BACnet M-Bus(Meter-Bus) Gateway

The BACnet M-Bus Gateway, an M-Bus(Meter-Bus) to BACnet/IP Protocol Converter product, from ProtoSense Technologies serves the industry needs for converging towards the ever popular BACnet standard and the widely used Ethernet networking standard. The various ProtoBeamer product lines enable System Integrators and control system designers to converge various physical and data-link layer standards(like RS-485, Low-Power Wireless) and application layer protocol standards(like BACnet–MS/TP, Modbus, ZigBee, M-Bus etc.) to BACnet/IP protocol which is becoming a de-facto standard in the BMS/BAS area.

   The M-Bus to BACnet/IP protocol converter product enables integrating BTU Meter devices which talk M-Bus protocol into a BACnet/IP system network. The Gateway makes the data-points/records in these M-Bus devices available as BACnet objects belonging to a BACnet/IP Device Server.

   This product can also do M-Bus to Modbus-TCP/IP protocol conversion in parallel and so supports site deployments where-in there is a local BACnet/IP based BMS and a remote Billing/Energy-monitoring kind of system using Modbus-TCP/IP protocol.

   This product also provides for Modbus-RTU to BACnet/IP protocol conversion thus allowing the widely used Modbus-RTU slave devices in a building along with M-Bus slave devices to be seamlessly integrated into a BACnet/IP based BMS.

So overall the BACnet M-Bus Gateway product offers the following communication interfaces:-
* M-Bus Master interface.
* Modbus-RTU Master interface.
* BACnet/IP Device Server interface.
* Modbus-TCP/IP Slave interface.
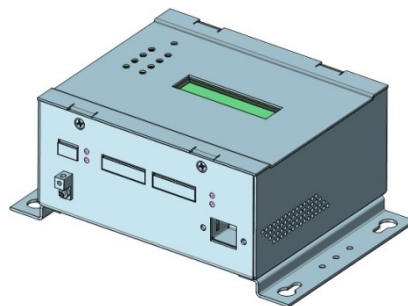
FEATURES
- Embedded fan-less and rugged system for industrial applications.
- Compact aluminum enclosure with provisions for both DIN-rail and wall mounting.
- Support for both 24V DC and 24V AC power source.
- Minimal power consumption design at the given CPU speed.
- Fast, efficient and full-featured BACnet protocol stack.

- **Built-in M-Bus Level Converter Hardware**.
- Both M-Bus port and RS-485(Modbus-RTU) serial port are galvanically isolated from the rest of the device electronics and so provides for reliable field connections.
- The M-Bus port allows connecting up to 60 M-Bus standard loads(M-Bus slaves).
- The RS-485 serial port allows connecting up to 31 Modbus-RTU slave devices.
- Ports baud support: Modbus-RTU: 9600, 19200, 38400.
                               M-Bus: 2400, 4800 and 9600.
- Easy to use Windows based GUI configuration tool with support for MS Excel configuration file import.
- Web based UI for status and statistics display.

Technical Specifications

HARDWARE PLATFORM

- SoC with CPU core running at 800 MHz.
- 128 MB RAM and 512 MB Flash.
- Watchdog timer for reliable operation.
- Battery backed Real-Time Clock.

SOFTWARE PLATFORM

- Real-time Embedded Operating System.
- Multi-threaded and fast response application architecture.
- Embedded Web Server

COMMUNICATION PORTS

- **Isolated M-Bus** power supply and data bus.
  - ✓ Idle condition bus voltage at 36V DC.
  - ✓ Maximum bus current loading of 90mA supported.
  - ✓ Internal M-Bus 36V DC power supply has 1600V DC Input to Output isolation.
  - ✓ Internal M-Bus data bus isolation barrier withstands $1000V_{RMS}$ for 1 minute.

- **Isolated RS-485** serial port with built-in ADDC support.
  - ✓ Isolation barrier withstands $2500V_{RMS}$ for 1 minute.
  - ✓ +/- 15kV ESD protection.

- 10/100 Mbps Isolated Ethernet port.

- Phoenix-Contact Screw-terminal connectors for easy connection.

M-BUS SAFETY FEATURES

- Bus current overload detection and warning indication.
- Bus short-circuit protection with automatic recovery.

USER INTERFACE

- Rx and Tx activity status LEDs for both M-Bus and RS-485 port.
- BACnet, M-Bus and Modbus activity status and M-Bus Overload error indication LEDs.
- Push-button for easy 'Reset to factory defaults' operation.

POWER SUPPLY

- 22 to 28V DC, 400mA@24V DC under M-Bus full-load condition(All the 60 M-Bus unit loads, wherein 1 unit load=1.5mA, are connected). So a 24V DC power-supply(SMPS adapter) capable of supplying atleast 400 mA is required.

- 24V AC, $400mA_{RMS}$. So a 24V AC single-phase transformer with a minimum 10VA output rating is required. Also, if a single-phase transformer is used then please make sure only one BACnet M-Bus Gateway device is connected to this transformer.
  [AC power-supply usage is not recommended]

- Screw-terminal connector.

MECHANICAL

- Aluminum enclosure with DIN-rail and wall-mount options.
- Dimensions: 143mm x 121mm x 65mm (Width x Height x Depth).
- Good EMI protection and EMC adherence.
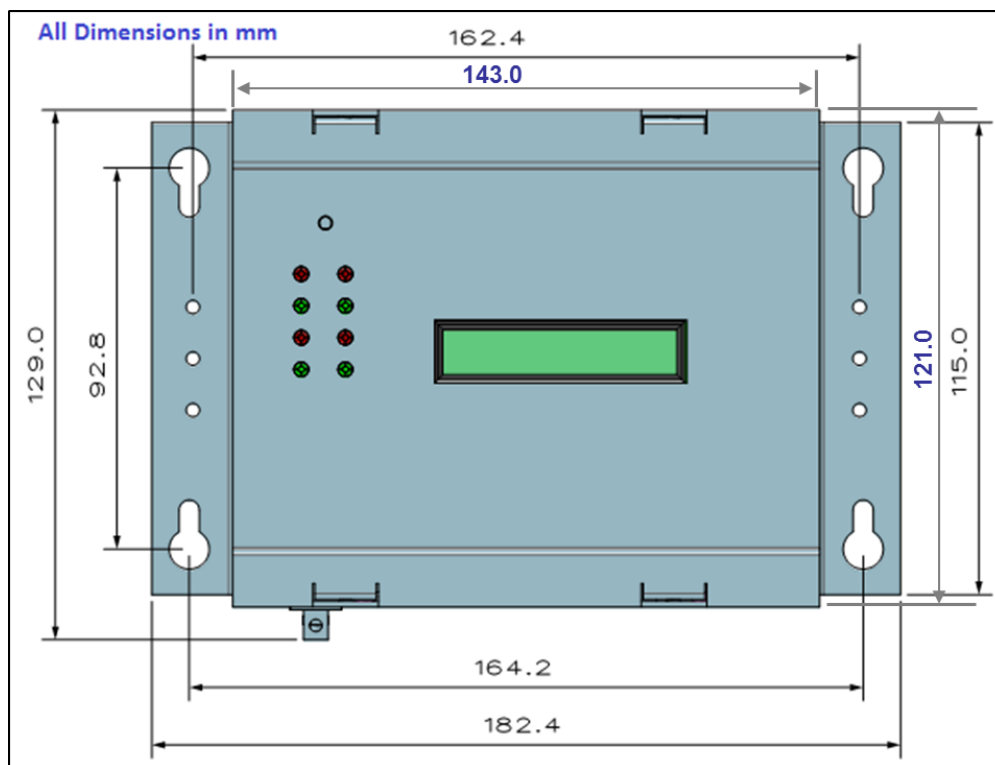
ENVIRONMENTAL

- Operating (ambient) temperature: 0 to 40 degree Celsius.
- Humidity: 10-90% non-condensing.

PROTOCOL SPECIFICATIONS

BACnet Services Supported

Object and Device Access Services
- ✓ ReadProperty
- ✓ ReadPropertyMultiple
- ✓ WriteProperty
- ✓ WritePropertyMultiple
- ✓ SubscribeCOV
- ✓ Confirmed/Un-confirmed COV notifications support.
- ✓ AddListElement
- ✓ GetAlarmSummary
- ✓ Confirmed/Un-confirmed Event/Alarm notifications support.
- ✓ Who-Is
- ✓ I-Am
- ✓ TimeSyncronization
- ✓ UTCTimeSyncronization
- ✓ Bi-directional Segmentation support

BACnet Object Types Supported

- ✓ Analog Input/Analog Output/Analog Value
- ✓ Binary Input/Binary Output/Binary Value
- ✓ Multi-state Input/Multi-state Output/Multi-state Value

M-Bus Services Supported

Datapoint Access Services
- ✓ SND_NKE
- ✓ SND_UD
- ✓ REQ_UD2

Modbus Services Supported

Datapoint Access Services
- ✓ Read Coils (FC 0x01)
- ✓ Read Discrete Inputs (FC 0x02)
- ✓ Read Holding Registers (FC 0x03)
- ✓ Read Input Registers (FC 0x04)
- ✓ Write Single Coil (FC 0x05)
- ✓ Write Single Register (FC 0x06)
- ✓ Write Multiple Coils (FC 0x0F)
- ✓ Write Multiple Registers (FC 0x10)

Product Information & Ordering
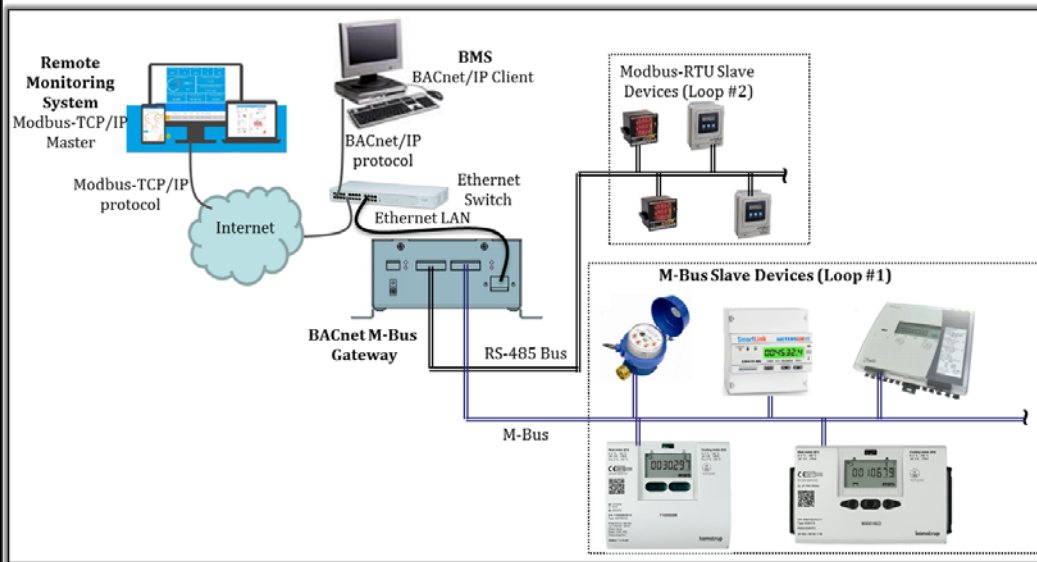
A typical application scenario with M-Bus BTU Meters on a multi-drop network and Modbus-RTU(connected on RS-485 multi-drop network) field devices connected through the Gateway to a BACnet based BMS and in parallel with a Modbus based remote monitoring system is shown in the picture. The BACnet/IP Device Server in the Gateway makes all the data-points accessed from all the configured M-Bus and Modbus-

RTU slave devices as the corresponding object instances in a BACnet device. This BACnet/IP device server, running in the Gateway, is then accessed by any BACnet/IP BMS Client software and use it to indirectly read data-points in the M-Bus devices and read/write to the data-points in the Modbus devices.

   The Gateway product is supplied with a Windows PC based configuration tool called Gateway Configuration Utility(GCU). The GCU tool provides for configuring the M-Bus and RS-485 port channel parameters, setting up the BACnet Device Server instance and either manually mapping M-Bus records and Modbus data-points to the corresponding BACnet object instances or importing mapping & configuration details from an Excel spreadsheet template.

Some extended features provided are Bi-directional Segmentation, BBMD function, COV Notifications and Alarm Events generation. Other useful features are M-Bus Slave device addressing using either Primary Address or Secondary Address, M-Bus records data value scaling, user specified Subunit number, Storage number and Tariff number based data extraction from M-Bus slave data frame.

A bonus feature of the GCU tool is the built-in BACnet/IP Client function using which the BACnet object property values can be retrieved from the BACnet Gateway. The tool also provides for saving the configuration/mappings into a file, download the configuration/mappings into the Gateway on-the-fly, Gateway firmware remote upgrade and changing the device IP Address and Password.

Product Type	Product Code
BACnet/IP Gateway for M-Bus and Modbus-RTU with 1 isolated M-Bus port and 1 isolated Modbus-RTU port(RS-485) and total 1000 points mappings. Total 60 M-Bus unit loads support.	GW-BIP-MBUS1-MBRTU1_64BTU

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