Inverter Systems, Inc. Communication Options – Cheat Sheet

• Why Do Inverters Need to Communicate?

Our inverters are very reliable, but still need periodic maintenance. Batteries naturally degrade over time and over charge/discharge cycles. Code requires monthly and yearly self-tests, which our inverters do, but the test results need to be monitored and often presented to building inspectors. Comm. options allow test results and other inverter 'health' and 'alarm' telemetry to be communicated digitally without requiring manual visits to the inverter. They can proactively notify the tenant when there is a problem with the Emergency Lighting system. The harder the inverters are to reach, the more useful comm. options are. Also, smart buildings like to have all intelligent devices in the building centrally visible/accessible/manageable in a Building Management System.

• What Inverter Families Support Communication?

FTW2, IPS4, UFT4, 3UFT, NFT
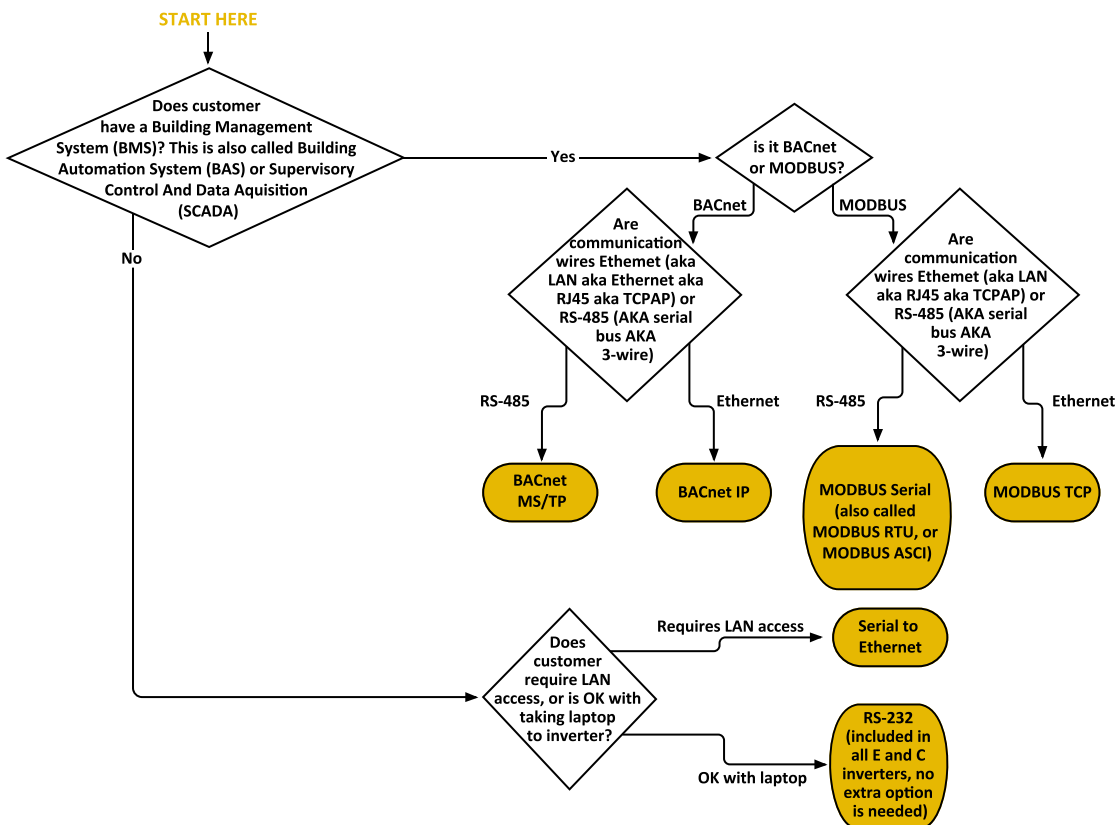
• What Data Can Be Communicated?

All communication options can communicate the following data for all inverter families:

Analog: Input voltage(s), output voltage(s), output current(s), output power (VA), battery voltage, ambient temperature at inverter, days running, total time on battery power.

Binary: On utility / on battery, battery charging, battery low, ambient temperature high , overload, input voltage high/low, monthly test failed, yearly test failed

If customer requires other data than the above, please check with Engineering. Some options provide further data (on some inverter families).

• What Option Should I Recommend?

START HERE

Does customer have a Building Management System (BMS)? This is also called Building Automation System (BAS) or Supervisory Control And Data Aquisition (SCADA)

No

Yes

is it BACnet or MODBUS?

BACnet

MODBUS

Are communication wires Ethemet (aka LAN aka Ethernet aka RJ45 aka TCPAP) or RS-485 (AKA serial bus AKA 3-wire)

Are communication wires Ethemet (aka LAN aka RJ45 aka TCPAP) or RS-485 (AKA serial bus AKA 3-wire)

RS-485

Ethernet

RS-485

Ethernet

BACnet MS/TP

BACnet IP

MODBUS Serial (also called MODBUS RTU, or MODBUS ASCI)

MODBUS TCP

Does customer require LAN access, or is OK with taking laptop to inverter?

Requires LAN access

Serial to Ethernet

OK with laptop

RS-232 (included in all E and C inverters, no extra option is needed)

• RS-232

All three-phase inverters and single-phase inverters that are 2kW or higher have RS-232 ports (also called DB9 ports. They look like the picture above) that you can communicate through **without any extra communication option**. However, you are limited to a max 50ft cable, and you must communicate over a custom protocol that is proprietary ISI.

• Serial To Ethernet (this was previously erroneously called "SNMP", and is now called "SEA")

The Serial To Ethernet communication option uses the same custom proprietary communication protocol as the RS-232. It basically takes the RS-232 communication signal and puts it on the customer's LAN (local area network, i.e. Ethernet network) so that they can communicate with the inverter (using the same protocol) from any PC that is on the LAN. The PC must have a Telnet client, or SSH client. See manual.

• BACnet MS/TP ("BAC")

BACnet MS/TP is the **RS-485** (serial bus wire) version of BACnet. This option is for customers that have a BACnet Building Management System (BMS… also called BAS and SCADA) and prefer to run RS-485 wiring to their inverters. We support different baud rates (9600, 19200, 38400, 57600 and 115200) and have a DIP switch to set a MAC address between 0 and 127 (we also support soft-MAC-address), and soft-settable Device Instance Number. See manual.

• BACnet IP ("BIP")

BACnet IP is the **Ethernet** (aka LAN aka RJ45 aka TCP/IP) version of BACnet. Our BACnet IP option is nothing but a BACnet MS/TP option plus a product called a 'Babel Buster' that translates from MS/TP to BACnet IP or MODBUS TCP (both are supported). This option is for customers that have a BACnet BMS and prefer to run LAN (network) cable to their inverters. We support static or dynamic IP, and settable device instance number and port number. If the customer wants BACnet IP and is buying multiple inverters, they may either buy BACnet IP options for all inverters and wire Ethernet to all inverters, or buy BACnet IP for just one inverter (to which they wire Ethernet) and BACnet MS/TP for all the others (they then have to connect all inverters – including the BACnet IP inverter - with RS-485 cables). See manual.

• MODBUS Serial ("MOD")

MODBUS Serial is the **RS-485** (serial bus wire) version of MODBUS. This option is for customers that have a MODBUS Building Management System (BMS… also called BAS and SCADA) and prefer to run RS-485 wiring to their inverters. We support different baud rates (9600, 19200, 38400, and 115200) and have a DIP switch to set a MODBUS slave address between 0 and 247. We support even parity or no parity. **With this option we support both MODBUS RTU and MODBUS ASCII** (which are two different protocols that can be spoken over MODBUS Serial). See manual.

• MODBUS TCP ("MIP")

MODBUS TCP is the **Ethernet** (aka LAN aka RJ45 aka TCP/IP) version of MODBUS. Our MODBUS TCP option is nothing but a BACnet MS/TP option plus a product called a 'Babel Buster' that translates from BACnet MS/TP to MODBUS TCP or BACnet IP (both are supported).. This option is for customers that have a MODBUS BMS and prefer to run LAN (network) cable to their inverters. We support static or dynamic IP, and settable port number. If the customer wants MODBUS TCP and is buying multiple inverters, they must buy MODBUS TCP options for all inverters and wire Ethernet to all inverters. See manual.

• Notes on BACnet/MODBUS options

- Serial (RS485) options (BAC and MOD) are priced lower than Ethernet options (BIP and MIP).
- If the wrong serial option is purchased by the customer (i.e. BAC is ordered when they wanted MOD, or vice versa), the issue can be fixed either by shipping out a 'programmer' device to the job site (to firmware update the PCB), or shipping out a low voltage circuit board which can be swapped in the field quite easily.
- The two Ethernet based options (BIP and MIP) can be ordered via either name (BIP or MIP) but are actually the same exact thing! **Both support the following three protocols: BACnet IP, MODBUS TCP and BACnet MS/TP!** In other words, BIP or MIP are the safer (albeit costlier) options to specify to an uncertain customer because they cover 3 out of the 4 protocols. And if the customer ends up needing MODBUS Serial AKA RTU (which is very unlikely; there is very little demand for it), they will need a 'programmer' device shipped out (or to swap a low voltage PCB).
- The two Ethernet based options (**BIP** and **MIP**) are in much higher demand than the two Serial options (**BAC** and **MOD**).
- MODBUS TCP tends to be preferred by Data Centers and IT based companies. BACnet IP is preferred by generic smart buildings, especially if the specification is driven by HVAC.