MODSYNC LX:
Modular Boiler Sequencing System

FOR BOILERS:
Hydronic (Hot Water) Heating

Fulton's ModSync LX 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. Control system functions and Sequence of Operation (SOO) are custom tailored to your project's unique requirements. ModSync LX solutions offer the flexibility to satisfy and simplify the complex needs of high-performance applications which cannot be met by the rigid mold of off-the-shelf and integrated boiler control systems.

STANDARD FEATURES: VERSION 6.5.4.0 AND NEWER

- Lead-Lag of Hydronic (Hot Water) Boilers
- Support for Parallel or Sequential Modulation Staging
- Modbus Communication Protocol
- Minimum Setpoint Temperature Protection for Oil Burner Firing Mode
- Supply Header, Return Header, and Outdoor Air Temperature Monitoring
- Outlet Temperature Monitoring (Prevents Nuisance MRHL Lockouts)
- Domestic Hot Water Setpoint Priority via Contact Closure
- Outdoor Air Temperature Setpoint Reset (Optional Sensor Required)
- System Clock with Setback Schedule for Occupied/Unoccupied Modes
- Automatic Boiler Rotation via Cycle/Run Hour Ratio
- Trending Data Logging of Supply, Setpoint and Outdoor Temperatures
- Alarm History of the Last 100 Alarm Conditions
- Access Password and Screensaver Time Out

PROJECT DETAILS:

Project Name		City, State (Province)	
Date Submitted		Engineer of Record	
Fulton Representative		Contractor	

PROJECT TAILORED CUSTOM CONTROL OPTIONS:

Lead-Lag for _____ Hydronic (Hot Water) Boilers
BACnet Communication Protocol
LonWorks Communication Protocol
Hybrid Fuel-Fired and Electric Boiler Plant Switchover
Panel Mount Alarm Horn
Panel Mount Non-Fused Disconnect Switch
Return Water Temperature Monitoring (Sensor Kit Required)
Supply and Return Pressure Monitoring (Sensor(s) Required)
0-10VDC to 4-20mA Setpoint Signal Converter
Individual Alarm Contact (Per Each Boiler)
Two-Position Boiler Isolation Valve Control (Per Each Boiler)
Boiler Isolation Valve Interlock (Per Each Boiler)
Dedicated (Primary) Boiler Pump Control (Per Each Boiler)
Dedicated (Primary) Boiler Pump Speed Signal (Per Each Boiler)
Dedicated (Primary) Boiler Pump Interlock (Per Each Boiler)

System (Secondary) Pump Control (2 Pump, Duty/Standby)
System (Secondary) Pump Control (2 Pump, Lead-Lag)
System (Secondary) Pump Control (3 Pump, Lead-Lag)
System (Secondary) Pump Control (4 Pump, Lead-Lag)
System (Secondary) Pump Speed Signal (PID via ΔT)
System (Secondary) Pump Speed Signal (PID via ΔP)
4-20mA Input for Remote CO Monitor (Device Not Included)
4-20mA Input for Water Flow Meter (Device Not Included)
4-20mA Input for Gas Flow Meter (Device Not Included)
4-20mA Input for Supply Fuel Oil Flow Meter (Device Not Included)
4-20mA Input for Return Fuel Oil Flow Meter (Device Not Included)
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_____
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OPTIONAL ACCESSORIES: PARTS SHIP LOOSE FOR FIELD INSTALLATION

Return Header Temperature Sensor   *4-30-000510*
Outdoor Air Temperature Sensor Kit   *4-30-000500*
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*
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BOILER CONTROL INTEGRATION:

Fulton PURE Control™
Siemens LMV3 Series
Siemens LMV5 Series
Fulton (Honeywell) SOLA

Fulton SC500
Fulton SC750
Legacy I/O *(Requires enable, 4-20mA fire rate, status)*

HARDWARE SPECIFICATIONS: PART NUMBER 7-53-006000C

- 12.1-inch 65,536 Color Touchscreen Display
- UL 508A Listed and Labeled
- NEMA4X Enclosure

- 120VAC 60Hz 1ø
- 5,000A SCCR
- Supply Header Temperature Sensor Included

PANEL DIMENSIONS:

21-1/16″

10-13/16″

28-7/8″
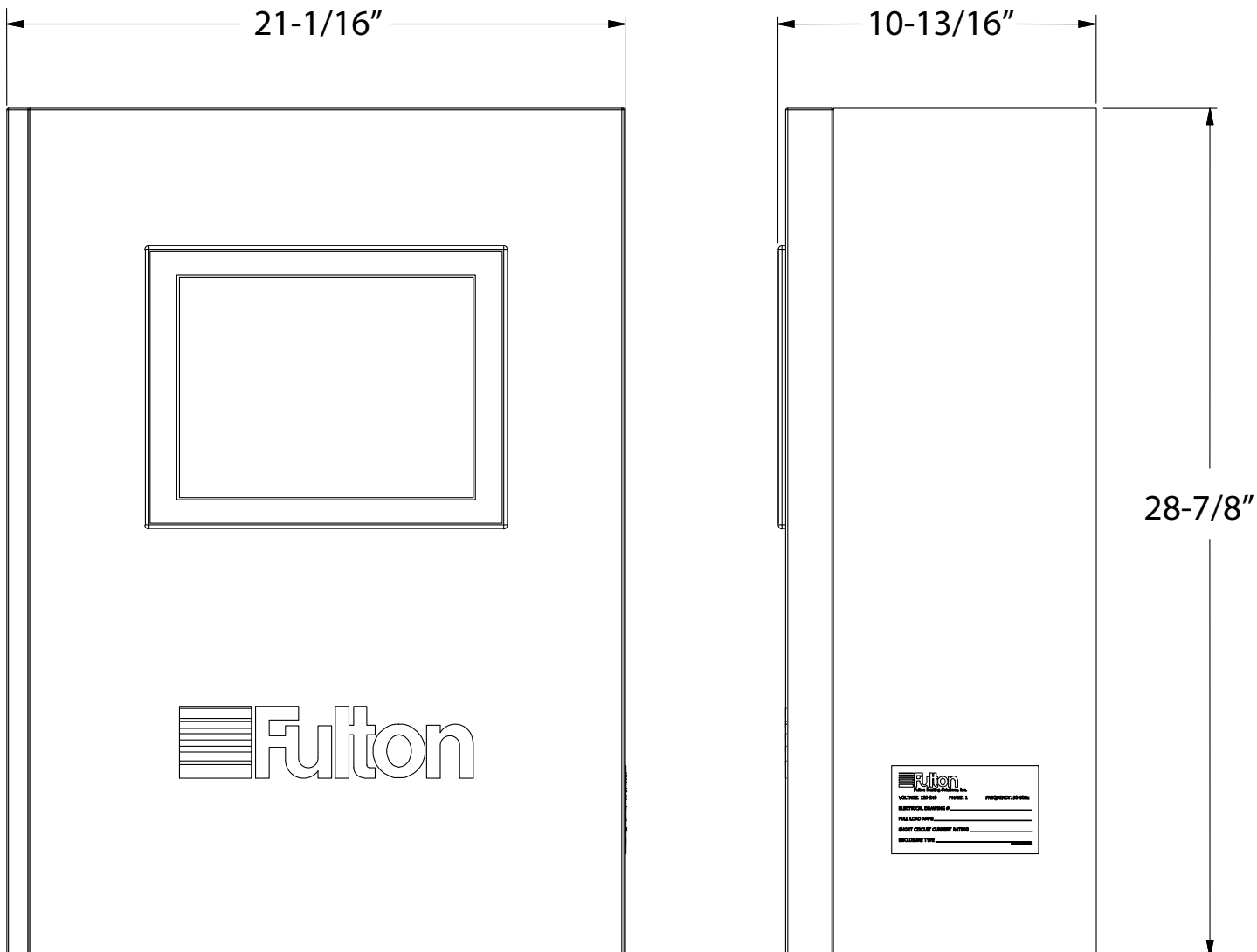
BOILER LEAD/LAG SEQUENCE OF OPERATION:

1. The ModSync 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 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 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 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 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 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. *Hybrid Fuel-Fired and Electric Boiler Plant Switchover:* Permits the operator to select energy priority. This will run exclusively on fuel or electricity, or may utilize fuel or electricity as Lead and the other energy source will be enabled to satisfy peak demand conditions or as a backup. The plant switchover can be performed through manual selection, time of day, setpoint, outdoor temperature, or digital input or BAS communication.

2. *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.

3. *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.

4. *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.

5. *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.

6. *General Alarm:* Provides a dry contact that will close whenever an alarm condition is present.

CUSTOM SEQUENCE OF OPERATION:

MODSYNC-LX-HYDR_TDS_230307