

# Compact Micro IV™ Lead-Lag Sequencer

## FEATURES & BENEFITS

- **Maintains facility main header temperature or pressure** for efficient production and heating: eliminates variable energy supply and meets demand!
- **Universal applications:** controls any model burner or boiler. Use Model C-05830 Compact Micro IV™ for up to six boilers. Model C-05810 Micro IV™ handles additional boilers with added features such as flue gas monitoring.
- **Sequencing with modulation** for steam or hot water boilers and auxiliary boiler plant equipment.
- **On-Off, Low-High-Off or Full-modulation.**
- **Time-based main header temperature or pressure control:** fully factory-configured before shipment.
- **Fully Automatic control & burner interface.**
- **Building Management (EMS) interface** with ASCII-II and RS-485 Modbus ports for remote control, data acquisition and SCADA systems.
- **Master set point tracking.**
- **Real-time data acquisition** including firing rates, lead boiler run time, pressures, and temperatures.
- **Bright Vacuum Fluorescent Display:** 2 easy-to-read lines using engineering units.
- **Front panel operator interfaces** include boiler ON lights, engineering unit displays of boiler operation functions, manual/auto/off switches, dedicated display of header temperature or pressure.
- **Five lead-boiler rotation modes:** manual selection (via keypad entry); automatic rotation on a weekly basis; automatic rotation based on lead-boiler run time; or remote select with Modbus or switched inputs.
- **Night set-back/weekend skip:** real-time clock for automatic set point reduction during lighter load periods.
- **Packaged systems ready for installation!** Systems include field sensors and installation start-up instructions.

## STANDARD IN FULL- MODULATION MODELS

- **Automatic control transfer upon CPU failure:** returns operating control to the individual boiler controls.
- **Selectable series or parallel modulation modes.** Series modulation varies the firing rate of only the last boiler brought on-line, while holding other online boilers at their throttle-back setting. **Parallel** modulation varies all online boilers at the same firing rate.
- **Throttle-back base-loading** is used in the series modulation mode. On-line boilers are automatically throttled back to their own selectable firing rate when each additional lag boiler is brought online.



**COMPACT MICRO IV™  
 (FOUR BOILER UNIT)**

## APPLICATIONS

**Hays Cleveland**, the company dedicated to providing efficient boiler plant operation since 1901, introduces the **Compact Micro IV™**, a fourth generation lead lag sequencer with modern control features designed to provide efficient operation for today's boiler plants.

Boiler plants today generally use *more* and *smaller* boilers than the plants of the past. These small boilers cost less to install and operate. The **Compact Micro IV™** is used to increase the flexibility and efficiency of these smaller boilers. First and foremost, the **Compact Micro IV™** provides the rate and desired pressure or temperature to meet changing facility demands not achievable with individual boiler controls.

The **Compact Micro IV™** facilitates **safe and efficient** steam or hot water plant operation today. The **Compact Micro IV™** sequence control enables boilers to work together, under any and all operating conditions, eliminating costly, unnecessary boiler cycling.

The **Model C-05810 Micro IV™** is available for controlling up to twelve boilers. It offers additional features such as combustion efficiency, flue gas temperature monitoring, and special control loops (such as air compressor loading).

## TECHNOLOGY

The **microprocessor-based controller** automatically responds to changing plant conditions. Advanced-technology sensors **monitor and display** steam pressure or water temperature continuously, independent of the **programming keypad and alphanumeric display**.

Operator controls include plainly labeled **boiler status lights** (to identify which boilers are currently on-line) and **manual/off/auto mode switches**. **Auxiliary loop and monitor displays** are available as options.

**On-Off, Low-High-Off and Full -modulating** models are available to provide the appropriate control strategy for any plant. On-off cycling is achieved with output relays. Full modulation is available with choice of **0-135 ohm, 1-5 VDC, or 4-20 mADC**, to interface with any type of actuator.

# MODEL SUFFIX CODES

C-05830- \* O- \_\_\_\_ - \_\_\_\_ - \_\_\_\_\_ - [ \_\_ ] - [ \_\_ ]  
                  A - B - (C,D,E,F) - [G] - [H]

(C,D,E,F): Choose just one.

[G] - [H]: Choose as many as noted.

\* = current revision designation.

## A\_ \_ \_ \_ Enclosure Size & Processor I/O Capability

The “yy” portion of the suffix code is the I/O capability. It is assigned by **Hays Cleveland**, and varies for the specific options selected. The enclosure will be selected from the following:

**-A01yy: Enclosed Version:** Hot Water Boilers.

**-A02yy: Enclosed Version:** Steam Boilers.

**-A11yy: Open Mount Version:** Steam Boilers.

**-A12yy: Open Mount Version:** Hot Water Boilers.

## B\_ \_ \_ Process Element

**-B01: RTD Assembly** for use with hot water service. Platinum 3-wire RTD with 12" stainless steel thermowell. The “U” insertion dimension is 2". Temperature range is +40 to +240F, or as specified.

**-B02: RTD Assembly**, same as **-B01**, but with a “U” insertion of 4".

**-B24: Steam Pressure Transducer** (stainless steel body) with steam syphon pigtail for steam pressures of 0 to 30 psig; specify set point.

**-B25: Steam Pressure Transducer**, same as **-B24** but with range of 0 to 100 psig; specify set point.

**-B26: Steam Pressure Transducer**, same as **-B24** but with range of 0 to 300 psig; specify set point.

## C\_ \_ , D\_ \_ , E\_ \_ , F\_ \_ Control Output & Quantity of Boilers:

Select only one output option. Then fill in the number of boilers in the “xx” value.

### Non-Modulating Outputs

**-Cxx: ON-OFF Relays only.** Use for boilers equipped with their own modulating control systems.

**-Dxx: LOW-HIGH-LOW.** Used with boilers that do not modulate, but have only minimum and maximum actuator positions that use relay output switching. Includes ON-OFF relays.

### Modulating Outputs

(Control selections **-Exx** & **-Fxx** include the standard modulation features (see above) that are unavailable with non-modulating models.)

**-Exx: ON-OFF with 4-20 mADC output MODULATION.** Boilers may or may not be equipped with control systems. Includes one relay and one isolated 4-20 mA (24 VDC) output per boiler.

**-Fxx: ON-OFF with 135 ohm MODULATION.** Boilers may or may not be equipped with control systems. One relay & one 135 ohm isolated output per boiler. Use without isolators with

modern low current 135 ohm control input motors that have low fire position switches. For interface with other 135 ohm actuators or 135 ohm firing rate controllers, isolators are recommended. Refer to option -H04xx.

## G Common Option Selections

For all control selections (**C, D, E & F**). Note: Purchase one per system, or one per boiler, as appropriate. Multiple selections are allowed. **Options G16 through G21** are for Hot Water Generators and Boilers only.

**-G0100: Outside Air Temperature Reset.** Includes RTD Assembly for through-wall mounting and a cabinet-located Indicating Transmitter. One per system.

**-G0200: Normal-Manual Night Set-Back Switch.** Front cabinet override of the standard night set-back feature, without using the keypad. One per system.

**-G0300: Dual Set Point Switch.** Front cabinet-located switch for selecting either of two operating temperatures or pressures. One per system.

**-G0400: Remote Set Point.** User supplies a 4-20 mADC isolated input of temperature or pressure set point. Processor defaults to local set point if input is less than 4 mADC. One per system.

**-G05xx: Remote Lead Boiler Select.** User supplies a multiplecontact switch input to select the lead boiler. One per boiler.

**-G06xx: Assured Low-Fire Warm-Up.** Boiler is not released from low-fire until temperature or pressure switch input is opened. Sensing switch by others. One per boiler.

**-G07xx: Assured Low-Fire Warm-Up with one Warm Stand-By Boiler.** Same as **-G06xx**, plus keeps one boiler warm for immediate use. Uses additional (two) isolated switch inputs, by others. The next available boiler is started by “lower” switch temperature or pressure and kept at low fire until “upper” input switch contacts open. The boiler is released to modulation or turned off (if not needed). **Hays Cleveland** can supply hardware to incorporate this option if it is not available from the boiler supplier. Equipment includes RTD assembly (P/N 1198-138) with Controller Model M3-3000. Controller is mounted remote from the Model C-05830-\*x unit.

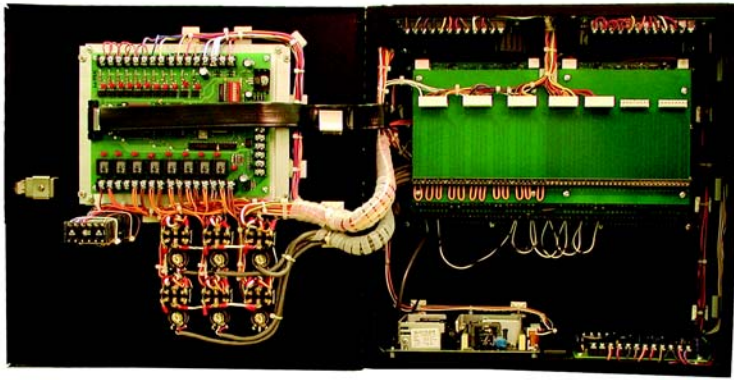
**-G08xx: Assured Low-Fire Shut-Down.** Ensures that the boiler is not taken off line until a switch input signals that the burner is in the low-fire position. One per boiler.

**-G11xx: Make-Up Air Damper Control.** Relay output to open boiler room air inlet damper(s). Proof-of-open input required before boilers are brought online. Two or more available per system depending on options and number of boilers.

**-G1600: Water Return Temperature Indication.** Includes RTD and 12" SS thermowell with a 2-inch (U-dimension insertion) pipe and a cabinet-located indicating transmitter with 4-20 mADC output. One per system.

**-G1700: Water Return Temperature Indication.** Same as **-G16xx** above, but with a 4-inch insertion RTD & thermowell. One per system.

**-G20xx: Boiler Pump ON with Time Delay OFF.** Relay output to turn on boiler’s circulation pump with its boiler. Adjustable time delay OFF after boiler is taken off-line. One per pump.



Continuous Digital Display  
Steam Pressure or  
Water Temperature.

3-Boiler enclosed version.



Two-line vacuum  
fluorescent  
alphanumeric  
display with  
keypad function  
selection.

4-Boiler open-mount version.



- G21xx: Boiler Pump ON with Lead Pump Always ON. Sequences boiler pumps which are used as system circulation pumps. The lead-boiler's pump is always ON, with adjustable time delay OFF for lag boiler pumps. One per pump.
- G2200: Password Menu Protection. Prevents unauthorized keyboard entry. The keypad control display is blanked until the proper code is entered to gain access. One per system.
- G2400: Auxiliary Digital I/O Expansion Module: 8 inputs, 6 outputs. One or more will be included at the factory if needed to accommodate system IO requirements.

- G2500: Second Auxiliary Digital I/O Expansion Module: 8 inputs, 6 outputs. One or more will be included at the factory if needed to accommodate system requirements.
- G3000: Custom engineered systems are available. Consult Hays Cleveland for local technical support.

**H. Hardware Options:**

- H01xx: Manual Potentiometer (Fxx with option). 135-ohm firing rate pot enables the boiler firing rate to be adjusted when the MAN/OFF/AUTO switch is in the manual position. One per boiler.



Typical RTD sensor with well for water temperature.



Steam pressure sensor.

## SPECIFICATIONS

**Line Power:** 117 VAC, 50/60 Hz.

**Ambient Temperature:** 32 to 130F (0 to 55 C).

**Cabinet Dimensions:** 16" x 16" x 6.5".

**Cabinet Rating:** NEMA 1, with door latch.

**Cabinet Mounting:** Surface-mounted.

**Open-mount Subpanel Size:** 13"H x 16"W.

**Open-mount Front Panel Size:** 13.13"H x 10.63"W.

**Process Display (C1):** ½" high characters. Displays process variable: Temperature (F) or Pressure (psig).

**Processor-CPU Display:** 2-line vacuum fluorescent display; alphanumeric with 20 characters per line; system status LED indicators.

**Processor Keypad:** 20 keys (membrane).

**Boiler Service Switch:** MANUAL/OFF/AUTO, one per boiler.

**Memory Type/Retention:** CMOS RAM with battery.

**Comm Ports:** RS485 Modbus 9600 baud, and RS232 ASCII-II.

**Inputs, Digital (standard):** Eleven; optically isolated.

**Inputs, Analog (standard):** Eight; 1-5 V DC or 4-20 mA DC into 250 Ω shunt.

**Outputs, Digital (standard):** Seven; 10A@117 V AC, noninductive, 10A@12 V DC.

**Outputs, Analog (standard):** Two (up to Eight, opt), 135 Ω or 4-20 mA DC @ 24 V DC.

**Expansion Module (digital):** Eight DI, Six DO relays.

**Approvals:** Dept. Environmental Protection, NYC DEP approved; Underwriters Laboratory & CUL pending.

### System Interface Requirements

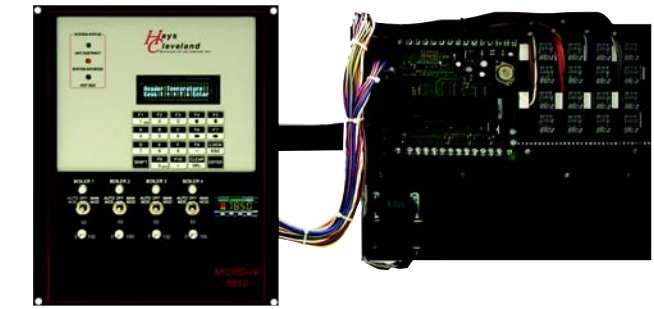
- Interface only with printed circuit board style firing rate actuators. **Honeywell Series 90™** electronic models or equivalent.
- Firing rate actuators must have low fire auxiliary switch available.
- 4 - 20 mA DC input signals must be isolated.

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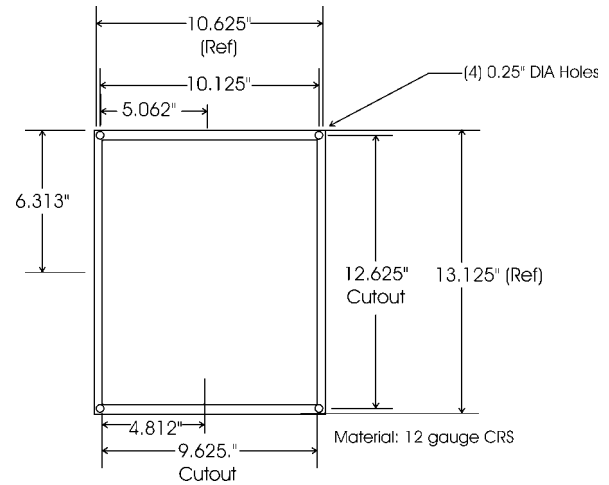
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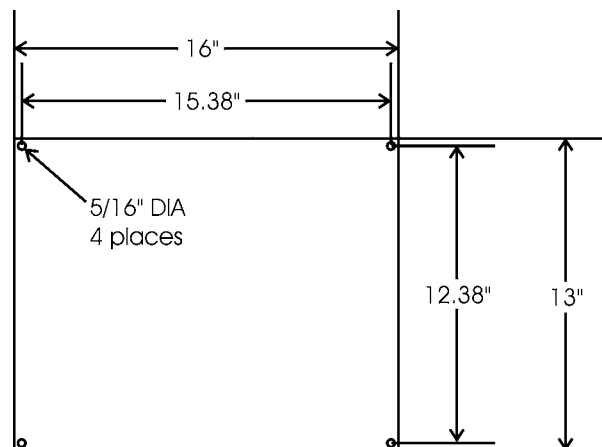


### 4-BOILER OPEN-MOUNT COMPACT Micro IV™ IV

Open-mount Compact Micro IV. Includes **ON Light**, **Auto/Off/Manual Switch**, and **Optional manual potentiometer** for each boiler and process variable display, temperature (F) or pressure (psig).



### OPEN-MOUNT COMPACT Micro IV™ FRONT PANEL DIMENSIONS AND PANEL CUTOUT



### OPEN-MOUNT COMPACT Micro IV™ SUB-PANEL

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