IR 12 Heating Controller

IR12_CTC400

Valid for FW 2.12

Technical Description of IR 12 Heating Controller
Ver. IR12 CTC 400

IR 12 Heating Controller (ver. IR12 CTC 400) is a controller of heating systems with a CTC heat pump and solar thermal system. The controller can handle 2 heating zones with a mixing valve, DHW heating by a heat pump, DHW heating by an el. heating element and it can control a backup source (electric or gas-fired boiler).

IR 12 Heating Controller is controlled by 6 keys. Information is shown on a 4-line display. The Controller features 13 inputs for temperatures measured (by Pt 1000 temperature sensors) one universal input for a switch (r.g. a room thermostat) and one input for Ripple control signal. Further it features 10 relay outputs (250V 3A) and two triac outputs (250V 1A) capable of continuous control of circulation pumps.
The Controller is fitted with an Ethernet interface a service intervention, firmware upgrades and eventually elementary visualization of the concerned heating system. The Controller also features an RS 232 and RS485 communication interfaces. As an option, an OpenTherm module can be connected to the Controller for communication with a heat source.
This Controller controls CTC Heat Pumps.

1 How to operate IR 12 Controller

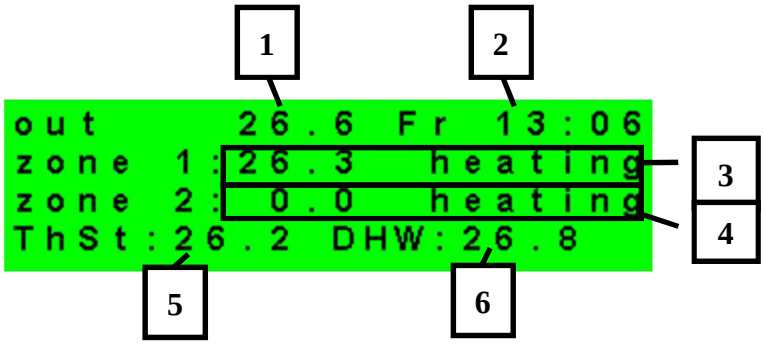
The controller is operated using 6 keys ◄, ►, ▲, ▼, **C**, **OK** on its front panel.
The **DISP** key switches between User and Service display.

Note: The Service display is intended to show info on the Controller itself and therefore it is not needed during common operation.

The keys ▲, ▼ are used to browse in the menu. In order to edit a parameter, press **OK** and a cursor appears on the parameter. The values of numeric parameters can be increased/decreased by pressing ▲ / ▼ keys. Selection parameters (e.g. ON/OFF) are chosen by pressing keys ◄, ►. When finished, pressing **OK** will move the cursor to the next parameter in the same display. Parameter editing can be also exited without saving by pressing the key **C**.

1.1 Basic User Menu

Pressing **C** in the basic User menu will always bring back the first – basic display.



1 – outdoor temperature

2 – weekday and time

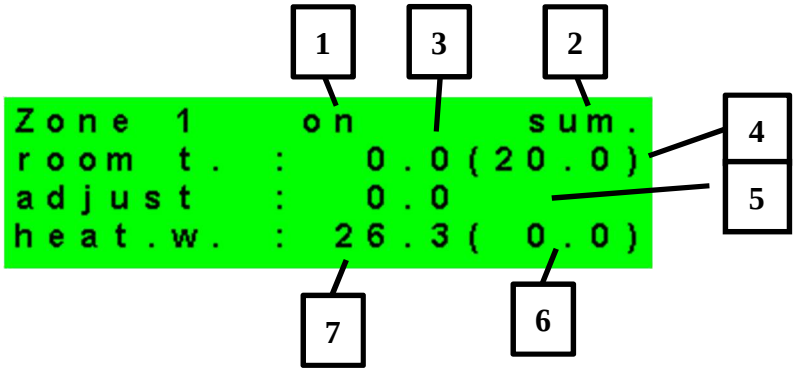
3 – temperature in zone (if room temp. sensor is used)

4 – heating water temperature (if no room temp. sensor is used)

5 – temperature in Thermal Store

6 – temperature in DHW storage tank

Heating zone display (zone 1, zone 2):



1 – zone NO / ON / OFF / blocked (by low ThSt temper.)

2 – controller mode winter / summer

3 – current room temperature. If no room sensor is used, the data is shown as 0.0)

4 – desired room temperature per program

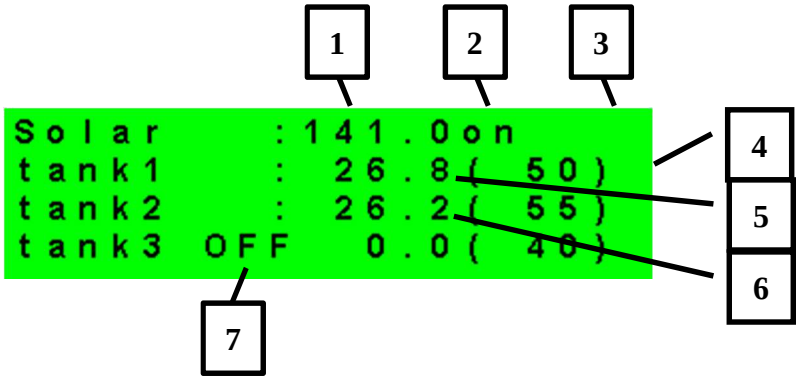
5 – adjustment to the desired room temperature. When RC21 IR room unit is used, "PJ" appears and the adjustment made by this unit is shown

6 – desired heating water temperature for the zone

7 – current heating water temperature

The desired temperature can be adjusted via the parameter “*adjust*”.

Solar thermal system display:



1 – solar collector temperature

2 – system ON

3 – ON= solar pump running

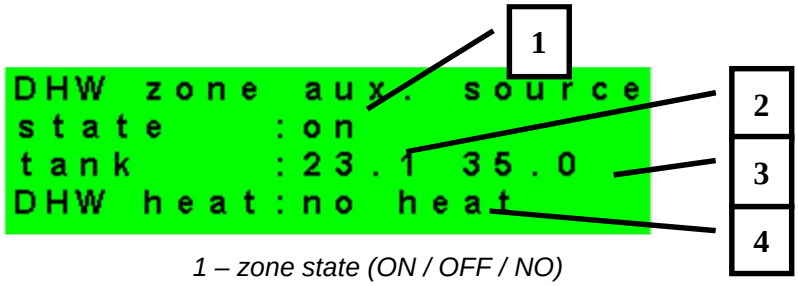
4 – currently charged tank mark

5 – tank 1, current temp (desired in solar heating)

6 – tank 2, current temp (desired in solar heating)

7 – tank 3, not used

DHW by auxiliary source display:



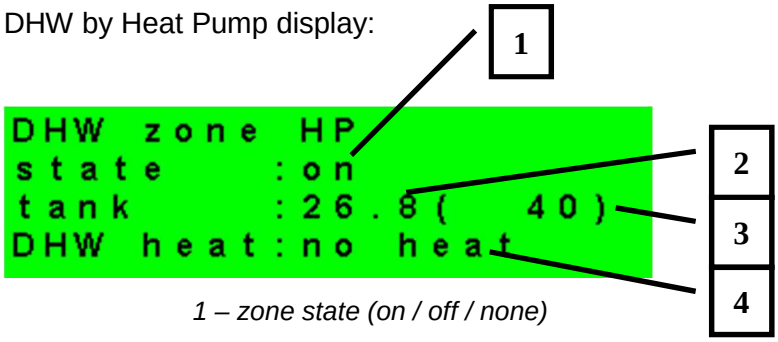
1 – zone state (ON / OFF / NO)

2 – current temperature in DHW tank

3 – desired temperature in DHW tank

4 – heating by el. element (heat / no heat)

DHW by Heat Pump display:



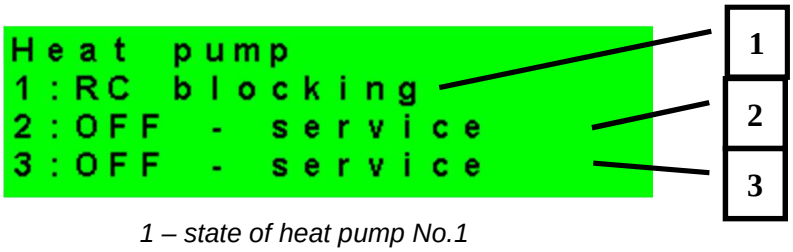
1 – zone state (on / off / none)

2 – current temperature in DHW tank

3 – desired temperature in DHW tank

4 – heating by heat pump (heat / no heat)

Heat Pump, cascade display:



1 – state of heat pump No.1

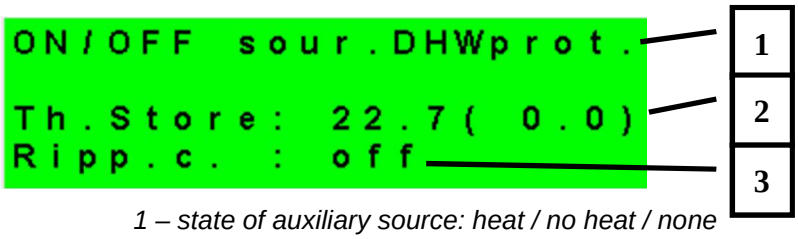
2 – state of heat pump No..2

3 – state of heat pump No. 3

In this section, heat pump states are shown that are enabled on the Service level. The states can be following:

- OFF - service : heat pump is turned off by a heating engineer
- OFF – user : heat pump is turned off on the User level
- fault : heat pump is in alarm mode, alarm details are shown on the User level in HP Alarms menu
- return - max.T : heat pump is blocked by max. possible return temperature
- flow - max.T : heat pump is blocked by max. possible flow temperature
- ambient – min.T : heat pump is blocked by min. possible outdoor temperature
- ambient – max.T : heat pump is blocked by max. possible outdoor temperature
- sup.refrig.vapor : heat pump is blocked by max. compressor temperature
- high T earth circ. : heat pump is blocked by max. brine circuit temperature
- vapor –low T : heat pump is blocked by low evaporation temperature
- vapor – high T : heat pump is blocked by high evaporation temperature
- cond. – high T : heat pump is blocked by high condensing temperature
- EEV-low T intake : heat pump is blocked by expansion valve's low suction gas temp.
- EEV-low T vapor : heat pump is blocked by expansion valve's low evaporation temper.
- EEV-high T vapor : heat pump is blocked by expansion valve's high evaporation temper.
- EEV-low superheat : heat pump is blocked by expansion valve's low superheat temper.
- EEV-high p cond. : heat pump is blocked by expansion valve's high condensing temper.
- high pressure : heat pump is blocked by high refrigerant pressure
- defrosting : heat pump is defrosting (only for air/source heat pumps)
- min.run time : HP min. running time is active. This activates always after start, DHW heating or defrosting
- DHW heating : heat pump is heating DHW
- rebooting : heat pump is blocked by min. time between 2 comperssor stars
- heating : heat pump is heating your home
- RC blocking : heat pump is blocked by Ripple control
- vol.flow control : heat pump's circulation pump is running
- ready : heat pump is ready to start heating as soon as there is call for heat

Display of auxiliary source and thermal store:

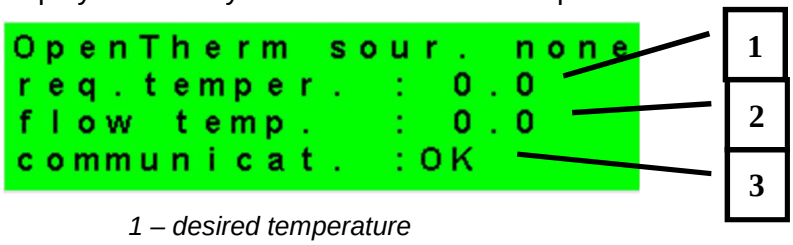


1 – state of auxiliary source: heat / no heat / none

2 – current thermal store temperature (desired)

3 – Ripple c. signal: on / off

Display of auxiliary source connected via OpenTherm interface:

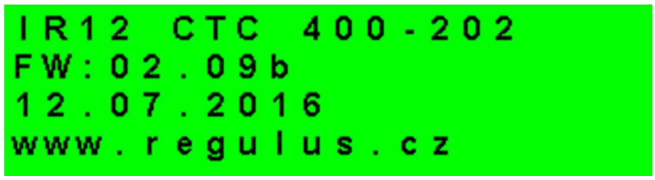


1 – desired temperature

2 – real flow temp. of OT source

3 – state of communication with OT source: OK / error

Display with firmware version and release date:



Controller in factory settings:

If the display shows the warning (above), then the Controller has been reset to factory setting after alarm mode, and service staff shall be called in to set the respective Controller parameters.

Menu:

While in MENU, use arrow keys ➤, ➤ to select user or service menu, or dispaying additional modules.

Add. Modules – this item will make available basic information on additional modules (if present).

User Menu is intended to set zones, time schedules, OTC curve and date/time.

Service Menu is intended for more detailed adjustments to zones, sources, solar thermal system and other parameters..
Access to the Service Menu is password protected and parameter adjustments are not intended for laymen!

Recirculation is intended to set immediate DHW recirculation (circulation period). After the set recirculation time expires, the function will be turned off automatically.

2. User menu

User menu is comprised of:

- Zone 1
- Zone 2
- Time program (time programs, holiday program)
- OTC curves
- HP (heat pump)
- DHW (DHW heating by heat pump)
- DHW-E (DHW heating by auxiliary source)
- ThSt (thermal store charging)
- DHW recirculation
- HP errors (error log)
- Statistics (heat pump statistics)
- Operating data (temperatures and outputs conditions)
- Others (Controller website username and password reset)
- Time and date (time and date)

The keys ➤, ➤ enable browsing, and the selected item can be entered by pressing **OK.**

User menu:

2.1 Zones – user settings

In this Menu, a user can adjust these parameters:

T comfort - setting comfort temperature in zone. This parameter makes sense only when a room sensor is used.

T setback - setting setback temperature in zone. This parameter makes sense only when a room sensor is used.

Note: During a day, the controller switches the desired zone temperatures between T day and T night by the preset time schedule..

zone on - Switching on Zone on the User level. When zone is switched off on this level, the circulation pump and valve outlets will be switched off. The pump and valve outlets can be activated by frost protection, if active.

Summer/winter mode state
- Switching on/off the function for automatic transition between summer and winter modes. Summer/Winter mode is intended to turn off zone heating when the outdoor temperature exceeds the preset threshold **summer** temperature, and vice versa, to turn on zone heating when the outdoor temperature stays below the preset threshold **winter** temperature.

summer temp (°C) - If the outdoor temperature keeps above this value for the time set in parameter ***summer time***, the Controller will switch to ***summer*** mode.

summer time (h) - see ***summer temp.***

winter temp (°C) - If the outdoor temperature keeps below this value for the time set in parameter ***winter time***, the Controller will switch to ***winter*** mode.

winter time (h) - see ***winter temp.***

2.2 Time programs – user settings

Time programs can be set either for separate days, or in blocks Mo-Fr and Sa-Su.
When the program is being set for separate days, there are 2 transitions from Comfort to Setback and 2 from Setback to Comfort for each day.

When the program is being set in blocks, there are similarly 2 transitions from *Comfort* to *Setback* and 2 from *Setback* to *Comfort* for the blocks Mo-Fr and Sa-Su. Answering YES to the question Copy program? will rewrite the respective time program blocks.

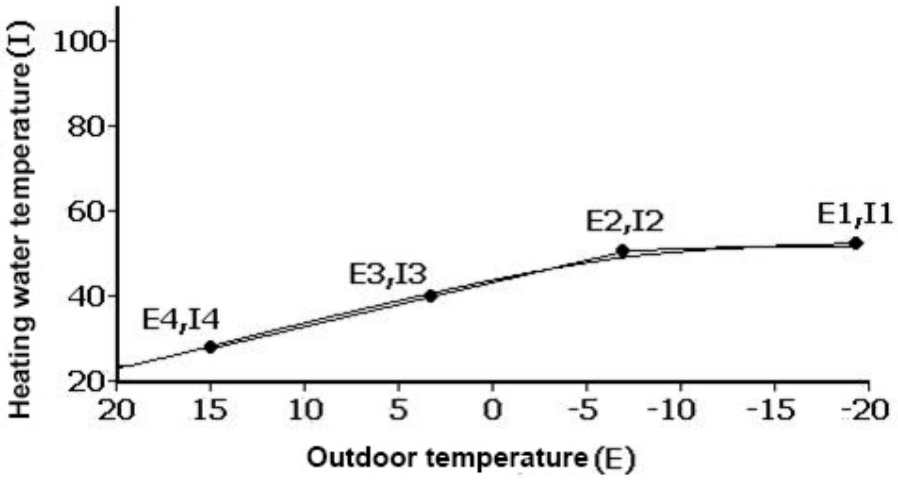
```
copy program?
no
```

If program copying is not desired, let the question be with no and leave the menu by pressing **C**.

Holiday mode – specific temperatures in zones can be set for the holiday period.

2.3 OTC curve – user settings

The controller works with a linear characteristics between separate points of the curve showing how heating water temperature depends on the outdoor temperature. The real OTC curve is entered into the controller using a 4-point polyline (see Fig.) with points E1; I1 to E4; I4 (cf. the display picture).



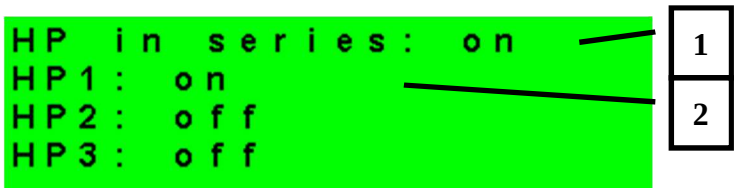
OTC points settings

```
Zone 1   E1: -15   I1: 55
OTC      E2:  -5   I2: 45
curve    E3:   5   I3: 40
         E4:  20   I4: 20
```

Point I1 represents the highest temperature that can be calculated by the controller, while point I4 represents the lowest temperature that can be calculated..

2.4 Heat pump control

A heat pump (or entire cascade if used) can be switched off by the user.



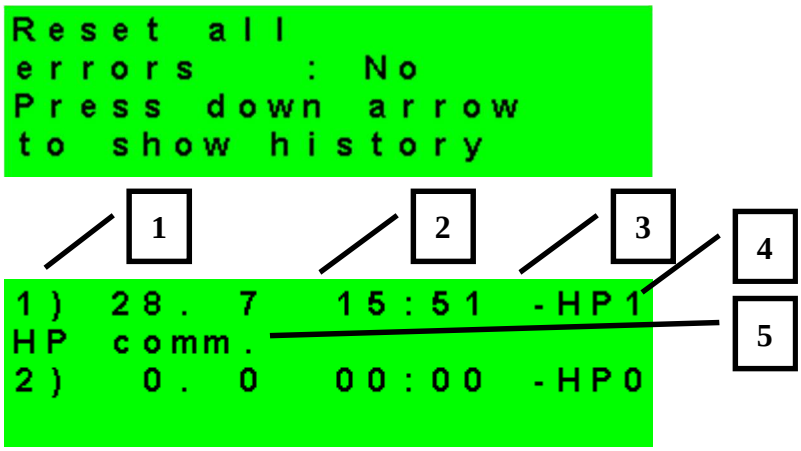
1 – HP cascade on / off (applies to all heat pumps).

2 – single HP on / off

Even when just one heat pump is used, HP cascade shall be on.

2.5 Heat pump errors

In this menu item all heat pump errors can be reset and HP error log is available. The following display is shown:



1 – error serial number (1 – 10)

2 – date & time of error occurrence

3 – information if the error is still active

4 – number of HP with error (1 – 10)

5 – error type

2.6 Setting temperatures for DHW storage tank heated by heat pump (DHW)

If this heating is enabled in the Service menu, a hot water storage tank is heated by a heat pump. Heating is performed by the preset time schedule and the set Comfort and Setback temperatures..

DHW on - Manual switching on DHW heating by a heat pump.

T comfort - Comfort temperature. Hot water storage tank is heated to this temperature if it is set to “Day“ program for the time in question.

T setback - Setback temperature. Hot water storage tank is heated to this temperature if it is set to “Night“ program for the time in question.

2.7 Setting temperatures for DHW storage tank heated by auxiliary source (DHW-E)

DHW-E on - Manual switching on DHW heating by an el. heating element.

T comfort - Comfort temperature. Hot water storage tank gets heated up to this temperature if the program is set to “Comfort” at the moment.

T setback - Setback temperature. Hot water storage tank gets heated up to this temperature if the program is set to “Setback“ at the moment.

Anti Legionella:
Anti-Legionella function helps “disinfect” hot water storage tanks, namely it kills Legionella bacteria.
When this function is ON, the hot water storage tank heats up to 65°C once in a week, at a preset time on a preset day. Heating is switched off either when this temperature is reached, or after two hours of heating disregarded of the temperature.

on (on/off) - Turns Anti Legionella function on.

day (weekday: mo-su) - Day when heating up starts.

Hour (hour) - Hour when heating up starts.

2.8 Setting temperatures for thermal store

ThSt on - Switchin on Thermal Store zonr .

T comfort - Comfort temperature. Thermal store gets heated up to this temperature if the program is set to “Comfort” at the moment..

T setback - Setback temperature. Thermal store gets heated up to this temperature if the program is set to “Setback“ at the moment.

2.9 DHW recirculation and time program settings

Here DHW recirculation is enabled and the time schedule of the pump set. When recirculation is on, it is performed following the time schedule set for each day. The time schedule defines from-to operation times. For this period, circulation time and idle time can be set if continuous operation is not desired. E.g. Monday from 6.00 a.m. to 10.30 p.m. the recirculation pump will always run for 10 min. and then idle for 15 min.

on (off / on) - - Recirculation switched on..

circ. time (min) - - Circulation time setting.

idle time (min) - - Idle time setting.

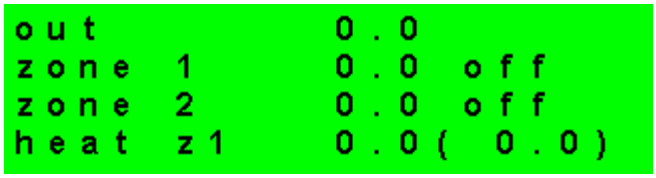
circulation times - - Time setting for separate days when recirculation is on.

2.10 Statistics

HP statistics is displayed here, i.e. number of compressor starts and operating time.

2.11 Operating data

All input temperatures and logic values of controller output are displayed here.



An **E** letter at the end of the temperature sensor line means that the temperature sensor is out of its permitted working range. Its proper connection or the sensor itself shall be checked.

2.12 Others

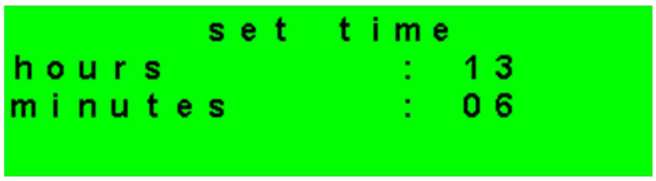
website password reset (no,reset) - Controller website username and password reset for User level. By resetting the default values are set (username: user, password: user)..

language for error messages and HP state: - Language for error messages and HP state shown on the display and website.

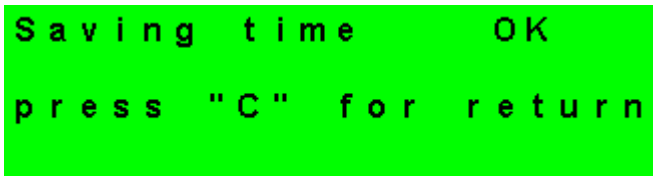
2.13 Time and date setting – user settings

Time and date shall be set to ensure proper operation of time programs. Clock is set in 24 hour format, weekdays are selected using ➤, ➤ keys, Mo-Fr.

Time and date setting



After time and day are set, pressing ➤ key will show the display :

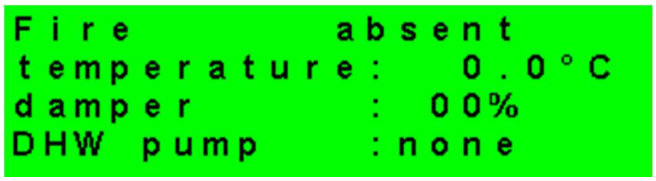


When this display is shown, time and date are saved into the controller's real time circuit.

3 Additional modules

In the menu *Additional modules* on User level, user information on additional modules (if present) can be viewed.

Fire Module:

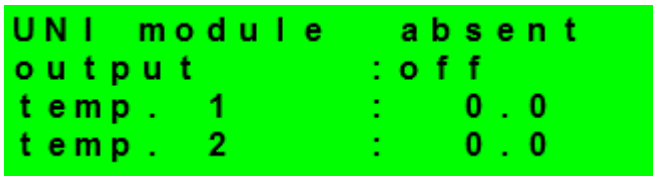


Temperature (displayed °C) - Fireplace flow temperature.

Damper (displayed %) - Fireplace combustion-air damper opened.

DHW pump (on/off) - Display of pump on/off for DHW heated from Thermal Store or fireplace.

UNI Module:



Output (on/off) - State of UNI universal module output displayed

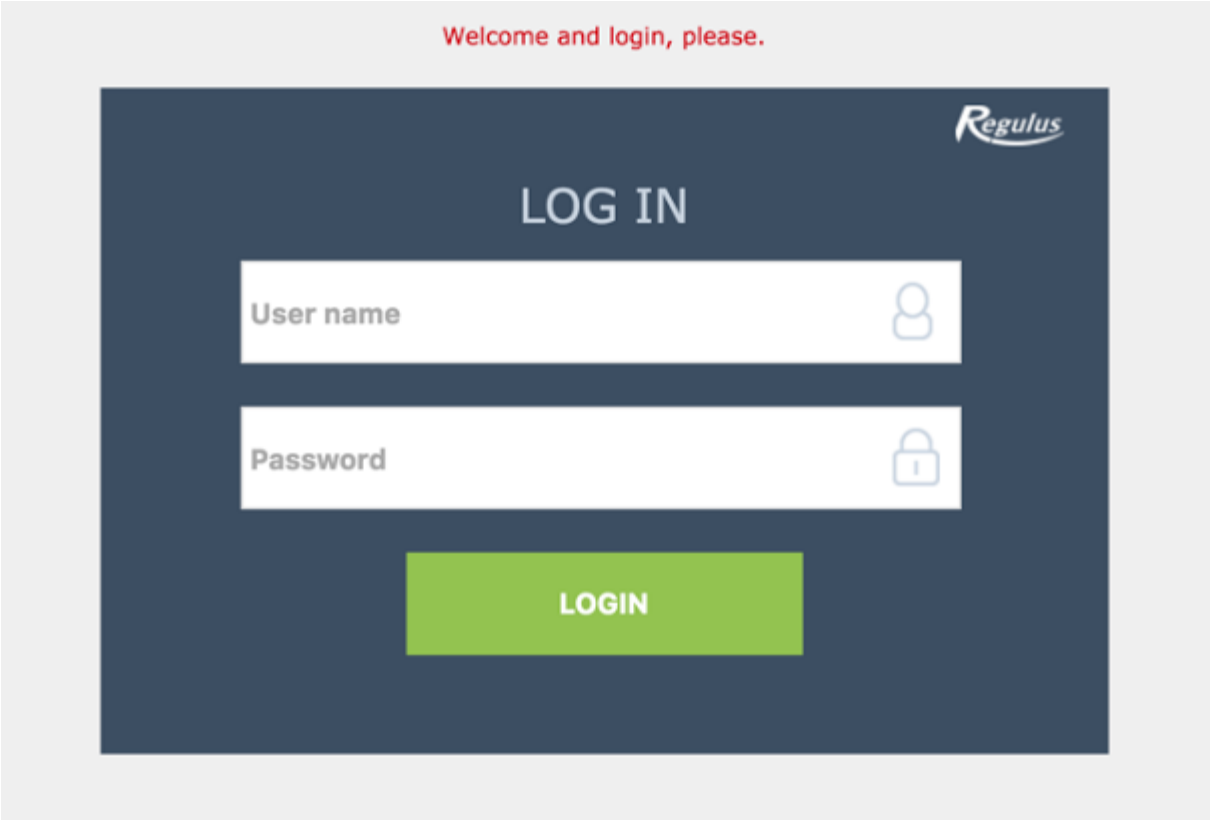
T1 (displayed °C) - T1 temperature from UNI module

T2 (displayed °C) - T2 temperature from UNI module

4 Web interface

The controller involves an integrated website showing a heating system overview and user settings.
For its website access, the controller shall be connected to a LAN or directly to a PC using a network cable. IP address of the controller can be retrieved by pressing the *DISP* key and then the down arrow. This will display info on its network settings. Pressing *DISP* again will return the controller to user display.

After the controller is connected to a LAN, entering its IP address into the browser address bar, the login form will appear:



Login name for user level is: **user**,
Password for user level is: **user.**

After successful login the welcome screen appears for User level, making available pages with settings.