



# I/O Modules

Simplicity of integration and installation  
with truly open range of BACnet and  
Modbus I/O modules



I/O Modules  
Issue No.3,  
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**In order to ensure that data can be monitored and buildings can be controlled, it is essential to be able to convert from the analog to digital world. Whether it's a newly developed or an existing facility, iSMA CONTROLLI I/O modules allow for its digitalization with a wide range of products equipped with Modbus and BACnet. Enable better energy management, lower the cost of maintaining the building and ensure greater safety and comfort of its occupants.**

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## Modbus I/O Modules

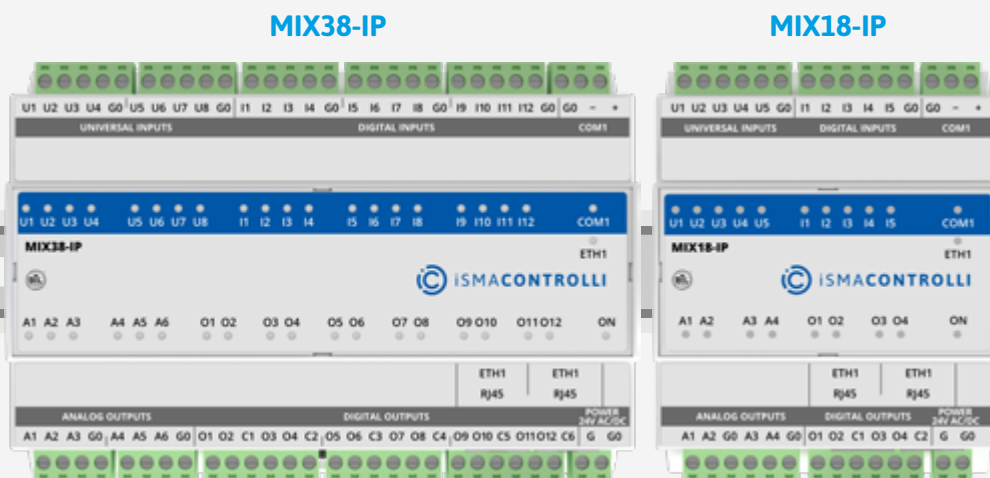
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# Multiprotocol I/O, BACnet IP / Modbus TCP/IP

## MIX IP I/O Modules



### Multiprotocol Module with a MIX of I/O's

The most versatile I/O module with 18 or 38 inputs and outputs, offering the most cost-effective price per point ratio. The most popular types of inputs and outputs are MIXed in a space-saving design and allow the module to be a versatile controller extension, whether in a small or large facility.

### Open Protocols Standard

Powerful I/O modules that work as remote or distributed I/Os over IP with open protocols: BACnet IP and Modbus TCP/IP. Open protocols standard offers a versatility of installing the modules in both new and existing facilities, whether it is a system expansion or a retrofit.

### Daisy Chaining

Two Ethernet ports working in a switch mode allow for daisy chaining multiple modules over an RJ45, which enhances the cabling process and reduces the engineering time.

### IP I/O Module & Modbus Gateway

Each IP I/O module, next to its functionalities, is equipped with a COM1 communication port that serves as Modbus TCP/IP to Modbus RTU/ASCII gateway.



See application example on page 14

## Communication

### BACnet IP

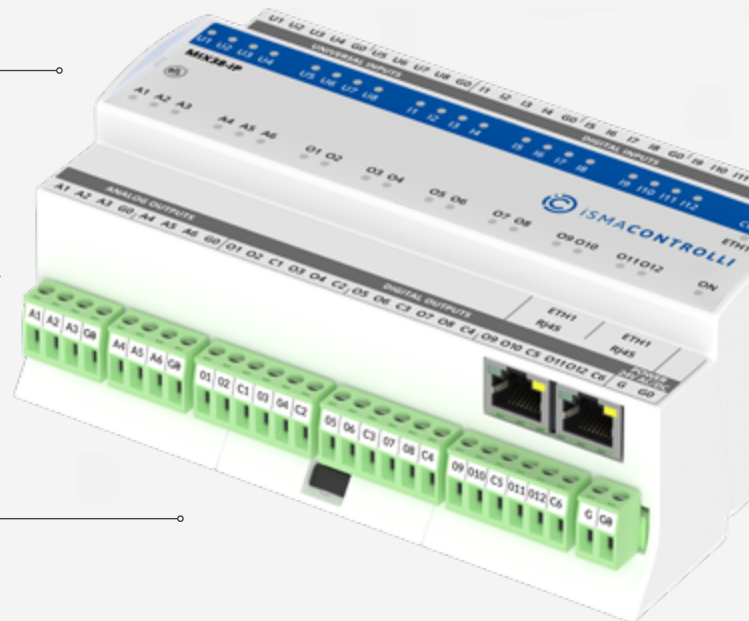
Multiprotocol I/O modules are equipped with Building Automation and Control Networks (BACnet) and are certified by the official BACnet Test Laboratories (BTL).

### Modbus TCP/IP

Modbus is one of the most used protocols in industrial electronic devices.

### Modbus TCP/IP to Modbus RTU/ASCII Gateway

IP Multiprotocol I/O modules can serve as a Modbus gateway with onboard COM1 port.



# Multiprotocol I/O, BACnet IP / Modbus TCP/IP

## MIX IP I/O Modules

Device	Local I/O	RS485 Configuration	IP Configuration	Device Management	Contact
	Universal Inputs	<b>Device Information</b>			
	Digital Inputs	<b>Basic Information</b>			
	Digital Outputs	iSMA-B-MIX18-IP			
	Analog Outputs	6.3.34			
	Bootloader Version	4.0.4			
	Hardware Version	4.0			
	Serial Number	24490066			
	Uptime	5 days, 5 hours, 28 minutes, 49 seconds			
<b>iSMA-B-MIX18-IP Device Specification</b>					
<b>Power Supply</b>					
	Voltage	24V AC/DC $\pm$ 20%			
	Power consumption	2W @ 24VDC; 3VA @ 24VAC			
<b>Universal Inputs</b>					
	Number of Inputs	5			
	Temperature Input	Measurement with attached RTDs Accuracy $\pm$ 0.1°C/ $\pm$ 0.2°F) For sensor Pt1000 and Ni1000 use <b>only 16bit resolution</b>			
	Voltage Input	Voltage measurement from 0 to 10V Input impedance 100k $\Omega$ Measurement accuracy $\pm$ 0.1%			

### Reduced Labor Costs

Building automation systems based on IP technologies enable completely new possibilities in terms of device management, like direct remote device access, building maintenance, and overall cost optimization including reduced labor costs.

### Ease of Installation

MIX multiprotocol I/O modules take the IP game to a new level with an onboard Ethernet switch, enabling daisy chaining multiple devices into one common IP system based on Modbus TCP/IP and BACnet IP.

### Web-based Configuration

Built-in web server enables not only a seamless device configuration without any additional tools, but also enables a preview of all I/O states and device specification, all with password-protected access.



Find more about configuration software on page 22

## Key Functionalities and Features

BACnet and Modbus protocols, easily selectable with a DIP switch.

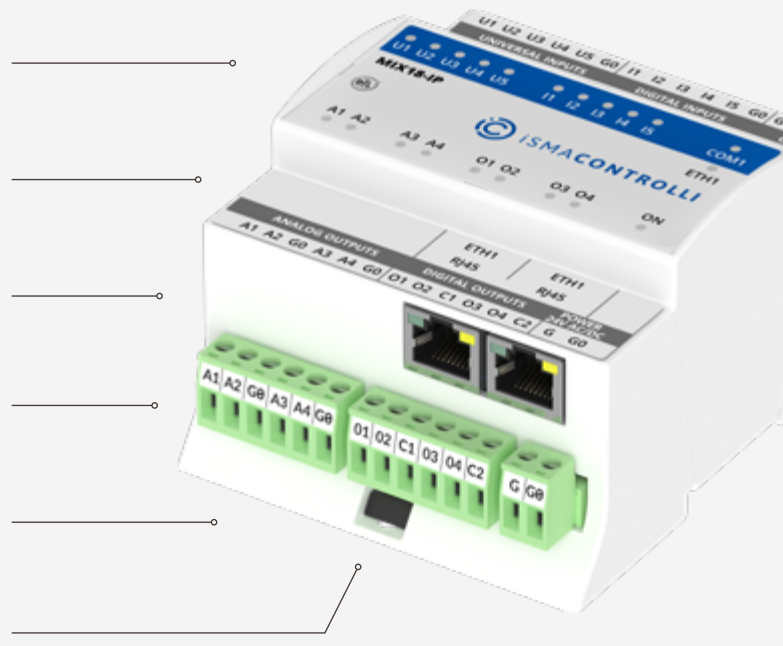
Built-in web server for seamless I/O and network configuration.

Up to 38 inputs and outputs fitting the most of the building applications.

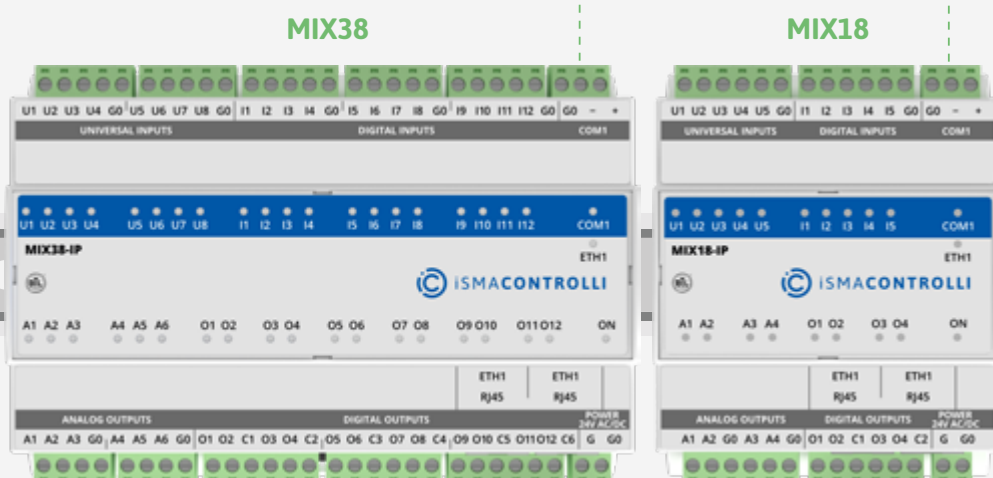
Onboard LED statuses of all I/Os and communication.

Built-in Modbus TCP/IP to Modbus RTU/ASCII gateway.

Two Ethernet ports working in a switch mode.



# Multiprotocol I/O, BACnet IP / Modbus TCP/IP MIX RS485 I/O Modules



## BACnet MS/TP and Modbus RTU

RS485 multiprotocol I/O modules are equipped with two most popular open protocols in building automation, BACnet and Modbus.

## Seamless Configuration

The protocol and other parameters can be configured in a matter of seconds thanks to onboard DIP and rotary switches.

## Powering with USB Cable

The ability to be powered from a USB port facilitates local testing and a straightforward updating process.

## iSMA Configurator

Portable software dedicated for device configuration and firmware upgrade.

## Dedicated Niagara Framework Modules

Seamless integration of multiprotocol I/O in Niagara Framework using a dedicated module.



See application example on page 14



## Standard of Inputs and Outputs

### Universal Inputs

Support for over 20 types of temperature sensors and voltage, resistance, current, and dry contact measurements on each universal input.

### Digital Inputs

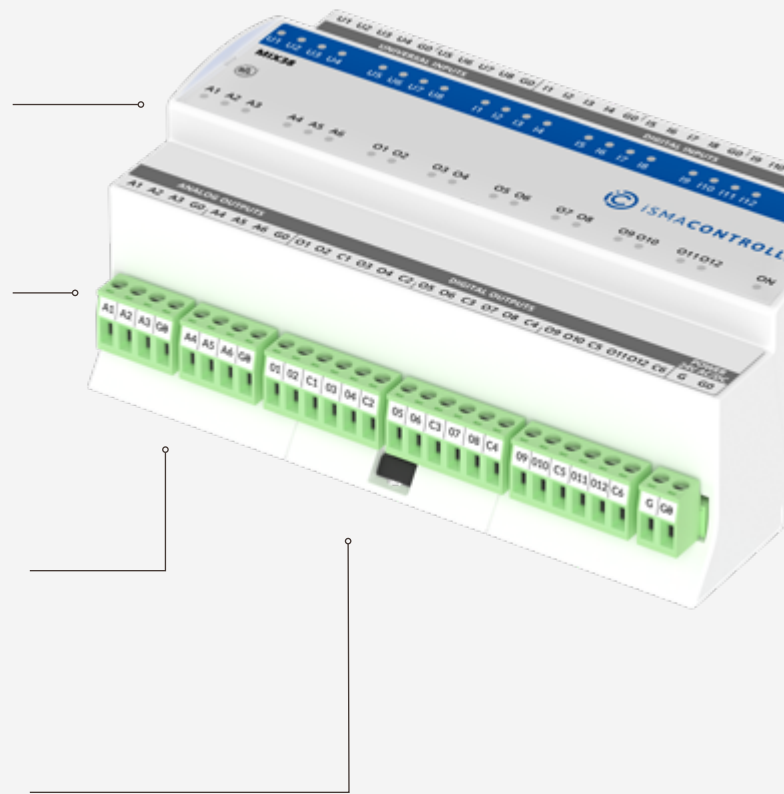
Dry contact inputs - made for monitoring. 100 Hz fast pulse counter with override function saves the real-time values to EEPROM memory.

### Analog Outputs

0-10 V DC control with 10 mA accuracy, PWM modes and a maximum load of up to 20 mA to power external relays makes the output suitable for a variety of scenarios.

### Digital Outputs

Equipped with normally open 3A relays allow for direct control without additional relays.



# Multiprotocol I/O, BACnet IP / Modbus TCP/IP

## IP MINI I/O Modules

4I40-H-IP



4U40-H-IP



4U4A-H-IP



4TO-H-IP



4O-H-IP



8I-IP



8U-IP



### I/O Modules Ready for the Future

Future-proof a building with open communication protocols! The modules can be integrated with most modern BMS systems. I/O IP modules are equipped with both Modbus TCP/IP and BACnet IP onboard. I/O RS485 modules have both Modbus RTU/ASCII and BACnet MS/TP onboard.

### The Right Modules from Small to Large Applications

Extremely compact dimensions and a wide range of I/O combinations make the MINI modules applicable in most of building automation systems.

### Seamless Configuration

The protocol and other parameters can be configured in a matter of seconds thanks to onboard DIP and rotary switches.

### IP I/O Module & Modbus Gateway

Each IP I/O module, next to its functionalities, is equipped with a COM1 communication port that serves as Modbus TCP/IP to Modbus RTU/ASCII gateway.



See application example on page 14

## Key Functionalities and Features

### Wide Range of I/O Modules

Compact size and a wide range of module types allow for ultimate flexibility in projects.

### Built-in HVAC and Light Applications

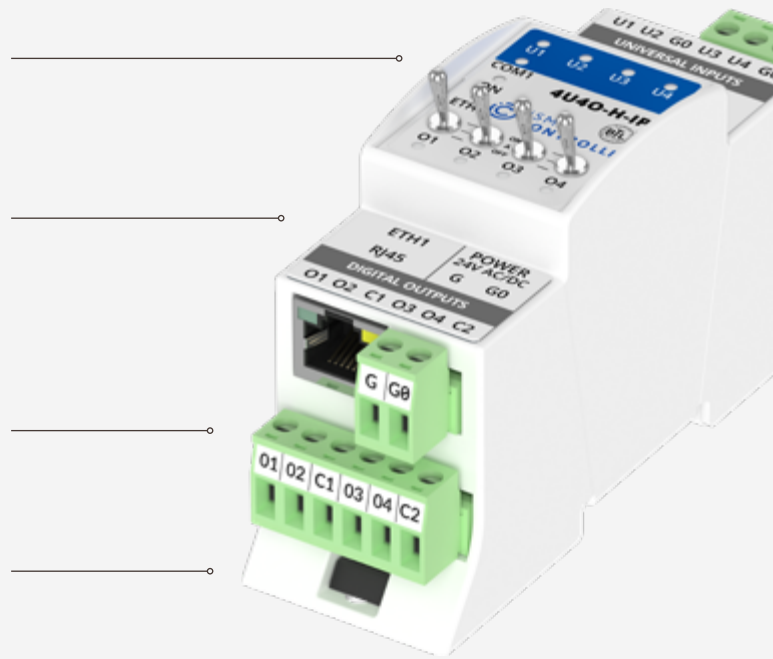
Light, cooling, and heating configurable algorithms make the module applicable as a standalone controller.

### Manual Override Switches

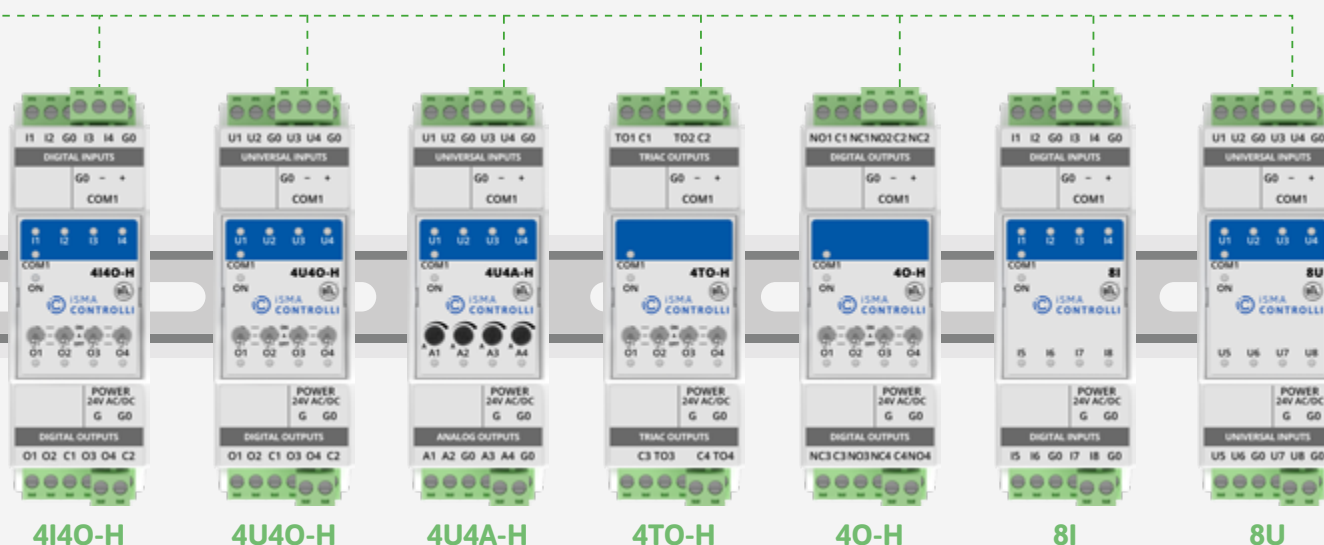
Each output can be manually overridden using a dedicated hand operating switch.

### Modbus TCP/IP to Modbus RTU/ASCII Gateway

Built-in Modbus gateway on the COM1 port enables integration of up to 128 Modbus slave devices to the IP layer.



# Multiprotocol I/O, BACnet MS/TP / Modbus RTU/ASCII RS485 MINI I/O Modules



## Manual Override Switches

Modules with digital, triac, and analog outputs can be manually overridden using hand operating switches.

## Standalone Controllers

Built-in HVAC and lighting applications in selected modules make them applicable as standalone controllers in light, cooling, and heating applications.

## Built-in Web Server

Technical overview and troubleshooting. BBMD, I/O, and protocol configuration – all can be done with a built-in web server.

## High Scalability

RS485 I/O modules use only  $\frac{1}{4}$  UL (unit load) on the bus. It means 128 iSMA I/O modules can be used on one serial bus, according to the EIA-RS485.

## Quality Proven by Certificates

Both hardware construction and communication quality are certified by external entities – Underwriters Laboratories – UL, BACnet Testing Laboratories – BTL.

## Quality and Reliability Confirmed by Certificates

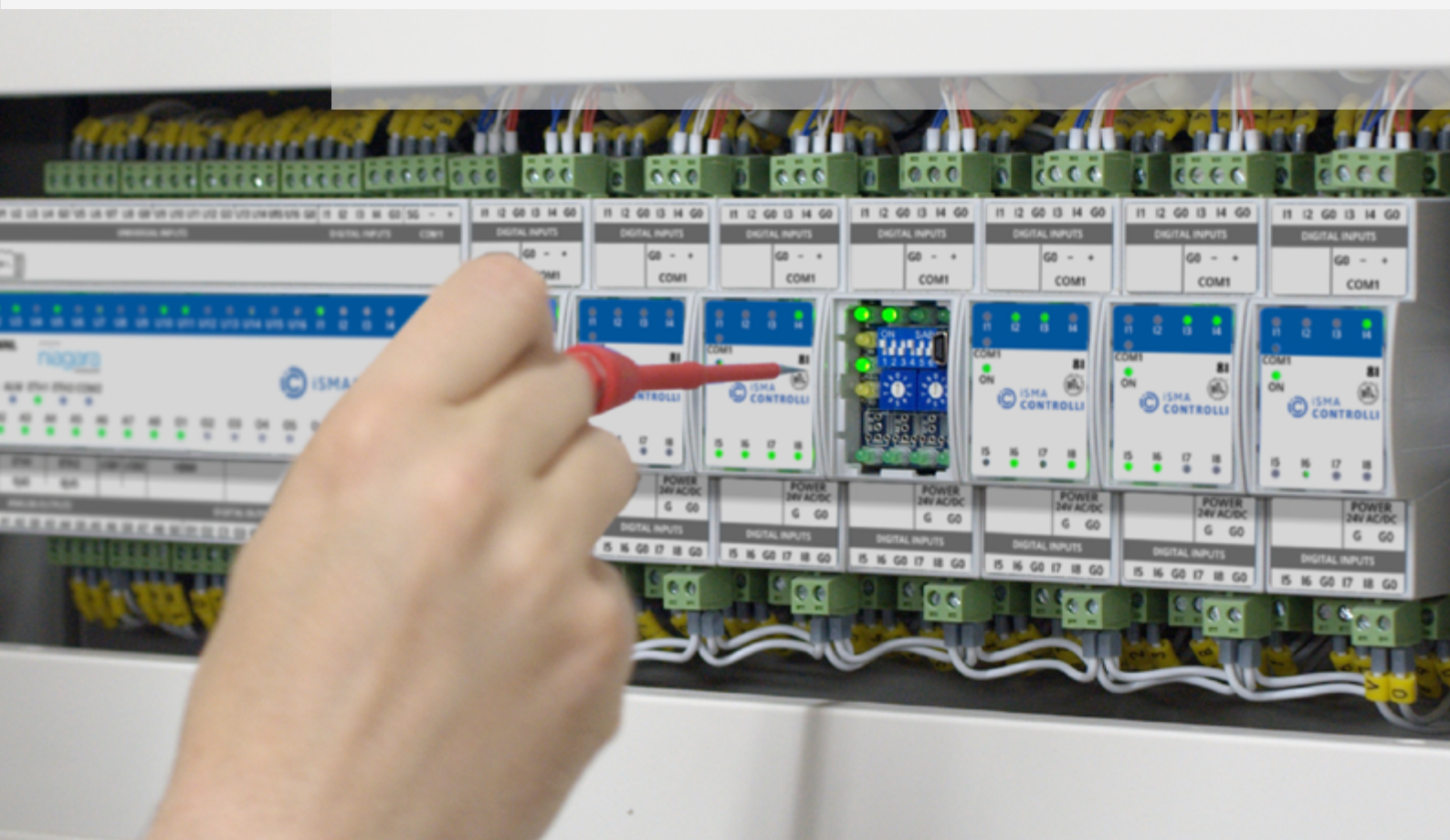
### BTL Listing

iSMA CONTROLLI is a long-standing member of the BACnet community. The experience in developing high quality products and the BTL (BACnet Test Laboratory) certification confirms the excellent performance of communication using the BACnet protocol.



### UL Certification

Reliability of operation is confirmed by the UL testing, certified by Underwriters Laboratories.



# Multiprotocol I/O Modules

## Application Example

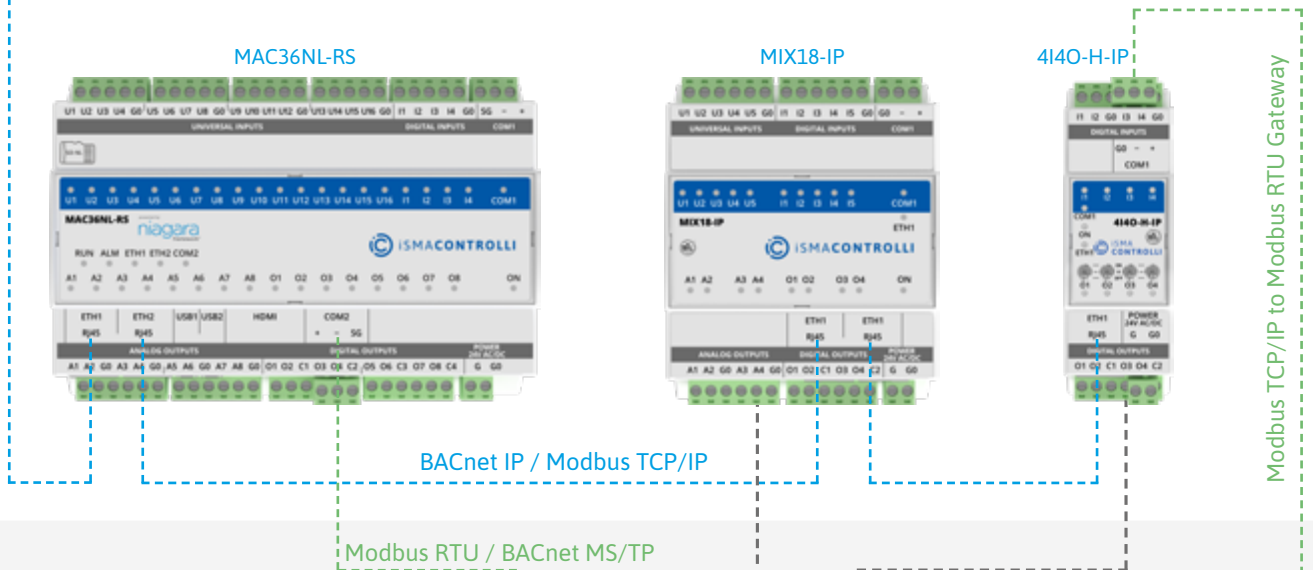
IP Communication

Web Server

Modbus TCP/IP

BACnet IP

IP Connectivity



Serial Bus



Analog Signal

Digital Signal

Analog Signal

Digital Signal

Analog Signal

Field Devices

MVE506



3TIA50

MVR24C2



VLX2P

MVH56E



2FGA32

MVP230

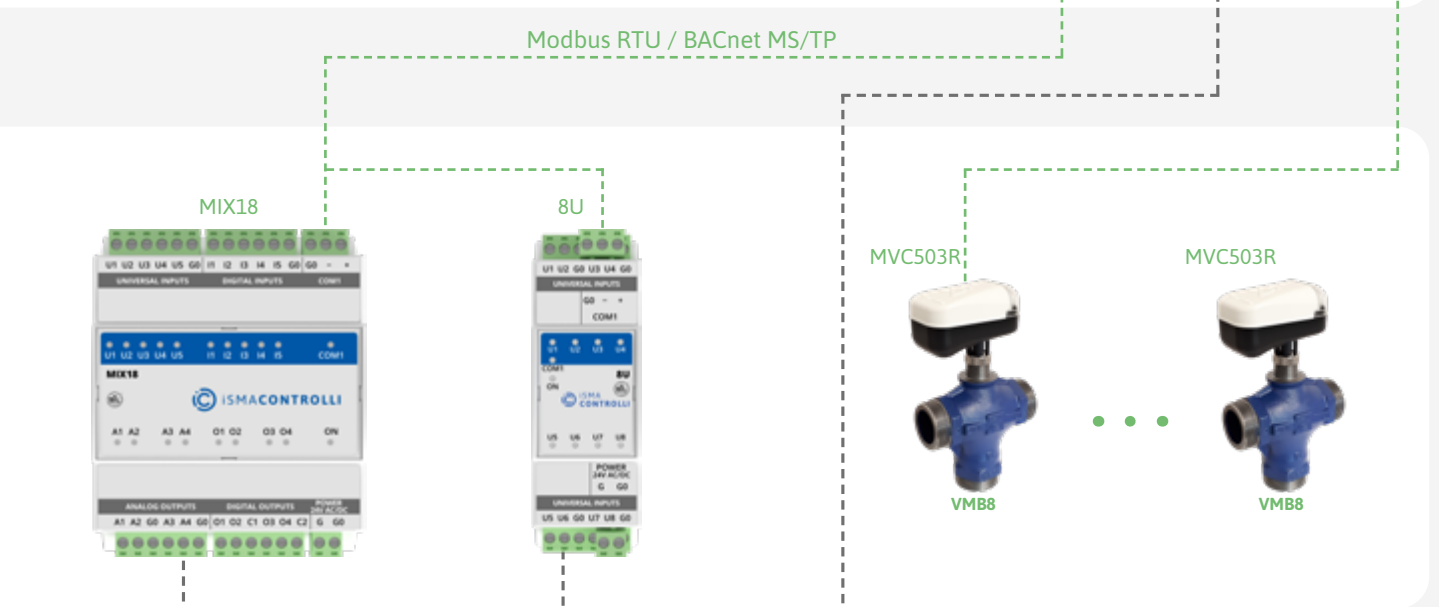
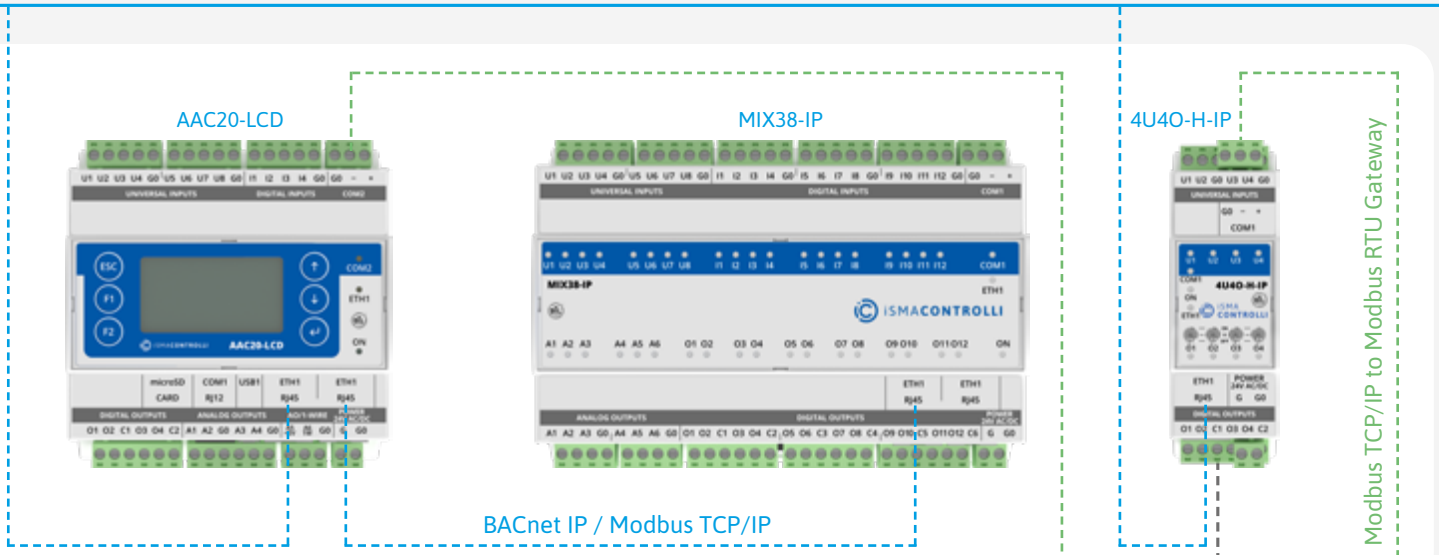


VPT25

MVC503R



VMB8



Learn more about valves & actuators at [ismacontrolli.com](http://ismacontrolli.com)

# Modbus I/O, Modbus TCP/IP, Modbus RTU SfAR-S I/O Modules



## Slim Modbus I/O Modules

The S line consists of slim modules offering 6-16 inputs and outputs in 12 combinations. Due to their size, multiple modules can be installed without taking up much space in control cabinets. Each module is equipped with an optoisolator between the inputs/outputs, power supply, and RS485.

## Open Communication Protocols

Each SfAR I/O module has the Modbus RTU/ASCII on-board supporting up to 128 modules on the RS485 bus. There is also a possibility to integrate them into a Modbus TCP/IP network thanks to the dedicated SfAR-S-ETH device, a gateway module enabling integration of Modbus RTU network into a Modbus TCP/IP network.

## Reliable Operation

Inputs and outputs in SfAR I/O modules are isolated from the power supply and RS485 port using optoisolators to avoid interferences in signal loops.

## Quick Connector System

To simplify installation, the modules have been equipped with the Quick Connector system. Using a dedicated SfAR-S-LINK cable allows for connecting of up to 10 modules, which provide both RS485 communication and external power supply.



See application  
example on  
page 20



## SfAR-S-ETH

Modbus TCP/IP to Modbus RTU/ASCII gateway with 4 digital inputs and 3 relay outputs.

### Built-in Web Server and Modbus Table

The SfAR-S-ETH offers a unique feature, the device table, which facilitates communication with devices connected to the RS485 port, making it even faster.

### 4 Digital Inputs & 3 Relay Outputs

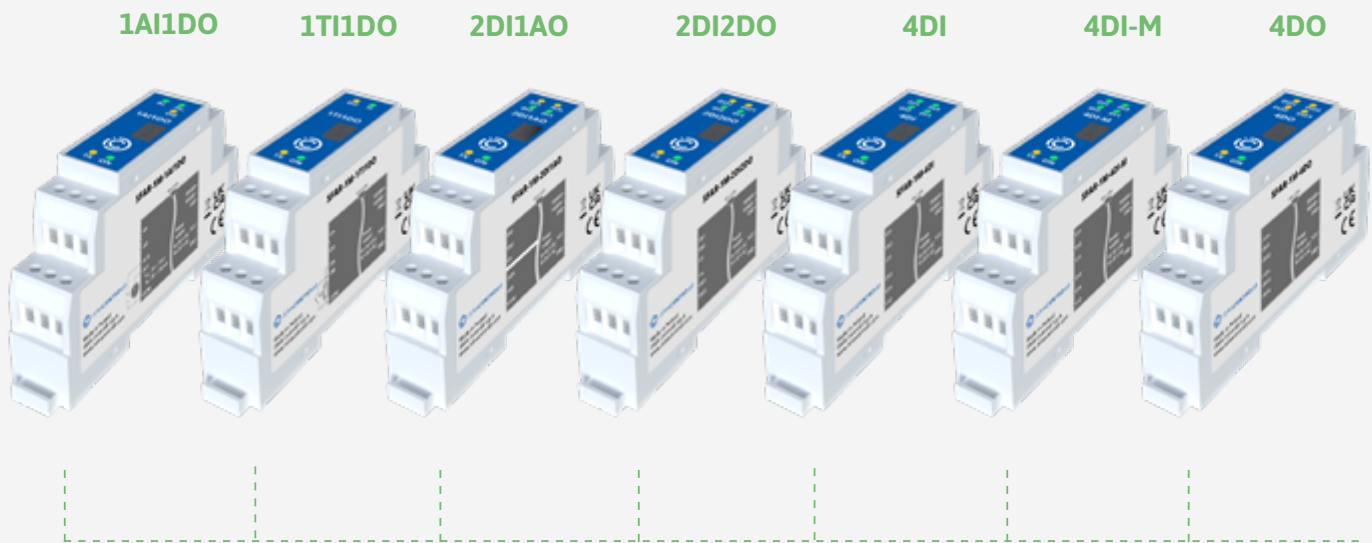
Digital inputs can work as fast pulse counters or timers, they support PNP or NPN input types, also offering a possibility to connect an encoder. Relay outputs are normally open (NO) type.

**Modbus TCP/IP to Modbus RTU/ASCII gateway,** allows the connection of Modbus RTU/ASCII devices to the Modbus TCP network.



# Modbus I/O, Modbus TCP/IP, Modbus RTU

## SfAR-1M I/O Modules



### The Smallest Distributed I/O Modules

The 1M line consists of small modules with a small amount of I/Os – 7 types of modules with 2 to 4 I/O. Each module with an opto-isolation between I/O, power supply, and RS485 onboard is a perfect choice for distributed systems with devices scattered over a large area.

### Made to Control and Communicate

Each module in this line is created for specific purpose with a main goal – to connect devices without Modbus onboard into the Modbus network.

### Simple Configuration and Commissioning

The module is equipped with a set of LEDs used to indicate the status of I/O, power supply, and RS485 communication.

Configuration of the modules is carried out with our free software, the SfAR Configurator. A built-in mini USB allows for performing a primary configuration of the unit without an additional power supply.



More about SfAR Configurator on page 22

## SfAR-1M-1AI1DO

The module can be used not only as a controller's I/O extension, but also as a standalone application controller.

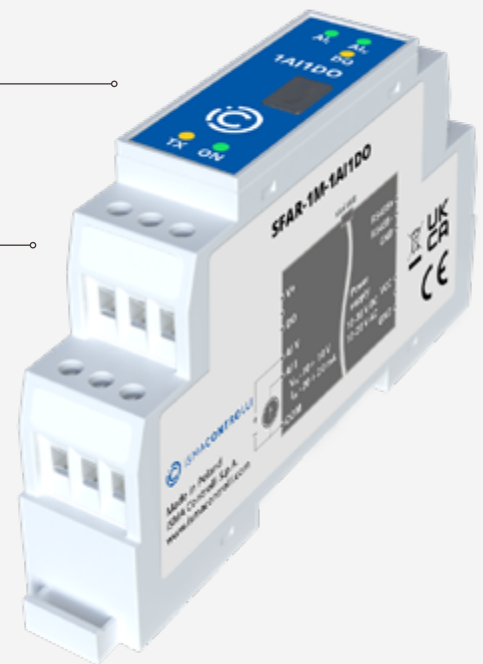
Perfect solution for controlling lights level according to light measurement and other similar applications.

### 1 Analog Input & 1 Digital Output

Analog input can work in 7 modes as a voltage or current input. A digital output is a NPN transistor output.

### Opto-isolation

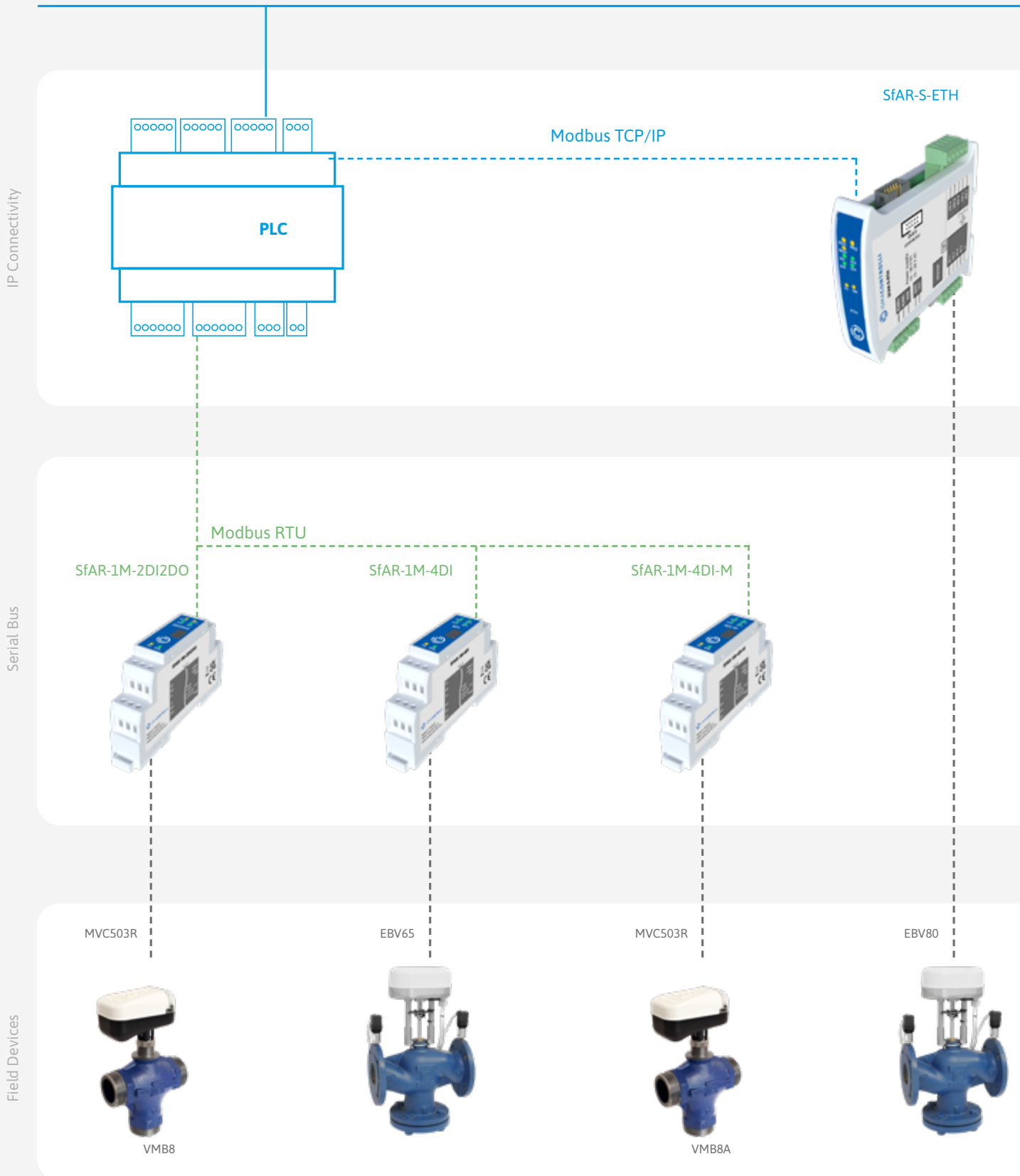
Inputs and outputs are isolated from the logic with optoisolators.



# Modbus I/O Modules

## Application Example

Modbus TCP/IP



SfAR-S-ETH



**Reliable Control and /Integration**

Modbus I/O modules, universal PLC extensions, are available in two lines: SfAR-S and SfAR-1M. They offer integration versatility through an open communication protocol. Modbus I/O modules can be connected directly to a controller using Modbus RTU, or through the SfAR-S-ETH module, with a built-in Modbus TCP/IP to Modbus RTU/ASCII gateway. SfAR-S-ETH also offers the Device Table mode, a mode that significantly increases communication between serial bus devices on Modbus TCP/IP.

Modbus RTU

SfAR-S-6RO



SfAR-S-16RO



SfAR-S-8AI2DO



SfAR-S-8AO



SfAR-S-8DI8RO



EBV100



MVC503R



VMB8A

MVC503R



VMB8

EBV125



MVC503R



VMB8



**iSMA Configurator**, a Windows-based freeware configuration tool made for non-programmable iSMA CONTROLI devices.

#### **Powerful and Portable**

iSMA Configurator is dedicated to I/O and network configuration, firmware updates, and troubleshooting of non-programmable iSMA CONTROLI devices, like multiprotocol I/O modules, wall panels, communication gateways.

iSMA Configurator communicates with the devices using various protocols, Modbus RTU, Modbus TCP, BACnet MS/TP, BACnet IP or USB. It allows for saving the configuration to multiple devices, saving the device tree for each site, and remote parameters adjustment. The iSMA Configurator is portable and needs at least Windows 7.

#### **Key Features**

- Free of charge, maintenance free software
- Device and firmware management
- The firmware is downloaded automatically from the iSMA CONTROLI server
- Device tree to support the management of each site
- Diagnostics and configuration of non-programmable devices
- Communicate with a device using USB or communication protocols
- Device discovery system in both Modbus and BACnet
- Remote device management and firmware update for iSMA CONTROLI MIX and MINI multiprotocol I/O modules series are equipped with device I/O points and configuration points, which significantly speeds up the integration of devices in the Niagara Framework



**SfAR Configurator**, a Windows-based freeware configuration tool made for Modbus I/O modules.

#### **Powerful and Portable**

SfAR Configurator is dedicated to I/O and network configuration, firmware updates, and troubleshooting of Modbus I/O modules. SfAR Configurator communicates with the devices using the USB port.

#### **Key features**

- Free-of-charge, maintenance-free software
- Device and firmware management
- The firmware is downloaded automatically from the iSMA CONTROLI server
- Diagnostics and configuration of Modbus I/O modules
- Communicate with devices using USB
- 5 language versions (English, Polish, German, Russian, and Czech)



**iSMA Modules**, a palette made to enhance the iSMA CONTROLLI multiprotocol I/O modules configuration and integration in the Niagara Framework.

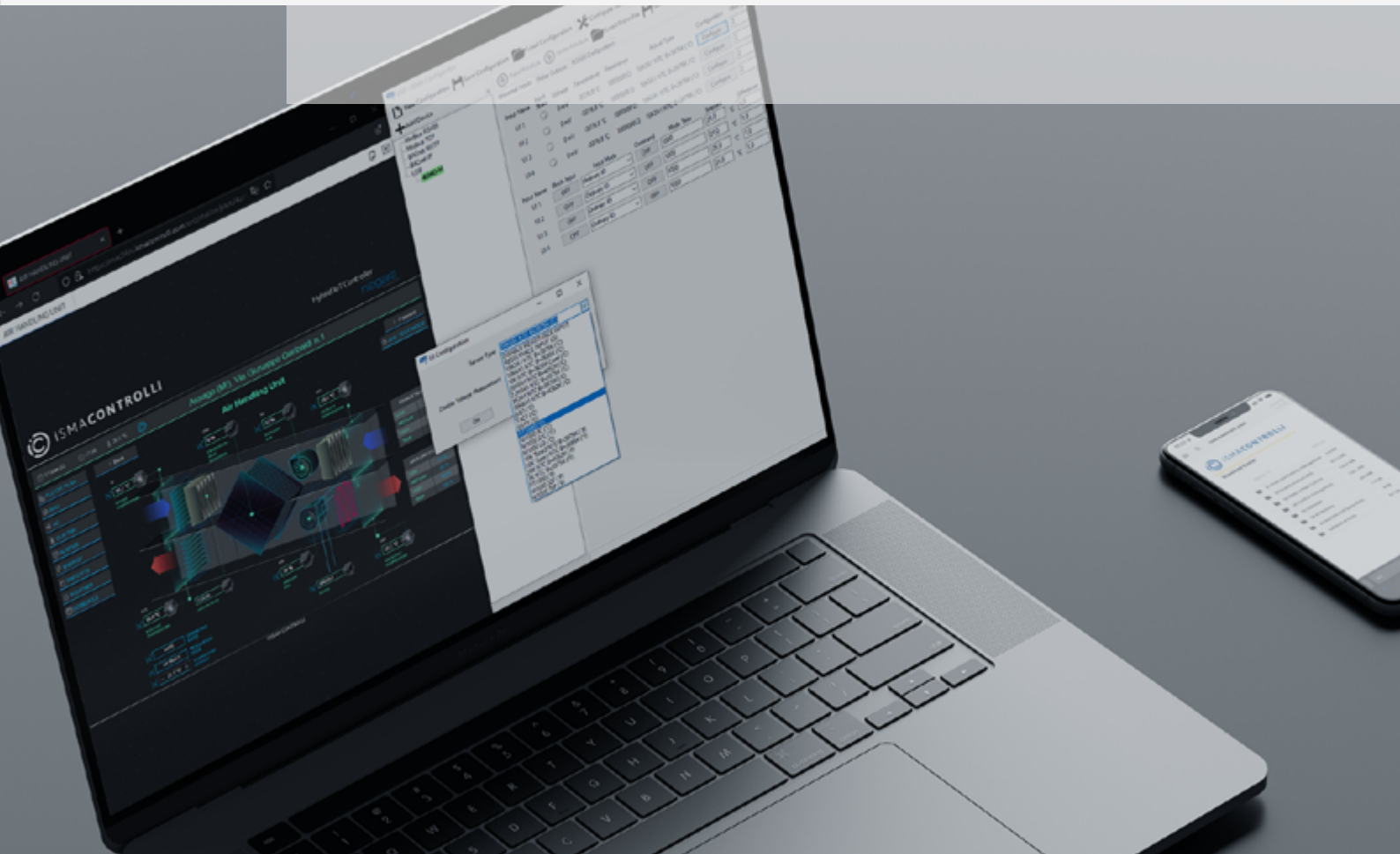
powered by  
**niagara**  
framework®

**Seamless Device Setup in Niagara Framework**

Take advantage of the dedicated palette with ready-made Modbus registers and BACnet IDs for each device, making the iSMA CONTROLLI devices configuration remarkably easier!

**Dedicated for Multiprotocol I/O Modules**

The ready-to-use device components for iSMA CONTROLLI MIX and MINI multiprotocol I/O modules series are equipped with device I/O points and configuration points, which significantly speeds up the integration of devices in the Niagara Framework.



## Products codes and description

### Multiprotocol I/O MINI I/O Modules with RS485

Product Code	Description
iSMA-B-8I	Multiprotocol I/O module with 8 digital inputs
iSMA-B-8U	Multiprotocol I/O module with 8 universal inputs
iSMA-B-4I4O-H	Multiprotocol I/O module with 4 digital inputs and 4 digital outputs, HOA switches, and built-in lighting applications
iSMA-B-4U4O-H	Multiprotocol I/O module with 4 universal inputs, 4 digital outputs, HOA switches, and built-in HVAC and lighting applications
iSMA-4U4A-H	Multiprotocol I/O module with 4 universal inputs, 4 analog outputs, hand output control
iSMA-B-4O-H	Multiprotocol I/O module with 4 digital outputs and HOA switches <b>Designed for higher loads switching and lighting control</b>
iSMA-B-4TO-H	Multiprotocol I/O module with 4 triac outputs and HOA switches

### Multiprotocol I/O MINI I/O Modules with RS485 and IP

Product Code	Description
iSMA-B-8I-IP	Multiprotocol I/O module with 8 digital inputs, IP connectivity, and built-in Modbus TCP/IP to Modbus RTU/ASCII gateway
iSMA-B-8U-IP	Multiprotocol I/O module with 8 universal inputs, IP connectivity, and built-in Modbus TCP/IP to Modbus RTU/ASCII gateway
iSMA-B-4I4O-H-IP	Multiprotocol I/O module with 4 digital inputs, 4 digital outputs, HOA switches, IP connectivity, and built-in Modbus TCP/IP to Modbus RTU/ASCII gateway <b>Built-in lighting applications</b>
iSMA-B-4U4O-H-IP	Multiprotocol I/O module with 4 universal inputs, 4 digital outputs, HOA switches, IP connectivity, and built-in Modbus TCP/IP to Modbus RTU/ASCII gateway Built-in HVAC and lighting applications
iSMA-B-4U4A-H-IP	Multiprotocol I/O module with 4 universal inputs, 4 analog outputs, hand output control, IP connectivity, and built-in Modbus TCP/IP to Modbus RTU/ASCII gateway
iSMA-B-4O-H-IP	Multiprotocol I/O module with 4 digital outputs, HOA switches, IP connectivity, and built-in Modbus TCP/IP to Modbus RTU/ASCII gateway <b>Designed for higher loads switching and lighting control</b>
iSMA-B-4TO-H-IP	Multiprotocol I/O module with 4 triac outputs, HOA switches, IP connectivity, and built-in Modbus TCP/IP to Modbus RTU/ASCII gateway

### Multiprotocol I/O MIX Modules with RS485

Product Code	Description
iSMA-B-MIX18	Multiprotocol I/O module with the most common MIX of 18 inputs and outputs in building automation
iSMA-B-MIX38	Multiprotocol I/O module with the most common MIX of 38 inputs and outputs in building automation



### Multiprotocol I/O MIX Modules with RS485 and IP

Product Code	Description
iSMA-B-MIX18-IP	Multiprotocol I/O module with the most common MIX of 18 inputs and outputs in building automation. Equipped with IP connectivity, and built-in Modbus TCP/IP to Modbus RTU/ASCII gateway
iSMA-B-MIX38-IP	Multiprotocol I/O module with the most common MIX of 38 inputs and outputs in building automation. Equipped with IP connectivity, and built-in Modbus TCP/IP to Modbus RTU/ASCII gateway

### Modbus I/O SfAR-S Modules

Product Code	Description
SfAR-S-ETH	Modbus TCP/IP to Modbus RTU/ASCII gateway with 4 digital inputs and 3 relay outputs
SfAR-S-6RO	Modbus I/O module with 6 NC/NO relay outputs
SfAR-S-6TI	Modbus I/O module with 6 temperature inputs
SfAR-S-8AI2DO	Modbus I/O module with 8 analog inputs and 2 digital outputs Power supply 12-24 V DC
SfAR-S-8AO	Modbus I/O module with 8 analog outputs
SfAR-S-8DI8DO	Modbus I/O module with 8 digital inputs and 8 digital outputs
SfAR-S-8DI8RO	Modbus I/O module with 8 digital inputs and 8 relay outputs
SfAR-S-8TO	Modbus I/O module with 8 triac outputs
SfAR-S-16DI-M	Modbus I/O module with 16 digital inputs, PNP or NPN type <b>Built-in FRAM memory for saving counters</b>
SfAR-S-16DI	Modbus I/O module with 16 digital inputs, PNP or NPN type
SfAR-S-16DO	Modbus I/O module with 16 digital outputs, PNP type
SfAR-S-16RO	Modbus I/O module with 16 relay outputs

### Modbus I/O SfAR-1M Modules

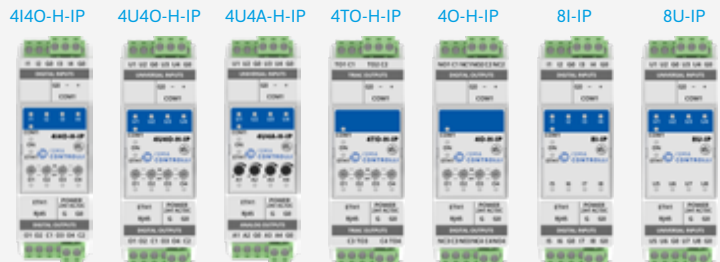
Product Code	Description
SfAR-1M-1AI1DO	Modbus I/O module with 1 analog input and 1 digital output
SfAR-1M-1TI1DO	Modbus I/O module with 1 temperature input and 1 digital output
SfAR-1M-2DI1AO	Modbus I/O module with 2 digital inputs and 1 analog output
SfAR-1M-2DI2DO	Modbus I/O module with 2 digital inputs and 2 digital output
SfAR-1M-4DI-M	Modbus I/O module with 4 digital inputs, PNP or NPN type <b>Built-in FRAM memory for saving counters</b>
SfAR-1M-4DI	Modbus I/O module with 4 digital inputs, PNP or NPN type
SfAR-1M-4DO	Modbus I/O module with 4 digital outputs, PNP type

# I/O Modules Solution Summary

## Multiprotocol I/O, BACnet IP / Modbus TCP/IP IP MIX I/O Modules



## Multiprotocol I/O, BACnet IP / Modbus TCP/IP IP MINI I/O Modules



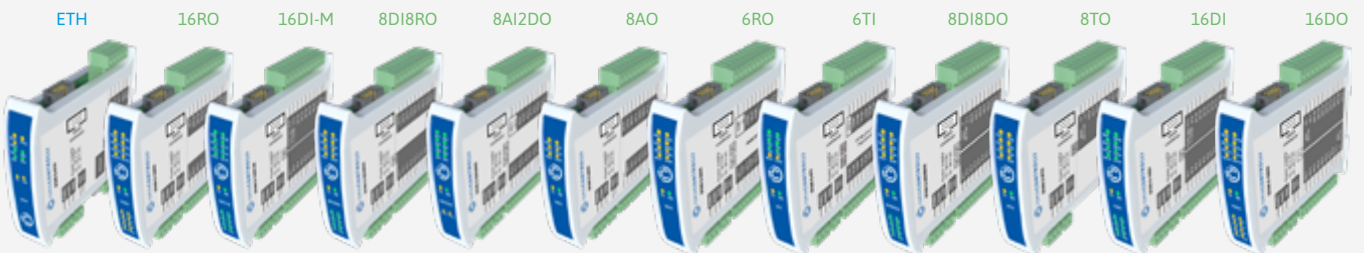
## Multiprotocol I/O, BACnet MS/TP / Modbus RTU/ASCII RS485 MINI I/O Modules



## Multiprotocol I/O, BACnet MS/TP / Modbus RTU/ASCII RS485 MIX I/O Modules



## Modbus I/O, Modbus TCP/IP, Modbus RTU SfAR-S I/O Modules



## Modbus I/O, Modbus RTU SfAR-1M I/O Modules



**We are the capital group operating in the field of building automation. Our purpose is to build an international brand that helps to make the buildings better places to live and work through innovative solutions for wellbeing, intelligence, sustainability and efficiency. We create the world of intelligent, eco and advanced ideas, offering the perfect solution for projects of all sizes, implemented in both new and existing BMS systems and increasing living comfort and energy savings. We are iSMA CONTROLLI.**

## I/O Modules

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**www.ismacontrolli.com**



**I/O modules**  
Issue No.3,  
May, 2022

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