

**Kotao
na čvrsto
gorivo/ SOLID
FUEL HEATING
BOILER**

**SERIJA
FK/ SERIE
FK**



INSTRUKCIJE/ INSTRUCTION MANUEL

Montaža,korišćenje i održavanje kotla/ Assembly,use and maintenance of heating boiler

Sadržaj:

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2. Opis kotla;
3. Montaža;
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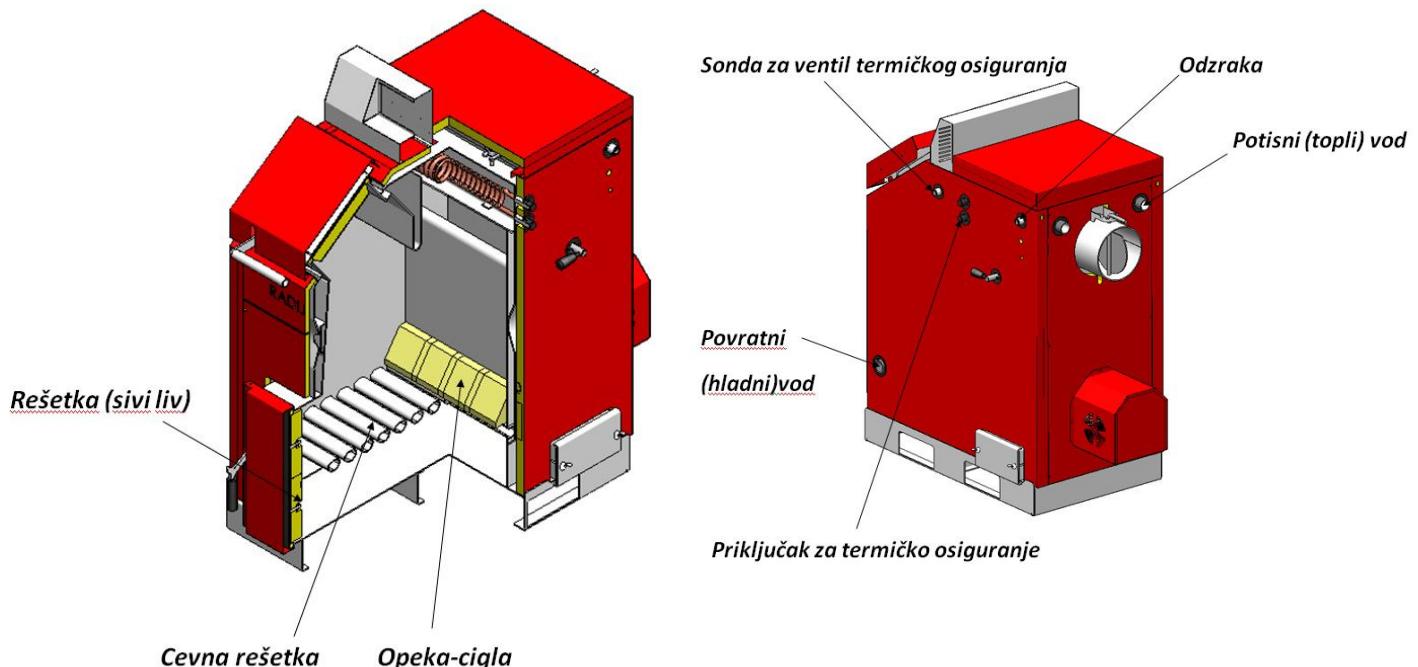
1. VAŽNA UPOZORENJA

Podsećamo da korišćenje uređaja na čvrsto gorivo i koji imaju kontakt sa električnom energijom i vodom zahtevaju poštovanje sigurnosnih mera i to:

- Zabranjeno je korišćenje kotla od strane dece i osoba sa ograničenim mogućnostima bez pratnje
- Zabranjeno je korišćenje kotla na instalacijama sa radnom temperaturom većom od 110°C, i radnim pritiskom većim od 3 bara.
- Zabranjeno je korišćenje lako zapaljivih goriva (alkohol, nafta) radi bržeg paljenja drveta
- Zabranjeno je odlaganje lako zapaljivih materijala u blizini kotla i u blizini vrata za loženje. Pepeo se mora odlagati u zatvorene i nezapaljive spremnike.
- Zabranjeno je spaljivanje otpada i materijala čije sagorevanje prouzrokuje plamen ili opasnost od eksplozije (npr. plastične kese, piljevinu, ugljenu prašinu, blato itd.)
- Zabranjena je bilo kakva intervencija tehničkog lica ili čišćenje pre nego se kotao isključi sa električnog napajanja postavljajući glavni prekidač uređaja na (0) "isključeno".
- Zabranjena je izmena na sigurnosnim elementima
- Zabranjeno je zatvaranje ventilacionih otvora na prostoriji u kojoj se nalazi kotao. Ventilacioni otvori su neophodni za pravilno sagorevanje
- Zabranjeno je izlaganje kotla atmosferskim nепрекидима. Sam kotao nije predviđen za spoljnu montažu i ne podrži sistem protiv smrzavanja.
- Zabranjeno je isključivanje kotla ukoliko spoljna temperatura može da padne ispod NULE (opasnost od smrzavanja)

2. Opis kotla

Kotao serije "FK" celicne je tropromajne konstrukcije za ciju izgradnju se koriste ugljenični kotlovske limovi kvaliteta 1.0425 EU standard odnosno P265GH EU standard EU II.U osnovi lozista je cevna rešetka napravljena od kotlovske besavne cevi kvaliteta St.35.4.Resetkasta vrata na otvoru za ciscenje i potpalu napravljena su od sivog livenog gvozdja.U zadnjem delu lozista postoje cigle koje su izradjene od vatrostalnog materijala koji akumulira toplotu. Sve celicne pozicije kotla seku se najmodernejšim laserskim postupkom i zavaruju vrhunskim tehnologijama zavarivanja uključujući i robotsku.Ispitivanje i atestiranje kotla izvršeno je u skladu sa evropskim normama EN303-5.



3. Montaža

Kotao se isporučuje sa spoljnom oblogom koja sadrzi izolaciju debljine 30mm

 Kotlovi serije FK mogu se priključiti na hidraulične sisteme samo ako je maksimalni radni pritisak 3 bara i maksimalna radna temperatura 90 stepeni Celzijusa

 Kotao je sa ventilatorom i automatikom i oba uredjaja koriste napajanje 230V,tako da nepravilno instaliranje i neoprezno rukovanje mogu da ugroze ljudski zivot strujnim udarom.

 Kotao na cvrsto gorivo i prinudnom promajom treba instalirati prema vazecim normama i zakonskim propisima.Svaka izmena ili na mehanickoj konstrukciji ili na elektricnoj instalaciji smatrace se narusavanjem garancijskih uslova i dovesce do njenog narusavanja.

Osnovni zahtevi koje treba ispostovati prilikom montiranja su:

- Kotao može da bude prikljucen i na zatvoreni i na otvoreni sistem centralnog grejanja. Ukoliko je sistem zatvoren,kotao poseduje bakarni izmenjivač za priključenje ventila za termičko osiguranje oticanjem (VTO).
- Kotao mora da se nalazi na sigurnoj udaljenosti od lako zapaljivih materijala.
- Elektricno napajanje kotla je 230V i 50Hz i priključenje svih uredjaja koje kotao sadrzi treba uraditi prema vazecim propisima i priključenje radi lice sa odgovarajucim ovlastenjem.
- Priključenje na dimnjak takodje se radi prema obavezujucim propisima kao i preporukama proizvodjaca sto se moze videti u narednom tekstu.

3.1. Mere i uredjaji bezbednosti kod kotlova FK

Za bezbedan rad kotla potrebno je ugraditi i održavati ih ispravnim sledeće elemente:

- Ventil sigurnosti na pritisak (slika 1)



Slika 1



Slika 2

- Ventil sigurnosti na pritisak mora biti nazivnog prečnika 1/2 cola baždaren na maksimalno 3 bara.
Ovaj sigurnosni element koji spada u grupu limitatora pritiska mora da bude takve konstrukcije da izdrži i kratkotrajna prekoračenja i temperature i pritiska kao i određen sadržaj glikola u tečnosti za grejanje.
Obično na istom mestu se priključuju još i odzraka(slika 2) i manometar tako da ova tri elementa zajedno sačinjavaju sigurnosnu grupu i montiraju se preko „T“ priključka.
Ovaj sigurnosni element mora da podleže i periodičnim ponovnim baždarenjima o čemu investitor tj. korisnik kotla mora da poseduje validnu dokumentaciju.
- Ventil sigurnosti mora biti montiran na najvišoj tački kotla i direktno na kotlu bez bilo kakvog cevovoda ili bilo kojih drugih elemenata između. Za ovu svrhu postoji i posebno predviđen priključak (videti sliku) . Strogo je zabranjeno bilo kakvo reduciranje prečnika ovog priključka.
- Ispusni tj. izduvni deo ventila sigurnosti mора da bude od cevi čiji je prečnik najmanje jednak nazivnom prečniku ispusnog dela ventila.Takođe dozvoljeno je za njegovu izradu koristiti najviše jedan luk radijusa $r > 3d$.

- Sigurnosni ventil mora posedovati nazivnu pločicu i na njoj sledeće podatke:
 - naziv proizvođača
 - oznaka tipa sigurnosnog ventila/godina ispitivanja
 - nazivni protok
 - podatak za koji toplotni učinak je sigurnosni ventil podešen
 - najviši pritisak otvaranja tj. 3 bara
- Obavezna je provera ispravnosti rada u određenim vremenskim periodima kao i ponovna baždarenja od strane sertifikovanih firmi. Ove obaveze se sprovode u skladu sa zakonom svake zemlje u kojoj je kotao namontiran. Obavezno čuvati pisani dokument o podacima zadnjeg baždarenja sigurnosnog ventila.
- Na povratnom vodu montirati barem jedan ventil sigurnosti na pritisak.

- Ventil termičkog osiguranja oticanjem (slika 3)



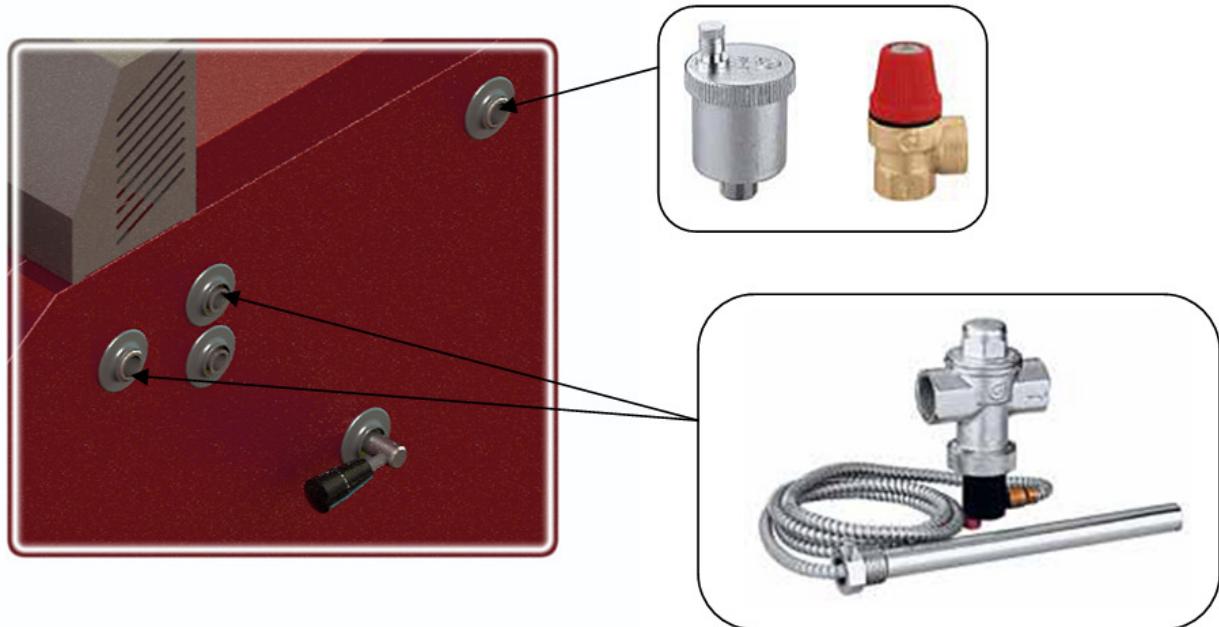
Slika 3

Ovaj sigurnosni element ima takođe ulogu ograničivača temperature.U daljem tekstu biće označen sa skraćenicom VTO.

- U nekim ekstremno opasnim situacijama prelaz vode u vodenu paru je takav da ventili sigurnosti za pritisak nisu dovoljni da obezbede sigurnost hidrauličkog sistema. Iz ovog razloga je obavezna ugradnja VTO.U zavisnosti od zakonskih regulativa zemalja u kojima se kotao montira, VTO je potrebno ugraditi samo za snage veće od određenih ili za svaku snagu kotla obavezno ugraditi VTO.
- Mesto ugradnje prikazano je na šemi montaže kotla na instalaciju i na slici 4.
U kotlu se isporučuje bakarna spirala tako da je potrebno koristiti VTO sa izmenjivačem kao na slici3.Do VTO-a se dovodi hladna sanitarna voda.Kada sonda VTO-a ima informaciju da je temp. preko 95 stepeni VTO se otvara i voda prolazi kroz bakarnu spiralu.Posle izvesnog vremena temp. vode u kotlu se vraća na normalnu.
- Jeden priključak spirale koristimo za VTO a drugi za ispušt vode koja je prošla kroz spiralu.Koji je priključak spirale za VTO a koji je ispusni je nebitno. Obavezno je pridržavati se uputstava ugradnje koje je dao proizvođač VTO
- Obavezno u određenim vremenskim periodima proveravati funkciju VTO.

Kao što je već rečeno jedan kraj VTO je za montažu na izmenjivač kotla a do drugog se dovodi hladna voda pod pritiskom. Naročito je bitno da protok te vode bude neometan i pri nestanku el. energije.

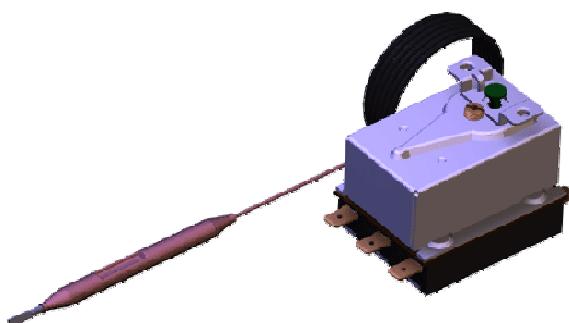
⚠️ Ukoliko je nemoguće obezrediti dotok hladne sanitarne vode i pri nestanku el.energije,obavezno kotao priključiti na otvoren sistem.



Slika 4.Prikaz postavljanja sigurnosnih elemenata

Termostati u automatici kotla

- U samoj automatici koja vodi proces sagorevanja i utiče na rad dva kruga grejanja postoje dva termostata. Oba su slične konstrukcije kao termostat prikazan na slici 4. i imaju i sigurnosne funkcije kao limitatori temp. vode u kotlu. Zbog sigurnosne uloge u funkcionisanju kotla oba termostata imaju nezavisne sonde za merenje temperature vode. Prvi termostat je tzv. radni i on služi da ograniči temperaturu do nivoa koji želi korisnik. Drugi termostat je sigurnosni jer prekida rad ventilatora koji pospešuje plamen, odnosno dodaje novu energiju. Sigurnosna temperatura je ograničena na 95 stepeni Celzijusa.
Pumpu za grejanje je veoma važno priključiti preko automatike iz sigurnosnih razloga. Kada temp. vode u kotlu dostigne kritičnu vrednost od 95 stepeni ventilator staje sa radom ali pumpa se obavezno uključuje kako bi razmenila toplotu vode kroz radijatore.

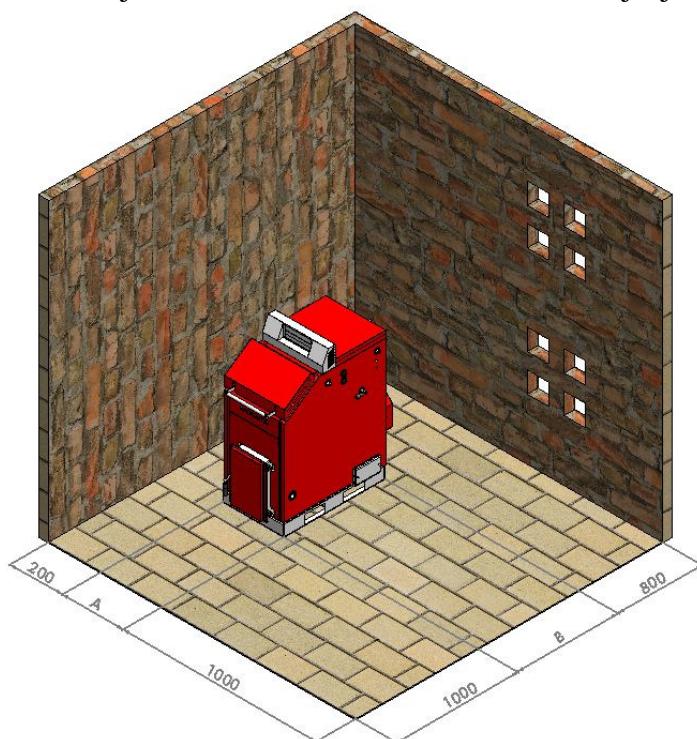


Slika 5

3.2. Kotlarnica

Kotlarnica mora biti obezbedjena od smrzavanja.

Pod kotla uradjen je u obliku metalne palete visine 110mm sa otvorima za paletni viljuskar.Ova visina je dovoljna udaljenost od poda (olaksano je ciscenje i kolicina vazduha za ventilator)tako da nije potrebna nikakva posebna betonska ploca u kotlarnici.Podloga za kotao u kotlarnici mora biti od nezapaljivog materijala.Preporucene vrednosti udaljenosti sve cetri strane kotla u odnosu na zidove kotlarnice ili neka druga kruta tela (akomulacioni bojler itd.)prikazane su na skici.Ove vrednosti udaljenosti omogucavaju siguran pristup prilikom lozenja,dovoljan prostor za ciscenje i nesmetan pristup ventilatoru i ventilu za punjenje i praznjenje.Situacija polozaja kotla u odnosu na bocni zid sa skice moze biti i ogledalno simetricna jer kotao poseduje bocne otvore za ciscenje sa obe strane.Rucica klapne za potpalu je demontazna i moze se staviti i na levu i na desnu stranu kotla.Kotlarnica mora da poseduje dovoljne otvore za ventilaciju kako za svez vazduh tako i za odvodjenje istrosenog vazduha.



slika 6. Prikaz pozicioniranja kotla u kotlarnici

Ukupna povrsina ovih otvora je minimalno 150cm² za snage do 50kW a za snagu preko 50kW povrsina mora biti veca za jos 2cm² po kilovatu.

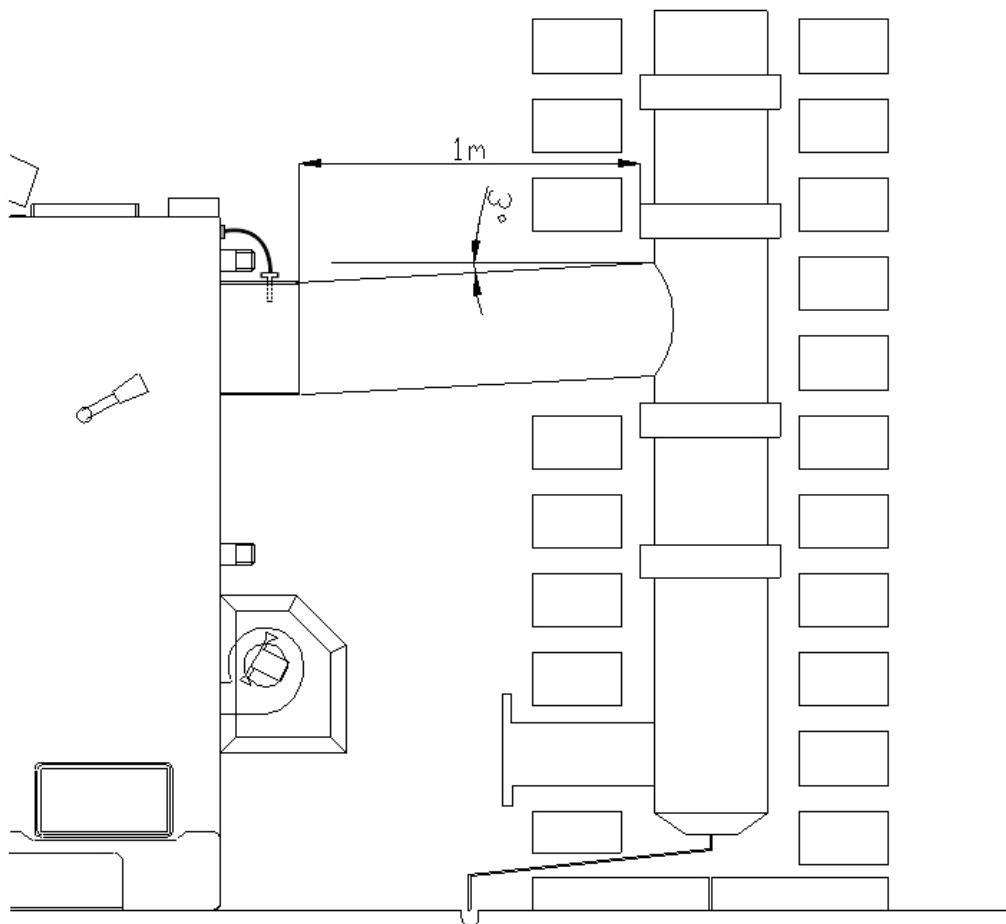
$$A = 150\text{cm}^2 + \frac{2\text{cm}^2}{\text{kW}} \times (\sum Q_n - 50\text{kW}) \quad \sum Q_n = \text{moguce snage preko } 50\text{kW}.$$

Nedostatak dovoljne ventilacije u kotlarnici moze da uzrokuje vise problema u radu kotla.Glavni problem je nemogucnost postizanja visokih temperature izlazne vode tj.ne postizanje maksimalne snage sto dovodi do kondezovanja u kotlu.

- Uzeti u obzir neophodan minimalni prostor koji je potreban za prilaz sigurnosnim elementima i za izvrsenje operacija ciscenja
- Utvrditi da li je stepen elektricne zastite u skladu sa karakteristikama prostorije u kojoj ce kotao biti smesten
- Zabranjeno je izlaganje kotla atmosferskim neprilikama.Sam kotao nije predvidjen za spoljnu montazu i ne sadrzi sistem protiv smrzavanja.
- Zabranjeno je zatvaranje ventilacionih otvora na prostoriji u kojoj se nalazi kotao.Ventilacioni otvori su neophodni za pravilno sagorevanje

3.3.Priklučenje na dimnjak

Najoptimalnije postavljanje kotla na dimnjacu je takvo da prava koja spaja centar izlaza dimnih gasova iz kotla i centar prikljucenja na dimnjak bude u blagom usponu (do 3%)(pogledati skicu).

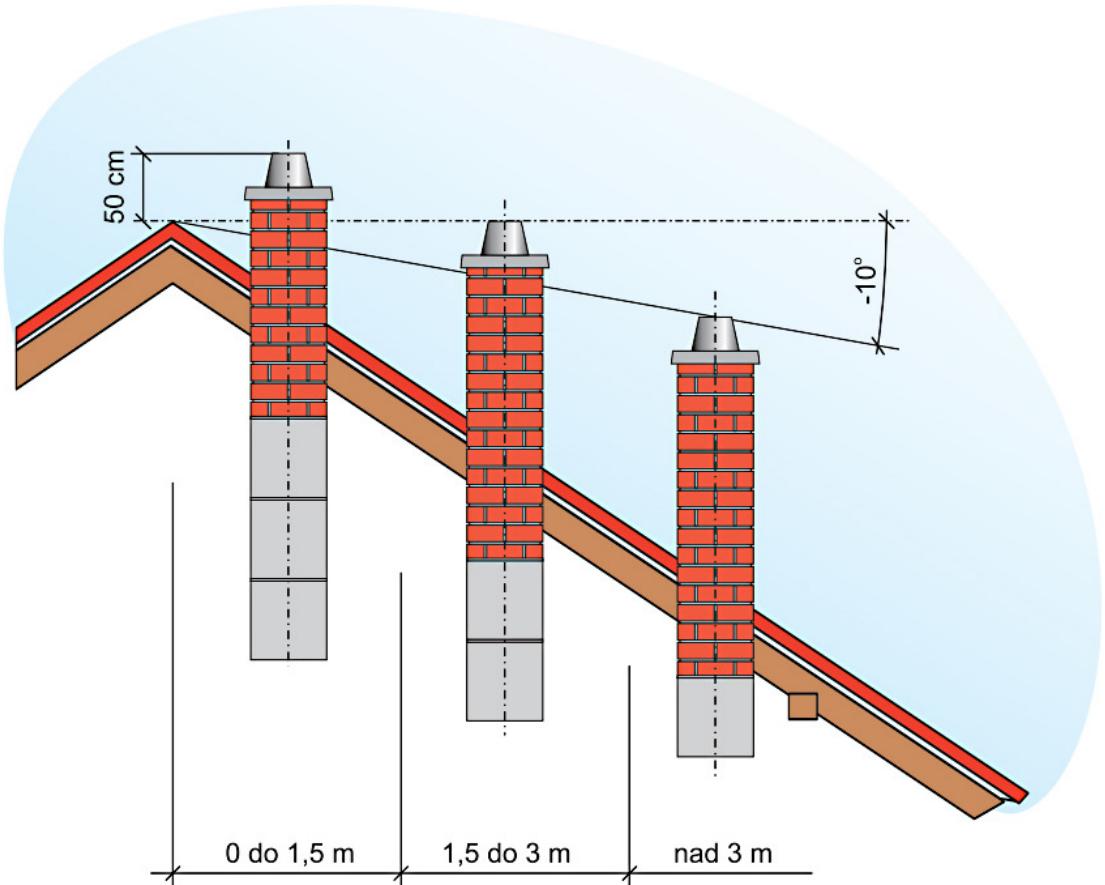


slika 7.Prikaz prikljucenja kotla na dimnjak

Treba izbegavati ako je moguce lukove,a ako nije onda je maksimalni broj lukova(2).Dimni kanal od kotla do dimnjaka pozeljno je izolovati,posebno ako ima lukova i duzih deonica. Sam dimnjak treba da je napravljen od keramickih cevi,oko njih treba da je izolacija debljine 3-5cm i zadnji spoljni sloj je cigla ili specijalni dimnjacki elementi.

Ako dimnjak ipak nije od keramike vec od cigle,povrsina svetlog preseka takvog dimnjaka mora da bude 30% veca nego ovakva povrsina keramickog dimnjaka.Minimalne dimenzije preseka oba dimnjaka i minimalne visine date su u tabeli 1.

Dimnjak mora da ima i vratanca za ciscenje a ona moraju dobro da dihtuju.Izlaz dimnjaka na krovu mora da bude po odredjenim propisima.Razlikuju se dva slucaja:ako je ugao krova manji od 12° i ako je ugao krova veci od 12° .Za ugao manji od 12° visine dimnjaka iznad krova je 1m a za ugao veci od 12° treba pogledati skicu.

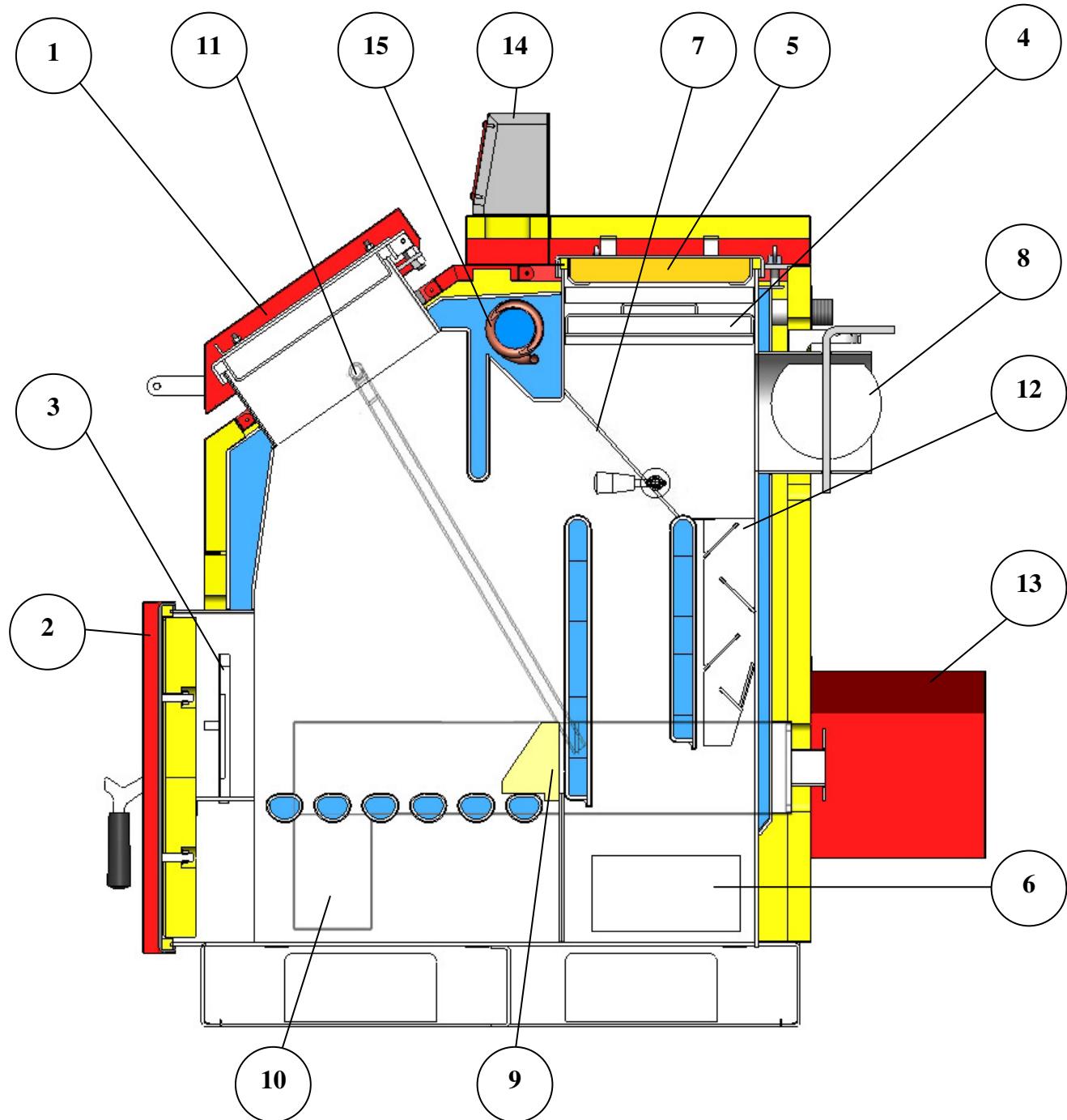


Ukoliko mislite da je dimnjak prejak i da isuvise hladnog vazduha prolazi kroz kotao, na izlazu iz kotla postoji klapna kojom moze da se smanji protok izduvnih gasova. Dimnjak treba redovno da se cisti ili barem jedanput godisnje.



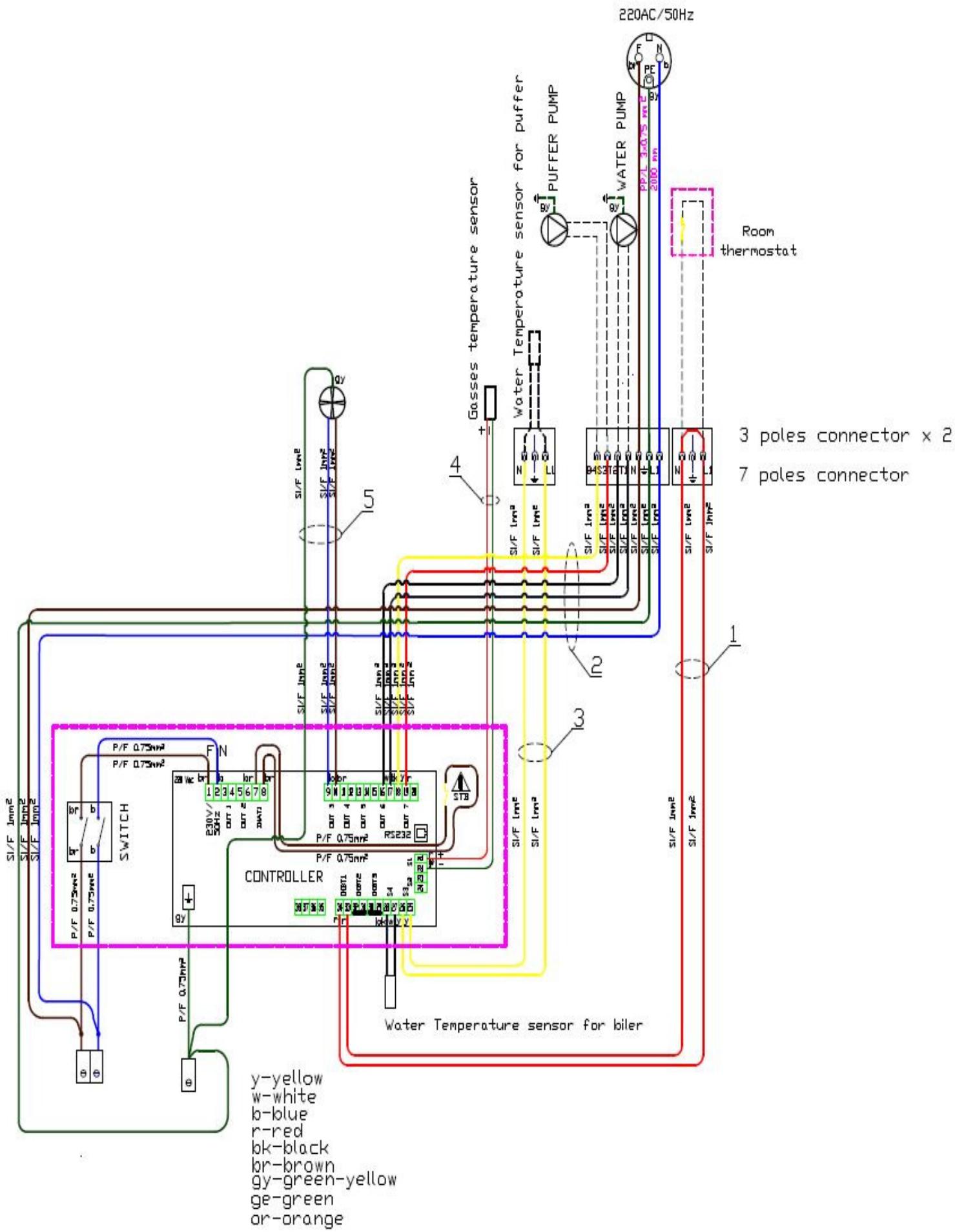
Ukoliko dimnjak nije propisne visine, poprecnog preseka ili ako se ne cisti moguce su komplikacije u radu kotla. Pre svega nije moguc visokotemperaturni rezim rada, tj. nema maksimalne radne snage, a posledice toga je pojava kondezacije sto utice na radni vek kotla.

4. Presek FK kotla sa opisom elemenata



1. Gornja vrata za loženje	9. Opeka ložišta
2. Donja vrata za čišćenje i potpalu	10. Vazdušni kanal
3. Rešetkasta vrata ložišta	11. Cev sekundarnog vazduha
4. Unutrašnji poklopac gornjeg otvora	12. Turbulatori
5. Spoljašnji poklopac gorjeg ovora	13. Ventilator
6. Donji otvor za čišćenje	14. Automatika
7. Klapna za radni i položaj potpale	15. Spirala termičkog osiguranja
8. Klapna dimnjače	

5. Električna šema spoljnih priključenja



Sve linije koje su prikazane isprekidano na šemi spoljnih priključenja su provodnici koje je potrebno da instalira tehničko lice prilikom priključenja spoljnih uređaja na automatiku kotla. Sva priključenja dodatnih uređaja tehničko lice obavlja preko tri konektora koja se nalaze na zadnjem delu kotla.Dva konektora su tropolna a jedan je sedmopolni.Jedan tropolni je za priključenje sobnog termostata što je prikazano na nalepnici samog konektora.



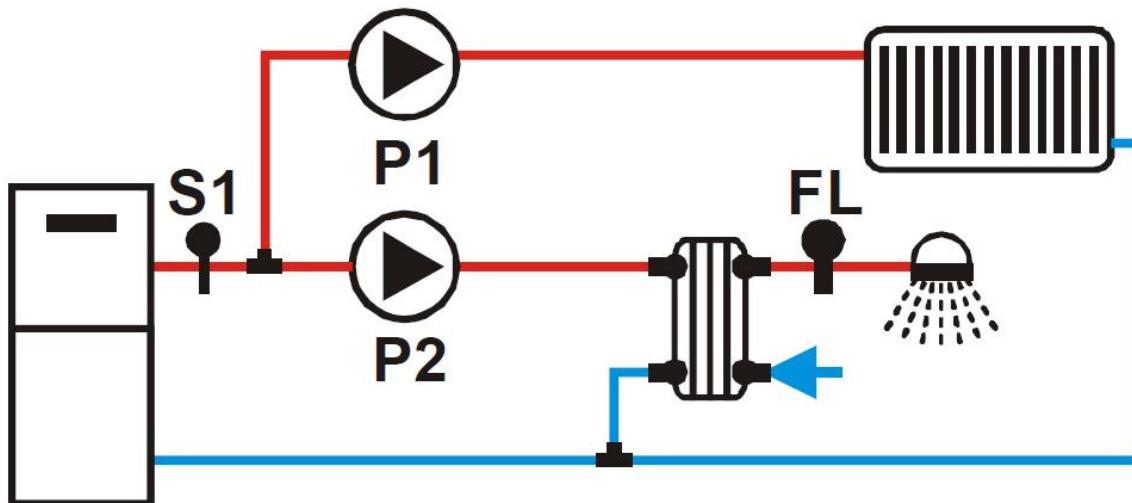
Za sobne termostate bitno je da budu sa baterijskim napajanjem, tj. da nemaju na sebi bilo kakav dovod napona 220 V. Na samom termostatu za povezivanje se koristi NC (normalno zatvoreni kontakt).

Drugi tropolni konektor je za priključenje sonde za merenje temperature u akumulatoru ili bojleru za sanitarnu vodu.Ova sonda se uvek isporučuje uz kotao.Ukoliko sonda za merenje temperature vode u akumulatoru odnosno bojleru sanitarne vode nije dovoljno dugačka moguće je produžiti običnim provodnicima.

Sedmopolni konektor je za priključni mrežni kabal i za priključenje cirkulacione pumpe i pumpe akumulatora odnosno bojlera za sanitarnu vodu.

!Kotao može da radi i u slučaju da nije priključena nijedna pumpa ali preporuka proizvođača je da bude priključena barem pumpa1 (pumpa centralnog grejanja) jer ona ima i funkciju sigurnosnog elementa.Uključuje se kada temperatura vode u kotlu preraste 90 stepeni Celzijusa.

Kotao je prema fabričkim podešavanjima prilagođen hidro instalaciji kao na slici 8.



slika 8

Očigledno je da postoji samo jedno merno mesto S1 a ta sonda je već fabrički postavljena.Druga sonda koja je povezana na konektoru na zadnjoj strani kotla u ovom slučaju ostaje neupotrebljena.

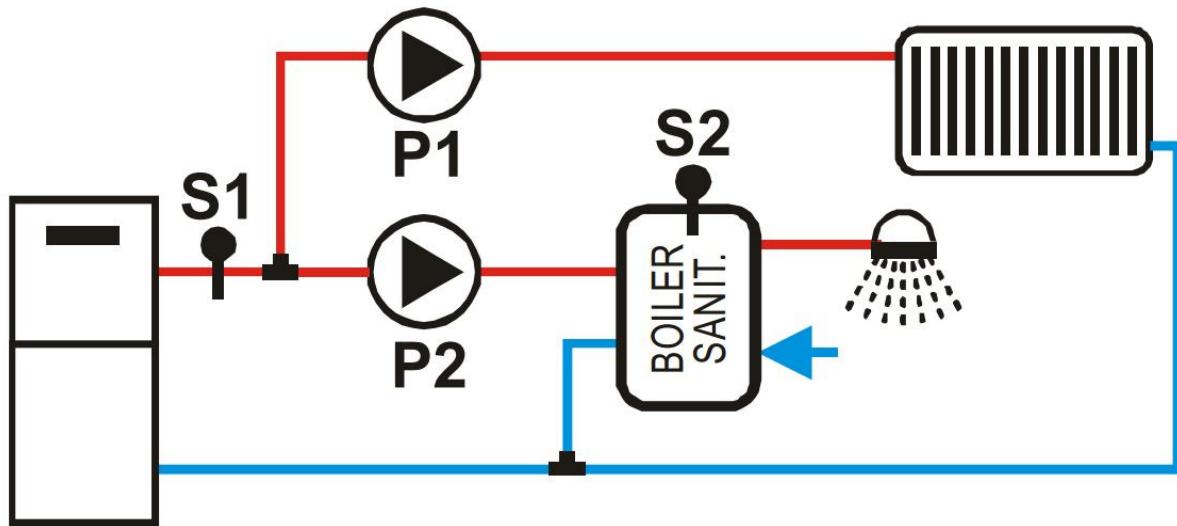
!Pumpu P2 koja služi za sanitarnu vodu ne moramo da ugradimo.Parametar koji određuje tip hidro instalacije u samoj automatici je P37 i za ovaku hidro šemu je P37 podešen na 1.

Ukoliko želimo da koristimo automatiku da vodi proces i zagrevanja akumulatora preko odgovarajuće pumpe,onda hidraulička šema treba da je kao na **slici 10**.Mesto merenja sonde temperature vode u akumulatoru je označeno sa S2.

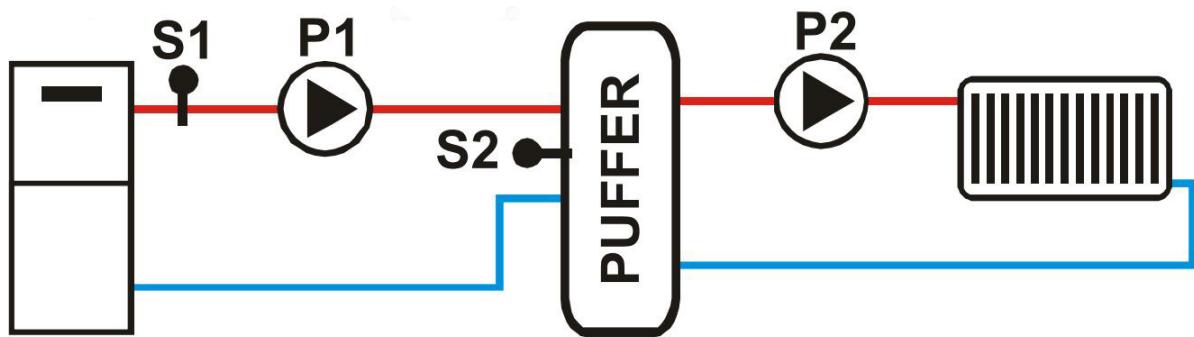
Da bi automatika pravilno vodila rad te pumpe za hidrauličku vezu i sa akumulatorom onda je potrebno parametar P37 podesiti na vrednost 4.

Ukoliko želimo da automatika vodi proces zagrevanja sanitarnе vode i to preko odgovarajuće pumpe, onda hidraulička šema treba da je kao na **slici 9**.

Da bi automatika pravilno vodila rad te pumpe za zagrevanje bojlera sanitarnе vode onda je potrebno parametar 37 podesiti na vrednost 3.

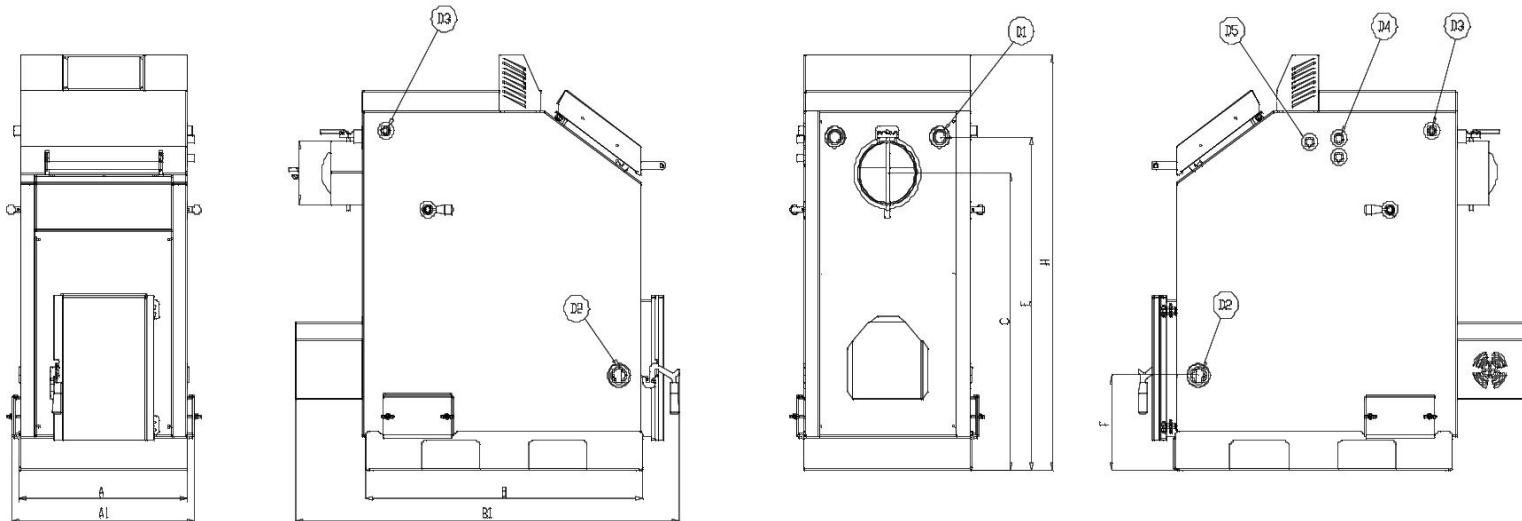


slika 9



slika 10

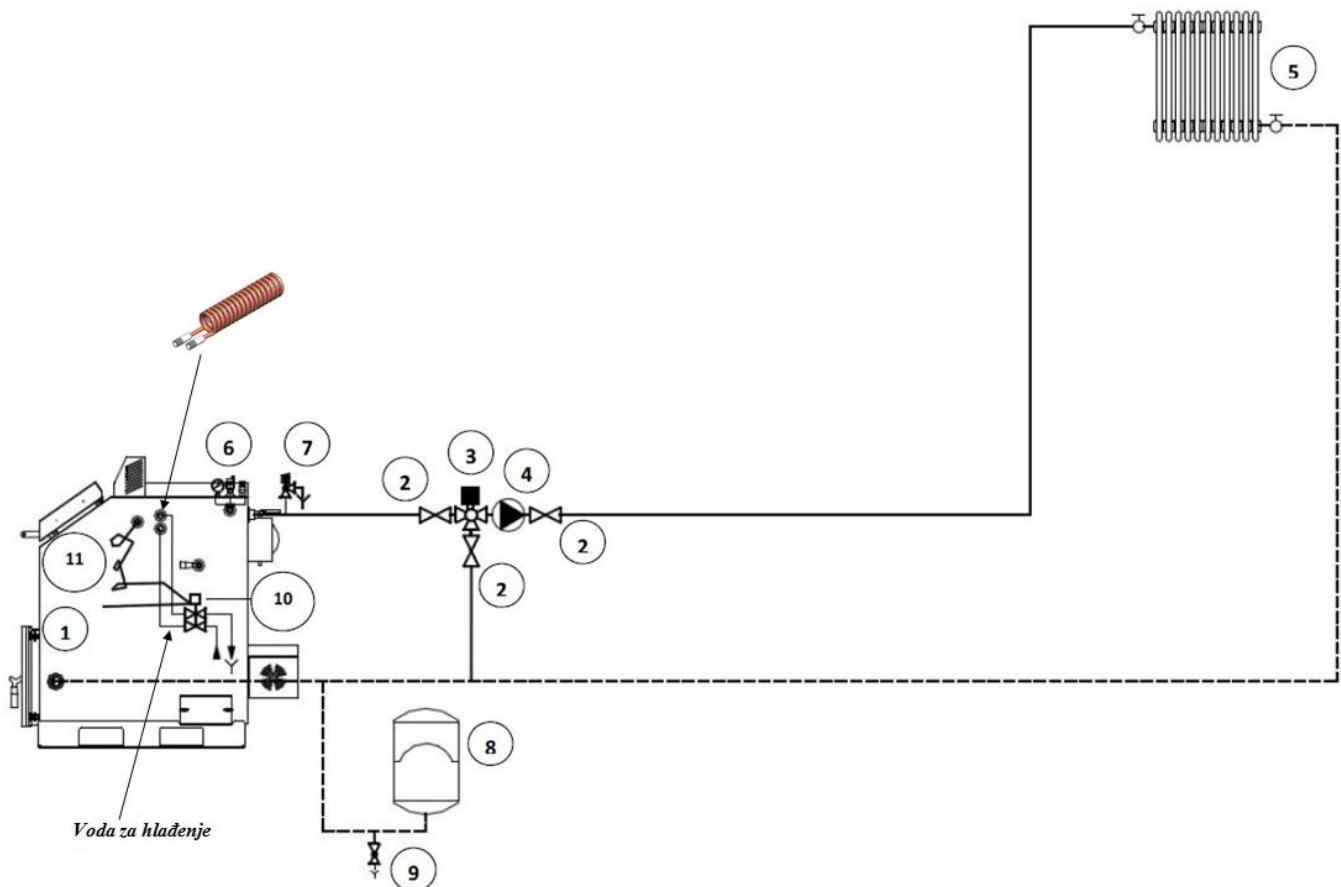
6. Tabela sa tehnickim podacima



Tip kotla		FK1	FK2	FK3	FK4
	mere				
Snaga	kW	15/23	25/33	33/40	40/49,5
Radni pritisak	bar	3	3	3	3
Probni pritisak		4.5	4.5	4.5	4.5
Zapremina vode u kotlu	L-cca	55	72	87	100
Masa kotla	kg	238	295	326	335
Potrebna promaja	Pa	17	18	20	22
Max.temp.potisnog voda	°C	90	90	90	90
Min.temp.povratnog voda	°C	60	60	60	60
Zapremina magacina za ogrev	m³	0,08	0,09	0,13	0,16
Stepen iskoriscenja	%	>85	>85	>85	>85
DIMENZIJE	A	458	528	578	668
	A1	516	566	626	686
	B	790	885	955	965
	B1	1164	1260	1326	1326
	C	810	910	965	1010
	ØD	160	180	200	200
	E	940	1040	1072	1125
	F	290	295	305	305
	H	1205	1285	1340	1395
	D1	1"	1"	5/4"	5/4"
	D2	1"	1"	5/4"	5/4"
	D3	1/2"	1/2"	1/2"	1/2"
	D4	1/2"	1/2"	1/2"	1/2"
	D5	1/2"	1/2"	1/2"	1/2"

- D1-priklučci za toplu vodu iz kotla
- D2- priklučci za hladnu,povratnu vodu iz radijatora
- D3- priklučci za odzračivanje i ventil sigurnosti na pritisak
- D4- priklučci za ventil termičkog osiguranja oticanjem VTO
- D5- priklučak za sondu VTO

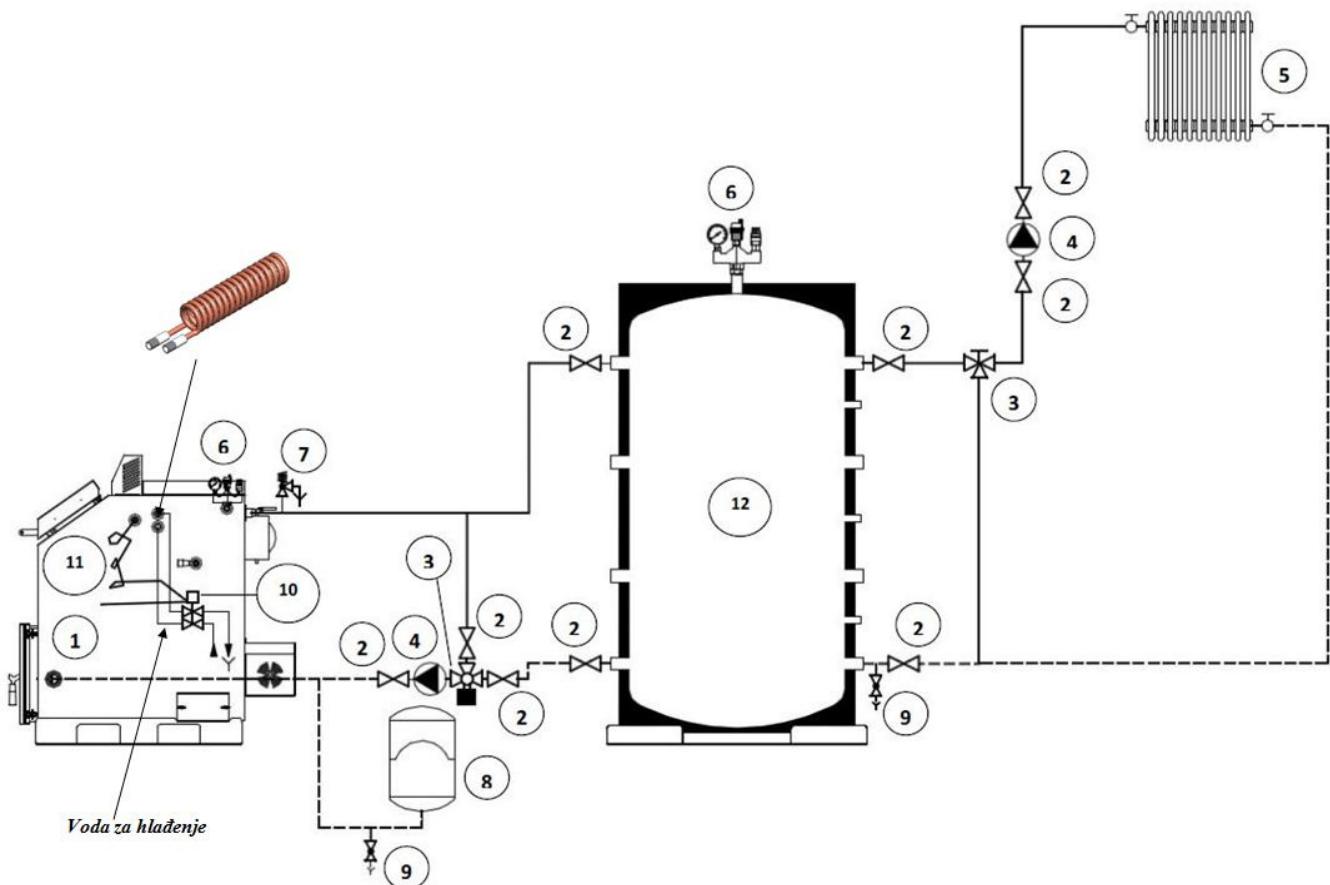
7. Hidraulička šema povezivanja FK kotla



Hidraulička šema

Opis:

1. Kotač FK
2. Ventil
3. Mešni ventil
4. Pumpa
5. Izmenjivač (radijator)
6. Sigurnosna grupa
7. Sigurnosni ventil
8. Ekspansiona posuda
9. Slavina
10. Ventil termičkog osiguranja
11. Sonda ventila termičkog osiguranja



Hidraulička šema sa akumulatorom

1. Kotač FK
2. Ventil
3. Mešni ventil
4. Pumpa
5. Izmenjivač (radijator)
6. Sigurnosna grupa
7. Sigurnosni ventil
8. Ekspanziona posuda
9. Slavina
10. Ventil termičkog osiguranja
11. Sonda ventila termičkog osiguranja
12. Akumulator

8. Start rada kotla, loženje i održavanje kotla

Pre pocetka eksplotacije treba biti siguran da je cela instalacija,a narucito kotao dobro odzracen id a nema curenja.

 Automatiku ne smete ukljucivati u struju dok niste apsolutno sigurni da svi elektricni delovi i provodnici nisu u kontaktu sa vodom.



Kotao ne potpaljivati dok niste pogledali unutar njega i na spoljne strane da slucajno nema curenja vode iz kotla.

 Ukoliko neposredno iz kotla postoje ventili proveriti da li su ottvoreni.
Tek kada je korisnik siguran u prethodne cinjenice moze pristupiti lozenju kotla.Lozenje kotla treba uraditi po redosledu sledech operacija:

8.1. Start rada kotla na čvrsto gorivo

Sledeća procedura potpale kotla i starta rada automatike odnosi se na situaciju prvog paljenja po instaliranju na hidraulički sistem ili kada se kotao potpuno gasi radi detaljnog čišćenja pa ponovo pušta u rad,s tim da tada neke korake preskačemo.

1. Proveriti da li je kotao pravilno priključen na hidraulički sistem.Naročito proveriti da li je iz kotla ispušten sav vazduh.

2. Utikač za glavno napajanje ubaciti u utičnicu mrežnog napajanja.Pritisnuti glavni prekidač na automatici.Tada dolazi do oživljavanja displeja i na njemu bi posle par sekundi trebalo da piše „OFF”.

3. Na dimovodnoj cevi a što bliže kotlu izbušiti otvor za sondu dimnih gasova.Otvor treba da bude u gornjoj zoni da ne bi vremenom došlo do prekrivanja sonde pepelom.Takođe,proveriti da klapna na dimnjači kotla ne udara u sondu.**Bez sonde za temp. dimnih gasova kotao ne može da radi.**

4. Unutar kotla postoji klapna za usmerivanje dimnih gasova u dva režima „radni” i položaj za potpalu.Ovom klapnom se rukuje pomoću ručice na bočnoj strani kotla.Pomeriti ručicu u smeru ka dimnjaku.Tada je klapna u položaju za potpalu.

Takođe klapna na izlazu iz kotla,tj. na dimnjači treba da je maksimalno otvorena.

5. Otvoriti donja vrata,a zatim i mala rešetkasta vrata.Na cevni rost staviti nešto materijala za potpalu u vidu papira i suvih tankih komada drveta.Najbolje je koristiti hemijske potpaljivače koji su u obliku kocki za potpalu drveta.Ručno potpaliti i sačekati da se plamen razgori.

6. Kada već imamo dobar,jak plamen dodati malo veću količinu goriva nego prvi put i to kroz gornja vrata.Zatvoriti sva vrata i pritisnuti komandno dugme 4 „START”.Dugme držati sve dok se na displeju ne pojavi „ACC”.To znači da je i automatika ušla u fazu potpale,pali se ventilator i dolazi do porasta temp. dimnih gasova.

Posle izvesnog vremena kotao ulazi u normalni radni režim a to se manifestuje tako što na displeju nema nikakve poruke osim trenutne temperature vode.

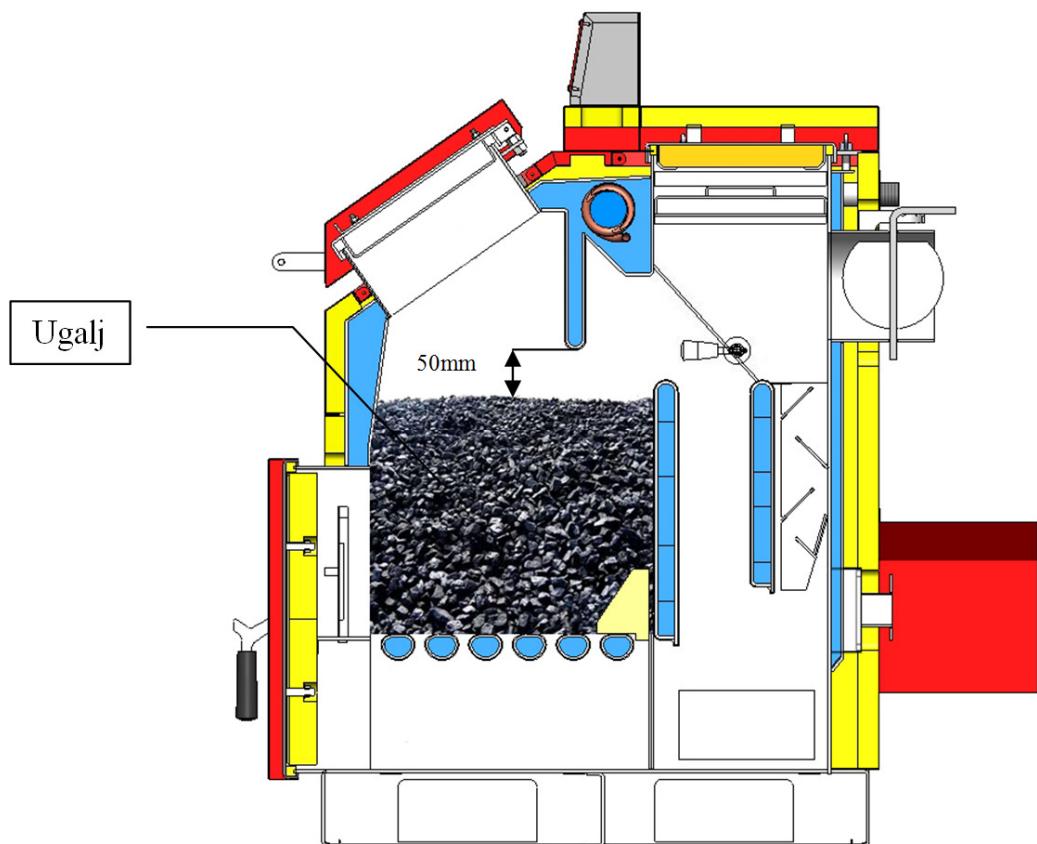
7. Kada temp. dimnih gasova pređe otprilike 200 stepeni Celzijusa, treba klapnu unutar kotla sa kojom se rukuje ručicom sa bočne strane,gurnuti ka prednjoj strani odnosno u radni položaj.Očitavanje temp. dimnih gasove se vrši tako što se kratko pritisne komandno dugme 1 pa komandno dugme 3 a zatim i komandno dugme 2.Na displeju se tada pojavi temp. dimnih gasova.Ovo je opisano i u uputstvu za brzo rukovanje automatikom.

8.2. Loženje kotla

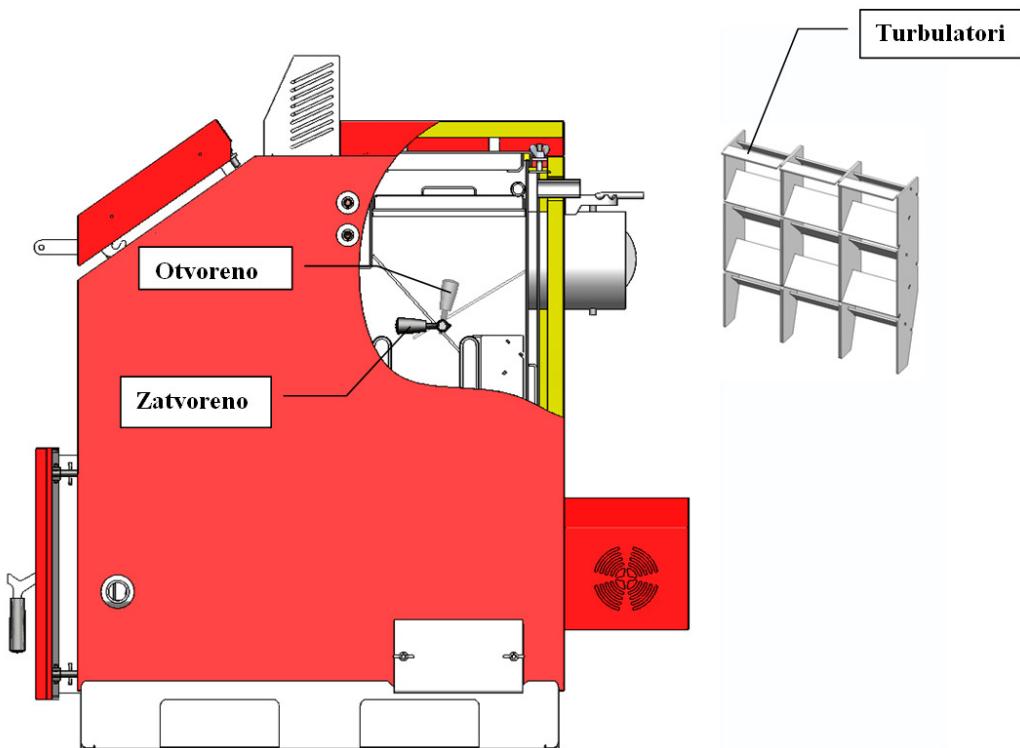
Tokom rada kotla moguce je dopuniti kolicinu uglja ili drveta u njemu ali prethodno treba prekinuti rad ventilatora i to pritiskom na dugme STOP(videti brzo uputstvo za rad automatike).

Kotao je moguce loziti i ugljenom prasinom i redosled operacija je isti.Razlika je u tome sto se kotao prvo napuni ugljenom prasinom a na vrh se stavi papir i drvo za potpalu.

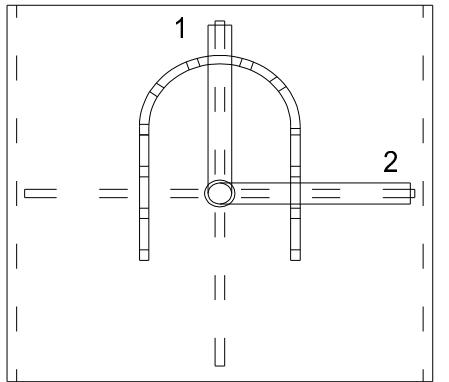
Kotao se koristi i za drva i za ugalj kao gorivo ili za njihovu mešavinu s tim da je naša preporuka da maksimalni nivo punjenja sa ugljem bude nešto niži, što je prikazano na slici 11.



Slika 11.Prikaz maksimalne visine lozenja ugljem



Slika 12.Prikaz pozicije klapne u OTVORENOM i ZATVORENOM polozaju i prikaz TURBULATORA



Klapna dimnjace

poz.1 otvorena klapna
poz.2 zatvorena klapna

Slika 13.Prikaz položaje klapne na dimovodnoj cevi

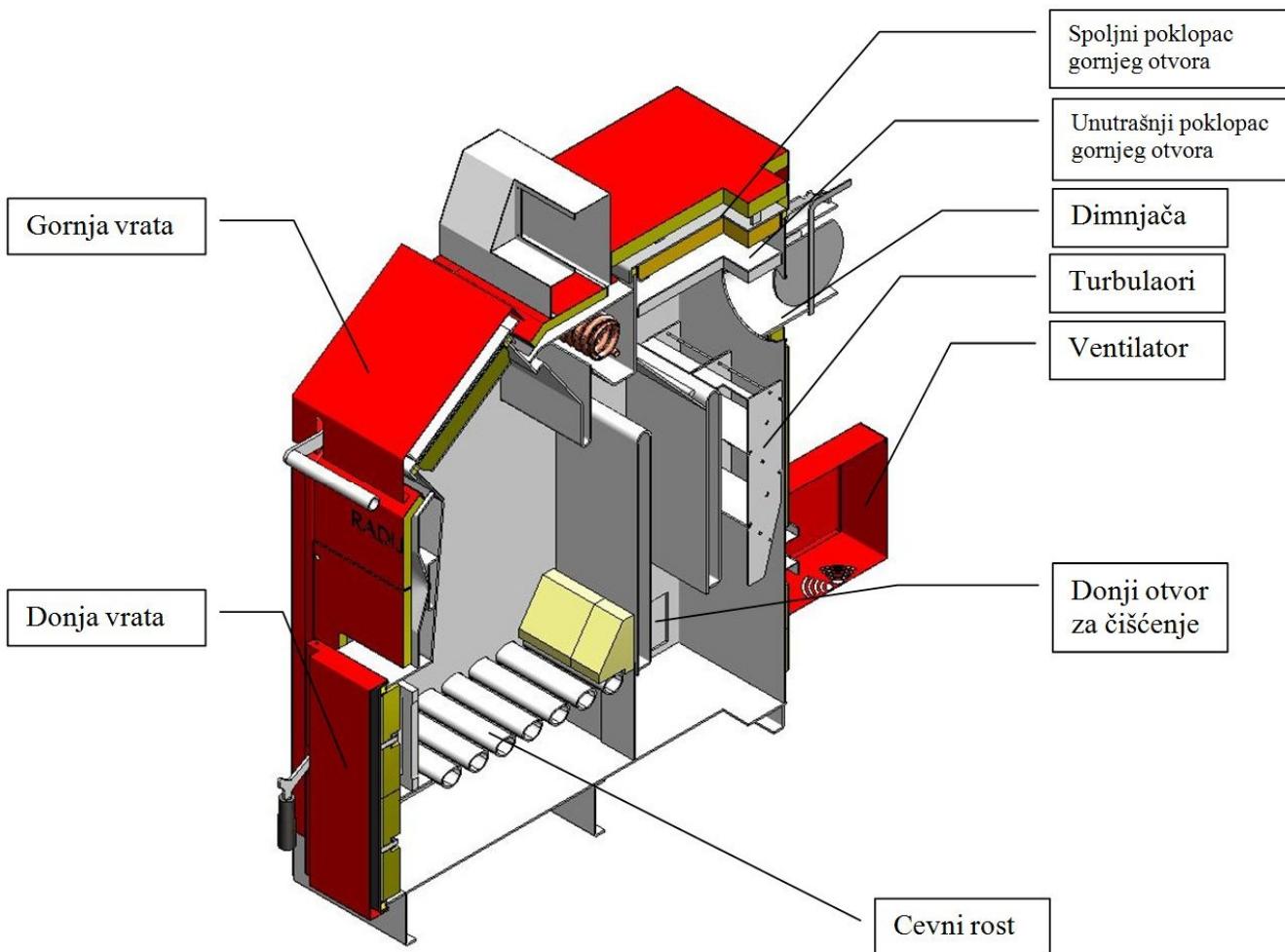


Kada radi sa ugljenom prasinom kotao se ne sme dopunjavati u toku rada.Dopuna lozenja se vrši tek kada predhodni ogrev izgori.
Kotao u procesu rada treba nadgledati jednom u 5-6 sati.



Otvaranje gornjih vrata za lozenje u toku rada raditi sto redje i to samo radi pregleda rada kotla.Vrata tada moraju da se otvore veoma sporo,a oprezno i to prvo samo malo i tako ih zadrzati desetak sekundi,a onda do kraja.Veoma je opasno otvoriti gornja vrata u situaciji kada ventilator neradi.Tada stvoreni gasovi sagorevajna izlaze kroz vrata i u kontaktu sa kiseonikom burno sagorevaju.U ovim slucajevima moze doci do laksih i tezih povreda lozaca ili zapaljenja kotlarnice.Zato se vrata otvaraju na vec opisan nacin i po mogucstvu sto pre posle funkcije ventilatora koja se zove "provetrvanje".

8.3. Održavanje kotla





Svakodnevno odrzavanje kotla odnosi se na izbacivanje pepela iz prostora izmedju poda i cevnog rosta.Ukoliko tu postoji velika kolicina pepela gorivo ne dobija veliku kolicinu vazduha za sagorevanje.Obratiti paznju da izlaz vazduha iz ventilatorskih kanala uvek bude bez smetnji.



Na svakih sedam dana kotao treba detaljno ocististi,tako sto se skine poklopac oplate na krovu i spoljni i unutrašnji poklopac na kotlu i kroz otvor na krovu kotla priborom za ciscenje treba skinuti garez i katran sa svih unutrasnjih povrsina kotla.Tada treba izvaditi i turbulatore(usmerivace dima) i takodje ih ocististi.Uraditi i ciscenje lozista i to kroz gornja i donja vrata.Svaki milimetar katrana na unutrasnjoj povrsini kotla je 5% slabije provodjenje toplote.



Naročito je bitno redovno vaditi iz kotla i čistiti turbulatore.U suprotnom dolazi do situacije da je turbulatore nemoguće izvaditi iz kotla a pepeo ih je potpuno blokirao tako da nema prolaska dimnih gasova.

Na svaki sedam dana treba ocistiti i ventilator.Do njega se dolazi skidanjem limene zastite koja je spojena sa limenom izolacijom kotla elasticnom vezom.Samo ciscenje ventilatora nikako ne raditi vodom vec mehanicki nezno po turbine,ilipneumatski.

Ukoliko u toku rada dodje do kondenzacije,kondenz obavezno ocistiti i kotao iznutra premazati baznim sredstvom za ciscenje ili bar krečnim mlekom.Na ovaj nacin neutralisace se kiseline koje su ostale u kotlu.

Na kraju greje sezone kotao obavezno detaljno ocistiti i izvrsiti neutralizaciju kiselina na vec pomenuti nacin.Sve otvore zatvoriti da ne dodje do cirkulacije vazduha kroz kotao jer i tako moze doci do pojave vlage u kotlu.



Odrzavanje kotla je jedan od najbitnijih faktora za duzinu radnog veka kotla.Kotao ne sme da saceka narednu sezonu grejanja neociscen i bez neutralizacije kiselina

9. Kratko uputstvo za korisnika automatike

- Uključiti glavni prekidač



- Pritisnuti taster  i držati 5 sekundi.



- Prekid rada kotla na pelet vrši se pritiskom na taster  i držajem 5 sekundi.

9.1. Promena jačine ventilatora u radnom režimu



9.2. Promena zadate temperature u kotlu



9.3. Kako očitati temperaturu vode u akumulatoru ili bojleru (ukoliko sistem poseduje akumulator tople vode ili bojler)



9.4. Kako očitati temperaturu dimovodnih gasova



9.5. Ulazak u skriveni meni

- Pritisnuti taster  i držati, odmah zatim pritisnuti taster  i držati oba taster 5 sekundi. Odmah po ulasku u skriveni MENI na displeju piše CL 00. To je prvi parametar.



- Za povratak korak nazad, koristite taster .

AUTOMATSKO UPRAVLJANJE KOTLOM

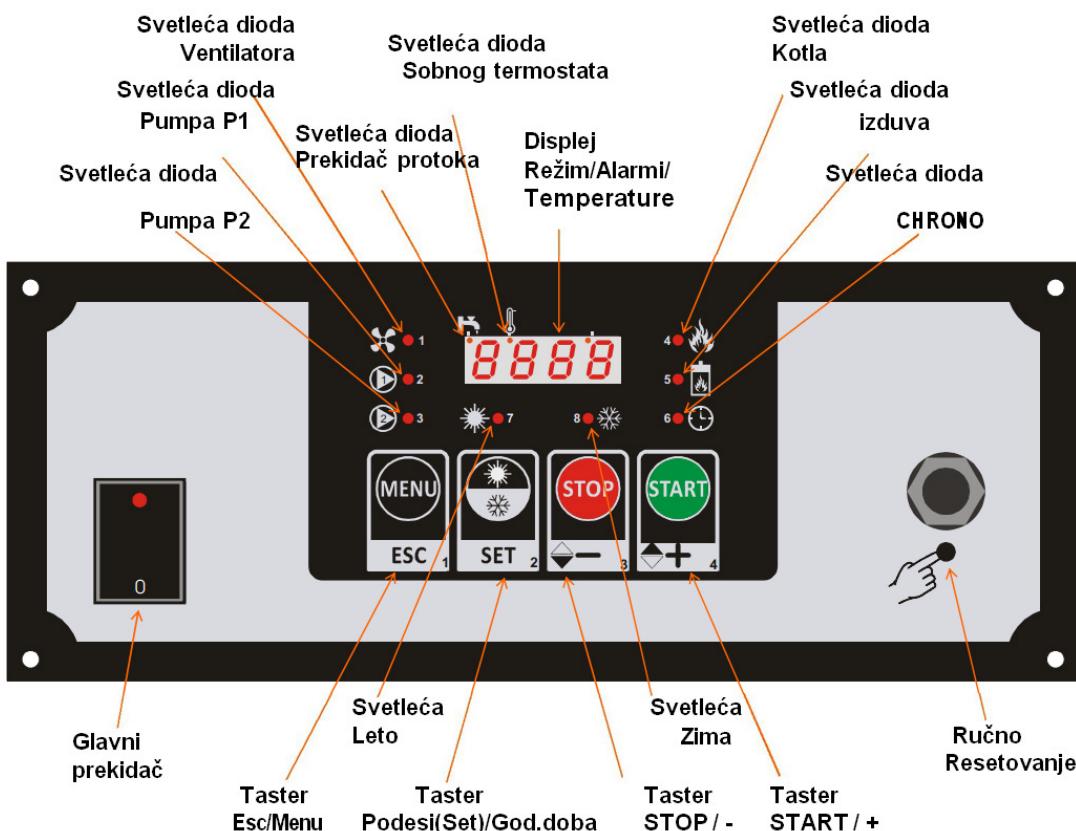
Sve funkcije koje obavlja automatika izvršavaju se na osnovu dve ulazne informacije a to su temperatura vode u kotlu i temperatura dimnih gasova na izlazu iz kotla.

9.6. Kontrol panel

Komandni panel sačinjavaju:

Glavni prekidač, dugme sigurnosnog termostata, displej, grupa komandnih tastera (dugmića), grupa svetlosnih dioda pokazivača

Sledeća slika je prikaz kontrolnog panela.



9.6.1. Komandni tasteri

U DONJEM DESNOM UGLU SVAKOG KOMANDNOG TASTERA OZNAČEN JE BROJ.

- **START/+ KOMANDNO DUGME 4** : Uključuje rad sistema (**ON**) kada se drži neprekidno 5 sekundi. Pritiskom u **Meniju (Menu)** povišava vrednost parametara.
- **STOP/- KOMANDNO DUGME 3** : Isključuje rad sistema (**OFF**) kada se drži neprekidno 5 sekundi. Pritiskom u **Meniju (Menu)** snižava vrednost parametara.
- **SET/Sezona KOMANDNO DUGME 2** : Kada se neprekidno drži pritisnutim 5 sekundi bira godišnje doba Leto/Zima. Pritiskom u **Meniju (Menu)** menja prikaz od koda parametara do vrednosti i odobrava se sačuvanje novog podešenja.
- **ESC/Menu KOMANDNO DUGME 1** : Ovim tasterom se ulazi/izlazi iz **Menija (Menu)**. Ukoliko menjate podešavanja i pritisnete ovo dugme, promene u podešavanjima neće biti sačuvane.

NAPOMENA:

U režimu **Isključen (OFF)** ili u režimu **Gašenje** možete resetovati prikaz Alarma pritiskom na taster + ili -, ali ako je uzrok alarma i dalje prisutan alarm će se ponovo uključiti.

9.6.2. Svetleće diode

1. **Svetleća dioda Ventilator:** UKLJUČEN kada je ventilator za pomaganje sagorevanja radi.
2. **Svetleća dioda Pumpa P1 :** UKLJUČEN je kada pumpa P1 radi. TREPĆE kada je pumpa P1 isključena od strane sobnog termostata.
3. **Svetleća dioda Pumpa P2 :** UKLJUČEN je kada ventil/pumpa P2 radi. TREPĆE kada je pumpa P2 isključena od strane sobnog termostata.
4. **Svetleća dioda Kotaо:** UKLJUČEN kada je temperatura vode u kotlu ispod vrednosti **T-KOTAо[A03] – ModulacijaDelta1[A05].** TREPĆE kada je temperatura vode u kotlu iznad zadate temperature. ISKLJUČEN kada je temperatura vode u kotlu iznad temperature **T-KOTAо[A03].**
5. **Svetleća dioda Izduv :** UKLJUČEN kada je temperatura izduva iznad **T-IZDUV-UKLJ[F18].** TREPĆE tokom režima predgašenje(**Vreme predgašenja[t06]**)
6. **Svetleća dioda Chrono :** UKLJUČEN kada je ulaz Chrono zatvoren .
7. **Svetleća dioda Leto :** UKLJUČEN kada je izabrano godišnje doba Leto .
8. **Svetleća dioda Zima :** UKLJUČEN kada je izabrano godišnje doma Zima.
9. **Svetleća dioda protok prekidača :** UKLJUČEN kada je priključak ulaza protok-prekidača zatvoren.
10. **Svetleća dioda sobnog termostata :** UKLJUČENA kada je priključak ulaza sobnog termostata zatvoren.

9.6.3. Displej

Displej\Režim\Alarmi\Temperatura:

Tokom rada sistem prolazi kroz razne faze o čemu obaveštava i korisnika odgovarajućim natpisima na displeju. Vrlo bitna obaveštenja iz domena bezbednosti, a to su situacije kada sistem prekoračuje granične temperature,takođe se pojavljuju na displeju.
Na displeju se očitavaju I sve temperature vezano za vodu u kotlu I dimne gasove.

OFF = Isključen (OFF)

Rcc = Paljenje

rEc = Ponovno paljenje

Mod1 = Modulacija 1

Mod2 = Modulacija 2

Movt = Mirovanje

Si c = Sigurnosni režim

ALM = Isključen sistem sa Alarmima

Ukoliko je alarm uključen, Displej će pokazati alternativne kodove-grešaka:

ESi c = Otvoren je priključak za ručno resetovanje

CRLd = Prekoračenje temperature vode u kotlu

RccF = Ne uspelo paljenje

SPAc = Slučajno gašenje

CONTENTS:

1. Important warning;
2. Description of the boiler;
3. Assembly;
 - 3.1. Measures and safety devices for boilers;
 - 3.2. Boiler room;
 - 3.3. Connection to the chimney;
4. Cross-section of FK Boiler with a description of the boiler elements;
5. Schematic connection of automation;
6. Table of technical data;
7. Hydraulic scheme;
8. Boiler Operation and Maintenance;
 - 8.1. Operation start of the solid fuel boiler;
 - 8.2. Adding fuel during operation of solid fuel boiler;
 - 8.3. Maintenance of boiler;
9. Kratko uputstvo za korisnika automatike.

GENERAL WARNING

- After removing the packing material you should be assured about the completeness of the delivery, and in case of the lack, you should contact the seller who sold the heating boiler
- Heating boiler must be used exclusively for the purpose foreseen by the manufacturer. Any responsibility by the manufacturer is excluded for the damage caused by the persons, animals or things, in case of mistakes in assembly, regulation, maintenance and improper use.
- In case of leakage of water the device should be switched off the electric power supply, water supply should be shut and authorized servicing department or authorized assembly operator informed.
- This manual is the constituent part of this unit and must be kept with attention and the unit itself MUST always be watched, and in case of the change of the owner or user, or in the case of connecting to another installation system. In case of a damage or being lost a new copy should be asked from the authorized seller.

1. Important warnings

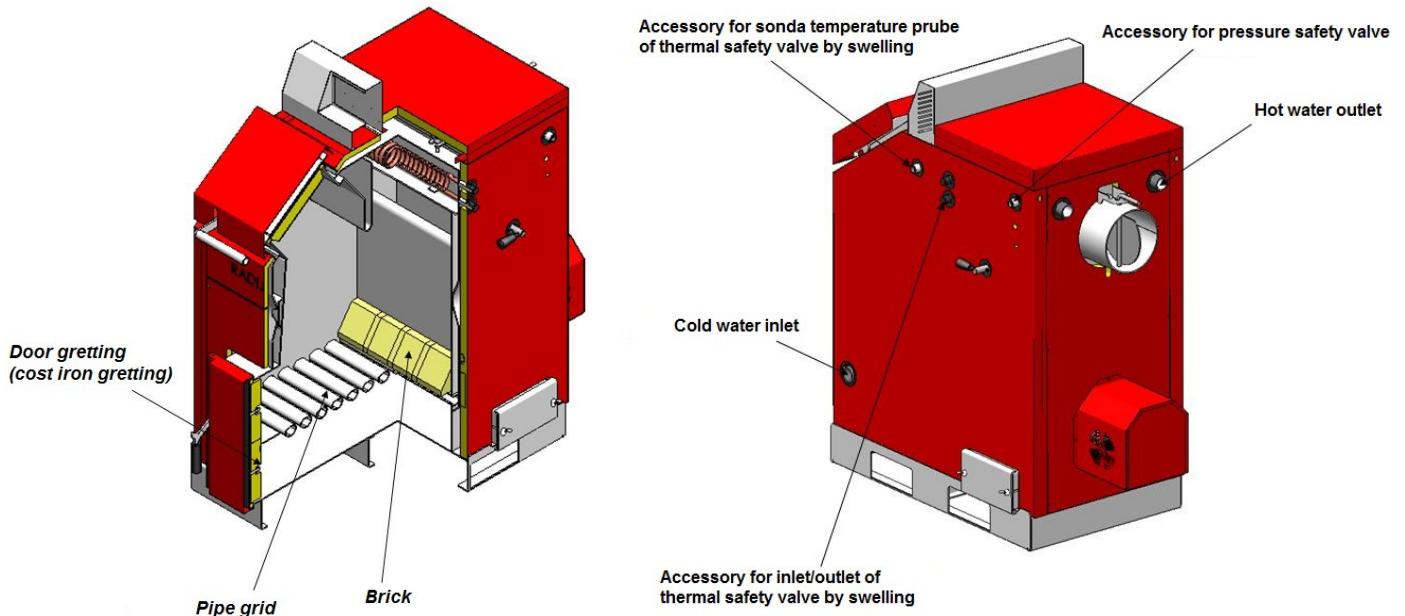
As a reminder, the use of the solid fuel heating boiler having the contact with electric power and water asks for the respect of safety measures such as:

- It is forbidden to use the heating boiler by children and persons with limited capabilities without attendance
- It is forbidden to use boiler installations operating at temperatures higher than 110 ° C, and pressure greater than 3 bar.
- It is forbidden to use the easy inflammable fuels (alcohol, oil) for a faster firing of wood
- It is forbidden to place easy inflammable materials close to the unit and firing door. Ashes must be put aside into the closed and non-firing containers.
- It is forbidden to burn the waste materials and materials whose combustion causes the flame or explosion danger (Example: plastic bags, sawdust, coal dust, mud etc.)
- Any intervention by technical operator is forbidden or cleaning before the heating boiler is disconnected from the electric supply, so as the switch should be positioned to “0” – “disconnected”.
- Any change in safety elements is forbidden.
- Valves’ ventilation openings in the room where the heating boiler is placed is forbidden. Ventilation openings are necessary for proper combustion.
- It is forbidden to expose the heating boiler to atmospheric negative influences. The heating boiler itself is not foreseen for exterior assembly and does not have the anti-freezing system.
- It is forbidden to switch off the unit if the outer temperature can fall below ZERO (freezing danger).

2. Description of the boiler

The solid fuel heating boiler of the series "FK" is in steel three-fold drought construction, and for its construction carbon sheets for manufacture of heating boilers are used of the quality 1.0425 EU Standard, i.e. P265GH EU Standard EU II. In the base of the fire place there is the pipes lattice manufactured in seamless pipes for heating boilers of the quality St.35.4. Lattice door in the opening for cleaning and firing is manufactured in gray iron. In the rear part of the firing place there are the bricks made of refractory material which accumulates the heat.

All steel items of the heating boiler are cut by means of the most up-to-date laser procedure and are welded in the top quality welding technology including robotics. Testing and certificate obtaining has been performed in accordance with European norms EN303-5.



3. Assembly

Solid fuel heating boiler is delivered with outer lining containing the insulation 30 mm thick.



The unit is equipped with the fan and automation system and both devices use the power supply of 230V, so that improper assembly and incautious maintenance can endanger human life by means of electric current shock.



Solid fuel heating boiler, even with forced drought, should be assembled according the valid norms and legal regulations. Any change either in mechanical construction or electric system shall be understood as the violation of the guarantee conditions and will lead to its violation.

Basic requirements that should be delivered during assembly are:

- the unit must be connected onto the open heating system
- the unit must be located at a safe distance from easy inflammable materials
- Electric power supply of the unit is 230V and 50 Hz and the connection of all items belonging to the unit should be performed according to the valid regulations, and the connecting itself is done by the authorized person.

Connection to the chimney is also performed according to the bounding regulations as well as to the recommendations of the manufacturer which is clear in the text to come.

3.1 Measures and safety devices for boilers

For safe operation of boiler it is necessary to assemble and maintain the following elements in working condition:

- Pressure Safety valve (Figure 1)



Figure 1



Figure 2

- Pressure safety valve must be of nominal diameter of 1/2 inch calibrated to a maximum of 3 bars.

This security element which belongs to the group of pressure limiters must be of such construction to withstand short-term overloads and temperatures and pressure as well as the content in the liquid glycol for heating.

Usually in the same place the vent (Figure 2) and the pressure gauge are connected so that these three elements together constitute a security group and can be mounted over T" connector.

This safety element must be subjected to periodic re-calibration , of which the investor, i.e. the user of the boiler must have valid documentation.

- Safety valve must be mounted on the highest point directly to the boiler and the boiler without any pipeline or any other elements in between. For this purpose there is a specially designed connector (see picture). Any reduction in diameter of the connector is prohibited.
- The vent ie. the exhaust of safety valve must be of pipes with a diameter at least equal to the nominal diameter of the exhaust part of valve. Also, it is allowed to use maximum one bend of the radius $r > 3d$.
- The safety valve must have a nameplate and the following information on it
 - - Name of manufacturer
 - Designation of type of safety valve / year of testing
 - Nominal flow rate
 - Data for which thermal effect the safety valve is set
 - The highest opening pressure 3 bars

It is obligatory to check the correct functioning at regular intervals as well as the re-calibration by certified companies. These responsibilities are carried out in

accordance with the law of every country in which the boiler is assembled. Always keep the written documentation of the last calibration data for the safety valve.

- On the return line assemble at least another pressure safety valve.

- The valve of thermal safety by swelling (Figure 3)



Figure 3

This safety element also has a role of a limitator of temperature. Below it will be marked with the abbreviation VTO.

- In some extremely dangerous situations in the transformation of water into vapor is such that the pressure safety valves are not sufficient to ensure the safety of the hydraulic system. For this reason, the installation of VTO is mandatory. Depending on the regulations of the countries in which the boiler is assembled, it is necessary to install the VTO only for the determined higher powers or for each power of a boiler it is obligatory to install the VTO.
- Place the installation is shown in the Assembly diagram of boiler onto the installation in Figure 4
The boiler is supplied with a copper coil so it is necessary to use the VTO with the exchanger, as shown in Figure 4. Cold sanitary water is brought to the VTO. When the VTO-probe has the information that the temperature is over 95 degrees the VTO is opened and water flows through copper coil. After some time the temperature of water in boiler returns to its normal state.
- One connection of coil is used for VTO and the other for draining of water that has passed through the coil. The choice of either connection; for VTO or for the discharge is irrelevant. It is necessary to follow the installation instructions provided by the manufacturer of the VTO.
- Be sure to check up, in certain periods of time, the functioning of the VTO.

As stated above one end of the VTO is for the mounting on the exchanger of the boiler, and the other is supplied with cold water under pressure. It is particularly important that the water flow is unobstructed even when the electricity is switched off.

⚠ If it is impossible to provide the inflow of cold sanitary water at the time of electricity switch off , the boiler must be connected onto the open system.

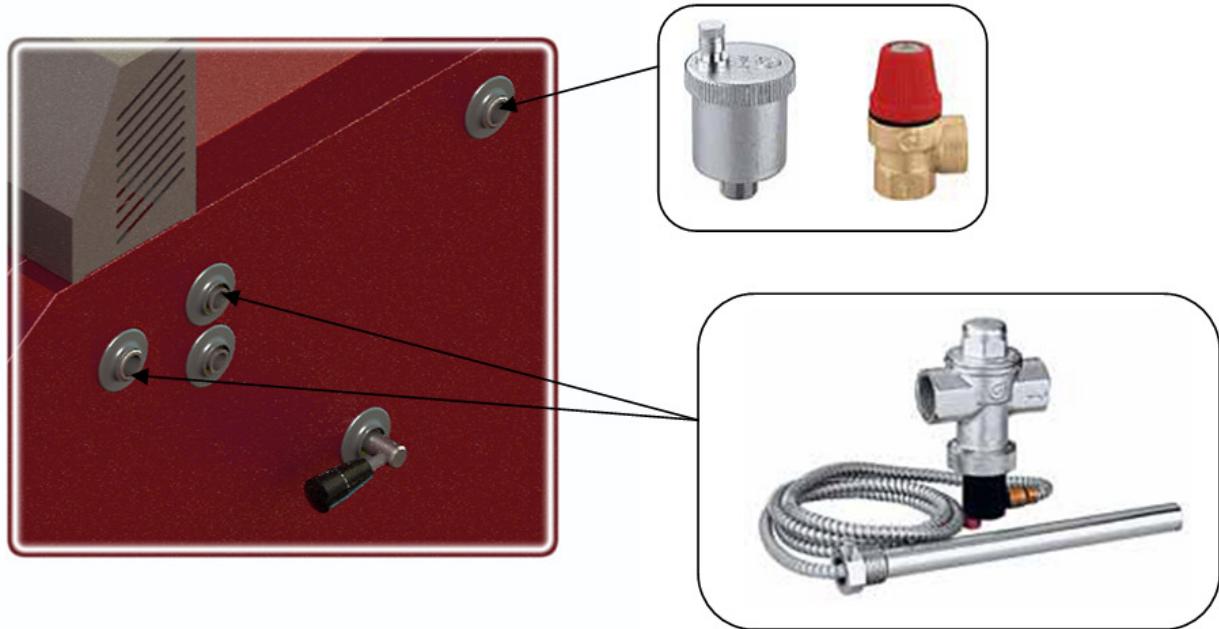


Figure 4. Installation of safety elements

Thermostats in the automation of the boiler (Figure 5)

- Within the automation itself that leads the combustion process and influences the work of two cycles of heating, there are two thermostats. Both are of similar construction as the thermostat shown in Figure 6 and they have safety functions as limiters of the temperature of water in the boiler. Because of the safety role in the functioning of the boiler, both thermostats have the independent probes for measuring of water temperature. The first thermostat is the so-called „working thermostat” work and it serves to limit the temperature to a level the user wants. Another thermostat is the „safety thermostat” because it stops the operation of the fan which favors the flame, and adds a new energy. Safety temperature is limited to 95 degrees Celsius.

It is very important to connect the pump for heating through automation for safety reasons. When the temperature of water in the boiler reaches the critical value of 95 degrees the fan stops working, but the pump is necessarily switched on to exchange the heat of water through radiators.

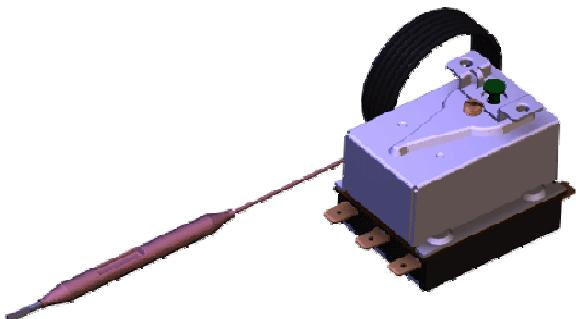


Figure 5

3.2 Boiler room

Boiler room must be secured against freezing.

The support surface of the boiler in the boiler room must be of non-combustible material. Recommended distance of all four sides of the boiler in relation to the boiler walls or other solid body (water heater, etc..) are shown in **Figure 6**. These values allow a safe distance access when firing, sufficient space for cleaning and easy access to fan and valve for filling and emptying. Boiler at its left hand side should be away from the wall 100 to 200 mm i.e. as much as needed for the connection of valves for thermal safety by over flow. If the valve is not to be installed then the space can be smaller. The flap handle for firing is removable and can be placed either on the left or right side of the boiler. The space on the right side of the boiler, which is recommended to be at least 800mm from the silo is important because after cleaning the boiler the user then goes and pulls out the ashtray from the back of the firebox. Boiler room must have sufficient ventilation holes for fresh air as well as for the outlet of the exhaust air.

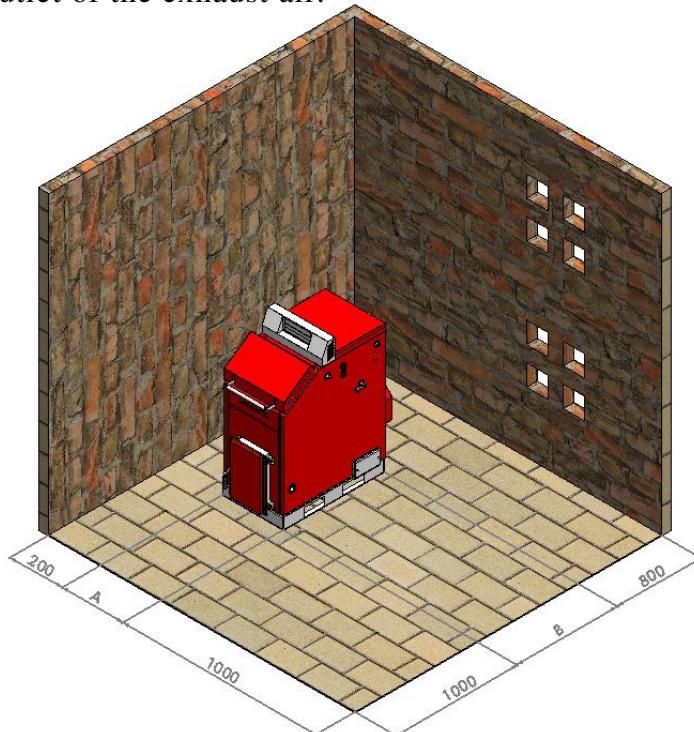


Figure 6. Positioning of boiler in the Boiler room

Total space of this openings is minimum 150cm² fro the boilers of the power of 50kW and for the power over 50kW the space must be larger for another 2cm² per 1kW.

$$A=150\text{cm}^2 + \frac{2\text{cm}^2}{\text{kW}} \times (\sum Q_n - 50\text{kW}) \quad \sum Q_n = \text{possible power of over } 50\text{kW}.$$

The lack of sufficient ventilation in the boiler room can cause more problems in the work of boiler. Main problem is the inability to achieve high output water temperature i.e. the lack of maximum power which leads to condensation in the boiler.

- Take into account the required minimum space required for access and security elements to carry out cleaning operations
- Determine whether the degree of electrical protection is in accordance with the characteristics of the room where the boiler will be located
- No exposure to atmospheric influences. The boiler itself is not anticipated for outdoor use and contains no anti-freeze system.

- It is forbidden to close the vents in the boiler room in which the openings are necessary for proper combustion.

3.3 Connection to the chimney

The boiler TKAN works on forced draft, but the rules should be respected as if the selection of the chimney were for the boiler working on over-pressure in the combustion chamber some other fuel, like oil fuel, for example. Otherwise the problems may occur in the work, especially in the ignition phase and in the mode of solid fuel.

It is recommended that the diameter of the chimney is at least equal to the diameter of the flue has, and minimum height of 7 to 8 meters, depending on the coverage of the chimney by some other high buildings next to it.

The most optimal positioning of the boiler onto the flue outlet is such that connecting the center of the exit gases from the boiler flue and chimney connection to the center is slightly raised (up to 3 %) (see **Figure 7**).

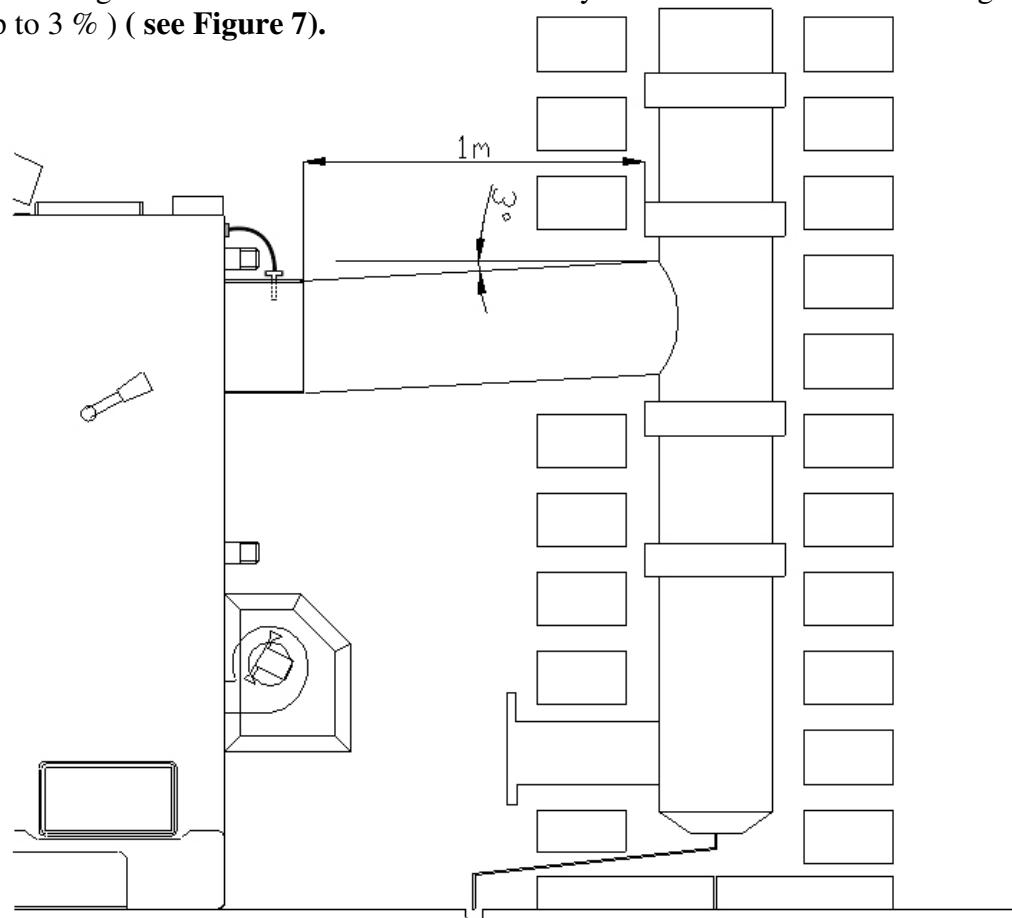


Figure 7. Connection to chimney

If possible, arcs should be avoided, but if not possible, then the maximum number of arcs is 2. The fume channel from the boiler to the chimney, should desirebly be insulated, specially if it has arcs and longer sections.

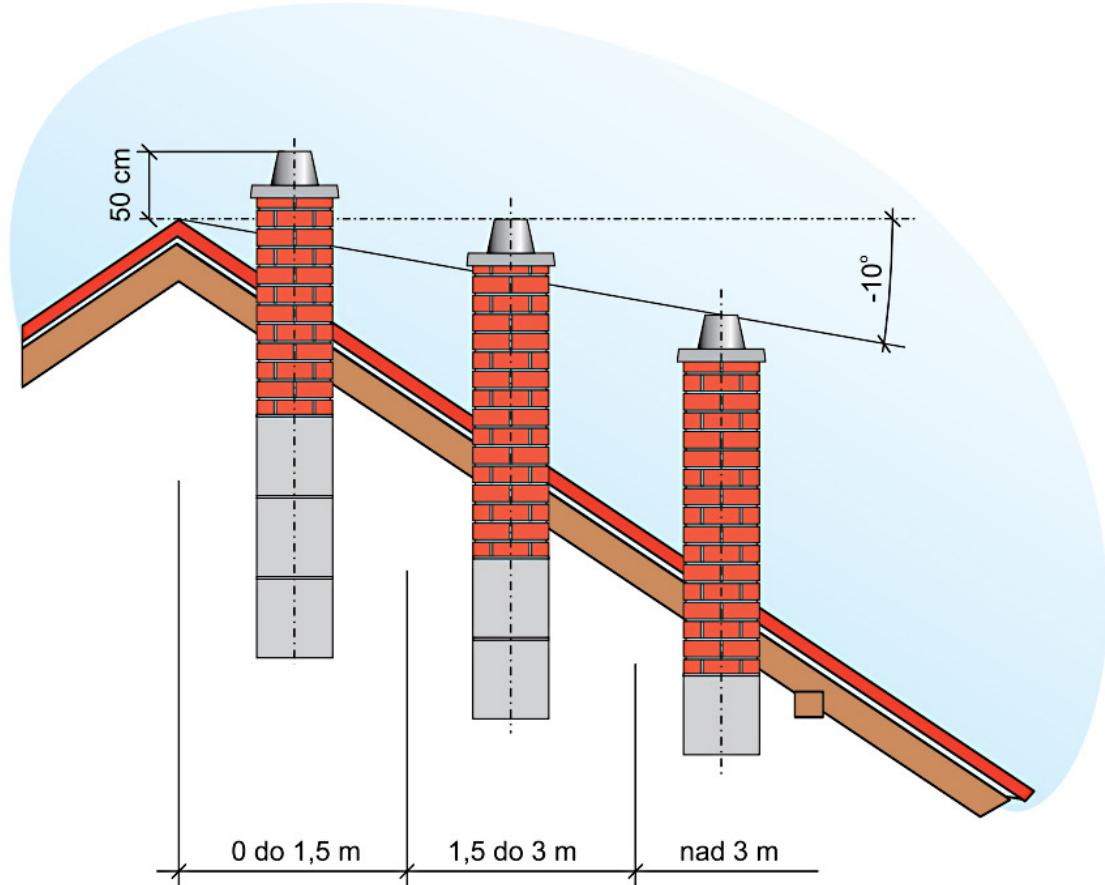
On the smoke pipe, approximately 100mm from the flue outlet from boiler, a hole should be drilled and a temperature gauge should be mounted for flue gas temperature measurings.

Without information about the temperature of flue gases there isn't the automatic mode of the boiler.

The chimney itself should be made of ceramic pipes, and around them there should be the insulation of 3- 5cm thickness and the outer layer is of the bricks or special elements. If the chimney is not from ceramic pipes but of bricks, the light opening area of such chimney shall be 30 % higher than the surface of this ceramic pipes chimeny. Minimal sectional dimensions of both chimneies and the minimum heights are given in table 1.

The chimney must have a door for cleaning and it must be well sealed. Chimney outlet on the roof must be according to certain regulations. There are two cases: if the angle of the roof is

less than 12° and if the roof angle is bigger than 12° . For angle less than 12° the height of the chimney above the roof is 1 m and for the larger than 12° , then look at the sketch.



If you think that the chimney is too strong and too much cold air passes through the boiler, at the exit of the boiler there is a valve which can reduce the flow of exhaust gases. The chimney should be cleaned regularly or at least once a year.

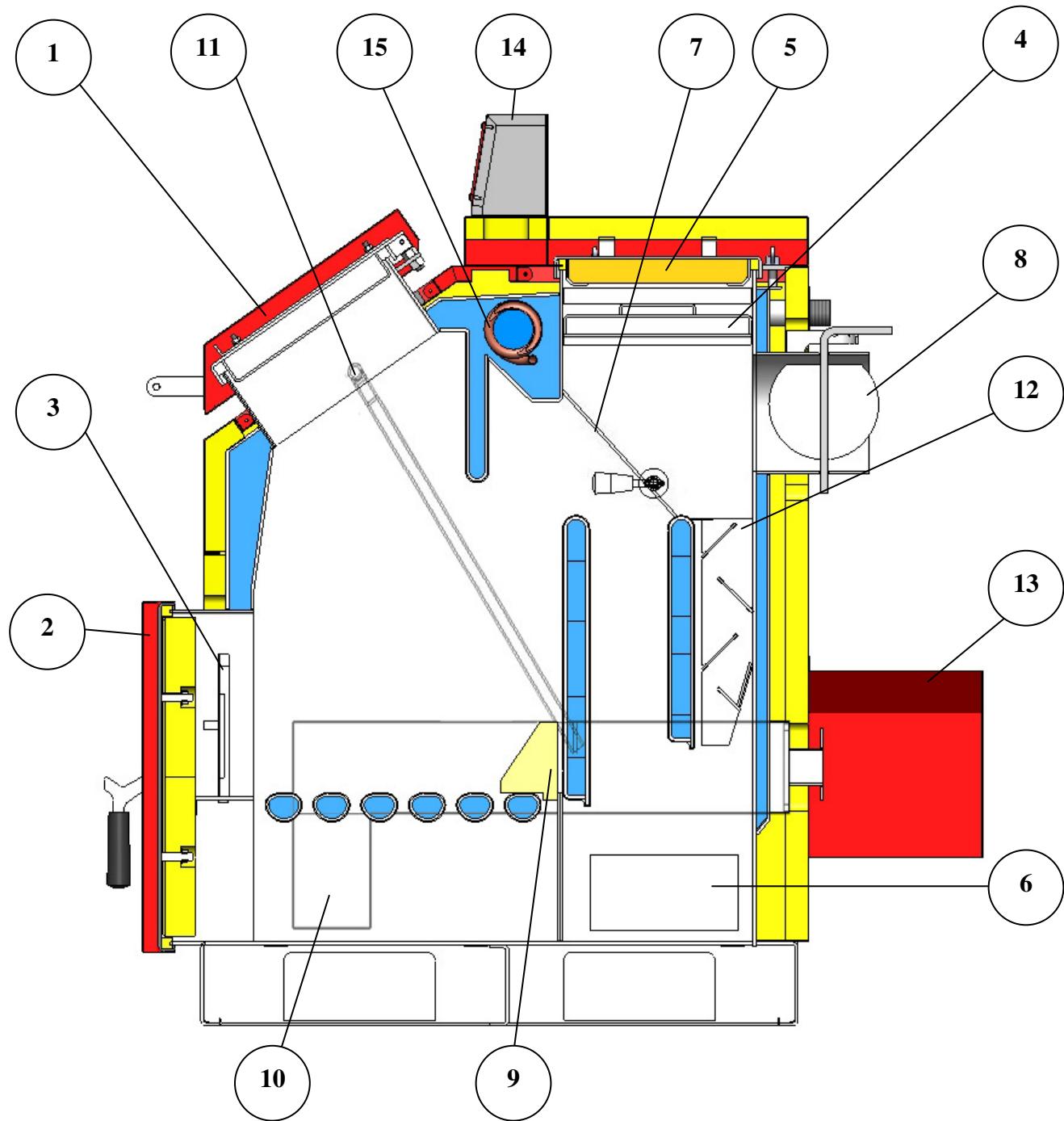


If the chimney is not of proper height, cross section, or if it is not enough clean as possible, then the complications in the work of boiler are possible. First, of all it is not possible to achieve the high teperature regime of work, i.e. there is not the maximum operation power, and the consequence of that is the occyrrence of condensation which affects the life of the boiler.



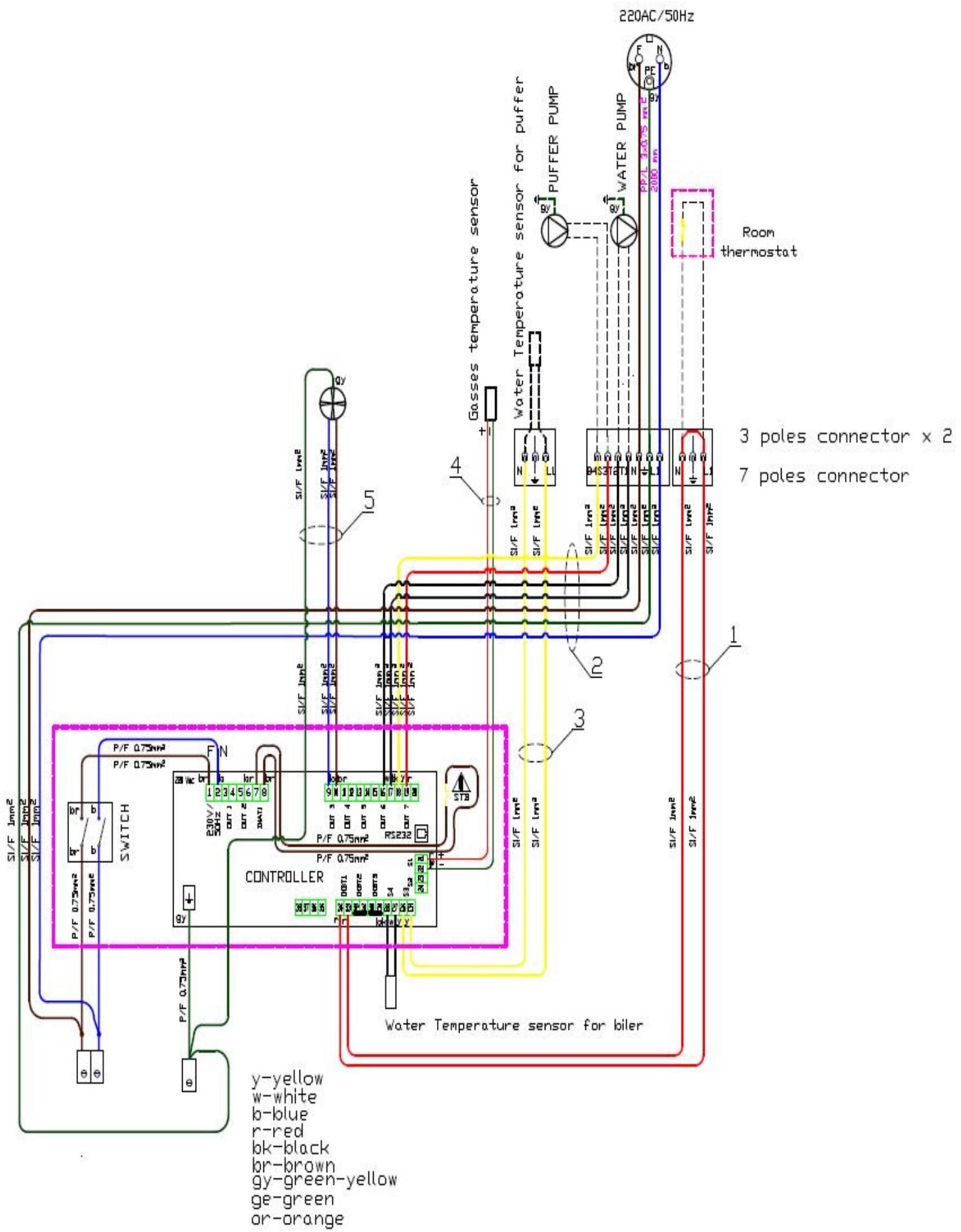
Weak/poor chimney is the main reason when during the ignition of the boiler or during the operation there is the appearance of smoke on the upper or lower door, especially at higher fan speeds.

4. Cross-section of FK Boiler with a description of the boiler elements



1. Upper door for wood loading	9. Brick
2. Lower door for firewood and cleaning	10. Channel to air
3. Door gretting (cost iron gretting)	11. Pipe for secundary air
4. Inside cover for cleaning	12. Turbulators
5. Outside cover for cleaning	13. Fan
6. Lateral lower cover for cleaning	14. Automatic
7. Flap for the working position and the position of the ignition	15. Copper spiral for thermal security
8. Flap of chimney	

5. Schematic connection of automation



All lines that are displayed in the intermittent form in the diagram of external connections are the conductors which should be installed by the technician when connecting the external devices onto the automation system of the boiler. All the connections of the additional devices are performed by the technician through three connectors located at the rear of the boiler. Two connectors are three-pole connectors while one is seven-pole connector. One three-pole connector serves for the connection of the room thermostat as shown on the label the connector itself.



For the room thermostats it is important to be battery-powered on, i.e. they should not have any supply of the voltage of 220 V. On the thermostat for the connection NC is used (normally closed contact).

The second three-pole connector for connecting the probe for measuring the temperature in the battery or in boiler for domestic sanitary water. This probe is always supplied with the boiler. If the probe for measuring water temperature in the battery or in the hot water heater is not long enough it is possible to extend it with ordinary conductors.

Seven-pole connector is for connecting network cable and for the connection of the circulation pump and the battery pump i.e. of the heater for sanitary water.

! The boiler can operate even if none of the pumps is connected, but manufacturer's recommendation is that, at least, the pumpa1 (central heating pump) because it has the function of a security element. It is switched on when the boiler water temperature exceeds 90 degrees Celsius.

The boiler is adjusted according to the default factory hydro installation as in Figure 8.

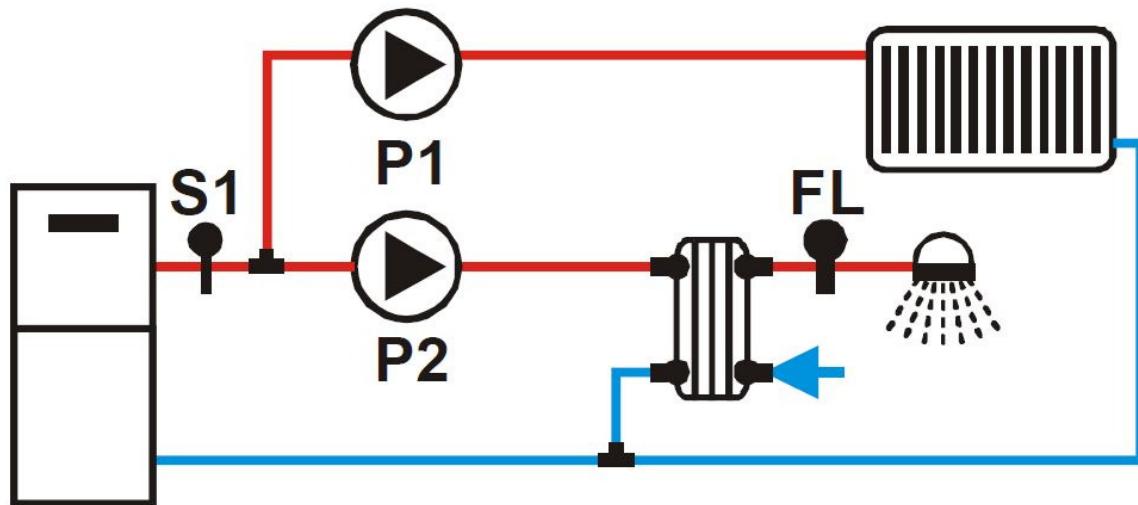


Figure 8.

It is obvious that there is only one measuring point S1 and that probe is already positioned. The second probe that is connected onto the connector on the back of the boiler, in this case, remains unused.

! We need not assemble the pump P2 which serves for the hot water. The parameter which determines the type of hydro installation inside the automation system is P37 and for this hydro scheme is P37 set to 1.

If we want to use automation to keep the process and the puffer warming up through the appropriate pump, then the hydraulic scheme should be as shown in Figure 10. The point of probe measuring for water temperature in the puffer is marked with S2.

In order to run operation of automation properly for the hydraulic connection and with the, then it is necessary to adjust the parameter P37 onto the value 4.

If we want the automation to keep the process of heating the sanitary water through the appropriate pump, then the hydraulic scheme should be as in Figure 9.

In order the automation system should keep the operation of that pump for heating the boiler with sanitary water, then it is necessary to adjust the parameter 37 onto the value 3.

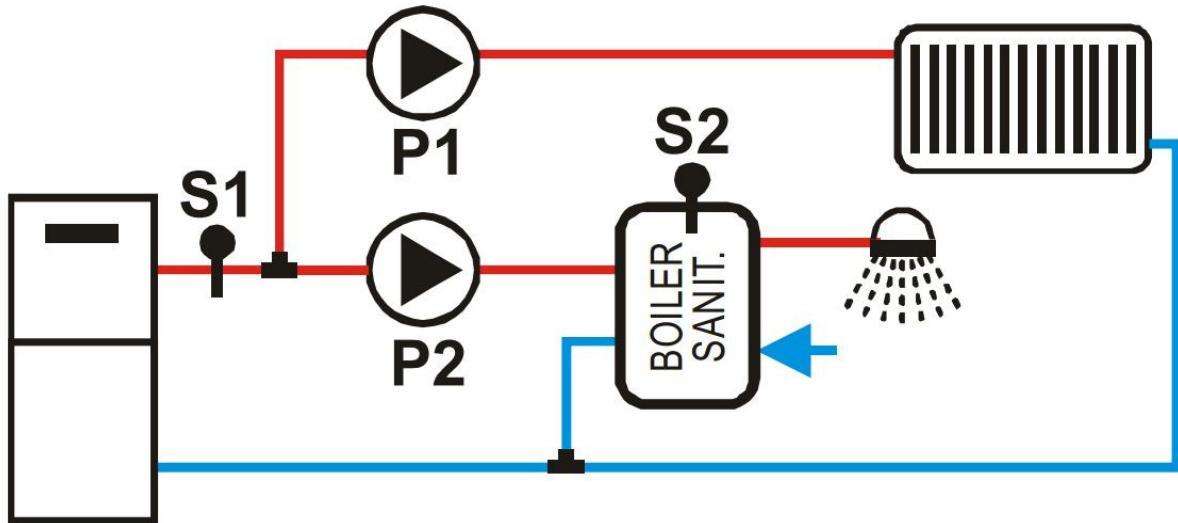


Figure 9.

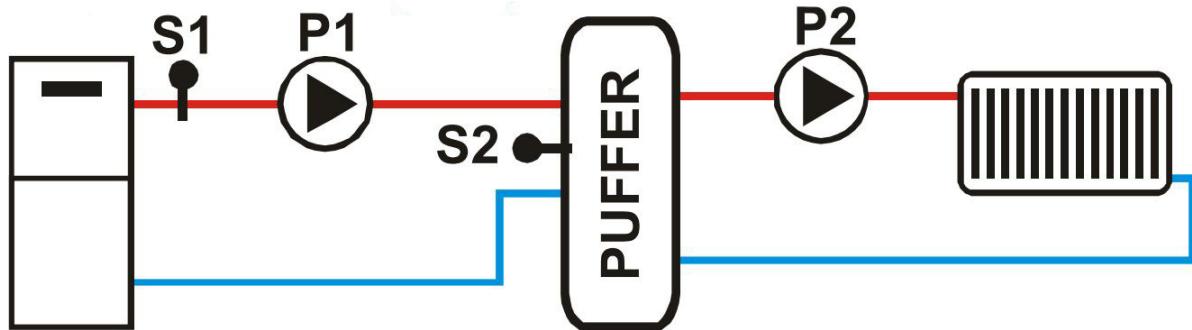
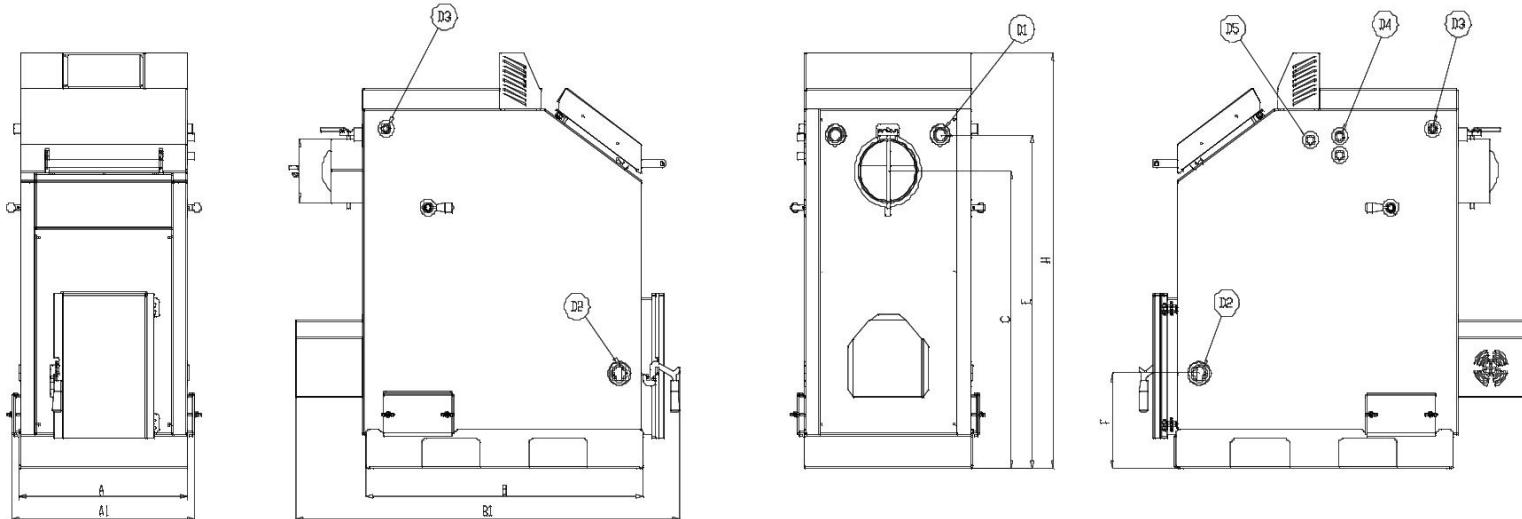


Figure 10.

6. Table of technical data



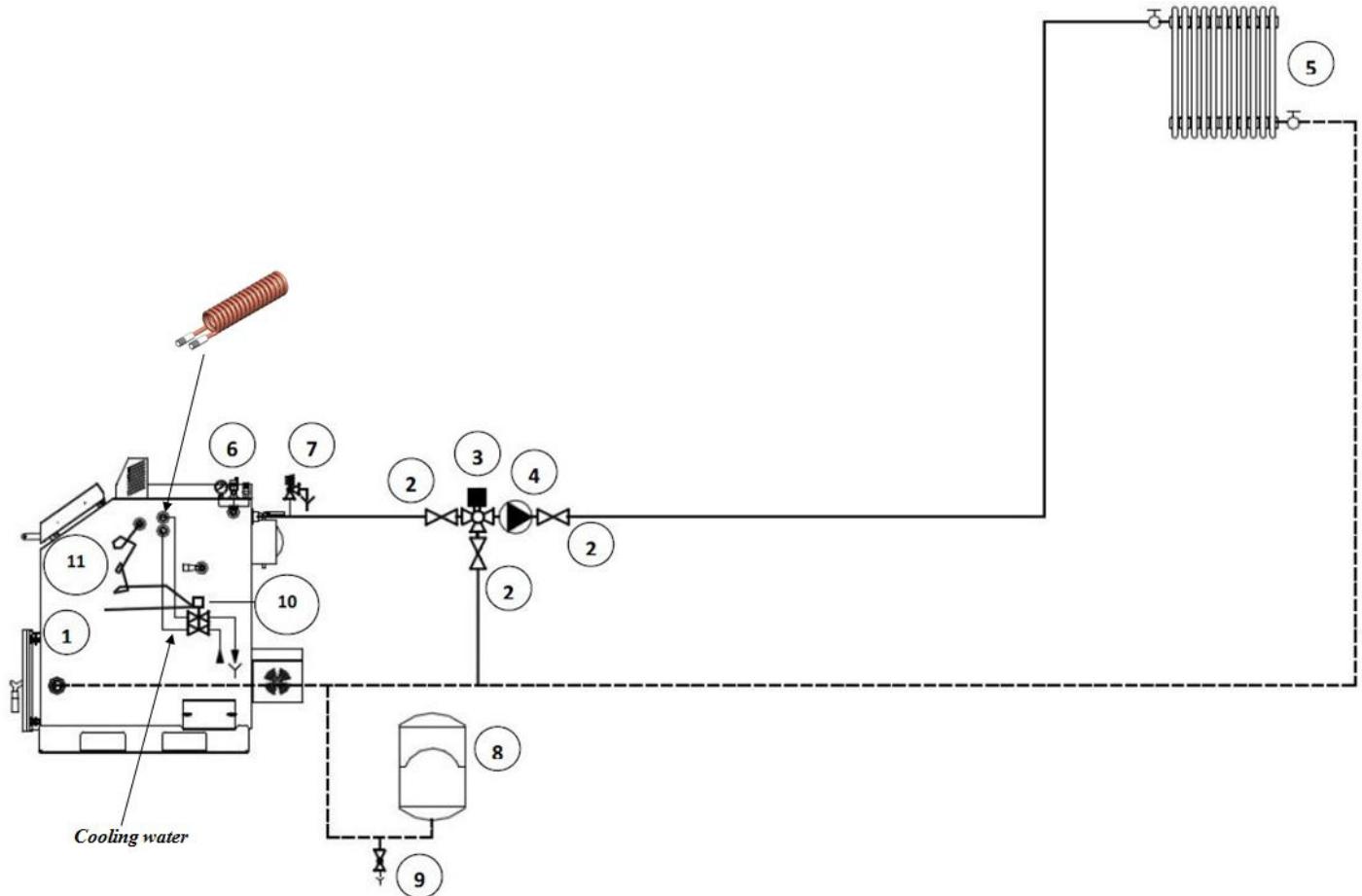
Type of boiler		FK1	FK2	FK3	FK4
Power	kW	15/23	25/33	33/40	40/49,5
Working Pressure	bar	3	3	3	3
Test Pressure		4.5	4.5	4.5	4.5
Volume of water in boiler	L-cca	55	72	87	100
Weight of boiler	kg	238	295	326	335
Necessary draft	Pa	17	18	20	22
Max.temp.hot water	°C	90	90	90	90
Min.temp.colad water	°C	60	60	60	60
Volume of fuel in boiler	m³	0,08	0,09	0,13	0,16
Efficiency	%	>85	>85	>85	>85
DIMENSIONS	A	458	528	578	668
	A1	516	566	626	686
	B	790	885	955	965
	B1	1164	1260	1326	1326
	C	810	910	965	1010
	ØD	160	180	200	200
	E	940	1040	1072	1125
	F	290	295	305	305
	H	1205	1285	1340	1395
	D1	1"	1"	5/4"	5/4"
	D2	1"	1"	5/4"	5/4"
	D3	1/2"	1/2"	1/2"	1/2"
	D4	1/2"	1/2"	1/2"	1/2"
	D5	1/2"	1/2"	1/2"	1/2"



Accessories for safety devices are: D3,D4 i D5

- D1 – hot water outlet;
- D2 – cold water inlet;
- D3 – Accessory for pressure safety valve;
- D4 – Accessory for inlet/outlet of thermal safety valve by swelling;
- D5 – Accessory for sonda temperature probe of thermal safety valve by swelling.

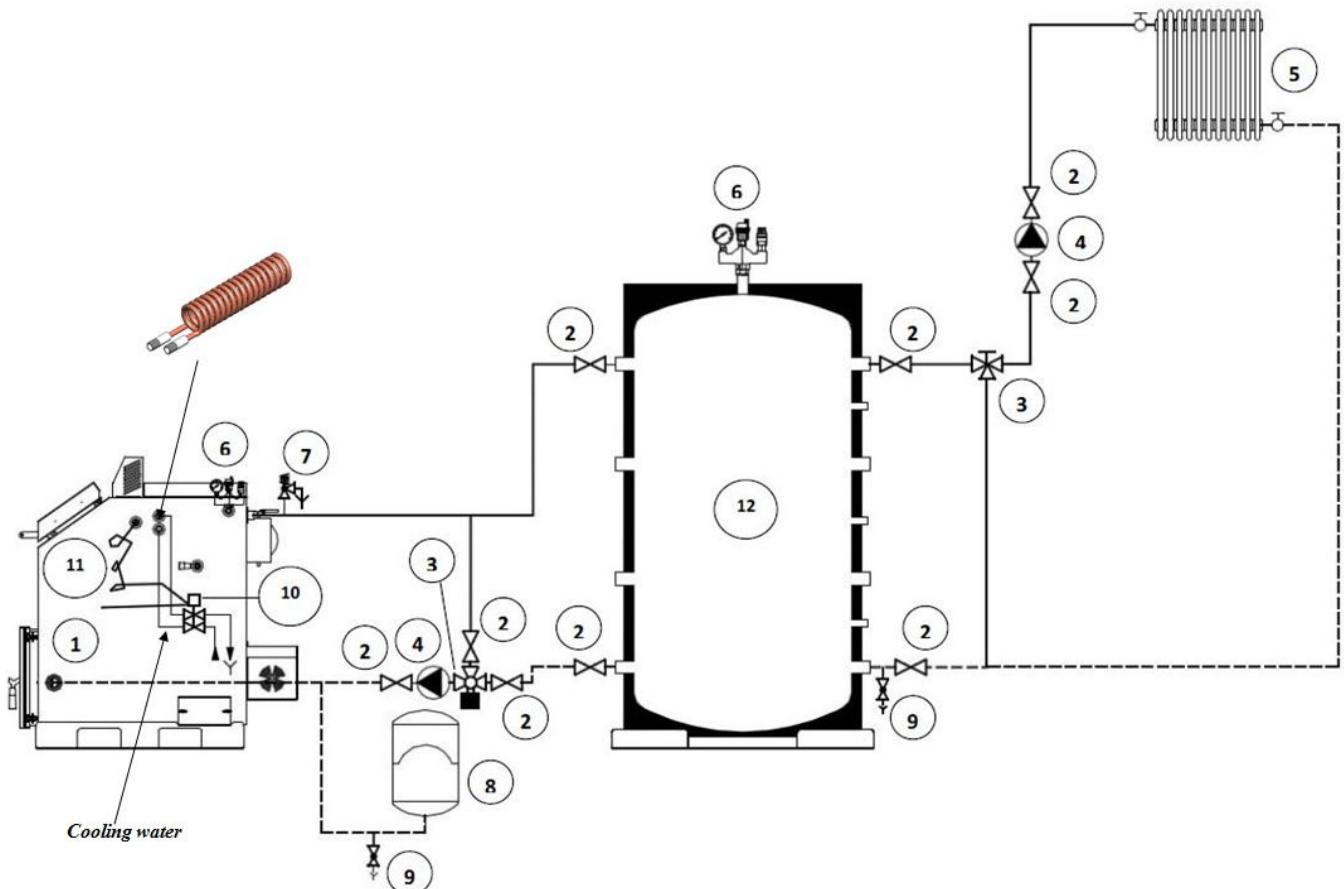
7. Hydraulic scheme



Hidraulic scheme

Description:

1. FK boiler;
2. Valve;
3. Mixing valve;
4. Pump
5. Heat exchanger;
6. Safety group;
7. Safety valve;
8. Expansive vessel;
9. Valve for filling/emptying;
10. Over heating temperature safety valve;
11. Sonda probe for safety valve.



Hidraulic scheme with akumulator

Description:

1. FK boiler;
2. Valve;
3. Mixing valve;
4. Pump
5. Heat exchanger;
6. Safety group;
7. Safety valve;
8. Expansive vessel;
9. Valve for filling/emptying;
10. Over heating temperature safety valve;
11. Sonda probe for safety valve;
12. Akumulator.

8. Boiler Operation and Maintenance

Before the start of operation be sure that the entire installation, specially the boiler is well vented with no leaks.

 Automation must not be switched on if you are not absolutely sure that all electrical parts and conductors are not in contact with water.



The boiler is not ignited if you have not looked inside it and at the outside sides to be sure there is no leakage of water from the boiler.

 If there are direct valves from the boiler check whether they are open.

 Check whether the safety devices on the hydro installation are correctly positioned and whether they are in the function mode.

Only when the user is sure of the previous facts he can be start the ignition of the boiler. Starting fire in boiler should be done according to the order of the following operations:

8.1. Operation start of the solid fuel boiler

The following procedure of boiler ignition and the start of automation system refers to the situation of first firing of the boiler after the installing onto the hydraulic system or when the boiler shuts down completely for thorough cleaning and then it is re-started into the operation, with a note that then some steps are skipped.

1. Check whether the boiler is properly connected to the hydraulic istem. Specially verify whether the whole air is vented out of the boiler
2. Plug the mains supply into the network socket. Press the main switch of the automation system. Then the display starts and is visible and after a few seconds there should appear 'OFF'.
3. On the hot gas pipe, as close as possible to the boiler, drill the hole for the boiler flue gas probe. The opening should be in the upper zone so as not to produce the covering of the probe with ashes. Also, check the flue damper is not hitting the probe. Without the temperature probe for boiler flue gases the boiler can not work.
4. Inside the boiler there is a flap for directing the boiler flue gases in two regimes, "the working position" and the „ignition“ regime. This flap is operated by means of the lever on the side of the boiler. Move the lever in the direction towards the chimney. Now the flap is in the position for ignition. It is the position - „open“ - in the picture „Figure of the position of flap“ which is on the next page.

Also, the flap on the outlet of the boiler, i.e. on the flue gas passage should maximum be opened. It is the position in the Figure 1 „Figure of the position of the flap on the flue gas pipe“

 Flue gas flap on the outlet from the boilser is under the direct effect of the hot flue gasses. Ako the boiler is operating for a long period of time this flap should be handled only with protective equipment for hands because of the possibility of burns.

5. Open the lower door, then the grid door. Put some material for ignition on the grate bars as paper and dry thin wood pieces. It is best to use chemical ignition units for firing being in the form of cubes for ignition of firewood. Make fire manually and wait for the fire to be intensive.

6. When we already have good, strong flame, add a bigger quantity of fuel than the first time but through the upper door. Close all doors and press the command button, 4., START". Hold the button until the display shows, " ACC. This means that the automation entered the stage of ignition, the fan is started and there comes to the increase in temperature of flue gases.

 When firing, make sure that firewood does not struck onto the upper door with great force, in which case it is ejected out of balance and returns to the closed position. Then the boiler operator can have the injuries.

After some time the boiler enters the normal operating mode and this is manifested in such a way that there are no messages on the display except for the current water temperature.

7. When the temperature of flue gases exceeds about 200 degrees Celsius, the flap inside the boiler with handle lever on the side, should be pushed towards the front or into the working position. Reading of temperature of the flue gases is done by briefly pressing the command button 1, then command button 3 and then the command button 2. On the display there will appear the temperature of flue gases. This is described in the instructions for fast handling of automation.

8.2. Adding fuel during operation of solid fuel boiler

During operation of the boiler it is possible to add the amount of coal or wood in it, but previously the work of blower fan should be stopped by pressing the “STOP” button (see Quick guide for automation).

 When firing during the operation, the upper door should be opened cautiously only for 2-3 cm, and hold it like that for about ten seconds. Only after that open the door completely. This prevents possible explosive penetration of flames from the firebox towards the operator. The boiler is possible to fire up with the coal dust and sequence of operations is the same. The difference is that first the boiler is filled with coal dust and on the top some paper is placed as well as the firewood.

The boiler is used both for wood and coal as fuel or with their mixture, with the note, that our recommendation is that the maximum filling level coal is somewhat lower, as shown in the Figure 11, “Display of the maximum amount of coal for firing.”

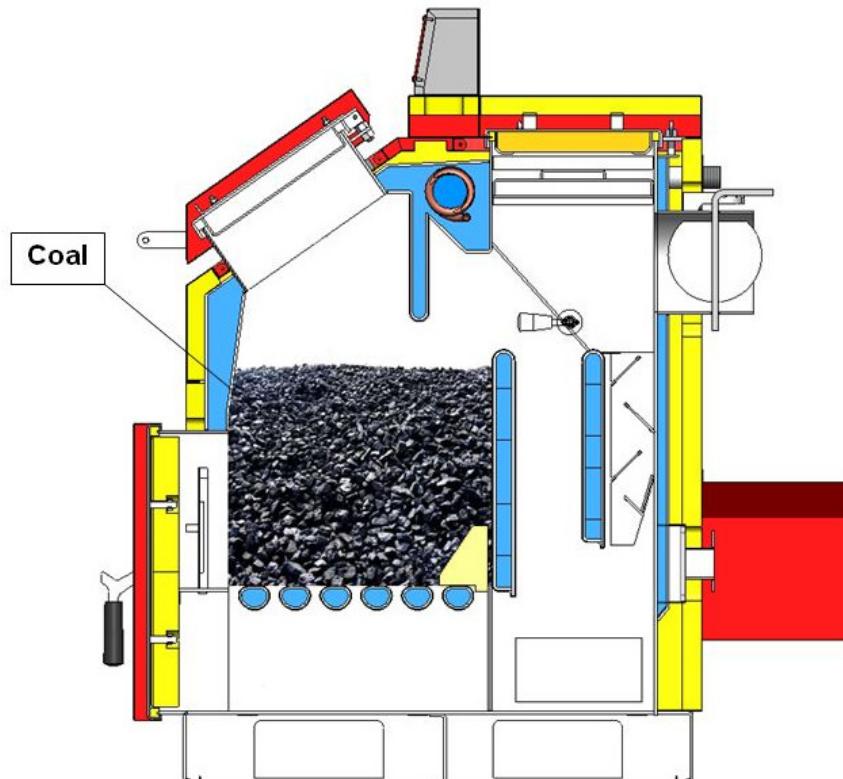


Figure 11. Maximum height of fuel when firing with Coal

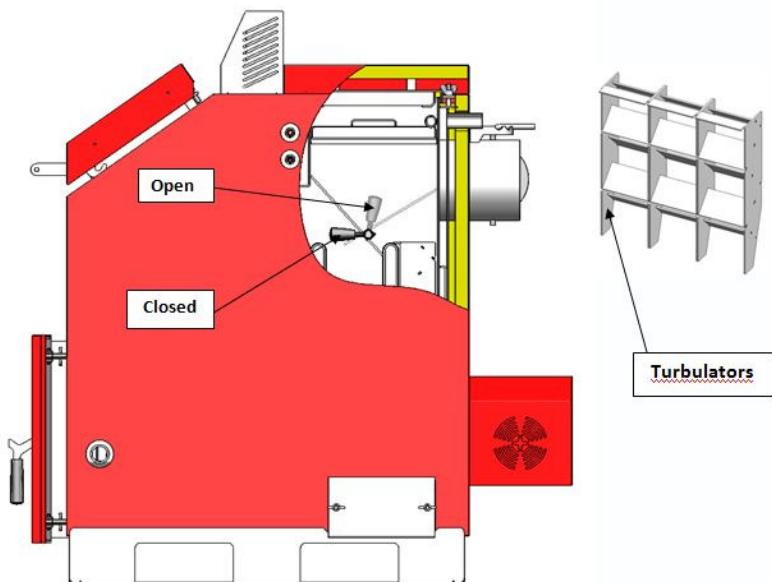


Figure 12. Positions of Flap in OPEN and CLOSE modes and look of TURBULATORS

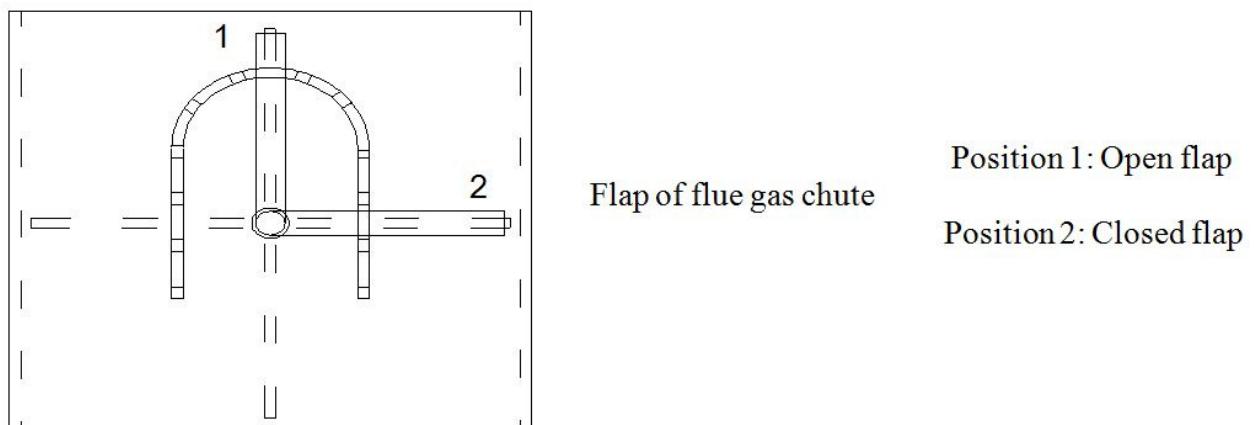
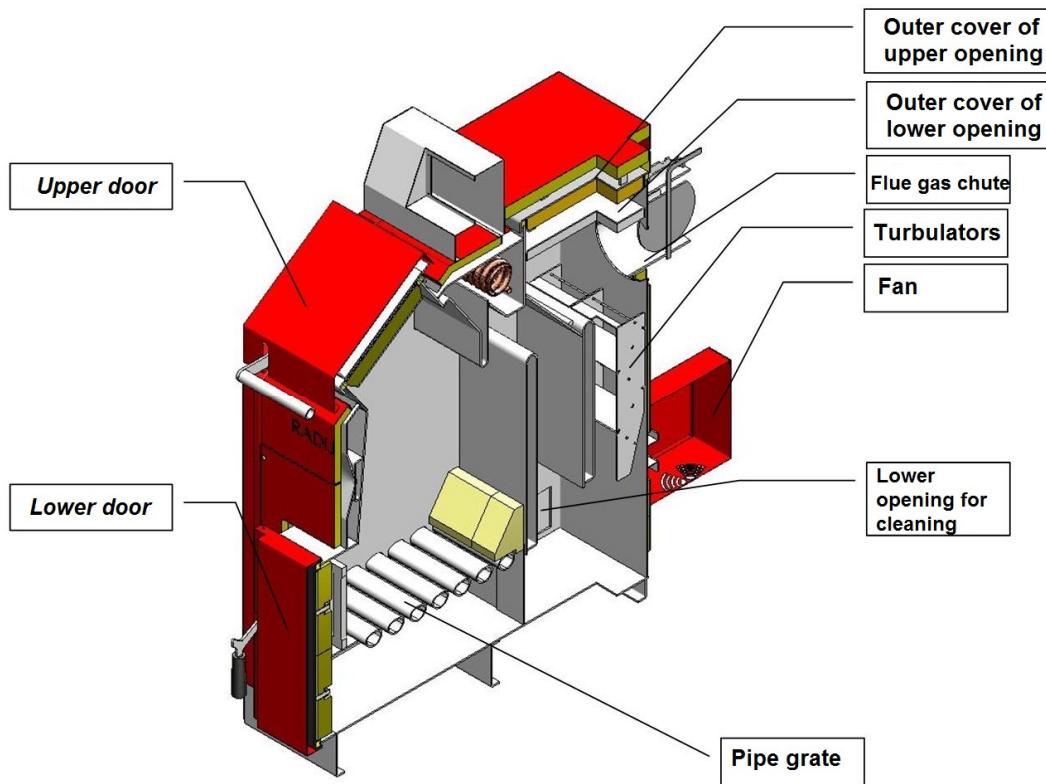


Figure 13. View of the positions of flap on the flue gas chute

! When working with coal dust, the boiler must not be added with fuel during its operation. Adding of fuel is done only after when the previous fuel has burned out. During the operation the boiler should be monitored once within every 5-6 hours.

! Opening the upper door for firing during the operation should be performed as rarely as possible, only for an examination of the boiler. The door must then be opened very slowly and cautiously, at first only slightly, keeping it in that position for ten seconds and then open it fully. It is very dangerous to open the upper door in the situation when the fan is not working. Then the created combustion gases exit through the door, and in contact with oxygen burn turbulently. In these cases it could result in heavy and light injuries, or putting the boiler room on fire. That is why the door is opened as described above, and preferably, as soon as after fan's function, the so-called "ventilation".

8.3 Maintenance of boiler



Daily maintenance of the boiler refers to the ejection of ash from the space between the floor and pipe grate. If there is a large amount of ashes the fuel is not receiving a large amount of air for combustion. Pay attention that the output channel of air from the fan should always have a free passage without obstacles.



Within every seven days, the boiler should be thoroughly cleaned, by removing the cover of the lining on the roof, as well as the outer and inner covers on the boiler, and through the hole on the roof of boiler by means of cleaning equipment remove the tar and grime from all surfaces of the boiler. Then take out the turbulators (directing gas units) and clean them, too. Cleaning of fire box should be done through the upper and lower doors. Each millimeter of tar on the inside surface of the boiler results in 5% less heat conduction.



It is particularly essential to regularly remove and clean the boiler turbulators. Otherwise there is a situation that the turbulators are impossible to remove from the boiler and the ashes have completely blocked them so that there is no passage of flue gases.

Within every seven days clean the fan. The access to it by removing the metal protection that is joined with a tin boiler insulation by elastic connection. Cleaning the fan should not be done with water but mechanically, gently for the turbines, or pneumatically.

If in the course of operation the comes to the condensation, condensate should be cleaned and boiler must be coated inside with alkaline detergent for cleaning or else by means of slaked lime solution. This way the acid remaining in the boiler will be neutralized.

At the end of the heating season the boiler must be cleaned thoroughly and carry out the neutralization of acid in the already mentioned manner. All openings are to be closed so as the air circulation does not pass through the boiler and, also this can cause moisture in the boiler.



Maintenance of the boiler is one of the most important factors for the length of working life of the boiler. The boiler should not wait for the next heating season uncleaned and without acid neutralization.

9. Short instruction for Users of Automation

- Turn the main switch

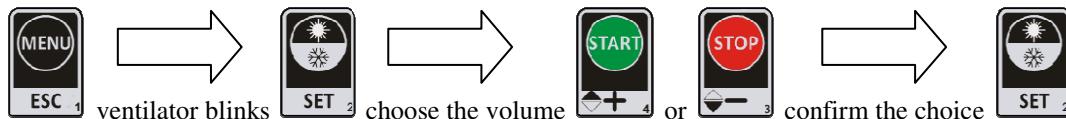


- Push the button and keep it in that position for 5 seconds.

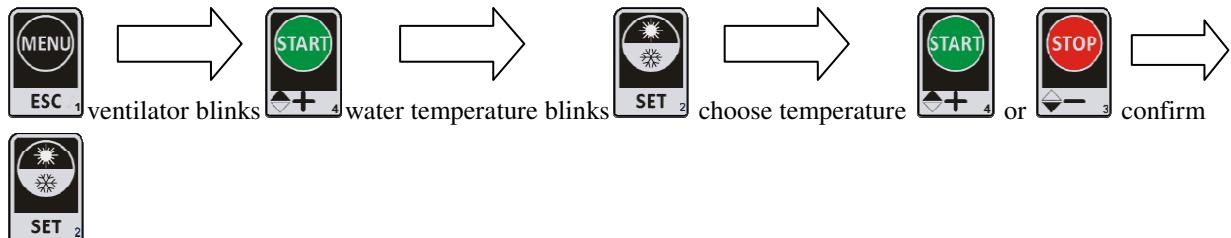


- Break of operation of pellet boiler is done by pressing the button and keeping for 5 seconds.

9.1. Change in volume fan operating mode



9.2. Change the set temperature in the boiler



9.3. How to read the water temperature in the battery or water heater (if the system has a battery pack or hot water heater)



9.4. How to read the temperature of flue gases



9.5. Entry into the hidden menu



Push button and keep, immediately push button and keep both button for 5 sesonds.

Immediately after the entry into the hidden MENU on the display there appears **CL 00**. It is the first parameter.



To go one step back, use the button .

AUTOMATIC MANAGEMENT OF BOILERS

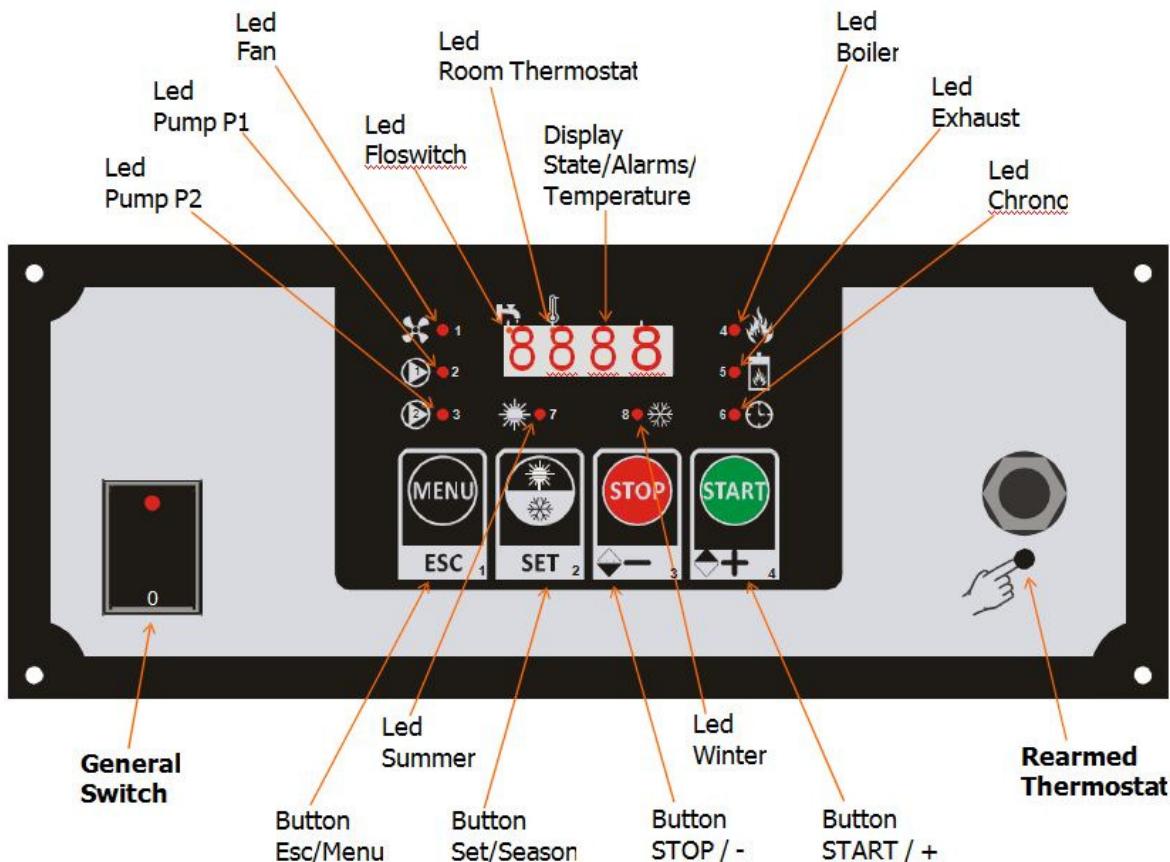
All functions performed by the automation are performed on the basis of a two-input information such as:
the boiler water temperature and the temperature of the flue gases flowing out from boiler.

9.6. Kontrol panel

Control panel consisting of:

The main switch, safety thermostat button, the display, the group command buttons, a group of light-emitting diode indicator

The following picture is to present of the control panel.



9.6.1. BUTTONS

START/+:Pushed for five seconds it switches ON the System. Pushed in **Menu** it increments a parameter's value.

STOP/-:Pushed for five seconds it switches OFF the System. Pushed in **Menu** it decrements a parameter's value.

SET/Season :Pushed for five seconds it selects the Season Summer/Winter.

Pushed in **Menu** it changes the visualization from parameter's code to parameter's value and it permits to save a new setting.

ESC/Menu :This button permits to enter/exit the Menu. If you are changing a setting and you push this button you will exit without saving the new value.

NOTE:

In **OFF** or **Extinguishing** State you can reset an Alarm visualization by pushing **button +** or **-**, but if the alarm were still there you would visualize it again.

9.6.2. LEDS

1. **LedFan** : ON when the Combustion Fan is ON;
2. **LedPumpP1** : ON when the Pump P1 is ON.**Blinking** when the Pump P1 is switched OFF by the Room Thermostat;
3. **LedPumpP2** : ON when the Valve/Pump P2 is ON.**Blinking** when the Pump P2 is switched OFF by the Room Thermostat;
4. **LedBoiler**: ON when the Water temperature is under the value **TH-BOILER[A03]** – **ModulationDelta1[A05]**.**Blinking** when the Water temperature is over that value **OFF** when the Water temperature is over **TH-BOILER[A03]**.
5. **LedExhaust** : ON when Exhaust temperature is over **TH-EXHAUST-ON[F18]**.
Blinking during the Pre-Extinguishing phase (**Pre-Extinguishing TIME[t06]**)
6. **LedChrono** : ON when the Chrono Input contact is closed.
7. **LedSummer** : ON when the selected Season is Summer.
8. **LedWinter** : ON when the selected Season is Winter.
9. **LedFloswitch** : ON when the Flowswitch Input contact is closed.
10. **LedRoomThermostat** : ON when the Room Thermostat Input contact is closed.

9.6.3. DISPLAY

Display\State\Alarms\Temperature : The 4 digit Display visualizes water temperature, the functioning State of the system and eventual alarms.
States' Codes:

OFF	= Off
Rcc	= Ignition
rEc	= Recover ignition
Mod1	= Modulation 1
Mod2	= Modulation 2
Standby	= Standby
Safety	= Safety
ALt	= System off with alarms

If there are alarms the Display will show alternatively ALt / ErrorCode.
Errors' Codes:

ES, c	= Rearmed Safety Thermostat contact is open
CRLd	= Over Temperature Water
RccF	= Failed Ignition
SPAc	= Accidental Extinguishing

GARANTNI LIST / GUARANTEE LIST

Tip kotla / Boiler type

Fabrički broj / Factory No.

Garantni rok / Guarantee period

24 MESECA / 24 MONTHS

**Datum proizvodnje /
Date of manufacture**

**Potpis ovlašćenog lica /
Signature of Authorized person**

pečat / stamp

Prodato u firmi / Company of Sale

Datum prodaje / Date of Sale

Potpis / Signature

pečat / stamp

***NAPOMENA: Period garancije na kotao je 24 meseca. Ista se ne odnosi na sledeće delove: rešetkasta
livena vrata i opeka u samom ložištu. Na te delove garansijska je 12 meseci.***

***VOTE: The guarantees boiler is 24 months. The same does not apply to the following parts: cast iron grid
door and bricks in the combustion chamber. Those parts of the guarantee from the 12 months.***