-proof and well ventilated. Boiler has to be positioned so that it can be properly connected to the chimney and simultaneously, enabling tending of boiler and additional equipment, control during operation, and cleaning and maintenance. No combustible materials may be stored in the boiler room. Boiler may only be placed on fire and temperature resistant floor. No temperature-sensitive pipes or lines may be installed in the floor beneath the heating boiler. The minimum distance to the walls required according to point „Minimum distance from the boiler room walls". The fresh air supply required according to point „Opening for fresh air". The temperature in the boiler room must not exceed +40°C while system is in operation. The temperature in the boiler room must not fall below +10°C while the system is in operation.

Always follow the most up-to-date local, municipal and building regulations and codes.

Boiler must not operate in flammable and explosive environment.

4.2. MINIMAL DISTANCES FROM THE BOILER ROOM WALLS



Minimal distances from the boiler room walls for the boiler EKO-CKS P UNIT and pellet tank Centropelet box 2700

	140-180	230	280	320	430	499	560
A	650	650	950	950	950	950	950
B	1000	1000	1000	1000	1200	1200	1200
C	300	300	300	300	300	300	300
D	300	300	300	300	300	300	300
E	900	470	600	500	500	500	500
F	550	200	150	150	150	150	150
G	500	500	615	615	800	800	1150

Flammable items must not be placed on the boiler and within the safety distances.

4.3. OPENING FOR FRESH AIR

Each boiler room **must be equipped with opening** for supply of fresh air which is dimensioned in accordance with boiler output. Such opening must be protected with a net or grate. The boiler location must never be under negative pressure.

Equation for calculate opening area: $A = 6{,}02 \cdot Q$

A - opening area in cm^2
Q - boiler output in kW

Always follow the most up-to-date local, municipal and building regulations and codes.

Boiler must not operate in flammable and explosive environment.

Never cover the boiler or store debris or other materials near the boiler, or in any way block the flow of adequate fresh air to the boiler. Never cover the combustion air opening.

Insufficient combustion air for chimney vent boilers with room air for combustion can lead to dangerous conditions.

Make sure that the combustion air supply and discharge openings are not reduced or closed off.

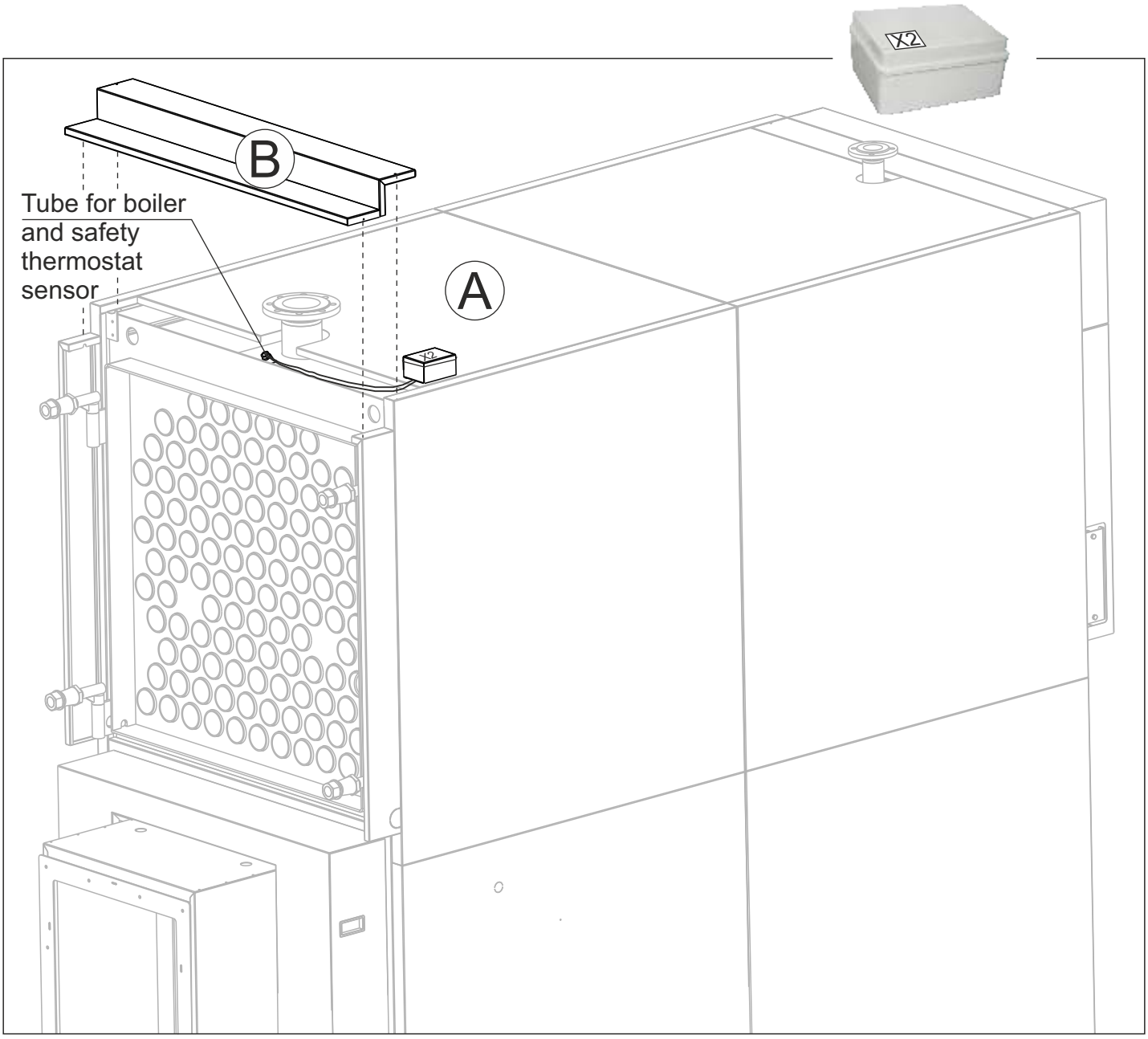
Keep doors to the boiler room closed and do not block lovers in boiler room door.

Protect the boiler room and avoid rodents and birds from entering and blocking the air openings.

When the above issues have not been resolved, the boiler can not be placed in operation.

5.0. SAFETY THERMOSTAT INSTALLATION

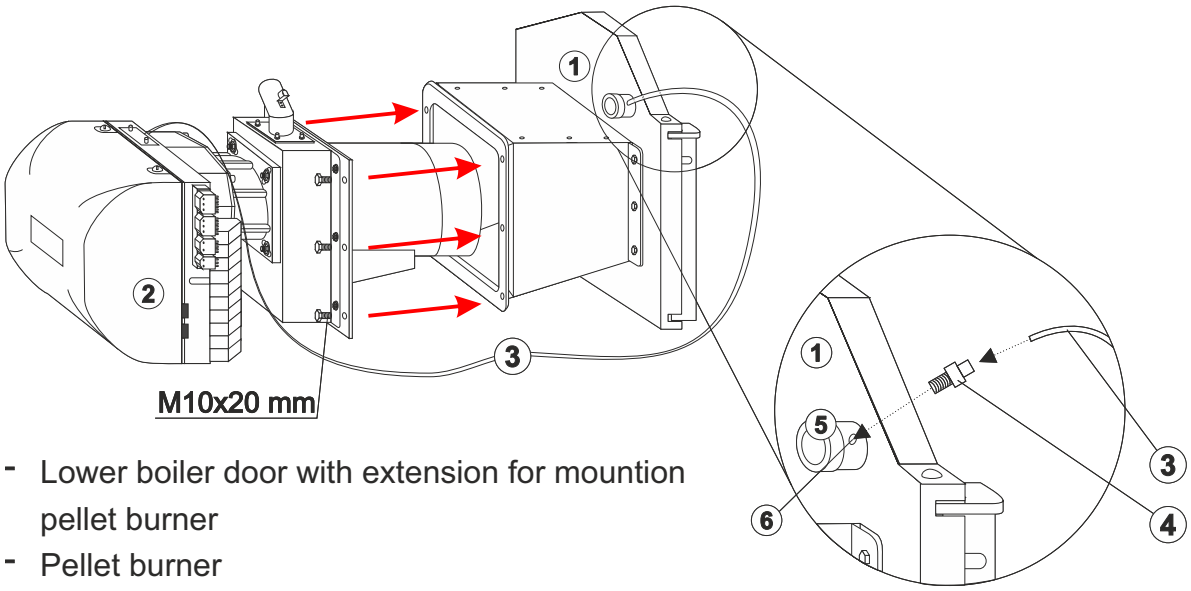
With boiler is delivered PVC box which consist safety thermostat. PVC box (marked with „X2") must be installed when are casing cover mounted on boiler. Place PVC box on upper casing cover side (A) and fix it with four screws through factory prepared holes. Place boiler sensor and safety thermostat sensor on common sensors tube which is placed below front casing cover (B).
Connect PVC box with junction box according to electrical schemes.



5.1. INSTALL PELLET BURNER CPPL TO LOWER BOILER DOOR

Parts needed for the burner installation are shown in Figure 1.
The burner shall be fixed with 6 screws M10x20 mm onto the extension flange which is installed on the lower boiler door. The presostat (pressure switch) tube (3) is on one side fixed to the presostat on the burner CPPL (2), and in the other side there is shallow pin (4) to connect the tube to the boiler door. Shallow pin (4) shall be removed from the presostat tube (3)and tighten in the threaded hole M5 (6) which is located on the control opening (5) on the lower boiler door (1). The presostat tube (3) shall be shortened if necessary and put on shallow pin.

Figure 1.

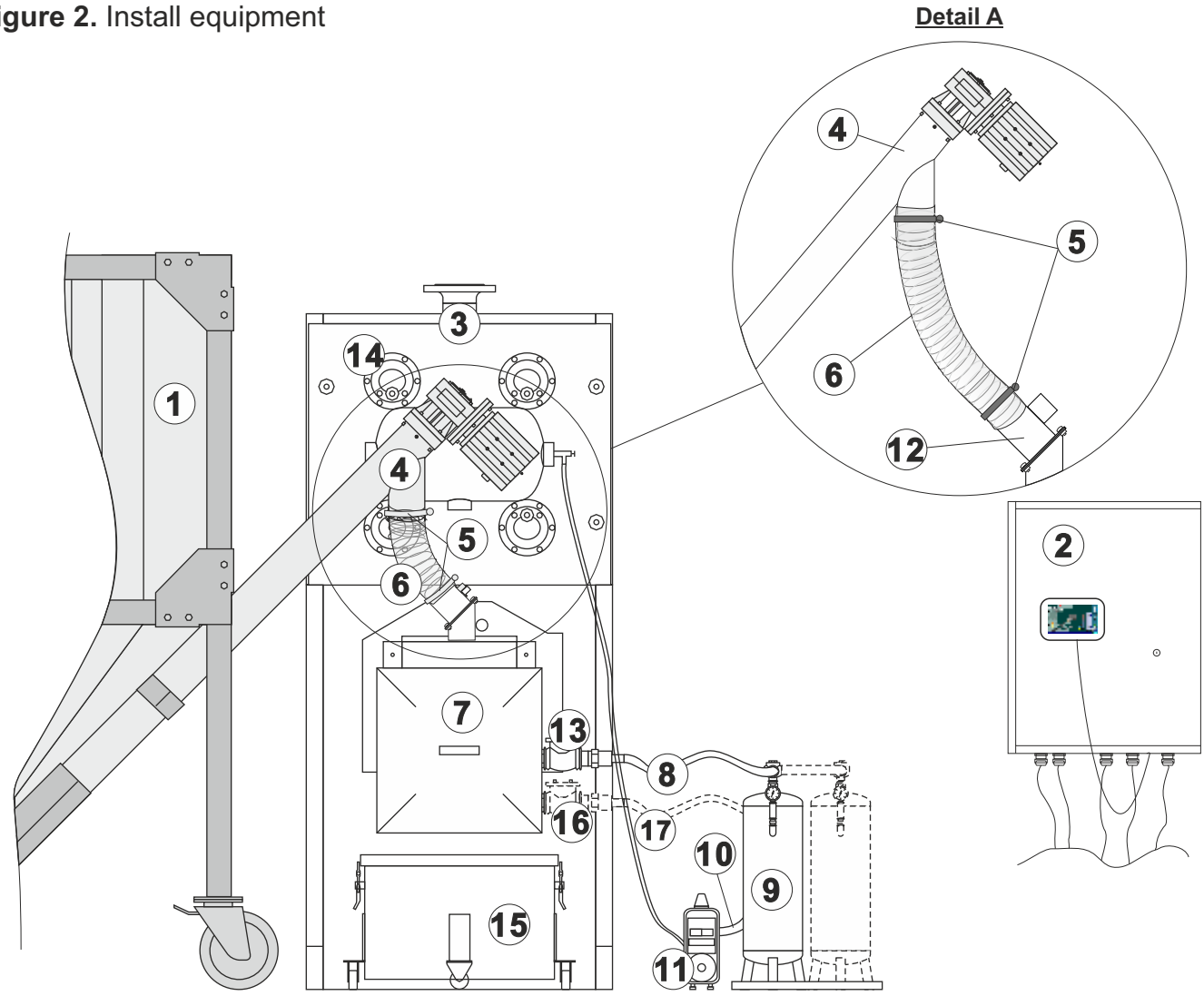


① - Lower boiler door with extension for mountion pellet burner
② - Pellet burner
③ - Pressure pipe
④ - Bolt
⑤ - Visual control opening
⑥ - Hole with thread M5

5.2. INSTALL EQUIPMENT FOR WOOD PELLET FIRING

Installation of equipment for wood pellet firing is shown in Figure 2. The feeder screw CPPT (position 4) shall be inserted from the right side of the wood pellet tank CentroPelet box into holders fixed on the lateral tank side. The wood pellet tank CentroPelet box (position 1), with previously installed feeder screw CPPT shall be placed to the left side of the boiler EKO-CKS P UNIT. One end of flexible tube for feeding of wood pellets (position 6) shall be placed on the wood pellet feed screw CPPT (position 4) and fix with clamps (positin 5), and the other end of flexible side shall be placed onto the burner CPPL (on the feeding tube position 6) to the cover of bimetal thermostat and it shall also be fasten with a clamp (position 5) (detail A). Flexible tube for feeding of wood pellets shall be as straight as possible between the feeder screw CPPT and CPPL burner so that wood pellets can fall freely from feeder screw CPPT into CPPL burner (if wood pellets remain in tube it is necessary to straighten the tube or shorten, if necessary). Compressor (position 11) and pressure vessel (position 9) shall be connected with tube for connectiong air compressor and pressure vessel (position 10). Pressure vessel (position 9) shall be connected through a tube (position 8) to electro- magnetic valve (position 13) located on the right lateral side of CPPL burner.

Figure 2. Install equipment



1 - Pellet tank (CentroPelet box 2,7 m^3 or similar)
2 - Junction box with boiler control unit and touchscreen display
3 - Boiler EKO-CKS P
4 - Feeder screw CPPT 200, 200/350, 600
5 - Clamps for fastening of flexible tube for wood pellet feeding
6 - Flexible tube for wood pellet feeding
7 - Pellet burner CPPL inv
8 - Tube for connecting pressure vessel and CPPL inv pellet burner
9 - Pressure vessel: 50l for CPPL 200,300,350 inv
2 x 50l for CPPL 600 inv
10 - Tube for connecting air compressor and pressure vessel
* 11 - Air compressor
12 - Tube for connecting wood pellet feeding to CPP pellet burner
13 - Electro-magnetic valve
** 14 - Automatic cleaning system of the heat exchanger's flue gas tubes (passages) by air (pneumatic)
** 15 - Ash box (for automatic ash removal system out of the boiler combustion chamber - optional)
16 - Electro-magnetic valve (only for CPPL 600 inv)
17 - Tube for connecting pressure vessel and CPPL inv pellet burner (only for CPPL 600 inv)

* Compressor is not delivered in configuration (AC-K)
** Additional equipment - option for order

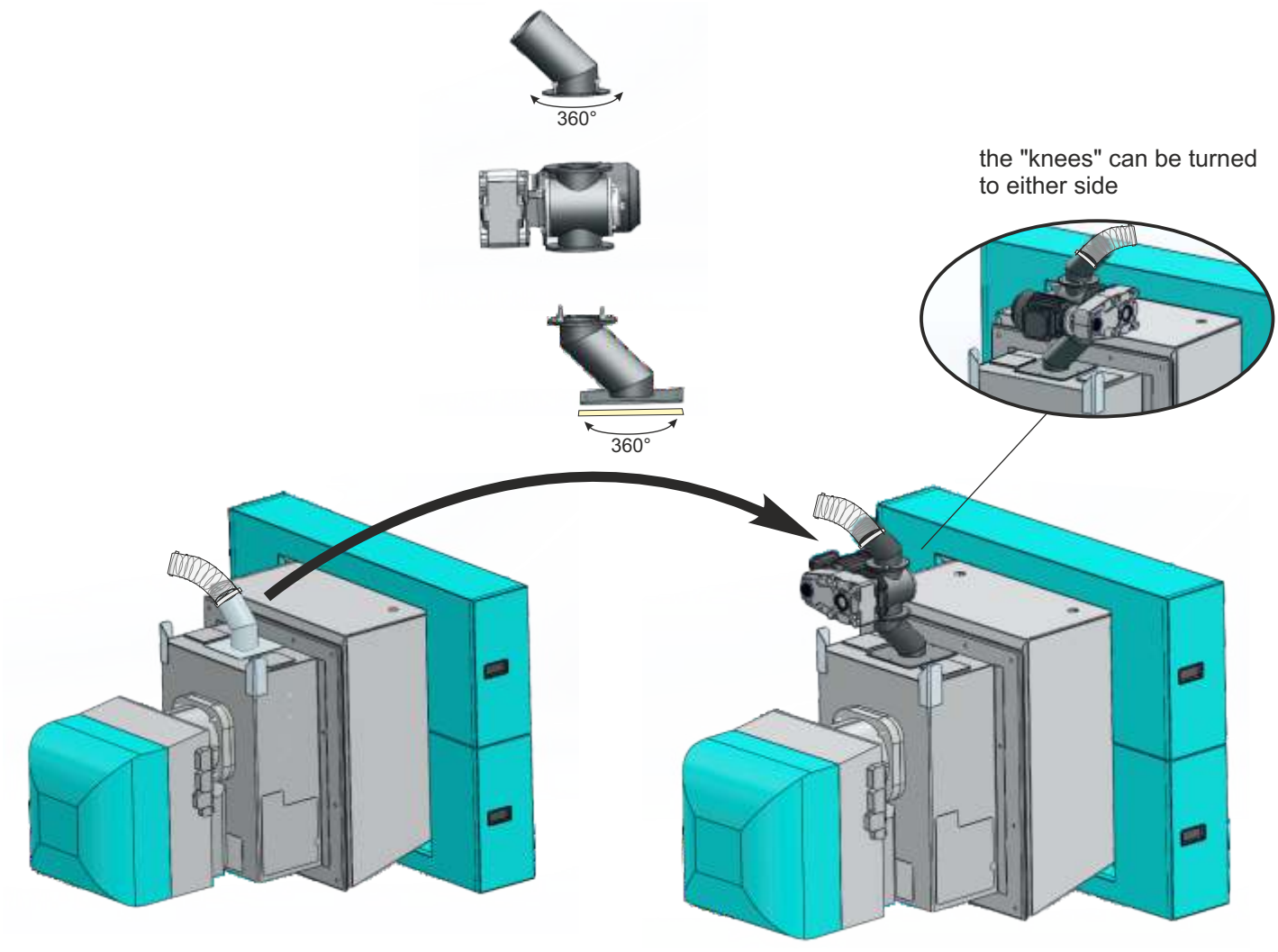
ROTARY DOSING VALVE INSTALLATION (RSE) (ADDITIONAL EQUIPMENT)

Prior to any work on the boiler, the el. power must be switched OFF on the device to disconnect all poles of the power supply.

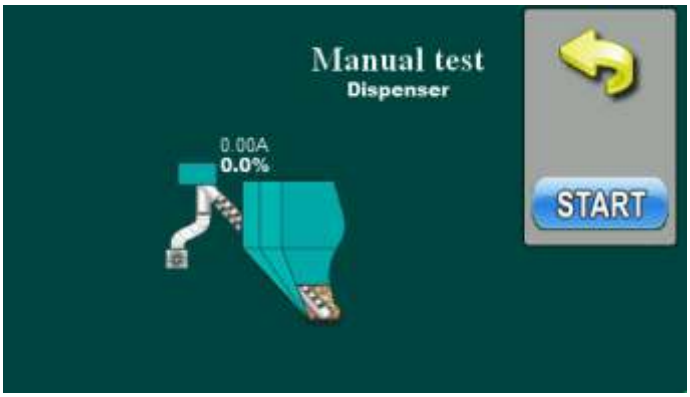
ROTARY DOSING VALVE AS ADDITIONAL EQUIPMENT MUST BE ORDER WHEN ORDERING A BOILER, BECAUSE TO ADJUST THE ELECTRIC CABINET. IN CASE THAT THE BOILER IS STANDARDLY DELIVERED WITHOUT PREPARATION FOR THE INSTALLATION OF A ROTARY DOSING VALVE, IT IS NECESSARY TO CONTACT CENTROMETAL D.O.O. TO SEE THE POSSIBILITY OF UPGRADING THE ELECTRIC CABINET.

To install the rotary dosing valve, the original pellet supply pipe must be removed from the burner. Then it is necessary to install a rotary dosing valve.

Important: use a seal left over from the original pellet supply pipe
Note: the rotary dosing valve flange is designed so that the dosing valve can be directed to the side required (see figure).



After the rotary valve is properly attached to the burner, it is necessary to connect it to the electrical cabinet in the intended place on the terminal block. An electrical wiring diagram is supplied with the boiler, indicating the connection point for the rotary valve (symbol x24). Then it is necessary to turn on the rotary valve (Dispenser) in the boiler control under the PIN for the installer and check the correctness of the operation using a manual test.



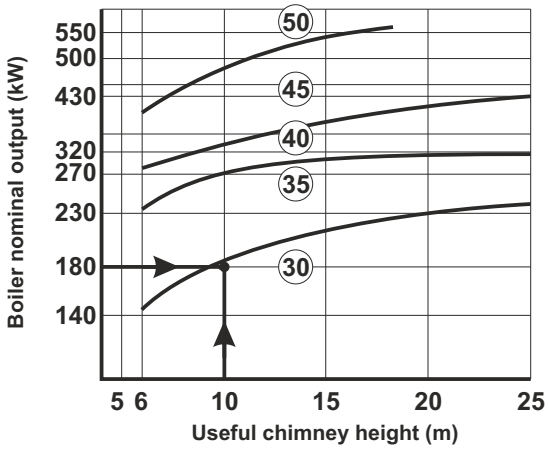
6.0. CONNECTION TO THE CHIMNEY

Properly dimensioned and built chimney is the main condition for safe and economical functioning of the boiler**. The thermal insulation of the chimney has to be done properly**, it has to be absolutely gas-proof and smooth. On its lower part there has to be built in the opening for cleaning with the door. An brick-layed chimney has to have three layers with an insulation of 30 mm in the middle, if the chimney is built inside the house (i.e. inside the heated area), or an insulation of 50 mm if it is built outside the house (i.e. outside the heated area). The flue gas temperature has to be at least 30°C higher then the temprerature of their consdensation point. The choice and the construction of the chimney has to be performed by the authorized person. Inside dimensions of the chimney intersection selected in accordance with diagram for chimney selection, they depend of its height and of the capacity of the boiler and existing of cyclone with fan. The **flue gas tube for connecting the boiler and the chimney has** to have a thermal insulation made out of 30-50 mm thick stone wool. Flue gas tube must be installed under angle +0° to 45°. In order to unable condensate to enter the boiler, the flue gas tube has to be situated 10 mm deaper inside the chimney. If for any reason the boiler has to be connected to the chimney dimensioned for higher capacity boilers, the possibility of condensation inside the chimney shall be highly inreased. The boiler's function shall not be affected, but the damper on the flue exhaust has to be positioned according to the chimney underpressure (see technical data regarding the chimney pressure for each type of the boiler).

CHIMNEY SELECTION FOR BOILER WITHOUT CYCLONE AND FAN

Required max. distance between boiler and chimney is 700 mm and minimal is 300 mm. Flue gas tube must have inner diameter fi 300 mm for boiler power 140-320 kW and fi 350 mm for power 430 kW with max. two elbows.

Diagram for chimney selection (for boiler without cyclone and fan)



An example of selection of a chimney:
(for boiler without cyclone and fan)

- BOILER HEAT OUTPUT - 180 kW
- FUEL - WOOD PELLET
- REQUIRED USABLE CHIMNEY HEIGHT - H = 10 m (or more if that laws require)
- REQUIRED CHIMNEY LIGHT DIAMETER - 30 cm

- Usable chimney height
- chimney height from connection spot of smoke pipe to the chimney top.

- Light chimney diameter
- chimney inner diameter.

CHIMNEY SELECTION FOR BOILER WITH CYCLONE AND FAN

Required max. distance between boiler and chimney is 5 m and minimal is 300 mm with max. four elbows.

Boiler	Inner flue gas tube diameter	Inner chimney diameter	Usable chimney height
140-230	250 mm	300 mm	4,5 - 40 m
280-320	300 mm	300 mm	4,5 - 40 m
430	300 mm	350 mm	4,5 - 40 m
499	300 mm	400 mm	4,5 - 40 m
560	300 mm	400 mm	4,5 - 40 m

For existing chimneys with not offered dimensions or out of standard is necessary to make chimney calculation by real conditions and determine correct dimensions of flue gas connection and chimney.

7.0. BOILER INSTALLATION TO CENTRAL HEATING SYSTEM

All installation works must be made in accordance with valid national and European standards. Boiler **EKO-CKS P UNIT** can be connected to closed or open central heating systems. Boiler can be fired with wood chip and wood pellets. Installation should be made, in according to technical standards, by a professional who will be responsible for proper boiler operation. Before connecting boiler to central heating system, the system has to be flushed to remove impurities remaining after system installation. It prevents boiler overheating, noise within the system, disturbances at a pump and mixing valve. Boiler should always be connected to central heating system by connectors/flange, never by welding. Connecting boiler to central heating system must be performed by EN 12828:2012+A1:2014 norm.

Boiler EKO-CKS P UNIT can be installed on following ways:

1) through **buffer tank** (CAS) (minimum volume of buffer tank is 12 l/kW)

2) through **hydraulic crossover**

Boiler return line protection (for low temperature) must be perfomed by 3-way mixing valve with actuator (connected to boiler control unit). Also, it must be installed adequately dimensioned boiler pump (connected to boiler control unit). Opening speed of 3-way mixing valve for boiler return line protection must be 30 seconds or maximum 60 seconds.

BOILER SHOULD ALWAYS BE CONNECTED TO CENTRAL HEATING SYSTEM BY CONNECTORS/FLANGE, NEVER BY WELDING!

MINIMAL DIMENSIONS FOR BOILER SAFETY VALVE MARKED H BY EN 12828:2012 NORM

BOILER	VALVE SIZE
EKO-CKS P UNIT 140	DN 25 (G 1")
EKO-CKS P UNIT 180	DN 25 (G 1")
EKO-CKS P UNIT 230	DN 32 (G 5/4")
EKO-CKS P UNIT 280	DN 32 (G 5/4")
EKO-CKS P UNIT 320	DN 40 (G 3/2")
EKO-CKS P UNIT 430	DN 40 (G 3/2")
EKO-CKS P UNIT 499	DN 40 (G 3/2")
EKO-CKS P UNIT 560	DN 40 (G 3/2")

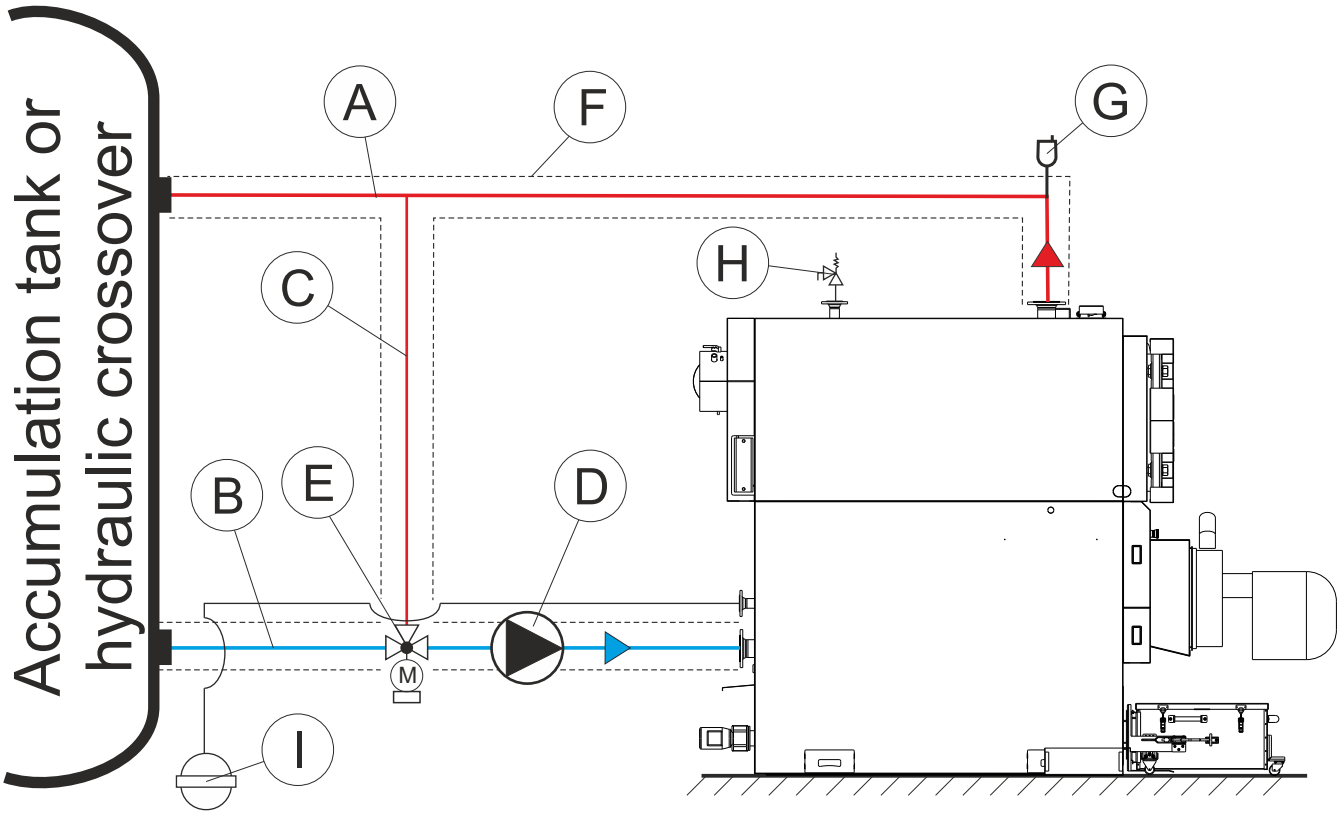
7.1. FILLING THE SYSTEM

Boiler and entire central heating system must be filled with water quality accordin to HRN M.E2011 - table 4. The system has to be airvented in order the water can circulate normaly.

7.2. BOILER INSTALLATION TO CLOSED HEATING SYSTEM

In closed heating system (as in example shown in Figure 3.) it is **obligatory** to build in certified safety valve with opening pressure of max. 3 bar and a closed expansion vessel. Safety valve and expansion vessel must be built in accordance with professional rules and any valve must not be located between safety valve and expansion vessel and boiler. The safety valve need to be chosen according to the norms EN 12828:2012+A1:2014.

Figure 3. General connection scheme of the EKO-CKS P UNIT to the closed heating system



LEGEND:

A - Boiler flow
B - Boiler return
C - Connection line flow-return
D - Boiler pump
E - 3-way mixing valve with motor drive (not included into delivery)
F - Thermal insulation of the safety boiler circuit
G - Automatic air vent pot
H - Safety valve (obligatory install by EN 12828)
I - Expansion vessel for closed systems (approx. 10% of the total volume of installation)

NOTE: CLOSING VALVES ARE NOT DISPLAYED ON THIS PLAN!

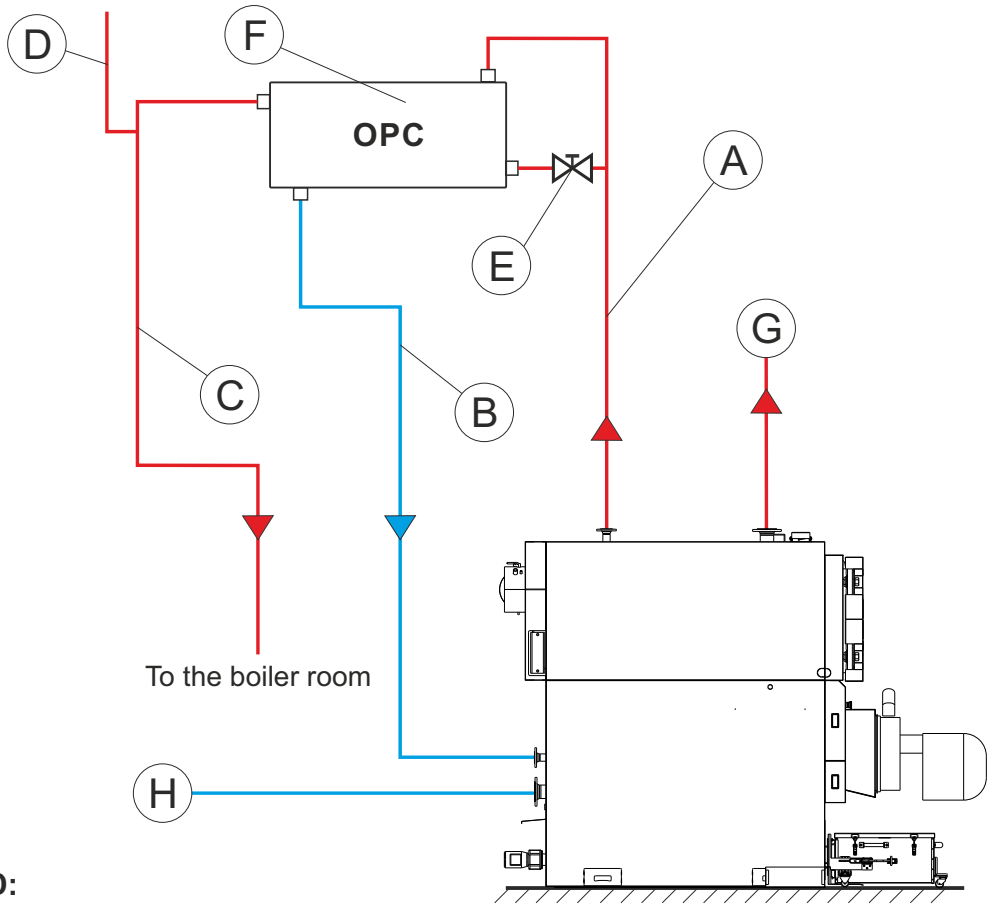
Hydraulic connection scheme must be preformed in a manner as shown in this scheme.
Other parts of installation which is not shown in this scheme must be preformed accordance to norm EN 12828:2012+A1:2014.

7.3. BOILER INSTALLATION TO OPEN HEATING SYSTEM

7.3.1. INSTALLATION TO OPEN EXPANSION VESSEL

The boiler has to be connected to the open system according to the Figure 4. All connections from the boiler to the open expansion vessel and from the open expansion vessel to the boiler have obligatory to be covered by the thermal insulation of min. 40 mm (stone wool or equivalent insulating material). If the expansion vessel is situated outside the heated area, it has to be insulated. Open expansion vessel must be built enough highly above the highest heating body harness and water heating to allow normal operation of the system, but the water pressure in the boiler in any case shall not exceed the maximum allowed. The dimension of the open expansion vessel is determined by the quantity of water inside the installation, i.e. approximatly 7% of the total water quantity inside the entire installation.

Figure 4. General connection scheme of the EKO-CKS P UNIT to the open expansion vessel



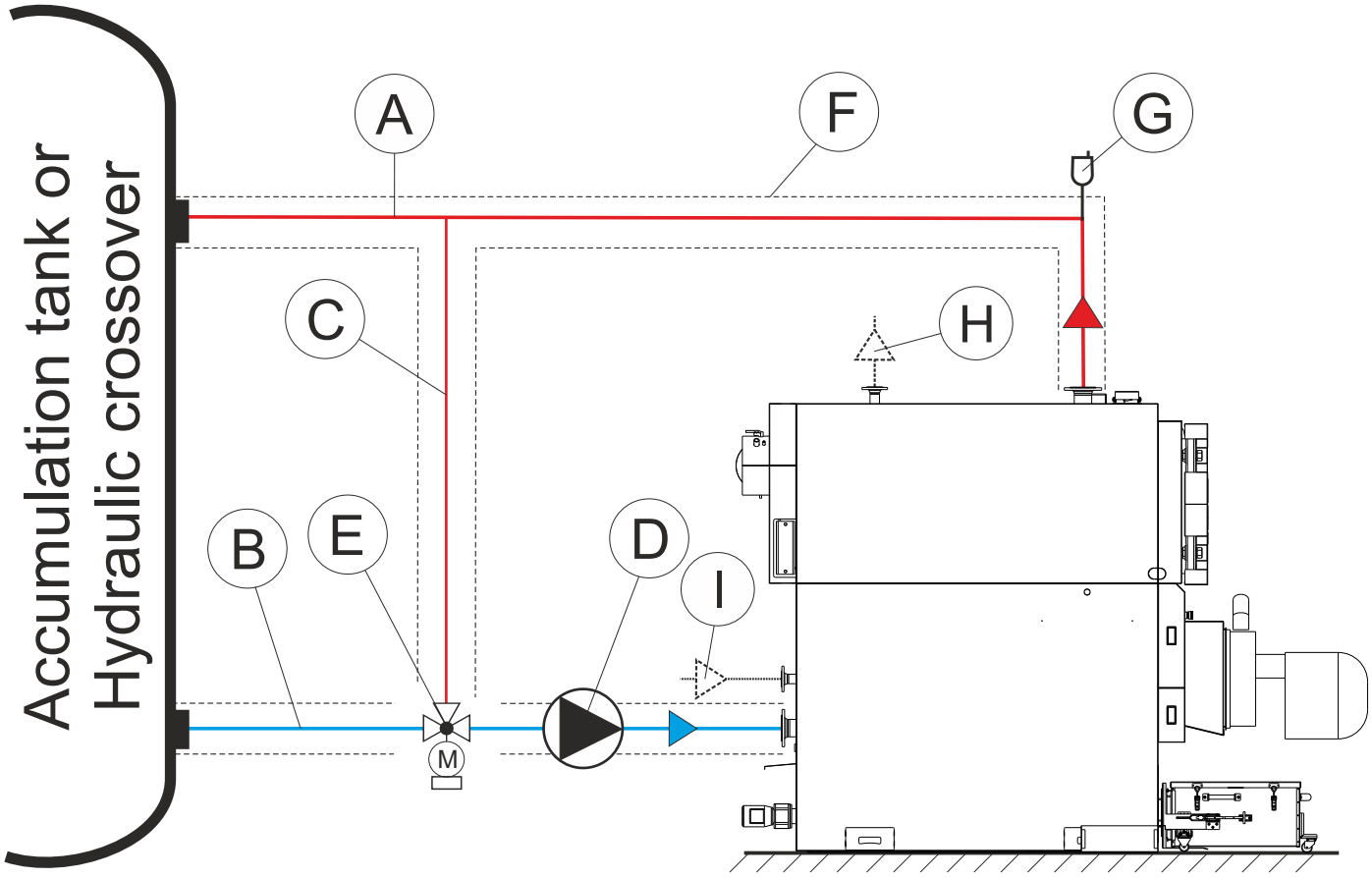
LEGEND:

A - Safety boiler flow
B - Safety boiler return
C - Overflow line (has to lead to the boiler room)
D - Air vent
E - Throttle valve
F - Open expansion vessel (Volume = 7% of total system volume)
G - Boiler flow (heating)
H - Boiler return (heating)

NOTE: CLOSING VALVES ARE NOT DISPLAYED ON THIS PLAN!

Hydraulic connection scheme must be preformed in a manner as shown in this scheme.
Other parts of installation which is not shown in this scheme must be preformed accordance to norm EN 12828:2012+A1:2014.

Figure 5. General connection scheme of the EKO-CKS P UNIT to te open heating system



LEGEND:

A - Boiler flow
B - Boiler return
C - Safety line
D - Boiler pump
E - 3-way mixing valve with actuator (not included into delivery)
F - Thermal insulation of the safety boiler output
G - Automatic air vent pot
H - Safety inlet line - accord. to the open expansion vessel
I - Safety outlet line

NOTE: CLOSING VALVES ARE NOT DISPLAYED ON THIS PLAN!

Hydraulic connection scheme must be preformed in a manner as shown in this scheme.
Other parts of installation which is not shown in this scheme must be preformed accordance to norm EN 12828:2012+A1:2014.

8.0. BOILER STARTUP

Boiler commisioning must be performed by the authorized service man of the company Centrometal d.o.o. who will be commission boiler and additional equipment by Commissioning list, carry out training of boilerman or responsible person for using boiler and make report about training with trained person signature.

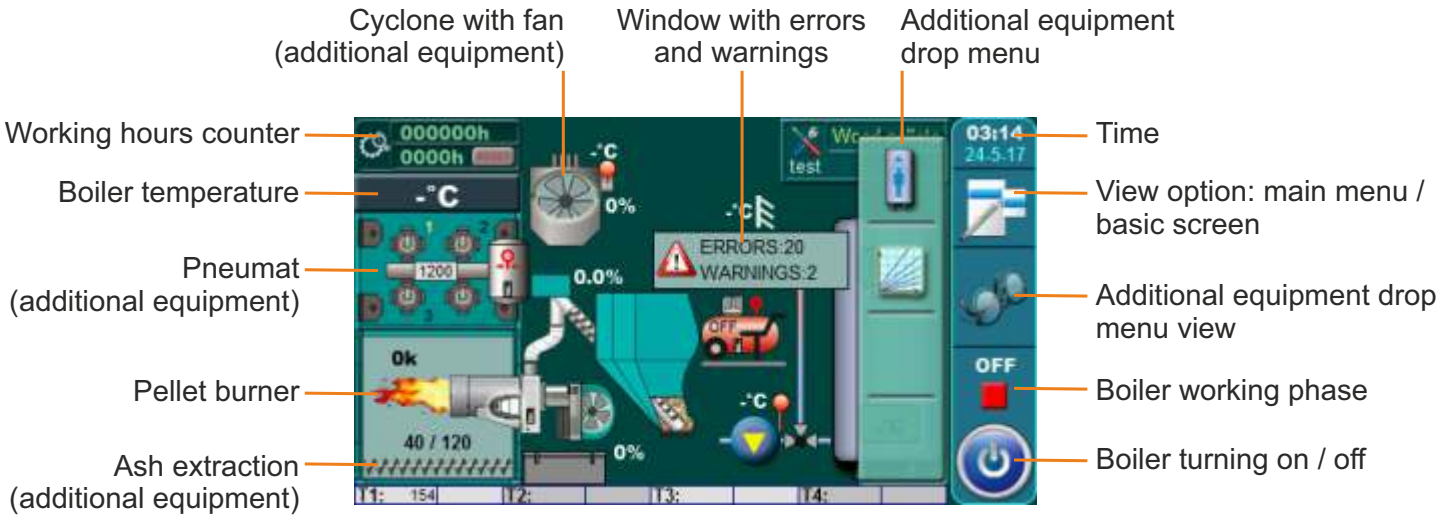
9.0. BOILER USE

It must not be used by children or disabled persons (either physically or mentally), as well as by person without knowledge or experience, unless they are under control or trained by s person responsible for their safety. Children must be supervised in the vicinity of the product.

Before any work on the boiler electrical energy must be switched off.

The boiler may only be used by a person appointed by the owner of the boiler and trained for the safe use, maintenance and cleaning of boiler authorized service technician / fitter of Centrometal d.o.o. for what should be own conviction.

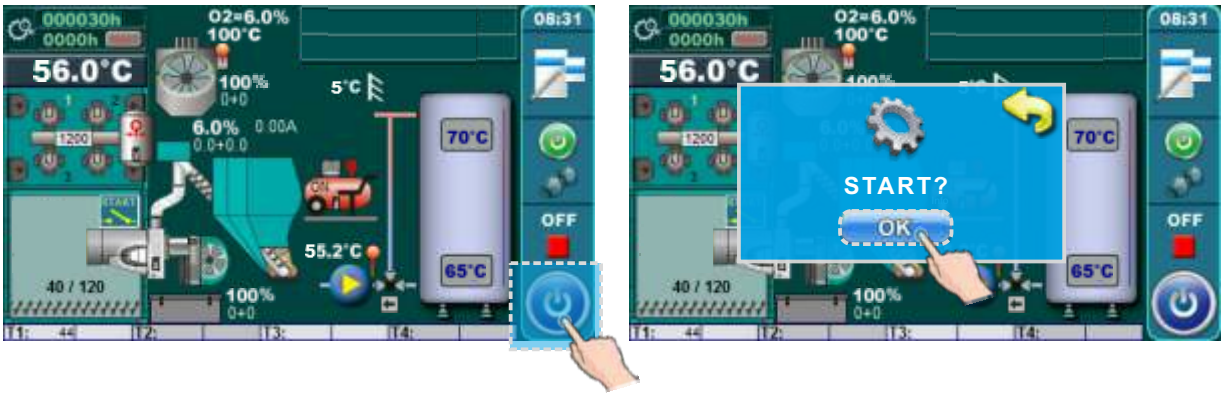
Boiler EKO-CKS P UNIT is equiped with boiler control unit which consist fixed and portable unit. Fix part is situated in junction box on which is connected portable unit which are used in boiler room. Portable unit is equiped with colored touchscreen display. On image below is showned control unit display on which are displayed boiler work tracking. Also, on display are displayed all parts of the boiler and additional equipment and tracking their work in real time.



Boiler control unit display with additional equipment

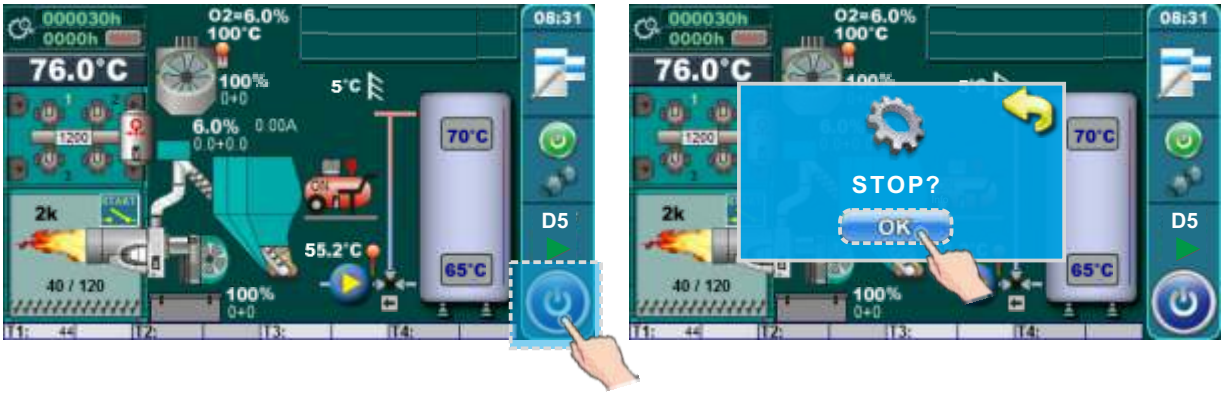
BOILER START (TURN ON):

For boiler start is neccesary to press ON / OFF button. After pressing ON / OFF button on display will be displayed window for boiler start confirmation. Press „OK" to confirm boiler start.



BOILER STOP (TURN OFF):

For boiler stop is neccesary to press ON / OFF button. After pressing ON / OFF button on display will be displayed window for boiler stop confirmation. Press „OK" to confirm boiler stop.



FOR DETAILED DESCRIPTION OF BOILER USING SEE „TECHNICAL INSTRUCTION FOR BOILER CONTROL UNIT"!

10.0. CLEANING AND MAINTENANCE

Cleaning intervals depend about quality of used wood pellets - worse pellets quality - more often cleaning.

Cleaning intervals depend about installed additional equipment.

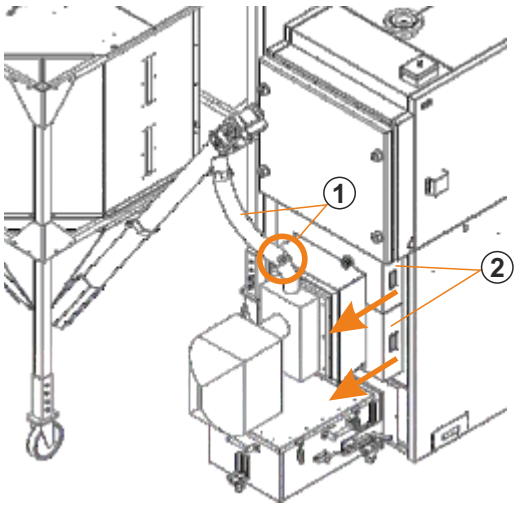
ITEM	CLEANING INTERVAL	DESCRIPTION
Pellet burner	Every 300 working hours or as is needed.	Clean accumulated ash from burner grate. Note: See point.
Boiler firebox	Every 300 working hours or as is needed.	Clean ash on water cooled firebox grate, clean sediments on firebox sides / back side of firebox. Note: See point.
Flue gas tubes of 1st and 2nd passage (if automatic pneumatic air cleaning of boler flue passages is not installed).	Every 80 working hours or as is needed.	Take out turbulators from tubes of 1st and 2nd passage, clean tubes, put back turbulators in tubes. Note: See point.
Flue gas tubes of 1st and 2nd passage (if automatic pneumatic air cleaning of boler flue passages is installed).	Once at year or as is needed.	Take out turbulators from tubes of 1st and 2nd passage, clean tubes, put back turbulators in tubes. Note: See point.
Flue gas chamber (if automatic ash removal system out of the flue gas chamber (spiral) is not installed).	Every 80 working hours or as is needed.	Remove lids from flue gas chamber and clean flue gas chamber by using scraper.
Connection box „Boiler - cyclone".	Once at year or as is needed.	Clean connection box.
Ash extraction from space below water cooled firebox grate.	Every 80 working hours or as is needed.	Use scraper and clean accumulated ash from water cooled firebox grate and space below water cooled firebox grate. Note: See point.
Ash box (if automatic ash removal system out of the boiler combustion chamber (spiral) is installed).	Every 80 working hours or as is needed.	Empty ash box(es). Note: See point.
Cyclone ash box (if is cyclone installed).	Every 300 working hours or as is needed.	Empty cyclone ash box. Note: See point.
Flue gas chamber ash box (if automatic ash removal system out of the flue gas chamber (spiral) is installed).	Every 300 working hours or as is needed.	Empty flue gas chamber ash box. Note: See point.
Photocell.	Every 300 working hours or as is needed.	Clean photocell.
Flexible connection tube.	Once at year.	Check and, if is needed, adjust flexible connection tube straight to burner for smooth pellet drop to burner.
Feeder screw and pellet tank.	Once at year or as is needed.	Empty feeder screw and clean it; clean pellet dust from pellet tank.

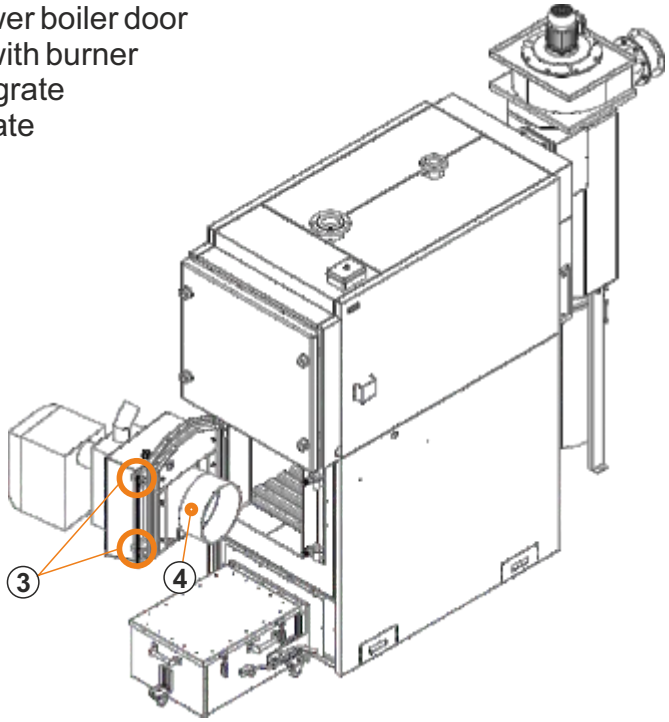
Recommendation: after boiler startup with specified pellet quality, every few days check surface conditions, flue gas tubes and ash box(es). With this observation correct cleaning intervals if is needed.

10.1. PELLET BURNER CLEANING

Clean ash / sediments on burner grate, clean space below grate.

Cleaning procedure:
1) remove flexible connection tube from pellet burner (remove clamp)
2) remove upper and lower casing cover from lower boiler door
3) unscrew two nuts and open lower boiler door with burner
4) remove burner extension and take out burner grate
5) clean burner grate and space below burner grate
6) restore everything to original state

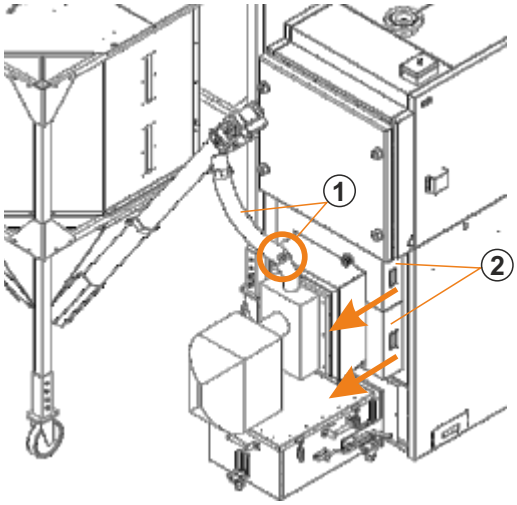


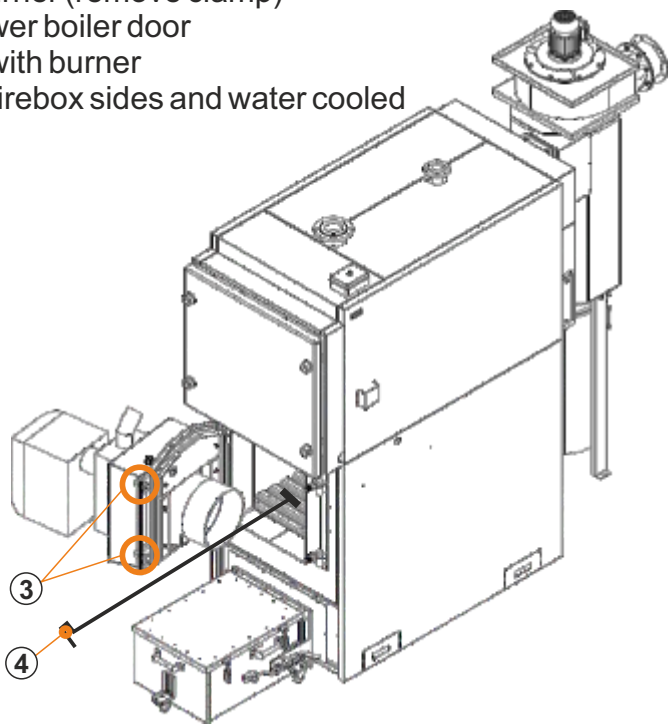


10.2. BOILER FIREBOX CLEANING

Clean ash / sediments on water cooled firebox grate, on firebox sides / back side.

Cleaning procedure:
1) remove flexible connection tube from pellet burner (remove clamp)
2) remove upper and lower casing cover from lower boiler door
3) unscrew two nuts and open lower boiler door with burner
4) use scraper and clean ash and sediments on firebox sides and water cooled firebox grate
5) restore everything to original state

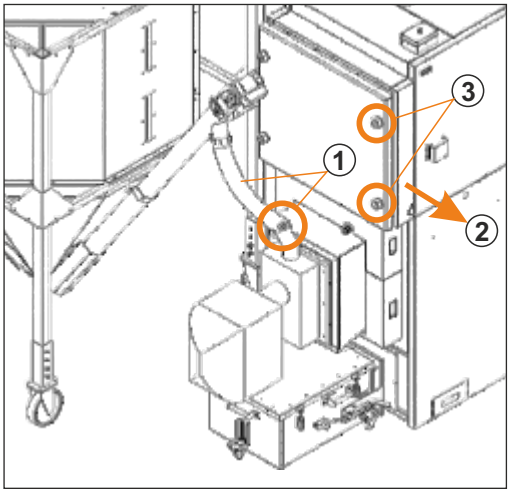


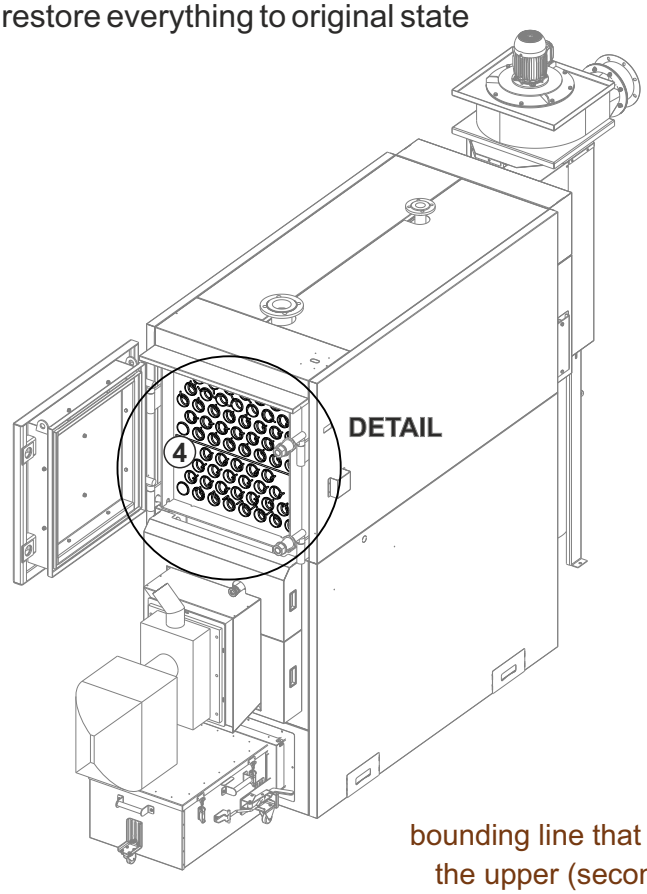


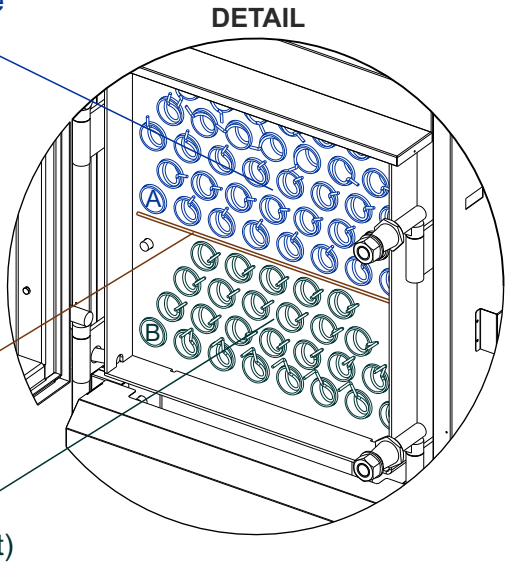
10.3. FLUE GAS TUBES CLEANING (without automatic cleaning)

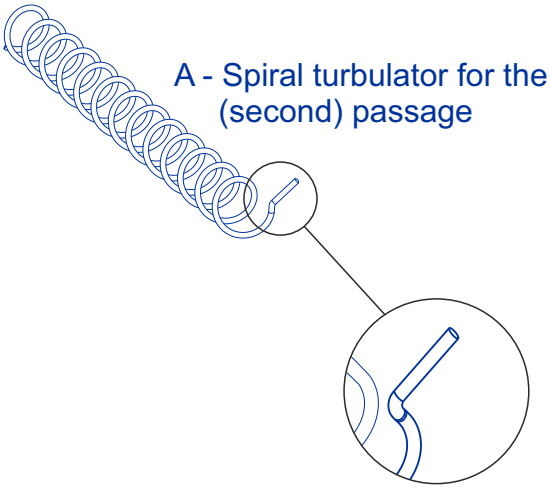
Take out turbulators from tubes of 1st and 2nd passage, clean tubes, put back turbulators in tubes.

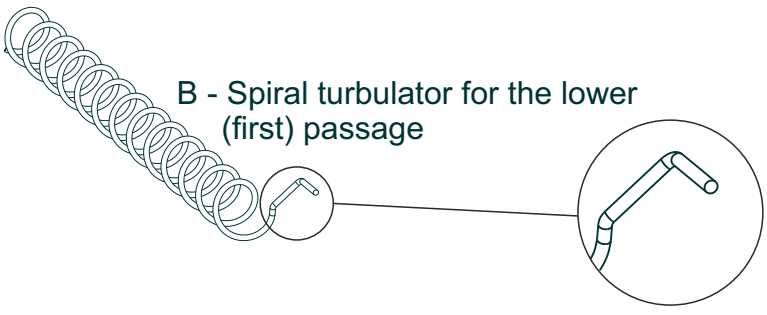
Cleaning procedure:
1) remove flexible connection tube from pellet burner (remove clamp)
2) remove upper sides casing cover from upper boiler door
3) unscrew two nuts and open upper boiler door
4) take out turbulator from all tubes
5) use cleaning brush and clean all tubes through all lenghtwise
6) restore everything to original state







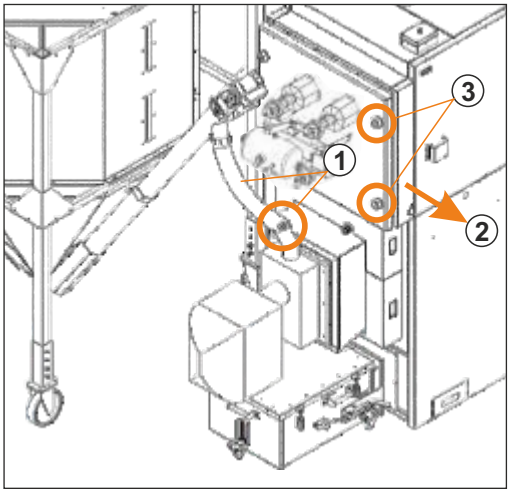


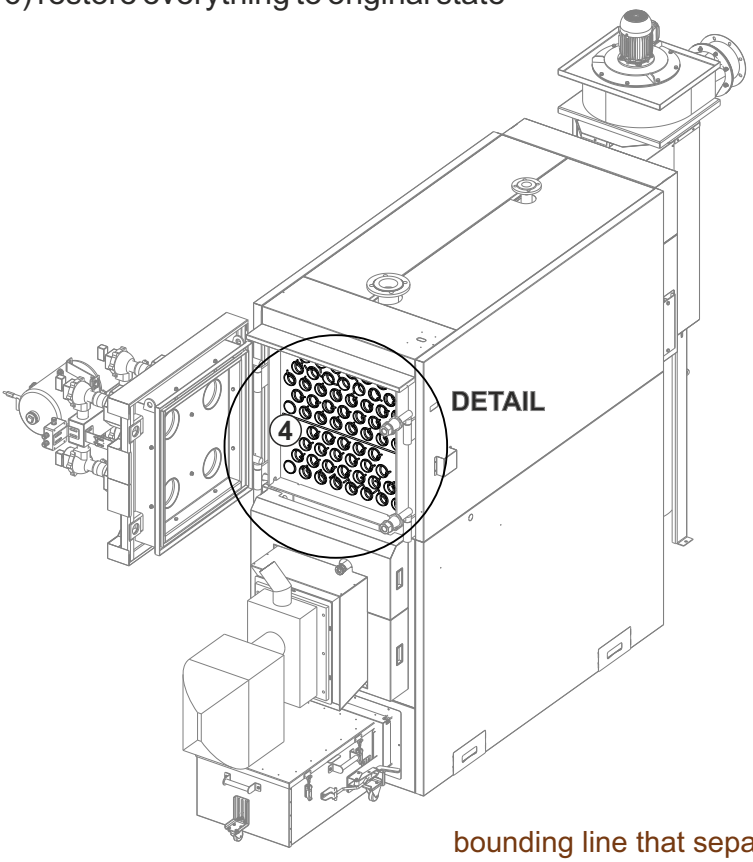


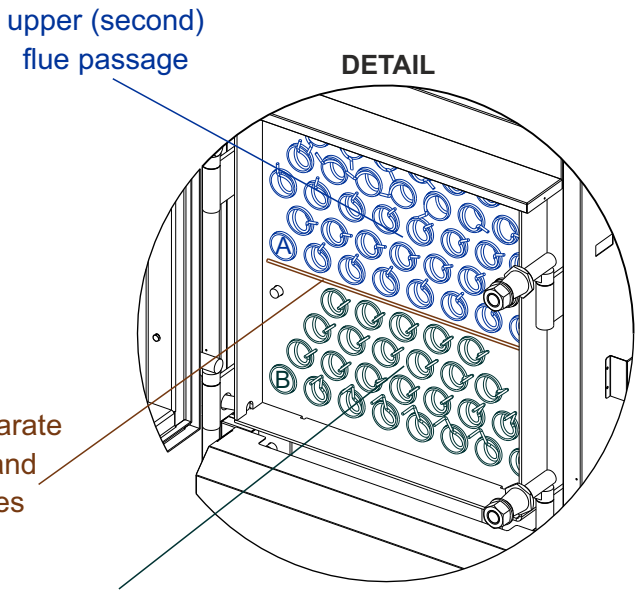
10.4. FLUE GAS TUBES CLEANING (with automatic cleaning)

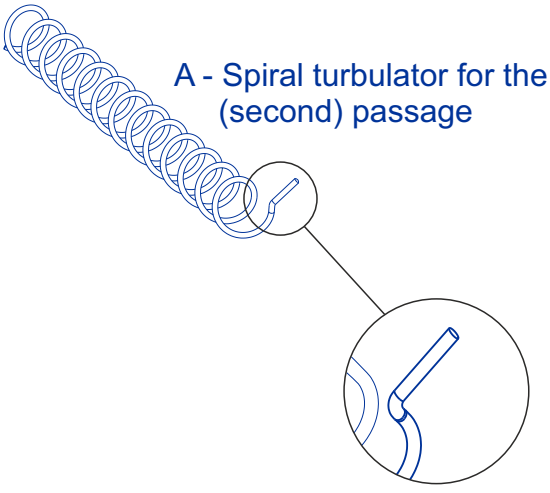
Take out turbulators from tubes of 1st and 2nd passage, clean tubes, put back turbulators in tubes.

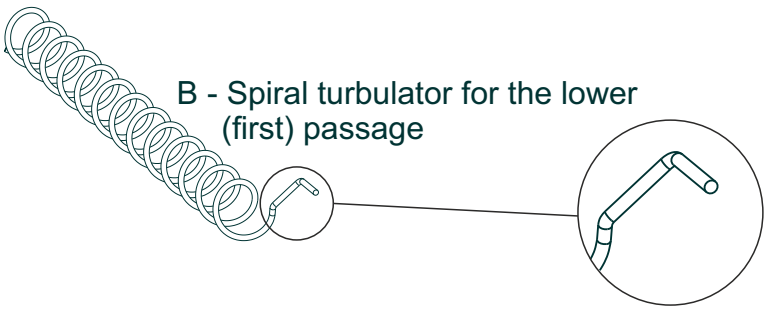
Cleaning procedure:
1) remove flexible connection tube from pellet burner (remove clamp)
2) remove upper sides casing cover from upper boiler door
3) unscrew two nuts and open upper boiler door
4) take out turbulator from all tubes
5) use cleaning brush and clean all tubes through all lenghtwise
6) restore everything to original state







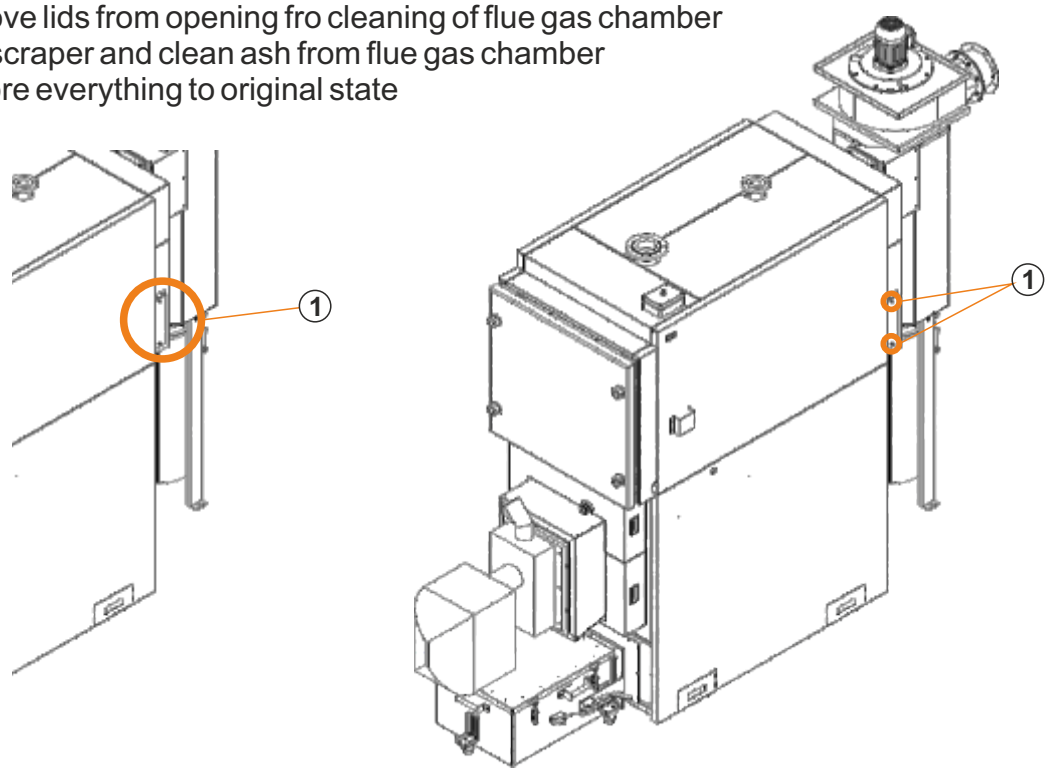




10.5. FLUE GAS CHAMBER CLEANING

Remove lids from flue gas chamber and clean flue gas chamber by using scraper.

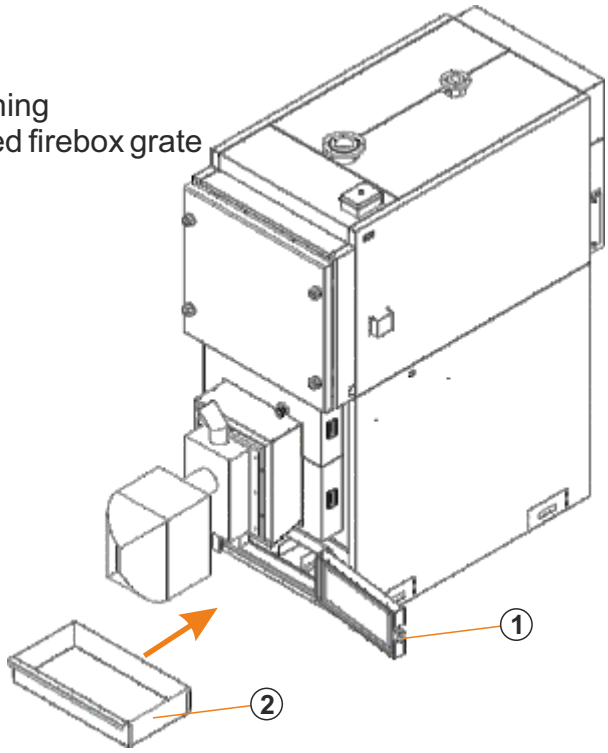
Cleaning procedure:
1) remove lids from opening fro cleaning of flue gas chamber
2) use scraper and clean ash from flue gas chamber
3) restore everything to original state



10.6. ASH EXTRACTION FROM BOILER FIREBOX (without auto. cleaning)

Use scraper and clean accumulated ash from water cooled firebox grate and space below below water cooled firebox grate.

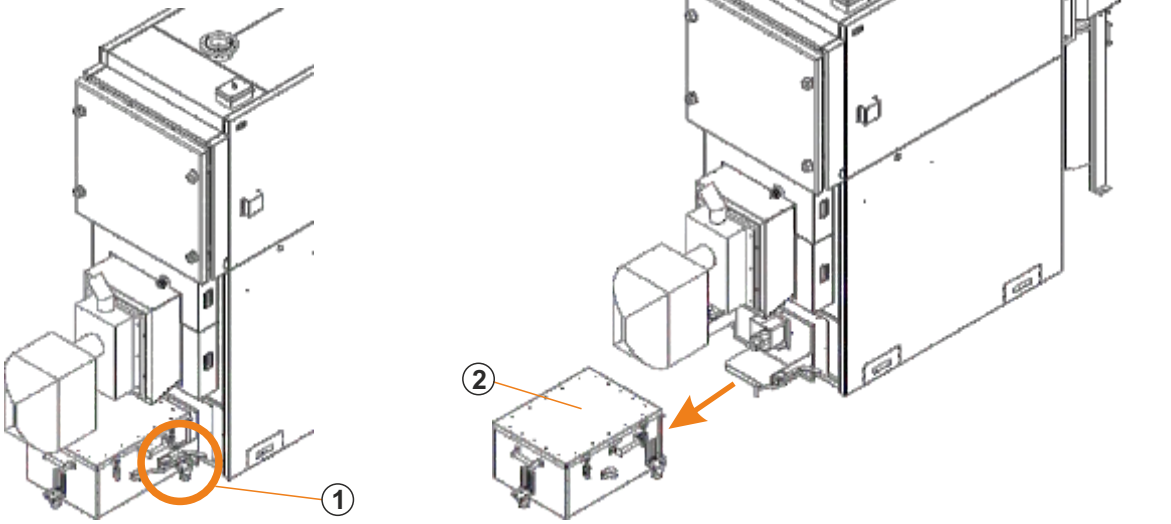
Cleaning procedure:
1) open lowest boiler door
2) put ash tray in front of lowest boiler door opening
3) use scraper and clean ash below water cooled firebox grate
4) restore everything to original state



10.7. ASH EXTRACTION (with automatic sistem for ash extraction)

Empty ash box(es).

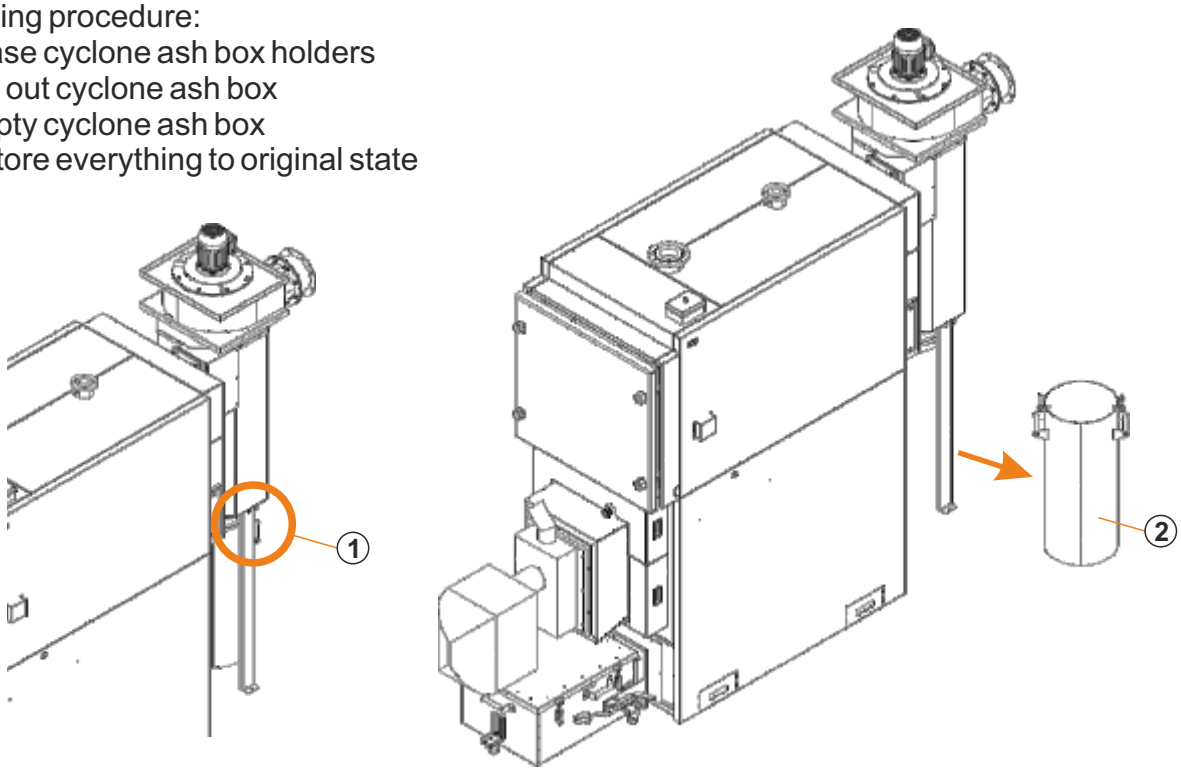
Cleaning procedure:
1) relase ash box(es) holders
2) pull out ash box
3) empty ash box(es)
4) restore everything to original state



10.8. CYCLONE ASH BOX CLEANING

Empty cyclone ash box.

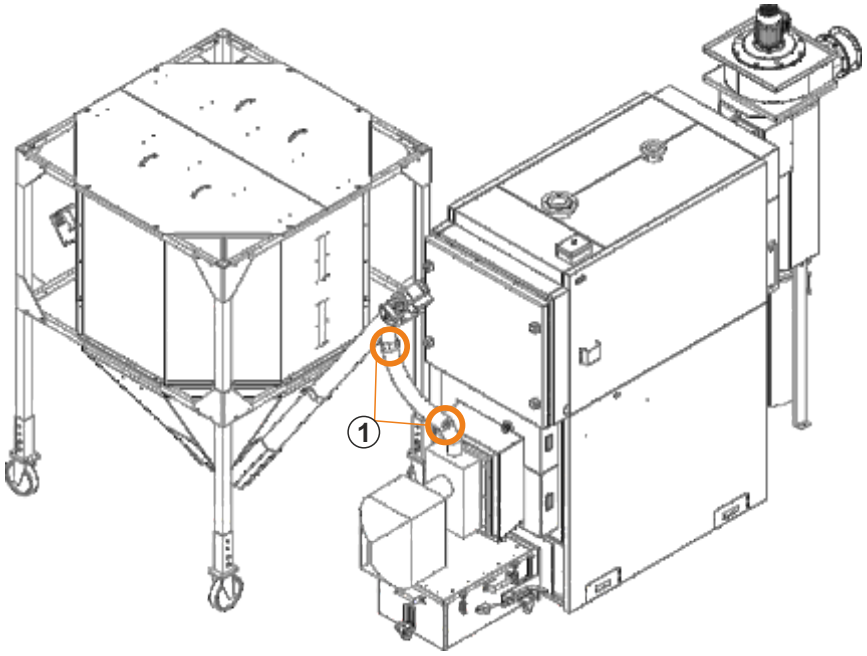
Cleaning procedure:
1) relase cyclone ash box holders
2) pull out cyclone ash box
3) empty cyclone ash box
4) restore everything to original state



10.9. CHECKING FLEXIBLE CONNECTION TUBE

Check and, if si needed, adjust flexible connection tube straight to burner for smooth pellet drop to burner.

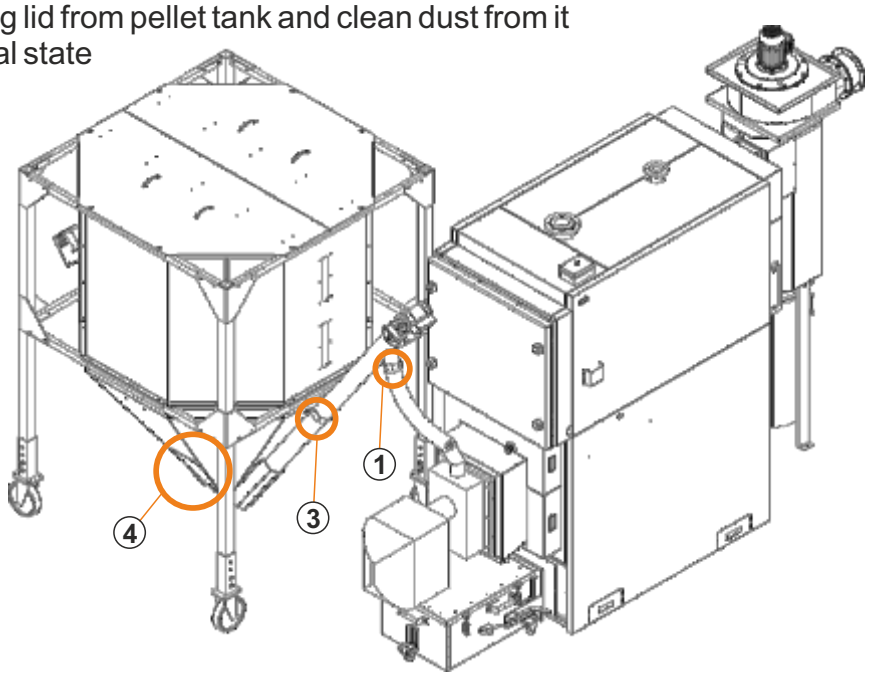
Procedure:
1) if flexible tube is not straight relase clamps, realign flexible tube and fasten clamps.



10.10. FEEDER SCREW AND PELLET TANK CLEANING

Empty feeder screw and clean it; clean pellet dust from pellet tank.

Cleaning procedure:
1) remove flexible connection tube from feeder screw (relase clamp)
2) detach feeder screw from pellet burner (remove connector)
3) relase feeder screw clamp and pull it out of pellet tank; clean dust from it
4) remove opening for cleaning lid from pellet tank and clean dust from it
5) restore everything to original state

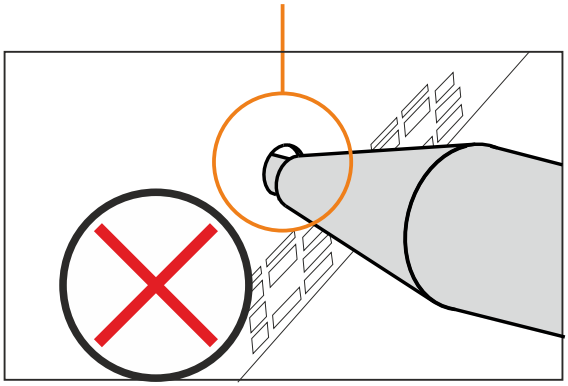


10.11. ELECTRIC HEATER REPLACMENT

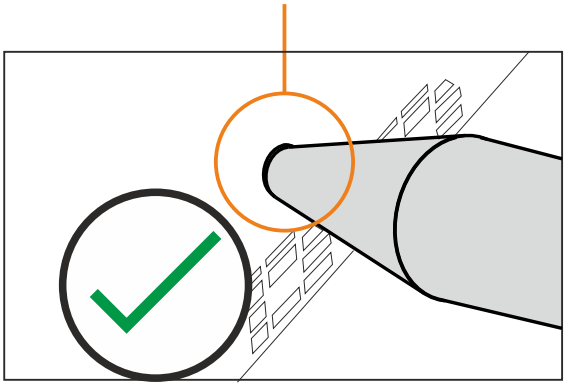
IMPORTANT!

When replacing electric heater it's neccessary to take care about correct placement of electric heater. Electric heater must be placed that electric heater can seal opening on burner head in which are placed. Otherwise, electric heate can blown out.

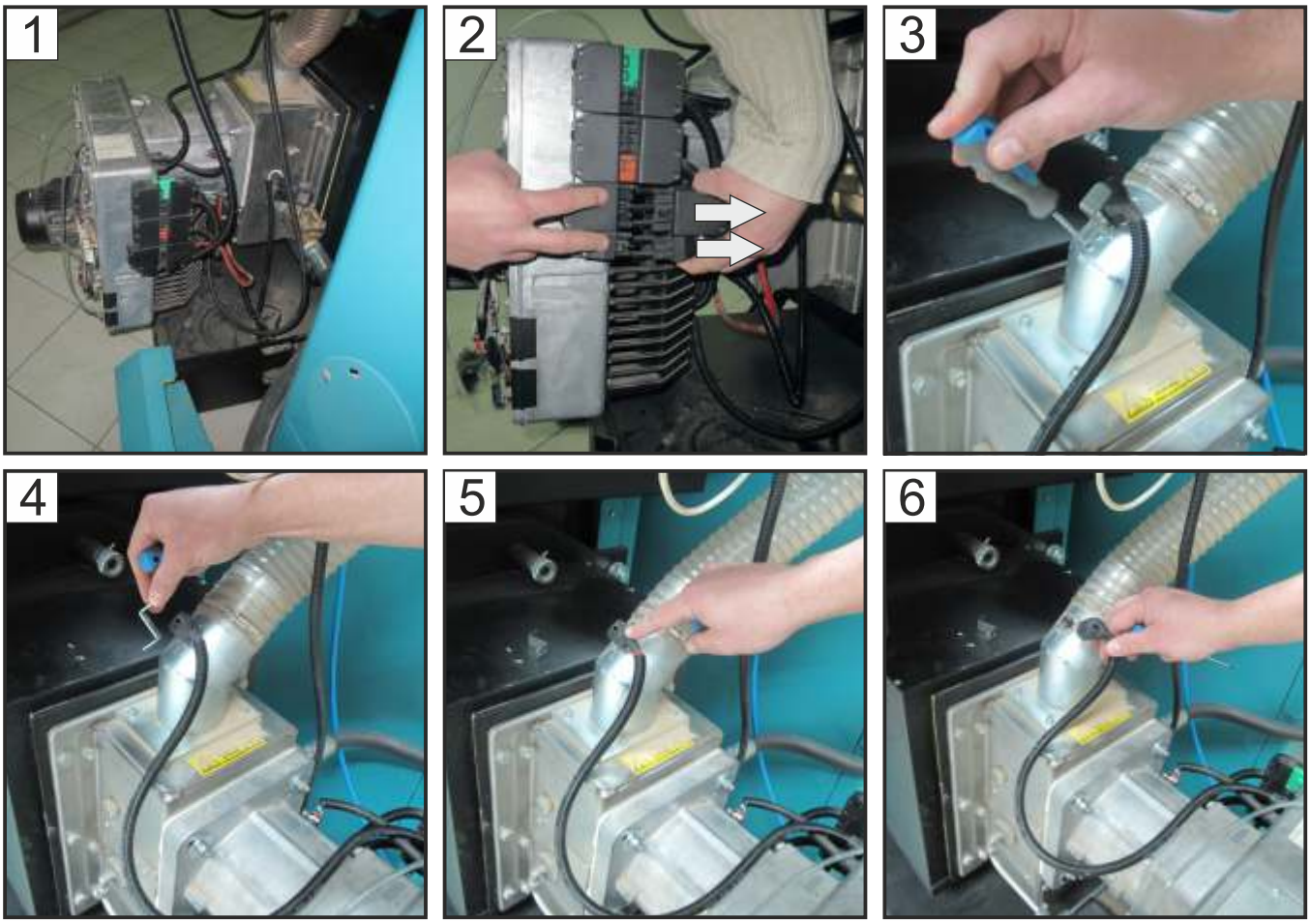
Electric heater cane don't seal opening in burner head

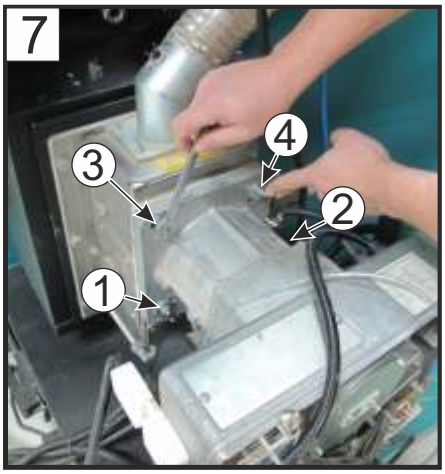


Electric heater cane seal opening in burner head



10.11.1. ELECTRIC HEATER REPLACMENT FOR BURNERS CPPL-200 inv, CPPL-300 inv and CPPL-350 inv

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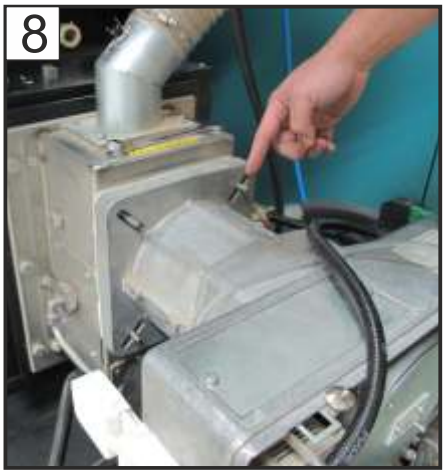
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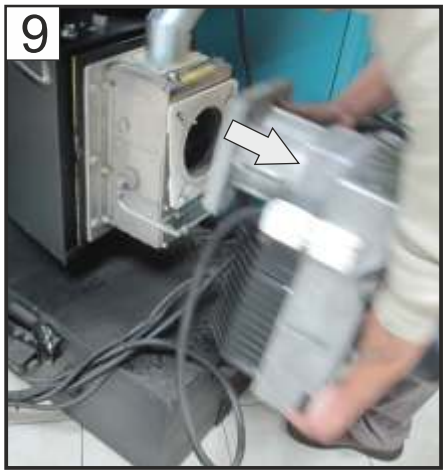
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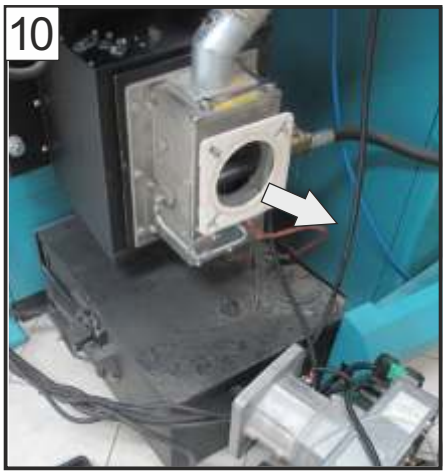
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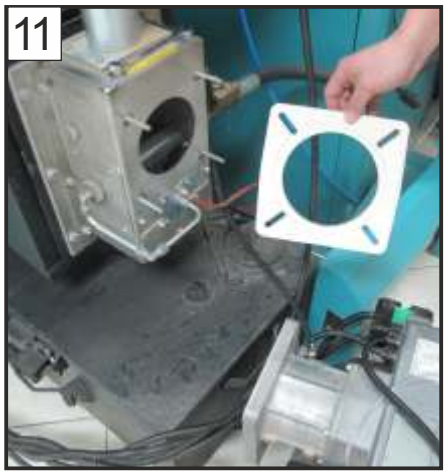
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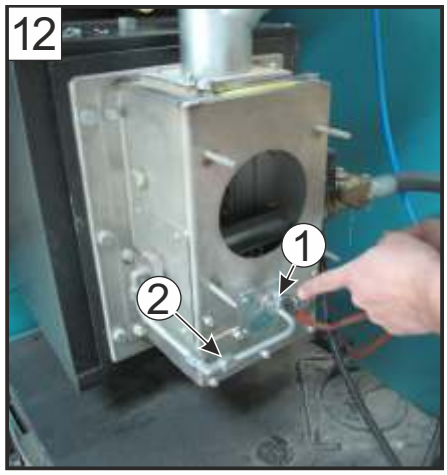
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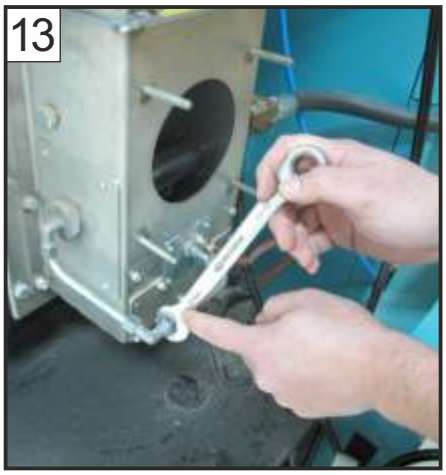
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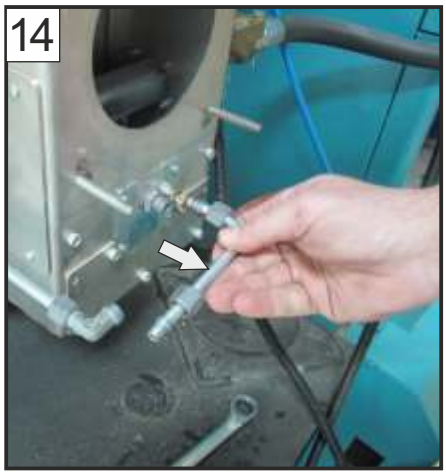
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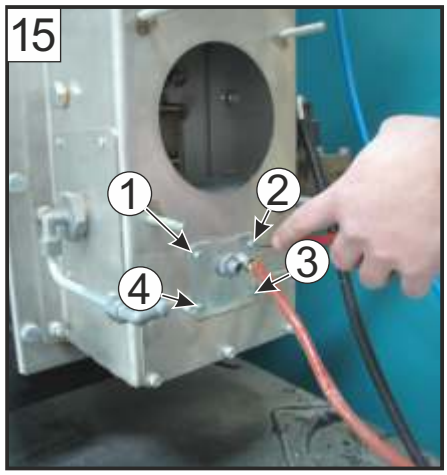
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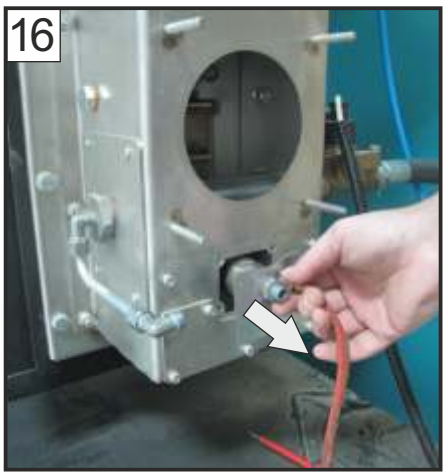
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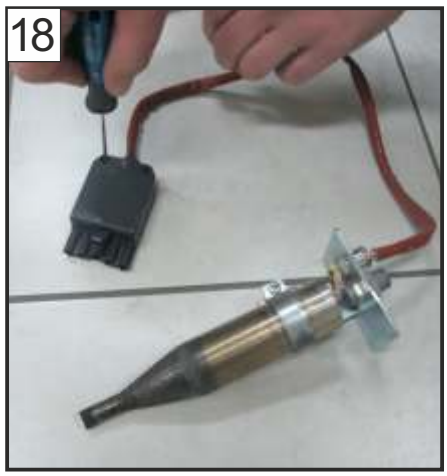
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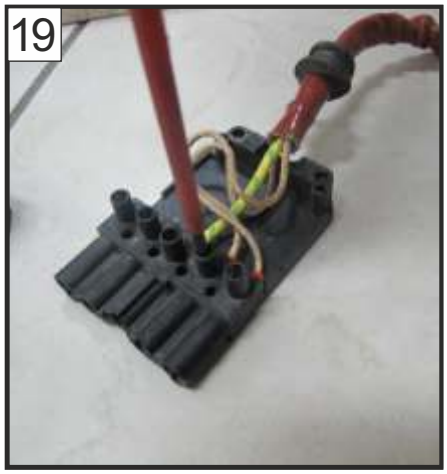
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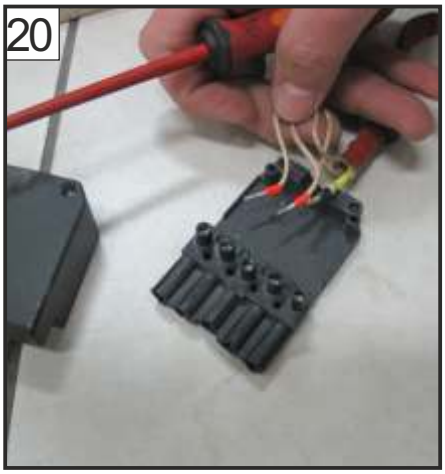
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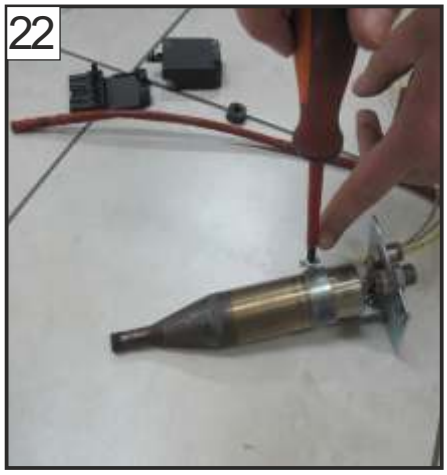
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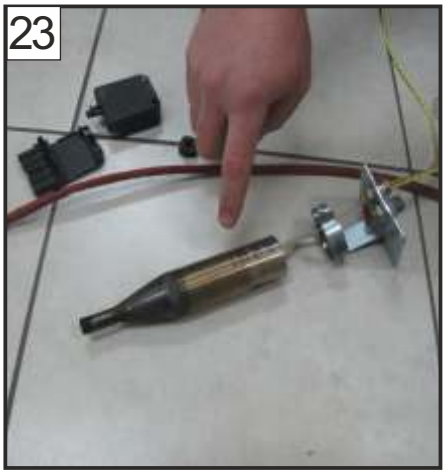
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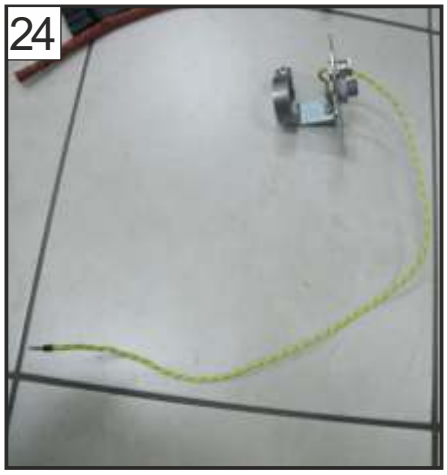
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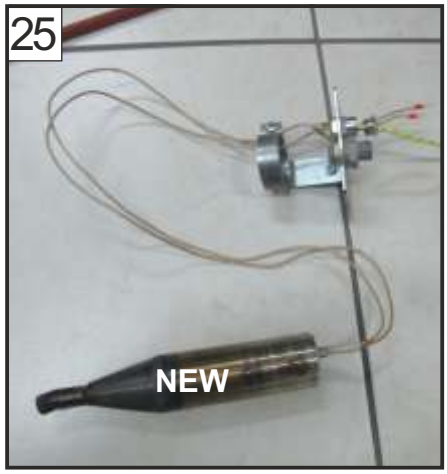
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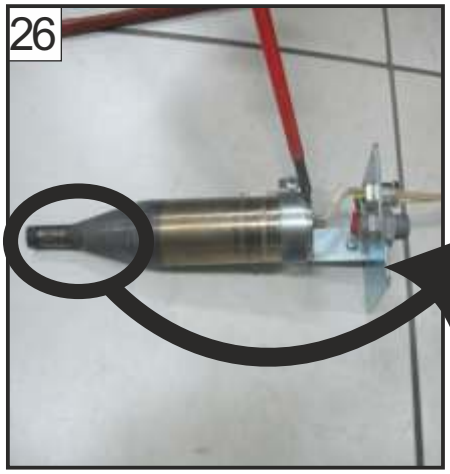
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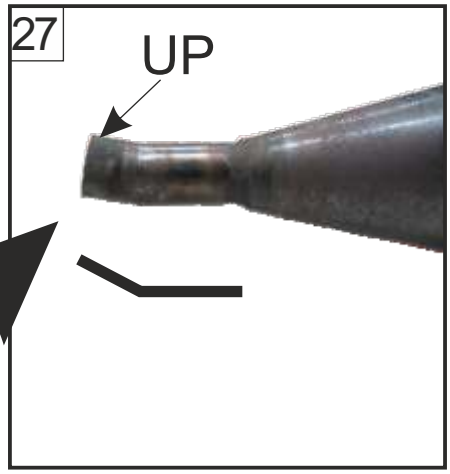
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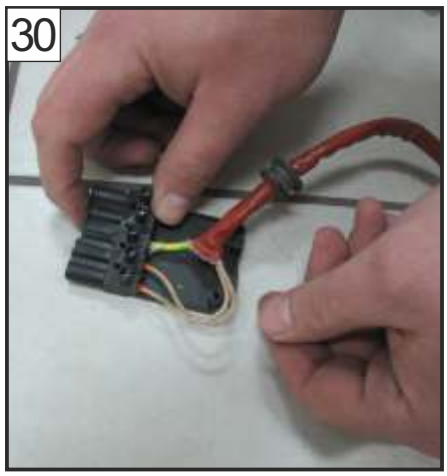
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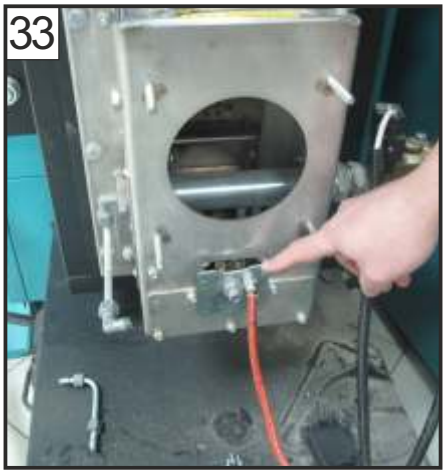
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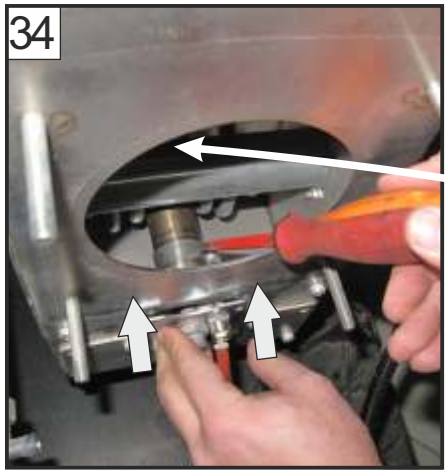
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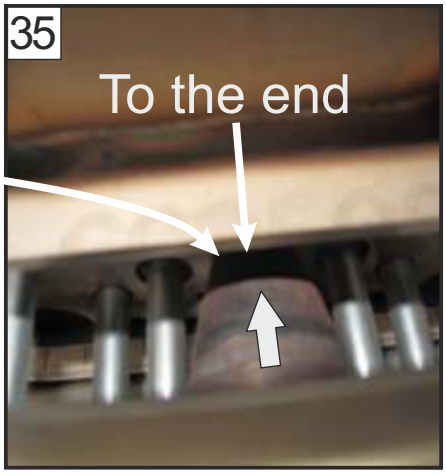
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To the end


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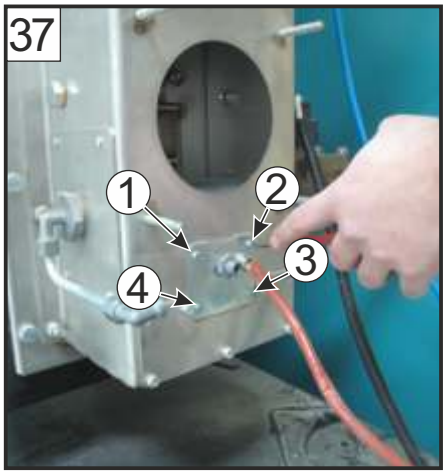
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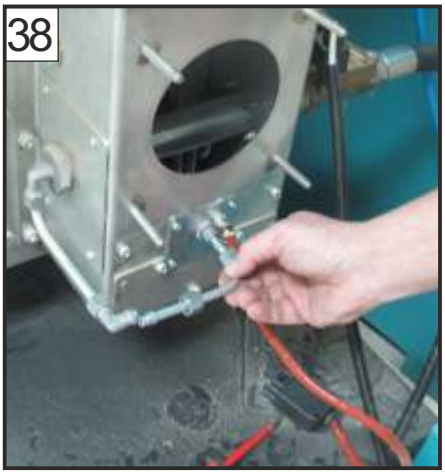
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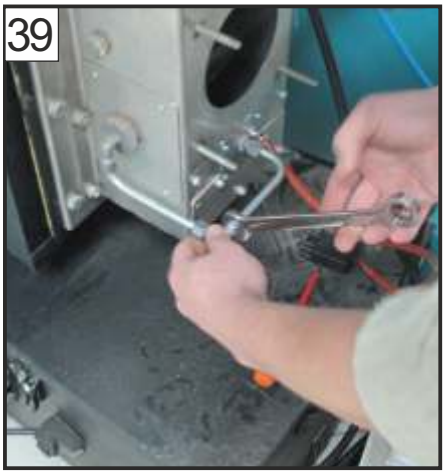
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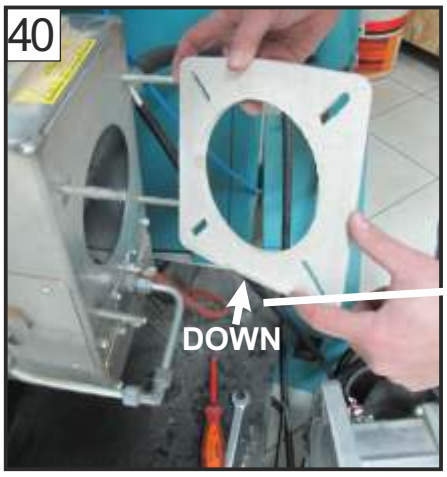
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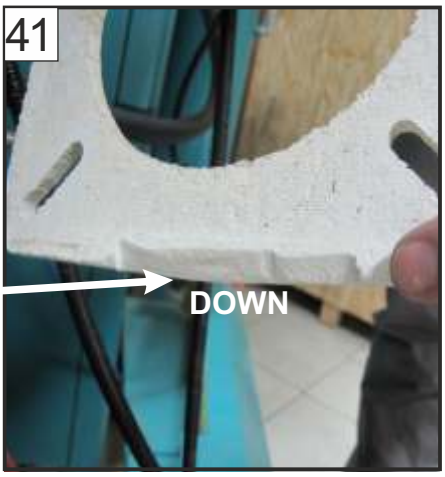
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DOWN


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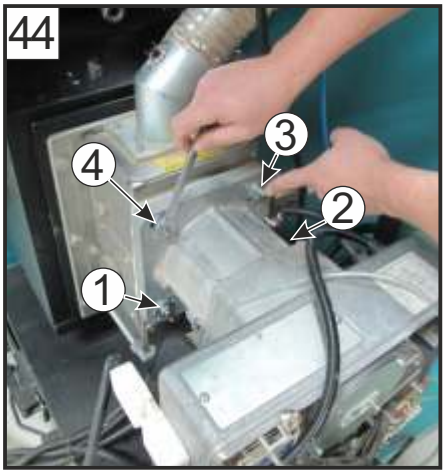
DOWN


43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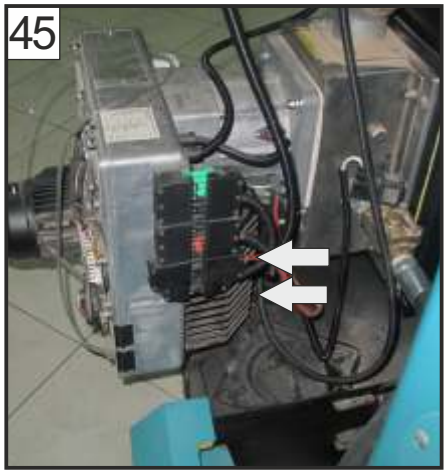
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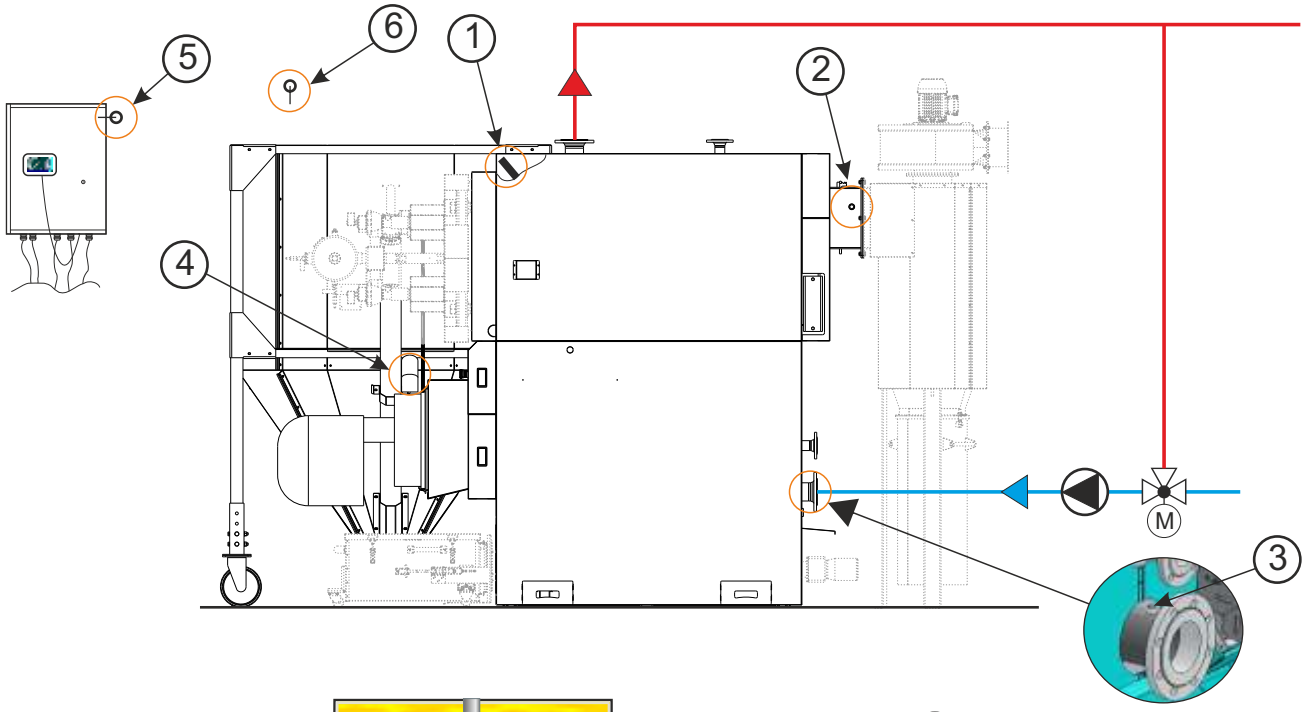
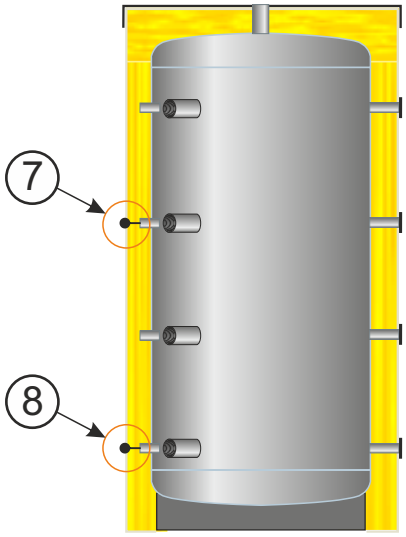
11.0. ELECTRICAL CONNECTIONS

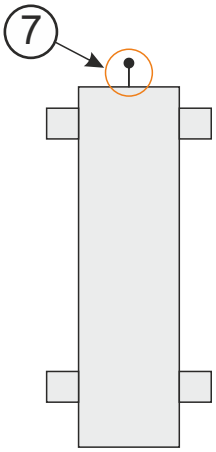
11.1. BOILER SENSORS

BOILER SENSORS AT STANDARD DELIVERY





BUFFER TANK „CAS”
(if is installed)



HYDRAULIC CROSSOVER
(if is installed)

1 - boiler temperature sensor, Type: NTC 5k
- safety thermostat STB
2 - Flue gas temperature sensor, Type: PT1000
3 - Boiler return sensor, Type: NTC 5k
4 - Backfilling sensor
5 - Junction box temperature sensor, Type: NTC 5k
6 - Outer temperature sensor, Type: NTC 5k
7 - Buffer tank sensor (up) / Crossover sensor, Type: NTC 5k
8 - Buffer tank sensor (down), Type: NTC 5k

ELECTRICAL SCHEMES

ELECTRICAL SCHEMES ARE DELIVERED IN BOILER ELECTRIC BOX

RESISTANCE LIST **Pt1000** SENSOR
(measuring field -30 - +400 °C)

Temperature (°C)	Resis. (W)	Temperature (°C)	Resis. (W)
-30	885	190	1.732
-25	904	195	1.751
-20	923	200	1.770
-15	942	205	1.789
-10	962	210	1.809
-5	981	215	1.828
0	1.000	220	1.847
5	1.019	225	1.866
10	1.039	230	1.886
15	1.058	235	1.905
20	1.077	240	1.924
25	1.096	245	1.943
30	1.116	250	1.963
35	1.135	255	1.982
40	1.154	260	2.001
45	1.173	265	2.020
50	1.193	270	2.040
55	1.212	275	2.059
60	1.231	280	2.078
65	1.250	285	2.097
70	1.270	290	2.117
75	1.289	295	2.136
80	1.308	300	2.155
85	1.327	305	2.174
90	1.347	310	2.194
95	1.366	315	2.213
100	1.385	320	2.232
105	1.404	325	2.251
110	1.424	330	2.271
115	1.443	335	2.290
120	1.462	340	2.309
125	1.481	345	2.328
130	1.501	350	2.348
135	1.520	355	2.367
140	1.539	360	2.386
145	1.558	365	2.405
150	1.578	370	2.425
155	1.597	375	2.444
160	1.616	380	2.463
165	1.635	385	2.482
170	1.655	390	2.502
175	1.674	395	2.521
180	1.693	400	2.540
185	1.712		

RESISTANCE LIST **NTC 5k/25°C** SENSOR
(measuring field from -20 - +130 °C)

Temperature (°C)	Resis. (Ω)
-20	48.535
-15	36.465
-10	27.665
-5	21.158
0	16.325
5	12.694
10	9.950
15	7.854
20	6.245
25	5.000
30	4.028
35	3.266
40	2.663
45	2.184
50	1.801
55	1.493
60	1,244
65	1.041
70	876,0
75	740,7
80	629,0
85	536,2
90	458,8
95	394,3
100	340,0
105	294,3
110	255,6
115	222,7
120	190,7
125	170,8
130	150,5

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Centrometal
HEATING TECHNIQUE