



Prometha[™]

Connected Boiler Room Solution Installation Manual



750-441
01/2020

 **WARNING**

Installation and service must be performed by a qualified service technician. Read instructions before installing and operating. Keep instructions in a safe place.

Disconnect electrical power before beginning installation. Follow all required site-specific lockout/tagout procedures.

Installation and application must adhere to local codes established by the authorities having jurisdiction.

TO: OWNERS, INSTALLERS, OPERATORS, and SERVICE PERSONNEL

Cleaver-Brooks equipment is designed and engineered to give long life and excellent service on the job. The electrical and mechanical devices supplied were chosen because of their known ability to perform; however, proper operating techniques and maintenance procedures must be followed at all times.

The operation of this equipment by the owner and any operating personnel must comply with all requirements or regulations of the insurance company and/or other authority having jurisdiction. In the event of any conflict or inconsistency between such requirements and the warnings or instructions contained herein, please contact Cleaver-Brooks before proceeding.

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The Cleaver-Brooks Prometha™ Connected Boiler Solution collects and transmits Hawk and network data to the C-B cloud to allow customer accessibility via web-based dashboards and optional user notifications. The specific Hawk network PLCs that are available for this solution are:

- Hawk ICS (PLC must include Ethernet port)
- Hawk 1000
- Hawk 4000
- Hawk 4000 V2

1 - Hardware Required:

Prometha™ requires the addition of four major components to allow data collection from the PLC and transmission of that data to the cloud via LTE cellular connection.

- Cellular Enable Gateway Device
- Gateway Power Cable
- 12VDC Power Supply
- Antenna

Optional Hardware:

5- or 8-Port Ethernet Switch (optional based on availability of Ethernet ports)

Miscellaneous:

Cables, fuses, cable ties, and DIN rail components - see Parts List.

Electrical Specifications
Voltage: 120VAC, 50-60 Hz
Amps: 1.1A

2 - Tools Required:

- Tape measure
- Alcohol wipes
- Pencil
- Drill
- 7/8" hole saw
- Adjustable pliers
- Screwdrivers
- Diagonal cutter

Wire stripper
Container for drill shavings
Lockout/Tagout kit
Portable monitor (MiniDisplayPort compatible)
Display adapter cable (monitor port to Mini DisplayPort)

Recommended:

Cable tie installation tool

Optional:

RF signal meter (5 band)
Torpedo level (for antenna placement)
Network cable tester

3 - Installation Options:

Each gateway device can accommodate any combination of up to 8 of the compatible systems listed above. There are several installation location options for the gateway hardware. Regardless of the option chosen, *the installation must ensure that gateway power and Hawk network connections are maintained as long as any connected boiler is powered up.* An optional 5- or 8-port Ethernet switch will need to be added for systems with no available Ethernet ports.

Single Boiler Installation Options

- Hawk Panel
- PT Panel
- DT Panel w/o Ethernet Switch

Multiple Boiler Installation Options

- Master Panel
- PT Panel
- DT Panel w/ Ethernet Switch

The Hawk Panel option uses the existing Hawk control panel to house the Prometha™ hardware.

The Master Panel and PT (Protocol Translator) Panel options use an existing Master Panel or stand-alone ProtoNode/CB-PT panel to house the Prometha™ components; the existing Ethernet switch provides the connection point for each Hawk network device.

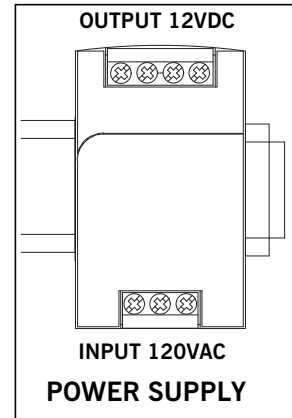
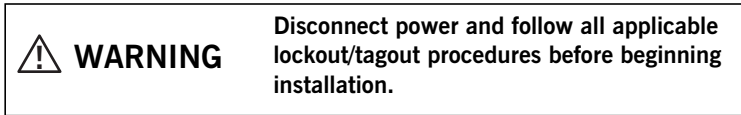
The DT (Data Transfer) Panel option incorporates all of the Prometha™ hardware in a single stand-alone panel and is available with or without an Ethernet switch.

Note: If a site has a weak cellular signal at the Hawk equipment location (as determined during the pre-installation sales process), the DT Panel can be located up to 328 ft. away from Hawk network.

4 - Installation Procedure - Hawk Panel, Master Panel, or PT Panel

4.1 - Power Supply

Mount the power supply on the DIN rail with the 12VDC output terminal on top and the 120VAC input terminals on the bottom. See dimensions and clearances below.



Install the gateway and power supply fuseblocks with 3A fuses and the terminal block with end barrier installed. Install end anchors as needed. The Supplemental Installation Kit (see Parts List) includes all required fuses and mounting hardware.

Wire the power supply terminals as described below, referring to the wiring diagram if necessary. All wiring is 16 gauge (see additional wiring specifications below).

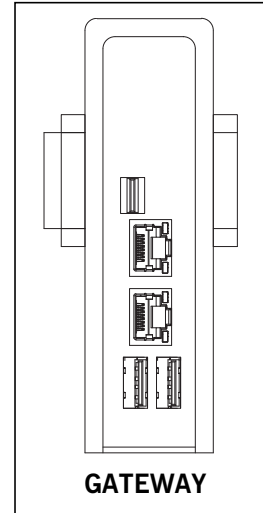
1. Connect a green (ground) wire from the (-) terminal on the top of the power supply to the ground terminal on the bottom. Insert an additional green wire into the bottom terminal and tighten. Connect the second wire to an available ground lug or grounded terminal inside the panel.
2. Connect a red wire between the top, load side terminal of the 120V fuse holder and the L (load) terminal at the bottom of the power supply.
3. Connect a white wire between the N terminal at the bottom of the power supply to the Neutral terminal strip in the control panel.
4. Use a screwdriver to open the port directly above the terminal on the 120V fuse holder. Connect a red wire to the bottom, line side terminal. Terminate the other end at a 120VAC power source in the control panel.
5. Connect a blue wire to either of the two (+) terminals at the top of the power supply and terminate the other end at the bottom, line side terminal of the 24V fuse holder.
6. Connect a blue-and-white wire to either of the two (-) terminals located on the top of the power supply and connect the other end to the bottom terminal of the blue terminal block.

POWER SUPPLY DIMENSIONS	1.75"W x 3"H x 3.6"D
INSTALLATION CLEARANCES	No minimum side clearance (5/8" each side if adjacent device is a heat source). 1.5" top .75" bottom
TEMPERATURE RANGE	14degF to 158degF
FUSING	3A input fuse for isolation purposes
WIRING SPECIFICATIONS	16AWG Stranded Wire ~1/4" Stripping Length 9 lb.in Tightening Torque

4.2 - Data Transfer Gateway

Mount the gateway on the DIN rail with the coaxial antenna connectors at the top and the power supply connection at the bottom.

INPUT VOLTAGE	12VDC
GATEWAY DIMENSIONS	1.3"W x 4.6"H x 3.3"D
INSTALLATION CLEARANCES	2" fin side clearance
TEMPERATURE RANGE	32degF to 122degF



4.3 - 12VDC Power Cable

Insert the plug end into the power supply connection at the bottom of the Gateway. Connect the red wire to the top, load side terminal of the 24V fuse holder. Connect the black wire to the top terminal of the blue terminal block.

4.4 - LTE Antenna

The antenna should be mounted on the top, horizontal exterior surface of a Hawk panel, master panel, DT panel or PT panel. If necessary, mounting the antenna on the side, vertical exterior surface of these enclosures is an option as well. When choosing a mounting location, maintain as much clearance as possible from external obstructions. The distance between the gateway and the antenna cannot exceed 9.8 ft (3 meters), the length of the antenna leads. To install:

1. Use a 7/8" hole saw to drill a hole through the panel for the antenna cable outlet. Collect the drill shavings in a container for later disposal. Take care not to allow drill shavings to fall inside the panel.
2. Prepare the panel surface by wiping the installation area clean with an alcohol wipe.
3. Pass the antenna leads through the hole and remove the backing from the adhesive tape on the underside of the antenna.
4. Attach antenna to the panel.
5. Attach the washer and nut to the threaded mounting stud. Recommended torque for mounting is 21.7 ft·lb (29.4 N·m), not to exceed 28.9 ft·lb (39.2 N·m).

The antenna cables should be routed away from 120VAC wiring wherever possible. Attach cable MIMO2/LTE2 to the BLUE Gateway coaxial connector and MIMO1/LTE1 to the RED connector. Bundle and tie excess cable lengths and attach to the panel with adhesive tie mounts.

ANTENNA DIMENSIONS	8.5"L x 3.7"W x 1.2"H
TEMPERATURE RANGE	-40degF to 185degF
INGRESS PROTECTION	IP67

4.5 - Ethernet Switch

An Ethernet switch is required for installations where the PLC Ethernet port is already in use. The 880-10069-000 kit includes the necessary installation hardware:

- Fuse holder
- 2A fuse
- End anchors
- 2-pole jumper
- Ethernet cables

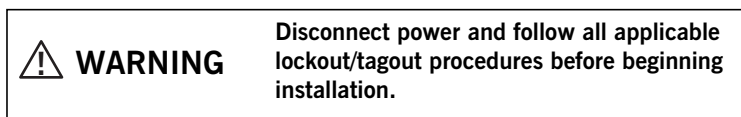
To install:

1. Install Ethernet switch (5-port or 8-port) on the DIN rail.
2. Install 24V fuse holder with 2A fuse next to the gateway fuse.
3. Connect the fuses with the 2-pole jumper. The gateway and Ethernet switch will both use the 12VDC power supply.
4. Wire Terminal 1 of the Ethernet switch to the blue terminal block.
5. Wire Terminal 2 of the Ethernet switch to the 2A fuse.
6. Remove the customer Ethernet connection from the PLC and connect it to any port on the Ethernet switch.

Using Ethernet cables:

7. Connect the TOP port of the Gateway to any port on the Ethernet switch.
8. Connect the Ethernet switch to the PLC.

5 - Installation Procedure - DT Panel



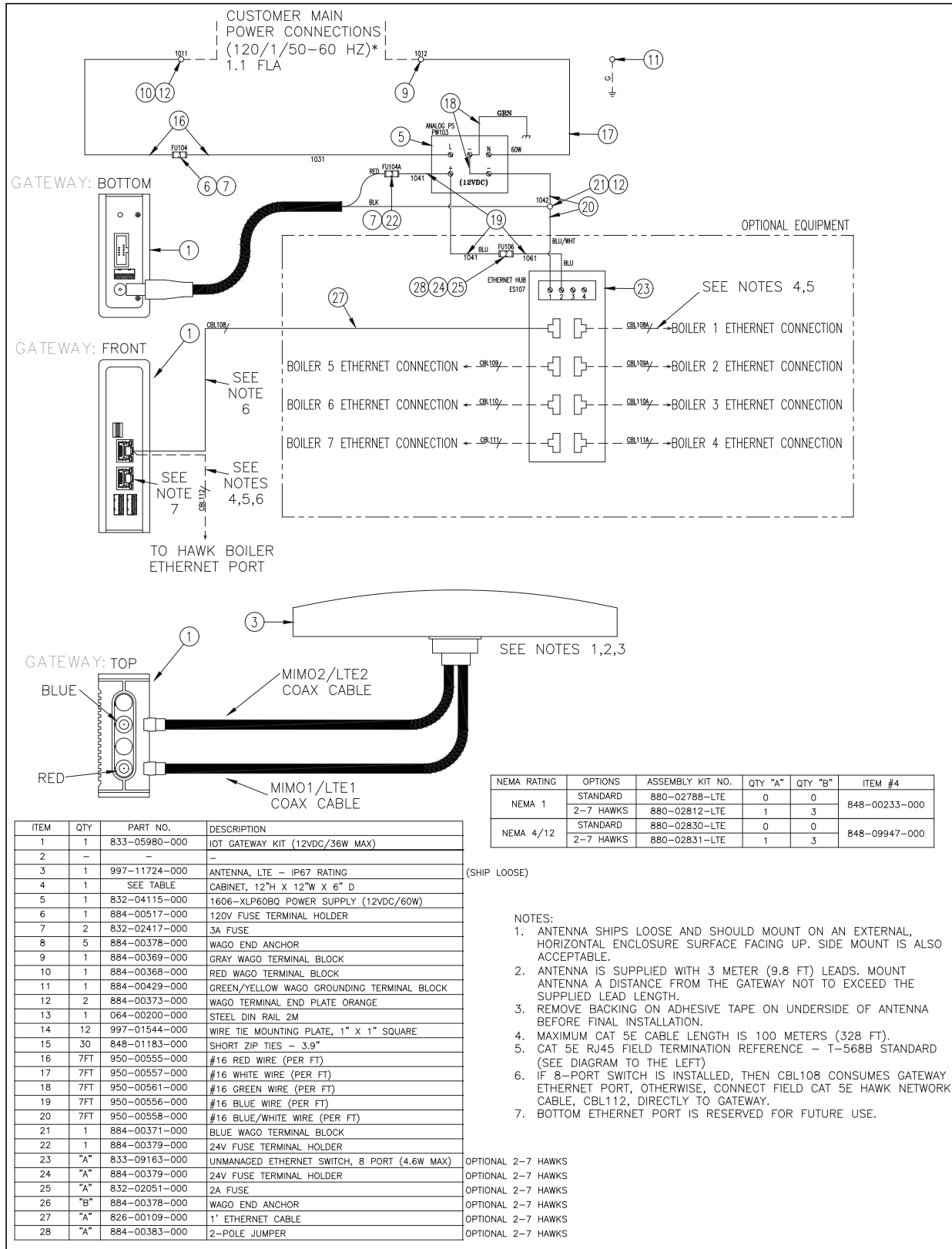
Subject to the maximum CAT 5E cable length of 328 ft (100 meters), the DT panel can be mounted in any suitable location with an acceptable cellular signal.

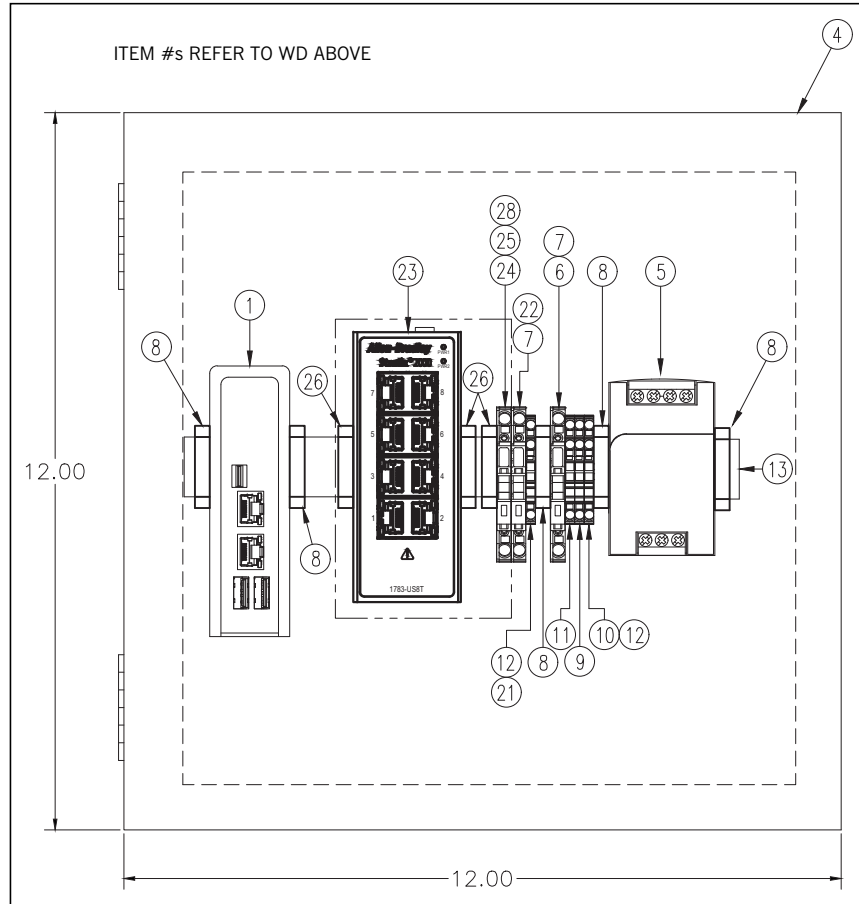
Install the LTE antenna on the panel exterior. The antenna may be mounted on the top or side of the panel. See steps 1-5 under **LTE Antenna** above.

Make 120VAC main power wiring connections as described above under **Power Supply**. Refer to wiring diagram if necessary.

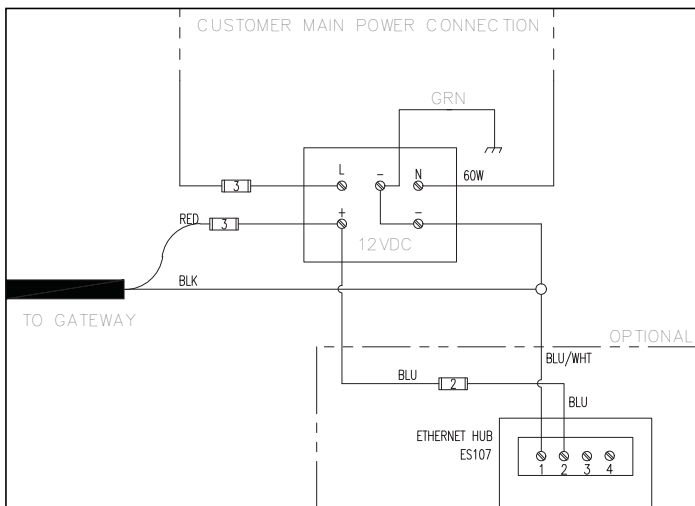
Continue with **Ethernet Connections** and **Troubleshooting** below.

6 - Wiring Diagrams

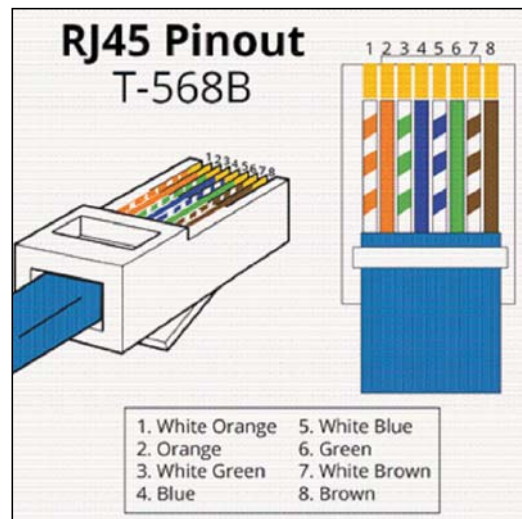




DT PANEL



POWER WIRING DETAIL

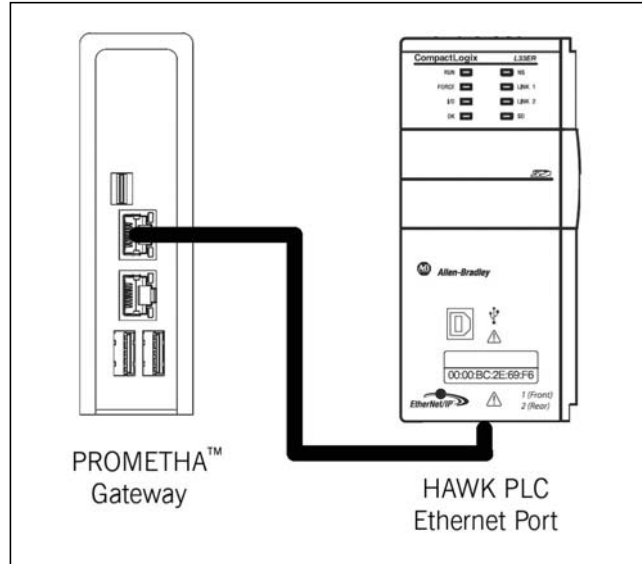


ETHERNET CABLE PIN ASSIGNMENTS

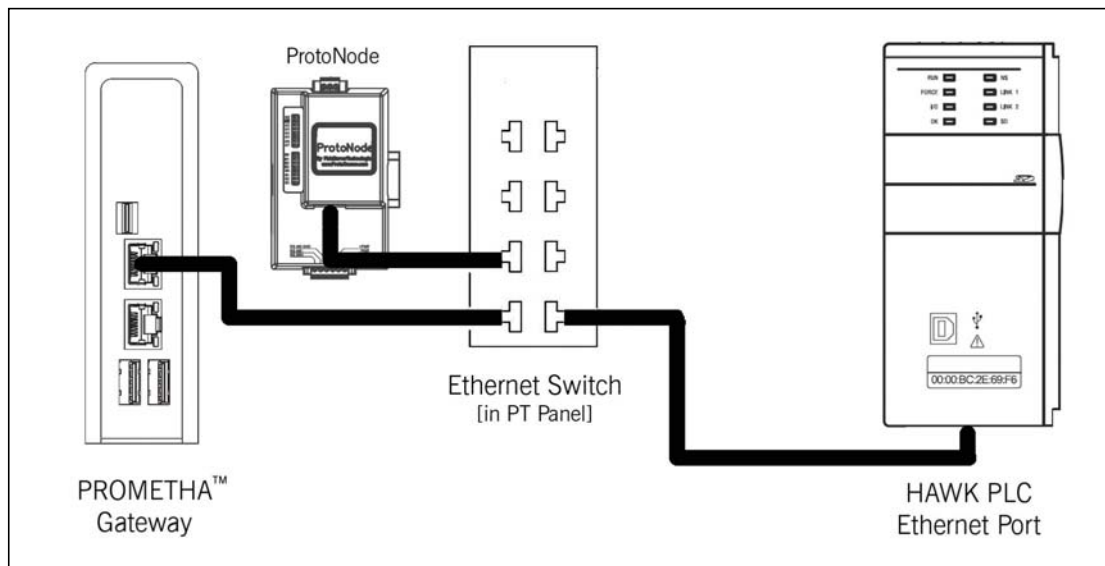
7 - Ethernet Connections

Shown below are the CAT5e cable connections for various installation options.

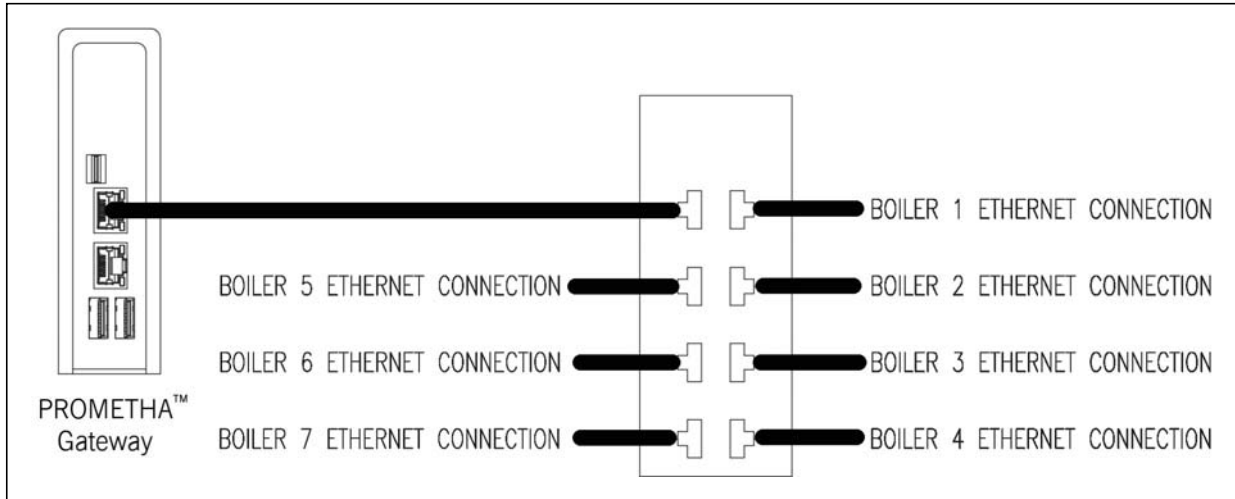
Single Boiler - Hawk Panel



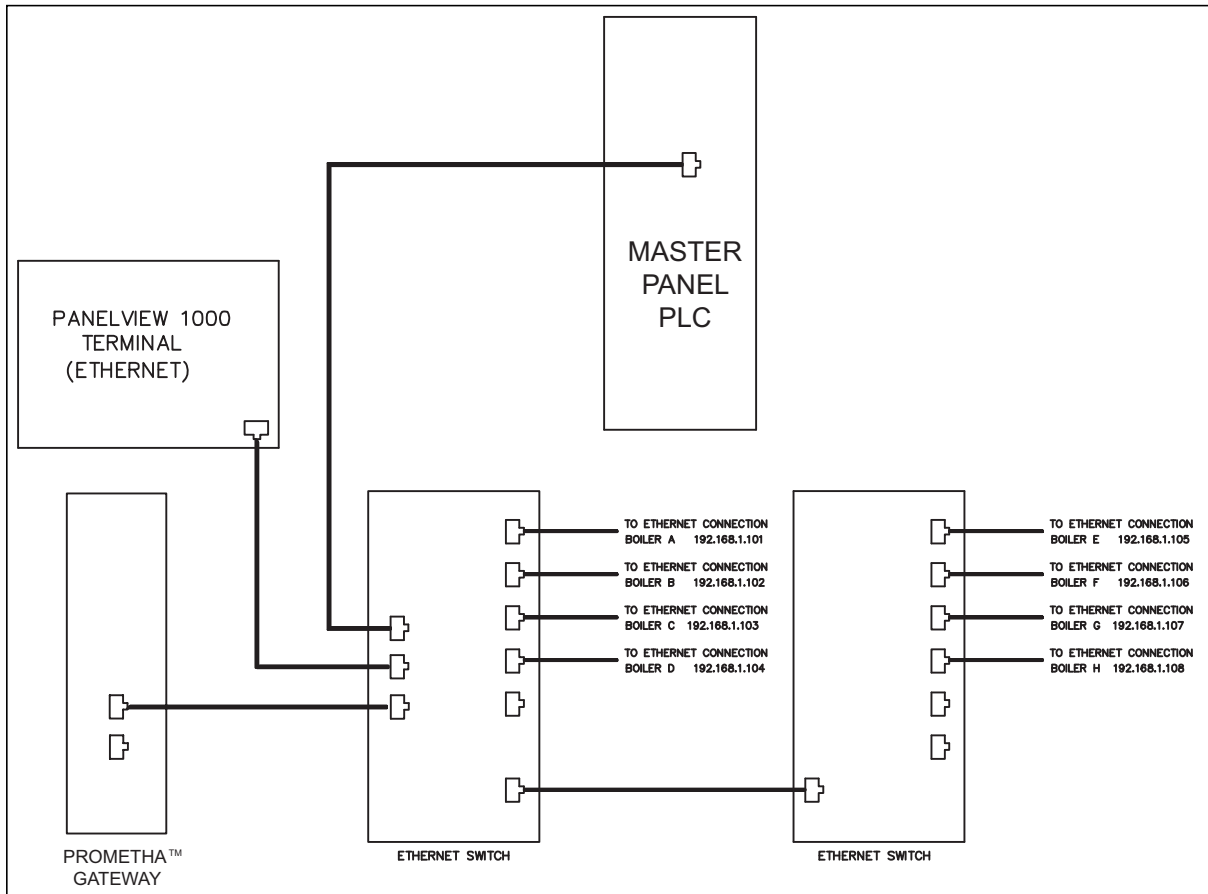
Single Boiler - PT Panel



Multiple Boilers - DT Panel (with Ethernet switch)

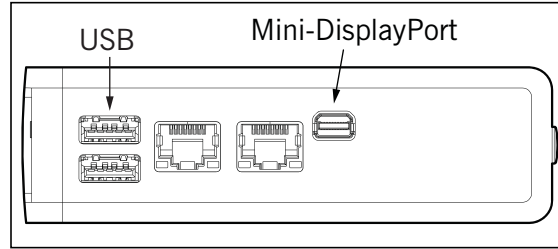


Multiple Boilers - Master Panel



8 - Troubleshooting

Before powering up the system, connect a portable monitor to the MiniDisplay port on the Gateway. Connect monitor power to one of the USB ports on the Gateway.



The Cleaver-Brooks IoT screen provides information on system status and can serve as a diagnostic tool in case of connection problems.

8.1 - Cellular Connection

The screenshot shows the Cleaver-Brooks IoT interface with the following data:

- Date: Oct 4, 2019 | Time: 02:58:13 pm
- Uptime: 7 minutes | Gateway IP: 192.168.1.2
- CPU Usage: 4.4% | Disk Usage: 9%
- MEM Usage: 4.06% | Processor: 93.2 F
- Cellular Status: **Connected or Searching** (1) | Signal Quality: **67% (recent) or 0%** (3)
- Cell Carrier: Verizon | CD IoT Version: 0.6.7
- Host Name: T101726 | Net Hash: 6c72b59c6e
- Temperature: NA
- Thing/Shadow name: T101726
- Number of units: 1
- Serial: T1344-5-3 | PLC IP: 192.168.1.101 | Unit Name: Boiler 2 | System Type: Hawk ICS | **Online: YES** (2)
- Info: Rockwell Automation/Allen-Bradley (1769-L33ER/A LOGIX5333ER)

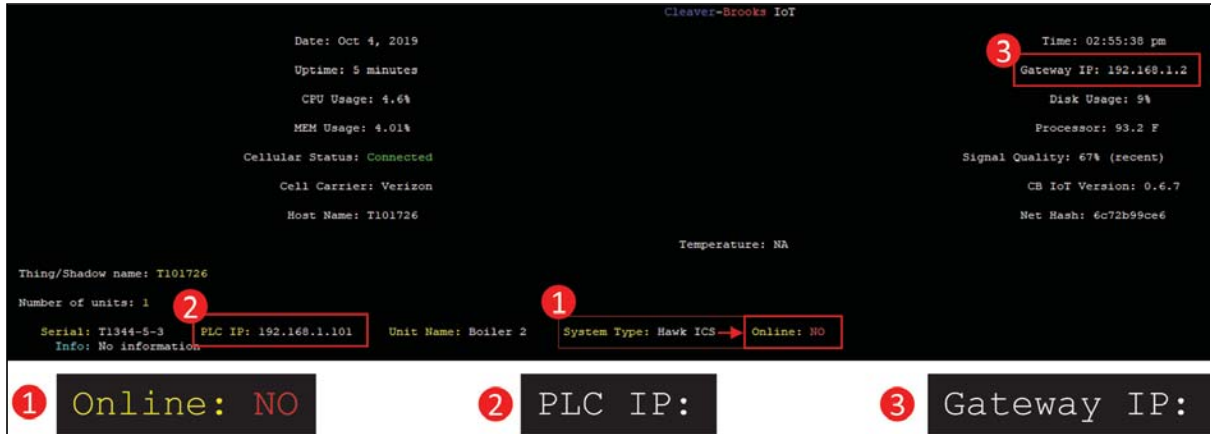
	Pass	Fail
1 Cellular Status	Connected	Searching
2 Online	Yes	Yes
3 Signal Quality	> 1	0

A successful connection is based on three criteria - *Status*, *Online*, and *Signal Quality*. All three criteria must be positive to pass; if one or more do not pass, the cellular connection has failed.

In the event of a failed connection:

1. Confirm cellular signal is available. Use either:
 - a. Carrier compatible cell phone to validate signal strength of at least one bar.
 - b. Signal meter to ensure signal is within -45 to -95 dBm range.
2. Check antenna cables. Ensure:
 - a. Antenna connections to gateway are threaded tightly.
 - b. Antenna cables are not damaged, pinched, or kinked.
 - c. Antenna Cable 1 and Antenna Cable 2 are connected to the correct gateway port.

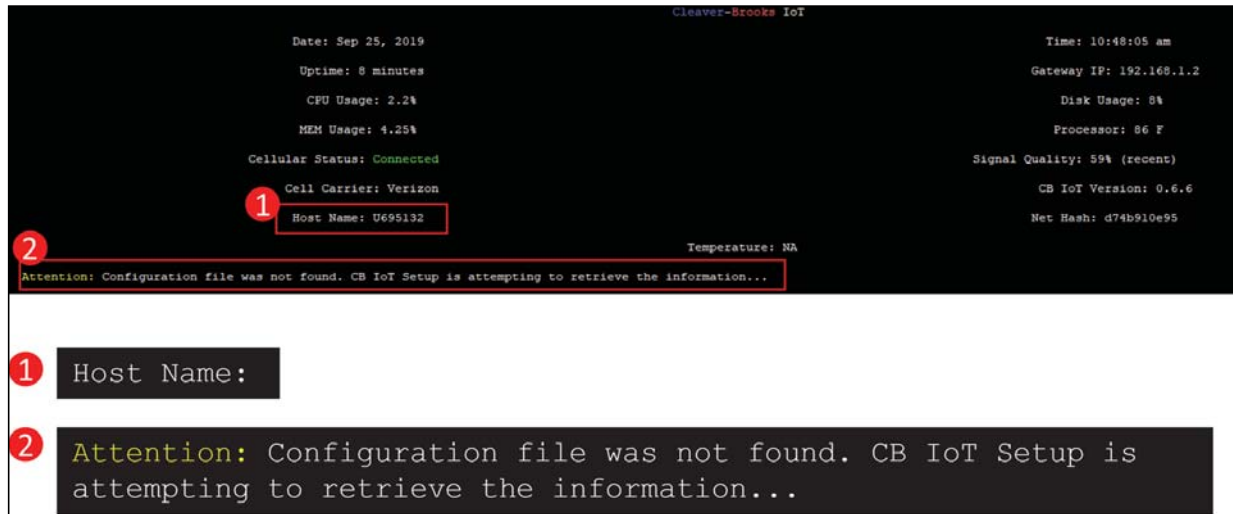
8.2 - Hawk Connection



In the event of a problem with the Hawk control system connection:

- Confirm gateway Ethernet cable is plugged into the top Ethernet port of the gateway.
- Confirm PLC Ethernet cable is plugged into the Hawk PLC or an Ethernet switch on the Hawk network. Do not plug the Ethernet cable into the 1769-SM2 module in the Hawk PLC I/O rack or, for older Hawks, the 1761-NET-ENI module.
- Confirm the offline Hawk control panel is powered up. Pay close attention to the PLC and Ethernet switch, if applicable, to ensure they are also powered up in the panel.
- Confirm IP addresses match. The Hawk PLC IP address displayed on the portable monitor must be consistent with IP address displayed on HMI (on the base rail). If mismatched, change the PLC IP address to match (refer to Hawk O&M manual) or call C-B IoT support at the number listed on the portable monitor for assistance.
- Confirm there is no gateway IP conflict on the Hawk network. The gateway IP address is listed (2) and there shouldn't be any other devices on the network with the same IP address. If there are, unplug the network cable from the gateway device and call C-B IoT support with the preferred gateway IP address for gateway IP address reassignment.
- Confirm the cables are good: use a network cable tester (Ideal LinkMaster 62-200), to test the Hawk network cabling. A failed test could indicate either a damaged cable or an improperly terminated RJ45 connector. Damaged cables that fail the network cable test will need replacing. Ensure that any incorrectly terminated RJ45 connectors are reterminated following the T-568B wiring standard. Refer to illustration in **Wiring Diagrams** section above for the T-568B pinout diagram.
- Confirm the CAT5e Ethernet cable does not exceed 328 ft in length. Cables beyond this length will not maintain proper connection.

8.3 - C-B Cloud Connection



The image shows a terminal window with the following content:

```
Cleaver-Brooks IoT
Date: Sep 25, 2019                               Time: 10:48:05 am
Uptime: 8 minutes                                Gateway IP: 192.168.1.2
CPU Usage: 2.2%                                  Disk Usage: 8%
MEM Usage: 4.25%                                  Processor: 86 F
Cellular Status: Connected                       Signal Quality: 59% (recent)
Cell Carrier: Verizon                            CB IoT Version: 0.6.6
Host Name: U695132                               Net Hash: d74b910e95
Temperature: NA
Attention: Configuration file was not found. CB IoT Setup is attempting to retrieve the information...
```

Red circles with numbers 1 and 2 are placed over the Host Name and the Attention message, respectively. Below the terminal screenshot, there are two text boxes:

- 1 Host Name:
- 2 Attention: Configuration file was not found. CB IoT Setup is attempting to retrieve the information...

In the event of an error message indicating an issue with the C-B cloud connection (2), call C-B Support and provide Host Name information (1).

9 - Parts List

Prometha™ - Base Hardware		
QTY	PART NUMBER	DESCRIPTION
1	833-05980-000	Gateway
1	997-11724-000	Antenna
1	832-04115-000	Power Supply
1	750-00441-000	O&M Manual
880-10068-000 - Supplemental Prometha™ Installation Kit		
QTY	PART NUMBER	DESCRIPTION
1	826-00111-000	Ethernet Cable, 7'
7	950-00555-000	Red #16 Wire
7	950-00557-000	White #16 Wire
7	950-00561-000	Green #16 Wire
7	950-00556-000	Blue #16 Wire
7	950-00558-000	Blue/White #16 Wire
2	832-02417-000	3 amp Fuse
1	884-00379-000	Fuse Holder, 24V
1	884-00517-000	Fuse Holder, 120V
1	884-00371-000	Blue Terminal Block
1	884-00373-000	End Plate
7	884-00378-000	Din Rail End Anchors
30	848-01183-000	Cable Ties
12	997-01544-000	Adhesive Tie Mounts
Prometha™ - Optional Ethernet Switches		
QTY	PART NUMBER	DESCRIPTION
1	833-09181-000	Ethernet Switch, 5-port
1	833-09163-000	Ethernet Switch, 8-port
880-10069-000 - Optional 5 or 8 Port Ethernet Switch Install Kit		
QTY	PART NUMBER	DESCRIPTION
1	884-00379-000	Fuse Holder, 24V
3	884-00378-000	Din Rail End Anchors
1	832-02051-000	2 amp Fuse
1	884-00383-000	2-Pole Jumper
1	826-00109-000	Ethernet Cable, 1'
1	826-00350-000	Ethernet Cable, 4'

10 - Tag Lists

Read-only tags for Prometha™ compatible devices

Hawk ICS

	Point Name	Data Type
1	Drive Fault	BI
2	Modbus Com Error	BI
3	Low Water	BI
4	BC Alarm	BI
5	Boiler Limits Open	BI
6	High Stack Temp Alarm	BI
7	High Stack Temp SD	BI
8	External Interlock	BI
9	I/O module fault	BI
10	Steam Sensor Fail	BI
11	Air Drive out of Position Alarm	BI
12	Gas Drive out of Position Alarm	BI
13	F/A Ratio Controller Fault	BI
14	No Fuel Selected	BI
15	Low Clogix Battery	BI
16	Non Recycle Limit Relay Fail	BI
17	Recycle Limit Relay Fail	BI
18	Remote Modulation Signal Fail	BI
19	Header Sensor Fail	BI
20	TC Channel Fail	BI
21	Low O2 Alarm	BI
22	High Limit Alarm	BI
23	ALWCO	BI
24	Low Gas Pressure/Low Oil Temp	BI
25	High Gas Pressure/High Oil Temp	BI
26	Low Oil Pressure	BI
27	High Oil Pressure	BI
28	Oil Drawer Switch Not Made	BI
29	Low Atomizing Air Pressure	BI
30	Low Combustion Air Pressure	BI
31	AUX Alarm 1	BI
32	AUX Alarm 2	BI
33	Blower On	BI
34	Purge Input	BI
35	Release To modulate Input	BI
36	Low Fire Switch	BI
37	High Fire Switch	BI
38	Ready to start/Limits Closed	BI
39	External Start Interlock	BI
40	ALFCO	BI
41	Pilot	BI
42	Main Fuel Valve Open	BI
43	Fuel 1 Selected	BI
44	Fuel 2 Selected	BI

Hawk ICS (continued)

45	FSG Alarm	BI
46	LWCO Shutdown	BI
47	Remote enable input	BI
48	Burner Switch	BI
49	Recycle Limit Relay	BI
50	External Device Start	BI
51	Non Recycle Limit Relay	BI
52	Drive to Low Fire (FARC)	BI
53	Start Slave Blr (2 Blr LL)	BI
54	Load Demand Output	BI
55	Alarm Output	BI
56	Boiler Ready (LL)	BI
57	Boiler Load Demand	BI
58	Firing Rate Remote/Llag	BI
59	Firing Rate Manual	BI
60	Firing Rate Auto	BI
61	Hot Stand By	BI
62	Warm Up	BI
63	Fuel 3 Selected	BI
64	Aux Alarm 3	BI
65	Steam or Hot Water	BI
66	Level Master Present	BI
67	Variable Speed Drive Present	BI
68	Economizer Present	BI
69	Combustion Air Temp Present	BI
70	Oil Temp Sensor Present	BI
71	O2 Analyzer Present	BI
72	Feedwater or Return Temp Present	BI
73	Outdoor Reset Selected	BI
74	Parallel Positioning Selected	BI
75	Two boiler lead lag master select	BI
76	Two boiler lead lag slave select	BI
77	Master panel select	BI
78	Hot stand by select	BI
79	Dual setpoint select	BI
80	Gas Flow Select	BI
81	Oil Flow Select	BI
82	Steam Flow Select	BI
83	Water Flow Select	BI
84	Honeywell or Fireye	BI
85	High Water Alarm	BI
86	Oil Drive out of Position Alarm	BI
87	FGR Drive out of Position Alarm	BI
88	Air Actuator FB Alarm Low	BI
89	Air Actuator FB Alarm High	BI
90	Fuel1 Actuator FB Alarm Low	BI
91	Fuel1 Actuator FB Alarm High	BI
92	Fuel2 Actuator FB Alarm Low	BI
93	Fuel2 Actuator FB Alarm High	BI
94	FGR Actuator FB Alarm Low	BI
95	FGR Actuator FB Alarm High	BI

Hawk ICS (continued)

96	VSD Deviation Alarm	BI
97	Flame Strength Honeywell	AI
98	Combustion Air Fan Speed	AI
99	Blower Motor Kw	AI
100	Boiler Efficiency	AI
101	Firing Rate	AI
102	O2 Level	AI
103	Set Point Steam Pressure/Water Temp	AI
104	Water Level	AI
105	Steam Pressure or HW Temp	AI
106	Combustion Air Pressure	AI
107	Stack Temp Before Econ	AI
108	Combustion Air Temp	AI
109	Water Temp Shell/Outdoor Temp	AI
110	Feedwater Temp/Econ Water Out Temp	AI
111	Stack Temp After Econ/Return HW	AI
112	Economizer Water In Temp	AI
113	Analog Input User Defined #1 Input	AI
114	Analog Input User Defined #2 Input	AI
115	Analog Input User Defined #3 Input	AI
116	Analog Input User Defined #4 Input	AI
117	Safety Valve Setting or Max Water Temp	AI
118	Header Pressure or temp 2 Boiler LL	AI
119	Set Point 2 Boiler LL	AI
120	Boiler Off Point	AI
121	Boiler On Point	AI
122	AR[25] Future	AI
123	AR[26] Future	AI
124	Brnr Control Status Line 1 Honeywell	AI
125	Brnr Control Status Line 2 Honeywell	AI
126	Brnr Control Status Line 1 Fireeye	AI
127	Brnr Control Status Line 2 Fireeye	AI
128	Flame Signal Fireeye	AI
129	Fuel 1 Type	AI
130	Fuel 2 Type	AI
131	Fuel 3 Type	AI
132	Boiler ID	AI
133	Elapsed Time (First 16 Bits)	AI
134	Elapsed Time (Second 16 Bits)	AI
135	Number Of Cycles (First 16 Bits)	AI
136	Number Of Cycles (Second 16 Bits)	AI
137	AI[13] Future	AI
138	AI[14] Future	AI
139	Elapsed Time	AI
140	Number Of Cycles	AI

Hawk 1000

	Point Name	Data Type
1	Drive Fault	BI
2	Modbus Comm Error	BI
3	Lo Water	BI
4	Burner Control Alm	BI
5	Boiler Limits Open	BI
6	Hi Stack Temp Alm	BI
7	Hi Stack Temp Shutdown	BI
8	External Interlock	BI
9	I/O module fault	BI
10	Steam Sensor Fail	BI
11	Air Actuator Out Of Pos Alm	BI
12	NG Actuator Out Of Pos Alm	BI
13	F/A Ratio Controller Fault	BI
14	No Fuel Selected	BI
15	Lo ControlLogix Battery	BI
16	Non Recycle Limit Relay Fail	BI
17	Recycle Limit Relay Fail	BI
18	Remote Modulation Signal Fail	BI
19	Header Pressure Sensor Fail	BI
20	Temperature Channel 0-5 Failure	BI
21	Lo O2 Alm	BI
22	Hi Limit Alm	BI
23	ALWCO	BI
24	Lo Gas Pressure/Lo Oil Temp	BI
25	Hi Gas Pressure/Hi Oil Temp	BI
26	Lo Oil Pressure	BI
27	Hi Oil Pressure	BI
28	Oil Drawer Switch Not Made	BI
29	Lo Atomizing Air Pressure	BI
30	Lo Combustion Air Pressure	BI
31	AUX Alm 1	BI
32	AUX Alm 2	BI
33	Blower On	BI
34	Purge Input	BI
35	Release To Modulate Input	BI
36	Lo Fire Switch	BI
37	Hi Fire Switch	BI
38	Ready to start/Limits Closed	BI
39	External Start Interlock	BI
40	ALFCO	BI
41	Pilot	BI
42	Main Fuel Valve Open	BI
43	Fuel 1 Selected	BI
44	Fuel 2 Selected	BI
45	Heart Beat To BMS	BI
46	LWCO Shutdown	BI
47	Remote Enable Input	BI
48	Burner Switch	BI

Hawk 1000 (continued)

49	Recycle Limit Relay	BI
50	External Device Start	BI
51	Non Recycle Limit Relay	BI
52	Drive to Lo Fire (FARC)	BI
53	Start Slave Blr (2 Blr LL)	BI
54	Load Demand Output	BI
55	Alm Output	BI
56	Boiler Ready (LL)	BI
57	Boiler Load Demand	BI
58	Firing Rate Remote/Llag	BI
59	Firing Rate Manual	BI
60	Firing Rate Auto	BI
61	Hot Stand By	BI
62	Warm Up	BI
63	Fuel 3 Selected	BI
64	Aux Alm 3	BI
65	Steam or Hot Water 1 = Steam	BI
66	Level Master Present	BI
67	Variable Speed Drive Present	BI
68	Economizer Present	BI
69	Combustion Air Temp Present	BI
70	Economizer Inlet FW Sensor Present	BI
71	O2 Analyzer Present	BI
72	Feedwater or Return Temp Present	BI
73	Outdoor Reset Selected	BI
74	Parallel Posing Selected	BI
75	Two Boiler Lead Lag Master Select	BI
76	Two Boiler Lead Lag Slave Select	BI
77	Master Panel Select	BI
78	Hot Stand By Select	BI
79	Dual Setpoint Select	BI
80	Slot 8 Ch 0 Analog Input Selected	BI
81	Slot 8 Ch 1 Analog Input Selected	BI
82	Slot 8 Ch 2 Analog Input Selected	BI
83	Slot 8 Ch 3 Analog Input Selected	BI
84	Honeywell or Fireye 1 = Fireye	BI
85	Hi Water Alm	BI
86	Oil Actuator Out Of Pos Alm	BI
87	FGR Actuator Out Of Pos Alm	BI
88	Air Actuator Feedback Fail Lo Alm	BI
89	Air Actuator Feedback Fail Hi Alm	BI
90	NG Actuator Feedback Fail Lo Alm	BI
91	NG Actuator Feedback Fail Hi Alm	BI
92	Oil Actuator Feedback Fail Lo Alm	BI
93	Oil Actuator Feedback Fail Hi Alm	BI
94	FGR Actuator Feedback Fail Lo Alm	BI
95	FGR Actuator Feedback Fail Hi Alm	BI
96	VSD Deviation Alm	BI
97	Increase MSG Register Size Bit	BI
98	Air/Fuel Deviation Alm	BI
99	2nd Stage CEC Economizer Selected	BI

Hawk 1000 (continued)

100	Fuel3 Actuator Out Of Pos Alm	BI
101	Fuel3 Actuator Feedback Fail Lo Alm	BI
102	Fuel3 Actuator Feedback Fail Hi Alm	BI
103	Stack Pressure Input Fail	BI
104	Hi Stack Pressure Alm	BI
105	Stack Damper Not Open Alm	BI
106	O2 Calibration Failed	BI
107	Lo Steam Pressure/Water Temp Alm	BI
108	Processor Test Fail Alm	BI
109	O2 Trim Internal Alm	BI
110	Firetube or Flextube 1 = Flextube	BI
111	Reserved for Cleaver Brooks	BI
112	VSD Limits Internal Alm	BI
113	Gas Actuator 2 Out Of Pos Alm	BI
114	Gas Actuator 2 Feedback Fail Lo Alm	BI
115	Gas Actuator 2 Feedback Fail Hi Alm	BI
116	Actuator Modbus Communication Error	BI
117	Air Actuator Modbus Comm Error Node 1	BI
118	Gas Actuator Modbus Comm Error Node 2	BI
119	Gas Act 2 Modbus Comm Error Node 3	BI
120	Oil Actuator Modbus Comm Error Node 5	BI
121	FGR Actuator Modbus Comm Error Node 7	BI
122	Reserved	BI
123	Reserved	BI
124	2nd Stg Outlet Wtr Temp Sensor Failed	BI
125	Wtr Temp Second Stg Out Hi	BI
126	Air Actuator Man Override Btn Press	BI
127	Gas Actuator 1 Man Override Btn Press	BI
128	Gas Actuator 2 Man Override Btn Press	BI
129	Oil Actuator Man Override Btn Press	BI
130	FGR Actuator Man Override Btn Press	BI
131	Fuel 3 Act 1 Man Override Btn Press	BI
132	Fuel 3 Act 2 Man Override Btn Press	BI
133	Communication from BMS Failed	BI
134	Combustion Air Pressure Hi	BI
135	Wtr FLo Lo	BI
136	Wtr Level Signal Failed	BI
137	Remote Setpoint Signal Failed	BI
138	Lo O2 Shutdown	BI
139	Air Actuator Fault	BI
140	Fuel 1 Actuator 1 Fault	BI
141	Fuel 1 Actuator 2 Fault	BI
142	Fuel 2 Actuator 1 Fault	BI
143	Fuel 2 Actuator 2 Fault	BI
144	FGR Actuator Fault	BI
145	Fuel 2 Actuator 2 Pos Deviation	BI
146	Fuel 2 Actuator 2 Feedback Lo	BI
147	Fuel 2 Actuator 2 Feedback Hi	BI
148	Fuel 2 Actuator 2 Man PB Press	BI
149	VFD Feedback Lo	BI
150	VFD Feedback Hi	BI

Hawk 1000 (continued)

151	Master PIDE Instruction Fault	BI
152	FGEN Fault	BI
153	Outdoor Temp/Retrun Temp Sensor Failed	BI
154	Combustion Air Temp Sensor Failed	BI
155	O2 Sensor Fault	BI
156	AB[9]11	BI
157	AB[9]12	BI
158	AB[9]13	BI
159	AB[9]14	BI
160	Hawk 1000 system	BI
161	Flame Strength Honeywell	AI
162	Combustion Air Fan Speed	AI
163	AR[2]	AI
164	Boiler Efficiency	AI
165	Firing Rate	AI
166	O2 Level	AI
167	SP Steam Pressure/Wtr Temp	AI
168	Wtr Level	AI
169	Steam Pressure or Hot Wtr Temp	AI
170	AR[9]	AI
171	Stack Temp Before Economizer	AI
172	Combustion Air Temp	AI
173	Wtr Temp Shell/Outdoor Temp	AI
174	FeedWtr Temp/Econ Wtr Out Temp	AI
175	Stack Temp After Econ/Return HW	AI
176	Economizer Wtr In Temp	AI
177	AI Slot8 Ch0 Value 2Stg Econ Temp IN	AI
178	AI Slot8 Ch1 Value 2Stg Econ Temp OUT	AI
179	AI Slot8 Ch2 Value (EU)	AI
180	AI Slot8 Ch3 Value (EU)	AI
181	Safety Valve Setting or Max Wtr Temp	AI
182	Header Pressure or Temp 2 Boiler LL	AI
183	SP 2 Boiler LL	AI
184	Boiler Off Point	AI
185	Boiler On Point	AI
186	Condensate Return Valve Output Command	AI
187	Makeup Bypass Valve Output Command	AI
188	Slot8 Ch0 FLo Total	AI
189	Slot8 Ch1 FLo Total	AI
190	Slot8 Ch2 FLo Total	AI
191	Slot8 Ch3 FLo Total	AI
192	AR[31]	AI
193	AR[32]	AI
194	AR[33]	AI
195	AR[34]	AI
196	AR[35]	AI
197	AR[36]	AI
198	AR[37]	AI
199	AR[38]	AI
200	AR[39]	AI
201	AR[40]	AI

Hawk 1000 (continued)

202	AR[41]	AI
203	AR[42]	AI
204	AR[43]	AI
205	AR[44]	AI
206	AR[45]	AI
207	AR[46]	AI
208	AR[47]	AI
209	AR[48]	AI
210	AR[49]	AI
211	Burner Control Status Line 1 Honeywell	AI
212	Burner Control Status Line 2 Honeywell	AI
213	Burner Control Status Line 1 Fireeye	AI
214	Burner Control Status Line 2 Fireeye	AI
215	Flame Signal Fireeye	AI
216	Fuel 1 Type	AI
217	Fuel 2 Type	AI
218	Fuel 3 Type	AI
219	Elapsed Time (First 16 Bits)	AI
220	Elapsed Time (Second 16 Bits)	AI
221	Number Of Cycles (First 16 Bits)	AI
222	Number Of Cycles (Second 16 Bits)	AI
223	AI[13]	AI
224	AI[14]	AI
225	Elapsed Time	AI
226	Number Of Cycles	AI

Hawk 4000

	Point Name	Data Type
1	Drive Fault	BI
2	Modbus Comm Error	BI
3	Lo Water	BI
4	Burner Control Alm	BI
5	Boiler Limits Open	BI
6	Hi Stack Temp Alm	BI
7	Hi Stack Temp Shutdown	BI
8	External Interlock	BI
9	I/O module fault	BI
10	Steam Sensor Fail	BI
11	Air Actuator Out Of Pos Alm	BI
12	NG Actuator Out Of Pos Alm	BI
13	F/A Ratio Controller Fault	BI
14	No Fuel Selected	BI
15	Lo ControlLogix Battery	BI
16	Non Recycle Limit Relay Fail	BI
17	Recycle Limit Relay Fail	BI
18	Rem Modulation Signal Fail	BI
19	Header Pressure Sensor Fail	BI
20	Temp Channel 0-5 Fail	BI
21	Lo O2 Alm	BI
22	Hi Limit Alm	BI
23	ALWCO	BI
24	Lo Gas Pressure/Lo Oil Temp	BI
25	Hi Gas Pressure/Hi Oil Temp	BI
26	Lo Oil Pressure	BI
27	Hi Oil Pressure	BI
28	Oil Drawer Switch Not Made	BI
29	Lo Atomizing Air Pressure	BI
30	Lo Combustion Air Pressure	BI
31	AUX Alm 1	BI
32	AUX Alm 2	BI
33	Blower On	BI
34	Purge Input	BI
35	Release To Modulate Input	BI
36	Lo Fire Switch	BI
37	Hi Fire Switch	BI
38	Ready to start/Limits Closed	BI
39	External Start Interlock	BI
40	ALFCO	BI
41	Pilot	BI
42	Main Fuel Valve Open	BI
43	Fuel 1 Selected	BI
44	Fuel 2 Selected	BI
45	Heart Beat To BMS	BI
46	LWCO Shutdown	BI
47	Rem Enable Input	BI
48	Burner Switch	BI

Hawk 4000 (continued)

49	Recycle Limit Relay	BI
50	External Device Start	BI
51	Non Recycle Limit Relay	BI
52	Drive to Lo Fire (FARC)	BI
53	Start Slave Blr (2 Blr LL)	BI
54	Load Demand Output	BI
55	Alm Output	BI
56	Boiler Ready (LL)	BI
57	Boiler Load Demand	BI
58	Firing Rate Rem/Llag	BI
59	Firing Rate Manual	BI
60	Firing Rate Auto	BI
61	Hot Stand By	BI
62	Warm Up	BI
63	Fuel 3 Selected	BI
64	Aux Alm 3	BI
65	Steam or Hot Water 1 = Steam	BI
66	Level Master Present	BI
67	Variable Speed Drive Present	BI
68	Economizer Present	BI
69	Combustion Air Temp Present	BI
70	Economizer Inlet FW Sensor Present	BI
71	O2 Analyzer Present	BI
72	Feedwater or Return Temp Present	BI
73	Outdoor Reset Selected	BI
74	Parallel Posing Selected	BI
75	Two Boiler Lead Lag Master Select	BI
76	Two Boiler Lead Lag Slave Select	BI
77	Master Panel Select	BI
78	Hot Stand By Select	BI
79	Dual Setpoint Select	BI
80	Slot 8 Ch 0 AI Selected	BI
81	Slot 8 Ch 1 AI Selected	BI
82	Slot 8 Ch 2 AI Selected	BI
83	Slot 8 Ch 3 AI Selected	BI
84	Honeywell or Fireye 1 = Fireye	BI
85	Hi Water Alm	BI
86	Oil Actuator Out Of Pos Alm	BI
87	FGR Actuator Out Of Pos Alm	BI
88	Air Actuator Feedback Fail Lo Alm	BI
89	Air Actuator Feedback Fail Hi Alm	BI
90	NG Actuator Feedback Fail Lo Alm	BI
91	NG Actuator Feedback Fail Hi Alm	BI
92	Oil Actuator Feedback Fail Lo Alm	BI
93	Oil Actuator Feedback Fail Hi Alm	BI
94	FGR Actuator Feedback Fail Lo Alm	BI
95	FGR Actuator Feedback Fail Hi Alm	BI
96	VSD Deviation Alm	BI
97	Increase MSG Reg Size Bit (CB Only)	BI
98	Air/Fuel Deviation Alm	BI
99	2nd Stage CEC Economizer Selected	BI

Hawk 4000 (continued)

100	Fuel3 Actuator Out Of Pos Alm	BI
101	Fuel3 Actuator Feedback Fail Lo Alm	BI
102	Fuel3 Actuator Feedback Fail Hi Alm	BI
103	Stack Pressure Input Fail	BI
104	Hi Stack Pressure Alm	BI
105	Stack Damper Not Open Alm	BI
106	O2 Calibration Failed	BI
107	Lo Steam Pressure/Water Temp Alm	BI
108	Processor Test Fail Alm	BI
109	O2 Trim Internal Alm	BI
110	Firetube or Flextube 1 = Flextube	BI
111	Reserved for Cleaver Brooks	BI
112	VSD Limits Internal Alm	BI
113	Gas Actuator 2 Out Of Pos Alm	BI
114	Gas Actuator 2 Feedback Fail Lo Alm	BI
115	Gas Actuator 2 Feedback Fail Hi Alm	BI
116	Actuator Modbus Communication Error	BI
117	Air Actuator Modbus Comm Error Node 1	BI
118	Gas Actuator Modbus Comm Error Node 2	BI
119	Gas Act 2 Modbus Comm Error Node 3	BI
120	Oil Actuator Modbus Comm Error Node 5	BI
121	FGR Actuator Modbus Comm Error Node 7	BI
122	Reserved	BI
123	Reserved	BI
124	2nd Stage Outlet Wtr Temp Sensor Fail	BI
125	Water Temp Second Stage Out Hi	BI
126	Air Actuator Man Override Btn Press	BI
127	Gas Actuator 1 Man Override Btn Press	BI
128	Gas Actuator 2 Man Override Btn Press	BI
129	Oil Actuator Man Override Btn Press	BI
130	FGR Actuator Man Override Btn Press	BI
131	Fuel 3 Act 1 Man Override Btn Press	BI
132	Fuel 3 Act 2 Man Override Btn Press	BI
133	Communication from BMS Failed	BI
134	Low O2 Shutdown	BI
135	AB[8]6	BI
136	AB[8]7	BI
137	AB[8]8	BI
138	AB[8]9	BI
139	AB[8]10	BI
140	AB[8]11	BI
141	AB[8]12	BI
142	AB[8]13	BI
143	AB[8]14	BI
144	AB[8]15	BI
145	AB[9]0	BI
146	AB[9]1	BI
147	AB[9]2	BI
148	AB[9]3	BI
149	AB[9]4	BI
150	AB[9]5	BI

Hawk 4000 (continued)

151	AB[9]6	BI
152	AB[9]7	BI
153	AB[9]8	BI
154	AB[9]9	BI
155	AB[9]10	BI
156	AB[9]11	BI
157	AB[9]12	BI
158	AB[9]13	BI
159	AB[9]14	BI
160	AB[9]15	BI
161	Flame Strength Honeywell	AI
162	Combustion Air Fan Speed	AI
163	AR[2]	AI
164	Boiler Efficiency	AI
165	Firing Rate	AI
166	O2 Level	AI
167	SP Steam Pressure/Water Temp	AI
168	Water Level	AI
169	Steam Pressure or Hot Water Temp	AI
170	AR[9]	AI
171	Stack Temp Before Economizer	AI
172	Combustion Air Temp	AI
173	Water Temp Shell/Outdoor Temp	AI
174	Feedwater Temp/Econ Water Out Temp	AI
175	Stack Temp After Econ/Return HW	AI
176	Economizer Water In Temp	AI
177	AI Slot8Ch0 Value/2Stg Econ Temp IN	AI
178	AI Slot8Ch1 Value/2Stg Econ Temp OUT	AI
179	AI Slot8 Ch2 Value (EU)	AI
180	AI Slot8 Ch3 Value (EU)	AI
181	Safety Valve Setting or Max Water Temp	AI
182	Header Pressure or Temp 2 Boiler LL	AI
183	SP 2 Boiler LL	AI
184	Boiler Off Point	AI
185	Boiler On Point	AI
186	Condensate Return Valve Output Command	AI
187	Makeup Bypass Valve Output Command	AI
188	Slot8 Ch0 FLo Total	AI
189	Slot8 Ch1 FLo Total	AI
190	Slot8 Ch2 FLo Total	AI
191	Slot8 Ch3 FLo Total	AI
192	AR[31]	AI
193	AR[32]	AI
194	AR[33]	AI
195	AR[34]	AI
196	AR[35]	AI
197	AR[36]	AI
198	AR[37]	AI
199	AR[38]	AI
200	AR[39]	AI
201	AR[40]	AI

Hawk 4000 (continued)

202	AR[41]	AI
203	AR[42]	AI
204	AR[43]	AI
205	AR[44]	AI
206	AR[45]	AI
207	AR[46]	AI
208	AR[47]	AI
209	AR[48]	AI
210	AR[49]	AI
211	Burner Control Status Line 1 Honeywell	AI
212	Burner Control Status Line 2 Honeywell	AI
213	Burner Control Status Line 1 Fireye	AI
214	Burner Control Status Line 2 Fireye	AI
215	Flame Signal Fireye	AI
216	Fuel 1 Type	AI
217	Fuel 2 Type	AI
218	Fuel 3 Type	AI
219	Elapsed Time (First 16 Bits)	AI
220	Elapsed Time (Second 16 Bits)	AI
221	Number Of Cycles (First 16 Bits)	AI
222	Number Of Cycles (Second 16 Bits)	AI
223	AI[13]	AI
224	AI[14]	AI
225	AI[15]	AI
226	AI[16]	AI
227	AI[17]	AI
228	AI[18]	AI
229	AI[19]	AI
230	AI[20]	AI
231	AI[21]	AI
232	AI[22]	AI
233	AI[23]	AI
234	AI[24]	AI
235	AI[25]	AI
236	AI[26]	AI
237	AI[27]	AI
238	AI[28]	AI
239	AI[29]	AI
240	Elapsed Time	AI
241	Number Of Cycles	AI

Hawk 4000 V2

	Point Name	Data Type
1	Drive Fault	BI
2	Modbus Comm Error	BI
3	Lo Water	BI
4	Burner Control Alm	BI
5	Boiler Limits Open	BI
6	Hi Stack Temp Alm	BI
7	Hi Stack Temp Shutdown	BI
8	External Interlock	BI
9	I/O module fault	BI
10	Steam Sensor Fail	BI
11	Air Actuator Out Of Pos Alm	BI
12	NG Actuator Out Of Pos Alm	BI
13	F/A Ratio Controller Fault	BI
14	No Fuel Selected	BI
15	Low ControlLogix Battery	BI
16	Non Recycle Limit Relay Fail	BI
17	Recyle Limit Relay Fail	BI
18	Rem Modulation Signal Fail	BI
19	Header Pressure Sensor Fail	BI
20	Temp Channel 0-5 Fail	BI
21	Lo O2 Alm	BI
22	Hi Limit Alm	BI
23	ALWCO	BI
24	Lo Gas Pressure/Lo Oil Temp	BI
25	Hi Gas Pressure/Hi Oil Temp	BI
26	Lo Oil Pressure	BI
27	Hi Oil Pressure	BI
28	Oil Drawer Switch Not Made	BI
29	Lo Atomizing Air Pressure	BI
30	Lo Combustion Air Pressure	BI
31	Stack Damper High Pressure	BI
32	AUX Alm 2	BI
33	Blower On	BI
34	Purge Input	BI
35	Release To Modulate Input	BI
36	Lo Fire Switch	BI
37	Hi Fire Switch	BI
38	Ready to start/Limits Closed	BI
39	External Start Interlock	BI
40	ALFCO	BI
41	Pilot	BI
42	Main Fuel Valve Open	BI
43	Fuel 1 Selected	BI
44	Fuel 2 Selected	BI
45	Heart Beat To BMS	BI
46	LWCO Shutdown	BI
47	Rem Enable Input	BI
48	Burner Switch	BI

Hawk 4000 V2 (continued)

49	Recycle Limit Relay	BI
50	External Device Start	BI
51	Non Recycle Limit Relay	BI
52	Drive to Lo Fire (FARC)	BI
53	Start Slave Blr (2 Blr LL)	BI
54	Load Demand Output	BI
55	Alm Output	BI
56	Boiler Ready (LL)	BI
57	Boiler Load Demand	BI
58	Firing Rate Rem/Llag	BI
59	Firing Rate Manual	BI
60	Firing Rate Auto	BI
61	Hot Stand By	BI
62	Warm Up	BI
63	Fuel 3 Selected	BI
64	Aux Alm 3	BI
65	Steam or Hot Water 1 = Steam	BI
66	Level Master Present	BI
67	Variable Speed Drive Present	BI
68	Economizer Present	BI
69	Combustion Air Temp Present	BI
70	Economizer Inlet FW Sensor Present	BI
71	O2 Analyzer Present	BI
72	Feedwater or Return Temp Present	BI
73	Outdoor Reset Selected	BI
74	Parallel Posing Selected	BI
75	Two Boiler Lead Lag Master Select	BI
76	Two Boiler Lead Lag Slave Select	BI
77	Master Panel Select	BI
78	Hot Stand By Select	BI
79	Dual Setpoint Select	BI
80	Slot 8 Ch 0 AI Selected	BI
81	Slot 8 Ch 1 AI Selected	BI
82	Slot 8 Ch 2 AI Selected	BI
83	Slot 8 Ch 3 AI Selected	BI
84	Honeywell or Fireye 1 = Fireye	BI
85	Hi Water Alm	BI
86	Oil Actuator Out Of Pos Alm	BI
87	FGR Actuator Out Of Pos Alm	BI
88	Air Actuator Feedback Fail Lo Alm	BI
89	Air Actuator Feedback Fail Hi Alm	BI
90	NG Actuator Feedback Fail Lo Alm	BI
91	NG Actuator Feedback Fail Hi Alm	BI
92	Oil Actuator Feedback Fail Lo Alm	BI
93	Oil Actuator Feedback Fail Hi Alm	BI
94	FGR Actuator Feedback Fail Lo Alm	BI
95	FGR Actuator Feedback Fail Hi Alm	BI
96	VSD Deviation Alm	BI
97	Increase MSG Reg Size Bit (CB Only)	BI
98	Air/Fuel Deviation Alm	BI
99	2nd Stage CEC Economizer Selected	BI

Hawk 4000 V2 (continued)

100	Fuel3 Actuator Out Of Pos Alm	BI
101	Fuel3 Actuator Feedback Fail Lo Alm	BI
102	Fuel3 Actuator Feedback Fail Hi Alm	BI
103	Stack Pressure Input Fail	BI
104	Hi Stack Pressure Alm	BI
105	Stack Damper Not Open Alm	BI
106	O2 Calibration Failed	BI
107	Lo Steam Pressure/Water Temp Alm	BI
108	Processor Test Fail Alm	BI
109	O2 Trim Internal Alm	BI
110	Firetube or Flextube 1 = Flextube	BI
111	Reserved for Cleaver Brooks	BI
112	VSD Limits Internal Alm	BI
113	Gas Actuator 2 Out Of Pos Alm	BI
114	Gas Actuator 2 Feedback Fail Lo Alm	BI
115	Gas Actuator 2 Feedback Fail Hi Alm	BI
116	Actuator Modbus Communication Error	BI
117	Air Actuator Modbus Comm Error Node 1	BI
118	Gas Actuator Modbus Comm Error Node 2	BI
119	Gas Act 2 Modbus Comm Error Node 3	BI
120	Oil Actuator Modbus Comm Error Node 5	BI
121	FGR Actuator Modbus Comm Error Node 7	BI
122	Reserved	BI
123	Reserved	BI
124	2nd Stage Outlet Wtr Temp Sensor Fail	BI
125	Water Temp Second Stage Out Hi	BI
126	Air Actuator Man Override Btn Press	BI
127	Gas Actuator 1 Man Override Btn Press	BI
128	Gas Actuator 2 Man Override Btn Press	BI
129	Oil Actuator Man Override Btn Press	BI
130	FGR Actuator Man Override Btn Press	BI
131	Fuel 3 Act 1 Man Override Btn Press	BI
132	Fuel 3 Act 2 Man Override Btn Press	BI
133	Communication from BMS Failed	BI
134	CAP High	BI
135	Water Flow Low	BI
136	Water Level Signal Failed	BI
137	Remote Setpoint Signal Failed	BI
138	Low O2 Shutdown	BI
139	Air Actuator Fault	BI
140	Fuel 1 Actuator 1 Fault	BI
141	Fuel 1 Actuator 2 Fault	BI
142	Fuel 2 Actuator 1 Fault	BI
143	Fuel 2 Actuator 2 Fault	BI
144	FGR Actuator Fault	BI
145	Fuel 2 Actuator 2 Position Deviation	BI
146	Fuel 2 Actuator 2 Feedback Low	BI
147	Fuel 2 Actuator 2 Feedback High	BI
148	Fuel 2 Actuator 2 Manual PB Pressed	BI
149	VFD Feedback Low	BI
150	VFD Feedback High	BI

Hawk 4000 V2 (continued)

151	Master PIDE Instruction Fault	BI
152	FGEN Fault	BI
153	Outdoor Temp Sensor Failed	BI
154	Combustion Air Temp Sensor Failed	BI
155	Yokogawa O2 Sensor Fault	BI
156	Mix O2 Sensor Calibration Fail	BI
157	Mix O2 Enable	BI
158	Air Actuator Not at Purge	BI
159	VFD Not at Purge	BI
160	Hawk 1000 system	BI
161	Hawk 4000 Next Gen	BI
162	Stack Temp Econ Out Sensor Failed	BI
163	Econ In Water Temp Sensor Failed	BI
164	Fuel 3 Actuator 1 Fault	BI
165	Fuel 3 Actuator 2 Position Deviation	BI
166	Fuel 3 Actuator 2 Feedback Low	BI
167	Fuel 3 Actuator 2 Feedback High	BI
168	Fuel 3 Actuator 2 Fault	BI
169	Fuel 3 Actuator 1 Modbus Comm Error	BI
170	Fuel 3 Actuator 2 Modbus Comm Error	BI
171	Fuel 2 Actuator 2 Modbus Comm Error	BI
172	Return Temp Sensor Failed	BI
173	Water Shell Temp Sensor Failed	BI
174	Feedwater/Econ Out Temp Sensor Failed	BI
175	Feedwater Level Control Option Selected	BI
176	FGR Not at Purge	BI
177	Slot8 Ch0 Bad Quality	BI
178	Slot8 Ch0 Low Alarm	BI
179	Slot8 Ch0 High Alarm	BI
180	Slot8 Ch1 Bad Quality	BI
181	Slot8 Ch1 Low Alarm	BI
182	Slot8 Ch1 High Alarm	BI
183	Slot8 Ch2 Bad Quality/Mix O2 Signal Fail	BI
184	Slot8 Ch2 Low Alarm	BI
185	Slot8 Ch2 High Alarm	BI
186	Slot8 Ch3 Bad Quality	BI
187	Slot8 Ch3 Low Alarm	BI
188	Slot8 Ch3 High Alarm	BI
189	Slot8 Ch4 Bad Quality	BI
190	Slot8 Ch4 Low Alarm	BI
191	Slot8 Ch4 High Alarm	BI
192	Isolation Valve Selected	BI
193	Slot8 Ch5 Bad Quality	BI
194	Slot8 Ch5 Low Alarm	BI
195	Slot8 Ch5 High Alarm	BI
196	Slot8 Ch6 Bad Quality	BI
197	Slot8 Ch6 Low Alarm	BI
198	Slot8 Ch6 High Alarm	BI
199	Slot8 Ch7 Bad Quality	BI
200	Slot8 Ch7 Low Alarm	BI
201	Slot8 Ch7 High Alarm	BI

Hawk 4000 V2 (continued)

202	VFD EtherNet Comm Error	BI
203	Slot 8 Ch 4 Analog Input Selected	BI
204	Slot 8 Ch 5 Analog Input Selected	BI
205	Slot 8 Ch 6 Analog Input Selected	BI
206	Slot 8 Ch 7 Analog Input Selected	BI
207	Isolation Valve Out of Position	BI
208	AB[12]15	BI
209	Air Actuator 2 Position Deviation	BI
210	Air Actuator 2 Feedback Low	BI
211	Air Actuator 2 Feedback High	BI
212	Air Actuator 2 Modbus Comm Error (Node 4)	BI
213	Air Actuator 2 Manual PB Pressed	BI
214	Air Actuator 2 Fault	BI
215	Air Actuator 2 Not At Purge	BI
216	Air Actuator 2 Not At Lightoff	BI
217	Air Actuator Not At Lightoff	BI
218	Fuel Actuator 1 Not At Lightoff	BI
219	Fuel Actuator 2 Not At Lightoff	BI
220	FGR Actuator Not At Lightoff	BI
221	VFD Not At Lightoff	BI
222	AB[13]13	BI
223	AB[13]14	BI
224	AB[13]15	BI
225	Nox Analyzer Present	BI
226	NOx Trim Enabled	BI
227	NOx Calibration Alarm	BI
228	Nox Sensor Comms Alarm	BI
229	M4/M5 Boiler Selected	BI
230	2 Brl L-L Slave Boiler IP Not Set	BI
231	2 Brl L-L Slave Boiler Comm Error	BI
232	2 Brl L-L Slave Boiler Not Capable of Comm Control	BI
233	2-Boiler L-L Master By Comms	BI
234	2-Boiler L-L Slave By Comms	BI
235	Boiler Ready To Modulate	BI
236	FW Level Low Water Level	BI
237	FW Level High Water Level	BI
238	Master panel Control Via Comms Boiler Ready	BI
239	Master panel Control Via Comms Heartbeat	BI
240	Master panel Control Via Comms Selected	BI
241	Flame Strength Honeywell	AI
242	Combustion Air Fan Speed	AI
243	AR[2]	AI
244	Boiler Efficiency	AI
245	Firing Rate	AI
246	O2 Level	AI
247	SP Steam Pressure/Water Temp	AI
248	Water Level	AI
249	Steam Pressure or Hot Water Temp	AI
250	AR[9]	AI
251	Stack Temp Before Economizer	AI
252	Combustion Air Temp	AI

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253	Water Temp Shell/Outdoor Temp	AI
254	Feedwater Temp/Econ Water Out Temp	AI
255	Stack Temp After Econ/Return HW	AI
256	Economizer Water In Temp	AI
257	AI Slot8Ch0 Value/2Stg Econ Temp IN	AI
258	AI Slot8Ch1 Value/2Stg Econ Temp OUT	AI
259	AI Slot8 Ch2 Value (EU)	AI
260	AI Slot8 Ch3 Value (EU)	AI
261	Safety Valve Setting or Max Water Temp	AI
262	Header Pressure or Temp 2 Boiler LL	AI
263	SP 2 Boiler LL	AI
264	Boiler Off Point	AI
265	Boiler On Point	AI
266	Condensate Return Valve Output Command	AI
267	Makeup Bypass Valve Output Command	AI
268	Slot8 Ch0 FLo Total	AI
269	Slot8 Ch1 FLo Total	AI
270	Slot8 Ch2 FLo Total	AI
271	Slot8 Ch3 FLo Total	AI
272	Slot8 Ch4 FloTotal	AI
273	Slot8 Ch5 Flo Total	AI
274	Slot8 Ch6 Flo Total	AI
275	Slot8 Ch7 Flo Total	AI
276	Slot8 Ch4 EU	AI
277	Slot8 Ch5 EU	AI
278	Slot8 Ch6 EU	AI
279	Slot8 Ch7 EU	AI
280	Stack Pressure	AI
281	NOx PPM	AI
282	Isolation Valve Output	AI
283	FW Valve Output	AI
284	AR[43]	AI
285	AR[44]	AI
286	AR[45]	AI
287	AR[46]	AI
288	AR[47]	AI
289	AR[48]	AI
290	AR[49]	AI
291	Burner Control Status Line 1 Honeywell	AI
292	Burner Control Status Line 2 Honeywell	AI
293	Burner Control Status Line 1 Fireye	AI
294	Burner Control Status Line 2 Fireye	AI
295	Flame Signal Fireye	AI
296	Fuel 1Type	AI
297	Fuel 2 Type	AI
298	Fuel 3 Type	AI
299	Elapsed Time (First 16 Bits)	AI
300	Elapsed Time (Second 16 Bits)	AI
301	Number Of Cycles (First 16 Bits)	AI
302	Number Of Cycles (Second 16 Bits)	AI
303	Duplicate of AB[6]	AI

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304	Boolean Bits to MP	AI
305	PLC Module Fault Num to MP	AI
306	ActuatorModbus[1].RdData.ErrCode to MP Air	AI
307	ActuatorModbus[2].RdData.ErrCode to MP F1A1	AI
308	ActuatorModbus[3].RdData.ErrCode to MP F1A2	AI
309	ActuatorModbus[4].RdData.ErrCode to MP Air2	AI
310	ActuatorModbus[5].RdData.ErrCode to MP F2A1	AI
311	ActuatorModbus[6].RdData.ErrCode to MP F2A2	AI
312	ActuatorModbus[7].RdData.ErrCode to MP FGR	AI
313	ActuatorModbus[8].RdData.ErrCode to MP F3A1	AI
314	ActuatorModbus[9].RdData.ErrCode to MP F3A2	AI
315	AI[25]	AI
316	AI[26]	AI
317	AI[27]	AI
318	AI[28]	AI
319	AI[29]	AI
320	Elapsed Time	AI
321	Number Of Cycles	AI

