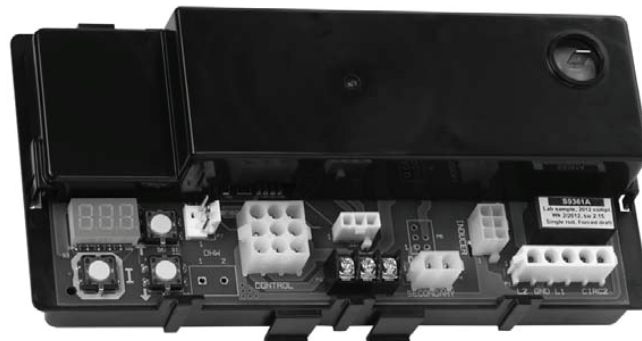




S9361A CONTROL SUPPLEMENT MANUAL

MG & SG SERIES BOILERS

FOR MODELS MG-50-E TO MG-150-E AND
SG-135-E TO SG-270-E



NEW CONTROLLER

This supplement manual must be used in conjunction with the Installation and Service Manual provided with your boiler. It provides important instructions relevant to controller programming, operation, troubleshooting, and wiring.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury, or loss of life. Please carefully read this manual along with the Installation and Service Manual. For assistance or additional information, consult a qualified installer, service agency or the gas supplier.

Allied Engineering Company

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1.1 CONTROLLER PROGRAMMING AND SERVICE CODES

2012 NRCan and DOE Compliance and Operation

Operation of this control may delay the burner operation while the residual heat is circulated out of the boiler.

The integrated boiler control module provides ignition sequence, flame monitoring and safety shutoff for intermittent pilot spark ignition. It also provides limit rated water temperature control for with two separate sensors in one casing (3-wire).

The control is located on the front panel inside the boiler. The control display, along with Up ▲, Down ▼, and “I” keys may be used to view boiler operating status and program parameters (Figure 1).

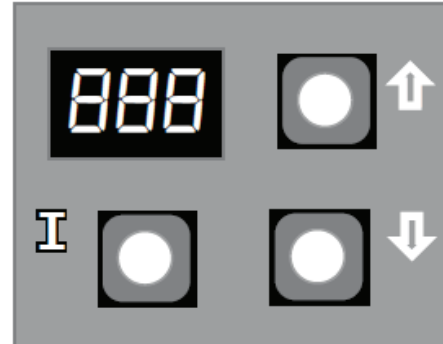


Figure 1 Control Display

1.1.1 RUN MODE

In the RUN mode, status items and parameters are viewable.

To read settings, press and release the “I” key to find the parameter of interest. Each setting will alternately flash between the relevant display code listed in the Table 1 and its corresponding value. For example, press and release “I” key until “HL_” setpoint is displayed, it will then flash a three-digit number, i.e., 220, followed by °F (or °C). This indicates that the boiler water temperature of 220 °F is set. Other operating parameters display the settings in a similar fashion.

Table 1 Run Mode Parameters

| Text | Description | Display |
|------------|-----------------------------|------------|
| <i>STA</i> | Status (see status numbers) | <i>StA</i> |
| <i>BT</i> | Boiler temperature | <i>bT</i> |
| <i>SP</i> | Operating setpoint | <i>SP</i> |
| <i>HL</i> | High limit setpoint | <i>HL</i> |
| <i>HdF</i> | Differential set-point | <i>HdF</i> |
| <i>FLA</i> | Flame current | <i>FLA</i> |
| <i>RUN</i> | Run time hours | <i>rUn</i> |
| <i>CYC</i> | Boiler cycles | <i>[Y]</i> |
| <i>ERR</i> | Error (see error numbers) | <i>Err</i> |

1.1.2 INSTALLER MODE

To enter the adjustment mode:

1. Press with Up ▲, Down ▼, and “I” keys (see Figure 1) simultaneously for three seconds.
2. Press and release the “I” key until the parameter (listed in the Table 2) requiring adjustment is displayed.
3. Press with Up ▲ or Down ▼ key until the parameter has reached the desired value.
4. After 60 seconds without any key inputs, the control will automatically return to the RUN Mode.

Table 2 Installer Mode Options

| 3-Digit 7-Segment Display | | | Default | Range | Description |
|---------------------------|--|------------------------|---------|-----------------------|---|
| 1 st Screen | 2 nd Screen (setting value) | 3 rd Screen | | | |
| HL_ | <high limit> | °F or °C | 180 °F | 130 to 220 °F | Adjust high limit setting |
| HdF | <high limit differential> | °F or °C | 15 °F | 10 to 30 °F | Adjust high limit differential |
| Or_ | <pump overrun time> | Sec | 60 sec | 0 to 120 seconds | Pump post-purge time |
| oLH | <ODR maximal temp.> | °F or °C | 55 °F | 40 to 70 °F | Maximal outdoor temperature |
| oLL | <ODR minimal temp.> | °F or °C | 0 °F | -40 to 40 °F | Minimal outdoor temperature |
| bLL | <minimal water temp.> | °F or °C | 140 °F | 130 to 150 °F | Minimal boiler temperature |
| tPL | <minimal boiler temp.> | °F or °C | 140 °F | OFF, 120 to 160 °F | Thermal purging minimal temperature (parameter is available only if outdoor temperature is invalid) |
| tPt | <maximal delay> | Min | 2 | 1 to 10 minutes | Maximal thermal purge time (parameter is available only if outdoor temperature is invalid) |
| rSt | On or OFF | | N/A | N/A | Reset lockout |
| F-[] | °F or °C | | °F | °F or °C | Select degrees °F or °C mode |

1.1.3 OPERATING CHECKOUT

After adjusting parameters, put the boiler into operation and observe operation through at least one complete cycle to make sure that the controller operates properly. See controller troubleshooting section to assist in determining boiler operation.

The sensor should fit snugly and should touch the bottom of the well for best temperature response. The sensor is held inside the well using the well clip.

1.1.4 THERMAL PURGE

The intent of thermal purge is to ensure usable residual heat in the boiler is circulated until it is sufficiently depleted from the system before the burner is allowed to fire. To that end, on a call for heat, the burner remains off while the circulator runs until the boiler temperature drops to the thermal purge temperature limit or the time delay is exceeded. Both of these parameters are adjustable. When the boiler temperature falls below the thermal purge temperature limit or the time delay expires, the burner is allowed to fire.

In addition to the thermal purge temperature and thermal purge time delay parameters, two other conditions release the integrated boiler controller from thermal purge and allow the burner to run in order to maintain comfort in the space:

- The boiler temperature has dropped 10 °F from the boiler water temperature measured at the beginning of the call for heat.
- Boiler temperature is cooling at a rate greater than 5 °F/minute while the circulator is running.

1.1.5 OPERATING STATE CODES AND TROUBLESHOOTING

When there is a problem during a call for heat or boiler operation, the controller provides specific information to help resolve the issue quickly. If the controller is displaying “5LR” by a number, use the state code definitions in Table 3 to determine the problem and possible causes.

1.1.6 CONTROLLER MOUNTING

The controller has four tabs which align with four slots in the control panel. To remove the controller, press and hold in the bottom two tabs while simultaneously rotating the controller about 45 degrees to unhook the top two tabs.

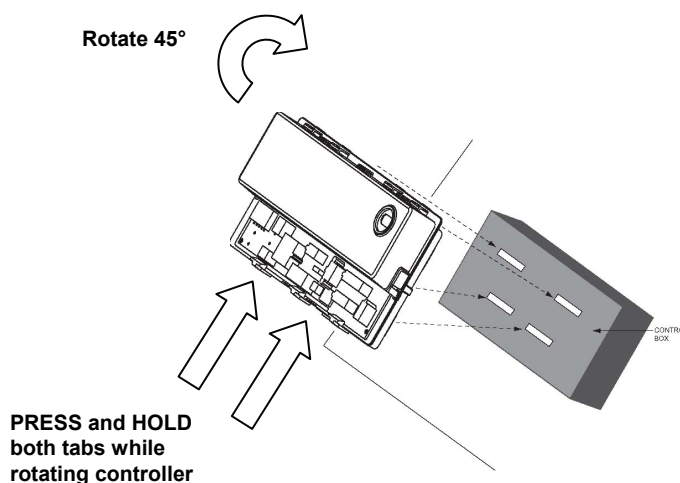


Figure 2 Controller Replacement

Table 3 State Code Definitions

| Display Code | State | Specific Description |
|------------------------------------|---|---|
| Operation Sequence | | |
| StA ↔ 1 | Idle/Standby | The boiler is in standby - no call for heat |
| | Run circulator | Heat request present but boiler water temperature sufficiently high to run circulator pump only (no ignition sequence) |
| Thermostat Calls For Heat | | |
| StA ↔ 17 | Self Test | Hardware self check, check of connected periphery, it is performed at start up, in the beginning of the heat cycle and in the "Wait For recovery" state |
| | Wait for recovery | There is an external error and the control is waiting to recover, no lockout |
| Circulator output energizes | | |
| StA ↔ 2 | Wait for end switch to open | The control is waiting for the end switch of the vent damper to open at the beginning of a heat cycle. If the end switch doesn't open in 60 seconds, the control goes to error code Err 2 |
| StA ↔ 3 | Wait for end switch to close | The control is waiting for the end switch of venting damper to close at the beginning of a cycle. If the end switch doesn't close within 60 seconds, the control goes to error code Err 29 |
| StA ↔ 4 | Pump pre-purge/ thermal purge | System is purging before ignition trial-safety relay diagnostics followed safety relay switch-on during last 2 seconds this state |
| StA ↔ 6 | Spark, ignition activation | System is sparking permanently 13 seconds whilst pilot gas valve relay is turned on |
| StA ↔ 7 | Prove flame | System is proving flame signal, typically 2 seconds |
| StA ↔ 8 | Running | System is in running mode, flame signal must be present |
| Call For Heat Ends | | |
| StA ↔ 9 | Pump post-purge | System is purging at the end of a call for heat |
| Troubleshooting/Diagnostics | | |
| StA ↔ 10 | Inter-purge (retry/recycle delay) | If the control loses flame signal during state code 7 or 8, or flame is not detected during stat code 6 to 8, it will recycle through the 30 seconds purge time and last 2 seconds part of pre-purge time |
| Err ↔ 2 | Wait for end switch to open – failed closed | The end switch of venting damper has not opened at the beginning of the heat cycle. The control is not in lockout |
| Err ↔ 29 | Wait for end switch to close – failed open | Waiting time for pressure switch to close expired. The control is not in lockout |
| Err ↔ 62 | Soft lockout | System is shutdown and will re-start following an enforced delay |
| StA ↔ 15 | Wait for limit to close | There may be a call for heat from the thermostat, but the limit switch is open |
| StA ↔ 16 | Flame out of sequence – before trial | Flame signal sensed before trial for ignition. |
| | Flame out of sequence – after trial | Flame out of sequence during post-purge. |
| | Wait for flame loss | Flame signal still present when not expected. |

If the controller is displaying “Err” followed by a number, use the error code definitions in the Table 4 to determine the problem and possible causes.

Table 4 Error Codes

| Display | State | Solution |
|----------|---|---|
| Err ↔ 2 | End switch of venting damper failed to open | The end switch contacts stuck closed. Check the venting damper and replace it if necessary. |
| Err ↔ 4 | Low flame current | Check pilot assembly and replace it if necessary. |
| Err ↔ 6 | Flame sensed out of normal sequence | Flame sensed out of normal sequence (before opening gas valve or after closing gas valve). |
| Err ↔ 18 | Gas valve relays welded 5 consecutive soft lockouts | A manual reset is required. |
| Err ↔ 23 | Flame sensed during pre-purge | Flame sensed during pre-purge (before gas valve signaled opened) |
| Err ↔ 24 | Flame sensed during post-purge | Flame sensed during post-purge (before gas valve signaled closed) |
| Err ↔ 29 | End switch of venting damper failed to close | The end switch contacts stuck open. Check the venting damper and replace it if necessary. |
| Err ↔ 32 | Sensor error | Temperature sensor or interface failure (open or short connection, increased connection resistance, dual sensor mismatch) or failure of A/D conversion (invalid offset or gain, too many failures during A/D conversion). |
| Err ↔ 57 | Flame rod shorted to burner ground | Check and adjust or replace if necessary. |
| Err ↔ 58 | AC line frequency error | AC signal is too noisy or frequency is incorrect. |
| Err ↔ 59 | Line voltage error | AC voltage out of specification high or low. |
| Err ↔ 60 | Thermostat input higher than threshold | Check thermostat wiring and replace it if necessary. |
| Err ↔ 61 | Line voltage unstable | Possibly too many heavy loads switching on and off cause erratic supply voltage. |
| Err ↔ 62 | Soft lockout | Maximum number of retries exceeded. |
| Err ↔ 63 | Soft lockout | Maximum number of recycles exceeded. |
| Err ↔ 64 | Soft lockout | Internal failure (Electronics failure). Caused by general electronics failure such as relay open or shorted contacts, flame sensing circuit error, or A to D error. |
| Err ↔ 65 | Over temperature error | Sensor measured temperature in excess of ECO limit. |

1.2 Replacement Parts

| ITEM | DESCRIPTION |
|------|------------------------------|
| 1 | COMBINATION GAS VALVE |
| 2 | MANIFOLD ASSEMBLY |
| 3 | PILOT BURNER UNIT |
| 4 | IGNITION CONTROL MODULE |
| 5 | ZONE CONTROL BOARD |
| 6* | TEMPERATURE / PRESSURE GAUGE |
| 7 | HI-LIMIT SENSOR |
| 8 | FLAME ROLL-OUT SAFETY SWITCH |
| 9 | BLOCKED VENT SAFETY SWITCH |
| 10 | AUTOMATIC VENT DAMPER |
| 11 | DRAFT HOOD |

*TEMPERATURE PRESSURE GAUGE MOUNTED ON MODELS MG-125, MG-150, SG-225 AND SG-270 ONLY; SUPPLIED LOOSE ON ALL OTHER MODELS

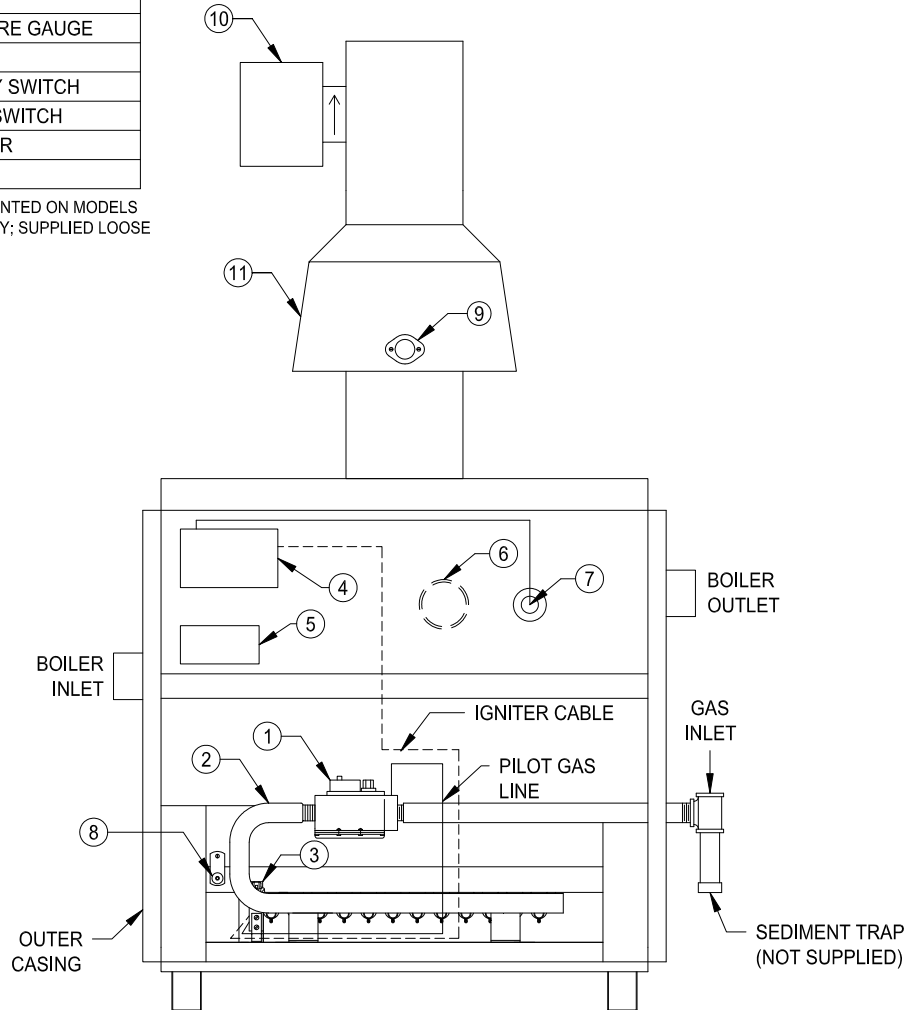
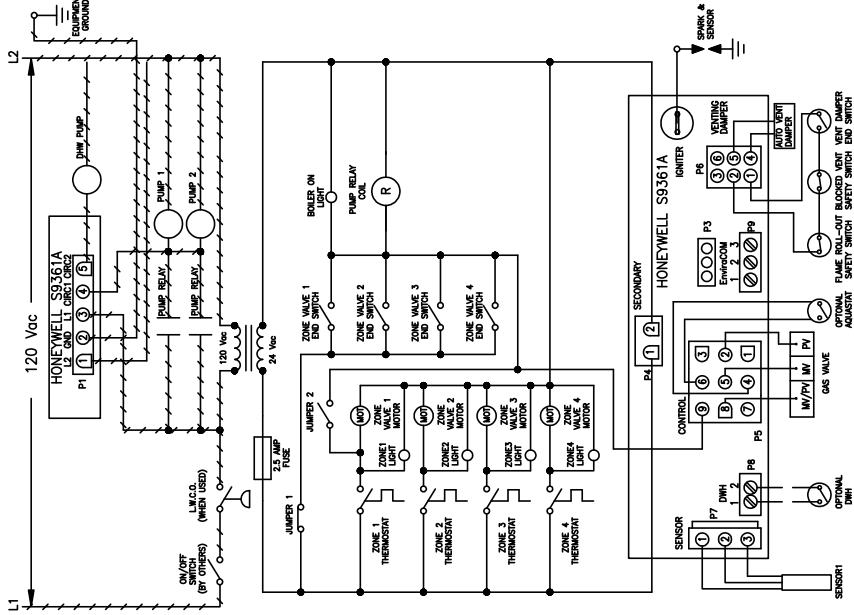


FIGURE 3 - TYPICAL GAS TRAIN ASSEMBLY AND CONTROL COMPONENT FOR RESIDENTIAL INSTALLATIONS

LADDER WIRING DIAGRAM

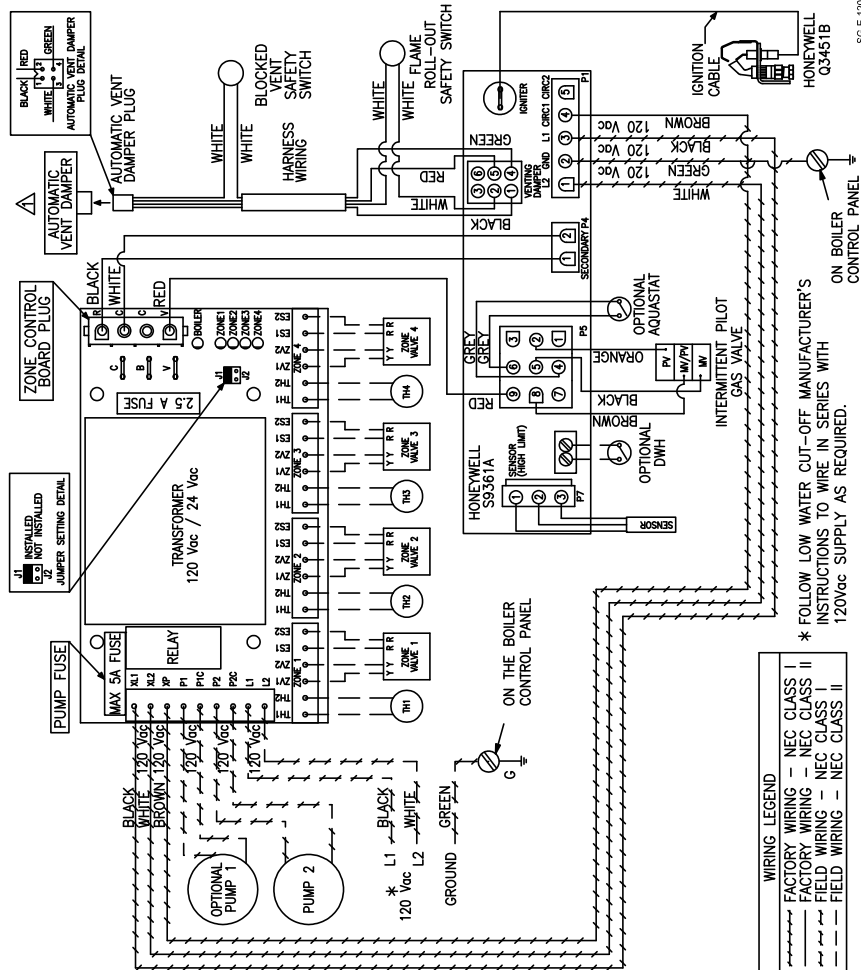


WARNING
ELECTRICAL SHOCK HAZARD, CAN CAUSE SEVERE INJURY OR DEATH.
DISCONNECT POWER BEFORE INSTALLING AND/OR SERVICING.

NOTES: 1. ALL WIRING MUST BE INSTALLED IN ACCORDANCE WITH:
 a) U.S.A. - N.E.C. ANS/NFPA 70 AND ANY OTHER NATIONAL, STATE, OR LOCAL CODE REQUIREMENTS
 b) CANADA - C.E.C. C.S.A., C22.1 PART 1 AND ANY OTHER NATIONAL, PROVINCIAL OR LOCAL CODE REQUIREMENTS
 2. IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE BOILER MUST BE REPLACED, TYPE 105°C WIRE OR ITS EQUIVALENT MUST BE USED.
 3. PILOT LEAD WIRES ARE NOT FIELD REPLACABLE
 REPLACE PILOT ASSEMBLY IF NECESSARY.

SCHEMATIC WIRING DIAGRAM

- NOTES: - WIRING IS 24 Vac UNLESS OTHERWISE SPECIFIED.
 HEATING OPERATION:
 - ZONE THERMOSTAT ACTIVATES ZONE VALVE, ZONE VALVE END SWITCH ACTIVATES SYSTEM PUMP(S) THROUGH RELAY ON THE ZONE BOARD AND HONEYWELL S9361A.
 - HONEYWELL S9361A ACTIVATES AUTOMATIC VENT DAMPER.
 - AUTOMATIC VENT DAMPER END SWITCH ACTIVATES GAS VALVE.
 - ZONE VALVES ARE IN THE NORMALLY CLOSED POSITION AND HAVE END SWITCHES.
 - JUMPER J1 INSTALLED, JUMPER J2 NOT INSTALLED.
 - ZONES 2, 3 AND 4 ARE OPTIONAL.



WIRING LEGEND
 - - - - - FACTORY WIRING - NEC CLASS I
 - - - - - FACTORY WIRING - NEC CLASS II
 - - - - - FIELD WIRING - NEC CLASS I
 - - - - - FIELD WIRING - NEC CLASS II

FIGURE 4 - WIRING DIAGRAM FOR HONEYWELL S9361A CONTROLLER AND ZCB, AUTO VENT DAMPER SPARK IGNITION, THERMAL PURGE