VIRGO THE CONTROLLER OF FORCED VENTILATION

VIRGO-INL THE CONTROLLER OF GRAVITY VENTILATION

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JOTAFAN
Cracow 2019r

controllers for breeding establishments

energy efficient lighting systems

automatic weighing systems

JOTAFAN
www.jotafan.pl

Temp.   23.2°C
Target   25.0°C

hoduj nowocześnie i efektywnie

Why is it worth to use the VIRGO controller during the microclimate control?

Wide range of applications:

- The control of the ventilation operation (standard, i.e. chimney or cross-flow as well as tunnel ventilation and appropriate inlets), heating (also three-stage infrared radiators), cooling and air mixers (together up to 16 control sections, so called 'smooth' sections with direct power supply of fans and by means of a 0..10V signal) on the basis o measurement of temperature, humidity and carbon dioxide concentration (up to 16 sensors). The sensors can be assigned to any sections what gives the possibility to divide a building into control areas (e.g. in order to switch on heaters locally what improves the temperature adjustment in the building). The VIRGO can control the operation of air inlets with maintaining fixed target underpressure (after connecting the JOTAFAN CCR-100 pressure sensor). It also provides the function of periodical ventilation.
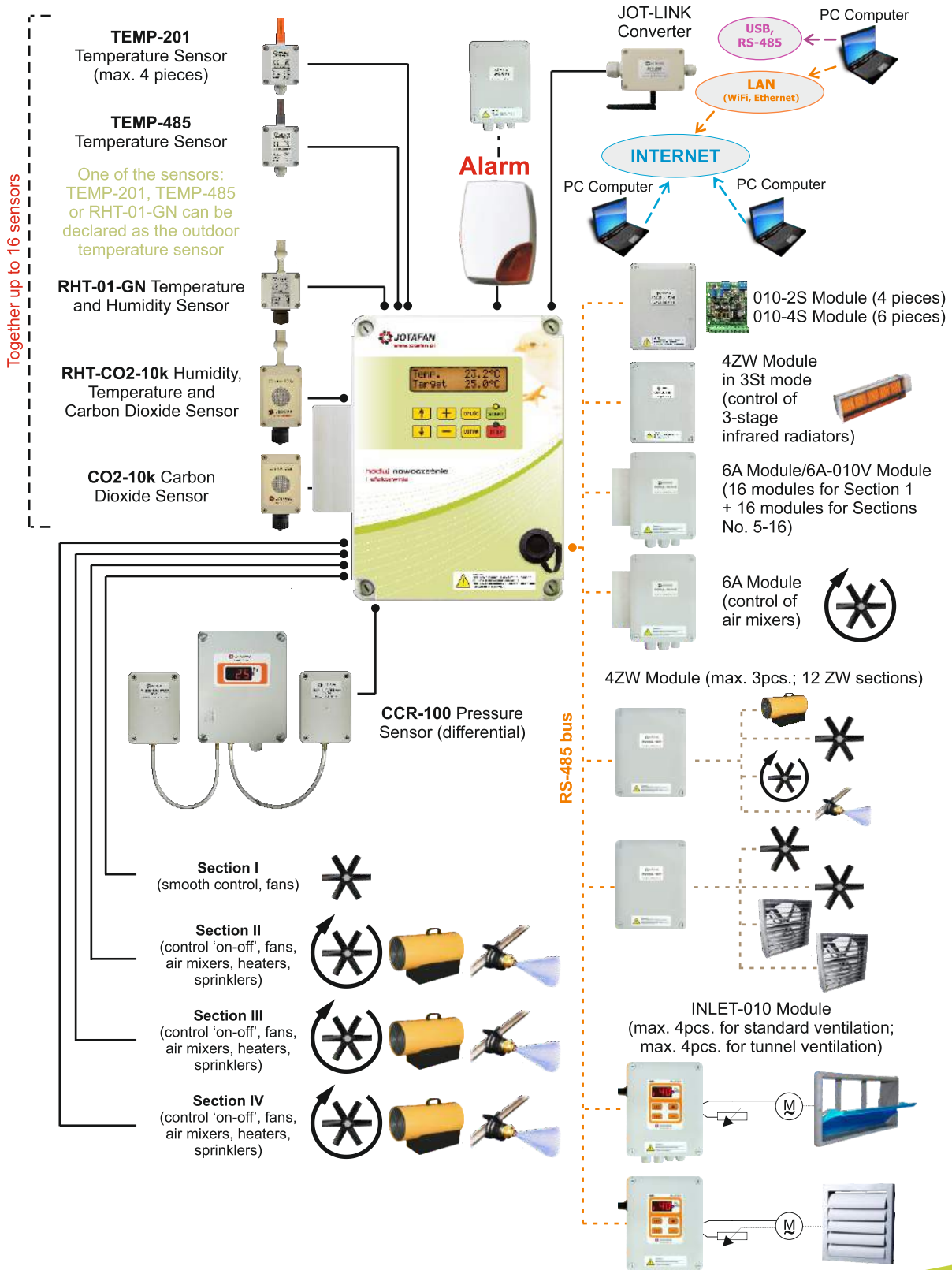
New possibilities:

- The recording of history operation: values of measured parameters, alarms, control, change of settings and other important events. The possibility of the current control of the breeding process as well as data verification in the form of tables and charts.

- Automatic change of temperature during the breeding process according to adjusted curve.

- A built-in communication interface provides the possibility of connecting many VIRGO controllers to the network and managing their operation by means of a PC computer. It is also possible to set up the system for remote monitoring via the Internet.

Versatility of the VIRGO:

- Implementation of a simple ventilation system, e.g. one or two-section with control o n l y in the function of temperature.

- Implementation of a complex system, multi-parameter with division the building into areas.

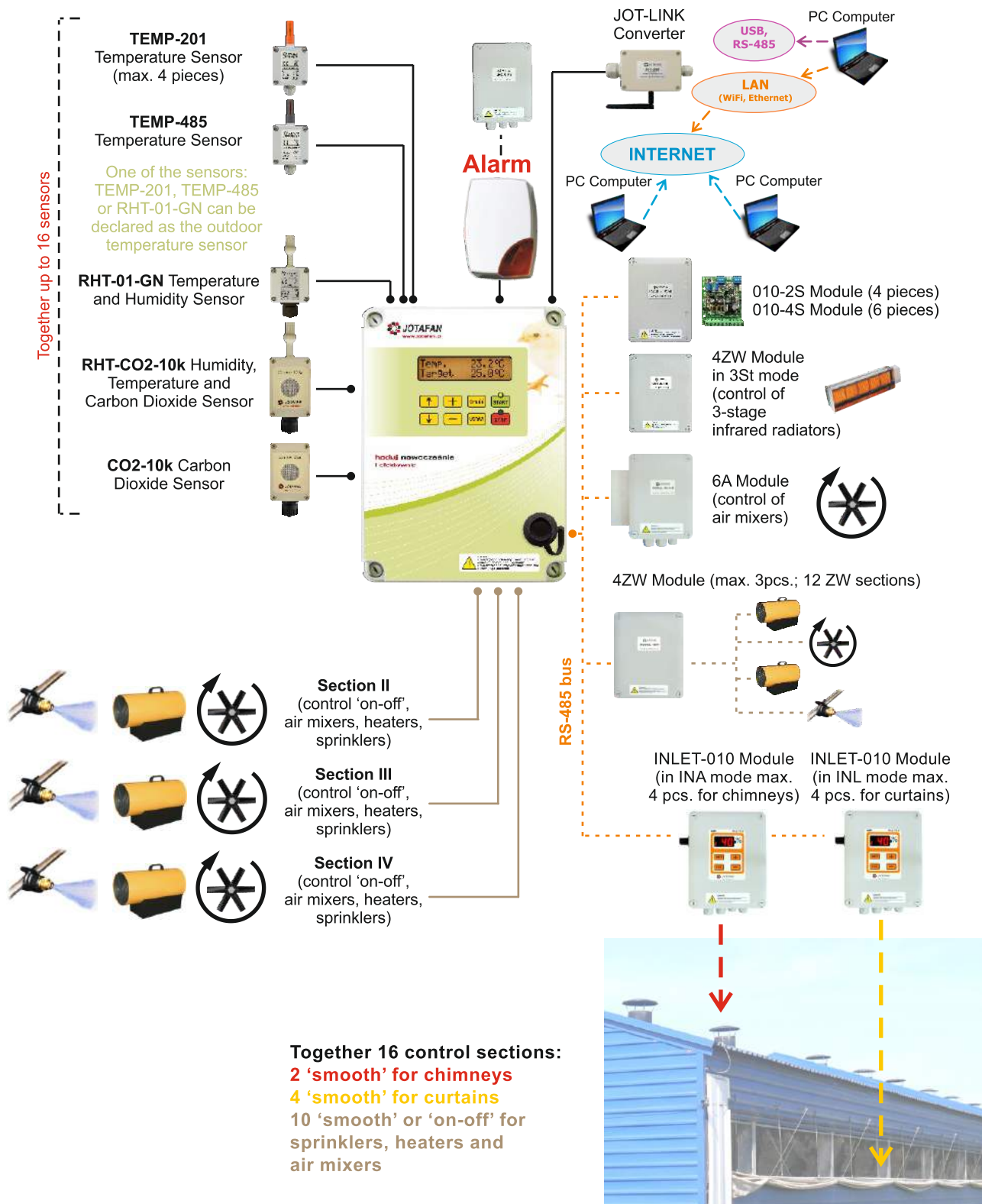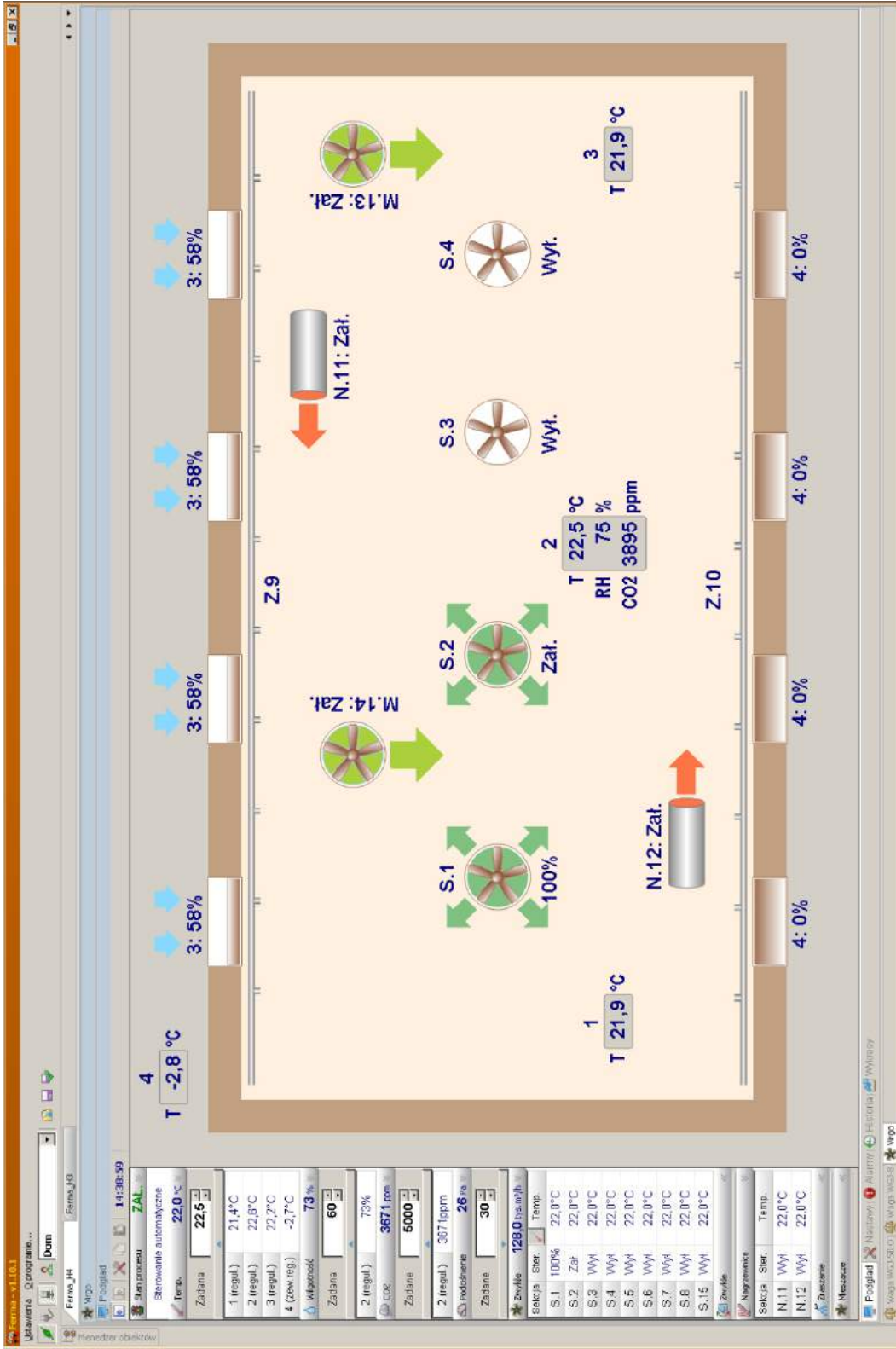# Wiring diagram of the VIRGO controller with sensors and modules

TEMP-201
Temperature Sensor
(max. 4 pieces)

TEMP-485
Temperature Sensor

One of the sensors:
TEMP-201, TEMP-485
or RHT-01-GN can be
declared as the outdoor
temperature sensor

RHT-01-GN Temperature
and Humidity Sensor

RHT-CO2-10k Humidity,
Temperature and
Carbon Dioxide Sensor

CO2-10k Carbon
Dioxide Sensor

Together up to 16 sensors

JOT-LINK
Converter

PC Computer

USB,
RS-485

LAN
(WiFi, Ethernet)

Alarm

INTERNET

PC Computer   PC Computer

010-2S Module (4 pieces)
010-4S Module (6 pieces)

4ZW Module
in 3St mode
(control of
3-stage
infrared radiators)

6A Module/6A-010V Module
(16 modules for Section 1
+ 16 modules for Sections
No. 5-16)

6A Module
(control of
air mixers)

4ZW Module (max. 3pcs.; 12 ZW sections)

CCR-100 Pressure
Sensor (differential)

RS-485 bus

Section I
(smooth control, fans)

Section II
(control 'on-off', fans,
air mixers, heaters,
sprinklers)

Section III
(control 'on-off', fans,
air mixers, heaters,
sprinklers)

Section IV
(control 'on-off', fans,
air mixers, heaters,
sprinklers)

INLET-010 Module
(max. 4pcs. for standard ventilation;
max. 4pcs. for tunnel ventilation)

The application and possibilities of the VIRGO-INL controller during gravity ventilation:

* The VIRGO-INL controller is an electronic device used to control microclimate in livestock buildings with gravity ventilation, heating and sprinkling (cooling, humidification) on the basis of measurements of temperature, humidity and carbon dioxide concentration. The microclimate control is performed by means of servomotors control that open or close air inlets (e.g. chimney flaps, side curtains).

* The controller enables to control a greater number of servomotors of chimney flaps and side curtains by connecting INLET-010 modules (max. 4 for chimneys and max. 4 for curtains).

* During its operation the VIRGO-INL controller records the history: values of measured parameters, alarms, control. That provides continuous control of the breeding process as well as data archiving. After reading the history to a PC computer it is possible to present it in the form of tables and charts.

* A built-in communication interface provides the possibility of connecting many VIRGO-INL controllers to the network and managing their operation by means of a PC computer. It is also possible to set up the system for remote monitoring - via the Internet.

# Wiring diagram of the VIRGO-INL controller with sensors and modules

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One of the sensors:
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RHT-01-GN Temperature
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RHT-CO2-10k Humidity,
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Together up to 16 sensors

Alarm

JOT-LINK
Converter

PC Computer

USB,
RS-485

LAN
(WiFi, Ethernet)

INTERNET

PC Computer   PC Computer

010-2S Module (4 pieces)
010-4S Module (6 pieces)

4ZW Module
in 3St mode
(control of
3-stage
infrared radiators)

6A Module
(control of
air mixers)

4ZW Module (max. 3pcs.; 12 ZW sections)

RS-485 bus

INLET-010 Module   INLET-010 Module
(in INA mode max.   (in INL mode max.
4 pcs. for chimneys)   4 pcs. for curtains)

Section II
(control 'on-off',
air mixers, heaters,
sprinklers)

Section III
(control 'on-off',
air mixers, heaters,
sprinklers)

Section IV
(control 'on-off',
air mixers, heaters,
sprinklers)

Together 16 control sections:
2 'smooth' for chimneys
4 'smooth' for curtains
10 'smooth' or 'on-off' for
sprinklers, heaters and
air mixers

5

The Farm Computer Program - visualisation of the building

One of the advantages of the VIRGO controller is its interoperation with a PC computer and visualisation of the process of microclimate control. In the exemplary building presented on the above screen there work four sections of ventilation, two groups of inlets, two heaters, two sprinkling sections and two air mixers. There have been installed four sensors: three TEMP-201 temperature sensors and one integrated RHT-CO2-10k sensor. The inlets are open to 58% and Section 1 (S.1) works to 100% (maximum ventilation).

The Farm Computer Program; Settings - Temperature Control
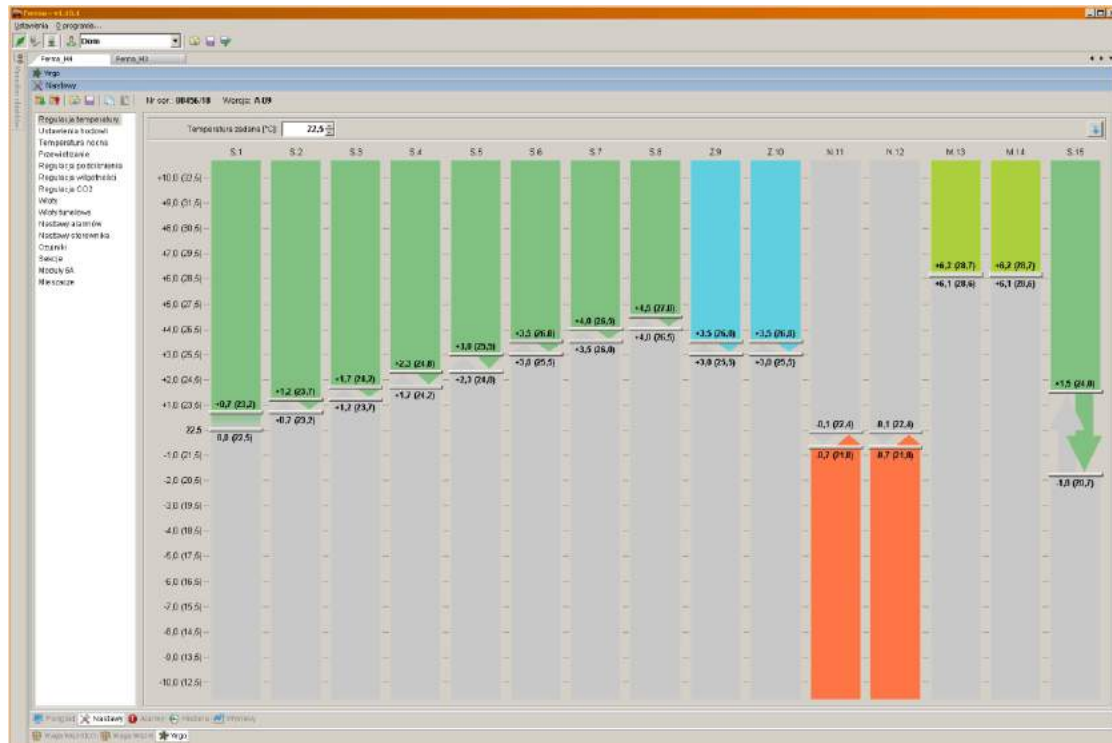
The Farm Computer Program - Charts

The Farm Computer Program - Settings
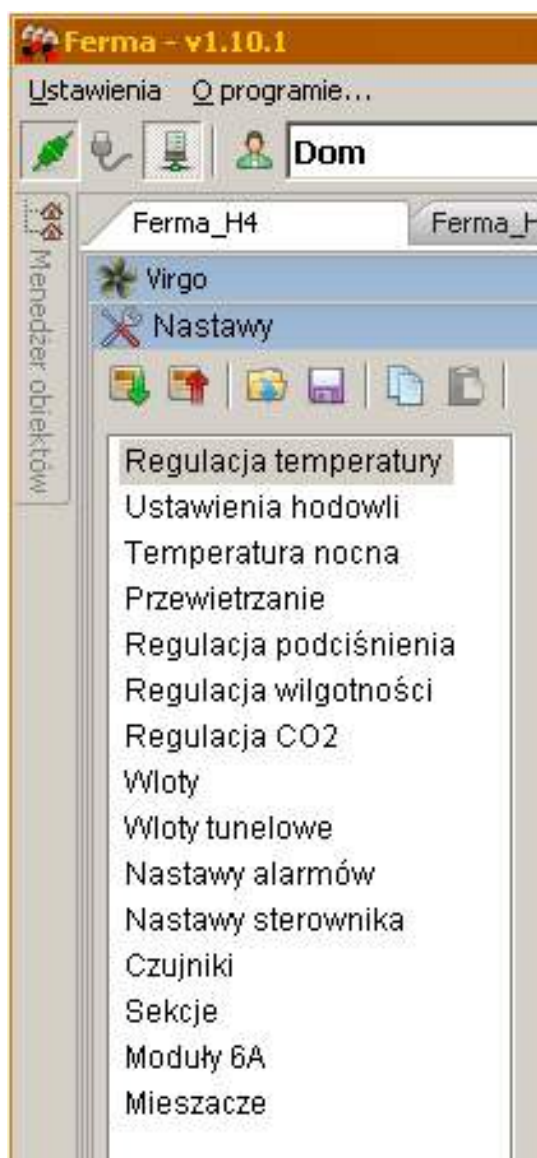
❖ **Temperature control** - settings of sections that work in the function of temperature. Ranges are related to the target temperature. Changes of the settings can be made by means of sliders (horizontal bars described by the temperature values)

❖ In **Breeding Settings** Menu it is possible to define a day-end closing resulting from the adopted manner of breeding - 'midnight' that is the change of a day can happen in the set time. Here, it is also possible to define the curve of temperature change for automatic control (graphically or by entering values in the table). The maximum number of curve points: 8, max. number of days: 1000.

❖ **Night Temperature** is used to improve birds welfare during their sleep – it is used primarily by the breeders of parent flocks. It enables to reduce temperature automatically (in terms of the target temperature) during the break in a light cycle. The change in temperature happens at the target time. It is possible to set up to 4 ranges (with the same reduced temperature).

❖ In **Periodical Ventilation** Menu the function of periodical ventilation is set in a new manner – there is defined how long a whole cycle lasts and not, as before, the time of break. This makes it easier to apply the function of periodical ventilation as minimum ventilation – cyclical supply of fresh air. This process can be realised in a multi-phase manner (up to 4 phases) and start different ventilating sections in subsequent phases. The function of periodical ventilation band has been maintained – the working time of periodical ventilation is shortened proportionally to temperature decrease below the target temperature (in order to prevent excessive cooling of a building in case of the lack of heating).

❖ **Pressure Control** Menu includes the set of settings that allow to keep constant underpressure in the building during ventilation and inlets operation.

❖ The setting **Humidity Control** enables to perform the function of dehumidification by means of ventilation (and optionally by heating) as well as humidification of the building when humidity is too low (and sprinkling is installed).

❖ In **CO2 Control** Menu it is possible to set the operation of ventilation sections depending on carbon dioxide concentration. The research on the impact of CO_2 concentration on production results, carried out over several years together with breeders, clearly showed that ventilation depending on this parameter is necessary, especially in the initial period of the breeding process.

In **Inlets** Menu it is possible to define up to four controllers of inlets and assign them common operation or depending on selected sections – for each option it is possible to define the characteristics of inlets opening in the function of efficiency of ventilation sections. A novelty is the setting of time of inlets movement in the full range – it provides more optimal ventilation control – switching on and switching off of particular sections takes place after some time from the moment when inlets start to move which prevents a sudden change of underpressure and ensures better air exchange in the building. Similar to the inlets settings are 'tunnel inlets' settings – for four modules of inlets that cooperate with ventilation sections declared as tunnel ones.

In the program window **Alarm Settings** Menu it is possible to specify values of alarm thresholds for temperature, humidity and carbon dioxide concentration. A novelty are two alarms from temperature defined as absolute values of temperature below and above which there will be reported an alarm. There have been maintained relative thermal alarms defined as deviations from the target temperature. There has been introduced a setting that enables for a delay in alarms acceptance: an alarming situation must continue for the target time (e.g. 1 minute for thermal alarms) so that an alarm was accepted and reported. A similar alarm 'insensitivity' can be set for errors in communication with sensors and extension modules.

In **Sensors** Menu it is possible to install sensors, set their functions and make possible correction of indications. There is a possibility of connection of up to 16 different sensors: max. 4 TEMP-201 (from numbers from 1 to 4), TEMP-485 temperature sensor, RHT-01-GN temperature and humidity sensor, CO2-10k carbon dioxide sensor, RHT-CO2-10k integrated sensor what increases the accuracy of control and reliability of operation. Additionally, it is possible to connect a CCR-100 pressure sensor (differential) for the measurement of pressure difference between the inside and outside of a livestock housing.

In the **Sections** Menu there is a possibility to define a kind, operation manner of each of sections, set their parameters and connect their operation with temperature sensors. On the left hand side of the window there is a list with groups of settings that enable to configure the VIRGO controller.

In the VIRGO controller there can be defined up to 13 smooth sections (1 built-in and 12 external, from 5 to 16). The controller supports up to 32 extension modules of the smooth section, 6A Module (for direct supply of variable-speed fans and other devices, e.g. electric heating plates) or 010-2S Module (010-4S Module) to perform 0..10V analogue outputs. In this menu it is possible to make correction of the control for each of modules so that all modules grouped in the same section could operate in the same way (with low values of control).

In the **Air Mixers** Menu it is possible to set the operation of air mixers sections (indoor fans that are used to cause air movement in the building in order to rebalance temperature distribution) with heaters and temperature thresholds (in case of the control in the function of temperature difference between sensors).

In the **Charts** Menu it is possible to illustrate the history of values of measured parameters recorded in the VIRGO memory. It allows for the current control of the breeding process as well as its verification in the form of tables and charts.

A connection scheme of the VIRGO in the communication network on the basis of an exemplary farm.
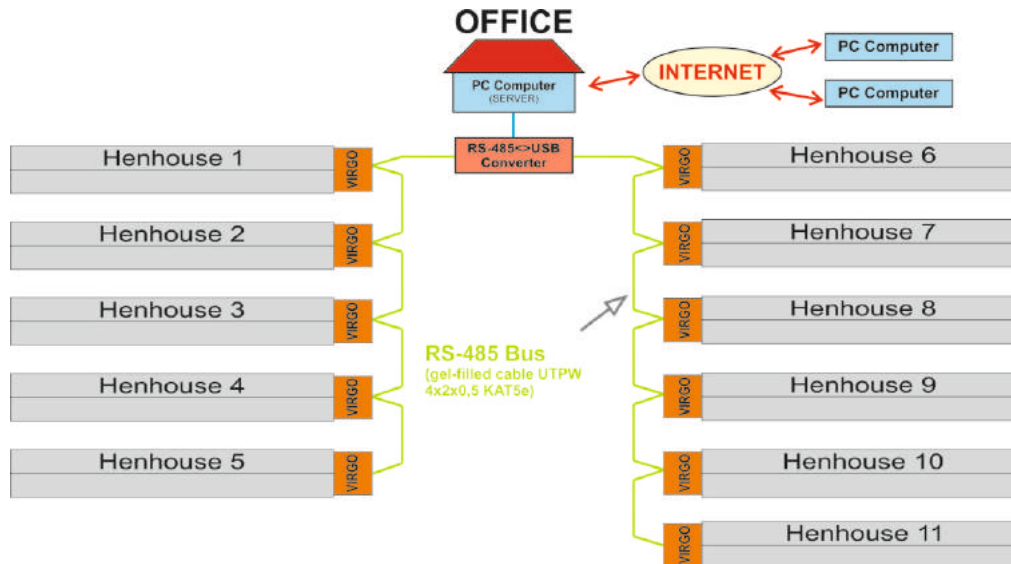
In this figure there is illustrated a real farm consisting of 11 henhouses equipped with VIRGO controllers connected in a communication network (RS-485 bus). The VIRGO communicates with a PC computer installed in the farm office. By means of a computer and the FARM software it is possible to change settings, visualise the operation of the VIRGO as well as microclimate parameters in particular buildings. On the screen of a display there are reported alarms while data of history operation are collected on the hard disc. A PC computer in the office is a server thanks to which it is possible to connect other computers to the VIRGO controller - also via the Internet.

The arguments in favour of the VIRGO application:

- The versatility with wide configuration possibilities. The possibility of implementing different systems of microclimate control: from the simplest (e.g. one ventilation section controlled in the function of temperature) to more complex – multi-zone and multi-parameter.

- Innovative technical solutions applied in the VIRGO controller based on reliable devices (COMBO+ and TERMISTAT-6-4S-485-LCD) together with long-term experience of the manufacturer – the JOTAFAN company as well as suggestions and expectations of the Users and installation firms.

- The recording of history operation with date and time. Connection to a PC computer and remote control of many VIRGO controllers also via the Internet.

- Increased reliability and safety: remote alarm reporting on a computer's screen, permanent insight into the process of microclimate control, the possibility of immediate reaction even away from the farm.

  In conclusion: there is a possibility of modernisation the TERMISTAT-4S-485-LCD and ..LCD+ controllers into the VIRGO one at a price several times lower than the purchase of a new VIRGO controller.

We would like to invite you to cooperation!

Ever since its foundation, the **JOTAFAN Andrzej Zagórski** company has been designing and manufacturing electronic control and measuring devices as well as systems of control. We specialize in designing and producing electronic devices for agriculture, especially for animal breeding (poultry houses, pig houses and barns) and mushrooms cultivation (mushroom growing facilities).

Our offer includes:
- microclimate controllers equipped with advanced control algorithms and the possibility of the system configuration in the building; temperature and humidity controllers,
- manual and automatic poultry scales, systems of automatic poultry weighing during the breeding process,
- silo weighing scales,
- an alarming unit with GSM communication, alarm signalling units, buffer power supply units,
- lighting fixtures with light intensity adjustment, controllers, dimmers, programmable light controllers,
- counters and controllers for feed and water dispensing,
- extension modules (e.g. for a smooth section of fans control, control of a servomotor of hopper-type windows, for interoperation with the JOTAFAN microclimate controllers as well as controllers of other manufacturers, modules are equipped with 0..10V control outputs),
- sensors of temperature, humidity and carbon dioxide concentration,
- speed regulators of single-phase fans, light intensity controllers, power regulators,
- computer software supporting the breeding and cultivation processes.

High quality and technical state of the JOTAFAN devices guarantee reliability during usage, required especially in the breeding and growing processes. Our products have developed a very good opinion among installation companies as well as the Users what results in a growing sale and continuous interest in our offer. We design new devices on the basis of our multiannual experience as well as taking into account needs and suggestions of our Customers, already existing devices are also modernised. This is how the VIRGO controller was manufactured. I hope that similarly to our other products it will be of good repute and thanks to its reliable operation will deserve your recognition.

I invite you to cooperation with my company

Andrzej Zagórski
owner

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