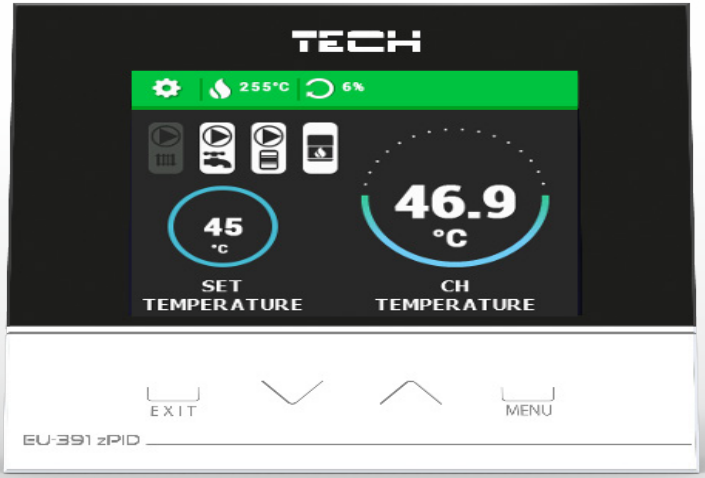
TECH CONTROLLERS

# USER MANUAL

# EU-391 zPID

EN




www.tech-controllers.com

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KN.2020.06.09

# I. Safety

Before using the device for the first time the user should read the following regulations carefully. Not obeying the rules included in this manual may lead to personal injuries or controller damage. The user's manual should be stored in a safe place for further reference. In order to avoid accidents and errors it should be ensured that every person using the device has familiarized themselves with the principle of operation as well as security functions of the controller. If the device is to be sold or put in a different place, make sure that the user's manual is there with the device so that any potential user has access to essential information about the device.
The manufacturer does not accept responsibility for any injuries or damage resulting from negligence; therefore, users are obliged to take the necessary safety measures listed in this manual to protect their lives and property.

**WARNING**

- High voltage! Make sure the regulator is disconnected from the mains before performing any activities involving the power supply (plugging cables, installing the device etc.)
- The device should be installed by a qualified electrician.
- Before starting the controller, the user shoud measure earthing resistance of the electric motors as well as the insulation resistance of the cables.
- The regulator should not be operated by children.

**WARNING**

- The device may be damaged if struck by a lightning. Make sure the plug is disconnected from the power supply during storm.
- Any use other than specified by the manufacturer is forbidden.
- Before and during the heating season, the controller should be checked for condition of its cables. The user should also check if the controller is properly mounted and clean it if dusty or dirty.

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Changes in the merchandise described in the manual may have been introduced subsequent to its completion on 09.06.2020. The manufacturer retains the right to introduce changes to the structure. The illustrations may include additional equipment. Print technology may result in diff erences in colours shown.

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We are committed to protecting the environment. Manufacturing electronic devices imposes an obligation of providing for environmentally safe disposal of used electronic components and devices. Hence, we have been entered into a register kept by the Inspection For Environmental Protection. The crossed-out bin symbol on a product means that the product may not be disposed of to household waste containers. Recycling of wastes helps to protect the environment. The user is obliged to transfer their used equipment to a collection point where all electric and electronic components will be recycled.

# II. Description

EU–391 temperature regulator with a throttle is intended for controlling the combustion process in a home fireplace. It controls the CH pump, additional pumps (DHW or floor pump), throttle and a voltage-free output (controlling an additional device).

Functions offered by the controller:

- control of CH pump
- control of additional DHW or floor pump (the pump type selected by the user)
- control of throttle
- contactor switching the gas furnace on and off, depending on the pre-set temperature of the circulating water including hysteresis
- zPID control
- buffer pump

Controller equipment:

- large, colour LCD display
- flue gas temperature sensor
- DHW temperature sensor
- CH temperature sensor
- throttle
- buffer sensor top
- buffer sensor bottom

# III. Installation

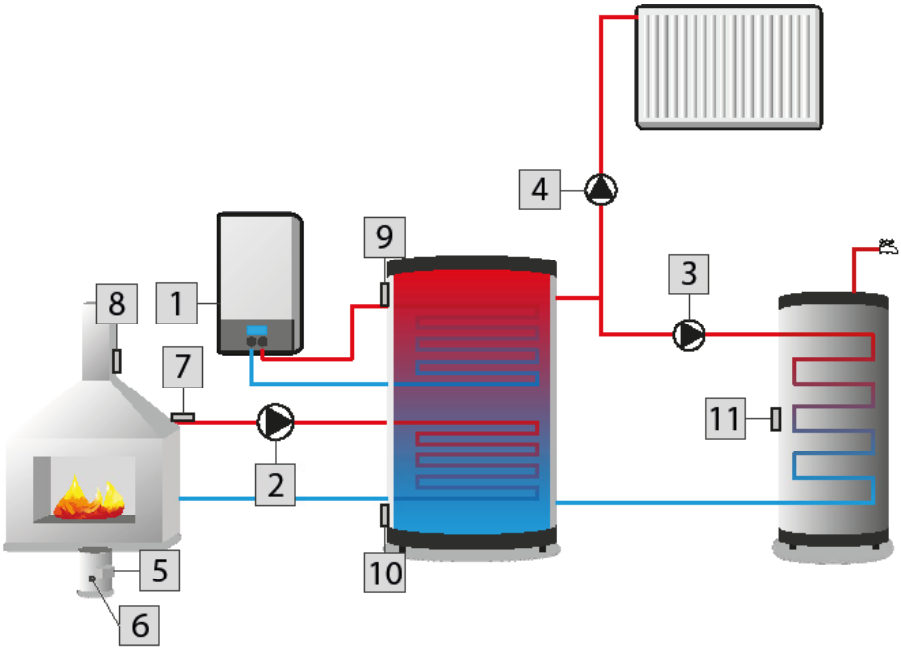
The controller should be installed by a qualified person.

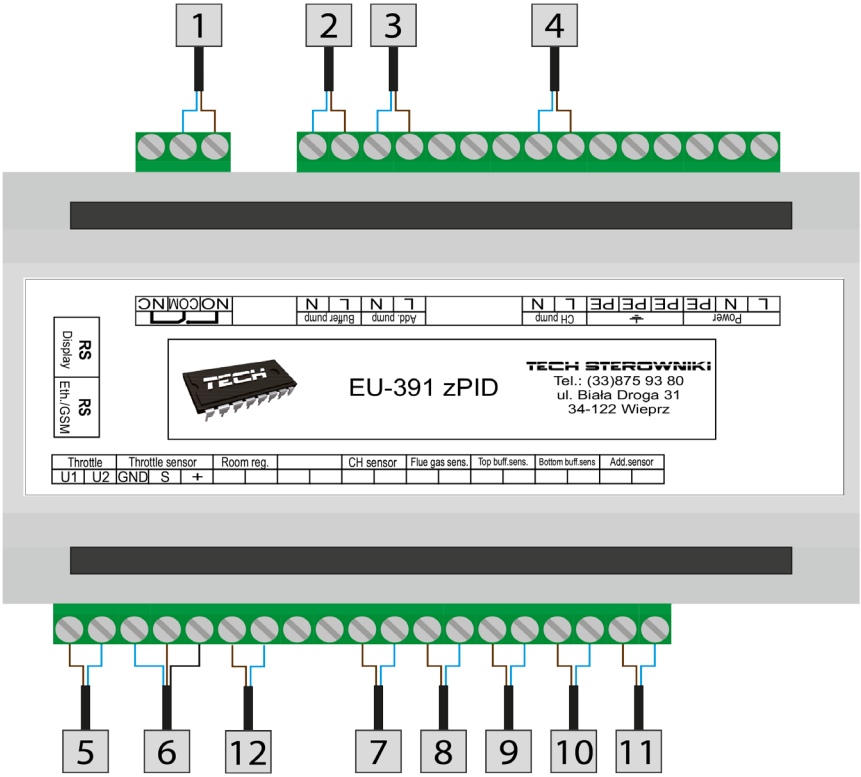
**WARNING**

Risk of fatal electric shock from touching live connections. Before working on the controller switch off the power supply and prevent it from being accidentally switched on.

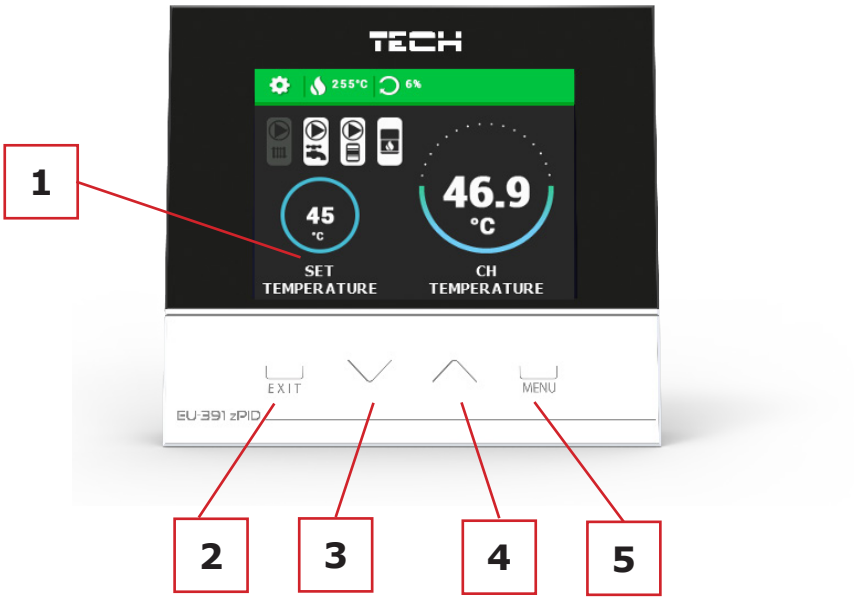
**WARNING**

Incorrect connection of the wires may lead to controller damage!



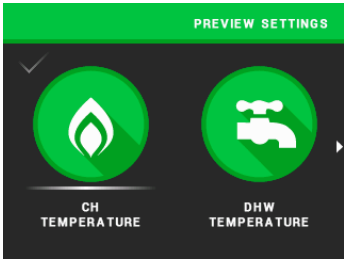

1
2
3
4
NO COM NC
Buffer pump
Add. pump
CH pump
Power
RS
Display
RS
Eth./GSM
EU-391 zPID
TECH STEROWNIKI
Tel.: (33)875 93 80
ul. Biała Droga 31
34-122 Wieprz
Throttle
U1 U2
Throttle sensor
GND S +
Room reg.
CH sensor
Flue gas sens.
Top buff.sens.
Bottom buff.sens
Add.sensor
5
6
12
7
8
9
10
11

# IV. How to use the controller



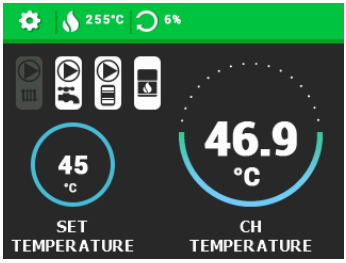

1. Controller display
2. EXIT button - in the main screen view it is used to open up the screen view selection panel. In the menu it is used to exit the menu and cancel the settings.
3. MINUS button - in the main screen view it is used to decrease the pre-set valve temperature. In the menu it is used to navigate through menu options and decrease the edited value.
4. PLUS button - in the main screen view it is used to increase the pre-set valve temperature. In the menu it is used to navigate through menu options and increase the edited value.
5. MENU button - it is used to enter the menu and confirm the settings.

Press EXIT button to select the operating parameters to be displayed:

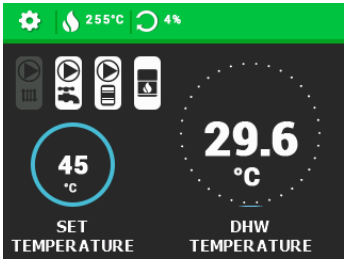



The user may choose from the following screen views:

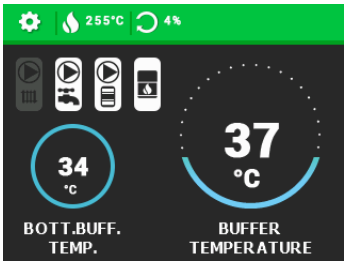
- CH temperature



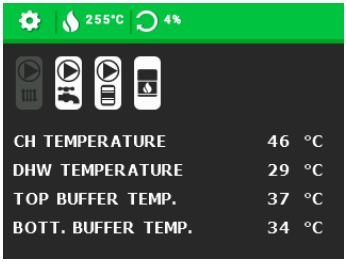

- Floor temperature - DHW temperature. (alternatively, depending on the type of additional pump selected)

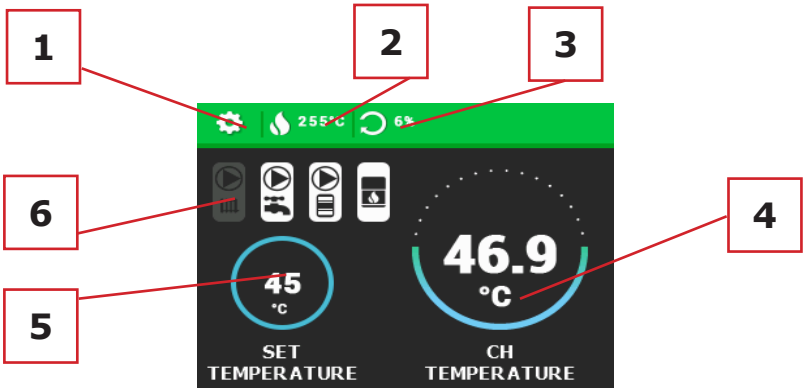



- Buffer temperature




- Sensors preview






1. Controller operation modes - the icons are explained in the table below:

| Icon | Mode | Icon | Mode | Icon | Mode |
|---|---|---|---|---|---|
| | Fireplace damped | | Flue gas sensor test | | Supervision |
| | Alarm | | Fire-up | | Operation |
| | Fire-up failure | | Damping | | Blow-by |

2. Current flue gas temperature
3. Degree of throttle opening
4. CH temperature (depending on the screen view other parameters may be displayed)
5. Pre-set CH temperature (depending on the screen view other parameters may be displayed)
6. Icons indicating current status of controlled devices - highlighted icon indicates that the device is active:

| Icon | Device | Icon | Device | Icon | Device |
|---|---|---|---|---|---|
| | Additional contact | | Buffer pump | | Additional pump - DHW pump |
| | CH pump | | Additional pump - floor pump | | |

# V. Principle of operation - operation stages

**1. Fire-up**

This phase starts when the fire-up function is selected in the controller menu, and lasts until CH temperature reaches at least 40ºC and the flue gas temperature reaches at least 100ºC (default fire-up threshold), provided that the temperature does not drop below these values for 4 minutes (default fire-up time). If these conditions are met, the controller enters operation mode. If the controller fails to reach proper parameters to enter operation mode within the pre-defined time, an icon indicating fire-up failure is displayed in the left upper corner of the screen (see: table above). In such a case, the fire-up process must be started again.

**2. Operation**

Once the fire-up process is completed, the controller enters operation mode. It is the primary mode of controller functioning when the throttle operation is regulated with PID algorithm, oscillating around the pre-set temperature defined by the user. Instead of Fire-up function, Throttle ON/OFF appears in the menu. The throttle may be disabled if necessary (e.g. while adding fuel) - then the throttle closes completely.

**3. Supervision**

This mode is activated automatically when the temperature exceeds the pre-set value by more than 5ºC in operation mode. In such a case, the controller closes the throttle completely to reduce the temperature of circulating water.

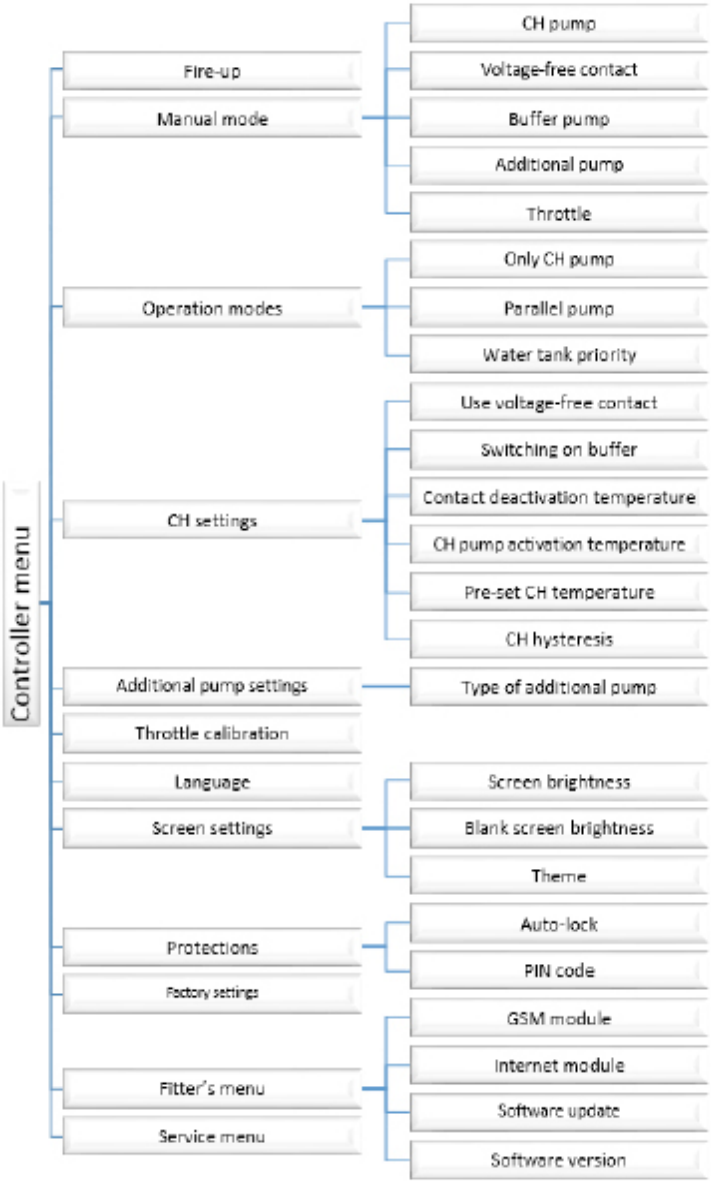
**4. Damping**

If damping conditions are met, the controller enters blow-by phase and the throttle closes completely. After blow-by phase, the controller enters damped mode. Damping process may also be activated by disabling the throttle in the main menu.

# VI. Controller menu

## VI.a) Block diagram

Due to a wide range of functions offered by the controller, the menu is divided into Main Menu and Fitter's menu.



## VI.b) Fire-up (Throttle ON/OFF)

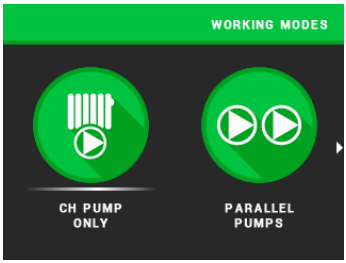
The aim of this function is to achieve optimum flame in the shortest time possible.The fire-up effectiveness is enhanced by throttle operation. This phase lasts until CH temperature reaches a pre-defined value required to enter the operation mode.
Once the controller enters operation mode, instead of Fire-up function, Throttle ON/OFF appears in the menu. The throttle may be disabled if necessary (e.g. while adding fuel) - then the throttle closes completely. Damping process may also be initiated by disabling the throttle.

## VI.c) Manual mode

The regulator offers manual mode function. In this function, each executive device may be activated and deactivated independently of others ( CH pump, voltage-free contact, additional pump, buffer pump). Additionally, the throttle position may be adjusted manually by changing the degree of opening in percentages. The throttle will start changing its position about 2 seconds after the change has been introduced.

## VI.d) Operation modes

This function is used to select the operation mode of the pump.




**NOTE:**
Water tank priority mode is available only for DHW pump (see: Additional pump settings submenu).

### VI.d.1) Only CH pump

When this function is selected, the controller enters house heating mode and controls only the CH pump (additional pump is inactive). CH pump is activated when the temperature is above the pump activation threshold (factory setting: 30ºC). Below this temperature value (minus hysteresis) the pump is disabled.

### VI.d.2) Parallel pumps

In this mode the pumps are enabled above the pump activation temperature measured by CH sensor. The temperature values may differ depending on pre-set parameters. It may result in different activation times, but when the temperature exceeds both these threshold values, both pumps will be active. CH pump operates all the time and additional pump is enabled when its activation conditions are met.

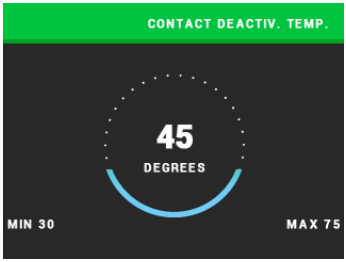
### VI.d.3) Water tank priority

This function is available only when DHW pump is selected as additional pump.
When the pre-set DHW temperature has been reached, DHW pump is switched off and the CH pump is activated.
CH pump operates continuously until the water tank temperature drops below the pre-set value minus DHW hysteresis. Then, the CH pump is disabled and the DHW pump is activated (in this mode the pumps operate alternately). This mode involves heating domestic hot water before heating water in the radiators.

**WARNING**
Return valves should be installed on the circuits of the CH and DHW pumps. The valve on DHW pump prevents hot water from being sucked out of the water tank. The valve on the CH pump circuit prevents the hot water heating the water tank from passing to the house heating installation.

# VI.e) CH settings

CH settings enable the user to activate (or deactivate) voltage-free contact and buffer sensor. If buffer sensor is active (Switching on buffer option selected), the pump is enabled when CH temperature exceeds activation temperature and is higher than buffer temperature by hysteresis value. Otherwise, the pump remains inactive.




The regulator has a voltage-free output which opens (or closes) contact when CH temperature reaches the value preset by the user. The setting range for this parameter is 30÷75ºC.
Voltage-free contact may be used to activate an external heating device or initiate fire-up process in a pellet-fired boiler.

**NOTE**

Voltage-free contact operation depends on CH sensor readings unless buffer is switched on. If buffer is switched on, the controller uses readings from the buffer sensor top

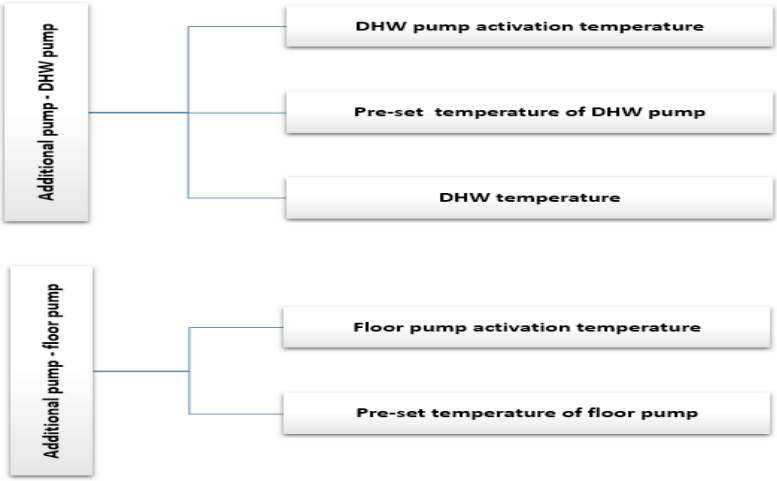
The user may also change CH pump activation temperature. It is the threshold temperature value of pump activation. CH pump operates continuously until CH temperature drops below the activation temperature minus CH hysteresis.

Additionally, CH hysteresis value may also be customised to suit individual needs. Hysteresis is the difference between the temperature of CH pump activation and the temperature when the CH pump is disabled (e.g. when activation temperature is 40ºC, hysteresis is 2ºC, the pump is disabled when CH temperature drops to 38ºC).

# VI.f) Additional pump settings

Additional pump settings enable the user to select the type of additional pump : floor pump / DHW pump. The type of pump influences the range of temperature settings and protections in case of alarms.

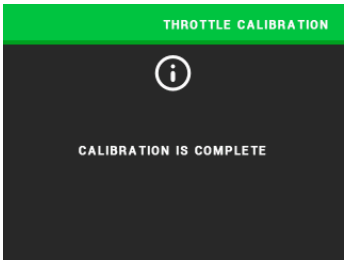
In the case of DHW pump, the user may change its activation temperature. It is the




threshold temperature at which the pump is enabled (the temperature measured by additional sensor). The pump remains active until the temperature reaches the pre-set value. Additionally, the user may adjust hysteresis of additional pump if DHW pump is selected. In the case of floor pump, the user may preset the minimum temperature of the sensor which is necessary for pump activation and the maximum temperature above which the floor pump is disabled.

## VI.g) Throttle calibration

Throttle calibration is performed automatically every few hours (and every time the controller is switched on). This function is used to activate throttle calibration manually. Once this option is selected, the throttle moves slightly above its current position, reaches '0' position and moves back to its original position.


**NOTE**

Check regularly if the throttle is unobstructed. An obstructed throttle may have negative impact on combustion process.

Mechanical damage caused by dirt or foreign matter entering the air duct, which may lead to throttle blocking, is not covered by warranty repair.

## VI.h) Language

This function is used to select the language version of the controller.

## VI.i) Screen settings

These parameters are used to adjust the screen layout.

### VI.i.1) Screen brightness

This parameter is used to adjust screen brightness during operation.

### VI.i.2) Blank screen brightness

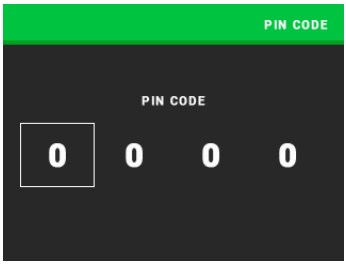
This parameter is used to adjust screen brightness after some time of inactivity.

### VI.i.3) Theme

This submenu enables the user to choose the display colour. The following colours are available: orange, blue, green and red.

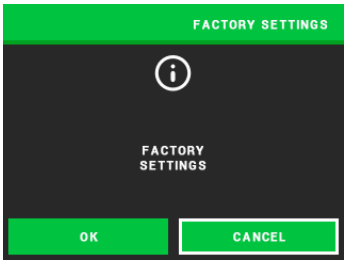
## VI.j) Protections

This function enables the user to set up menu access protection. Once Auto-lock function is selected, access to the menu is possible only after entering a 4 digit PIN code - 3142. PIN code may be changed by the user in PIN code submenu.



## VI.k) Factory settings

The controller is pre-configured for operation. However, the settings should be customized to the user's needs. Return to factory settings is possible at any time. When the factory settings option is activated, all customized settings of fireplace controller are lost and replaced with the manufacturer's settings. Then, the parameters may be customized anew.




## VI.l) Fitter's menu

Fitter's menu settings should be configured by a qualified person.

### VI.l.1) GSM module

**NOTE**
This type of control is available only after purchasing and connecting an additional controlling module ST-65 which is not included in the standard controller set.

GSM Module is an optional device which, cooperating with the fireplace controller, enables the user remote control of the CH boiler operation via mobile phone. The user is sent an SMS each time an alarm occurs. Moreover, after sending a certain text message, the user receives feedback on the current temperature of all the sensors. Remote change of the pre-set temperatures is also possible after the authorisation code is entered.

GSM Module may operate independently of the fireplace controller. It has two additional inputs with temperature sensors, one contact input to be used in any configuration (detecting closing/opening of contacts) and one controlled output (e.g. a possibility of connecting an additional contractor to control any electric circuit).

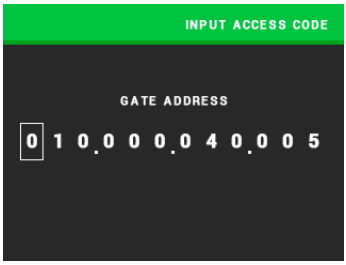
When any of the temperature sensors reaches the preset maximum or minimum temperature, the module automatically sends an SMS message with such information.

A similar procedure is used in the case of opening or closing of the contact input, which may be used as a simple means of property protection.

If the GSM Module is to be used with the ST-391 controller, it should be activated by selecting ON option (MENU>Fitter's menu>GSM Module>ON).

## VI.I.2) Internet module

**NOTE**
This type of control is available only after purchasing and connecting an additional controlling module ST-505 which is not included in the standard controller set.




Internet module is a device enabling the user remote control of the CH boiler via the Internet at www.emodul.pl. The user controls the status of all fireplace system devices on the home computer screen and the operation of each device is presented in the form of animation.

Apart from the possibility to view the temperature of every sensor, the user can change the pre-set temperature values. The installation process is intuitive. Connect the module and go to Fitter's menu of the main controller to activate the Internet module (Menu>>Fitter's menu>>Internet module>>ON). Once Registration option is selected, the device generates a code which must be entered on the website.

**NOTE**
The code is valid for 60 minutes. If the user fails to register on the website within this time, anew code must be generated.

Internet module parameters such as IP address, IP mask, gate address etc may be set manually or by selecting DHCP option.

## VI.I.3) Software update

**NOTE**
PSoftware update must be conducted by a qualified fitter. Once the process is over, it is not possible to restore previous settings.

In order to install new software, insert the memory stick with new software into USB port. Select Software update in the controller menu.

## VI.I.4) Software version

When this function is selected, the display shows the controller manufacturer's logo and the software version.

| | |
|---|---|
| Power supply | 230V ± 10% / 50Hz |
| Power consumption | 4W |
| Ambient temperature | 5°÷50°C |
| Maximum output load of pumps | 0,5A |
| Potential-free cont. nom. out. load | 230V AC / 0,5A (AC1) *<br>24V DC / 0,5A (DC1) ** |
| Thermal resistance of sensor KTY | -30÷99°C |
| Thermal resistance of flue gas sensor | -30÷480°C |
| Fuse link | 2x3,15A |

* AC1 load category: single-phase, resistive or slightly inductive AC load.
** DC1 load category: direct current, resistive or slightly inductive load.

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# EU Declaration of conformity

Hereby, we declare under our sole responsibility that **EU-391 z PID** manufactured by TECH STEROWNIKI, head-quartered in Wieprz Biała Droga 31, 34-122 Wieprz, is compliant with Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits (EU OJ L 96, of 29.03.2014, p. 357), Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of Member States relating to electromagnetic compatibility (EU OJ L 96 of 29.03.2014, p.79), Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products as well as the regulation by the MINISTRY OF ENTREPRENEURSHIP AND TECHNOLOGY of 24 June 2019 amending the regulation concerning the essential requirements as regards the restriction of the use of certain hazardous substances in electrical and electronic equipment, implementing provisions of Directive (EU) 2017/2102 of the European Parliament and of the Council of 15 November 2017 amending Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (OJ L 305, 21.11.2017, p. 8).

For compliance assessment, harmonized standards were used:
**PN-EN IEC 60730-2-9:2019-06, PN-EN 60730-1:2016-10**.

Wieprz, 09.06.2020

Paweł Jura Janusz Master

Prezesi firmy

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