Zero Software Instruction Manual

Contents

Section 1. ABOUT THE MANUAL

This manual details the use of **Zero** software with air handling units equipped with **Zero 2** controller-based automatic control systems.

The document which covers the entire functionality and features of the software is intended to assists users in its installation and operation.

Section 2. SYSTEM REQUIREMENTS, SOFTWARE INSTALLATION AND UNIT CONNECTION TO COMPUTER

2.1 System requirements, software installation and removal

Zero software is installed on and run from a laptop or a PC running Windows 2000, Windows XP, Windows Vista, Windows 7, Windows 8, Windows 8.1 or Windows 10 operating system with administrator privileges (please consult your system administrator).

Use **Setup_Zero__vX_X.exe** file to install the software.

Download the file to your hard drive and run it.

This will initiate the standard Windows installation wizard - just follow the on-screen instructions.

By the time the installation is complete, the wizard will have created the shortcut on the desktop and a new folder in the Start menu containing the shortcuts for running and uninstalling the software.

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2.2 Connecting the unit to a computer

You will need a USB cable to connect the unit to a laptop or a PC.

Units with **USB** Type A connector require an **AM-AM** cable **(Fig. 1)**.

Fig. 1. *Type A USB socket in unit casing and AM-AM USB cable*

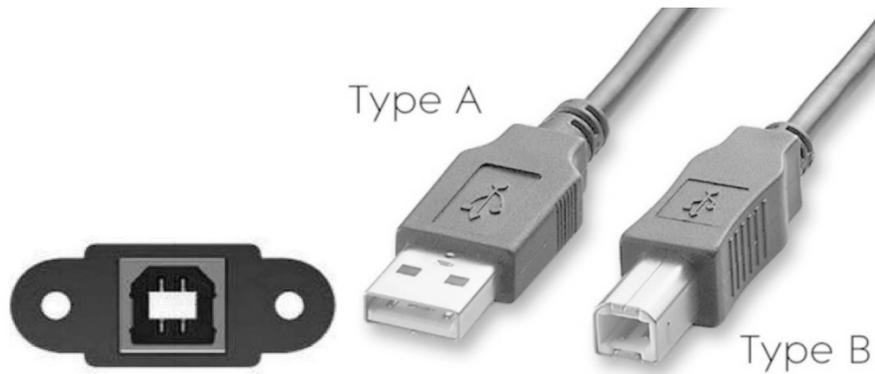Units with Type B USB connector require an **AM-BM USB** cable **(Fig. 2)**.

Fig. 2. *Type B USB socket in unit casing and AM-BM USB cable*

Section 3. ABOUT ZERO SOFTWARE

Zero software is a PC program. The software has a graphic user interface.

Zero software allows real-time control over all the parameter values, changing settings on the fly as well as creating configuration profiles, saving them to the computer and uploading them to the air handling unit.

The software also allows convenient testing of the unit for troubleshooting.

A connection from a laptop running **Zero** software provides access to the entire information about the unit health including all the input and output parameters such as temperature sensor readings, control signals, alarm input state etc.).

Zero software is a convenient commissioning tool.

All the configuration parameters (e.g. fan speed, temperature, humidity and operation mode) can be pre-configured and batch-loaded into the unit controller.

Zero software main window has three tabs:

Program Mode – firmware upgrade tab

Control Mode – unit management and control tab

Demo – demonstration mode tab

Section 4. CONTROLLER PROGRAMMING AND SETUP

4.1 Software window in the firmware upgrade mode and Program Mode

Launching the program by double-clicking the [Zero Service Edition icon] shortcut opens the Zero main window which has the following appearance in the firmware upgrade mode as given on **Fig. 3**.
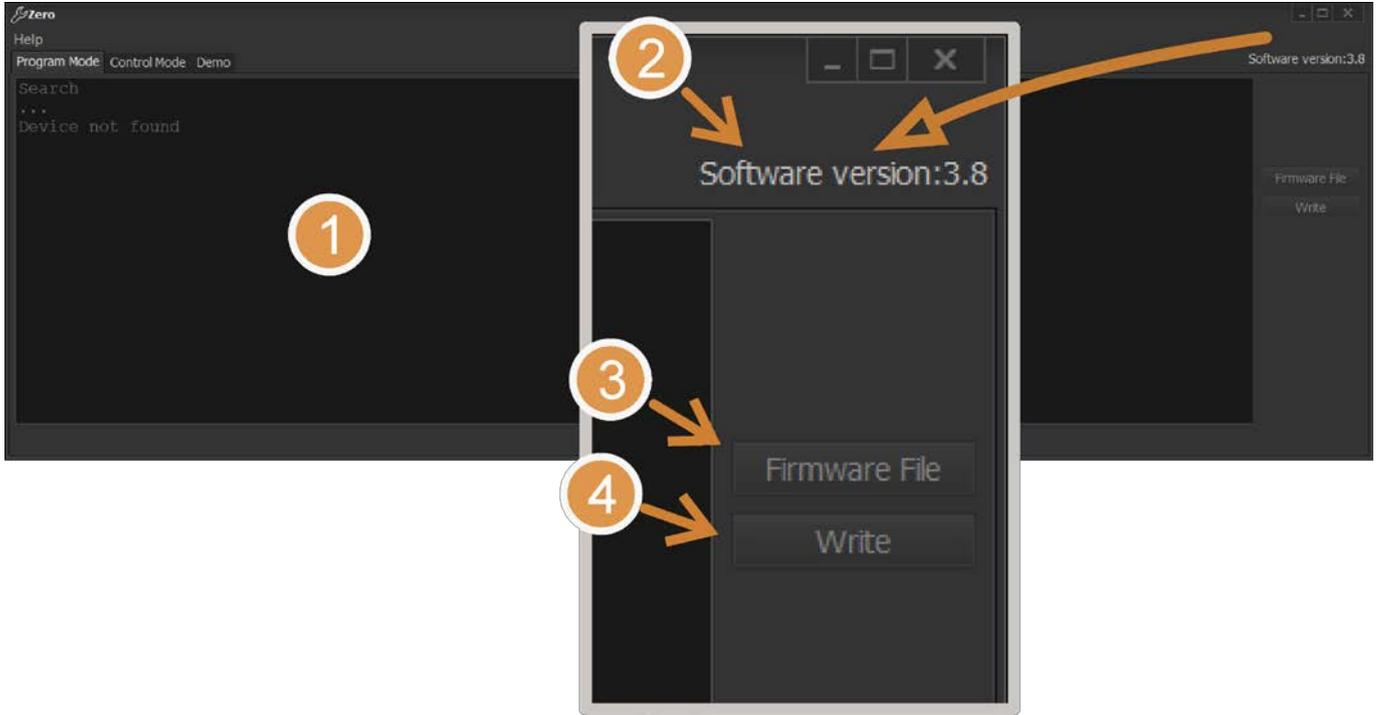

Fig. 3. *Program window in firmware upgrade mode*

The window interface contains the following control and information display elements:

1. Connection status and firmware information field.

2. Software version in use.

3. Firmware file selection button.

4. Firmware upload button.

4.2 Zero 2 controller circuit board firmware upgrade

Connect the unit to a laptop via a **USB** cable. You do not have to switch off the unit before making the connection. Wait till the software connects to the unit controller.

Click the **Firmware File** button to bring up the standard firmware file selection dialogue box. After selecting the necessary file click the **Write** button.

The controller firmware upgrade process is shown on **Fig. 4**.
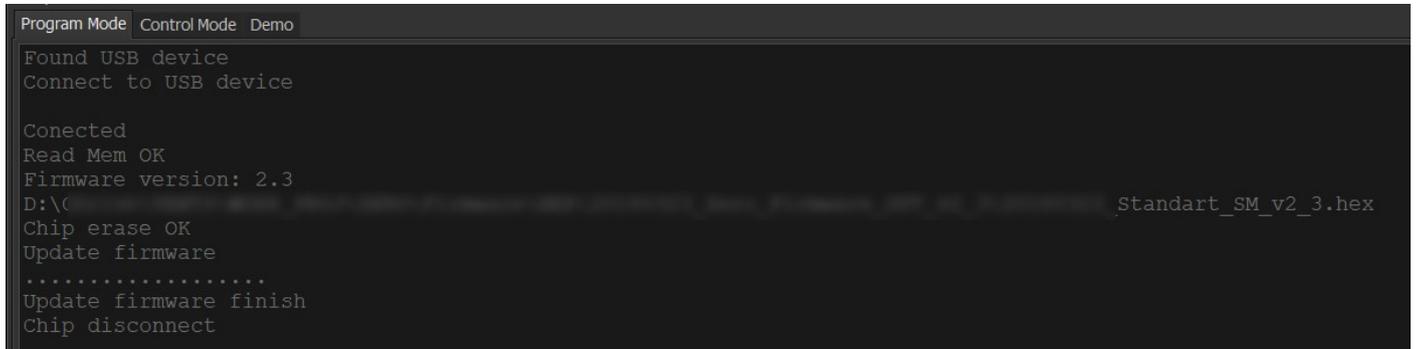
Fig. 4. *Controller firmware upgrade*

Allow some time for the firmware to upload to the microcontroller memory. Upon a successful upload the program window shows the messages given on **Fig. 5**.
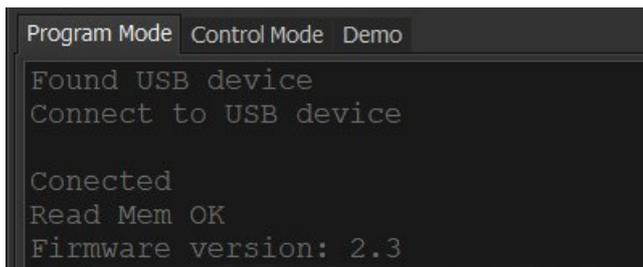
Fig. 5. *Successful firmware upgrade/connection to microcontroller*

The firmware upgrade is complete.

Section 5. UNIT CONTROL

The **Control Mode** tab is used to control the unit as well as to create, test and save configuration profiles containing operating parameter sets.

Fig. 6 shows the **Control Mode** tab appearance.
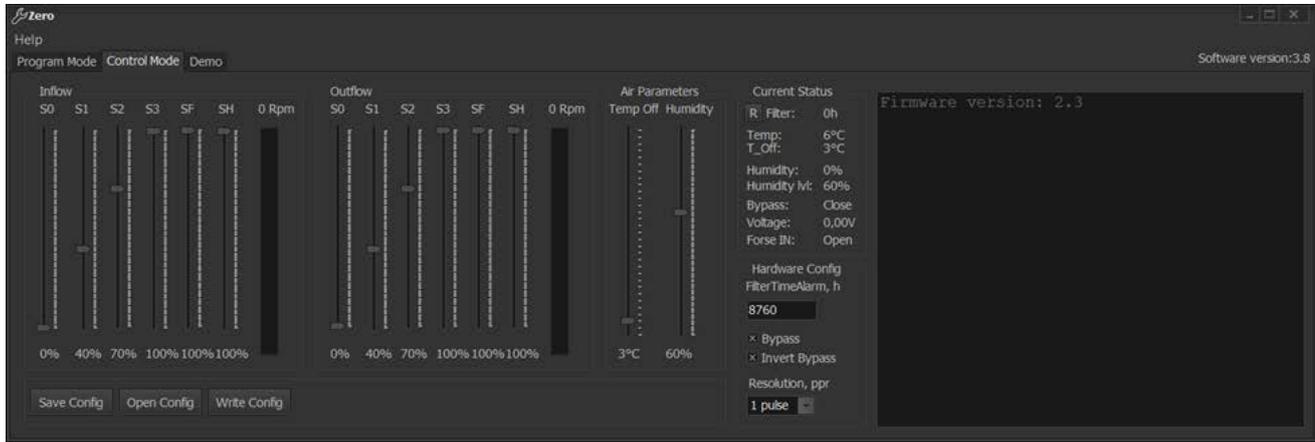
Fig. 6. *Control Mode tab*

This tab contains management and control elements.

Inflow and **Outflow** groups for the respective fans:

S0 – speed preset slider for Standby mode (0 % by default)

S1 – speed preset slider for Speed 1

S2 – speed preset slider for Speed 2

S3 – speed preset slider for Speed 3

SF – speed preset slider for unit operation with the external device (e.g. CO_2 sensor) normally open (NO) contact closed which corresponds to **Force IN:** Close status.

SH – speed preset slider for unit operation after exceeding the humidity threshold (**Humidity lvl**) value.

Rpm – fan speed bar chart updated in real time.

Air Parameters group:

Temp Off – temperature threshold setpoint using the feedback from the temperature sensor downstream of the heat exchanger to activate heat exchanger freezing protection protocol. The heat exchanger is protected by the supply fan (factory setpoint 3 °C).

Humidity – humidity threshold setpoint. When the threshold is exceeded the supply and extract air flow is increased starting from the pre-set **SH** level in proportion to the humidity increase.

<u>*Current Status* group:</u>

Filter: current number of hours in operation (saved every 3 hours)

R button: reset the number of hours of filter operation

Temp: current temperature being picked up by the extract air sensor downstream of the heat exchanger

T_Off: pre-set temperature threshold for activating heat exchanger protection against freezing

Humidity: current humidity level (according to the humidity sensor)

Humidity lvl: pre-set humidity threshold after which the fans reach the speed set with the **SH** speed slider

Bypass: current bypass status

Voltage: current voltage level at the 0-10 V input

Forse IN: current status of the input for an external control device with a normally open (NO) contact (e.g. CO_2 or humidity sensor)

<u>*Hardware Config* group:</u>

FilterTimeAlarm, h: timer delay before the filter maintenance warning appears. Enter a value using the keyboard and press Enter to confirm.

Bypass: bypass function enabled/disabled (must be disabled for air handling units without a bypass)

Invert Bypass: inverted bypass operation

<u>**Buttons:**</u>

Save Config: saves current configuration onto the PC

Open Config: opens a file with a previously saved configuration profile

Write Config: uploads the current configuration to the controller (to save the new parameter values in the controller memory use this button to confirm the changes)

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Section 6. UNIT OPERATION SIMULATION USING DEMO TAB

The **Demo** tab is intended for simulating air handling unit operation as if the laptop running the program was connected to a operating unit with a live main window and control panel. The simulation does not require actual connection to a unit controller and can be launched on any computer from within the software.

The simulation mode allows sending commands from the control panel and changing the current ambient conditions while observing the control system response to those inputs.

The settings and processes in the **Demo** tab have no relation whatsoever to managing a real air handling unit and do not affect the settings made on the **Control Mode** tab.

The **Demo** tab which is intended for demonstration only allows an insight into the software operation and features as well the capabilities of a controller-equipped air handling unit.

6.1 Demo tab elements

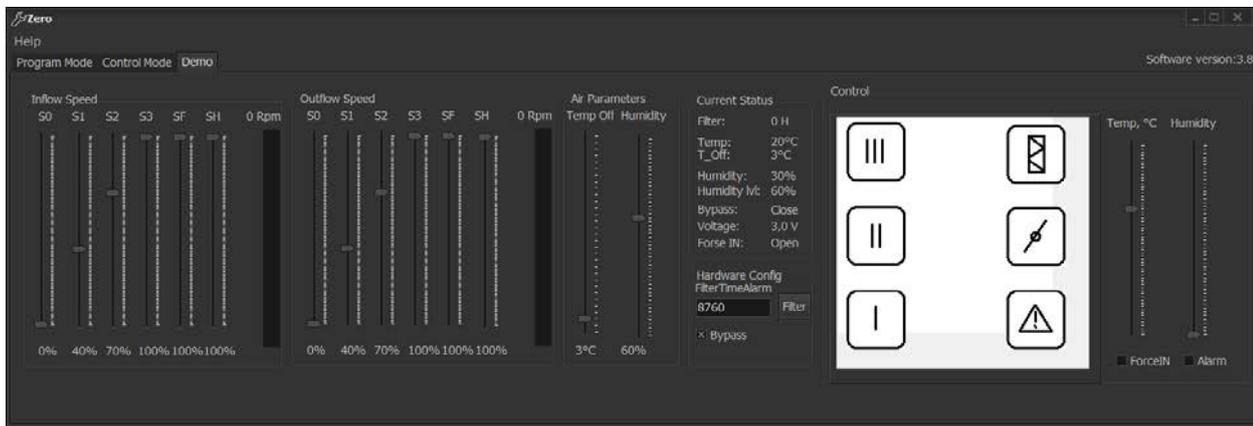**Fig. 7** represents the **Demo** tab appearance.

Fig. 7. *Program window in the **Demo** mode*

The **Demo** tab includes the following element groups:

Inflow Speed, Outflow Speed, Air Parameters, Current Status, Hardware Config and **Control.**

The **Inflow Speed** and **Outflow Speed** groups are similar to the ones on the **Control Mode** tab and enable mode-specific speed settings for the respective fans.

The **Air Parameters** group elements on the **Demo** tab are completely identical to those of the **Air Parameters** group on the **Control Mode** tab.

The **Current Status** group also includes the same elements as in the identically named one on the **Control Mode** tab except the filter operating time reset button.

The **Hardware Config** group also includes the same elements as in the identically named one on the **Control Mode** tab except the **Invert Bypass** checkbox.

The **Control** group contains the field which simulates an actual control panel (the control panel functions are detailed in the user's manual for touchscreen control panels) and the controls which enable simulation of ambient parameter changes.

Temp, °C: this slider allows to simulate current temperature changes according to the feedback from the sensor in the exhaust air duct downstream of the heat exchanger. The current value is displayed in the **Temp:** field of the **Current Status** group.

Humidity: this slider allows to simulate current humidity changes according to the feedback from the sensor in the exhaust air duct or in the ventilated space. The current humidity value is displayed in the **Humidity:** field whereas the sensor voltage is displayed in the **Voltage:** field of the **Current Status** group.

Force IN: this checkbox allows to simulate changes in the current state of the external input (CO_2 sensor/humidistat). The current state is displayed in the **Force IN:** field of the **Current Status** group.

Alarm: this checkbox simulates an alarm caused by an emergency situation.

6.2 Simulation of software-controlled unit operation

To simulate air handling unit operation and run the program in the demonstration mode install the software onto any suitable computer and run it (see Section 2, page 4).

Go to the Demo tab which contains the default parameter configuration (see Fig. 12). These parameters correspond to a unit in the **Standby** mode.

6.2.1 Simulation of unit operation via control panel

Clicking on any of the I, II and III buttons simulates unit activation at a corresponding speed. The bar charts in the supply and exhaust fan groups shall display the speed level whereas the **Prm** field will show the numerical value of the rotation speed in rpm. In addition to that the **Filter:** field of the **Current Status** group initiates a countdown which imitates the filter operating hours countdown at a rapid pace.

As soon as the filter operating time reaches the threshold set in the **Filter Time Alarm** field of the **Hardware Config** group, the **Control** field in the control panel representation simulates a filter replacement signal.

To reset the filter operating time counter, left-click on the filter maintenance pushbutton and hold it for 5 seconds. After that the button is no longer highlighted in red and the counter in the **Filter:** field of the **Current Status** group is reset.

Clicking on the pushbutton simulates bypass damper opening and the button becomes highlighted in blue. The message in the **Bypass** field of the **Current Status** group changes from **Close** to **Open**. In units without a bypass (**Bypass** checkbox in the **Hardware Config** is disabled) this results in a simulated deactivation of the supply fan as reflected by the bar chart in the **Inflow Speed** group.

6.2.2 Simulating control system response to changes in ambient conditions

The ambient condition parameters and the control system response to their changes depending on the current status of the air handling unit are given in the table below.

Control	Changing parameter being simulated	Unit status	Control system response
Temp, °C slider	Current temperature according to the sensor in the exhaust air duct downstream of the heat exchanger	Standby	No response to change
		One of the speed settings enabled	If the temperature drops below the level set in the **T_Off** field (3 °C by default), the supply fan is enabled. The supply fan is restarted upon reaching **T_Off** + 3 °C.
Humidity slider	Current humidity according to the sensor in the exhaust air duct or in the ventilated space	Standby	No response to change
		One of the speed settings enabled	If the humidity level reaches the value set in the **Humidity lvl:** field, the fan speed is set at the level corresponding to the **SH** slider position if the **SH** value is larger than the current speed. If the humidity level drops, the fan speed is reverted to the initial setting when the humidity level falls below **Humidity lvl:** - 5%.
Force IN checkbox	Current external input state (CO_2 sensor/humidistat)	Standby	No response to change
		Unit status independent	Upon simulation of closing the contacts of the **Force IN** sensor the fan speed is set at the level corresponding to the SF slider position if the **SF** value is higher than current speed.
Alarm checkbox	Emergency occurs	Unit status independent	Shutdown of both fans. The emergency indicator on the control panel is flashing.

Section 7. HOTKEYS

Hotkeys	Description
<F10>	Highlight the **Help** button
<↓>, <↑>	Select Help file type
<Enter>	Run selected Help file
<Esc>	Remove selection
<Ctrl>+<Tab>	Switch between program tabs
Program Mode tab	
<Tab>	Highlight **Auto** checkbox and buttons
<Space>	Changes highlighted checkbox state
Control Mode and **Demo** tabs	
<Tab>	Toggle between interface elements
<Space>	Change highlighted checkbox state Press highlighted buttons
<Enter>	Press highlighted buttons
<↑>, <→>	Move highlighted slider one bar up
<↓>, <←>	Move highlighted slider one bar down
<Ctrl>+<W>	Save current configuration to controller memory
<Ctrl>+<O>	Open configuration file
<Ctrl>+<S>	Save configuration file
<Ctrl>+<R>	Reset filter operating time