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PANDA Microprocessor Regulator
User's Guide

CONTENTS:

1. Regulator usage and benefits

The PANDA control unit ensures that the screw feeder feeds the boiler to maintain the desired water temperature. Thanks to its advanced features, central heating (CH), domestic hot water (DHW) and under-floor heating (UFH) are managed automatically and economically when fully installed. Compared to conventional units providing functions such as day/night modes, the economy setting and new fan speed control algorithm result in excess savings of up to 20%. The thermostat is simple and easy to use; it is also possible to connect additional remote control panels (the boiler can be controlled from anywhere in the home). The user-friendly thermostat together with its wide range of functions puts this unit in a class with other commercially available models.

As many as three additional control panels may be purchased and added onto every PANDA control unit. Each has the same functions as the main regulator connected to the boiler. For additional information please contact the manufacturer listed on the cover page.

1.1 Control unit features

The PANDA control unit includes a wide range of features that afford extra comfort to users. The unit has the following:
- CH pump socket
- DHW pump socket
- UFH pump socket
- Circulation pump socket
- Thermostat socket
- Remote control socket
- CH and DHW thermo sensors, UFH sensor, circulation pump sensor
- Emergency thermostat (to protect the boiler against overheating above 90°C)
- Hopper thermo sensor (to prevent back-burn)

1.2 Regulator technical specifications

Supply voltage	230V / 50Hz
Nominal operating current	6W
Thermo sensor operation range	0 – 100°C
Ambient Temperature	0 – 40°C
Socket loads (fuse 6.3A)	Feeder – 1.5A CH pump – 0.8A DHW pump – 0.8A UFH pump – 0.8A Circulation pump – 0.8A Fan – 1.5A
CH pump Anti-Stop function	Every 7 days for 1 minute
Automatic start-up of the CH pump	Below 5°C
Automatic start-up of the emergency thermostat	Above 85°C
Automatic start-up of the safety alarms	Above 90°C
Time divisions	24 per day
Possibility to connect remote controls	YES / max. 4 remote controls
DHW pump operation	YES
Circulation pump operation	YES
UFH pump operation	YES
Thermal security (STB thermostat)	YES

1.3 Description of the rear panel
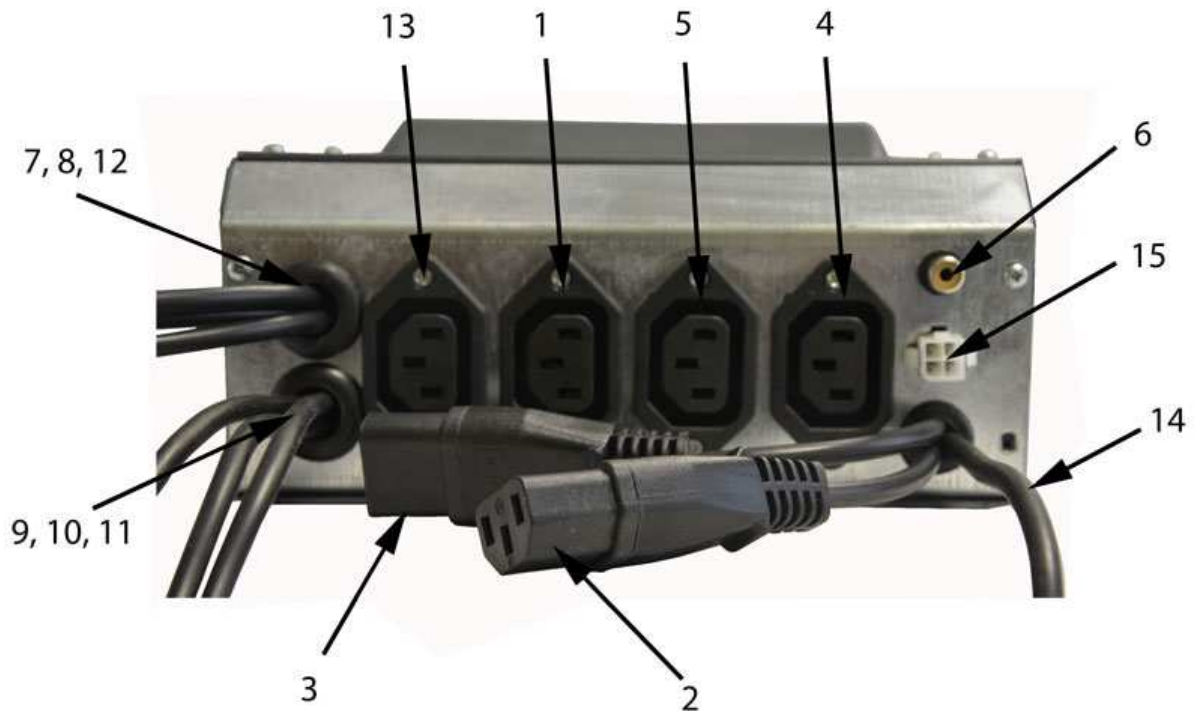
Figure 1 – Control unit rear panel

1. CH pump socket
2. UFH pump socket
3. Circulation pump socket
4. Feeder socket
5. Fan socket
6. Room thermostat socket
7. UFH sensor
8. Circulation pump sensor

9. CH boiler sensor
10. Emergency thermostat
11. DHW temperature sensor
12. Hopper temperature sensor
13. DHW pump socket
14. Supply voltage
15. Remote control socket

1.4 Unit front panel description

Figure 2 – Control unit front panel

The Power Switch, which starts up or shuts down the control unit, is located on the left side of the cover.

1.4.1 Buttons found on the unit

The **"Power"** button

− This button turns connected devices on or off and changes the unit's status from "OFF" to REGULATION mode keeping pumps within the set parameters when in operation. **It starts up or shuts down the fan and feeder only.**

− When heating manually with wood, the control unit will switch to OFF and regulate all pumps.
− When in the "Manual feed" mode, the button starts up the feeder.

The **"Operation Switch mode"** Button

- Any one of five operation modes can be chosen. The current mode is indicated on the display located in the upper right corner by one of the following abbreviations: NOR, D/N, EKO, KAL and TERM; these change when the mode is changed.

- When in "Manual feed" mode, the button starts up the CH Pump.

NOR – **normal mode** allows the user to set a constant temperature.

D/N –**DAY/NIGHT mode** automatically allows the temperature to decrease to a set level during the night (from 10:00 pm to 6:00 am); this can be set in the ±10°C range.

EKO – **economy mode** decreases the temperature for any period of time depending on the setting (time, day or year is irrelevant). The ECONOMY CORRECTION can be set in the range of ±10°C. Upon activation of the economy mode, the DHW pump and Circulation Pump are off. UFH temperature is automatically corrected proportionally to the desired room temperature.

KAL – **week mode** for operating pumps. A day and hour can be set for the pumps to start up / shut down if a temperature adjustment is desired. This is described in detail in Section 9.2.

TERM – **thermostat**. This mode can be used when the desired room temperature has been reached; the mode initiates forced temperature monitoring and initiates the CH pump to start up in cycles. The principles of use for the thermostat are described in detail in the Section 9.3.

The **"UP"** button has three basic functions:
1. Scrolling up in the menu.
2. Increasing parameter values.
3. In "manual" mode, it accelerates the fan when it is running.

The **"DOWN"** button has three basic functions:
1. Scrolling down in the menu.
2. Decreasing parameter values.
3. In "manual" mode, it slows the fan when it is running.

The "**BACK"** button

− Allows the user to go one step back in the menu.
− In "manual" mode, it starts the fan up.

The **"OK"** button allows the user to:

− Access edit mode.
− Confirm changes.

1.4.2 Status LEDs (Light Emitting Diodes)

When an LED is on, it means that the connected device is running. If the LED is off, then connected device is idle.

FEEDER

FAN

CH PUMP

DHW PUMP

UFH PUMP

CIRCULATION PUMP

THERMOSTAT – signals that the required temperature in the room has been reached if the thermostat is connected.

ALARM

2. Feeder and fan pump wiring

Using the connectors provided with the control unit, wires are connected as illustrated below. Then the connectors are plugged into the appropriate socket in the control unit cover.
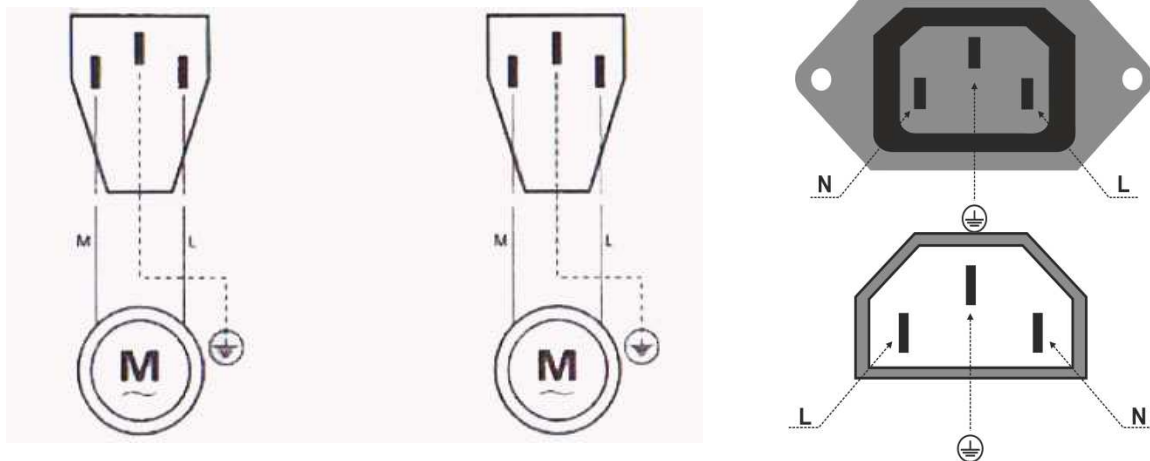
Figure 3 – Wiring of sockets in the control unit

2.1 Wiring on the control panel side
1. Connect the green and yellow wire (the earth, or ground, wire) to the grounding terminal at the top in the centre.
2. Connect the brown and blue wires (N and L1 230V) to the side terminals.
3. Check all the connections and screw the box shut.

2.2 Wiring on the circulation pump side
1. Remove the circulation pump housing cover.
2. Connect the green and yellow wire (the earth/ground wire) to the grounding terminal marked PE.
3. Connect the brown and blue wires (N and L1 230V) to the terminals.
4. Check all connections and screw the box shut.

Detailed schemata of the circulation pump wiring are included in the manual.

CAUTION! Improper wiring can cause damage to the control unit and devices connected to it.

-------- Wiring is to be undertaken by trained professionals only! --------

Before connecting, unplug the cable from the power supply network!!

3. Connecting a remote control

The PANDA control unit can accommodate up to **four** remote controls, marked "0", "1", "2" and "3". The respective number is shown on the control panel display when the control panel is switched on. Control panel "0", the main control panel, is part of the regulator. Other control panels installed are numbered "1", "2" and "3". Two control panels with the same number cannot be connected. The regulator software automatically finds the panels connected and enables access to the control unit. Additional panels look the same as the main panel and allow full boiler control; they also show the current status of the heating system's operation. The panel can be placed anywhere depending on the user's needs.

Figure 4 – Control panel

3.1 Remote control power supply

Each of the remote control panels are powered directly from the main regulator cover. We normally use a 4-wire cable with a 0.5-mm diameter for the power supply (red and blue wires) and data transfer (red and white wires). A description of the socket and wiring arrangements are given on the back of each panel and in the panel user manual. A description of socket wiring can be found below in this manual. It is possible to supply power from an independent 12V power source connected to the main panel with a 2-wire data cable. In this case, only the two middle pins in the panel plug (red and white – for data transfer) are used.

When connecting more than one remote panel it is not necessary to connect each one directly to main panel! The panels can be simply connected in series. E.g. three panels connect in series with one connecting directly to the main panel.
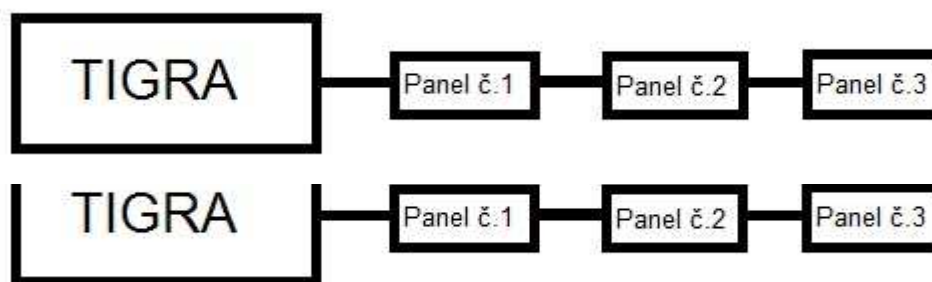
Pic 5 – remote controls connected in series

Remote control socket: The two upper pins are for power. The two lower pins are for data.

- **12V +**   RED wire
- **12V -**   BLUE wire
- **INFO +**   data transmission, BLACK wire
- **INFO -**   data transmission, WHITE wire

3.2 Communication between the remote control panel and the control unit

The two central pins on lower side of connector are used for communication between additional panels and the main panel. They are marked as **"INFO+"** and **"INFO–"** (black and white wires) in the diagram. If power is to be supplied directly from the main panel, use the two upper pins (side pins on the panel and top pins on the main socket – red and blue wires). Then the panel can be supplied from an independent 12V power source. In this case, a simple 2-wire cable is used for data transmission (INFO+ and INFO-).
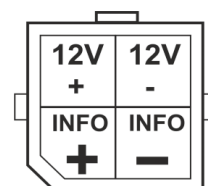
"Insufficient power supply" indicates a mistake in wiring, i.e. the +12V and -12V pins are reversed. If something is missing on the main control panel display (time, operating mode, required temperature or operation status), there has been a mistake in wiring, i.e. the INFO+ and INFO– pins are reversed. A wiring error can lead to damage to the control panel or regulator!

4. Factory settings and parameter ranges
4.1 Main menu

Functions:	Factory Settings:	Range:	Units:
CH boiler required temperature	60	35 - 90	°C
night adjustment	-3	-10 ... +10	°C
economy adjustment	-3	0 ... -10	°C
CH pump switch-on temperature	35	OFF ... 25 – 70	°C
DHW pump switch-on temperature	OFF	Section 6.2	°C
feeding time	15	OFF ... 1 – 205	s
time between feedings	90	1 - 150	s
feeding repetitions	2	OFF ... 1 - 20	
fan cycle period	10	OFF … 5 – 59	s
fan idle time	10	1 – 99	min.
fan speed	50	10 - 100	%
fan speed in monitoring mode	50	10 - 100	%
regulator shut-off temperature	30	25 - 35	°C

4.2 Service menu

Functions:	Factory Settings:	Range:	Units:
Language	Czech	English, Russian, Polish	
minimum temperature	40	35 - 55	°C
maximum temperature	80	60 – 90	°C
Temperature lag	1	1 – 5	°C
minimum fan speed	25	20 – 70	%
maximum fan speed	55	20 – 70	%
fuel check interval	90	OFF... - 90	min.
circulation pump down time	3	1 – 250	min.
DHW priority	NO	YES / NO	
feeder temperature - ALARM	70	OFF ... 35 – 90	°C
feeding time	5	1 - 30	min.
heating time	2 hr.	1 – 7	hr.
Burn-out time	2 hr.	1 – 7	hr.
circulation pump shut-off temperature	OFF	OFF – 70	°C
UHF pump shut-off temperature	OFF	OFF – 50	°C

CAUTION: Minimum or maximum fan speeds change only for custom fans.

5. Regulator operation

If after reading this manual there are any problems connected with regulator operation, please contact technical support listed on first page.

5.1 The regulator's first use

Connect the regulator to a 230V power network and switch it on using the power switch located on left side of the cover. After switching the regulator on, there will be a short beep indicating that the thermo sensors are functioning properly. The current temperature of the CH boiler will appear in red in the small display. The Tzad value (required water temperature in the boiler) will appear in the centre of the main LCD; the current time will be displayed in the top left corner. "OFF" will appear in the bottom left corner and the top right corner will indicate the operation mode (detailed description in Section 5.3). To set the HEATING mode, press the ⊙ power button and the value will be displayed. Pressing the button again will change the mode back to "OFF" mode.

CAUTION! When the boiler is not being used (e.g. seasonal usage), the boiler must be switched off (this cannot be done using the power switch). The CH pump has an ANTISTOP function when the "OFF" state is activated. This function ensures that the CH pump runs for one minute once a week to protect it against seizing.

5.2 Changing function parameters in the menu

By pressing ▲ or ▼, it is possible to access the menu to find desired functions and to change parameter values. Select the desired function by pressing OK ; this changes the mode (the LCD background turns green). By pressing ▲ or ▼ changes are set. Changed parameters are confirmed by pressing OK. The LCD background then turns back to blue. This indicates that all parameter changes have been accepted. To get back to the main menu press BACK.

5.3 Procedure for firing up the boiler for the first time

After installing the boiler and connecting it to the regulator according to the instructions above, it can be started up by pressing the power switch. The unit will initially be in the "OFF" state. Find MANUAL CONTROL in the menu by pressing ▲ or ▼. Then confirm by pressing OK - the display background colour will turn to green meaning that manual control is active. When ⏻ is pressed, fuel is fed into the burner to approximately 2cm below edge of the burner. Now feeding time is engaged. If the feeding screw is empty for more than roughly 7 minutes, the feeder motor is at risk of overheating. If this occurs, it will be shut down by the thermo-fuse. After cooling down, the motor is ready to go back into operation.

Now the following connected devices can be started up or shut down with the control unit:

OK   FAN – after activation you can set the fan speed by pressing ▲ or ▼. For optimal initial heat output, we recommend a minimum fan speed (10-20%).

⏻   FUEL FEEDER

⚙   CH circulation pump

When heating up, we recommend keeping the CH circulation pump on manually.

After heating up and reaching a temperature of at least 40°C, switch from MANUAL CONTROL by pressing BACK. The LCD background will turn back to blue. By pressing ⏻ the OFF mode is switched to HEATING mode. The correct value for feeding time, idle time and fan speed must be set according to the type of fuel used.

Check and set:
- Check the amount of water in the heating system with a manometer.
- **Reseal the burner collar and burner ash hole (pan) according to the instructions!**
- Open the stop valves between the burner and the heating system.
- Fill the hopper with the appropriate amount of fuel, then close the hopper to avoid excess air intake into the feeder.
- The fuel must be ignited with liquid or solid fire starter or with wood kindling.
- After ignition, allow it to burn. It is necessary to heat the kiln burner throughout! If it is not hot, the flame may be confined to one small area inside!
- **In the beginning, set the burner to a minimum setting (feeding time to 5 seconds, feeding idle time to 50 seconds, and fan speed between 10-20%) and let it burn. When the boiler has warmed up, gradually decrease the feeding idle time until the entire kiln has fire throughout and the ash layer in the kiln is 3-5 cm. thick. Then set the burner to nominal power – see the instructions in Section 13.1, Maximum burner outputs.**

5.4 Operating modes

OFF – this mode is set after the control unit has been started up with the power switch. The control unit does not regulate the feeder or fan in this mode, but is possible to set parameters. (all pumps are regulated in the OFF mode).

HEATING – To switch from OFF mode to HEATING mode press ⟳ - this will regulate the fan and feeder according to the values that have been set.

MONITORING – When the desired input temperature is reached, the control unit will switch to monitoring mode. In this mode the regulator is set to keep feeding the burner so not to burn out. After the fan idle time, the fan is regulated to the appropriate speed in monitoring mode. If feeding repetitions is set to 3, for example, the feeder will add fuel to the burner the after every 3rd period of fan engagement (blow-through). For more information see Section 5.5.

REGULATION – If the temperature in the boiler drops below the value set (minus the built-in lag), the system will switch from MONITORING mode to REGULATION mode. The boiler will reheat to the desired set temperature. After the water reaches the desired temperature, the system will switch back to MONITORING mode.

BURN OUT – This mode is triggered when there is no fuel in the hopper, if a shear fuse is damage, or if the feeder is damaged. Meaning, if the temperature inside the boiler does not increase by more than 2°C during the FUEL CHECK INTERVAL, the user will be informed with an LED and audio alarm and the regulator will change to BURN OUT mode. If the temperature drops below the REGULATOR SHUT-OFF TEMPERATURE, the regulator will switch to BURN OUT mode after a delay of 5 minutes. This can take up to 2 hours and then the regulator will switch to MONITORING mode, but if the hopper is refilled or if the problem is fixed, ⟳ can be pressed and the regulator will switch back to HEATING mode. When in BURN OUT mode the CH pump remains on until the temperature in the boiler drops below the CH PUMP SWITCH-ON TEMPERATURE.

When in BURN OUT mode (5 min. delay), the user is informed with a short beep when the current temperature drops below the REGULATOR SHUT-OFF TEMPERATURE.

In this mode the control unit only regulates the fan, which extinguishes the fire!!

When the temperature falls below 5°C the control unit automatically turns the CH pump on to prevent freezing in the heating system. At the end of the heating season, the regulator should be in OFF mode and the pumps are started up once a week for one minute to prevent corrosion.

5.5 Working in MONITORING

When the boiler is in MONITORING mode, the regulator has a setting to ensure embers remain in the kiln so the fire never burns out.

This feature enables four control unit functions:
Feeding repetitions (in monitoring)
This determines the number of times the boiler is stoked by the feeder. E.g. If it is set to 3, after every 3 fan cycles, the feeder will stoke the burner for the allotted FEEDING TIME.

Fan cycle period (in monitoring)
The period of time for which the fan is engaged in the MONITORING mode after the idle time elapses (e.g. if the idle time is set for 5 minutes, the fan will blow when the 5 minutes have elapsed for the period of time the fan is set to be engaged). This time can be set to OFF.
Fan idle time (in monitoring)
In the MONITORING mode, idle time is when fan is not engaged (blowing). When the fan idle time expires, the fan engages once again for the set fan cycle period.
Fan speed (in monitoring)
The speed at which the fan blades turn.

5.6 Operation modes

NOR – **normal mode** – the regulator maintains a constant temperature.
D/N – **day/night mode** – the regulator decreases the temperature at night (from 10:00 pm to 6:00 am) according to the settings. It can be set for a variation of as much as ±10°C.
EKO – **economy mode** – the regulator decreases the temperature according to the settings for as long as it remains activated (regardless of the time of day or season). The ECONOMY SETTING can be set for a temperature variance of as much as ±10°C. In addition, the regulator shuts down the DHW pump and circulation pump when the economy mode is activated. The UFH temperature is automatically corrected correlating to the desired decrease in temperature.
KAL – **week mode** - for pump operation. A time and day can be chosen for pumps to shut down. Some temperature variations may also be input. This is described in more detail in Section 9.2
TERM – **thermostat mode** – when the desired room temperature is reached and the regulator is activated to force monitoring mode, the CH pump engages intermittently. This is explained in greater detail in Section 9.3.

5.7 Date and time settings

The control unit has a built-in clock function that triggers automatic changes in temperature when in day/night mode. The clock is employed when the regulator is in calendar or week mode. It helps regulate temperature settings and pump circulation.

If the regulator is disconnected from the power supply either as a result of being unplugged from the power source, being switched off using the power switch, or due to power failure, the regulator will continue to maintain time accurately for a maximum of 48 hours. After 48 hours have elapsed, the clock unit goes to default settings and must be reset! If the power supply is uninterrupted, resetting will never be necessary.

To set the time, find the TIME SETTING function in the main menu using the ▲ or ▼ buttons. Press OK to open the TIME SETTING function. If OK is pressed a second time, the system will go to editing mode. When in editing mode, use ▲ or ▼ to set the time and then confirm by pressing OK to save changes. Using the same procedure, the MINUTE SETTING and DAY SETTING can be changed. Items can be listed in the TIME SETTING submenu using ▲ or ▼. To escape editing mode, press BACK and the newly set values will be shown in the upper left corner on the LCD.

6. CH and DHW pump operation

The control unit enables advanced functions in CH, DHW, UFH and circulation pump management. The regulator not only regulates temperatures, in KAL mode it allows the user to set start-up or shut-off options according to time and temperature sensor settings.

6.1 CH pump

In the factory settings, this pump is the only one that is active by default. The switch-on temperature is set at 35 ˚C, but this can be changed by the user

 indicates that the CH pump is running.

It engages when the CH PUMP START-UP TEMPERATURE is reached. If the temperature is too low, the CH pump shuts down. There is a 3˚C lag in the shut-off temperature, e.g. if the CH PUMP START-UP TEMPERATURE is set at 35˚C, the pump will engage when 35˚C is reached in the boiler, but it will switch itself off if the temperature drops to 32˚C. The pump will run for 20 seconds from the moment the sensor detects this temperature and then it will shut down.

When operating in TERM mode, the thermostat will stop the boiler from heating when the desired room temperature is reached. When this happens, the regulator will begin to regulate the system. The regulator will start the pump up for 30 seconds and the CH PUMP SHUT-OFF TEMPERATURE settings will determine the idle time (service settings).

6.2 DHW Pump

Factory setting – OFF.

 indicates that the DHW pump is running

To switch DHW pump on, the desired temperature must be set using the DESIRED DHW TEMPERATURE function. After reaching the desired value (i.e. the desired tank temperature has been reached), the pump shuts down. If temperature in the tank drops – the temperature lag for the DHW pump is 3°C – the pump will automatically engage and will reheat the water in the DHW tank back to REQUIRED DHW TEMPERATURE.
"Auto start" for DHW pump is factory-set at 35˚C. This means that it automatically engages when the temperature in the boiler is higher than 35˚C. Below that temperature, the pump is idle.

- The DHW pump is always off in EKO mode.
- The maximum temperature in the DHW tank can never be higher than the desired CH temperature, e.g. if the Tzad in the boiler is set at 50˚C, it is not possible to set the DHW temperature to value higher than 50˚C.
- In order to set the DHW temperature higher than the desired CH, the DHW PRIORITY mode must be set. In this mode, the DHW tank temperature is the most important temperature. Is more important than temperature in the boiler.

6.2.1 DHW priority

The CH pump remains off in this mode until the temperature reaches the desired DHW temperature. The desired pump temperatures must be set in the DHW PUMP SHUT-OFF TEMPERATURE function. The DHW PRIORITY function must then be set to YES (ON) in the service menu. DHW heats first and the CH pump begins pumping only after the set DHW temperature is reached.

When the DHW priority mode is active, the DHW tank temperature can be set to a higher temperature than CH. The maximum difference between the CH and DHW temperatures is 8˚C, e.g. if the CH temperature is set at 50˚C, the DHW temperature can be set to 52, 53 or up to 58˚C. The boiler temperature required to heat the DHW tank will automatically increase to the desired DHW temperature. The regulator will operate in REGULATION mode rather than MONITORING mode. The MONITORING mode will initiate at the moment the desired DHW temperature is reached in the tank. The moment the required temperature in DHW tank is reached, the regulator switches to MONITORING mode, where the limit value is again Tzad.

The user is informed of automatic increases and boiler temperature changes in the DHW tank temperature with the corresponding message - PRIOR. Ttuv =68°C appears on the LCD. The 68°C is the value set by user. This boiler temperature must be reached for DHW and after switching off the DHW pump the boiler temperature begins to drop.

6.3 UFH pump

Factory settings – OFF

⬜ indicates that the UFH pump is running

The desired water temperature for under floor heating is set using the UFH PUMP TEMPERATURE function (service menu). It cannot be higher than the desired CH temperature, or 50˚C for safety reasons. If the UFH pump sensor detects that the desired temperature has been reached, the pump will shut down.

The pump's "auto-start" switch-on temperature depends on REGULATOR SHUT-OFF TEMPERATURE function setting, e.g. if the regulator switch-on temperature is set to 35°C, the UFH switch-on temperature auto-starts at 40˚C. **The difference is always +5˚C!**

6.4 Circulation pump

Factory settings – OFF

◎ indicates that the circulator pump is running

Thanks to its independent sensor, the PANDA regulator allows the user to choose a desired pump shut-off temperature so that it does not run at the same time as the CH pump. This temperature can be set in the service menu using the CIRCULATION PUMP SHUT-OFF TEMPERATURE function.

This function enables the pumping of water only to a given temperature e.g. 60˚C. In addition, the output from the circulation pump can by used to power a second UFH pump. If the "shut-off" temperature is set to 70°C, for example, and if boiler sensor is installed in the same place, a continuous mode for circulation pumps can be set in the same way as the regulator without additional sensors, and which only control the circulation pump according to the temperature in CH boiler base.

- The pump shut-off temperature is set using the CIRCULATION PUMP SHUT-OFF TEMPERATURE function (service setting).
  The adjustable maximum value is 70˚C.

- The pump start-up "auto-start" temperature depends on the REGULATOR SHUT-OFF TEMPERATURE, e.g. if the regulator shut-off temperature is set at 35°C, the circulation pump auto-starts at 40˚C.
The difference is always +5˚C!
The DHW and circulation pumps do not run in EKO mode!

6.5 Pump auto-start

This value dictates when the UFH and circulation pump are activated. The temperature at which they are initiated is set using the REGULATOR SHUT-OFF TEMPERATURE function. The activation temperature is always 5°C higher!
E.g. if the shut-off temperature is set at 35°C, the UFH pump and circulation pump will start up when 40°C is detected by the CH temperature sensor.

7. Temperature sensors, installation and testing

The basic control unit is equipped with five digital temperature sensors and one bimetal thermo sensor.

7.1 Installation of temperature sensors

1. CH temperature sensor
This sensor detects the current water temperature in the boiler. This temperature is shown on the red LCD control panel. Operating modes are set according to this value. The sensor is connected to the boiler output to have the best possible contact and heat transfer. It is either installed in a reservoir or it is taped to pipe. The brass part should have the best contact. The wire must never come into direct contact with any element of heating system!

To ensure the accurate measurement of temperature, it is recommended to use thermal grease. Oil must not be used as it can damage the sensor!

2. DHW temperature sensor
This sensor reads water temperature in the DHW tank. DHW pump start-ups and shut-offs are initiated according to this sensor's readings. It is either installed in a reservoir or it is taped to a pipe. This sensor is set to OFF in the factory settings so, it must be set in the main menu for use.

3. Feeder temperature sensor
This sensor checks the screw feeder temperature to prevent back-burn in the hopper. If the temperature rises above 70°C (this temperature can be set in the service menu using the FEEDER TEMPERATURE function) an ALARM will be triggered and the feeder motor will engage. The motor run-time is set using the FEEDING TIME function (5 minutes is recommended) in the service menu. It will feed the burner until the burning fuel is removed from the screw feeder. It will also will fill ash pan with burning fuel and, in this way, the fire in the burner is smothered. The sensor is installed in a tube set up for this purpose behind the fan.

4. UFH sensor

This sensor measures the temperature at the point of installation – the regulation of the pump is initiated from here.

5. Circulation pump sensor

This sensor measures the temperature at the point of installation– the regulation of the pump is initiated from here. This sensor can be used for any other system, e.g. another UFH. It is possible to shut the pump down when the desired temperature is reached. If continuous pump operation is desired, for the CH pump for example, do not mount this sensor.

6. Emergency thermostat – thermocouple sensor

The independent thermocouple sensor protects the system against overheating. It operates independently of the control unit and, when it detects temperatures above 90°C, it will immediately shut the fan and the feeder down to prevent the burner from heating up any further. **The alarm will switch the control unit to OFF mode!** After checking the system, the user can press ⊙ to switch the system to HEAT mode.

The first sensor is installed on the boiler's hot water output. It is placed in the reservoir or taped onto the tube with insulation. For the best results, remember that the wire must not be in direct contact with the tubes!

The sensor is installed with the CH sensor!

Image 4 – Thermal sensor installation

CAUTION:

> ➢ The sensors must not be immersed in liquids such including water, oil, etc.

During assembly and operation, the sensor cables must not come into contact with hot pipes and or other elements of the heating system.

Any sensor temperature can be checked at any time. The temperature is shown on the LCD after selecting the sensor function using △ or ▽:

- DHW temperature   **(Ttuv)**
- feeder temperature   **(Tpod)**
- circulation pump temperature   **(Tcir)**
- UFH temperature   **(Tpdl)**

8. Alarms and safeguards

For safety reasons, the PANDA control unit is equipped with a number of safeguards – all alarms are displayed as red LED ALARMs.

8.1 Water temperature in the boiler above 90°C

The display reads – **OVERHEATING**

This alarm is very important – it informs the user of dangerously high water temperatures in the boiler. The alarm is activated by the CH temperature sensor when the water temperature exceeds 90˚C. The LCD background colour changes to RED. The ALARM LED comes on and regulator beeps. During the time the alarm is active (i.e. as long as the temperature is above 90˚C), the feeder and fan are inactive. The circulation pumps engaged in emergency mode to cool the heating system.
The alarm remains on until the temperature drops to 89 ˚C.

8.2 Water temperature in the boiler in range 80 – 90°C

The display reads – **HIGH TEMPERATURE WARNING**

If the water temperature in the boiler is between 80˚C and 90˚C, the alarm warns that there is a danger of OVERHEATING. While the OVERHEATING alarm is displayed, if temperature approaches 90 ˚C, i.e. if the temperature is in the range of 80-90˚C, the LCD will flash red and beep, although combustion will continue in the burner. **This is only an warning alarm and it will not interrupt the combustion process in any way.**

8.3 Feeder overheating

The display reads – **FEEDER TEMPERATURE**

The feeder temperature sensor measures the current screw feeder temperature and safeguards the system against back-burn into the hopper. If the fuel burns back into the hopper and the sensor detects a temperature higher than the temperature set in the FEEDER ALARM in the service menu (recommended FEEDER ALARM temperature – 70°C), the LCD will start to flash red and beep. The regulator will initiate feeding and will feed the burner for the duration of the time set in the FEEDING TIME function (service menu) and will fill the burner full of fuel to smother the fire. The recommended feeding time value is 5 minutes, however, if can be changed. For safety reasons, **the alarm can not be interrupted!**

8.4 Drop in boiler water temperature

The display reads – **TEMPERATURE DROP**

Normally, the regulator monitors the current CH temperature and the desired CH temperature intermittently. The timing of the periodic temperature checks can be set using the SHORTAGE FUEL TIME function (in the service menu). The factory setting is 90 minutes. This means that, if the temperature does not rise by at least 2°C for 90 minutes, the control unit informs the user by beeping and a flashing LCD. You can set any time for signalling this decrease. If this function is not desired, it can be set to OFF using the SHORTAGE FUEL TIME functions.

8.5 Anti-freezing safeguard

The display reads – **FREEZE**

The regulator will automatically start up the circulation pumps if the temperature in the system drops below 5 ˚C to safeguard against freezing.
This alarm changes the display background to dark blue. An audio alarm can be set.

8.6 Emergency thermostat

The display reads – **OVERHEATING**

The control unit is equipped an independent bimetallic sensor – an **emergency thermostat.** This additional temperature sensor works independently from the boiler's CH sensor. It shuts down the feeder and the fan if the temperature rises above 90˚C, and it automatically triggers pumps to start up in order to cool the boiler. In emergency mode, the LCD flashes red and reads **OVERHEATING**. This thermo-safeguard is independent of other safety functions and can be activated concurrently along with other safeguards. If the alarm is activated, the control unit will switch the system to OFF mode and will initiate a shut-off of the feeder and fan. To deactivate the alarm, the system must cool to below 50°C. The user should restart the system by pressing ◎ to put the system back in burning mode. The regulator never starts up automatically!

An additional emergency thermostat is used to safeguard the system against overheating in case the CH sensor is damaged or removed. If the sensor is out of place it cannot track the temperature meaning the overheating alarm cannot work. This alarm shuts down the feeder and the fan. An additional independent thermostat protects the system.

8.7 Defective temperature sensors

If the main CH sensor is damaged, it must be replaced. Combustion in the boiler is not possible without it! If any other sensor is damaged (pumps or feeder) combustion is possible in the boiler in emergency mode – a damaged pump will continue to run (pump start up / shut off is not controlled by temperature). If the feeder sensor is damaged, the temperature is not controlled, it will initiate the damaged feeder alarm. Combustion in the boiler is possible without a sensor. It is also possible to switch the alarm off (the FEEDER ALARM TEMPERATURE can be set to OFF). The moment the heat begins goes back in the direction of the hopper, the regulator will cease to start up feeding for emergency reason to displace the heat. The sensor must be replaced as soon as possible and reset to 70˚C to activate the regulator's feeding procedure in emergencies, or in cases of unexpected or dangerous temperature increases in the screw feeder. Emergency mode will only keep the system in operation for 7 days. After that time the regulator will display alarms and block usage!

Thermal alarms are shown on the control panel display with these warnings:

8.7.1 DEFECTIVE CH – REPLACE - if this text is displayed on the LCD together with beeping + alarm LED ⓘ, the main CH pump sensor is defective. A red LCD will display the current temperature and 000. Further regulator use **is not possible!** Please contact the service hotline on **+420 571 420 926** to order a new sensor. The replacement procedure takes approximately 2 minutes. The sensor is not covered under warranty and the product warranty remains valid after replacing this part. While the CH sensor is damaged, the fan and the fuel feeder are shut down. The CH pump will run with a damaged sensor regardless of the settings.

8.7.2 DEFECTIVE Tpdl. – if this text is displayed on the LCD with beeping + alarm LED ⓘ is on, the UFH pump sensor is defective. If this sensor is defective, you can switch off the alarm and continue to use the system in emergency mode. You can set UFH TEMPERATURE to its maximum value. The pump will run in continuous mode and the alarm will stop automatically. Improper measurements will affect the pump's operation. If the sensor is damaged, the pump will continue to run without its input, i.e. it will run continuously. It is still possible to heat rooms until the damaged sensor is replaced (the regulator can function in emergency mode for up to 7 days). Another way to switch the alarm off is by setting the UFH TEMPERATURE function (service settings) to OFF. The pump will shut down and the regulator will signal a defective sensor.

8.7.3 DEFECTIVE Tcir. – if this text is displayed on the LCD with beeping + alarm LED ⓘ is on, the circulation pump sensor is defective. If the sensor is defective, the alarm can be switched off and the system can continued to be used in emergency mode. Simply set the CIRCULATION PUMP SHUT-OFF TEMPERATURE function (service menu) to the maximum value. The pump will run in continuous mode without input from the damaged sensor and the alarm will switch off. The pump can be used until the damaged sensor is replaced (the regulator can function in emergency mode for up to 7 days). Another way to switch the alarm off is by setting the CIRCULATION PUMP SHUT-OFF TEMPERATURE function to OFF. The pump will shut down and the regulator will signal a defective sensor.

8.7.4 DEFECTIVE Ttuv. – if this text is displayed on the LCD with beeping + alarm LED ⓘ is on, the DHW pump sensor is defective. If the sensor is defective, the alarm can be switched off and the system can continued to be used in emergency mode. Simply set the DHW PUMP SHUT-OFF TEMPERATURE function to the maximum value. The pump will run in continuous mode without input from the damaged sensor and the alarm will switch off. The DHW tank can be heated until the damaged sensor is replaced (the regulator can function in emergency mode for up to 7 days). Another way to switch the alarm off is by setting the DHW PUMP SHUT-OFF TEMPERATURE function to OFF. The pump will shut down and the regulator will signal a defective sensor.

8.7.5 DEFECTIVE Tpod. – if this text is displayed on the LCD, the feeder sensor is defective. For more information see Section 8.7.
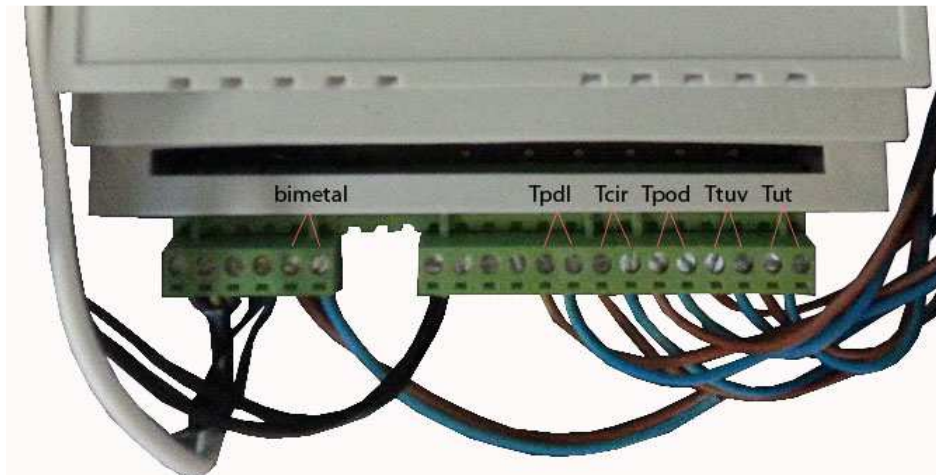

Image 5 – Sensor wiring arrangement

9. Operation modes

The "PANDA" regulator's Calendar function ensures that the system operates at the desired temperature. This function allows the user to set the circulation pump start-up and shut-off temperatures by the hour and day of the week until the end date is reached. The **DAY/NIGHT** mode features a similar setting, although it less time consuming. Day/night mode can be set with the press of a button; night temperatures are set for every night 10.00pm to 6.00am. The use advanced Calendar function and the simple DAY/NIGHT time range function are described below.

9.1 DAY/NIGHT

DAY/NIGHT mode (shown as **D/N** on the regulator's LCD) allows the user to make a simple adjustment for a temperature change from 10.00pm to 6.00am. The adjustment can be an increase or a decrease of as much as10°C.

If an automatic increase / decrease in the CH temperature is desired at night, use the NIGHT ADJUSTMENT function and set a value. When in set in D/N mode, the system makes these automatic adjustments.

This mode is set by pressing ⚙. The value is set so that the LCD reads D/N in the upper right corner. Now the regulator will automatically decrease or increase the temperature to the desired DAY/NIGHT value. This can be set in the regulator menu (the factory setting is -3°C). We do not recommend adjustments of more than 3°C.

9.2 CALENDAR

The Calendar (KAL) function is used to set desired temperature adjustments based on the time and day of the week. Every day of the week can be programmed for every hour of the day. In addition to temperature adjustments, the CH pump, the UFH pump and the circulation pump can started up / shut down. Start-up / shut-off times must be scheduled regularly. When in use, the Calendar function must be set and the regulator must be in **KAL** mode.

To set, press ⚙ and set the CALENDAR function. This function will be displayed on the regulator LCD as KAL.

9.2.1 Calendar settings

To use Calendar settings, find the CALENDAR function in the menu. To change the calendar press OK until the LCD background colour changes to green. This indicates that editing mode is active.

Then, by pressing ▽ or △, the function (day, hour, correction type NOR, EKO, D/N and start up / shut off the CH pump, circulation pump (C) or UFH pump (P)) can be chosen.

E.g. For setting a day, select the function then press OK and use △ or ▽ to select the appropriate day. The change is confirmed by pressing OK. To set a time proceed in the same way. Setting KOR (correction) allows the user to choose from 3 modes: NOR (normal), EKO (ECONOMY SETTING) or D/N (night setting). E.G. If Friday at 5:00 pm is the designated **EKO** setting, the CH pump shuts down and the temperature at that time will decrease by the value set in ECONOMY SETTING function – (this can be set in the menu) and DHW pump will start up, even if it is not set to **ON** in the menu (the Calendar has a higher priority). If the NOR mode and the DHW pump are set to **ON** at 6.00 pm on the same day, there will be no correction, but the DHW pump will start up.

Each hour must be set separately; settings from the previous hours are discontinued!

For others pumps (UFH and circulation) the user can choose (0) to shut down at a specific time or (1) to start up according to the setting temperature – this is done in the same way as in normal mode.
Labelling in the menu: (1) means the pump is running, while (0) means the pump is shut down at a given time.

In this way each day of the week can be set by the hour. e.g. The user can set a unique temperature for 3:00pm to 4:00 pm and, if an adjustment is desired between 4:00 and 8:00pm, each hour must be set individually (i.e. 4:00, 5:00, 6:00 and 7:00 –note– times are given in the 24-hour system, so 16:00, 17:00, 18:00 and 19:00).

9.3 Room thermostat

For more convenient control of the boiler functions, it can be connected to a thermostat in the room being heated. This ensures comfortable room temperatures..

The room thermostat can by connect with a 2-wire cable. Wiring is described in the Control panel installation section. There is a cinch connector (the connector is part of accessories) on the side of the control panel.

The thermostat communicates with the control panel in Start--up/Shut-off signals. The Shut-off signal is when the desired temperature higher than the temperature detected and the Start-up signal is when the room reaches the desired temperature.

Wired or wireless thermostats can be used to provide the start-up/shut-off relay.

9.3.1 Room thermostat operation

To set communication between the thermostat and the control unit press ⚙ to until TERM is displayed in the upper right corner of the LCD.

When the room is heated to the desired temperature, the connectors are in contact and the control unit changes the operating mode to forced MONITORING. Here, the circulation pump is off for 30 seconds and the LED THERMOSTAT on the control panel is on (but the PUMP SHUT-OFF TIME function is still active). If the boiler is in MONITORING mode, the feeder and the fan are switched off. If the boiler temperature reaches 80°C (because the circulation pump does not work), the regulator starts up the pumps regardless of the information from room thermostat (the control unit will override the thermostat). The boiler will never overheat.

If the temperature in the boiler drops below the set minimum CH temperature (in the service menu) - it is 40°C – the control unit will switch from MONITORING mode to REGULATION mode and the boiler will heat back up to the minimum required temperature. The circulation pump is shut off during reheating if the CH pump start-up temperature is set below 40°C. If the CH pump start-up temperature is set higher than 45°C, the pump will shut off. If the thermostat signals that the room temperature is too low and requires reheating, the control unit will switch back to REGULATION mode and the circulation pump will be initiated to reheat the room to the desired temperature.

9.3.2 Room thermostat installation

The thermostat signals the system to heat or shut off. If the thermostat contacts are not touching the signal is to HEAT. If they are open, the signal is DO NOT HEAT.
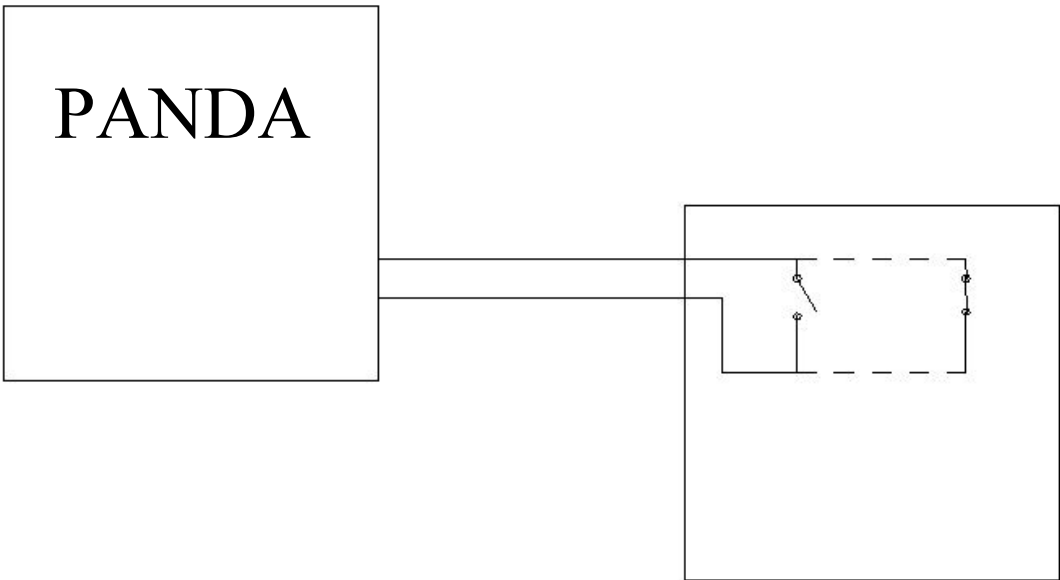
Figure 4 – Diagram of room thermostat installation

The thermostat signals the regulator. A HEAT signal is sent if is thermostat contacts are closed and a DO NOT HEAT signal if they are open. In this case a rely must be added to ensure the thermostat shuts off when there is an open circuit (HEAT signal). When the room temperature reaches the thermostat setting, the thermostat will shut off – it disconnects the power relay, which switches to ON (DO NOT HEAT signal).

PANDA

Figure 5 - Thermostat wiring arrangement with relay
(negation of thermostat – reversed state open / closed)

10. Explanation of configuration parameters
10.1 Main menu parameters

Required water temperature in CH
When the temperature is reached, the system will switch to the MONITORING mode and will maintain the desired temperature.

Night settings
Temperature adjustments may be set to decrease the regular daytime temperature between the hours of 10:00 pm and 6:00 am. The maximum temperature variation is ±10°C. D/N mode must be initialized to use this setting.

Economic correction
Temperature adjustments may be set to decrease the regular temperature by as much as 10°C. EKO mode must be initialized to use this setting.

CH pump switch-on temperature
The CH circulator pump engages when the value set in °C is exceeded. The pump shuts down below this temperature – there is a lag of 3°C.

DHW pump shut-off temperature
This value, set in °C, is setting the desired temperature in the DHW boiler. When the temperature is reached, the regulator shuts DHW pump down. If the temperature drops by 3°C, the regulator engages the pump and the water will is heated back to the required temperature.

Feeding time
This value is length of time the burner is fed fuel. It is set in seconds.

Feeding idle time
This is the length of time that the feeder is idle, i.e. the burner is not fed.

Feeding repetitions (in monitoring)
In the monitoring mode is this value setting the multiple for fuel feeding. E.g. If the value is set to 3, then after every 3th blow throw of the fan will feeder feed the burner. You can set this value in FEEDING TIME function. More is described in chapter 5.5

Fan engagement period (in monitoring)

This is the length of time that the fan blows when in MONITORING mode, e.g. if the **Fan engagement period** value is set at 5 minutes, then the fan will blow air for 5 minutes and then go idle for the duration of the **Fan idle time** setting. It is possible to set this value to OFF. More is described in Section 5.5

Fan idle time (in monitoring)

This MONITORING mode value is the setting for desired length of time that the fan is to be idle. When the idle time has expired, the fan will engage for the length of time set in the **Fan engagement period**. More is described in Section 5.5

Fan speed

Speed of the fan in %. This is used only in HEATING mode or REGULATION mode. The speed is set according to the type of fuel being burned. The higher the heating value of the fuel, the higher the recommended fan speed.

Fan speed in monitoring

Fan speed in % indicates the blow force in MONITORING mode. This is described in Section 5.

Regulator shut-off temperature

The control unit switches to BURN-OUT mode when this value is reached. There is a 5-minute delay before switching to this mode.

Manual feeding

In this function allows the user to start up feeding by pressing ⏻; by pressing ⬅BACK the user can start up the fan, and the circulation pump can be started up by pressing ⚙. If the fan is active the user can control the speed by pressing 🔼 or 🔽. Pressing the button repeatedly will cancel the command.

Service

The service menu is accessed with Service. Described in Section 7.2

Reset to factory defaults

Factory settings can be restored at any time. If the RESTORE TO FACTORY DEAFAULTS function is selected and OK is pressed, the selection must be confirmed by choosing YES or NO with the help of 🔼 or 🔽 and then OK to confirm. After selecting YES, the control unit returns to its factory settings.

CAUTION: Restoring factory settings does not return the values in the SERVICE function!

Date and time settings

More is described in Section 4.6, Date and time settings.

Calendar settings

More is described in Section 9.2, Calendar.

10.2 Service menu parameters

Language

The desired language can be set using this function.

Minimum temperature

This is the minimum temperature to which boiler can be adjusted (if a room thermostat is being used, the boiler is maintains this minimum temperature).

Maximum temperature

This is the maximum temperature to which boiler can be adjusted.

Lag

This is a value in °C. It is the number of degrees the boiler temperature can slip below the desired temperature set in the MONITORING mode before the regulator switches to REGULATION mode. E.g. If a lag temperature is set to 1°C and desired boiler temperature is 60°C, the regulator will switch from MONITORING mode to REGULATION mode at 59°C.

Minimum fan speed

This is a value given in % (of fan speed). It is the lowest possible fan speed. It is only set on custom fans.

Maximum fan speed

This is a value given in % (of fan speed). It is the highest possible fan speed. It is only set on custom fans.

Finding fuel check interval

This is a value given minutes. If the temperature value does not increase by at least 2°C, the alarm will engage. This alarm can be disabled by pressing ▼ to OFF in service settings.

Pump down time

This function is only available when the room thermostat is being used and regulator is in TERM mode. When the desired temperature is reached in the room, the CH pump runs for 30 seconds after the LED THERMOSTAT comes on, then it shuts down for the duration of time set in the PUMP DOWN TIME function. When this time has elapsed, the pump starts up and runs for another 30 seconds and then shuts down for the duration of the DOWN TIME. This continues until the thermostat does not detect a room temperature lower than the one that has been set.

DHW priority switching on/off

This function is described in Section 6.2.1. CH and DHW pump operation

Feeder temperature alarm

If the hopper temperature sensor detects a high or low temperature, the alarm is activated and the feeder is switched to the time set in the FEEDING TIME function as it feeds fuel to the burner. Feeding cools the feeder, prevents back-burn and also performs an extinguishing function.

Feeding time

This is the time during which the feeder is feeding fuel to the burner. It is also used if the feeder temperature exceeds the temperature set for the hopper. This temperature can be set in FEEDER ALARM TEMPERATURE function.

Heating time

This is the time limit in order to reach the desired boiler temperature. If the desired temperature is not reached, the regulator will switch from HEATING mode to MONITORING mode.

Burn-out time

This is the time it takes to switch the regulator to MONITORING mode if the temperature drops below the REGULATOR OFF TEMPERATURE.

Circulation pump deactivation

The temperature is set at °C. When this temperature is reached, the circulation pump is shut down.

UFH pump temperature

When the temperature at °C is reached, the UFH pump is shut down.

11. Safety instructions

1. Do not expose the control unit to water, a humid environment or temperatures above 40°C.
2. If the unit is not being used put it back into the box to avoid protect it from humidity.
3. When connecting or disconnecting attached devices, disconnecting the control unit or changing fuses, disconnect the control unit from the power network.
4. In the event of storms or lightning, disconnect the control unit from power network.
5. If there are problems or questions during installation, contact the manufacturer. The technical support telephone number can be found on the front page of this manual.
6. Installation of the control unit must be undertaken by an authorized person. Improper installation, in particular in connecting the equipment, may cause damage to the control unit.

12. Troubleshooting

FAULT	SOLUTION
The power button is switched on but the LCD or LED are not lit.	Damaged Fuse CAUTION: The fuse must be replaced with a new one of the same amperage is the same. The fuse type is shown on the control unit.
The fan does not work even though LED indicator is on	Damaged sensor or emergency thermostat exceeded 90 ° Wait for the boiler to cool down. Check fuses. Check all connector wiring– bad connections
Alarm activation of some of the sensors	Find out which sensor is damaged. The warning message is on the LCD display. Information is given in Section 8.7 Contact the manufacturer.
Temperature measurement error	Check the for sensor contact with the mounting surface. Contact the manufacturer.
Room thermostat responds in reverse	Follow the instructions and connect the room thermostat correctly, Section 7.1 Connect the relay for proper operation.
The display shows only dashes	Disconnect the unit from power supply and reconnect.
The sensor cable is too short	The sensor can be set to 2-wire cable.

13. Recommended settings for various output burners and various types of fuel

13.1 Maximum burner outputs

	universal burner 27 kW		universal burner 35 kW	
	brown coal	wood pellets	brown coal	wood pellets
feeding time	12	6	6	L9
feeding idle time	30	10	8	6
fan speed	22	23	39	38
min. speed - SERVICE	20	20	20	20
max. speed - SERVICE	52	51	51	51

	universal burner 60 kW		universal burner 90 kW	
	brown coal	wood pellets	brown coal	wood pellets
feeding time	5	5	10	10
feeding idle time	15	8	15	8
fan speed	30	32	30	30
min. speed - SERVICE	30	30	30	30
max. speed - SERVICE	43	50	50	50

13.2 Minimum burner outputs

	universal burner 27 kW		universal burner 35 kW	
	brown coal	wood pellets	brown coal	wood pellets
feeding time	5	8	6	8
feeding idle time	54	66	41	50
fan speed	25	13	28	16
min. speed - SERVICE	20	20	20	20
max. speed - SERVICE	36	28	45	30

	universal burner 60 kW		universal burner 90 kW	
	brown coal	wood pellets	brown coal	wood pellets
feeding time	7	8	10	8
feeding idle time	35	28	30	20
fan speed	34	20	30	20
min. speed - SERVICE	20	20	20	20
max. speed - SERVICE	45	50	50	50

CAUTION! It is not necessary to set min or max fan speeds for the PANDA regulator. Fan speed is regulated automatically unless custom fans have been installed. This setting is enabled only when the fan is off and unplugged from regulator.

14. Recommended boiler installation

14.1 Hydraulic installation arrangement with 4-way mixing valve
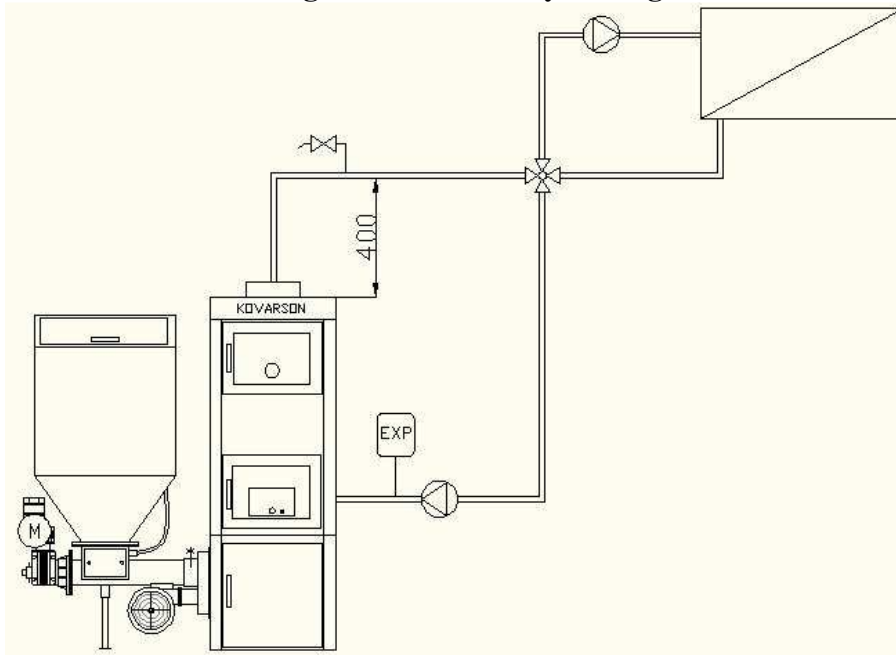
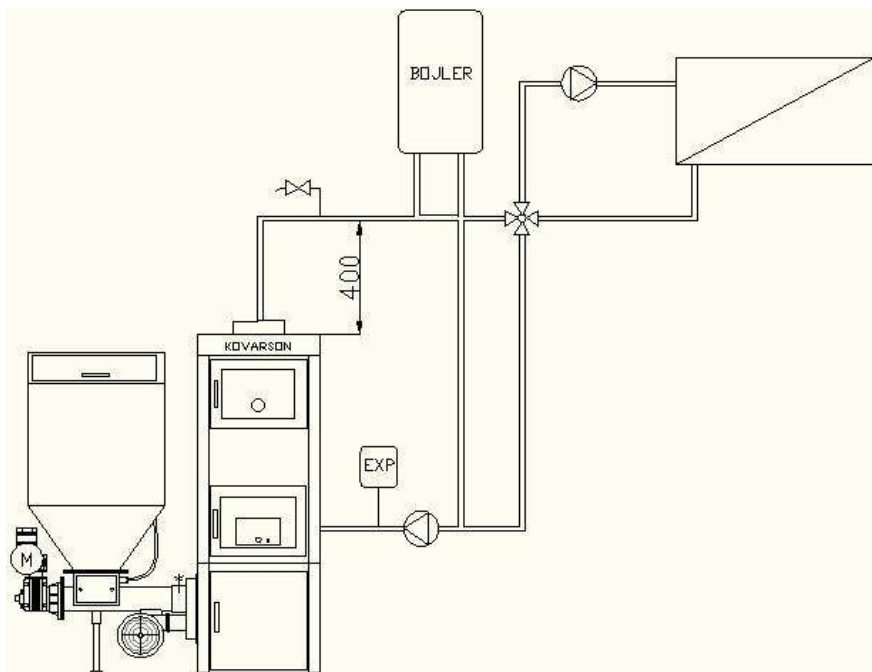Figure 6 Installation arrangement without DHW

Figure 7 Installation arrangement with DHW

We recommend 4-way mixing valves manufactured by KOMEXTHERM – DUOMIX.

Certain conditions must be met when installing 4-way mixing valves. Firstly, it must be placed at least 300 - 400mm above the boiler output; if the ceiling height in the boiler room permits, the further, the better. Based on experience, it is recommended to install the circulation pump at a distance of about 500 mm behind the mixer, according to the manufacturer's instructions.

If the CH system is gravity fed, installation of pumps is not necessary.

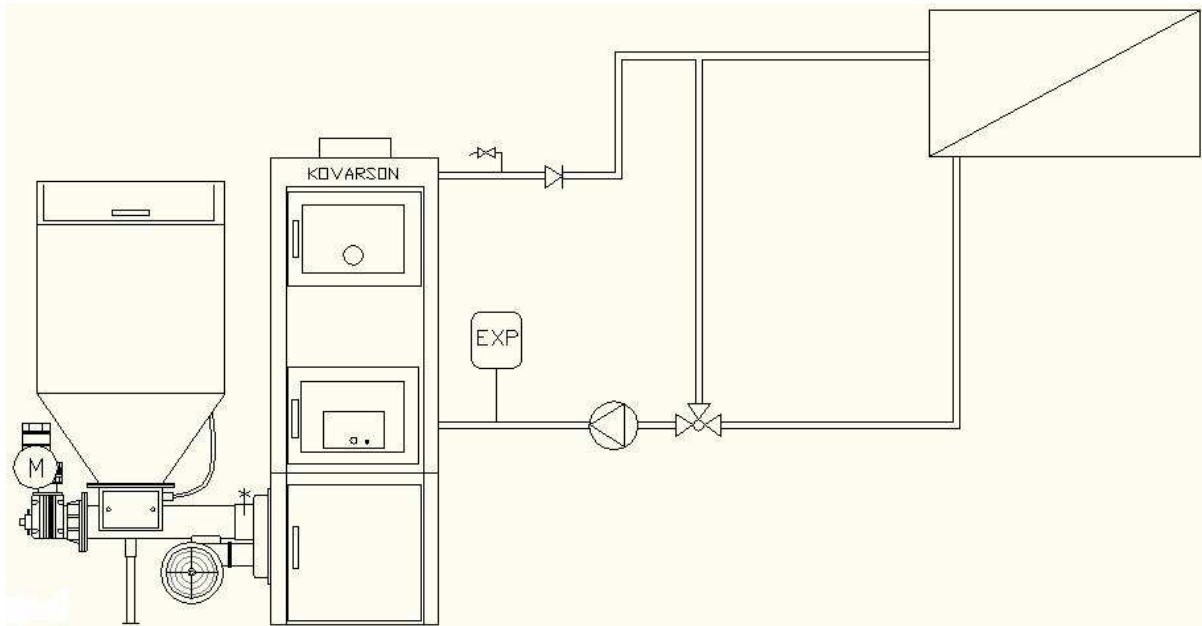## 14.2 Hydraulic installation arrangement with 3-way mixing valve

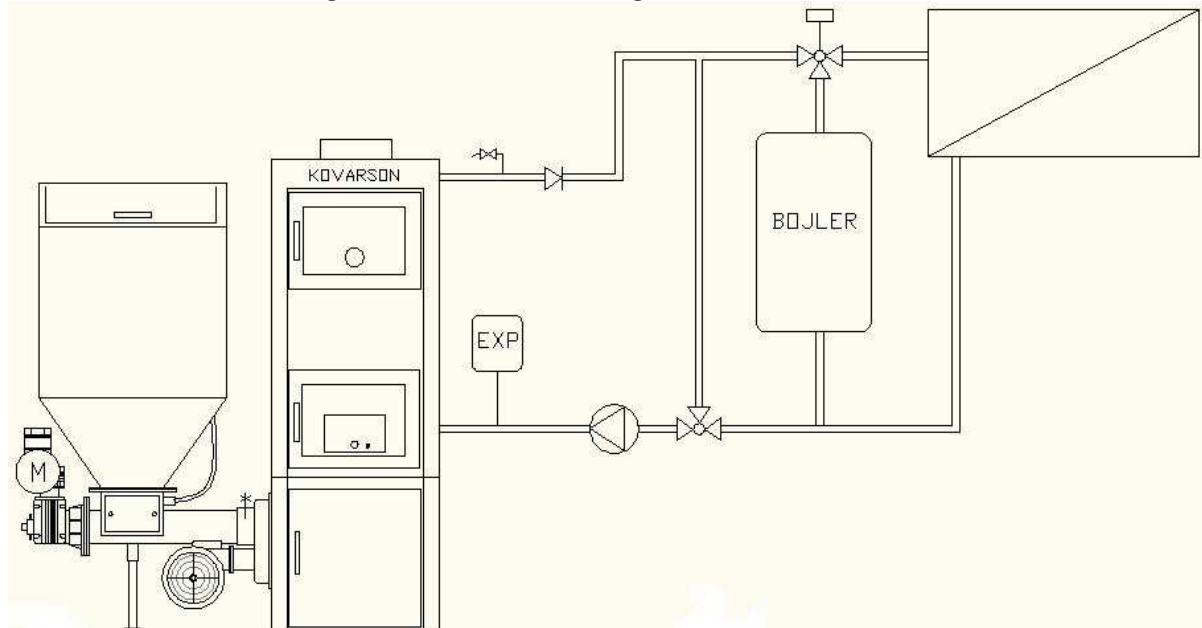Figure 8 Installation arrangement without DHW

Figure 9 7 Installation arrangement with DHW

We recommended mixing valves manufactured by ESBE.

- thermostat valve - VTC312 series (outer thread)

Minimum temperature of returning water 45 °C – **10 - 20kW**

- thermostat valve - VTC512 series (outer thread)

Minimum temperature of returning water 50 °C – **25kW – 60kW**

15. Please note

1. If the burner is placed in a corner, fan speed must be decreased to blow less.
2. For proper combustion it is necessary for the burner and boiler to be properly warmed up. The required boiler temperature is above 50°C.
3. If the burner door is opened, there should be no smoke! If smoke appears, change the air intake. A smoking burner is a sign of too much fuel and too little air (SOLUTION – decrease the fuel or increase the fan speed)
4. The burner output also depends on the quality of fuel. If the boiler cannot reach the desired temperature, more fuel and air must be added. If there is unburned fuel in the ash pan, reduce the fuel level and the fan speed. The more unburned material there is, the more air there is, and, conversely, the less material, the less air.
5. The feeder motor operating temperature is **80°C!** A thermal fuse safeguards the motor against overheating.

15.1 Important information for the first use

1. The burner must be properly resealed according to the instructions. Gaskets must be inserted between the fan and the hopper flange. We recommend engine sealant.
2. Ensure that the fuel level reaches the upper air vents near the burner (about 2 cm below the top edge of the burner). Wood pellets work best for the initial fire-up.
3. Use liquid or solid fire starters to start the fire.
4. Let it burn without air for 3 minutes, then run the fan, set the system to 10% output and wait for the pellets/coal to glow throughout the burner.
5. The system will automatically switch to BURNING. Set feeding to minimum (e.g. feeding time 5 seconds, feeding idle time roughly 40 seconds and fan speed at10%) and also fan speed to minimum, until the boiler reaches operating temperature (60°C – 80°C), then set the nominal output, see Section 13.1.

KOVARSON