



Using a Common Header Sensor for Two-Boiler Sequencing

September 25, 2020

It is possible to use a common header sensor for two boiler peer-to-peer sequencing. To do this, the common header sensor is connected to the first boiler as sensor 1. The first boiler will retransmit this signal to the second boiler. On each boiler, a local sensor of the same type should be connected to sensor 2. 24VDC from the first boiler will also be sent to the second boiler so that if the first boiler is not online, the analog output from the second boiler will retransmit the signal from its own sensor 2 to sensor 1. This will not only avoid a sensor under range lockout but will also allow continued operation using the local sensor.

Note that if this method is used with a steam boiler, the warm standby function could not be used since it would not be the same type and range of sensor as the header. A second header sensor could be installed in this application.

The local sensor is necessary for this method to work well since the readings in the boiler will often vary significantly from those in the header. This is usually a larger concern with water boilers. Since the firing rate is based upon the header reading, the boiler may be firing at high fire when approaching the setting of the mechanical operating control. This would cause the boiler to cycle on and off. Using the second sensor to trigger a marginal alarm allows the low fire hold to enabled when approaching this setting. The setting for this should be enough to ensure that if the reading approaches the operating control setpoint, the burner will shut down at low fire. It should not be so low as to interfere with the normal firing rate when there is a normal load on the system.



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CONFIGURATION

Configure both sensor 1 and sensor 2 to match the type of sensor that is installed – they need be the same type and range for this to work.

For the first boiler, set up the analog output to retransmit sensor 1.

ANALOG OUT SETUP → ANA 0 OUT → SENSOR 1

For the second boiler, set up the analog output to retransmit sensor 2.

ANALOG OUT SETUP → ANA 0 OUT → SENSOR 2

Set up setpoint 2 so that the marginal alarm will activate before the operating control setpoint. How far below to set this can be adjusted – check the setting of the mechanical operating control.

*SETPOINT SETUP → SETPOINT 2 SETUP → SETPOINT → (set to a low value)
SETPOINT SETUP → SETPOINT 2 SETUP → HIGH MARGNL → (where to force LF)*

Set up user output 1* to indicate when sensor 2 has a marginal alarm. This will be connected to digital input 1*, which will be programmed to activate low fire hold. When using this method, also set up another user output (user output 2* in example) to indicate when there is a lockout and use this output instead of the alarm output (P4.2) for any alarm lights or horns. If a marginal alarm is set up and an alarm light or horn is connected to P4.2, it will activate when the marginal alarm is present.

USER OUTPUT SETUP → USER OUTPUT 1 → USE → MARGINAL 2

USER OUTPUT SETUP → USER OUTPUT 1 → ASSIGNMENT → 1,2,3,4

USER OUTPUT SETUP → USER OUTPUT 2 → LOCKOUT

DIGITAL INPUT SETUP → DI 1 → USE → LOW FIRE HOLD

DIGITAL INPUT SETUP → DI 1 → ACTION → OR

If the using water as the sensor type, thermal shock can also be set up if desired. Use sensor 2 for this function since it is piped in the boiler itself.

Finally, set up sequencing. Sequencing requires that one boiler is chosen as the lead boiler. The lead can be chosen using the operator interface, a digital input or via Modbus.

The first step is to choose a unique node address for the boiler. This address will also affect the BMS Modbus connection so be sure that the address chosen also works for that connection (if used). The baud rate chosen for the BMS Modbus connection does



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not have any effect on sequencing.

COMMUNICATION SETUP → UNIT ADDRESS → (1 to 247)

Next, enable sequencing. Before doing so, determine how the lead will be chosen.

If the lead will be selected using the LEAD LAG key on the NXD410 or NXD410TS:

**KEYPAD SETUP → LEAD LAG KEY → USED
SEQUENCING SETUP → MASTER SLCT → KEYPAD**

If the lead will be selected using the LEAD LAG key on the NXTSD507HD or NXTSD512HD:

**KEYPAD SETUP → LEAD LAG KEY → USED
SEQUENCING SETUP → MASTER SLCT → COMMS**

If the lead will be selected using BMS Modbus:

**KEYPAD SETUP → LEAD LAG KEY → UNUSED
SEQUENCING SETUP → MASTER SLCT → COMMS**

If the lead will be selected using a digital input (digital input 2* in example):

**KEYPAD SETUP → LEAD LAG KEY → UNUSED
DIGITAL INPUT SETUP → DI 2 → USE → FORCE SEQ. MASTER
DIGITAL INPUT SETUP → DI 2 → ACTION → OR
SEQUENCING SETUP → MASTER SLCT → INPUT**

Set up the sequencing parameters on each control:

**SEQUENCING SETUP → SLAVES AVAILABLE → 1
SEQUENCING SETUP → 1ST SLAVE ON → (node address of the other boiler)
SEQUENCING SETUP → SLAVE ON RATE → (firing rate > this to enable lag boiler)
SEQUENCING SETUP → SLAVE ON DELAY → (delay to enable lag)
SEQUENCING SETUP → SLAVE OFF RATE → (firing rate < this to disable lag boiler)
SEQUENCING SETUP → SLAVE OFF DELAY → (delay to disable lag)**

To enable, the firing rate must be greater than the on rate setting for the entire duration of the on delay, or the firing rate must be lower than the off rate setting for the entire duration of the off delay.

***NOTE:** Any input or output can be used – adjust settings accordingly.



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WIRING

