MegaControls

Issue Date   March 6, 2017

IOM Series
Input/Output Field Modules

Features

- Support Modbus RTU or Native BACnet MS/TP protocol when connecting in a RS-485 network trunk
- Support Modbus or native BACnet TCP/IP protocol when connecting in Ethernet mode
- Field selectable communication baud rate of 9600, 19200, 38400 or 76,800 bps
- Removable screw-type connectors for power connection
- LED indicators for power status, communication status and CPU working status
- Derived network addressing (DNA) for simple integration into a standard network architecture
- Easy-to-mount housing for rack mount or direct mounting.

General

The IOM Series input/output field modules provide remote inputs/outputs to any Modbus TCP/IP network or RTU controllers, or native BACnet TCP/IP network or MS/TP controllers. These field modules, in 1 basic configuration, provide various combinations of binary o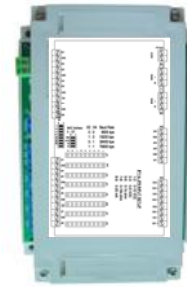utputs, analog outputs, binary inputs and universal inputs and are capable of communicating directly on a RS-485 network trunk or Ethernet network.

The IOM Series field modules fit a diverse range of application needs where additional inputs and outputs are required or where a small number of points are remotely located and are most suitable for monitoring and control applications for HVAC, electrical and lighting equipment.

When connected to the Modbus TCP/IP or RTU or BACnet TCP/IP or MS/TP network, the modules function as independent devices with inputs and outputs accessible over the entire Modbus or BACnet system.

All binary outputs are volt-free dry contacts provided by relays.

A maximum of 32 devices (a mix of IOM Series field modules and other Modbus RTU or BACnet MS/TP devices) can be connected to one RS-485 network segment within a maximum distance of 1,000 m. With a repeater, the number of devices can be extended to a total of 63 and a total distance of 2,000 m. If more than 63 devices are required in the network, a second Modbus RTU or BACnet MS/TP network trunk must be installed. The MAC address of the IOM module is set via DIP switches in the unit from 1 to 63. The Modbus or BACnet device ID address is set as per the Modbus or BACnet standard through the operating software.

Mounting
The IOM Series modules can be mounted directly inside a panel or on a surface with 2 or 4 screws or rack-mounted in DIN rail.

Ordering
To order, specify complete model number and whether for Modbus or BACnet system. Protocol firmware is not field changeable and must be pre-defined.

Figure 1: Model Number Selection Guide

Product Type	Digital Outputs	Analog Outputs	Digital Inputs	Universal Inputs	Hyphenated	Network Type	System Type
IOM	8	8	4	4	-	xx	x

Product Type	Number of Universal Input (UI) Points	Example:
IOM Series input/output field modules	4	Model number IOM8844-R1B, with 8 DI, 8 UI, 4 DO and 4 AO, and 1 RS-485 network trunk with BACnet MS/TP protocol
Number of Digital Output (DO)Points	**Network Type**	
8	xx = R1 = with 1 RS-485 network trunk / xx = EN = for Ethernet network	
Number of Analog Output (AO) Points	**System Type**	
8	x = B = with BACnet protocol / x = M = with Modbus protocol	
Number of Digital Input (DI) Points		
4		

Figure 2: Tables of Jumper Numbers and Jumper Settings of Universal Inputs

Jumper Number	JP1	JP2	JP3	JP4	JP5	JP6	JP7	JP8
Universal Input Number	UI1	UI2	UI3	UI4	UI5	UI6	UI7	UI8

Input Type	Pin Numbers of Universal Input Jumper Settings				
	1 & 2	2 & 3	5 & 6	7 & 8	8 & 9
Analog	0-10 VDC	0-5 VDC	0-1 KΩ Pt1000	0-10 KΩ Thermistor	0-20 mA
Others				Binary Input*	

* For the universal input used as a binary input, set as 0-10 KΩ thermistor input. The universal input will have the following values:

With input contact open, value = 0;
With input contact closed, value = 1.

www.megacontrols.com   1

Specifications

Product model numbers	See Figure 1: Model Number Selection Guide	
Power requirements	Voltage	24 V 50/60 Hz ±15%, 25 VA
BACnet device profile	BACnet application specific controller (B-ASC)	
Technology	CPU	32-bit ARM at 48M clock
	ROM	256 kB Flash
	RAM	64 kB SRAM
	EEPROM	2 kB
BACnet MS/TP Communication port	Physical	RS-485
	Baud Rate	Field selectable 9,600, 19,200, 38,400 or 76,800 bps (Factory set 38,400 bps)
	Protocol	BACnet MS/TP
	Indicators	Red LEDs
Ethernet communication port	Physical	10Base-T via RJ-45 phone jack
	Protocol	BACnet-over-Ethernet in compliance with ISO-8802-3
	ndicators	Red LED for data receiving and green LED for data transmitting
	IDevice MAC address	Set via DIP switches
	Maximum number	32 IOM devices in one BACnet platform
	Service supported	WhoIs, ReadProperty, ReadPropertyMultiple, WriteProperty
	Objects supported	Device, Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Multi-State Input, Multi-State Output
	Object names	Static
Device addressing	MAC address set via DIP switches; Modbus or BACnet device ID via software setup	
Number of devices	63 Maximum (with repeater) in one network trunk	
Binary inputs	Binary inputs for voltage-free contacts	
Universal inputs	Support 0-5 VDC, 0-10 VDC, 4-20 mA, 1kΩ@25ºC & 10kΩ@25ºC thermistor, 1kΩ@0ºC Pt1000 platinum sensor or binary input, jumper selectable	
Binary outputs	Volt-free dry contacts provided by relays or triac outputs in some models	
Analog outputs	Analog outputs (0-10 VDC), 10 mA maximum, ±0.5 V accuracy, with current limiting device	
Ambient/storage temperature limits	0 to 55 ^{o}C / -30 to 50 ^{o}C, 10 to 90% RH non-condensing	
Wiring class	Class II for 24 VAC power supply	
Connectors	Removable screw-type terminal connectors	
Power wire	Wire size 1 mm^2 or 18 AWG solid copper recommended	
Communication wire	Balanced 100 to 120 Ω nominal impedance twisted shielded pair (TSP) cable	
Input/Output wire	Twisted shielded pair (TSP) cable	
Agency approval	CE Mark compliant to EMC and Low Voltage Directives and BTL certification pending	
Shipping weights	0.25 kg	
Dimensions	See Figure 4: 110 x 180x 60 mm (W x L x D)	

The performance specifications above are nominal and subject to tolerances and application variables of generally acceptable industry standards. The manufacturer shall not be liable for damages resulting from misapplication or misuse of its products.

Module MAC Addressing
The DIP switch is a binary switch. Each individual DIP switch represents a unique value, which forms the module MAC address when added together. To set the address, simply move the switches that add up to the module's desired address to the ON position.
Example: If the module is to be address 7 on the network, set the switches numbered 1, 2 and 4 (equals 7) to the ON position.
Note: Each module in the same BACnet network must have a unique DIP switch address.

Derived Network Addressing (DNA)
The DNA DIP switch is set by factory default to ON position. This allows the module to automatically configure a BACnet instance ID number. This setting should not be changed unless an authorized agent is assigning a BACnet instance ID number through the system setup procedure. The BACnet instance ID number should not be confused with the module MAC address DIP switch setting, and each module must still have a unique DIP switch MAC address even when using software to define the module's instance ID number.
Example: If the MAC address of the upstream network router or controller is 8 and the module MAC address is set as 13, the module's DNA BACnet Instance ID is 80013 (8 x 10000 + 13).

Device Object
The device's default object name can be changed by the workstation operator and the new name will be stored in the EEPROM chip in the module. Interruption of power supply will not lose the new name.

Input/Output Objects
The input or output object's name can be changed by the workstation operator and the new name will be stored in the EEPROM chip in the module. Interruption of power supply will not lose the new name.

Enter Engineering Unit
The engineering unit for the object can be changed.

Module Baud Rate Setting
Make sure that the baud rate of the module for BACnet MS/TP connection is set to match the network baud rate.
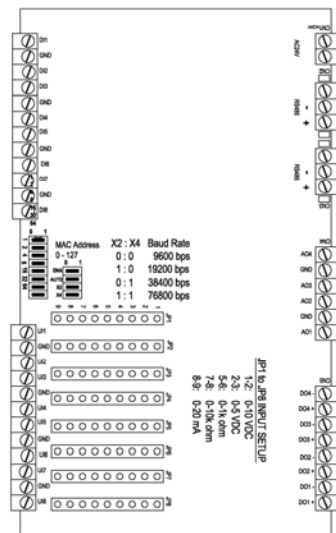**Example**: If the network baud rate is 38,400 bps, set the DIP switches X2 and X4 to OFF and ON respectively.

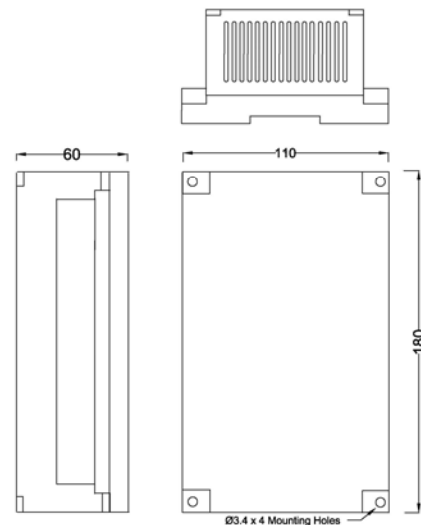**Network, Cabling and Step-down Transformer Requirements**

To ensure network stability and reliable communications, particularly at high speeds on a BACnet MS/TP network for a number of devices, it is imperative that the following network and cabling requirements are adhered to:

Item	Description
Cabling	It is recommended to use networking cabling that matches the following specifications: • Balanced 100 to 120 ohms nominal impedance, 22 or 24 AWG Twisted Shielded Pair (TSP) Cable • Nominal capacitance of 52 pF/m or lower • Nominal velocity of propagation of 66% or higher • Terminating the shield to ground at one end only for each isolated segment will prevent ground loops in the shield and drain RF energy to ground. Grounding at the BACnet router or controller is preferred.
Topology	Ensure the MS/TP network cable is installed as a daisy chain from one device to the next.
Maximum Nodes	The maximum number of devices is 32 per MS/TP network segment and 64 per network trunk with one Repeater.
Terminator	A terminator of 120-ohm impedance must be installed at each end of each MS/TP network segment, or two per MS/TP network. Ensure that this requirement is not overlooked in laying out the network architecture and ordering product.
Cable Shielding	Use a shielded, twisted pair cable for communications. Never directly ground wire in more than one point on the shield. Doing so can induce large currents and result in communication problem.
Repeater	A repeater is not necessary unless more than 32 nodes will be installed on a network or the MS/TP network is extended beyond 1,000 m.
Step-down Transformer	A separate isolated double-wound transformer is recommended for supplying 24 VAC power to each IOM. If and when the same transformer is shared with other devices, observe the polarities of the power supply of all devices including the IOM.

Figure 3: Termination and Wiring Diagram

Figure 4: Dimensions in mm