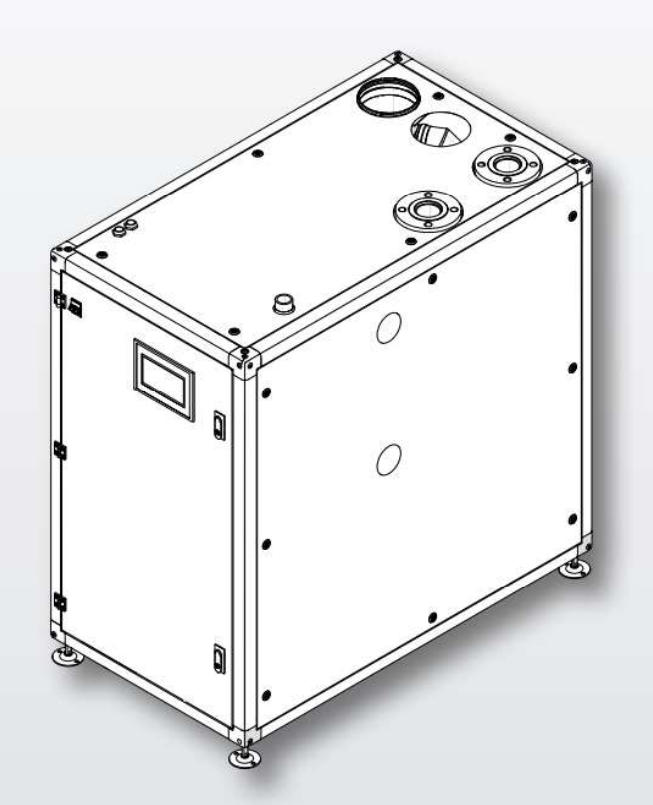


WARNING: This start-up guide does not supersede or replace the Riello Array Installation & Operation Manual in anyway. The Riello Array Installation & Operation Manual must be read in it's entirety. Failure to do so may result in substantial property damage, severe injury or death.

Array AR 800

US QUICKSTART GUIDE

RIELLO

CONTENTS

1 GENERAL

1.1 Website downloads

1. go to the following link and download “CommercialBoilers” form https://www.riello.com/north-america/service/technical-support/commissioning

1.2 Key Symbols

PAY ATTENTION TO THESE TERMS

⚠ DANGER: Indicates the presence of immediate hazards which will cause severe personal injury, death or substantial property damage if ignored.

⚠ WARNING: Indicates the presence of hazards or unsafe practices which could cause severe personal injury, death or substantial property damage if ignored.

⊖ CAUTION: Indicates the presence of hazards or unsafe practices which could cause minor personal injury or product or property damage if ignored.

⚠ NOTICE: Indicates special instructions on installation, operation, or maintenance which are important but not related to personal injury hazards.

⚠ DANGER: Improper installation and/or operation could create carbon monoxide gas in flue gases which could cause serious injury, property damage, or death. Improper installation and/or operation will void the warranty.

2 INITIAL CHECKS

2.1 Incoming Power and Device Conections

1. Check and ensure correct incoming power (Power as stated on boiler label)
   Single phase : L-N, L-N, N-G.

⚠ WARNING: Risk of electrical shock. Use caution when testing the power sources. Failure to do so may result in severe personal injury or death.

2. Ensure all relevant system connections are tied into low voltage terminal strip and high voltage terminal strip of the boiler.

⚠ NOTE: All line voltage outputs are 120V and require a relay to power external devices.

2.2 Incoming Gas Supply

1. Check for recommended supply gas pressure, up stream of the boiler:
- For natural gas: 8.0” wc. minimum, 14” wc. maximum.
- For propane gas: 8.0” wc. minimum, 14” wc. maximum.

⚠ WARNING: Ensure the gas supply line has been pressure tested and is free from leaks. Failure to do so may result in substantial property damage, severe personal injury or death.

⚠ DANGER: Flammable gas explodes. Beware if you smell gas: there may be an explosion hazard!

2. Ensure all gas connections have been pressure tested. Soap test connections downstream of gas valve while module is running.

⚠ NOTE: Check minimum and dynamic pressure when all modules are at high fire.

2.3 Dip Switch Settings

1. Set S1 dip switches on boiler controllers (Fig. 1)
   a. Managing control in managing boiler away from boiler in “on “position (See Fig.1).
   b. All other controls on all other boilers facing towards the boiler in “off” position .

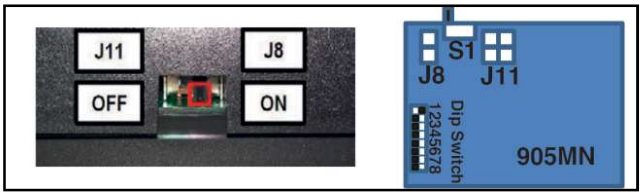


Fig.1 Setting Controller S1 Dipswitch

3 FILLING THE BOILER WITH WATER

3.1 Filling Condensate Traps and Syphon

1. Fill all condensate traps and syphon (Fig.2).

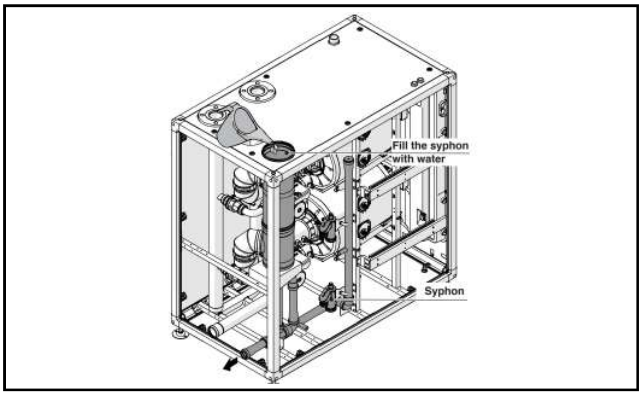


Fig.2 FILLING SYPHON AND CONDENSATE TRAPS

FILLING THE BOILER WITH WATER & COMMISSIONING MODULES

3.2 Filling Modules

1. Ensure all water valves in the boiler are closed.

⛔ CAUTION: Before commissioning ensure all hydronic water connections are tight and free from leaks.

2. Ensure you have enough water pressure to the boiler (min. 7.5 PSIG).
3. Make sure all module air vents are open.
4. Start at lowest module.
   a. Open return valve (you may hear a hissing sound as air is escaping from the vent at the front of the module).
   b. Once hissing stops, open supply valve of the module.
5. Move to the next module, working up to the top of the boiler. Repeat for each module.

4 COMMISSIONING MODULES

⚠ DANGER: Ensure all venting has been fastened and secured in-accordance with the venting manufactures instructions, the Riello Array Installation & Operation Manual and the local authority having jurisdiction. Failure to do so may result in severe injury or death.

⚠ WARNING: Before commissioning ensure the Riello Array Installation and Operation Manual has been read in its entirety. Failure to do so may result in substantial property damage, severe injury or death.

⚠ WARNING: Before commissioning ensure all gas connections have been pressure tested; failure to do so may result in substantial property damage, severe injury or death.

4.1 Combustion Tuning

1. Ensure boiler is disabled via touchscreen button. Button should display in red as "Boiler OFF"(See Fig 3).
2. Insert a combustion analyzer into the exhaust test port of module 1 and select "MODULE TEST" (See Fig 4).

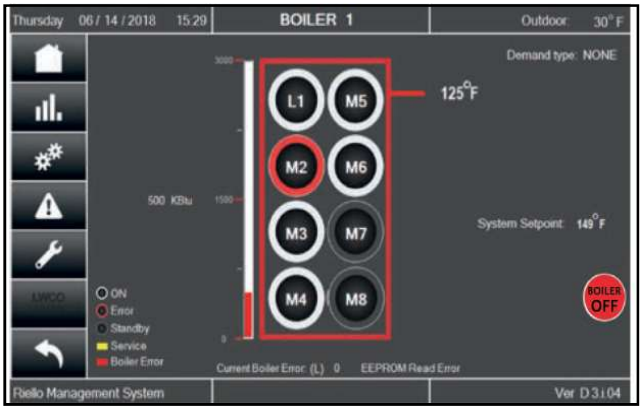


Fig.3 Boiler Screen - Boiler disable

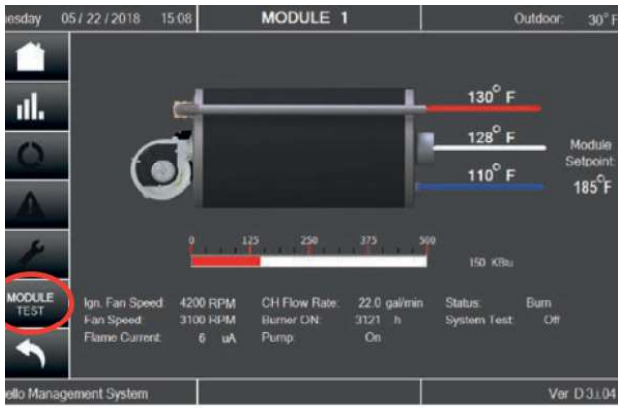


Fig.4 Module Screen - "MODULE TEST"

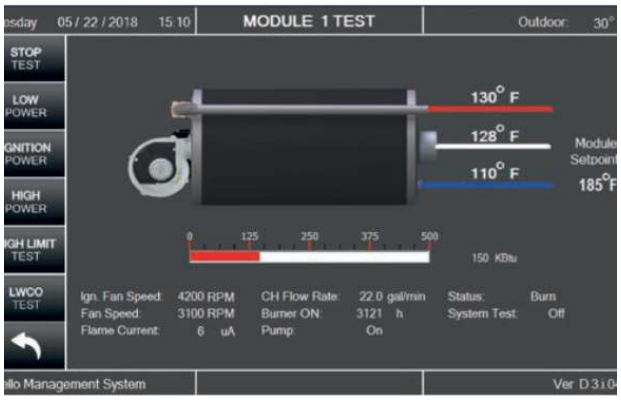


Fig.5 Module Screen - "MODULE TEST" mode

3. Tuning for combustion (See Figs. 5 & 6):
   a. In "MODULE TEST" screen select "HIGH POWER". Adjust high fire combustion using screw "A". Adjust for approximately 5% O2, keep CO under local code recommendations.
   b. In "MODULE TEST" screen select "LOW POWER". Adjust low fire combustion using screw "B". Adjust for approximately 5% O2, keep CO under local code recommendations.
   c. Select "HIGH POWER" to ensure readings have not changed. Record readings. Return to "LOW POWER", to ensure readings have not changed. Record readings.

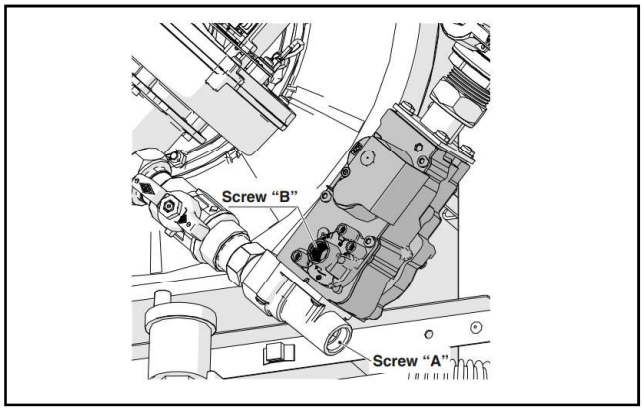


Fig.6 Zero Govener - Screw Adjustments

4.2 Testing Safeties

Test all module and boiler safeties from the touch screen as well as the high and low gas pressure switches to ensure they work properly.

1. Boiler Level Safeties:
   a. From Boiler Screen test Boiler Level LWCO.

2. Module Level Safeties:
   a. From Module Test Screen test Module Level LWCO
   b. From Module Test Screen test Module Level High Limit

5 SETTING UP CONTROLS

5.1 Control Mode

1. Configure CH Mode of boiler cascade from the 7" touch screen on the front of the boiler from settings screen.

CH Mode	Model Type	DHW Mode	Model Type
0	Room Thermostat (Enabled/Disabled	0	Function Disabled
1	Room Thermostat + Outdoor Reset	1	Tank W/Sensor
2	Full Outdoor Reset w/ Night Setback	2	Tank with Aquastat
3	Permanent Demand w/ Night Setback		
4	Analog Input to Setpoint		

Note: Night Setback feature utilizes Enable/Disable (Room Thermostat) Terminals
DHW Mode accessible on Service Display inside boiler front door.

5.2 Boiler Cascade

Wire terminals 1 & 2 (Cascade Link) on the low voltage terminal strip to each boiler in cascade.

BOILER CASCADE SETTINGS:

In Managing Boiler:

. Parameter 73 Boiler Address - Managing

. Parameter 167 Number of Boilers - Set to total number of boilers in cascade.

In Dependent Boilers:

. Parameter 73 Boiler Address - Set to corresponding boiler position.

Boiler Position	Boiler Address (73)
Boiler 1	Managing
Boiler 2	dep 2
Boiler 3	dep 3
Boiler 4	dep 4
Boiler 5	dep 5
Boiler 6	dep 6
Boiler 7	dep 7
Boiler 8	dep 8

5.3 Boiler & Module Rotation

1. On service display go to:
   a. Boiler Cascade Settings > Set Boiler Rotation (174 - Only on Managing).
   b. Module Cascade Settings > Set Module Rotation (84 - All boilers).

2. Observe system trends and DHW setpoint and the actual value for the control.

5.4 Boiler Control

Observe the boiler running in normal system conditions. If you notice the boiler overshooting setpoint and/or overcycling, the following parameter changes can be made.

Module Cascade settings: (Set on each boiler)
Parameter 79 (Max offset down): 10 deg f
Parameter 80 (Max offset up): 10 deg f
Parameter 87 (PID I): 250
Parameter 150 (PID slewrate up): 5
Parameter 151 (PID slewrate down): 5

Boiler Casacade settings: (Set on Managing boiler only)
Parameter 169 (Max offset down): 15 deg f
Parameter 170 (Max offset up): 15 deg f
Parameter 177 (PID I): 500
Parameter 178 (PID slewrate up): 5
Parameter 179 (PID slewrate down): 5

6 ERRORS

6.1 Multimeter Checks

⚠ WARNING: Risk of electrical shock. Use caution when testing the power sources. Failure to do so may result in severe personal injury or death

AL Link
24VDC (with S1 Switch On and open circuit). Voltage is variable while in normal operation depending
on data stream.

Pressure Switches
(ie: Gas Pressure, Water Pressure, Flue Pressure, etc) 3.3VDC while circuit is open.

Safety Switch
(High Limit) 24VDC while open

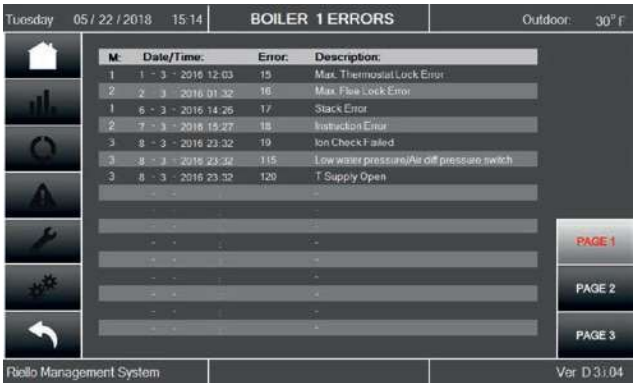
Flow Meter
5VDC at all times

6.2 Types Of Errors

1. Locking: Error Codes <100. These are hard lockouts. Manual reset is required to clear these errors. Reset button will be available on the Touchscreen, PB display or the individual controller.

2. Blocking: Error Codes 100<200. These errors are self-resettable errors. No reset button will be available to clear these errors. A blocking error that does not reset itself after a period of time will cause a hard lockout condition to occur. Burner/boiler will not operate until blocking error is corrected.

3. Warning: Error Codes >200. These are informational errors only. Boiler will still be functional.



6.3 Common Errors

ERROR	CAUSE	REMEDY
EEPROM_ERROR	Loss of communication	If communication errors occur with the touchscreen but not on the PB display, then the communication problem is between the touchscreen and PB display. Check all wiring to ensure proper connections. Verify proper Modbus setting on the PB display. Modbus address on the PB must always be set for Address 1 with 2 stop bits. If only data for module 1 is available on the touchscreen and not additional modules: check the Cascade Mode Setting in the PB display. Ensure that it is set for FULL not BASIC.
1 IGNIT_ERROR	3 unsuccessful ignition attempts in a row	Burner attempted to light normally but was unsuccessful. Check gas pressure. Check spark and ignitor rod. Ensure that the gas valve is functioning properly by checking for changes in gas pressure.
3 SAFTEY_RELAY_ERROR	High Limit Switch was detected open in Stand-by	Check connections in High Limit circuit on corresponding heat exchanger.
4 BLOCKING_TOO_LONG	Control had a blocking error and was not corrected for more than 20 hours	Check error log on touchscreen. The blocking error that occurred previous to current locking error will be the cause (i.e.- 163 LowExFlow).
15 MAX_THERMOSTAT_ ERROR	The external overheat protection is enabled or the T_Supply sensor measures a temperature of over 100°C (212°F). This is high limit.	Check module water temp. Verify that pump is operating. Ensure all water valves are open. Check the supply temperature reading in the info menu.
33 LWCO/AIR INLET BLOCK	This is the boiler LWCO or cabinet air switch.	Check to ensure all valves are open, pump is running. Check the wiring between the controller and the LWCO probe. Ensure there is water in the boiler and free of air. Also verify that fresh air intake to the boiler is open and free from blockage.
34 LWCO2	This is module LWCO	Check to ensure water is in the module and free of air. Ensure pump is running. Check wiring between LWCO probe and module controller.
35 GAS_PRESSURE_ERROR	Gas pressure switch is open. This can either be the high or low gas pressure switch.	Check gas pressure to ensure it is correct and in the recommended range for the unit. Check with as many modules on as possible to ensure supply connections are sized properly.
37 FLUE_PRESSURE_LOCKING	Flue pressure switch is open for the fourth time.	Check for obstruction in the flue piping. Blocking errors should be recorded prior to the locking error to occur. Check for condensate in the hose towards the flue pressure switch to ensure it isn't blocked. Check to ensure proper operation of the flue check device (clapper valve). Make sure it is not stuck in the open or closed position and in functioning properly.

ERROR	CAUSE	REMEDY
115 LOW_WATER_PRESSURE_ERROR	System water pressure is below 7.5 PSI	Ensure system water pressure is above min recommended pressure (7.5PSI). Check pressure on mounted T&P gauges. If the value is not in line with the system pressure check the switch. Also on boiler models AR1500-2000-4000, check bottom condensate traps to ensure condensate is draining as needed. On these models the bottom condensate traps are tied in series with the water pressure switch and will cause this same alarm code to be displayed.
155 FLUE_PRESSURE_ERROR	Flue pressure switch is open	Check flue for obstructions. Clear if found. Check flue pressure to ensure flue has been installed and sized properly. Flue pressure switch default to 2.2"wc.
163 LOWEXFLOW_PROTECTION	Minimum flow of module not reached	Water flow through the module is below recommended rate. Check to ensure module pump is running. Verify valves are open. Possible air entrapment. Make sure pump is coming on. Verify proper operation of the pump relays.
200 CC_LOSS_COMMUNICATION	Cascade System: Leading burner lost communication with one of the depending burners.	Check wiring and connections on individual Modules. Make sure all controllers in the boiler are powered on. Make sure Parameter 147 set to correct number of modules in this boiler. Check the position of the S1 switches on the dependent modules to make sure it is off.
201 CC_LOSS_BOILER_COMM	Cascade System: Leading boiler lost communication with one of the depending boilers.	Check interconnecting wiring between boilers. Make sure all boilers are powered on. Make sure that Parameter 167 set to proper number of boilers. Whichever boiler(s) loses communication with the Master Boiler will enter boiler level emergency mode. Check the position of the S1 switches on the managing boiler (on) and on the dependent boiler (off) to make sure they are set properly.
203 T_SYSTEM_WRONG	T_System sensor is open or shorted	Check connections of the boiler mounted sensor. This will cause Module Emergency Mode to activate on that particular boiler. Remaining cascade will continue to operate as normal. Check the value of the reading of this sensor on the info screen.
204 T_CASCADE_WRONG	T_Cascade sensor is open or shorted	Check connections of the System sensor mounted in the header. This will cause Boiler level emergency mode to activate on all boilers in the cascade. Check the value of the reading of this sensor on the info screen.
209 BOILER_DEMAND_DISABLED	All incoming demand is disabled	Boler has been turned off via the Boiler On/Off function on the touchscreen. Activate boiler on Boiler Screen on touchscreen or via Module Cascade Setting Menu on the PB Service Display.

7 NOTES

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37045 Legnago (VR)
Tel. 0442630111 - Fax 044222378

RIELLO NORTH AMERICA

35 Pound Park Road
Hingham, Massachusetts
U.S.A. 02043

2165 Meadowpine Blvd
Mississauga, Ontario
Canada L5N 6H6
Tel. (905) 542-0303

www.riello.com
www.rielloboilers.com