

# KRONOTERM



## Heat pump controller for sanitary water **DHWS-BB**

- ✓ Modern glass-like design with color LCD display
- ✓ Robust capacitive touch solution
- ✓ Universal controller for any type of heat pump configuration
- ✓ Daily schedules
- ✓ Real-time remote control, weekly schedules, energy metering and much more in combination with additional **DHWS-Web module**

# Functionality

## Basic modes of operation:



**NORMAL:** The water is heated to the preset temperature set point using the primary heat source (heat pump compressor) whenever possible. When primary heat source provides insufficient power due to operating conditions (e.g. outside air temperature) one or more additional heat sources (electrical heater, alternative heat source) are activated to assist in the heating process.



**ECO:** The water is heated to the preset temperature set point corrected by a negative ECO offset (eco temperature set point). The final water temperature is lower compared to NORMAL mode. ECO offset is available as a configurable setting in the user menu. This is the most environmental friendly program so only the primary heat source (heat pump compressor) is used in the heating process.



**LUX:** The water is heated to the preset temperature set point corrected by a positive LUX offset (comfort temperature set point). The final water temperature is higher compared to NORMAL mode. LUX offset is available as a configurable setting in the user menu. The heat pump automatically switches between the primary and additional heat sources to optimize performance.



**LUX Plus:** The water is heated to the preset temperature set point corrected by a positive LUX offset (comfort temperature set point). The final water temperature is higher compared to NORMAL mode. LUX offset is available as a configurable setting in the user menu. All available heat sources are activated at the same time to achieve as fast as possible heating process, regardless of operation cost.



**ALTERNATIVE:** The water is heated using alternative heat source only. This mode is typically used when a separate gas/oil/wood central heating system is being used with plenty of heat energy to spare.



**OFF:** Water heating is not active. Only frost protection program is enabled preventing frost damage to the piping. This mode should be selected when heat pump is not used for a longer period of time.

Kronoterm DHWS-BB is a heat pump control system specially designed to provide all necessary functionality that a modern heat pump system for sanitary water requires.

System consists of a controller unit and a display unit. The powerful microelectronics and applied software algorithms deliver maximal possible energy savings at any given operating conditions. The innovative design combined with a state of the art technology resulted in a product with outstanding graphical capabilities, ease of use and optimal price at the same time.

## KRONOTERM

Termo-tehnika d.o.o.  
Orla vas 27  
3314 BRASLOVČE  
Slovenia - EU

[info@kronoterm.com](mailto:info@kronoterm.com)  
[www.kronoterm.com](http://www.kronoterm.com)



Developed in cooperation with:



ELEKTRINA d.o.o.  
Gorenjska cesta 21  
1234 Mengeš  
Slovenia - EU

[www.elektrina.si](http://www.elektrina.si)



## Additional modes of operation:



**Anti-legionella:** An automatic or manually triggered procedure where the water is heated to over 65°C to remove any Legionella bacteria. The automatic procedure is repeated every 28 days (or it can be reconfigured to a time period from 1 to 28 days).



**Boost:** Fast water heat-up function that heats the water to the preset temperature set point corrected by a positive LUX offset (comfort temperature set point). When the water temperature reaches comfort temperature set point the heat pump returns to the previously selected operation mode. Boost program can be started on demand or automatically when the water temperature drops below a certain set value.



**Defrost:** When the outside temperature is low enough for ice to develop on the evaporator, the heat pump becomes less efficient. Should this occur, the unit will automatically enter defrost mode. This will divert heat from the heating circuit back to the coil until the ice has melted.



**Frost protection:** Heat pump operates with the minimum operation capacity to prevent pipes from freezing. Frost protection program is active in all operating modes at all times.

## Special features:



**External Input:** The Heat pump can be configured to change the mode of operation on a detection of external input signal. Different modes of operation are supported:



**ECO mode:** Change to ECO mode during high power price periods to reduce operation cost.



**LUX mode:** Change to LUX mode during low power price periods to maximize performance.



**LUX PLUS mode:** Change to LUX PLUS mode, when power from photovoltaic solar panels is available.



**OFF mode (frost protection):** Remotely switch the pump to OFF mode, when leaving the premises for a longer period of time.



**Boost:** Remotely execute the Boost function.



**ALTERNATIVE mode:** Change to ALTERNATIVE mode, when heat is available at the alternative heat source.



**Daily Schedule:** Modification of the operation mode can be time triggered. Up to two scheduled periods can be configured during a day. Scheduled period is defined by a start time, stop time and an active operation mode it changes to. After the scheduled period ends the heat pump returns to the previously selected operation mode.



**Ventilation:** If heat pump is equipped with 2-speed fan it can be used to ventilate the rooms where the air intake vents are located. Ventilation operates according to a ventilation schedule with a defined start and stop time period.



**Away mode:** Away mode allows a user to set a period in days when the heat pump operates in OFF mode. After the defined number of days elapses the operation mode reverts to the previously selected operation mode.



**Errors & Warnings:** A diagnostic menu provides access to warnings and errors generated by the DHWS-BB-IO controller.



**Additional heat source:** The secondary heat source can operate as a combination of different systems (the availability depends on the Heat Pump type):



Electrical heating element only



Gas/oil/wood central heating system only



Both



**Backup heat source:** In case of a heat pump compressor malfunction the backup/additional heat source can be permanently enabled to allow emergency heat pump operation until a proper service procedure by a qualified technician is performed.



**Advanced user menu:** An advanced user menu is accessible via a 4-number PIN code. Advanced user menu provides access to settings like External Signal definition, Additional heat source selection and Anti-Legionella execution period definition.



**Technician menu:** For installation purposes a technician menu is accessible via a 4-number PIN code. The technician's menu provides access to the DHWS-BB-IO controller's core preferences and settings.



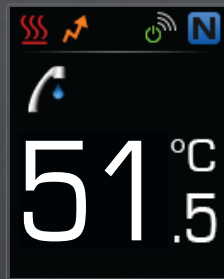
**Factory menu:** Factory menu is accessible via a 4-number PIN code. Factory menu provides access to all of the DHWS-BB-IO controller's registers.

## User interface highlights

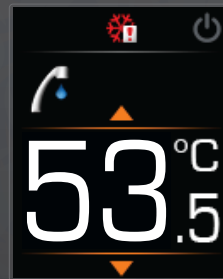


### Operation mode selection menu:

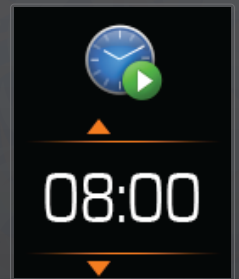
Select in between operation modes: NORMAL, ECO, LUX, LUX plus, ALTERNATIVE and OFF



**Main temperature display:**  
Displays current hot water temperature.



**Set temperature display:**  
Adjust the desired hot water temperature



**Daily schedule**



**Boost feature**

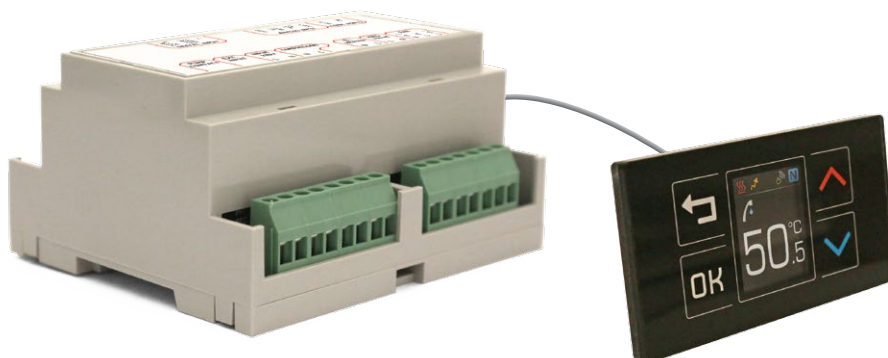


**Eco mode offset setting**



**Advanced menu pin input**

# Technical specification



Controller unit  
DHWS-BB-IO

Display unit  
DHWS-BB-D

## Controller unit:

### Power supply

230VAC, 50HZ  $\pm 10\%$ ; max. 4.5 VA  
1.65W standby (controller + display unit)  
2.95W standby with DHWS-Web module

### Micro-controller

PIC32MX; MIPS32 M4K Core; 40 MHz  
32 kBytes of RAM; 128 kBytes of FLASH memory

### 4 Analog Inputs (NTC 10k)

Water temperature in boiler  
Alternative heat source temperature (gas/oil heating system)  
Input air temperature  
Evaporator temperature

### 4 Digital Inputs (3 internal 5/3.3 VDC / 1 External 230 VAC)

Pressure switch 1  
Pressure switch 2  
External general input - software selectable function\*  
Internal general input - software selectable function\*

### 6 Relay outputs (1 x 30A / 1 x 16A / 4 x 5A)

Compressor (30A)  
Electrical heater (16A)  
Defrost - solenoid valve (5A)  
Ventilator - Speed 1 (5A)  
Ventilator - Speed 2 (5A)  
External Pump (5A)

### 2 Communication channels (3-wire Modbus compatible)

Communication with Display unit ( up to 10m shielded cable)  
Communication with PC config & diagnostic tool or  
DHWS-Web module

## Display unit:

### Power supply

5VDC, 300mW

### Microprocessor

PIC32MX; MIPS32 M4K Core; 40 MHz  
32 kBytes of RAM; 128 kBytes of FLASH memory  
16 Mbit external flash used for graphics  
Real time clock - RTC (RTC retention 7 days)

### Display and interface device

Size 1.8"; 128x160 pixel resolution  
Configurable backlight brightness level  
4 Capacitive touch buttons

### 1 Communication channels (3-wire Modbus compatible)

Communication with Controller unit



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Real-time remote control, weekly schedules, heating costs overview and much more in combination with additional DHWS-Web module.



Two display units can be connected with the controller unit, if DHWS-Web module is not used.