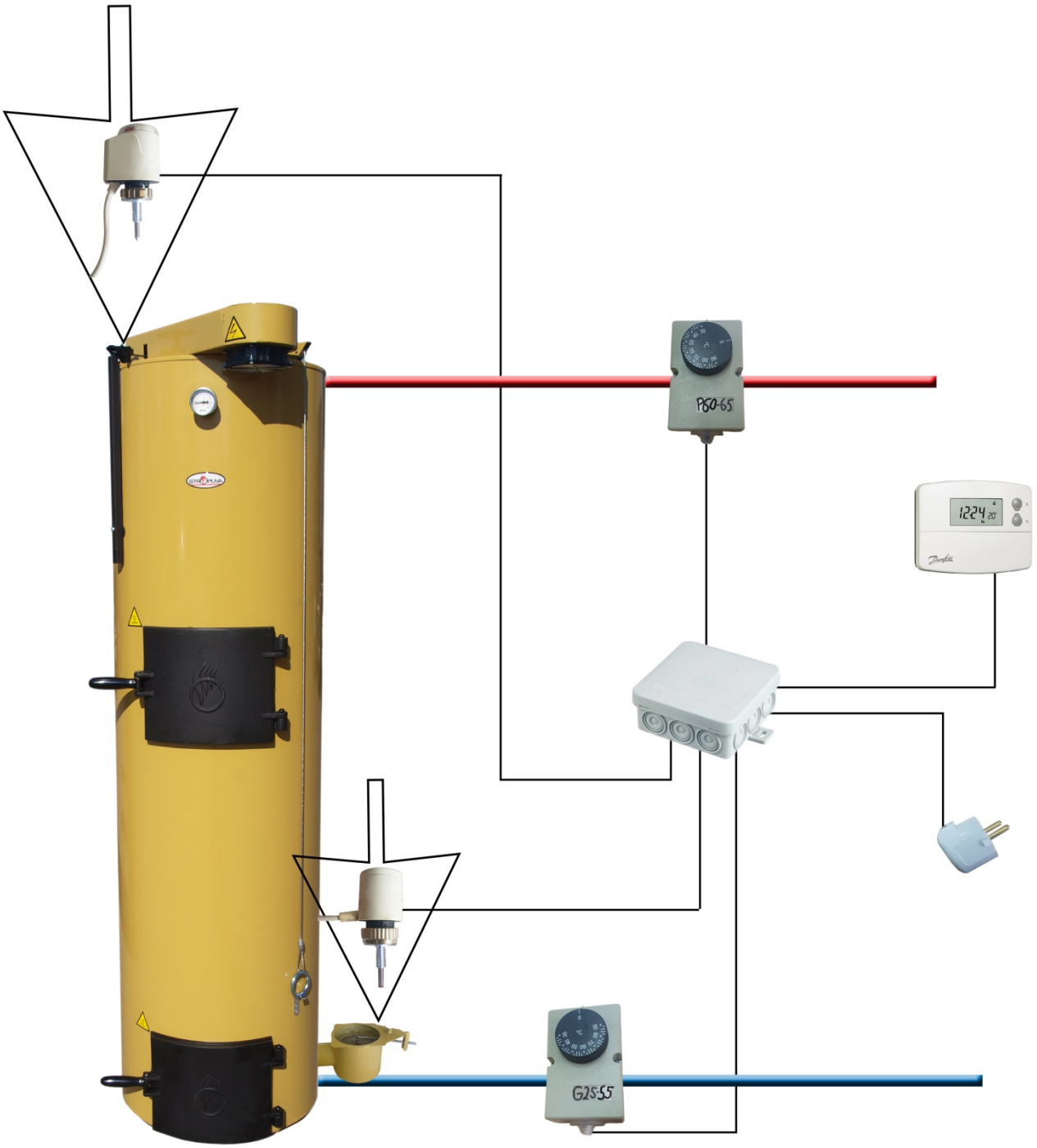
ELECTRO-THERMAL CONTROLLER



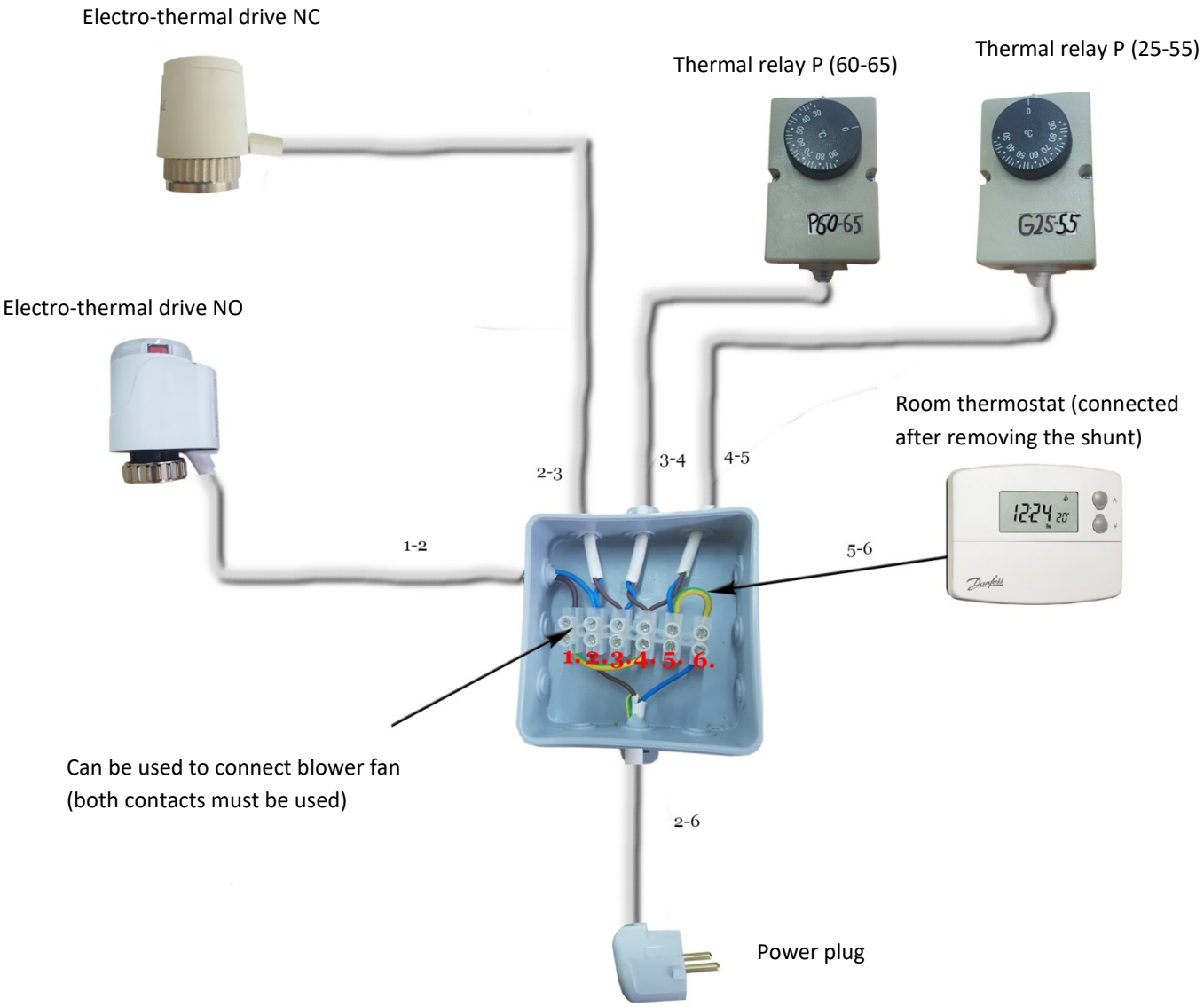
INTENDED USE

Electro-thermal controller is a chain of thermostats and electro-thermal drives, which controls the activity of solid fuel boiler Stropuva. Use of controller devices allows easier operation and automatization of burning process. This controller also supports the connection to room thermostat (not included), which allows to control boiler's operation parameters according to room's temperature. Depending on the model of room thermostat, there is a possibility to program hourly, weekly and monthly modes. Electromagnetic controller can be installed on Stropuva room heating furnace.

PRINCIPLE OF OPERATION

Devices use oxygen dosage principle. Oxygen is delivered using natural draft (or with help of a fan) and regulated by adjusting the opening angle of the damper using bi-thermal regulator and electronic drives. It allows controlling the burning process. After temperature of hot water reaches selected value, controller maintains this temperature and can even stop the burning process if external parameters require that. After disconnecting, fuel is ignited naturally – using natural draft or with help of ventilator, which is connected to controller. Operation of boiler can also be controlled by thermostat of the room. This way, heating can be controlled according to temperature of the room.

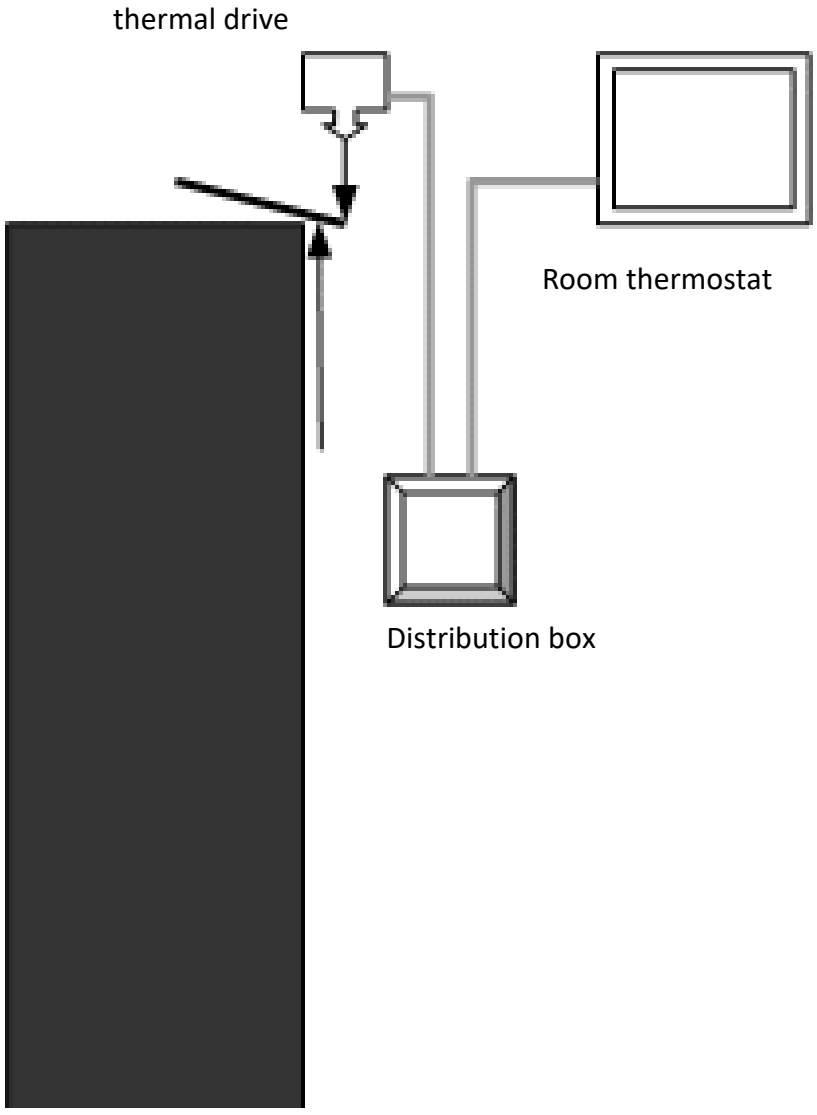
CONNECTION DIAGRAM



Bi-thermal regulator maintains stabile temperature of water in our boilers and surfaces of furnace. However, nowadays when quality of homes reached perfection and heating doesn't require a lot of energy, burning of fuel is slowed down a lot and it turns into smoldering. Two thirds of energy is lost during smoldering. Large and expensive accumulation tanks can help avoid the loss of energy.

However, we are able to use heat storing capacity of premises and objects contained within. It is achieved by using thermal drives and thermostats, which allows us to stop the burning of the fuel, to prevent smoldering, and wait till the heat contained in premises and objects is depleted and only then resume the burning in most efficient way possible.

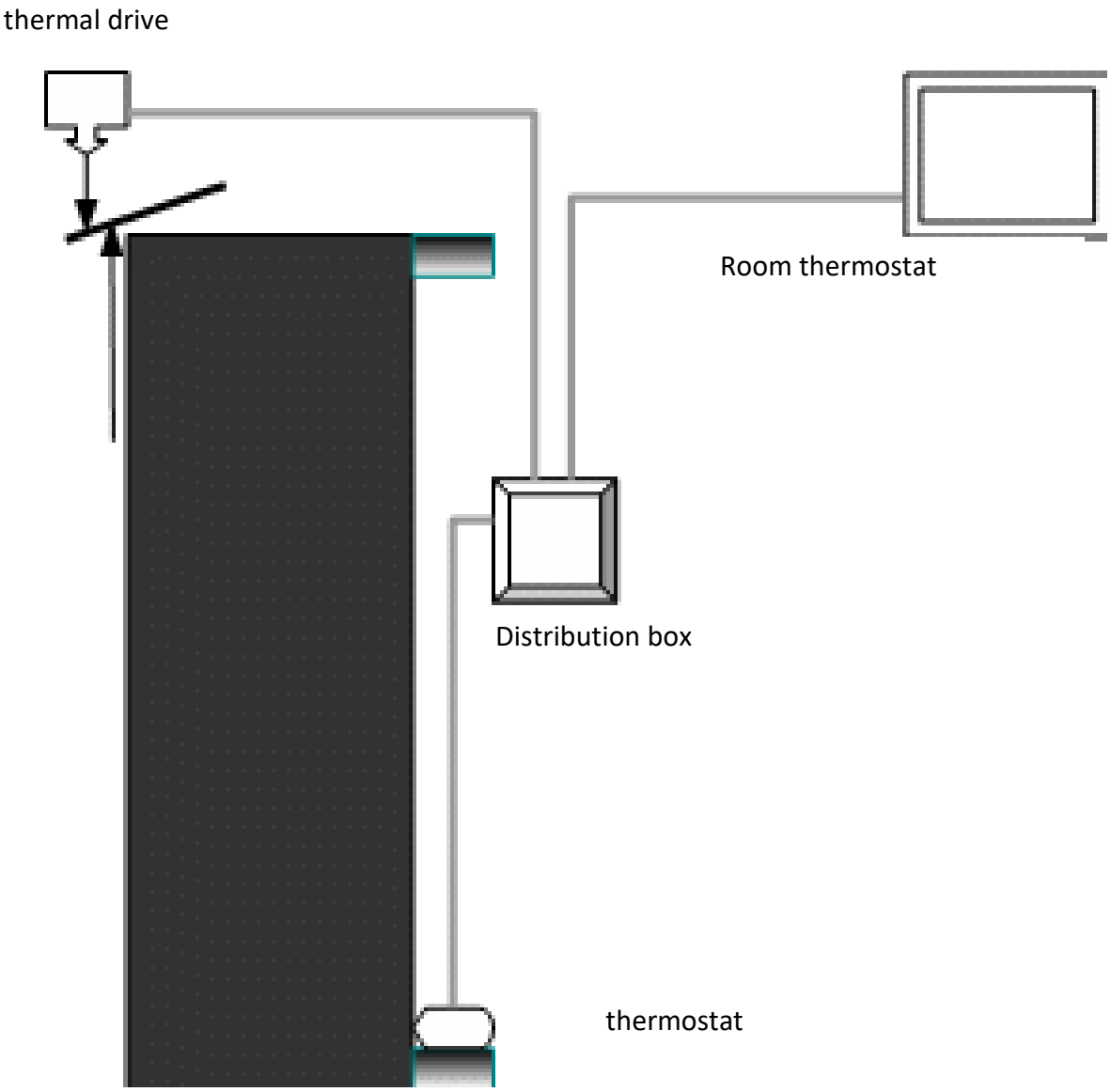
Controlling the firewood boiler and furnace with thermal drive and room thermostat



Here thermostat is connected to thermal drive using series method. Temperature of furnace is maintained by bio thermal regulator. However, when room temperature reaches selected value, room thermostat cuts off the powers supply and thermostat closes air damper. When the temperature in the premises gets lower, thermostat turns on the power supply, thermal drive opens air damper and firewood gets ignited by cinder. This way furnace operates periodically, but in intensive economic mode. At the beginning of Spring,

when there is more sunshine, thermostat keeps the furnace(or boiler) turned off for longer period during daytime. To make sure that cinder doesn't expire, add some sawdust, wood briquettes, small wood particles or chips to a load of firewood.

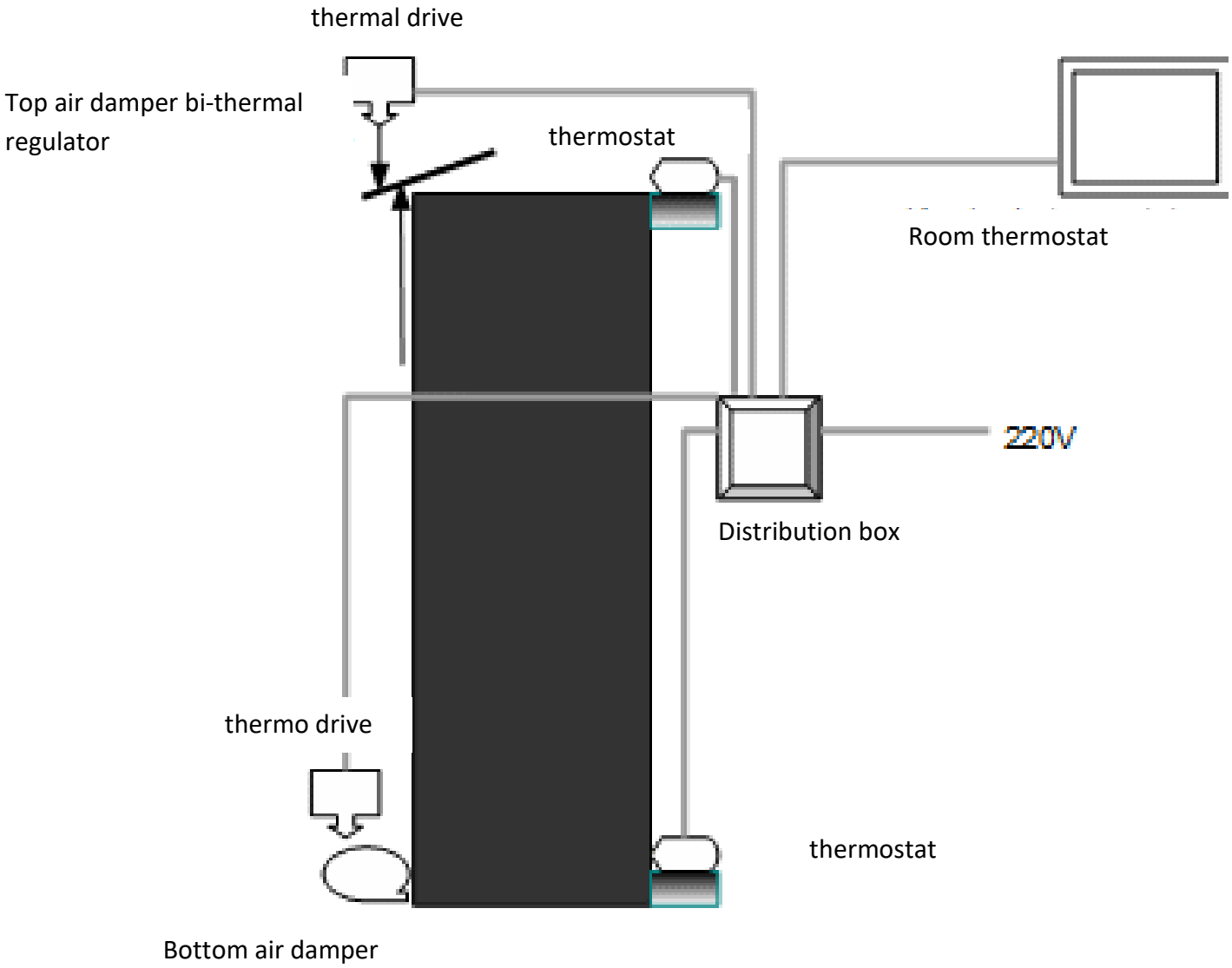
Controlling firewood boiler with thermal drive, return flow thermostat and room thermostat.



We all know that active heating system is affected by environmental changes – on colder days we need more energy than on warmer days. So in order to maintain stable temperature of the premises all we need to do is maintain stable temperature of return flow – thermostat installed on return flow pipe doesn't turn of the boiler so often or doesn't turn it off at all when it is cold outside and on warmer days it is easier for boiler to heat up radiators and return flow, therefore thermostat turns of the boiler more often and radiators remain cooler.

When boiler is controlled solely by room thermostat, changes of temperature of premises depend on delay of thermostat. Temperature of premises remains more stable when using return flow thermostat. Therefore, temperature set for room thermostat must be a little bit higher than it is in the room when it settles down, so that boiler wouldn't be turned off before it is turned off by thermostat of return flow. This way, room thermostat turns off the boiler when outside temperature becomes high enough and there is no need for additional heating and after sunset when it gets colder outside, thermostat turns on the boiler.

Universal boiler



When using coal, peat briquettes, wood particles (chips), sometimes air needs to be delivered under the fuel load. This can be done by using ash grill and bottom air damper. Bottom air damper is operated with thermal drive, which is controlled by supply water flow thermostat.

Bottom air damper is installed in dedicated port at the bottom of boiler. This allows converting firewood boiler into universal boiler by installing ash grate and air damper in bottom door.

When burning is obstructed by ash content of the fuel and supply water temperature falls below the target temperature, supply water thermostat turns on thermal drive of bottom air damper and opens it. Air supplied to bottom of fuel load revives it and increases the thickness of burning layer. Air form the bottom is not supplied constantly, therefore volume of burning layer increases only as much as it is needed for efficient burning.

It is know that it immediate stopping of intensive burning is inefficient because a lot of unburned CO is emitted, but thermal drive closes top damper when burning is slowed down by bi-thermal damper and burning is not intensive, therefore extinction is carried out with least possible CO losses. Bottom damper is closed during the process of burning, therefore there are no losses.

Air is pulled through dampers because of draft of the flue therefore boiler doesn't emit additional noise.

Air supply fans can also be installed. Fans must be connected to same terminals as thermal drives. When thermostat turns off thermal drive, fan also is turned off and after 3-5 min thermal drive closes the damper. When thermostat turns on the drive, fan turns on and damper opens after few minutes. It may seem a little bit strange, but it is nothing bad and power consumption during this time is really low.

As practice shows, additional overheating protection (in case of failure of circulation pump etc.) is not necessary because bio-thermal air regulator closes the damper and prevents accidents.

With reserve generator after loss of power supply accumulator can supply power to circulation pump for more than 10 hours, therefore any accident will be prevented.

However there are various protection devices that can be added on request.

Programing of controller on firewood boiler

As mentioned before, system monitors the environment and therefore environment changes determine the amount of used fuel, return flow temperature that needs to be maintained in order to maintain specific temperature of the premises.

1. Plug in the controller into mains power supply. Wait 3 – 5 minutes till top air thermal drive completely opens the damper. Then, using threads under the thermal drive and near the damper, adjust the position of the damper so that it would be 2 – 3 centimeters from air vent. Ignite the fuel. Observe the damper – if damper is closed when boiler temperature reaches 70^{o}C, open up the damper by 2-3 mm using threads. If opening of the damper is larger – make it smaller.

2. Set the maximum temperature on room thermostat so that it wouldn't participate in this procedure.

3. Set 30°C on return flow thermostat if you are using floor heating as your home heating system. If you ae using radiator heating system – set 40°C.

4. If it becomes too hot in the premises while heating is active, set lower temperature on the thermostat. If you want more heat in the premises – set higher temperature. Observe room thermostat. When stabile temperature will be reached, set room thermostat to a little higher temperature than the current temperature – this will make thermostat turn off the heating when environment heats up because of sunlight, home appliances or people inside. (One person radiates about 140 W of heat – equal to one section of cast iron radiator.)

Programing of controller on universal boiler

Return flow and room thermostats must be set the same as with firewood boiler.

However, universal boiler has supply flow thermostat which controls air supply under the grate.

1. Usually it can be set to 50°C – if fuel ash content causes capacity and temperature of boiler to fall below

50°C, thermostat opens air under the grate – closes it again after temperature rises. It is recommended to set lower temperature, this way air will be supplied in short periods. After supplying to high, air under grate will be supplied for longer periods or even constantly and this is not desirable because it increases the thickness of burning layer too much.

THERMAL RELAY G

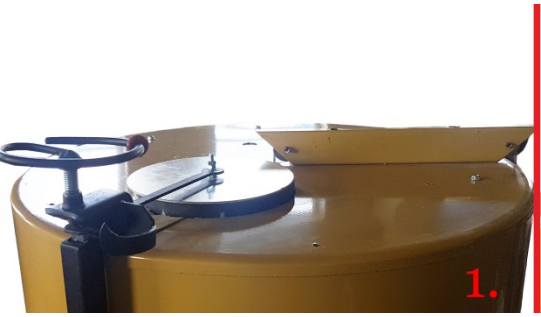
Thermal relay G – is installed on return pipe of heating system. Recommended temperature setting is 25-55 degrees. When return heating pipe reaches the set temperature at Thermal relay G – power supply to electronic drive NO is cut off, this drive opens up in 4 minutes while closing air supply damper. Boiler goes into standby mode – fuel is not being burned till temperature of heat exchange medium falls by 6-7 degrees below the set value.

THERMAL RELAY P

Thermal relay P – installed on supply pipe of heating system. Recommended temperature setting is 60-65 degrees. When temperature of heat exchange medium supplied from boiler reaches the set temperature of thermal relay P - power supply to electronic drive NC is cut off and then the drive closes the bottom air supply valve in 3 minutes. Air supply to boiler from the bottom is stopped and burning proceeds with air supplied from the top till temperature of heat exchange medium falls to 6-7 degrees below selected value.

ELECTRO-THERMAL DRIVE NO

Electro-thermal drive NO – in installed instead of boiler's draft regulator. After unscrewing boiler's draft regulator – electro-thermal drive NO can be screwed in.



Initial set-up is carried out before igniting the boiler:

1 – Power supply to electro-thermal controller is turned on.

2 – Maximum recommended temperature (55 degrees) of Thermal relay G is set and after that user must wait 4 minutes till NO closes – goes into operation mode.

3 – during screwing in and screwing out of electro-thermal drive NO air supply damper settings are set according to description provided in boiler's instruction (7.3 settings of draft regulator).

NO – normally open when there is no voltage, therefore air damper will automatically close in case of loss of power.

ELECTRO-THERMAL DRIVE NC

Electro-thermal drive NC – for controlling bottom air supply valve.

Initial set-up is carried out before igniting the boiler:

1 - Power supply to electro-thermal controller is turned on.

2 - Maximum recommended temperature (55 degrees) of Thermal relay G is set

3 – Temperature setting of Thermal relay P is set to 0 degrees and after that user must wait 3 minutes till NC drive closes.

4 - during screwing in and screwing out of electro-thermal drive NC – bottom air supply valve must be closed tightly.

NO – normally open when there is no voltage, therefore air supply valve will automatically closed in case of loss of power.

BOTTOM AIR SUPPLY VALVE

Electro-thermal controller can be installed with bottom air supply valve, which is controlled by Electro-thermal drive NC.

Valve is installed into opening D50 (2 inches) on the boiler or it can be installed into bottom door (after it is modified to support the installation of air supply valve).

USAGE OF CONTROL DEVICE

Firewood:

Firewood only requires top air supply, therefore you should turn off the bottom air valve (by setting Thermal relay P to 0 degrees). When firewood is burning slowly and you want more heat – use air injection collector. We recommend adding some sawdust briquettes into middle of firewood load. This will allow the boiler to resume the burning more easily after longer break.

Sawdust briquettes:

Sawdust briquettes only requires top air supply therefore you should turn off the bottom air valve (by setting Thermal relay P to 0 degrees). If sawdust briquettes are of low quality or burning poorly and you need more heat - use air injection collector. We recommend using grates or add a 10 cm layer of fine pieces of firewood at the bottom of load when using sawdust briquettes.

Coal:

Single top air supply with air injection collector is enough during the first day of burning, therefore you can turn off the bottom air valve (by setting Thermal relay P to 0 degrees). At the end of burning (when there is 1/3 or ¼ of fuel load left) pellets burn slower, therefore you can enhance the burning – turn on the bottom air supply valve (by setting Thermal relay P to 60-65 degrees).

USAGE SAFETY

- Read this instruction thoroughly before using the device.
- This control device must be installed and connected by qualified person who is familiar with these acts regulating safe usage of electric devices: General rules of installing electric devices (Tin., 2012, No. 18-816); Safety rules of operation of electric devices (Tin., 2010, No.39-1878); General provision of using work equipment (Tin., 2000, No. 3-88); Technical regulations "Safety of machinery" (Tin, 2007, No.129-5249) and with other acts of law that regulate this activity. All safety requirements must be followed.
- Check all connections before turning on the device. Check if there is possibility to touch live wires;
- Visually check connection wires and cables for damage, cracks etc. It is forbidden to use the device when there are damaged wires or other parts of the device;
- In case of severe heat in parts, wires of the device, sparks in wires, connections or other malfunctions and smell of burning wires and eventual power loss it is NECESSARY to disconnect the device from the mains.
- All installation works must be finished before plugging in the power supply cable of the device.
- Appropriate working conditions must be assured. Working conditions must meet the specifications of the device.

MEASURING RECOMMENDATIONS

- It is forbidden to connect this device to the same electric cable, which already has other powerful devices connected, without using appropriate network filters.

- Do not place signal cables near or with energy and supply cables.
- Keep a distance from remote controlled devices, avoid heavy power load, avoid contact between the device and group or phase regulated devices and other devices that could hinder the operation of boiler's regulator.
- When connecting the device, keep in mind that building's system must have a switch and automatic switch. This element must be near the controller device, easily accessible to its user and marked in a way that would indicate that it is used to turn of the device.
- Manufacturer cannot be held responsible for damages caused because of failure to follow this manual.

PACKAGE WITHOUT BOTTOM AIR SUPPLY

THERMAL RELAYS G

ELECTRO THERMAL DRIVE NO + THREADED ADAPTER

DISTRIBUTION BOX

PACKAGE WITH BOTTOM AIR SUPPLY

THERMAL RELAYS G

ELECTRO THERMAL DRIVE NO + THREADED ADAPTER

DISTRIBUTION BOX

THERMAL RELAY P

ELECTRO THERMAL DRIVE NC + THREADED ADAPTER

BOTTOM AIR SUPPLY VALVE

ADDITIONAL PACKAGE

ROOM THERMOSTAT

AIR INJECTION COLLECTOR + CABLE AND FIXING SCREWS

THERMAL RELAY PV

RHEOSTAT (for controlling the revs. of fan)

WARRANTY

MANUFACTURER:	UAB „Stropuva ir ko“, Company code 300149972 , Adress: Kestučio st. 1A, Lentvaris, Traku r. Vilnius, LT - 25144 , Lithuania General phone.: +370 525 51763 Service phone: +370 650 15994
Model:	
Sale date / Signature / Stamp	
SELLER:	
Sale date / Signature / Stamp	
INSTALLER:	
Address of installation:	
Date/ Name Surname/ Signature / Stamp	
SPECIALIST Who carried out the assessment and commissioning of installed heating equipment	
Notes	
Date/ Name Surname/ Signature / Stamp	

WARRANTY / AFTER WARRANTY REPAIRS			
Date	Performed work, replaced parts	Organization	Name / Surname / Signature

Electro-thermal controller is given 2 year warranty

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