SPEED CONTROL - SERVOMOTOR

Instruction Manual

Microprocessor climate controller belonging to the SPEED CONTROL family. A reliable device, easy to assemble and utilize with a software available in four build-in language versions: Polish (default), English, German and Russian. Its programme allows the user to intuitively set various parameters such as: the temperature, airing, heating, min/max fan speed and the alarms.

Parameters and features:

- Ventilation 1st stage
  - output current smooth regulation up to 5A
  - thermal overload protection
  - soft start
  - minimal fan speed calibration
- Ventilation 2nd stage, separated relay up to 3A (one to choose)
- air heating, separated relay up to 3A (one to choose)
- NO/NC alarm outputs
  - power outage signalling
  - min/max temperature threshold exceedance signalisation
- one analog input for the temperature measurement
- two 0-10V outputs
- power consumption of <3W
- IP56 hermetic enclosure
- 230V AC 50 Hz power supply voltage

Climate controller with output current permissible up to 5A

ELETOR SC-SERVOMOTOR

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Controller installation

Warning! While installing the device it must be cut off from any power supply, because the voltage on some of the components is highly hazardous to your health and life. It is advised to entrust a qualified and skilled personnel to carry out this installation.

Choosing a place for the installation

The place for the installation have to be chosen rationally, taking into account easy access to such device for the persons concerned, and at the same time having a spot inaccessible for children or animals. Climate conditions should be also concerned, which means that the device ought to work within the temperature range from -10°C to 40 °C, in a place not exposed to direct sunlight. Free air flow around the device is also essential. The temperature sensor is an integral part of the device. There are a few rules to be followed in order to install such sensor:

- the sensor should not be installed in a place with no free air flow, or in a spot directly exposed to sunlight
- the sensor should not be installed on the load-bearing wall of the building
- presence of nearby heat-emitting devices such as radiators or lamps should be avoided
- the sensor should not be placed directly by the door or ventilation holes
- the sensor should not be placed in spots accessible for animals
- it is advised to arrange the wire connected to the sensor away from the power cords

The installation

The device works in rough climate conditions, high humidity and ammonia quickly lead to corrosion. If properly installed, the controller and the sensor are both resistant to the harmful influence of the environment.

Bear in mind the following comments while installing the device:

- the cover gasket should be checked before screwing
- the cover should be fully tightened by all the screws
- the wires used to connect the sensor should be round
- after connecting a wire, the cable gland should be tightened up in such a way to seal and immobilize the wire, the use of silicone is advised
- unused cable glands should be closed (sealed)
- the controller (from its bottom part) should be attached on a flat wall using four rawlplugs

Plugging in

Warning! Be sure that the power supply is cut off before plugging the device in !

After unscrewing the controller, the front panel should be removed. The wires should be inserted into the rubber cable glands and then connected. The illustration below presents the arrangement of the connectors of this device.

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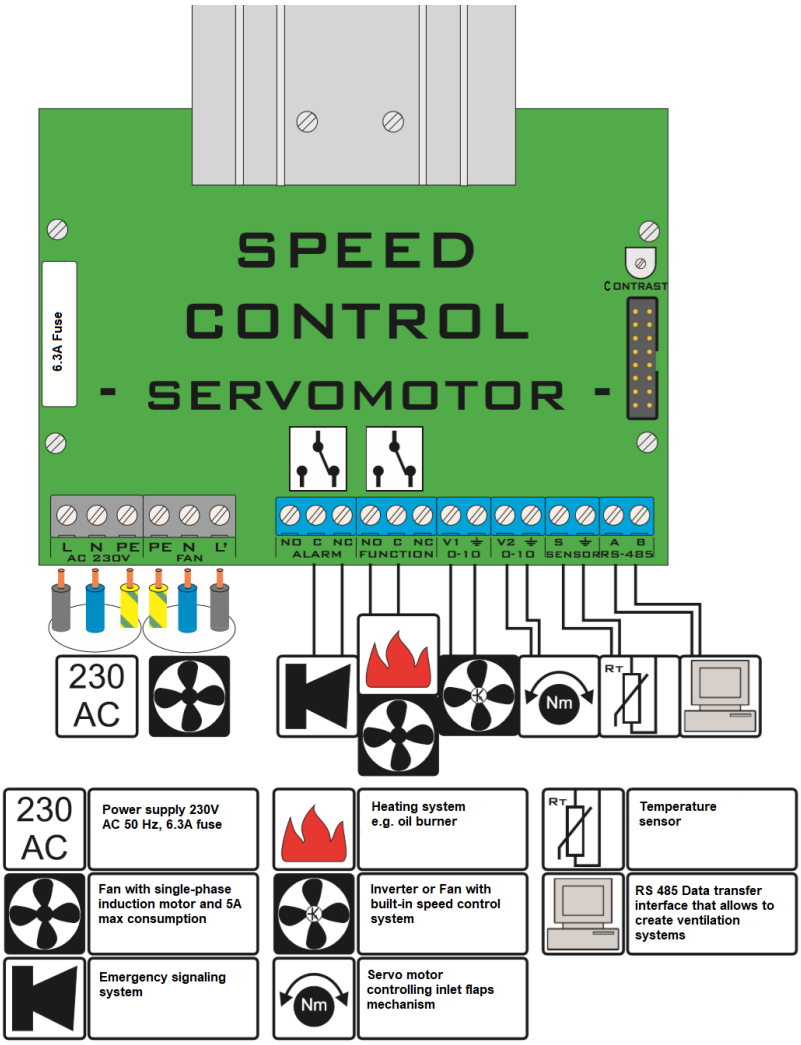
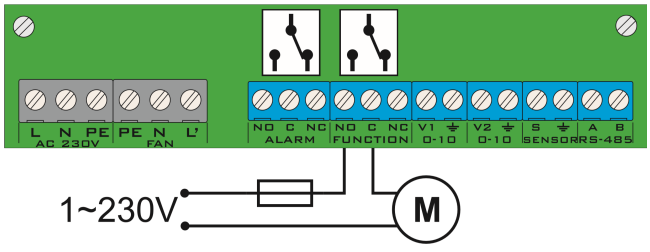


Connector labelled as AC 230V should be connected to the power supply (switching station). Using the circuit breaker 1P-B6 and overvoltage limiters of T1 and T2 type is obligatory. It is worth grouping the controllers on different phases (L1,L2,L3) while connecting multiple devices, in order to equally load the power line.

Connector labelled as FAN should be directly connected to the ventilator. In case of controlling multiple ventilators the aggregated load cannot be higher than 5A. Every ventilator should be separately secured. PE and N outputs should not be guided from the power supply (the switching station). Instead, they ought to be connected to the connectors of the controller.

Connector labelled as FUNCTION – relay separated output with max relay current of 6A (the circuit breaker 1P-B6 is required, when controlling the load directly). It may be used as:

- Heating – the relay activates when the temperature drops below the previously set value.
- Ventilation 2nd stage or spraying systems- the relay activates when the measured temperature is higher than the total amount of value set previously by the user and the band ventilation value. The scheme below presents an exemplary way of connecting Ventilation 2nd stage or the heater



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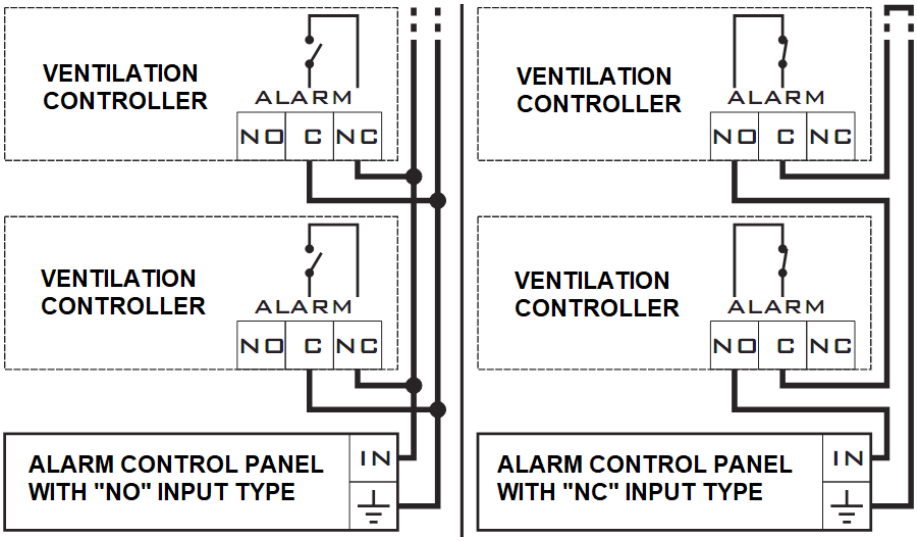
Connector labelled as ALARM should be connected to the alarm control panel. The alarm activates automatically when:

- the temperature is too low or too high,
- the controller or the temperature sensor is damaged,
- the power blackout occurs,
- the controller malfunction occurs (e.g the device is overheated)



Connector labelled as V1 0-10V is intended to connect the expansion modules. The voltage on this connector is proportional to the ventilation level.
Connector labelled as V2 0-10V is intended to connect the servo motor that opens the inlet flaps.
Connector labelled as SENSOR should be connected to one TS-3 or TS-5 temperature sensor, the polarity is not relevant. It is advised to arrange the test leads away from the power cords .
Connector labelled as RS-485 may be used to build ventilation systems and for the PC communication.

Working principle

The primary function of the controller is to maintain the temperature in the breeding room at the level set by the breeder. Please note that the controller is only a tool that helps to provide the optimal climate conditions in the room. The breeder plays the main role in the whole process by adjusting the settings on the device based on current weather conditions outside the building, as well as (and most importantly) based on the observation of the behaviour of all animals. The user should also monitor the device work status using the alarm control panel.

First controller start-up

Caution! While starting the sensor up for the first time the settings of the minimal fan speed must be adjusted immediately.

The sensor cooperates with the ventilators equipped with the single-phase induction motor, capacitor start-up and the maximum current consumption of 5A. After the attachment of a given ventilator, the user has to adapt it to the cooperation with the controller. In other words, it is necessary to set the minimal fan speed. Such function is similarly called “Minimal speed” and it can be set after entering “Advanced settings” option. To perform such action properly, it is advised to cooperate with another person, who can set the value of “Minimal speed” (the default value is 0µs). Not having this setting adjusted, the device may not work properly. The value of “Minimal speed” may be considered as valid ,as soon as the flaps of the ventilation stack start to lift slightly. If a new ventilator is being attached to the controller, the whole activity of setting the “Minimal speed” has to be repeated.

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Periodical airing

Airing is one of the functions performed by the controller, which activates when the temperature in the room drops below the temperature value set by the user. Such function guarantees a constant air circulation inside the breeding room to provide a regular air supply for the animals, at the same time extracting already used air. There are three parameters available in the airing mode:

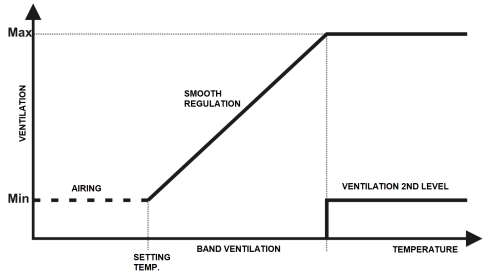
- "Time airing" - indicates the time duration of the activated ventilator (in minutes)
- "Break time" - determines the amount of time during which the ventilator is not working
- "Airing level" - indicates the power value of the ventilator in "Time airing"

For example, the configuration 60s/120s informs, that the airing process is in the time mode. It simply means that the ventilator is turned on for 60 seconds and then it becomes turned off for the next 120 seconds – one minute of work, then a two-minute break.

All of the parameters above can be set by the user. However, there are some rules to be remembered while adjusting the values in the airing process:

- airing is turned on only when the temperature in the piggery drops below the value previously set by the user,
- the primary function of airing is to provide a constant fresh air supply for the animals, and not maintaining the temperature that had been set in the room,
- airing the room frequently for short periods is strongly recommended
- longer airing periods should be avoided, because they can lead to major temperature variations
- the parameters must be adjusted properly according to the behaviour of animals in the breeding room and all the conditions that occur not only inside, but also outside of the building.
- it is possible to completely turn off the airing function; to do so, both in time and percent mode, the values should be set to zero e.g. 0/120s for the time mode or 0%/3min for the percent mode.

Device working scheme



The controller smoothly regulates the ventilation from "Min 1" to "Max1" within the range of "Setting temp." and "Airing band 1". "Vent 2nd stage" will be active above that range and "Level min. 1" will immediately change to "Level min. 2". As the temperature continues to grow, it will change to "Level max. 2" at the end of "Airing band 2" range. If "Airing band 2: equals "0", but "Level max.1" is enabled, "Vent. 2nd stage" will be activated, causing further increases in the temperature to have no effect on changes in the ventilation process (dotted part of the graph). In the case of the temperature in the room dropping below the "Setting temp.", the controller turns on the airing process periodically and if it continues to drop, heating is additionally activated. Every action is based on the adjustments that the user had implemented before. When the temperature in the piggery has different parameters than those set by the user, the programme of the controller may connect with the alarm control panel and activate the alarm.

Controller programming

The sensor has a built-in set of default settings entered to the non-volatile device memory in two cases:

- during the first device start-up
- when the memory data error occurs

In case of the power outage, the controller is not losing any of the settings that had been adjusted earlier by the user.

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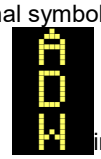
Using the menu (setup)

Rich in a wild range of functions, the controller allows to adjust the settings to the specific circumstances. After entering the menu (by pressing either “left arrow” or “right arrow” button), access to the grouped functions section is granted. Pressing “+” or “-” button allows to adjust the parameters. Any adjustments implemented in the settings by the user, will be automatically saved in the non- volatile memory of the device after 30 seconds since the last button pressed.

Basic menu functions

MENU	DESCRIPTION
	*“**Information mode”*** - of a normal work. The current temperature value is displayed on the screen and if the ventilator is turned on, the display also shows a supplied power value given as a percentage. Additional symbols:  indicates that the alarm is active indicates that the heating is active indicates the presence of additional ventilation
	Adjusting the “**Setting temperature”** - this value determines the start of the ventilating process in the form of the temperature value.
	„The setting of **“Airing time”** - the level of the periodical room airing process. They are two possible variants of this setting.
	**„Airing level”** - during the ventilation process
	„**Alarm minimum**” - indicates the minimal absolute temperature value, signalling the alarm activation.
	„**Alarm maximum**” - indicates the maximal absolute temperature value, signalling the alarm activation..
 	The following functions are being implemented depending on the configuration: • **“Heating”** - activates when the temperature drops below the threshold previously set by the user • **“Fan two groups”** - activates when the measured temperature is higher than the total amount of value set previously by the user and the band ventilation value.
	„**Band ventilation”** - indicates the controller’s response speed (changes in the ventilation level from min 1 to max 1) on the growing temperature.
	The setting of **“Fan speed min”** - is a status, in which the device stays for an indefinite period adjusting the output voltage set value. It is used to calibrate the device with the motor and the flap mechanism.
	The setting of **“Fan speed max”** - is a status, in which the device stays for an indefinite period, adjusting the output voltage set value. It is used to limit the power intended for the ventilating process.

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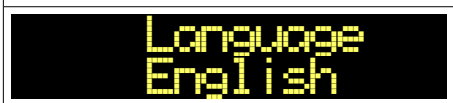
Advanced menu (setup)

Menu intended mainly for the installers, that allows to adapt the controller to the ventilator and the installation process. Switching to the advanced settings option may be triggered by pressing both menu buttons (two arrows) at the same time, for about 10 seconds.

Indicates that the controller had not been calibrated with the ventilation or it signals the malfunction occurrence. Entering the advanced settings and adjusting the ”minimal speed” setting is necessary.

MENU	DESCRIPTION
	Indicates entering the advanced settings.
	Information about the software version.
	The calibration of the minimal fan speed directly attached to the controller . The following parameter equals “1%” in ventilation level.
	The choice of the relay function: • heating • Fan two groups
	The choice of the airing time mode: • Time (default) • Percentage
	Adjusting the voltage range on V1 0÷10V output, concerning the min/max voltage value. Used to adapt the controller to the fan or the inverter.
	The activation of this setting triggers the reversion of V1 output characteristics. The voltage will drop, as the ventilation level in the min/max range increases. The V1 output signal is 10-0V type.
	The activation of this setting triggers supplying the V1 output with 0-10V of 0V level, not the minimal set value, when the ventilation level reaches 0%.
	Adjusting the voltage range on V1 0÷10V output, concerning the min/max voltage value. Used to calibrate the flaps arrangement.
	The activation of this setting triggers the reversion of V2 output characteristics. The voltage will drop, as the ventilation level in the min/max range increases. The V2 output signal is 10-0V type.
	The temperature sensor calibration allowing to rescale the reported value.
	Determining the ventilation level value during every start-up. The fan speed is increased untill it reaches the value set by the user.
	The option of choosing one of four available menu languages .
	Leaving the advanced menu by pressing “+” button, all the changes will be saved in the non-volatile device memory.

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Error messages and warnings

Error messages inform the user about the software malfunctions of the ventilating system.
Possible error messages that may appear on the screen are listed below:

ERROR	DESCRIPTION
Overload	The overload alarm, activating at 75°C. The device stops working until it cools down.
Open sensor! Check the sensor	The sensor may be opened. It signals the potential damage caused to the sensor or the connecting cable
Shorted sensor! Check the sensor	The sensor is probably shorted. It signals the potential damage caused to the sensor or the connecting cable
Power failure	Power outage, low power supply voltage, wrong frequency or strong voltage distortion.

Comments and warnings

Caution! While installing the device it must be cut off from any power supply, because the voltage on some of the components is highly hazardous to health and life. It is advised to entrust a qualified and skilled personnel to carry out this installation.

To avoid problems with the utilisation of the device it is necessary to familiarise with the Instruction Manual before installation and further usage. The user should not interfere with the device construction or perform any repairs. This applies in particular to modifying various elements or components. Maintenance and service works should be only performed by the authorised staff (the installer or the authorised service). The controller requires proper adjustments of the parameters in accordance with the conditions that occur inside the breeding room. Such adjustments are the matter of breeder's choice. The alarm system is required in rooms with artificial ventilation. The producer of this product is not responsible for the damage/losses caused by the abnormal installation, improper programming of the functions, repercussions of random events, or other external factors.
The producer reserves all the rights to modification of the construction, or software of the device.

The product should not be thrown away with unsorted municipal waste after being used for the last time. Instead, it should be reprocessed in accordance with current requirements (EU Commission WEEE directive 2012/19/EU).

The product was manufactured in compliance with RoHS EU directive (also known as Directive 2011/65/EU *).*

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Technical data

Power supply voltage	230VAC 50Hz
Max FAN power output	5A
Range of operating output voltage	70V ÷ (Uz-5)V
Max ALARM (relay) power output	3A
Max FUNCTION (relay) power output	3A
Operating temperature range	-20 +40°C
Temperature measurement range	0 +50°C
Temperature measurement resolution	0.1°C
Temperature sensor damage detection	YES
Maximum number of analog sensors	1
Temperature measurement accuracy – analog input	1°C
Dependence of wire resistance on the measurement – analog input	15,8Ω/°C
Surge protection (max E)	210J
Overload protection	75°C
Dimensions	20x15x8 [cm]
Enclosure class	IP56

The controller SPEED CONTROL SERVOMOTOR comes with:

- one temperature sensor with the accessories
- four rawlplugs
- one 10A fuse

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