

MultiCon = Meter + Controller + Recorder + HMI in one package, part III

In the previous articles we presented the device design and options of presentation of results and operation using the touch panel. To have a full picture of huge potential of MultiCon, now we will focus on processing measurement data, control functions and possibilities of cooperation in network systems.



The distinguishing feature of MultiCon is its capability of simultaneous implementation of tasks related to measurements, processing, control and recording of data. To make this possible, the designers have used the concept of "logical channels" which are virtual bridge between physical inputs/outputs and control and visualization processes.

An expanded configuration menu of logical channels allows for a very precise configuration. It will not suffice to mention the names, units of measure, precision of displayed data or ranges of indicators and graphs. The designers provided for easy rescaling of collected data, as well as filtering or data hold controlled by another channel.

In the MultiCon devices, it is the user who decides how to use the available logical channels. The parameter which allows to select the channel function is the "operation mode". It can be set so that the logical channel:

- represents the data from physical inputs and outputs;
- processes the data from other logical channels using the mathematical and logical functions;
- generates constant values (set points) or sequence diagrams (profiles);
- works in the PID controller mode;
- constitutes a virtual function key.

Relationships between channels (including mathematical operations on the values) can be set directly in the device and it is not necessary to know any programming language. As the essence of any data processing is mathematical operations in the device, many standard functions have been provided to build complex algorithms.

In addition to the basic mathematical functions, such as addition, subtraction, multiplication and division, the device allows, amongst others, to use trigonometric functions, calculate the mean or maximum or minimum value from any number of channels, as well as logical functions or comparison and election. The source of data in mathematical functions can be of course other logical channels and constant values set in the menu.

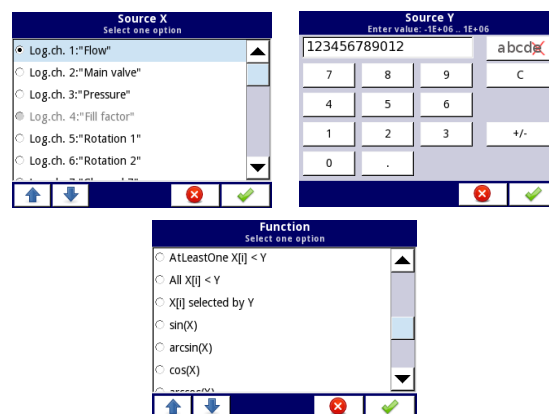


Fig. 1: An example of mathematical function

One of the most important functions of MultiCon is a controlled configuration menu of built-in outputs (e.g. relays) which allows to use them directly as so-called two-position controllers.

Free combination between inputs and outputs allows to create easily multi-channel controllers operating totally independently. In addition, the concept of logical channels provides an opportunity of making many outputs (including outputs of different types) dependent on a single input channel, and introduction of mathematical operations significantly expands the control options.

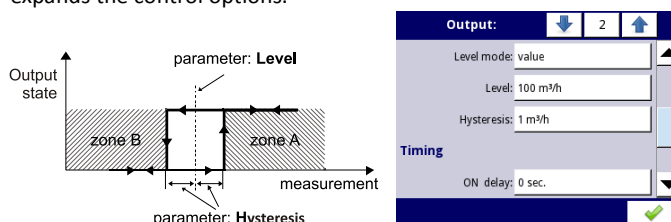


Fig. 2: Operation principle of ON/OFF controller and a fragment of relay menu

In addition to ordinary ON/OFF control using binary signals, MultiCon allows PID control using built-in and external analogue outputs or SSR outputs in the PWW mode.

Each of 60 logical channels can be set in the PD, PI, PID controller modes with an independent set point, input and output. The user can choose from 8 sets of PID control parameters (available in the "Controllers" submenu) each of which can be assigned to many logical channels operating in the controller mode. This is a perfect solution when many similar processes need to be controlled. The MultiCon can work then as a unique multi-channel PID controller.

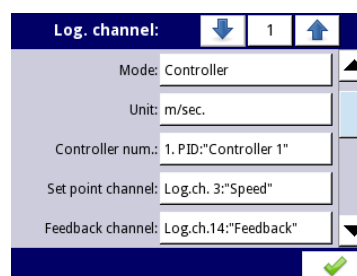


Fig. 3: Basic logical channel settings in the PID controller mode

A necessary supplement to the control functions of the device is a possibility of automatic change of the set value – timers/profiles – which allow for generating signals of a user-defined waveform and duration. What's important, the MultiCon allows to define profiles even 100-section long, and the duration of each of them can be different. Additionally, looping can be introduced. You can also define the trigger moment and method (e.g. by a state of another channel or a RTC clock). Thanks to such flexibility the selected process can be launched cyclically, e.g. on a set day of the month at a set time, with additional conditions.

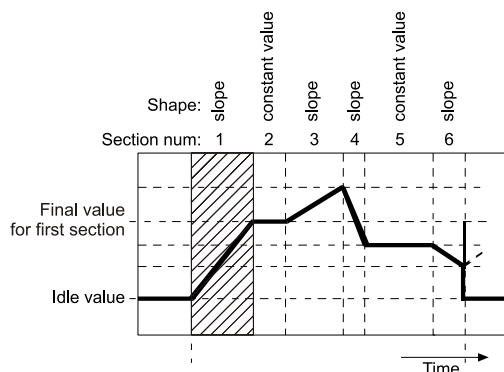


Fig. 4: An example of time profile with variable section lengths

Undoubtedly, an advantage of MultiCon is that it can cooperate with other devices and systems. The basic configuration includes a single RS-485 port with the Modbus RTU interface. It is however sufficient to add an ACM module to increase the application potential many times. This module is equipped with isolated RS-485 and RS-485/232 ports, an Ethernet interface and an additional USB Host port. Each of serial ports is a separate interface with Modbus RTU protocol and can operate independently of the others, both in the Master and Slave modes.

Expanded communication possibilities are particularly useful when it is necessary to control a very high number of physical execution units or collect data from many distant sources.

Via Modbus RTU, MultiCon can use external inputs/outputs (i.e. inputs and outputs for other devices) just as it uses the built-in modules – it can read data and control the outputs of other devices present in the network. In addition, in the Slave mode it is possible to write data in individual MultiCon logical channels (up to three at a time). Combining these options, MultiCon can be a programmable network hub.

The Ethernet interface was described in more detail in part II, so let us just turn your attention to implementation of the Modbus TCP protocol which allows to connect the device with other systems via Internet. Using the world wide web, you can also control the device and download data on-line using dedicated software. More importantly, all tools are available free of charge right on the manufacturer's website.

Summary

We do hope that this cycle of articles has introduced to some extent the great potential of these devices, quite incomparable to their small size, and that it will encourage the readers to create applications using them.

The device is constantly developed, the measurement options are expanded, new software improvements are made, new functionalities are introduced as requested by the users of industrial applications. If as of today, the users believe that the device lacks some specific options, we suggest they directly contact SIMEX. Perhaps, the missing functions are just being developed. A specific modification can also be ordered by a customer. Functions like these are not provided by any competing device available in the market.



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Fig. 5: Manage a developed network of devices

