

MODSYNC SE:

Modular Boiler Sequencing System

FOR BOILERS:

Hydronic (Hot Water) Heating



Fulton's ModSync SE is a highly-optimized sequencing control system engineered to maximize the thermal efficiency of modular (multiple boiler) plants for exceptional energy savings. A user-friendly intuitive touchscreen interface provides rapid access to robust functionality. Reliable lead-lag staging precisely matches system load to boiler output, thereby minimizing boiler cycling and extending equipment life.

STANDARD FEATURES: VERSION 6.6.1.X AND NEWER

- Lead-Lag of 2 to 8 Hydronic (Hot Water) Boilers
- Support for Parallel or Sequential Modulation Staging
- Modbus Communication Protocol
- Operator Configurable Assignable Inputs/Outputs (I/O)
- Multiple Setpoint Modes (Remote 4-20mA, OAT Reset, Manual, BMS)
- Minimum Setpoint Temperature Protection for Oil Burner Firing Mode
- Supply and Return Header, and Outdoor Air Temperature Monitoring
- System Supply and Return Pressure Monitoring
- Outlet Temperature Monitoring (Prevents Nuisance MRHL Lockouts)
- Domestic Hot Water Setpoint Priority via Contact Closure
- Outdoor Air Temperature Setpoint Reset
- Boiler Isolation Valve Control; Optional End Switch Interlock
- Constant or Variable Speed Boiler (Primary) Pump Control
- System (Secondary) Pump Lead/Lag; Speed Control via ΔT or ΔP
- System Clock with Occupied/Unoccupied Setback Schedule
- Automatic Boiler Rotation via Cycle/Run Hour Ratio
- Trending Data Logging of Supply, Setpoint and Outdoor Temperatures
- Access Password and Screensaver Time Out
- Preventative Maintenance Reminders

PROJECT DETAILS:

Project Name	
Date Submitted	
Fulton Representative	

City, State (Province)	
Engineer of Record	
Contractor	

BOILER CONTROL INTEGRATION SUPPORT:

- Fulton PURE Control™
- Siemens LMV3 Series
- Siemens LMV5 Series
- Fulton (Honeywell) SOLA
- Legacy I/O (*Up to 5 boilers; enable, 4-20mA fire rate, status*)

ASSIGNABLE INPUTS/OUTPUTS AVAILABLE:

- 16 Digital Inputs (24 VDC)
- 14 Digital Outputs (24 VDC)
- 3 Analog Inputs (4-20 mA)
- 4 Analog Outputs (4-20 mA)

OPTIONAL ACCESSORIES: PARTS SHIP LOOSE FOR FIELD INSTALLATION

Outdoor Air Temperature Sensor Kit 4-30-000500
 Return Header Temperature Sensor 4-30-000510
 N54 BACnet Protonode 2-45-001058
 LonWorks Gateway 2-45-001055
 Supply Header Pressure Transducer (0-100 PSI) 2-40-000999
 Supply Header Pressure Transducer (0-200 PSI) 2-40-000994
 Return Header Pressure Transducer (0-100 PSI) 2-40-000999
 Return Header Pressure Transducer (0-200 PSI) 2-40-000994

0-10VDC to 4-20mA Setpoint Signal Converter 2-45-001140
 A06X Expansion (For 10 Total Analog Outputs) 2-45-001045
 24VDC Relay (DPDT 10A) 2-45-880400
 120VAC Relay (DPDT 10A) 2-45-880360
 Resistor Kit for 4-20mA to 0-135 Ω Conversion 2-40-000334

NOTE:

The ModSync SE is designed for use with the standard configurations of Fulton EDR, EDR+, EXE, VTG, VTG DF, PHW series of boilers. It is not compatible with boilers utilizing the SC500 or SC750 controls such as the VTG LE series. The ModSync SE may not be compatible with custom ordered off-standard boiler controls, or applications on other equipment manufacturers. This submittal is not applicable to the ModSync LX custom engineered controls system.

HARDWARE SPECIFICATIONS: PART NUMBER 7-53-006000

- 5.7-inch 256 Color Touchscreen Display
- UL 508A Listed and Labeled
- NEMA4X Enclosure
- 120VAC 60Hz 1ø
- 5,000A SCCR
- Supply Header Temperature Sensor Included

FIXED I/O FUNCTIONALITY:

- Remote 4-20mA Temperature Setpoint Input
- Remote Enable/Disable Contact (24VDC)
- Domestic Hot Water Aquastat Demand Contact (24VDC)
- General Alarm Dry Contact
- Supply Header Temperature Sensor (3 Wire RTD)
- Return Header Temperature Sensor (3 Wire RTD)
- Outdoor Air Temperature Sensor (3 Wire RTD)

ASSIGNABLE I/O FUNCTIONALITY:

Digital Input (24 VDC)

- Individual Boiler Isolation Valve Interlock
- Individual Boiler Dedicated (Primary) Pump Interlock
- Individual Boiler Remote Mode Selected
- Individual Boiler Main Burner On Status
- Individual Boiler Alarm Status
- Individual Boiler Primary Low Water
- Individual Boiler Secondary (Auxiliary) Low Water
- Individual System (Secondary) Pump Status
- Individual System (Secondary) Pump Alarm
- Emergency-Stop Status *(Monitoring only; Not a safety shutdown interlock)*

Analog Input (4-20 mA)

- Supply Header Pressure
- Return Header Pressure
- Differential Pressure
- Temperature Retransmission

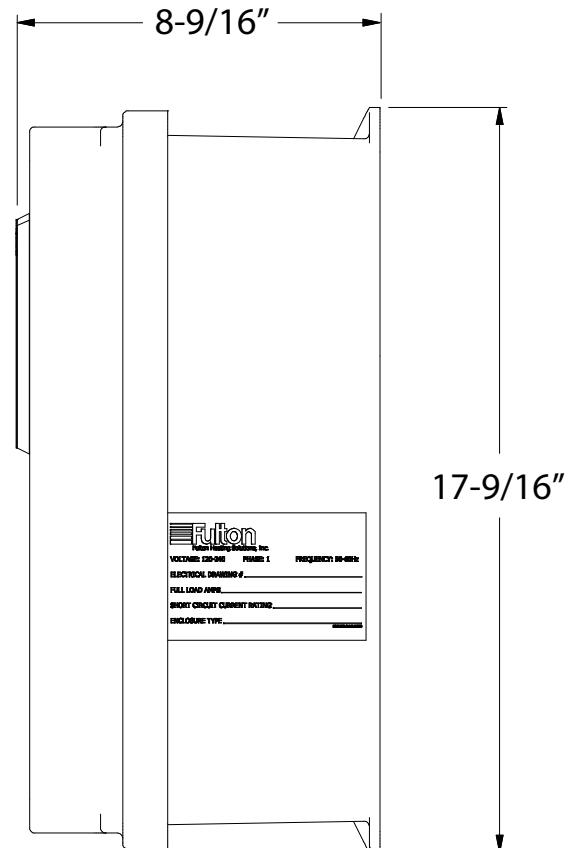
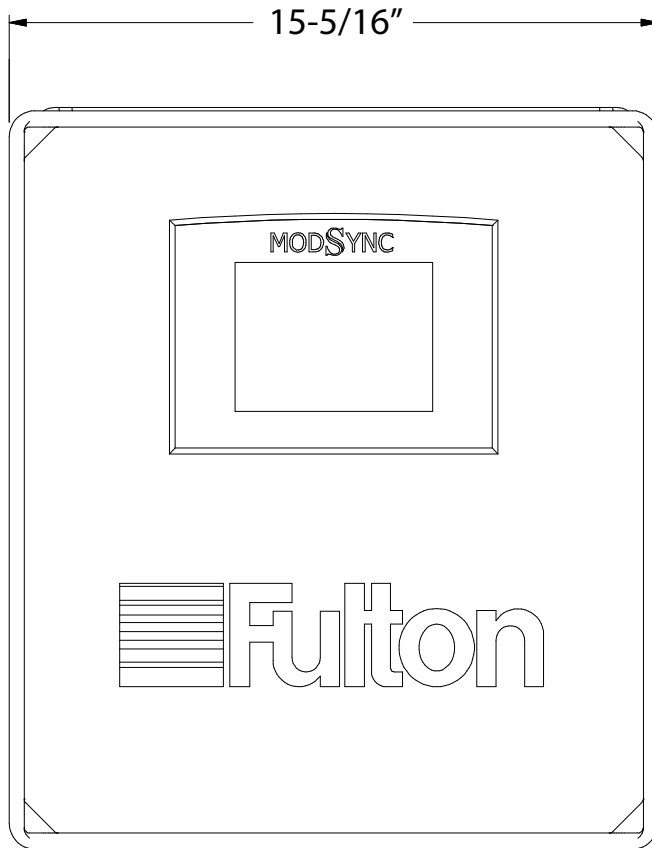
Digital Output (0.5A max 24 VDC)

- General Heat Demand Status Output
- Individual Boiler Isolation Valve Control
- Individual Boiler (Primary) Pump Enable Control
- Individual Boiler Alarm Output
- Individual Boiler Status Output
- Individual Boiler Heat Demand Status Output
- Individual System (Secondary) Pump Enable Control

Analog Output (4-20 mA)

- Individual Boiler Firing Rate Output
- Dedicated Boiler (Primary) Pump Speed
- System (Secondary) Pump Speed

PANEL DIMENSIONS:



BOILER LEAD/LAG SEQUENCE OF OPERATION:

1. The ModSync SE monitors outdoor temperature and calculates a water loop temperature setpoint based on the selectable preset values. A Proportional/Integral/Derivative (PID) Control Variable (CV) determines when the hydronic boilers will begin sequencing based on the difference between the actual water loop temperature.
2. When the ModSync SE determines a request for heat, the lead hydronic boiler is energized.
3. If the water loop temperature continues to decrease, the CV will increase. The lead hydronic boiler's burner firing rate will track the CV value. The ModSync SE will enable a lag boiler when the Lag Boiler Start CV value has been reached and the Lag Boiler Start Delay has expired. The lead and lag boiler's firing rates will modulate together at the lowest possible firing rate necessary.
4. If additional heat is required, the ModSync SE will enable each additional lag boiler stage until all available hydronic boilers in the plant have been energized.
5. If all hydronic boilers are enabled and additional heat is required the boilers will be commanded to modulate together as a single cohesive unit to keep the hydronic boiler system at the lowest possible firing rate, maximizing the plant thermal efficiency.
6. As the water loop temperature increases, the ModSync SE will begin to decrease the firing rate of the hydronic boilers to maintain the water loop temperature. If all of the hydronic boilers are at low fire and the CV decreases to a user configurable level, the ModSync SE will begin to stage the boilers off. The hydronic boilers will continue to be disabled based on the temperature rise and CV response.
7. The lead boiler is disabled when the water loop temperature reaches a selectable hysteresis value referenced around the loop supply temperature setpoint.
8. Automatic rotation of the boiler Lead and Lag positions will be determined using configurable operating history cycle count or run hours.

OTHER FUNCTIONS:

1. *Boiler Isolation Valve Control:* The lead boiler isolation valve is held open at all times to provide a continuous flow path and prevent dead-heading of the main system (secondary) pump(s). A lag boiler's isolation valve will be enabled when the boiler has a call for heat and will remain enabled until a user defined delay time elapses after the boiler is disabled. This will allow for any residual heat in the boiler to dissipate before the isolation valve closes and prevent a high limit lockout at the boiler. Valve end switch status input (interlock) may also be configured for verification and alarm purposes.
2. *Boiler Pump Control:* Enable the boiler circulator on a call for heat at the boiler. The boiler sequencing system will provide a user-defined Pump Off Delay time to keep the pump energized for a defined timeframe after the boilers have turned off. Pump status input (interlock) may also be configured for verification and alarm purposes. Boiler Pumps may be configured for constant speed or variable speed with a 4-20mA output proportional to fire rate, bound by configured Min and Max Speed Control parameters.
3. *System (Secondary) Pump Control:* The lead system pump will be enabled when the outdoor air temperature is below the user defined outdoor air temperature setting or anytime the system is enabled. The ModSync SE will automatically rotate the lead system pump based on a user defined number of run hours. The pump with the fewest number of run hours will become lead. The lead pump will run at all times until the outdoor air temperature is above the user defined outdoor air temperature setting or the system is disabled. If VFD System Pumps are used, the 4-20mA analog output signal will be generated utilizing user defined Proportional/Integral/Derivative settings that compare the hydronic system process variable to the configured setpoint. Process variable may be either differential pressure or differential temperature.
4. *Return Header Temperature Sensor:* May be installed and wired back to the ModSync SE for the purpose of monitoring the temperature of the water returning to the boilers.
5. *General Alarm:* Provides a dry contact that will close whenever an alarm condition is present.