

iFire Burner Controller User Manual

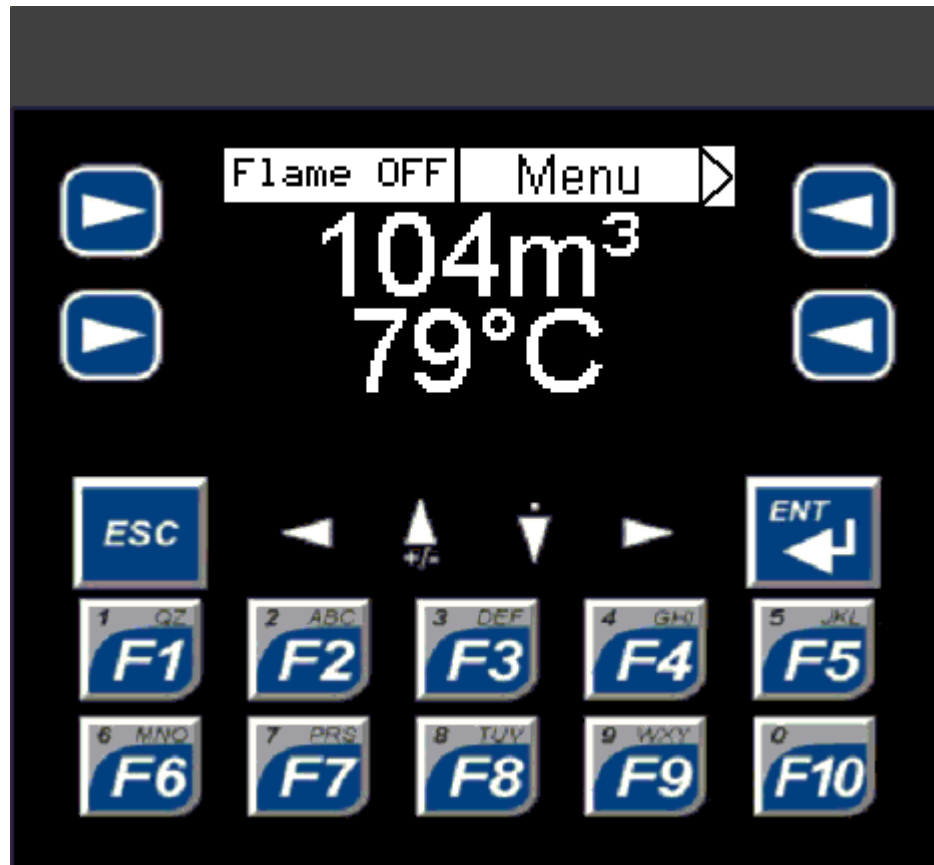


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Description of Operation

The iFire Burner Controller is programmed to be a universal burner controller with selectable options to meet a variety of needs in most situations. The iFire allows the user to select and adjust the temperature desired inside the tank. At its simplest, the iFire will turn the flame on and off to maintain the temperature setpoint as well as shut down the burner if the fluid level in the tank becomes dangerously low.

Included Selectable Features

1. Level Control (Float Switches or Pressure Transmitter)
2. High Level alarm (Dry Contacts for Skid shutdown or Hydraulic 'pump-to-tank' valve)
3. Auto Restart after Low Level Shutdown (only available with Transmitter Level Control)
4. Continuous Pilot
5. Low Fire / High Fire for High BTU output
6. Soft Start
7. Auto Restart on Flame Fail (adjustable to a minimum delay of 60min)
8. Modbus Communication for Scada including remote shutdown capability
9. 48hr and 24hr Trends on Temperature and Level
10. Alarm history (last 30 alarms) including date and time
11. Operator Adjustable temperature setpoint
12. Auto Restart on Power Cycled

Screen Display

During normal operation the screen will display one of the two home screens depending on the level monitoring devices in use. If a pressure transmitter is used to determine the level of fluid in the tank than the home screen is shown in Figure1. If Float Switches are used for level control, the current tank level is unknown and the home screen is shown in Figure2.

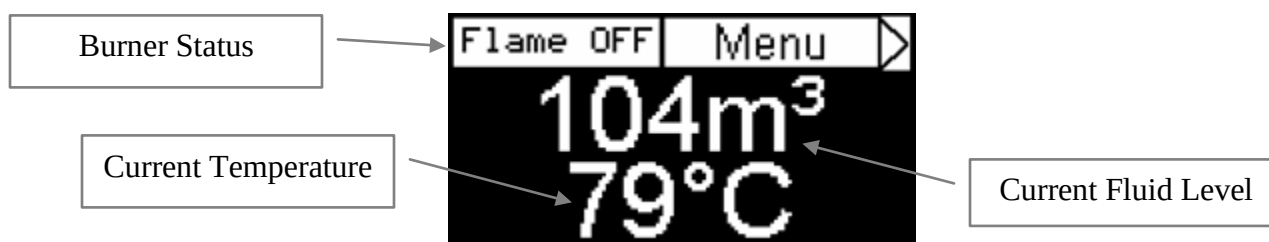


Figure1: Level Transmitter

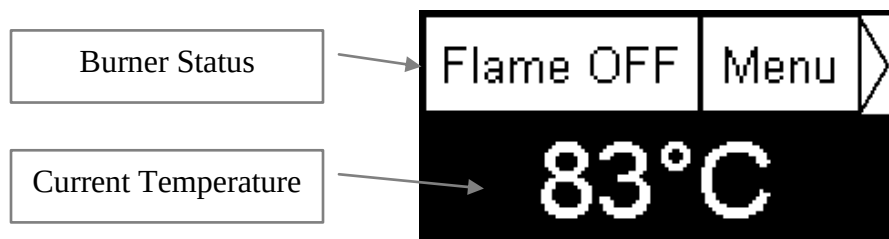


Figure2: Level Switch (Float)

Ignition Startup Sequence

The iFire will turn the flame off when the temperature in the tank has reached the operator selectable setpoint. Once the temperature has dropped 2°C below the setpoint, the Burner Controller will turn the flame on and begin heating the tank. During the ignition sequence the screen will display the current stage of ignition and walk the user through the process. This screen is shown in Figure3.

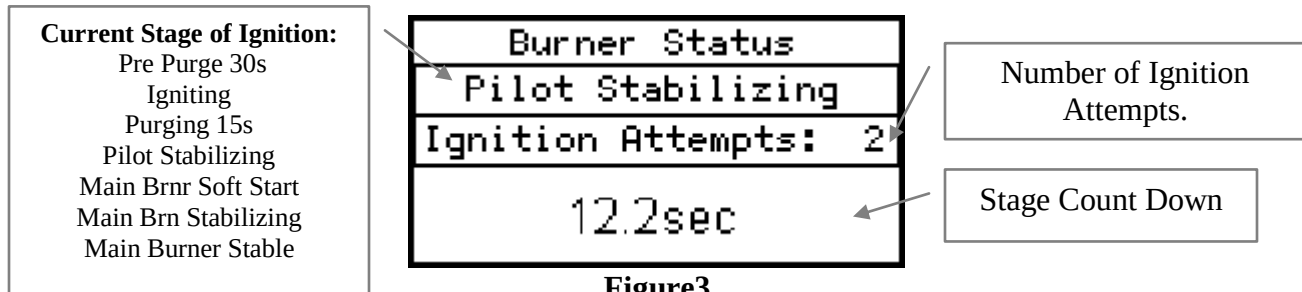


Figure3

Note: During Ignition Startup Sequence, the Burner Controller will attempt to ignite the gas 3 times before going into Flame Fail

Menu Features and Navigation

The menu is accessible to the user by simply pressing the button that the 'Menu' word is pointing to. The only time that the Menu is not reachable is during the Ignition Startup Sequence. The 'Menu' word may be in a different place depending on which screen is being displayed, but the menu can be reached by pressing the button that is being pointed to.

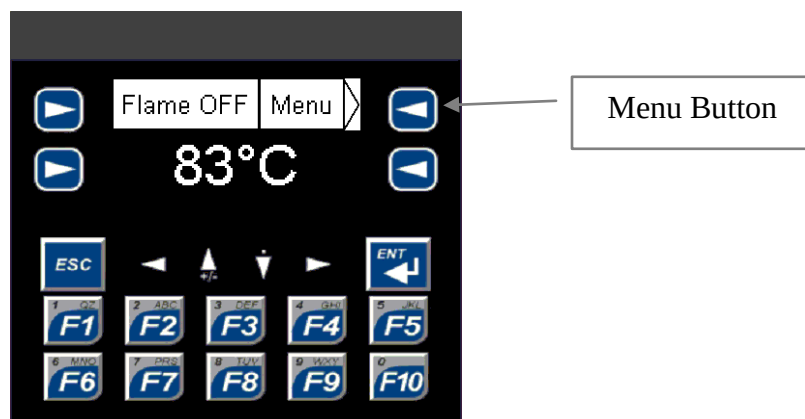


Figure4

Once pressed, the 'Menu' screen will be displayed shown in Figure5. From here the user can view and change the Temperature Setpoint, access the Historical Trends for Level or Temperature, or view the Alarm History. To exit the Menu, press the  button.

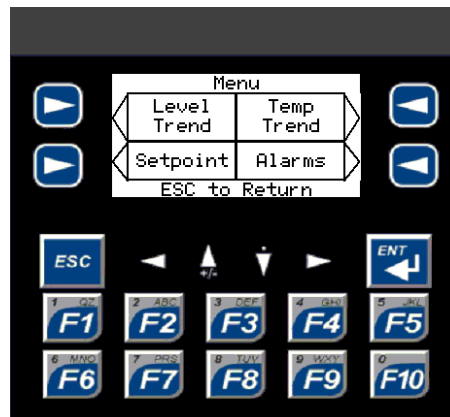


Figure5

Adjusting the Setpoint

From the Menu screen, press the 'Setpoint' button. This will take you to the 'Adjust Setpoint' screen shown in Figure6.

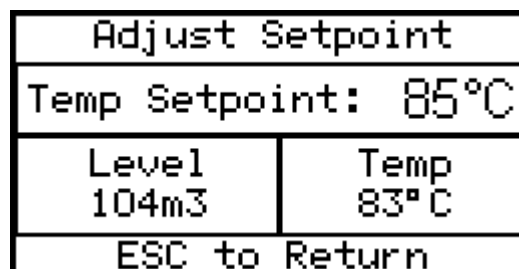


Figure6

Once this screen is displayed, press the  button to highlight the setpoint value then use the numbered keys to enter the desired value. Press the  button again to accept the newly entered value, or press the  button to discard the changes. Once the setpoint value is not highlighted, press the  button again to return to the menu screen.

Historical Trends

From the Menu screen, press the 'Level Trend' button to view the historical trend of the tank level. This will take you to the screen shown in Figure7 which shows a graph of the tank level over the past 48 hours.

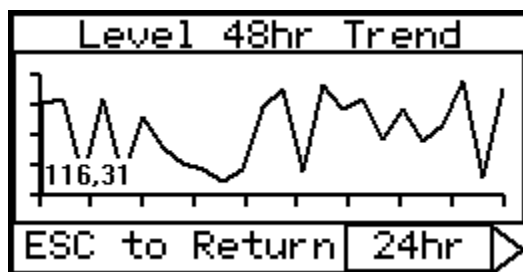


Figure7

The graph is scaled from 0m³ to 160m³. The operator may also press the '24hr' button to view the tank levels 24 hour graph. From the 24 hour trend screen press the  button to return to the 48hr trend screen and from the 48hr trend screen press the  button to return to the menu screen.

To view the historical trends of the tank temperature, press the 'Temp Trend' button from the menu screen. This will display the 48 hour trend of the tank temperature which is scaled from 50°C to 100°C. Navigating the temperature trend screens is the same as the level trend screens.

Alarm History

The iFire Burner Controller records and stores the 30 most recent alarms that have occurred including the date and time the alarm was triggered. To view the alarm history press the 'Alarms' button from the menu screen. This will display the 6 most recent alarms that have occurred which is shown in Figure8.



Figure8

Once the 'Alarm History' screen is displayed the operator may press the  or  button to scroll up and down and view alarms 1 through 6. The operator can also use the  button to skip to the very top of the list or use the  button to skip to the bottom of the list. The 'Alarm History' screen allows the operator to view 6 alarms at a time.

To view the next 6 alarms go to the bottom of the list and highlight the selection named ‘Alarms 7-12’ shown in Figure9 and press the  button.



Figure9

Now the Alarm History screen will display alarms 7 through 12 and at the bottom of that list is a selection named ‘Alarms 13-18’. Highlight this selection and press the  button to view alarms 13 through 18 and so on. Press the  button to go back to the previous alarm group, and also to exit to the menu screen.

Alarms

The iFire Burner Controller has been developed to shut down onsite equipment if an unsafe situation arises. When an alarm state is triggered an alarm screen appears which is shown in Figure10. The alarm screen displays the alarm type, what equipment has been shutdown or operator action required.

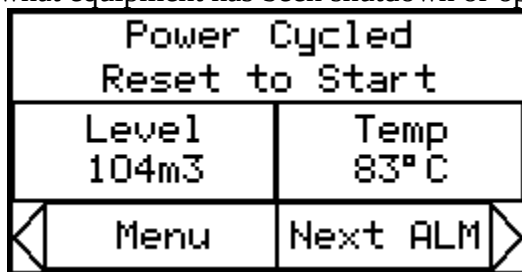


Figure10

In this case, the alarm type is Power Cycled which means that the controller has lost power and now the power has been restored. It informs the operator that a reset is required to begin normal operation. Also displayed on the alarm screen is the current tank level and fluid temperature. The alarm screen only allows the viewing or resetting of 1 alarm at a time. To view any other alarm that has been triggered press the button that the ‘Next ALM’ is pointing to. This will cycle the display to the next pending alarm condition. By pressing this button multiple times the operator can view all pending alarms by cycling through them. The operator can also get into the menu screen by pressing the button that the ‘Menu’ is pointing to. From there the Alarm History and Historical Trends may be viewed to provide a more detailed diagnostics.

Alarm Details

There are several ‘Alarm’ states that may result in a burner shutdown or well ESD and this section details each alarm, what caused it and troubleshooting tips.

<table><tr><td colspan="2">iFire Status</td></tr><tr><td colspan="2">Idle Mode</td></tr><tr><td colspan="2">iFire Halted</td></tr><tr><td colspan="2">Set RUN to continue</td></tr></table>	iFire Status		Idle Mode		iFire Halted		Set RUN to continue		iFire has been Halted and is NOT operating		
iFire Status											
Idle Mode											
iFire Halted											
Set RUN to continue											
Action	Press  to highlight the “Idle Mode” then use the  or  to select “Run Mode” and press  again to accept it.										
<table><tr><td colspan="2">Power Cycled</td></tr><tr><td colspan="2">Reset to Start</td></tr><tr><td>Level</td><td>Temp</td></tr><tr><td>104m3</td><td>83°C</td></tr><tr><td>Menu</td><td>Next ALM</td></tr></table>	Power Cycled		Reset to Start		Level	Temp	104m3	83°C	Menu	Next ALM	Power has been lost and is now restored - Note: The Auto Start feature enables the iFire to auto run on a power cycle
Power Cycled											
Reset to Start											
Level	Temp										
104m3	83°C										
Menu	Next ALM										
<table><tr><td colspan="2">Temp XMitter Error</td></tr><tr><td colspan="2">Burner Shutdown</td></tr><tr><td>Level</td><td>Temp</td></tr><tr><td>104m3</td><td>+++°C</td></tr><tr><td>Menu</td><td>Next ALM</td></tr></table>	Temp XMitter Error		Burner Shutdown		Level	Temp	104m3	+++°C	Menu	Next ALM	Temperature Transmitter (Thermocouple) Error - Burner has been shut down
Temp XMitter Error											
Burner Shutdown											
Level	Temp										
104m3	+++°C										
Menu	Next ALM										
<table><tr><td colspan="2">Low Level ALARM</td></tr><tr><td colspan="2">Burner Shutdown</td></tr><tr><td>Level</td><td>Temp</td></tr><tr><td>58m3</td><td>83°C</td></tr><tr><td>Menu</td><td>Next ALM</td></tr></table>	Low Level ALARM		Burner Shutdown		Level	Temp	58m3	83°C	Menu	Next ALM	Low fluid level inside the tank (either float switch or transmitter) - Burner has been shut down
Low Level ALARM											
Burner Shutdown											
Level	Temp										
58m3	83°C										
Menu	Next ALM										
<table><tr><td colspan="2">Low Lvl Safe: Reset</td></tr><tr><td colspan="2">Auto Reset in: 32min</td></tr><tr><td>Level</td><td>Temp</td></tr><tr><td>104m3</td><td>83°C</td></tr><tr><td>Menu</td><td>Next ALM</td></tr></table>	Low Lvl Safe: Reset		Auto Reset in: 32min		Level	Temp	104m3	83°C	Menu	Next ALM	Low fluid level inside the tank has recovered and is now safe - Burner can be reset.
Low Lvl Safe: Reset											
Auto Reset in: 32min											
Level	Temp										
104m3	83°C										
Menu	Next ALM										
Description	When using a Level Transmitter there is an ‘Auto Reset’ feature on the Low Level Recovery parameter. This means that the iFire can be setup to shutdown the burner on low level and automatically restart the burner once the level has recovered. The time delay between recovery and Auto Restart can be adjusted but has a minimum of 30 minutes. This feature is not available when using a float switch for level control										

Guest Control Systems

IFIRE
USER MANUAL

Revision: 00 000
Date: 11/07/11

<table><tr><td colspan="2">High Temp ALARM Burner Shutdown</td></tr><tr><td>Level 104m3</td><td>Temp 96°C</td></tr><tr><td>◀ Menu</td><td>Next ALM ▶</td></tr></table>	High Temp ALARM Burner Shutdown		Level 104m3	Temp 96°C	◀ Menu	Next ALM ▶	The temperature inside the tank has reached a dangerously high temperature - Burner has been shut down
High Temp ALARM Burner Shutdown							
Level 104m3	Temp 96°C						
◀ Menu	Next ALM ▶						
<table><tr><td colspan="2">High Level ALARM Skid Shutdown</td></tr><tr><td>Level 148m3</td><td>Temp 83°C</td></tr><tr><td>◀ Menu</td><td>Next ALM ▶</td></tr></table>	High Level ALARM Skid Shutdown		Level 148m3	Temp 83°C	◀ Menu	Next ALM ▶	High fluid level inside the tank (either float switch or transmitter) - Skid has been shut down
High Level ALARM Skid Shutdown							
Level 148m3	Temp 83°C						
◀ Menu	Next ALM ▶						
<table><tr><td colspan="2">Ign. Module Failed: Call Guest Controls @ 780-875-5822</td></tr><tr><td>Level 89m3</td><td>Temp 84°C</td></tr><tr><td>◀ Menu</td><td>Next ALM ▶</td></tr></table>	Ign. Module Failed: Call Guest Controls @ 780-875-5822		Level 89m3	Temp 84°C	◀ Menu	Next ALM ▶	The Ignition Module (Fenwal) has failed to respond
Ign. Module Failed: Call Guest Controls @ 780-875-5822							
Level 89m3	Temp 84°C						
◀ Menu	Next ALM ▶						
<table><tr><td colspan="2">Remote Brnr Shutdown Enabled</td></tr><tr><td>Level 104m3</td><td>Temp 83°C</td></tr><tr><td>◀ Menu</td><td>Next ALM ▶</td></tr></table>	Remote Brnr Shutdown Enabled		Level 104m3	Temp 83°C	◀ Menu	Next ALM ▶	The burner has been shutdown remotely (SCADA) - The burner can't be reset until the remote source disables the shutdown
Remote Brnr Shutdown Enabled							
Level 104m3	Temp 83°C						
◀ Menu	Next ALM ▶						
<table><tr><td colspan="2">Remote Skid Shutdown Enabled</td></tr><tr><td>Level 104m3</td><td>Temp 83°C</td></tr><tr><td>◀ Menu</td><td>Next ALM ▶</td></tr></table>	Remote Skid Shutdown Enabled		Level 104m3	Temp 83°C	◀ Menu	Next ALM ▶	The skid has been shutdown remotely (SCADA) - The skid can't be restarted until the remote source disables the shutdown
Remote Skid Shutdown Enabled							
Level 104m3	Temp 83°C						
◀ Menu	Next ALM ▶						
<table><tr><td colspan="2">Level XMitter Error Brnr & Skid Shutdown</td></tr><tr><td>Level +++m3</td><td>Temp 83°C</td></tr><tr><td>◀ Menu</td><td>Next ALM ▶</td></tr></table>	Level XMitter Error Brnr & Skid Shutdown		Level +++m3	Temp 83°C	◀ Menu	Next ALM ▶	Pressure Transmitter (for level) Error - Burner and Skid have been shut down
Level XMitter Error Brnr & Skid Shutdown							
Level +++m3	Temp 83°C						
◀ Menu	Next ALM ▶						
<table><tr><td colspan="2">Flam Fail: Rst Retry Auto-Start in 65min</td></tr><tr><td>Level 148m3</td><td>Temp 83°C</td></tr><tr><td>◀ Menu</td><td>Next ALM ▶</td></tr></table>	Flam Fail: Rst Retry Auto-Start in 65min		Level 148m3	Temp 83°C	◀ Menu	Next ALM ▶	Flame Failed to light during ignition - Burner will automatically reset and retry ignition - Reset manually to retry immediately
Flam Fail: Rst Retry Auto-Start in 65min							
Level 148m3	Temp 83°C						
◀ Menu	Next ALM ▶						
<table><tr><td colspan="2">Setup Incomplete Call Guest Controls: 780-875-5822</td></tr><tr><td colspan="2">High Temp 98°C</td></tr><tr><td>Max 95</td><td>Min 50</td></tr></table>	Setup Incomplete Call Guest Controls: 780-875-5822		High Temp 98°C		Max 95	Min 50	One or more of the Initial Setup values has been lost or not entered correctly - The burner and skid have been shutdown
Setup Incomplete Call Guest Controls: 780-875-5822							
High Temp 98°C							
Max 95	Min 50						

Warnings

This is a feature that lets the user know when any value is approaching an alarm setpoint and is intended to be used with SCADA or some other form of monitoring. This feature can be enabled or disabled by a qualified technician. The screen will display any active warnings, the High Temperature Warning screen shown in Figure11.

High Temp Warning Reset to Acknowledge	
Level 104m3	Temp 93° C
◀ Menu	

Figure11

It is important to know that Warnings are NOT Alarms, there are no shutdowns performed and they auto-clear. For example, in Figure11 the High Temp has been set to 95°C and the High Temp Warning has been set to 92°C. As the Temperature in the tank reaches 92°C the High Temp Warning screen is displayed but there are no shutdowns performed. The operator can use the reset switch to acknowledge this warning and clear the screen, or the screen will auto clear itself after the temperature has dropped below a 2°C deadband from the 92°C warning setpoint. Once the temperature has cooled below to 90°C the warning screen will clear and the home screen will be displayed.

There are 4 different warnings: High Level, Low Level, High Temperature and Low Temperature.

Communications

The iFire Burner Controller is Modbus ready and can communicate via RS485. The parameters that can be read and written are described below.

Read ONLY Bits	
Description	Modbus Address
Alarm (any alarm active)	43600.01
Burner Flame ON	43600.02
Level Transmitter Failed	43600.03
High Fluid Level	43600.04
Low Fluid Level	43600.05
Temp Transmitter Failed	43600.06
High Temperature	43600.07
Setup Incomplete	43600.08
High Fluid Level Warning	43600.09
Low Fluid Level Warning	43600.10
High Temperature Warning	43600.11
Low Temperature Warning	43600.12
Burner OFF by Remote	43600.13
Engine OFF by Remote	43600.14
Low Fuel Gas Pressure	43600.15
High Fuel Gas Pressure	43600.16
Write ONLY Bits	
	Modbus Address
Turn OFF Burner Remotely	3600
Turn OFF Engine Remotely	3601

Read ONLY Integers (16bit)	
Description	Modbus Address
Current Fluid Depth	43601
High Fluid Level Deadband	43602
High Fluid Level Setpoint	43603
Low Fluid Level Deadband	43604
Low Fluid Level Setpoint	43605
Low Level Auto Reset Count Down*	43606
Temperature Setpoint	43607
Current Temperature	43608
High Temperature Setpoint	43609
High Temperature Deadband	43610
Flame Fail Auto Reset Count Down**	43611
High Level Warning Setpoint	43612
Low Level Warning Setpoint	43613
High Temperature Warning Setpoint	43614
Low Temperature Warning Setpoint	43615
Tank Height in inches	43616
Tank Diameter in inches	43617
Level Transmitters Height in inches	43618
Burner Tubes Height in inches	43619
Level Transmitters Range 0-XX psi***	43620
Oil Density (Specific Gravity)	43621
Read ONLY Real (32bit)	
Description	Modbus Address
Current Fluid Depth REAL	43651-2
Current Temperature REAL	43653-4

*** Low Level Auto Reset Count Down:** Once a Low Level alarm is triggered the iFire may Auto-Start after a minimum time delay of 30 minutes (only available if using level transmitter. See Low Level Safe on Page 8). This register shows minutes left until auto-start.

**** Flame Fail Auto Reset Count Down:** Once a Flame Failed alarm is triggered the iFire will Auto-Start after a minimum time delay of 60 minutes (See 'Flame Fail' on Page 10). This register shows minutes left until auto-start.

***** Level Transmitters Range:** This register shows the range of the pressure transmitter used to determine fluid level. Standard sites will use a 0-15psi transmitter; however, any transmitter that is relative to zero may be used. This register shows the top-end range of the pressure transmitter in use. For example, when using a 0-15psi transmitter this register will show 15, when using a 0-25psi transmitter this register will show 25. A 10-40psi transmitter cannot be used; it must be relative to zero.

Alarm Codes:

- 0 No Alarm Recorded
- 1 Temperature Transmitter Error
- 2 High Temperature
- 3 Low Level
- 4 Level Transmitter Error
- 5 Ignition Module Failed
- 6 Flame Failed
- 7 High Level
- 8 Setup Incomplete
- 9 Remote Burner Off
- 10 Remote Skid ESD
- 11 Power Cycled
- 12 Low Gas Pressure
- 13 High Gas Pressure

Alarm History (see alarm code table above)	
Description	Modbus Address
Alarm 1 Code	43700
Alarm 1 minute	43701
Alarm 1 hour	43702
Alarm 1 day	43703
Alarm 1 month	43704
Alarm 2 Code	43705
Alarm 2 minute	43706
Alarm 2 hour	43707
Alarm 2 day	43708
Alarm 2 month	43709

----Continues Sequentially----

Alarm 29 Code	43840
Alarm 29 minute	43841
Alarm 29 hour	43842
Alarm 29 day	43843
Alarm 29 month	43844
Alarm 30 Code	43845
Alarm 30 minute	43846
Alarm 30 hour	43847
Alarm 30 day	43848
Alarm 30 month	43849