



PMSTR-4000 Quick Start Tips

September 15, 2021

The PMSTR-4000 Plant Master controls up to eight NXF4000 and/or PPC4000 in any combination using a central sensor. The connection from the PMSTR-4000 is via Modbus and uses the dedicated sequencing bus.

WIRING

The Modbus terminals for the sequencing bus are on connector P12:

- P12.3: Modbus A+
- P12.4: Modbus B-

Just as when using peer-to-peer sequencing, all the connected units must be wired in a serial string, also known as a “daisy-chain”. This means that each control is connected to the next, and only the first or the last control is connected to the PMSTR-4000.

CONFIGURATION OF UNITS

First, sequencing must be enabled on each NXF4000 or PPC4000. It is also important that no control is specified to be the master, and that the LEAD LAG key on the keypad is disabled so that a master isn't inadvertently specified in the future. If a master does get enabled on one of the units there will be communication issues from the PMSTR-4000.

The sequencing bus has communication settings fixed at 19200 baud, eight data bits, no parity and one stop bit. The node address for the sequencing bus is the same as the node address used for the BMS Modbus port.

Settings to change on each NXF4000 or PPC4000:

COMMUNICATION SETUP → UNIT ADDRESS → (1-8)
SEQUENCING SETUP → MASTER SLCT → COMMS
SEQUENCING SETUP → SLAVES AVAILABLE → 0
KEYPAD SETUP → LEAD LAG KEY → UNUSED





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CONFIGURATION OF PMSTR-4000

Option parameters are used to configure the PMSTR-4000. To access the option parameters, press the gear icon. Enter 903 when prompted for a passcode.

The recommended first step when configuring a new installation is to apply the default settings by setting option 12.0 to 1. This will apply the default settings and then reset to 0 when complete.

Next, refer to bulletin PMSTR-4001 and go through the option parameters group by group. This is important so that the sensor can be set up correctly, as well as any other options such as pump control or outside air reset. The bulletin has a more complete description of more advanced option groups such as rotation order and unit skipping.

ONLINE STATUS OF UNITS

Once the units are wired and powered, if communication is okay the firing rate should appear if the unit is running, even if it shows as OFFLINE. Several conditions must be true before a unit can be recognized as ONLINE (STANDBY, STARTING or RUNNING):

- Communication must be active
- Sequencing must be properly enabled on the unit (described earlier)
- Virtual HAND-OFF-AUTO switch must be set for AUTO
- Unit must not be locked out
- Unit must have operating limit input satisfied (voltage on terminal P15.4)
- Unit must have burner control input on (from keypad or digital input)

If the unit is running when placed in AUTO, this ensures that all the conditions are met, and the unit should be assigned a role as lead or lag and should then be controlled by the PMSTR-4000 immediately.

If a unit is operated in HAND mode, it will show as OFFLINE, but the actual firing rate will be displayed. This is because the unit is only OFFLINE relative to the PMSTR-4000. This simply means that the PMSTR-4000 can't remotely command the unit to help satisfy the load.

If the unit is running and the firing rate is not being displayed, it is possible that the Modbus communication is not set up at the units properly or that there is a wiring issue.





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USING MODBUS MONITOR TO VERIFY COMMUNICATION STATUS

A Modbus monitoring program such as ModScan or Shortbus Modbus Scanner can be used to check if communication is active. Connect the Ethernet port of the PMSTR-4000 to a PC and set up a static IP address to match that of the PMSTR-4000. By default, the IP address of the PMSTR-4000 is 192.168.0.11, but this can be immediately changed from option groups 13 through 15. Set up the PC address to have a different last octet from the PMSTR-4000 – an example would be to set the PC static IP address to 192.168.0.19.

Use the Modbus monitoring program to read registers 00020 through 00027. These indicate the following:

- 00020 – status of unit 1 (0 = no communication, 1 = communication active)
- 00021 – status of unit 2 (0 = no communication, 1 = communication active)
- 00022 – status of unit 3 (0 = no communication, 1 = communication active)
- 00023 – status of unit 4 (0 = no communication, 1 = communication active)
- 00024 – status of unit 5 (0 = no communication, 1 = communication active)
- 00025 – status of unit 6 (0 = no communication, 1 = communication active)
- 00026 – status of unit 7 (0 = no communication, 1 = communication active)
- 00027 – status of unit 8 (0 = no communication, 1 = communication active)

SENSOR ISSUES

If the process control sensor (steam or hot water) does not have a valid reading, the PMSTR-4000 will override the virtual HAND-OFF-AUTO position of each unit and force each into HAND. The PMSTR-4000 does this since it is not possible to control the load without a sensor connected. Placing each unit back into HAND allows them to control to their local sensor and maintain an output. Since the units will all be in HAND, it will not be possible for the units to be ONLINE when there is a sensor issue.





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TROUBLESHOOTING MODBUS COMMUNICATION ISSUES

Here are some common issues with Modbus wiring between the PMSTR-4000 and the connected units:

- Modbus wiring is backwards – swap the wires between A+ and B- on the PMSTR-4000 terminal block. A+ should connect to all the terminals P12.3 (in series) and B- should connect to all the terminals P12.4 (in series).
- Modbus wiring is inconsistent – some units may have the wiring connected backwards while others do not. This may appear as only some units communicating.
- Addresses programmed into the units are not correct. These need to be set from 1 to 8. Since these are the same addresses used from the BMS Modbus port, ensure that the BMS integrators know that these can't be changed. Note that by default, a new unit has an address of 247.
- One of the connected units had the LEAD/LAG key pressed on the keypad and is attempting to become master. This will cause interference and loss of communication on the Modbus network as a network can typically only have one master. Follow the steps described earlier in this document to disable the LEAD/LAG key on the keypad to prevent this. The key will highlight in green or flash in green when it has been pressed.
- If the Modbus network has a long run of wiring or a lot of connected units, it may benefit to add a 120-ohm resistor across P12.3 and P12.4 at the last unit. This is referred to as a "termination resistor" and can help mitigate the impedance in the large run of wiring.





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MESSAGES

Once a unit is ONLINE, the NXD410TS will display a message on the home screen to indicate the current sequencing command status. The NXTSD507HD and NXTSD512HD will display a similar message.

STANDBY	s01
SEQUENCED OFF	
SETPOINT 1	100psi
PCV VALUE	90psi

Status message when sequenced slave disabled

AUTO	s16
FLAME STRENGTH	100
SEQUENCED SLAVE	
PCV VALUE	90psi

Status message when sequenced slave enabled

Note that the internal stat (cut-in and cut-out) is still respected when sequenced slave is enabled.

STANDBY	s01
NO CALL FOR HEAT	
SEQUENCED SLAVE	
PCV VALUE	106psi

Status message when sequenced slave enabled but the PCV is greater than the setpoint plus cut-out





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HOT STANDBY

If sequencing is used, sensor 2 on the unit can be connected to a shell temperature sensor to enable the hot standby feature. Setpoint 2 on the unit is configured to the standby setpoint and whenever the sequenced slave disable command is sent, the control will override this to maintain the standby water temperature.

AUTO	s16
FLAME STRENGTH	100
STANDBY WATER	304°F
PCV VALUE	97psi

Message when sequenced slave is disabled but hot standby is active

To enable hot standby:

SENSOR SETUP → SENSOR 2 → TYPE → STANDBY

SENSOR SETUP → SENSOR 2 → RANGE → (choose sensor range)

SETPOINT SETUP → SETPOINT 2 SETUP → SENSOR USED → 2

Enter the desired setpoint, cut-in, cut-out and PID settings as desired. Note that setpoint 1 and setpoint 2 each have individual settings.

