simex | POLISH PRODUCER

COMPACT AUTOMATION

SimModulo

Measure,
Control and Log Data

SimModulo Compact automation

- CONVERTER
- GAUGE
- REGULATOR
- CONTROLLER

all in one

SimModulo is an advanced device that allows you to measure, process, present and regulate parameters read from measurement sensors in many data channels simultaneously. It performs the functions of signal transducers and control units, typical for devices such as microcontrollers or programmable relays.

- **signal transducer system with control functions**
- **two product lines: SimModulo PRO and SimModulo ONE**
- **mathematical and logical functions**
- **full galvanic isolation between all circuits**
- **EMC immunity 4/5 kV (optional)**

Main Functions and Advantages:

Wide range of applications thanks to the large number of inputs/outputs available in one system

Free expansion with local extension modules

Virtually unlimited combinations of basic units and expansion modules

AI / DI
AO / DO

Mixed combination of AI / DI / AO / DO modules - flexibility in use

Ethernet connector - wide range of communication options

Dedicated SimFlexSoft software

Configurable drag & drop logic

BO AI AO BI

Submodular card - 4 ports for individual I/O configuration

Can be used worldwide

X Y

Full separation of I/O and power supply circuits

SimModulo PRO

SimModulo PRO - can work autonomously or cooperate with external measurement and execution modules.
The system is characterized by the possibility of modular scaling (with a scalable housing) and multi-level expansion of supported inputs and outputs. Thanks to the possibility of programming the operating logic and using specialized control functions, they are able to perform most activities related to monitoring and controlling industrial processes.

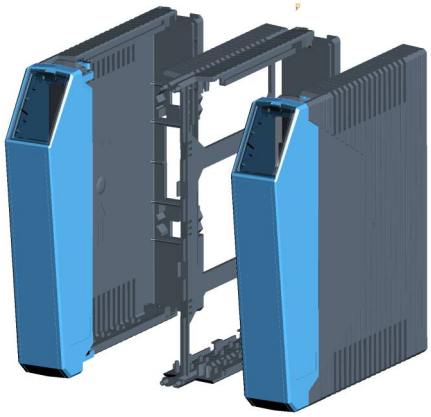
- **modular, multi-segment enclosure (up to 7 modules)**
- **cards: base, communication, and I/O (single- and multi-channel)**
- **inputs: 0/4-20 mA, 0-10 V, 0–150 mV, RTD, TC, binary**
- **outputs: relay, OC, SSR, 0/4-20 mA, 0-10 V**
- **submodule card supporting 1 to 4 configurable I/Os**
- **engineering software: SimFlexSoft and visualization software**

- **Modular data processing platform**

  SimModulo PRO is a modular device with one base card and the possibility of freely configuring measurement functions in the form of expansion cards. This solution is completely tailored to the user's needs, both in terms of functionality and the number of input and output ports used.

- **Modular, multi-segment housing**

  The mechanical structure of the housing has been designed to freely expand its size from 1 up to 7 modules. Regardless of the number of supported I/O cards, the housing creates one compact whole. Additional I/O cards can be added at any time without having to dismantle the existing device.



- **Stable operation in a wide temperature range: -40°C to +85°C (optional)**
- **Dedicated SimFlexSoft tool**

  Multi-level configuration of SimModulo PRO using SimFlexSoft software gives the user the possibility to freely select the data source, processing method (operating logic), and operating mode of individual input/output ports.

- **Possibility to read data using a web server**

  The web server using the Modbus TCP protocol enables the presentation of measurement results in a tabular form, up to 20 measurement channels.

SimModulo PRO is the most advanced group of devices in the SimModulo line. It enables simultaneous measurement, processing, visualization, and control of parameters read from measurement sensors across multiple data channels at the same time. It performs signal conversion and control functions typical of devices such as microcontrollers or programmable relays.

Hardware inputs/outputs

- **any I/O combination - one device, many processing standards**
- **four-port submodule card for single I/O support**
- **possibility of expansion by the operator during operation**
- **Ethernet with Modbus TCP and web server**
- **full separation of input/output and power supply circuits**
- **freedom to choose the data source and control mode**
- **dedicated to an environment with above-standard EMC interference**
- **as autonomous or slave units in industrial networks**

Do you need a measurement and control device for a specific task?

1. Evaluate the complexity of the application
2. Estimate the necessary number of inputs and outputs
3. Select a base card
4. Add appropriate I/O cards
5. Insert a communication card with the web server
6. Upload the logical configuration (and here the free SimFlexSoft configurator will be invaluable) and you're done...

In practice, the entire process is intuitive and does not require advanced programming knowledge. The modular structure of the system allows the solution to be flexibly adapted to the needs of a specific installation - both in small applications and in more complex industrial projects. Thanks to the clear configuration interface, you can quickly define the operating logic, set communication parameters, and test the system's functionality even before it is launched on site. Moreover, the possibility of integration with a web server enables remote monitoring and control of device operation directly from a web browser, without the need to install additional software. This means time savings during implementation, easier diagnostics, and convenient system expansion in the future.

Base and communication cards

Name	Base card M-B1	Communication card M-COM1
Number and type of inputs	2 x binary	-
Number and type of outputs	2 x OC	-
Communication interface	RS-485, Ethernet RJ-45, USB (service)	RS-485, Ethernet RJ-45 / ModbusTCP + webserver

Extension cards - I/O

Input / output modules							
Name	M-TC5	M-UI4	M-RT4	M-BI4G3	M-IO4UO4	M-RS54OC4	M-SSR14
Number and type of inputs	5 x mV/TC	4 x U/I	4 x R/RTD	4 groups of 3 binary	-	-	-
Input signal					-	-	-
Number and type of outputs	-	-	-	-	8 x U/I	8 x REL/OC	14 x SSR
Output signal	-	-	-	-			

Extension card - submodular

Input / output submodules						
Name	S-TC1	S-RT1	S-UI1	S-BI1G3	S-IO1UO1	S-SSR1OC1
Number and type of inputs	1 x mV/TC	1 x R/RTD	1 x U/I	1 x binarne	-	-
Input signal					-	-
Number and type of outputs	-	-	-	-	1 x U/I	1 x SSR/OC
Output signal	-	-	-	-		

SimModulo ONE

SimModulo ONE is a line of multi-channel signal converters housed in a single-module design. They feature full galvanic isolation between all input circuits, output circuits, and the power supply. The design of the converters allows flexible configuration of the number of available device inputs and outputs. As a result, the device can function both as a multi-channel signal isolator and as a signal splitter. Additionally, built-in arithmetic and logic functions enable mathematical operations on input signals, such as **SUM A+B(+C)**, **DIFFERENCE A-B(-C)**, as well as transmitting the **MIN** or **MAX** value from any number of input signals to the output. An option for **nonlinear scaling** of the input signal to the output according to a **20-point user-defined characteristic** is also available.

Hardware inputs / outputs

- from 1 to 3 galvanically isolated 0/4..20 mA inputs
- from 1 to 3 galvanically isolated 0/4..20 mA outputs
- freely configurable input/output ranges: 0..20 mA, 4..20 mA, 20..0 mA, 20..4 mA

Processing function

- multi-channel 0/4..20 mA isolators, from 1 to 3 channels
- signal splitter with 2 or 3 outputs
- arithmetic module: A-B(-C), A+B(+C), MIN, MAX
- converter with a user-defined nonlinear characteristic (up to 20 points)
- special versions

SMS-AQA-1: signal splitter with 2 or 3 outputs

Input / output modules		
Name	**SMS-AQA-1-12**	**SMS-AQA-1-13**
Function		
Number and type of inputs	1 x 0/4..20 mA 1 x 20..0/4 mA	
Input signal		
Number and type of outputs	2 x 0/4..20 mA 2 x 20..0/4 mA	3 x 0/4..20 mA 3 x 20..0/4 mA
Output signal		

SMS-AQA-2: isolator, from 1 to 3 channels in one device

Input / output modules			
Name	**SMS-AQA-2-11**	**SMS-AQA-2-22**	**SMS-AQA-2-33**
Function			
Number and type of inputs	1 x 0/4..20 mA 1 x 20..0/4 mA	2 x 0/4..20 mA 2 x 20..0/4 mA	3 x 0/4..20 mA 3 x 20..0/4 mA
Input signal			
Number and type of outputs	1 x 0/4..20 mA 1 x 20..0/4 mA	2 x 0/4..20 mA 2 x 20..0/4 mA	3 x 0/4..20 mA 3 x 20..0/4 mA
Output signal			

Mathematical functions

SMS-AQA-3: converter with a user-defined non-linear characteristic (up to 20 points), processing from 1 to 3 channels

Input / output modules			
Name	**SMS-AQA-3-11**	**SMS-AQA-3-22**	**SMS-AQA-3-33**
Function			
Number and type of inputs	1 x 0/4..20 mA 1 x 20..0/4 mA	2 x 0/4..20 mA 2 x 20..0/4 mA	3 x 0/4..20 mA 3 x 20..0/4 mA
Input signal			
Number and type of outputs	1 x 0/4..20 mA 1 x 20..0/4 mA	2 x 0/4..20 mA 2 x 20..0/4 mA	3 x 0/4..20 mA 3 x 20..0/4 mA
Output signal			

SMS-AQA-4: arithmetic module with the A-B function (optionally -C), processing 2 or 3 channels
SMS-AQA-5: arithmetic module with the A+B function (optionally +C), processing 2 or 3 channels

Input / output modules				
Name	**SMS-AQA-4-21**	**SMS-AQA-4-31**	**SMS-AQA-5-21**	**SMS-AQA-5-31**
Function	a-b	a-b-c	a+b	a+b+c
Number and type of inputs	2 x 0/4..20 mA 2 x 20..0/4 mA	3 x 0/4..20 mA 3 x 20..0/4 mA	2 x 0/4..20 mA 2 x 20..0/4 mA	3 x 0/4..20 mA 3 x 20..0/4 mA
Input signal				
Number and type of outputs	1 x 0/4..20 mA 1 x 20..0/4 mA	1 x 0/4..20 mA 1 x 20..0/4 mA	1 x 0/4..20 mA 1 x 20..0/4 mA	1 x 0/4..20 mA 1 x 20..0/4 mA
Output signal				

SMS-AQA-6: averaging summator (arithmetic mean) from 2 or 3 inputs
SMS-AQA-7: arithmetic module - MIN value from 2 or 3 inputs
SMS-AQA-8: arithmetic module - MAX value from 2 or 3 inputs

Input / output modules						
Name	**SMS-AQA-6-21**	**SMS-AQA-6-31**	**SMS-AQA-7-21**	**SMS-AQA-7-31**	**SMS-AQA-8-21**	**SMS-AQA-8-31**
Function	$\overline{X}$	$\overline{X}$	MIN	MIN	MAX	MAX
Number and type of inputs	2 x 0/4..20mA 2 x 20..0/4mA	3 x 0/4..20mA 3 x 20..0/4mA	2 x 0/4..20mA 2 x 20..0/4mA	3 x 0/4..20mA 3 x 20..0/4mA	2 x 0/4..20mA 2 x 20..0/4mA	3 x 0/4..20mA 3 x 20..0/4mA
Input signal						
Number and type of outputs	1 x 0/4..20mA 1 x 20..0/4mA		1 x 0/4..20mA 1 x 20..0/4mA		1 x 0/4..20mA 1 x 20..0/4mA	
Output signal						

Processing function: special versions

SMS-AQA-R: psychrometric transducer - relative humidity measurement transducer based on wet- and dry-bulb temperature sensors
2 galvanically isolated 0/4..20 mA inputs
1 galvanically isolated 0/4..20 mA output

SMS-AQA-R is a transmitter equipped with two 4..20 mA current inputs, to which signals corresponding to the following are supplied:
- temperature from the dry-bulb sensor,
- temperature from the wet-bulb sensor.

The device has one 4..20 mA output on which the calculated value of relative humidity is provided.
Built-in mathematical functions enable automatic calculation of humidity based on the temperature difference and psychrometric relationships. The temperature difference between the dry and wet thermometers makes it possible to determine the intensity of evaporation, and thus the amount of water vapor in the air. The transmitter uses known psychrometric relationships to convert this difference into relative humidity.

Module inputs:
IN1: dry-bulb sensor (4..20 mA from the temperature transmitter)
IN2: wet-bulb sensor (4..20 mA from the temperature transmitter)
Module output:
OUT1: relative humidity (% RH)

SMS-AQA-N: calculation of normal gas flow (Nm^3/h)
3 galvanically isolated 0/4..20 mA inputs
1 galvanically isolated 0/4..20 mA output

SMS-AQA-N is a transmitter equipped with a function that enables the calculation of normal gas flow (Nm^3/h). The device uses known psychrometric relationships to convert the volumetric gas flow into normal flow, taking into account temperature and, optionally, pressure. This is a commonly used solution in industrial installations where accurate monitoring of gas consumption is essential.

Module inputs:
IN1: flow (4..20 mA from the flowmeter)
IN2: pressure (4..20 mA from the pressure transmitter)
IN3: temperature (4..20 mA from the temperature transmitter)
Module output:
OUT1: normal flow rate

SMS-AQA-T: intelligent ballast tank mass calculation module for floating vessels
3 galvanically isolated inputs 0/4..20 mA
3 galvanically isolated outputs 0/4..20 mA

The **SMS-AQA-T** module is an advanced device for processing 4..20 mA signals, designed for calculating trim on maritime vessels. It combines scaling, filtering, nonlinear conversion, and mathematical functions, enabling precise ballast mass calculations without the need for additional controllers.In ballast systems, the module converts water level and density measurements into the actual ballast mass, taking into account the tank geometry and water temperature. It provides a stable 4..20 mA output signal ready for use in trim and stability systems, improving the accuracy of moment calculations and enhancing the efficiency of ballast management.

The Trim & Stability System plays a critical role on ships, maintaining the vessel's longitudinal stability. It performs the following calculations:
- summing the masses of all ballast tanks,
- calculating longitudinal moments,
- determining the current trim,
- simulations such as "what happens if 50 t is transferred from the bow to the stern?",
- recommendations like "to achieve optimal trim of 0.3 m, add 80 t to tank X."

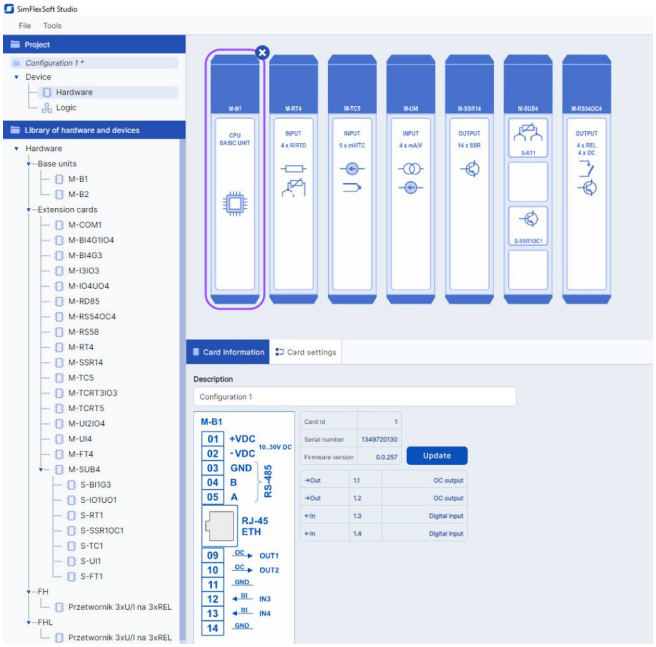
Module inputs:
IN1: level (4..20 mA from level transmitter)
IN2: density (4..20 mA from conductivity/density transmitter)
IN3: temperature (4..20 mA from temperature transmitter)
Module outputs:
OUT1: mass [t]
OUT2: volume [m^3]
OUT3: retransmission / level

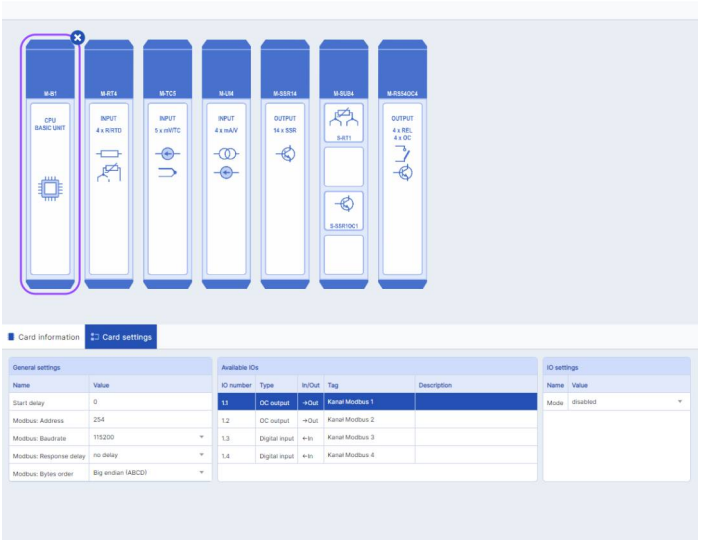
SimFlexSoft engineering software

Creating hardware configuration in SFS in SimModulo PRO

SFS - Configurator software (SimFlexSoftware) is used to configure the operation of devices. The software allows you to both define the hardware configuration and build the SimModulo operating logic with which the built set is to work.

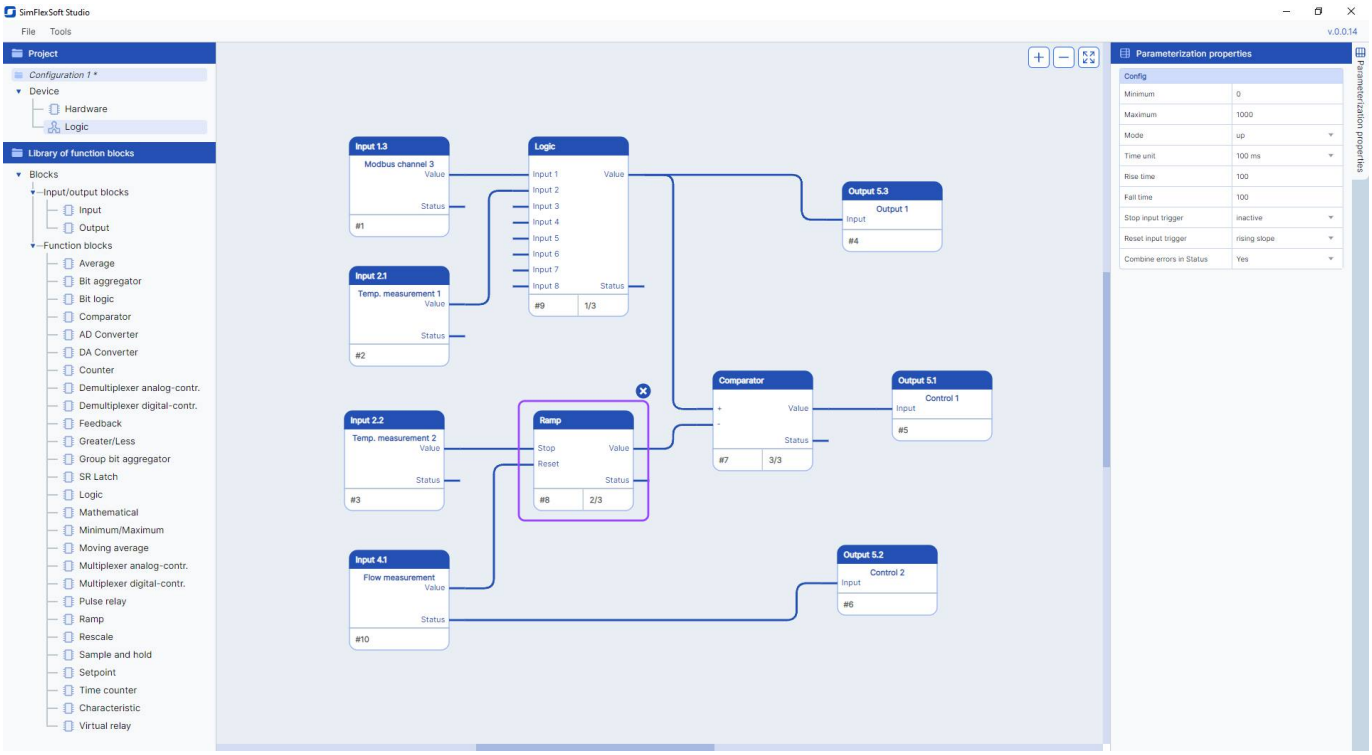
Working with SimFlexSoftware begins with configuring the cards included in the SimModulo set. The user can do this by importing cards included in the built set.





Creating operating logic in SFS

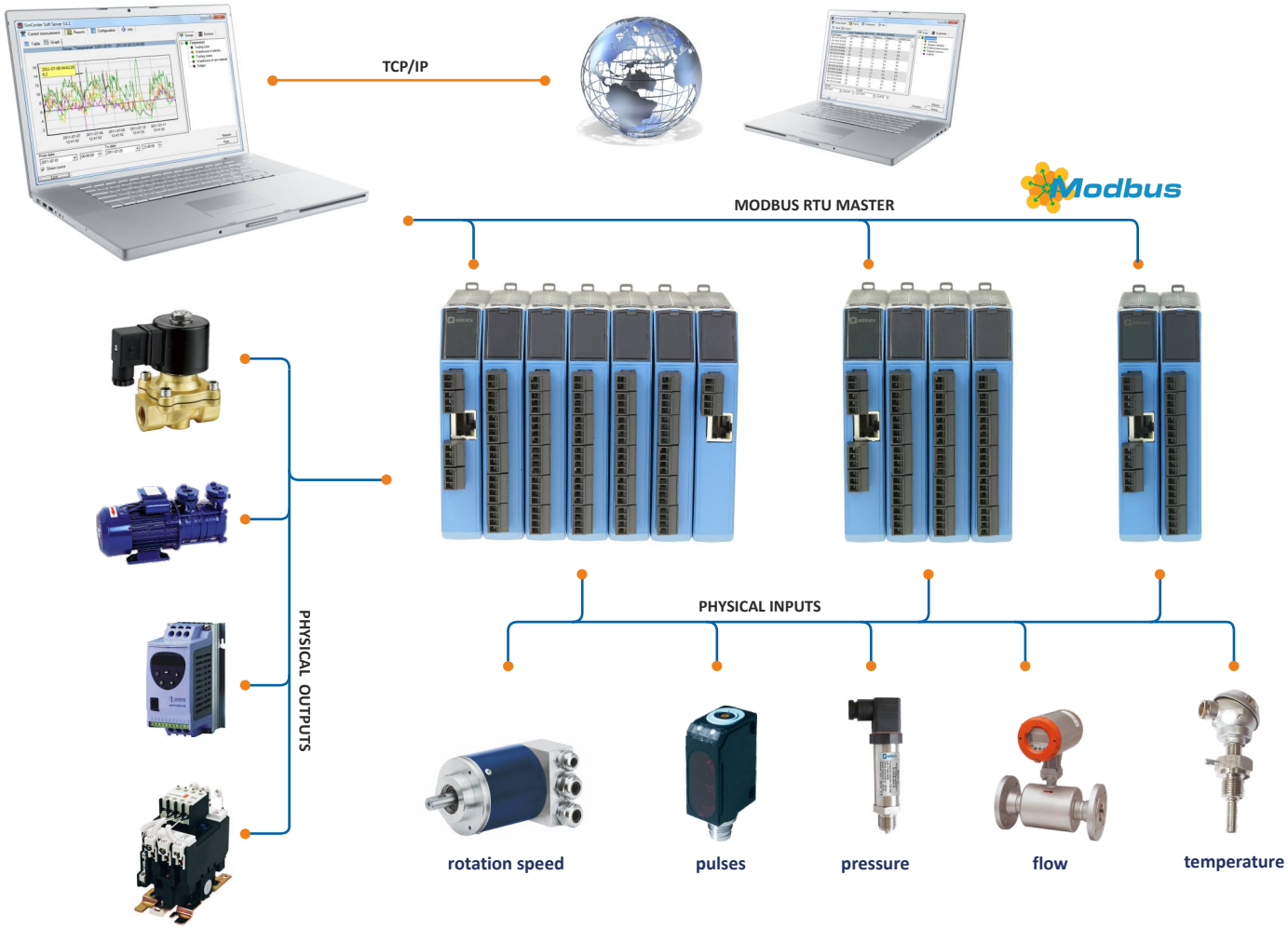
SFS - Configurator software has the functionality of defining the operating logic of the built device. This logic is defined by placing selected logical blocks on the "canvas", configuring their properties and connecting appropriate lines to them connecting to other blocks or input and output ports.



Visualization software

SimCorder Soft

The **SimCorder Soft** software is a visualization application created to improve work with extensive networks of SIMEX devices. Acquiring, archiving, visualizing, reporting and exporting measurement data from all devices in the network has become extremely easy. Measurements are collected from devices both automatically and on demand. The possibility to immediately notify about alarm conditions via text messages and e-mails will often make you solve the problem quickly, thus avoiding long and costly downtime. Additionally, measurement data, alarm states, and configuration can be viewed at any time, also via the Internet.



Monitoring from any place of your choice

SimCorder Soft in the **Network SERVER** version can share recorded data and information about the system, including: alarm states, via the Internet. Depending on your needs, you can choose from the following versions of SimCorder:

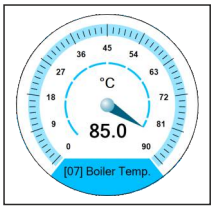
Functionality	BASIC	ALARM	NETWORK	
			SERVER	TERMINAL
Licensed USB key required	✓	✓	✓	
semiSCADA	✓ *	✓ *	✓ *	
Taking measurements on demand	✓	✓	✓	
Direct cooperation with the registrar	✓	✓	✓	
Changing the operating configuration of devices	✓	✓	✓	
Information about system alarm states	✓	✓	✓	✓
Alarm forwarding to external devices		✓	✓	
GSM and e-mail notification		✓	✓	
Remote cooperation with a network of devices			✓	✓

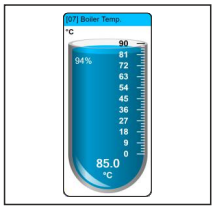
* functionality resulting from the license

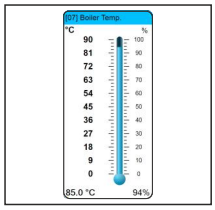
Web server configuration

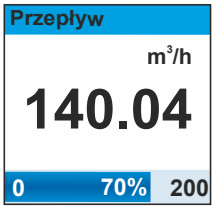
The SimModulo device can be equipped with a communication card - Ethernet with ModbusTCP and a web server. This card allows the user to observe measurement data using an interface supporting the Modbus TCP protocol or using a dedicated web server.

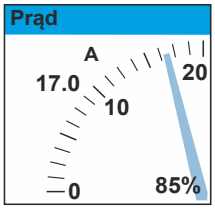
As part of the webserver, the functionality of selecting various pages presenting measurement results has been added, not only in tabular form, but also using special widgets called "Sidgets":





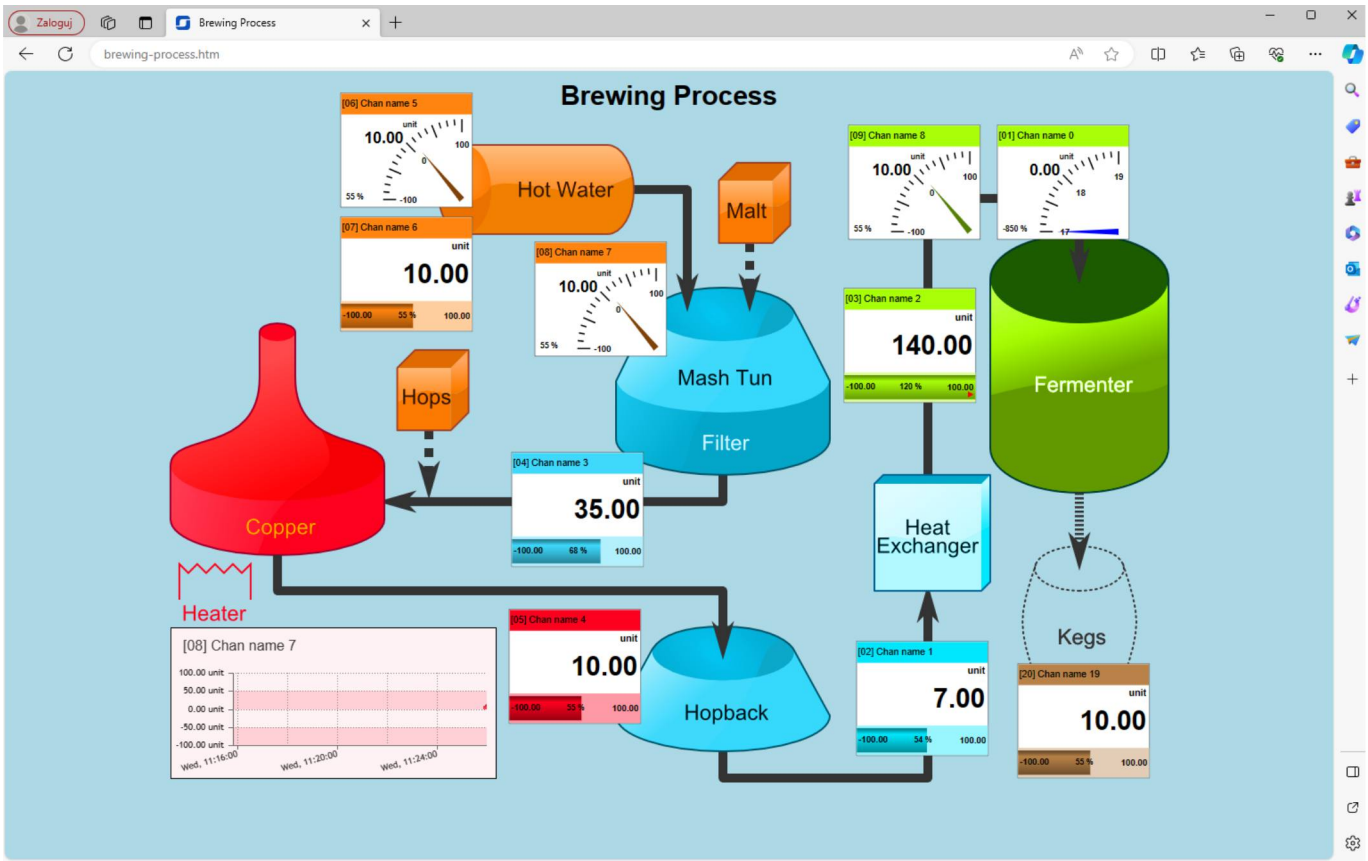






When creating their website, the user can choose from many types of sidgets:

- Text - channel data is presented in the form of freely formatted text, e.g. in an easy to read table.
- Value - channel data is presented in the form of a numerical value and a fill bar scaled by the user.
- Needle - channel data is presented by a needle in a user-defined range.
- Graph - channel data is presented in the form of a graph. This type of sidget allows you to view not only the current sample, but also several previous ones.
- Thermometer - sidget designed with temperature measurements in mind. Channel data is presented as a fill in the thermometer graphic
- Two-state LED - two-color LED. State transition threshold is set by the user.
- Three-state LED - three-color LED. State transition thresholds are set by the user.
- Three-state RectangularLED - rectangular tricolor diode.
- Analog Meter - channel data is presented by means of a circular indicator.
- Horizontal LED Bar - channel data is presented in the form of a horizontal bargraph that is scaled by the user.
- Digital & Analog - a "double" indicator that shows channel data both in a numerical form, and by means of a clock hand.
- Arc LED Bar - channel data is presented in the form of a round bargraph that is scaled by the user.
- Tank - sidget created with level measurement in mind. Channel data is presented as filling in tank graphics.
- Pie Chart - this sidget presents channel data as filling in a pie chart.



Applications

Industrial Automation

- Control of machines and production lines
- Monitoring and control of technological processes (temperature, pressure, level, flow)
- Collection of production data and remote monitoring
- Machine and drive control systems
- Signal transmission - remote data acquisition systems
- Monitoring of parameters in distributed networks
- Measurement and separation systems for analog and binary signals
- Conditioning of digital and analog process signals

Environmental and Infrastructure Systems

- Multipoint measurement of physicochemical parameters
- Measurement and control in water and wastewater management
- Control of pumping stations and wastewater treatment plants
- Monitoring of water supply stations
- Automation in agriculture (irrigation, greenhouses, livestock facilities)
- Control systems for HVAC

Energy Industry

- Monitoring in electrical power distribution systems
- Monitoring and management of PV installations
- Control of generator sets
- Energy Management Systems (EMS)

BMS - Building Management System

- Control of lighting, heating, ventilation, and air conditioning (HVAC)
- Energy consumption management
- Integration with alarm and access control systems

Smaller local applications:
Control of gates, blinds, and outdoor lighting
Monitoring of parameters in server rooms
Basic alarm and notification systems

Thanks to its modular design, such solutions are suitable for both small installations and large distributed systems. Remote access via a web server significantly simplifies diagnostics, maintenance, and future system expansion.

Polska

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Smart Growth

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