

CNG Modbus for Two Sided Dispenser

The CNG Modbus is a serial communications protocol used with a programmable logic controller (PLC) that enables the station equipment to communicate with a 2-sided CNG dispenser.

Overview

The CNG Modbus utilizes a Breakout Board (129195) that is used for RS485 communication. A RS485/422 non-isolated serial port cable (129194) plugged into the DB9 connector of the Breakout Board is connected to a RS485/422 port on the PLC (129192). The Breakout Board and PLC are mounted on a DIN Rail on the sidewall of the CNG electrical enclosure as shown in *Figure A1*.

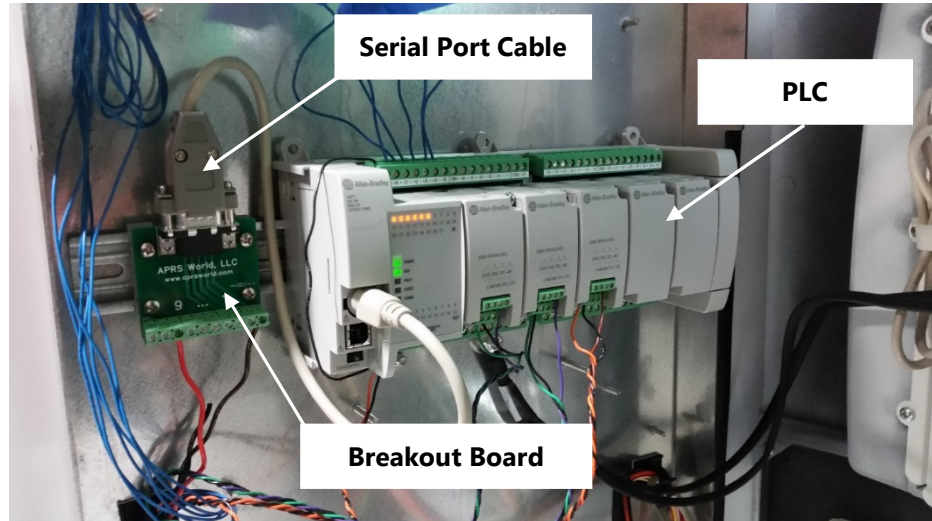


Figure A1 - Breakout Board and PLC

PLC Controller

The PLC Controller is a 48-point controller with embedded input and outputs. It operates three plug-in serial ports and has a 24VDC output power supply. For additional PLC information, refer to the *Allen-Bradley Micro830 and Micro850 Programmable Controllers User Manual* that can be found at <http://www.rockwellautomation.com/literature/> use keywords Bulletin 2080-LC30 and 2080-LC50.

Pinouts, Terminal Strips, and Serial Ports

The following is a description of the pin-outs, terminal strips, and serial ports connections used on the Breakout Board and PLC. Refer to the *Wiring Information for all CNG Series Remote Dispenser with 708 Electronics and RS485 COMM. 2 Sided Modbus* and the *CNG MODBUS Wiring Diagrams* for additional wiring information.

Breakout Board Interface

The PLC sends and receives Modbus data from the Breakout Board. **Note:** Only positive and negative are used.

- Pin 1: RS485 (+ positive)
- Pin 8: RS485 (- negative)

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PLC Terminal Blocks

The PLC uses terminal blocks for inputs and outputs. Terminal strip 1 is used to monitor the solenoid valves.

- Terminal Strip 1 uses valve wire harness (129201) that connects to the CPU Board.
- Terminal Strip 2 uses wire harness (129200) that connects to J4 (Comm Hub Board-Side 1) of the CPU Board.

Terminal Strip 1 Inputs Valve Monitor	Terminal Strip 2 Outputs Power
• Pin 1 COM0 – Ground	• Pin 1 +DC24 - +24VDC
• Pin 2 I-00 – Side 1 Low	• Pin 2 –DC24 - Ground
• Pin 3 I-01 – Side 1 Mid	
• Pin 4 I-02 – Side 1 High	
• Pin 5 I-03 – Side 2 Low	
• Pin 6 I-04 – Side 2 Mid	
• Pin 7 I-05 – Side 2 High	
• Pins 8-16 – Unused	

PLC Serial Port Plug-Ins

The PLC uses a Modbus protocol through three non-isolated serial ports (Slot 1 through Slot 3). **Note:** Slot 3 is a POS Field Wiring Connection.

- Slot 1 uses wire harness (129200) that connects to J4 (Comm Hub Board Side 1) of the CPU Board.
- Slot 2 uses wire harness (129199) that connects to J3 (Comm Hub Board Side 2) of the CPU Board.
- Slot 3 uses wire assembly (129202) that connects to the POS for RS485 Fuel Communication.

Slot 1	Slot 2	Slot 3
• Pin A1 RS485 + positive - Green	• Pin A1 RS485 +positive - Green	• Pin A1 RS485 +positive - Orange
• Pin A2 RS232/485 ground - Black	• Pin A2 RS232/485 ground - Black	• Pin A2 RS232/485 ground - Black
• Pin A3 RS232 RTS - N/A	• Pin A3 RS232 RTS - N/A	• Pin A3 RS232 RTS - N/A
• Pin A4 RS232 CTS - N/A	• Pin A4 RS232 CTS - N/A	• Pin A4 RS232 CTS - N/A
• Pin B1 RS232 DCD – N/A	• Pin B1 RS232 DCD – N/A	• Pin B1 RS232 DCD – N/A
• Pin B2 RS232 RXD – N/A	• Pin B2 RS232 RXD – N/A	• Pin B2 RS232 RXD – N/A
• Pin B3 RS232 TXD – N/A	• Pin B3 RS232 TXD – N/A	• Pin B3 RS232 TXD – N/A
• Pin B4 RS485 -negative – Violet	• Pin B4 RS485 -negative – Violet	• Pin B4 RS485 -negative – Brown

Field Wiring Installation

Data communication wires are required for operation of each fueling position with a control console or controller. The data wires can be put in the same conduit as the other pump wiring. Refer to the *Wiring Information for all CNG Series Remote Dispensers with 708 Electronics and RS485 Comm. 2 Sided Modbus* for additional information.

RS485 Wires should be twisted together at 3 turns per foot to reduce the effects of electrical noise on the communication circuit. Due to the risk of possible noise causing problems with communication, Bennett highly recommends the use of twisted wires, but does not require it. **Note:** Use a Belden 7928A or equivalent gas and oil resistant category 5e cable (two-wire shielded twisted pair with drain), but the “drain” must not be terminated.

Modbus Communication Wiring

- Connect 1 Orange 18ga. wire through the junction box to Timer Board TS3, Terminal 7. Connect the other end to the PLC Modbus (+ positive).
- Connect 1 Brown 18ga. wire to through the junction box to the Timer Board TS3, Terminal 8. Connect the other end to the PLC Modbus (- negative).

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MODBUS Mapping

The following table is a memory map that details what information is available over Modbus. **Note:** The register order from side 1 to side 2 differs.

Name	Address	Data Words	Unit	bit 15-bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Dispenser Status Side 1	40001	1	Bit map	Reserved	Valve 3	Valve 2	Valve 1	Reserved	Handle B Lifted	Handle A Lifted	Dispenser ARMED
Ambient Temp Side 1	40009	2	Deg C								
Mass Flow Rate Side 1	40012	2	Kg/min								
Pressure Side 1	40014	2	PSI								
Sale Mass Side 1	40026	2	Kg								
Sale Amount Side 1	40028	2	\$								
Mass Flow Rate Side 1 (IEEE 754)	40030	2	Kg/min	IEEE 754 Format							
Dispenser Status Side 2	40051	1	Bit map	Reserved	Valve 3	Valve 2	Valve 1	Reserved	Handle B Lifted	Handle A Lifted	Dispenser ARMED
Ambient Temp Side 2	40059	2	Deg C								
Sale Mass Side 2	40062	2	Kg								
Pressure Side 2	40064	2	PSI								
Mass Flow Rate Side 2	40076	2	Kg/min								
Sale Amount Side 2	40078	2	\$								
Mass Flow Rate Side 2 (IEEE 754)	40080	2	Kg/min	IEEE 754 Format							

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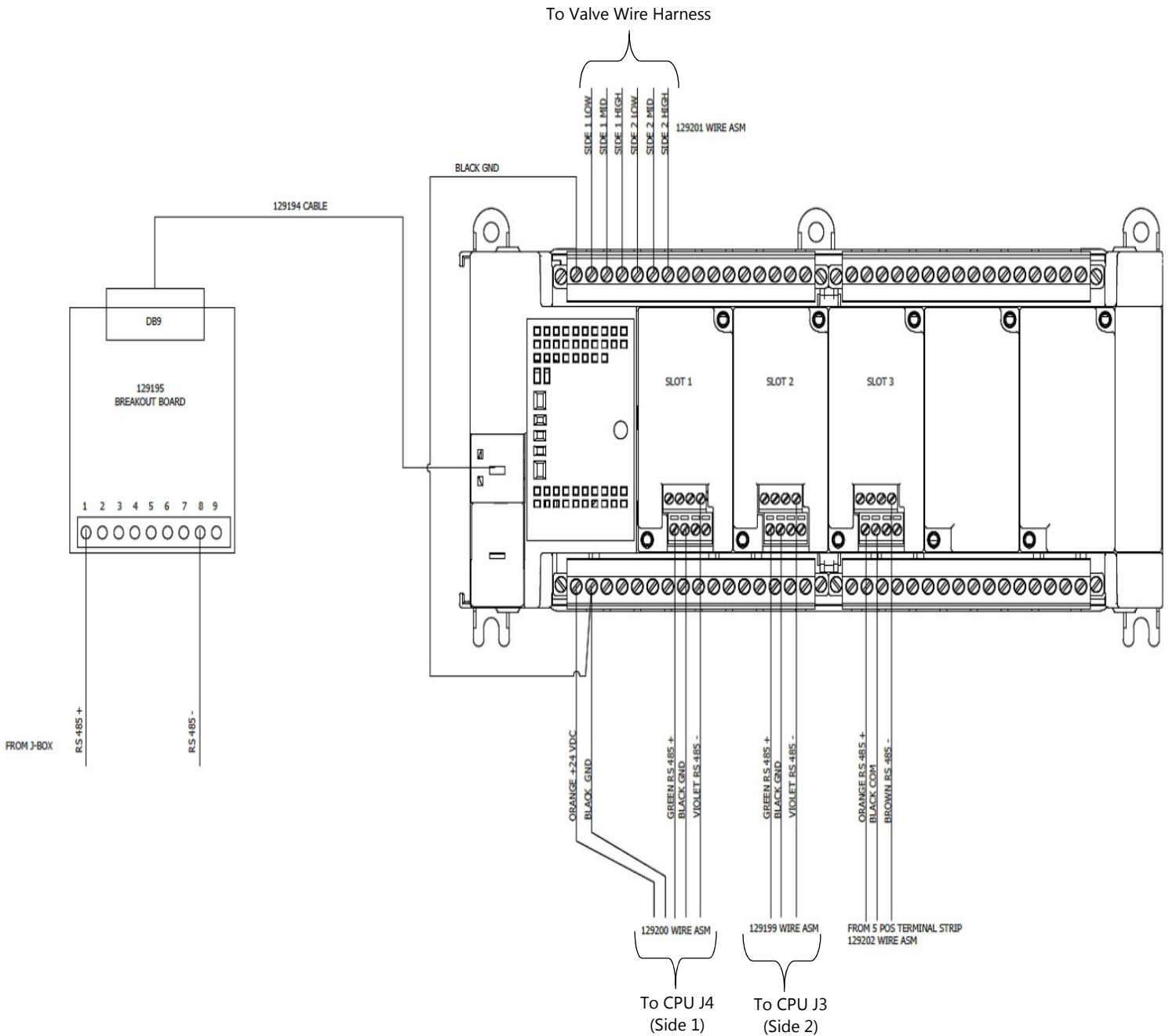


Figure A2 - CNG Modbus Wiring Diagram

CNG Modbus for Two Sided Dispenser

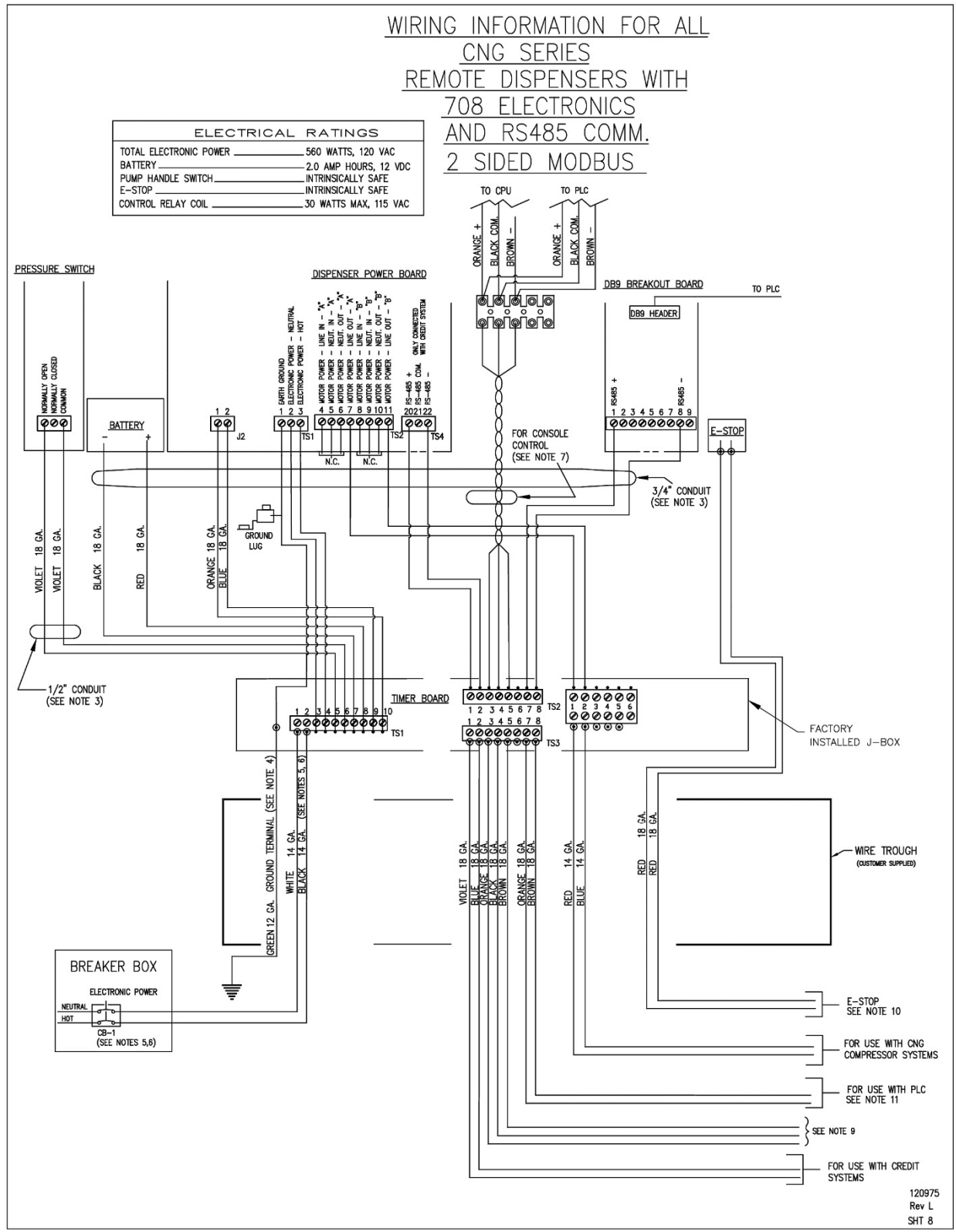


Figure A3 - CNG 708 Electronics and RS485 COMM 2 Sided Modbus Wiring Diagram

CNG Modbus for Two Sided Dispenser

Notes For Wiring Diagram:

1. All wiring must be installed and used in accordance with the national electrical code (NFPA #70, Automotive and marine service code NFPA #30A and NFPA #52 Gaseous Fuels), state and local electrical codes.
2. All wiring gauge is minimum required, stranded wire with THHN insulation must be used. Do NOT reuse old wire from an existing installation.
3. Do not use PVC conduit. Use only Rigid metal conduit. Using PVC conduit could void the Bennett Limited Warranty!
4. Pull a green 12 GA. stranded THHN ground wire through the junction box and wiring trough and secure at grounding post near the terminal strip in the dispensers electrical enclosure. Terminate the other end at the main electrical service panel ground bar. Do not terminate at the neutral bar of a sub-panel or rely on metal conduit for this ground connection. Each dispenser's grounding post must be within 1 ohm resistance to earth ground potential. Do not use wire nuts on ground circuits, use only compression type connectors.
5. Electronics power must be a dedicated circuit. The electronic power required for this dispenser is 115VAC for its operation. Electronic power for all dispensers at the installation must be wired to the same AC line phase or damage will result to the dispensers.
6. Use 15 Amp neutral breaking circuit breakers which are supplied by the customer.

Breaker Identification:

CB# 1 Electronic Power- Hot for electronic power is 115V AC.

NOTE: No more than 2 dispensers per breaker.

7. Absolutely no daisy chaining of data wires (orange or yellow 18Ga.). Damage to the dispenser or console will result. Do not connect these wires if unit is used without a console.
8. Field connection = ⊙
9. These wires are used for connecting remote consoles. Refer to console installation instructions for proper wiring methods. For all dispenser codes the dispenser must be connected to an approved Bennett console or control device.
10. E-STOP wiring must come into dispenser as intrinsically safe.
11. OPTIONAL: PLC modbus communication link

Electrical Ratings	
Electronic Power	560 Watts, 115V 60Hz
Battery	2.0 AMP Hours 12 VDC
Pump Handle Switch	INTRINSICALLY SAFE
E-STOP	INTRINSICALLY SAFE
Control Relay Coil	30 Watts, 115V 60Hz

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Figure A4 - CNG 708 Electronics and RS485 COMM 2 Sided Modbus Wiring Diagram Notes