

boiler  **manager**™



Overview

Table of Contents

OVERVIEW.....	1
GENERAL.....	1
CONTROLS INCLUDED	1
PRIMARY FEATURES	1
CONTROL FEATURES & OPTIONS.....	2
<i>Boiler pressure / water temperature control</i>	<i>2</i>
<i>Cold start (thermal shock prevention).....</i>	<i>2</i>
<i>Furnace draft pressure control.....</i>	<i>2</i>
<i>Oxygen trim control</i>	<i>2</i>
<i>Feedwater control.....</i>	<i>2</i>
SECURITY	2
SPECIFICATIONS	3
OVERALL.....	3
MAJOR COMPONENTS	3
<i>Programmable Logic Controller (PLC).....</i>	<i>3</i>
<i>Primary Safety Control (BMS, FSG)</i>	<i>5</i>
Option 1 - Fireeye	5
Option 2 - Honeywell	7
<i>Display (Operator Interface)</i>	<i>9</i>
FUSES.....	9

Overview

General

The Boiler Manager™ is a complete boiler control system that integrates all of the following key capabilities into a self contained package.

- Burner primary safety control (Burner Management System / Flame Safeguard).
- Linkage-less burner combustion control, either parallel positioning or full metering.
- Gas or oil firing.
- Graphical user interface with 12 inch, high resolution touch screen.
- Simple and intuitive to use, easy step-by-step commissioning process.

Controls Included

- Boiler pressure or water temperature control.
- Boiler master control (when used with a separate Plant Master or Boiler Sequencer).
- Feedwater (water level) control.
- Furnace draft pressure control.
- Oxygen trim control.
- Ambient temperature compensation.

Primary Features

- Automatic fuel changeover.
- Remote monitoring from a PC running Microsoft Windows™.
- Modbus Ethernet communication.
- Password protection of system setup for security.
- “Measurement only” options with alarms where control is not needed.
- Individual alarms can be enabled or disabled and have adjustable delays.
- Fuel pressure measurement with adjustable high, low and deviation from baseline alarms.
- User resettable flow totalizers (integrators) for gas, oil and steam.
- Filtering on sensitive signals to reduce process noise.
- Cross limiting on both control types for maximum safety.
- Actuator calibration sets limits and scales feedback directly from control panel.
- Full support of all detectable BMS alarms.
- Actuators can be stroked from control panel for off-line testing and maintenance.

Control Features & Options

Boiler pressure / water temperature control

- Two-element mode available for hot water boilers using measured inlet temperature.
- Can be forced to always start in manual mode after burner ignition.
- On process value signal failure can be set to force control to manual mode or force firing rate to user adjustable value.
- Setpoint can track process value or stay at last value when control in manual mode.
- Includes user adjustable call for heat pressure/temperature settings and delay.
- Includes option to switch to secondary (backup) fuel when outside temperature drops low.
- Optional boiler master mode for use with separate Boiler Sequencer.

Cold start (thermal shock prevention)

- Option for low fire hold and/or setpoint ramp up.
- Cold start can be cancelled by operator at any time.

Furnace draft pressure control

- Setpoint can be user adjustable or set to follow a firing rate curve established during commissioning.
- On process value signal failure can be set to trip burner, force control to manual or force damper to user adjustable preset.
- Uses firing rate as feed-forward for quick response to load changes.

Oxygen trim control

- Adjustable delay before activated after burner ignition.
- Adjustable low fire suspend mode available to prevent trimming at low loads.
- Slowly drives to “no trim” value whenever in a standby state or suspend mode.

Feedwater control

- Both single element and two element modes (using steam flow) available.
- Automatically drops to single element mode when measured steam flow goes below user adjustable low setting or signal fails.
- On process value signal failure can be set to force control to manual or force valve to user adjustable preset.

Security

The system is configured with three independent password protected users, OEM, Engineer and Technician, that can access critical settings. All other users do not have access.

Specifications

Overall

Supply Voltage	120VAC nominal, 102-132VAC limits 50/60Hz, 47 to 63Hz limits
Power Consumption	105W nominal internal consumption Requires 15A branch circuit
24VDC Power	30W maximum available for field transmitters & instrumentation
Temperature	0 deg C to 40 deg C ambient, not in direct sunlight 0 deg C to 60 deg C cabinet interior
Humidity	5% to 95% non-condensing
Shock & Vibration	0.5g maximum
Environmental	Nema 4 Nema 4X option available
Approximate weight	125 lbs
Dimensions	30 inches high x 30 inches wide x 8.8 inches deep 10 inch depth including front panel switches & door latch handles
Finish	Powder coated enamel, gray color Brushed 304 stainless steel for Nema 4X version
Mounting	Wall mounted Four 0.5 diameter holes provided on back surface, one in each corner 28.5 inches between holes, center-to-center
Field Wiring Termination	Spring clamp terminals, 10-24 gauge, 600V, 30A

Major Components

Programmable Logic Controller (PLC)

Manufacturer	Modicon (Schneider Electric)
Make	M340
Model Number	CPU module, BMX P34 2020 Power supply, BMX CPS 3500 Rack, BMX, XPB 0800
Functionality	Combustion & boiler controls
Supply Voltage	100-240VAC nominal, 85-264VAC limits 50/60Hz nominal, 47-63 Hz limits
Power loss	≤ ½ cycle
Power Consumption	120VA, 1.04A nominal total CPU 2.3W Discrete input modules 3.8W each (x2) Discrete output module 4W Analog input/output modules 3.5W each (x4)
Temperature	0°C - +60°C (IEC 61131-2 = +5°C to +55°C) operating -40 to +85C non-operating
Humidity	5% to 85% non-condensing
Shock	15 g (0.53 oz.) / 11 ms / 3 shocks per axis/all directions

Vibration	5 Hz to 8.7 Hz with +/- 10 mm amplitude 8.7 Hz - 150 Hz with 1 g (0.03527 oz.) Durability: 10 cycles on each axis (1 octave/min. +/-10%)
Altitude	0 - 4,000 meters (13,124 feet)
Approvals & Certifications	IEC 61131-2 Ed. 2 (2003) CSA 22.2 No. 142 UL 508
Discrete Inputs	Module Part No. BMX DAI 1604 Quantity 32 input channels total (16 each x 2 modules) 120VAC nominal, 85-132VAC limits 50/60Hz, 47-63Hz limits 5mA nominal, off state \leq 1mA, on state \geq 2.5mA 13k Ω impedance nominal
Discrete Outputs	Module Part No. BMX DDO 1602 Quantity 16 output channels total 24VDC, 19-30VDC limits 0.625mA maximum per channel, 10A maximum per module 48 Ω minimum load impedance
Analog Inputs	Module Part No. BMX AMM 0600 Quantity 16 input channels total (4 each x 4 modules) 4-20mA, -90 to +90mA maximum Non-isolated single ended 250 Ω input impedance, internally protected 12 bit resolution
Analog Outputs	Module Part No. BMX AMM 0600 Quantity 8 output channels total (2 each x 4 modules) 4-20mA, 24mA maximum available Non-isolated self-powered 600 Ω maximum load impedance
Communication Ports	Integral to CPU Module Ethernet 10/100 mb RJ45 jack Modbus protocol Serial 9600 BAUD, N, 8, 1 RS-485 RJ45 jack Reserved for connection to primary safety control

Primary Safety Control (BMS, FSG)

Option 1 - Fireye

Manufacturer	Fireye
Make	BurnerLogiX
Model Number	YB110
Functionality	Burner management system / flame safeguard
Supply Voltage	120VAC nominal, 102-132VAC limits 50/60Hz nominal
Power Consumption	25VA
Temperature	-40°C - +60°C
Humidity	90% maximum non-condensing
Vibration	0.5 g
Approvals & Certifications	<ul style="list-style-type: none"> UL <ul style="list-style-type: none"> Listed Certified for Canada File No. MP1537 Guide No. MCCZ & MCCZ7 (Primary Safety Controls) FM <ul style="list-style-type: none"> Approved IRI <ul style="list-style-type: none"> Acceptable CE <ul style="list-style-type: none"> Gas Appliances Gas Appliance Directive 90/396/EEC Low Voltage Directive 73/23/EC EMC Directive 89/336/EEC GASTEC 0063BT1754 (EN298, 2003; EN230, 2005) DVGW <ul style="list-style-type: none"> Reg. No. NG-2510BT0347 DIN-CERTCO <ul style="list-style-type: none"> Reg. No. 5F233/08
Load Ratings	<ul style="list-style-type: none"> Terminal M <ul style="list-style-type: none"> Combustion air fan starter Atomizing air compressor starter Oil pump starter Oil heater contactors 9.8 FLA, 58 LRA combined total Terminal 5 <ul style="list-style-type: none"> Ignition transformer Pilot valve(s) 4.5A ignition 50VA pilot duty (valves) Terminal 7 <ul style="list-style-type: none"> Gas valve(s) Oil valve(s) 64VA pilot duty 3850VA inrush, 700VA opening, 250VA holding <p>Maximum connected load 2000VA</p>

Input Ratings	<p>Terminal 13 Pre-ignition interlocks 120VAC, 1mA</p> <p>Terminal 3 Operating interlocks 120VAC, 1mA</p> <p>Terminal P Running interlocks 120VAC, 1mA</p> <p>Terminals 8 & D High fire & low fire switches 120VAC, 1mA</p> <p>Note: All interlock and limit switches must be rated to carry full starter and valve loads</p>
---------------	---

Option 2 - Honeywell

Manufacturer	Honeywell
Model Number	RM7800L1087
Functionality	Burner management system / flame safeguard
Supply Voltage	120VAC nominal, 102-132VAC limits 50/60Hz nominal, $\pm 10\%$
Power Consumption	10W maximum
Temperature	-40°C - +60°C
Humidity	85% maximum non-condensing
Vibration	0.5 g
Approvals & Certifications	<ul style="list-style-type: none"> UL <ul style="list-style-type: none"> Listed File No. MP268, Guide No. MCCZ (Primary Safety Controls) CSA <ul style="list-style-type: none"> Certified LR9S329-3 FM <ul style="list-style-type: none"> Approved Report No. J.I.1VgAo.AF IRI <ul style="list-style-type: none"> Acceptable FCC <ul style="list-style-type: none"> Part 15, Class B – Emissions
Load Ratings	<p>Terminal 5</p> <ul style="list-style-type: none"> Combustion air fan starter Atomizing air compressor starter Oil pump starter Oil heater contactors 9.8 FLA, 58.8 LRA combined total <p>Terminals 8 & 10</p> <ul style="list-style-type: none"> Ignition transformer Pilot valve(s) 4.5A ignition 50VA pilot duty (valves) <p>Terminal 9 & 21</p> <ul style="list-style-type: none"> Gas valve(s) Oil valve(s) 64VA pilot duty 3850VA inrush, 700VA opening, 250VA holding <p>Maximum connected load 2000VA</p>

Input Ratings	<p>Terminal 20 Pre-ignition interlocks 120VAC, 1mA</p> <p>Terminal 17 Operating interlocks for valve proving 120VAC, 1mA</p> <p>Terminal 6 Operating interlocks with no valve proving 120VAC, 1mA</p> <p>Terminal 7 Operating & running interlocks 120VAC, 8A run, 43A inrush</p> <p>Terminals 18 & 19 High fire & low fire switches 120VAC, 1mA</p> <p>Note: All interlock and limit switches must be rated to carry full starter and valve loads</p>
---------------	--

Display (Operator Interface)

Manufacturer	AutomationDirect
Make	C-more model EA7-T12C
Functionality	Graphical Operator Interface
Supply Voltage	20.4-28.8VDC
Power Consumption	20W
Temperature	0°C - +50°C operating -20°C - +60°C non-operating
Humidity	10-85% non-condensing
Shock	15g peak
Vibration	1g from 57-150Hz operating
Screen Size & Type	12.1 inch TFT LCD
Screen Resolution	SVGA 800x600
Screen Brightness	260 nits

Fuses

FS-1	Ignition transformer & pilot valve(s) Time delay 3A, 120V
FS-2	PLC input power Time delay 2A, 120V
FS-3	Display 24VDC supply input power Time delay 1A, 120V
FS-4	Display 24VDC supply output power Fast 3A, 120V
FS-5	Instrumentation 24VDC supply input power Time delay 1A, 120V
FS-6	Instrumentation 24VDC supply output power Fast 3A, 120V



Since 1903

S.T. Johnson Company
925 Stanford Ave. • Oakland, CA 94608 • USA
Phone (510) 652-6000 • Fax (510) 652-4302
www.johnsonburners.com