



Rodin EZ-FLAME SOFTWARE

User Manual



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Preface

This manual describes the use of Safe-Fire Rodin software with the EZ-FLAME detection system.

Manual Content

The manual consists of the following sections:

- *Instruction* gives an overview of the Rodin software.
- *Installation* includes general information of the Rodin software working environment.
- *Tool Overview* provides detailed information how the Rodin software works.
- *Operation Basics* contains information and procedures for using the Rodin software.
- *Troubleshooting* lists the solutions for some common failure cases.
- *Warning*

Manual Convention

This manual uses certain conventions and definitions that a user should become familiar with. These conventions and definitions are as follows:

- *AC Amplitude:*
This is the relative signal strength from the target flame. It is the first factor to measure the target flame presence by the Rodin software.
- *AMP:*
The amplifier module plays key role in monitoring two detectors. The Rodin software recommends using both detectors on one burner.
- *Burner:*
A boiler consists of a main burner and a pilot burner (igniter). The user can identify the burner with customized labels in the Rodin software.
- *Detection Types:*
There are two types of flame detectors: Infrared (IR) and Ultraviolet (UV), which can be installed on the main or pilot channel and identified on the Rodin software “Burner Status” screen.

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■ *Fault:*

Fault indicates the flame detection channel is not working properly. This fault is normally activated when the detector self-checking function fails. The detector self-checking function occurs approximately every 2 minutes and continues to run during the fault. The flame fault indication will be “ON” during the fault. For details on the fault information, see the “ALARM” screen.

■ *FFRT:*

FFRT stands for “Flame Failure Response Time”. This is the time elapsed when the flame is lost until the flame relay de-energizes and locks out. The time delay can be set from 1 to 6 seconds.

■ *FRAM:*

It stands for “Ferroelectric Random Access Memory”. FRAM is a super memory product for non-volatile memory. The memory can be used to hold all the information collected from setup and operating data.

■ *Frequency:*

This is the flicker signal frequency component derived from the target flame and the second factor to measure the target flame presence by the Rodin software.

■ *FQ:*

FQ stands for Flame Quality. It is one of the target flame measurement parameters. FQ value is based on the AMP analog output when considering all factors as DC, AC & FREQ components. When the target flame is “OFF”, the FQ value is 0% and when the target flame is “ON”, the FQ value is 100%.

■ *Gain:*

In order to accommodate different flame sensitivities, the Rodin software supports the option to add signal gain into or subtracted from the input flame signal for proper screen display.

■ *Main Burner:*

This is the burner using the main fuel. The Rodin software recommends connecting the main burner cable to AMP Channel □.

■ *MAX:*

MAX indicates the maximum flame AC component, which should indicate 20 mA on the 4-20 mA current loop output to the BMS.

■ *MIN:*

MIN indicates the minimum flame AC component, which should indicate 4 mA on the 4-20 mA current loop output to the BMS.

■ *OFF_TH:*

This is the threshold for indicating when the target flame is “OFF”. It is used to measure the AC component. When the AC value is lower than the threshold, the flame state is “OFF”.

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■ *ON_TH:*

This is the threshold for indicating when the target flame is “ON”. It is used to measure the AC component. When the AC value is between the OFF_TH and the ON_TH, the flame state is “ON”. Normally, ON_TH should be set higher than the OFF_TH.

■ *OTD:*

When the Flame Intensity value raises to or above the Flame Relay ON_TH, the flame relay will energize after the On Time Delay (OTD). The OTD can be set from 1 to 6 seconds. The relay open (NO) output will close and the normally closed (NC) output will open.

■ *Pilot Burner:*

The pilot is used to ignite the main burner. The Rodin software recommends connecting the pilot burner cable to AMP Channel #2.

■ *Status:*

The Rodin software displays the flame status as FLAME ON, FLAME OFF and FAULT based on the amplifier analysis. See more details in System Overview and BurnerStatus sections.

■ *TEMP:*

TEMP represents the internal detector’s temperature higher than -40°C or -40°F. The value can be displayed in Celsius or Fahrenheit. 85°C is maximum working operating temperature. The temperature above 85°C may damage the detector and trigger alarms.

Instruction

Congratulations for selecting the EZ-FLAME detector. You have chosen a powerful, easy-to-use and the safest flame detection product on the market. This manual contains information that is required to properly operate the EZ-FLAME equipment by running the Rodin software on the PC. The Rodin software is a graphical user interface (GUI) for the EZ-FLAME detection system and providing visibility into the flame's real-time performance and behavior for the entire system.

In order to get the best performance from the EZ-FLAME detector installed in the system, an administrator can easily adjust the parameters of the corresponding amplifier to optimize the detection based on flame conditions and customer requirements.

Topics in this manual cover:

- Preface
- Instruction
- Installation
- Tool Overview
- Operation Basics
- Troubleshooting
- Warning

Installation

Use the following information to install the Rodin software on the PC: ensure the PC has a Prolific USB to Serial/UART driver installed, and meets the minimum requirements as shown below:

System Requirements:

- *Windows® XP SP3*
- *Windows® Vista SP1 or later*
- *Windows® 7*
- *Windows® 7 SP1*
- *Windows® Server 2008 R2 SP1*

Servers

- *The Microsoft .NET Framework 4 installed*

Hardware Requirements:

- *Recommended Minimum: Pentium 1GHz or higher with 1GB RAM or more*
- *USB 2.0 host controller or above*
- *Minimum disk space: 120GB*
- *Widescreen PC monitor, at least 1366 x 768 pixel display resolution*

Before you start to install the Rodin software on your PC, connect the RS-485 adapter to a spare USB port on your PC, then click on the Rodin installer. The automatic installation should take place if a suitable drive mentioned earlier is automatically found. The Prolific driver installation status is shown in Figure 1.

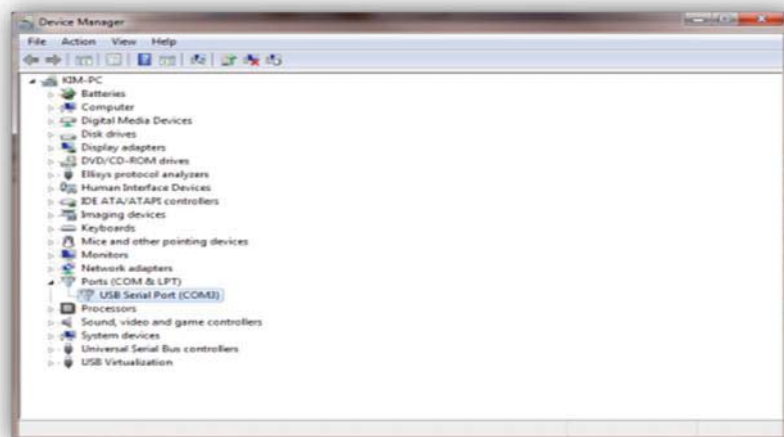


Figure 1: Prolific driver installation status

Tool Overview

This section provides the operating tool information that is necessary for the Rodin software.

Overview

The Rodin software tool comprises the following features and elements:

- Monitors the flame status and captures flame data in less than 1 second.
- Provides two user classifications with different access rights.
- Modifies the EZ-FLAME detector's parameters in the real-time.
- Provides each EZ-FLAME detector's overview status: "Flame-On", "Flame-Off" and "Fault".
- Displays the flame quality on each burner, including the target flame intensity, flame ratio, detector temperature and alarm code.
- Allows a user to track any detector's alarm history.
- Uses a toolbar on the left side to access the most frequently viewed screens.

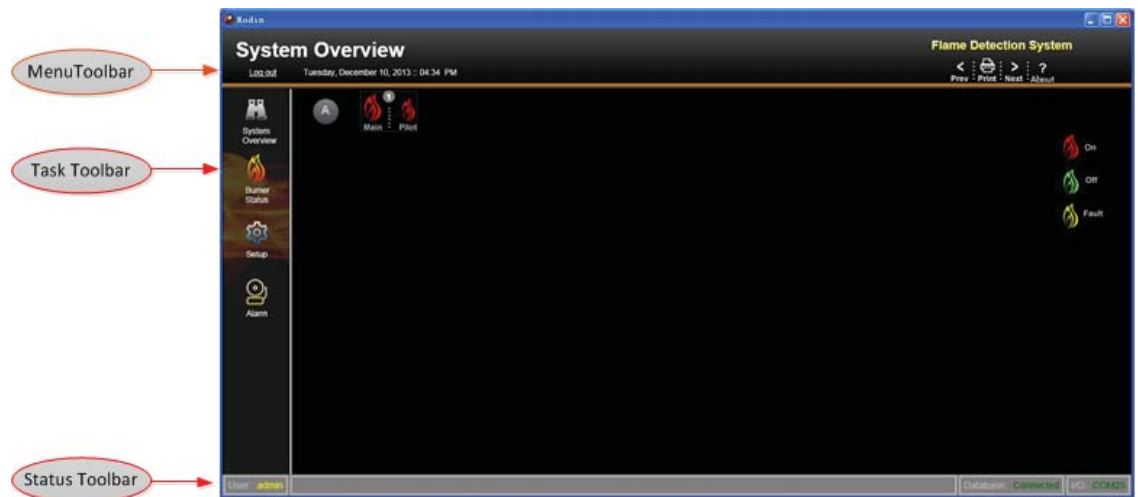




Figure 2: Rodin Software Tool


Tool Overview


Rodin’s toolbars (Menu, Task and Status) provide easy and quick access to common features. Right click any icon in the toolbar, and the Rodin software will provide the screen selected.

Toolbars

- **Menu Bar:** This toolbar at the top of the Rodin window contains the “Log In” button, system running time stamp and the browser menus  :

Clicking  allows the user to jump to the previous page.

Clicking  allows the user to jump to the next page.

Clicking  allows the user to save the current page in the form of images stored in a user-defined path for printing later.

- **Task Bar:** This toolbar at the left side of the Rodin window contains major task buttons shown below: For more information, see the Major Screens Description section.



- **Status Bar:** This toolbar at the bottom of the Rodin window contains the buttons associated with Database connection and USB Serial Port connection options: Open, Close, connection status and user privilege level (admin or guest).

Tool Overview

Display Pane

The most important information mentioned in the “Major Screens Description” section can be displayed in the display pane after you right-click on any button listed on the Task Bar.

Major Screens Description

The Rodin software enables a user to view the entire boiler system’s flame status on the “System Overview” screen. It also records all flame statuses including: Flame On, Flame Off and Fault, as well as each detector’s configuration parameters. The parameters can be set to maximize the detector’s performance.

■ Log In

Login screen allows a user to log into the system account with two different privilege rights. This is useful in order to maintain the entire system configuration and database security. The details are shown below:

Table 1: User Accounts

Privileges	User Name	Password	Roles
administrator	admin	admin001	<ul style="list-style-type: none">● Setup I/O ports● Display the flame status on the overview screen● Scan the flame quality on a burner● Modify parameters of the amplifier● Scan the alarm records and save in another form
guest	null	null	<ul style="list-style-type: none">● Display the flame status on the overview screen● Scan the flame quality on a burner● Scan the alarm records

Tool Overview

Two types of user accounts are identified by logging in as an admin or a guest. Either of them can log into the system from the login screen as shown in Figure 3. Using a default password “admin001”, will allow logging into the system as an administrator and provide viewing of the following screens:

- System Overview
- Burner Status
- Setup
- Alarm

Logging in as a guest without a password, ‘Setup’ screen access will be denied.

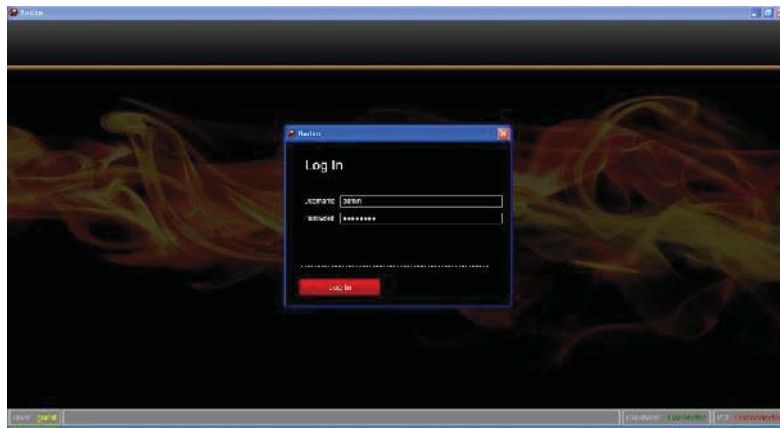


Figure 3: Log In Screen

Log in status should be displayed in the right corner of status toolbar.



Note: Once you have logged into the system, “Log Out:” should appear in the right corner of menu bar. For details, see the previous section under Menu Bar. If you log out as the administrator, all the administrator privileges explained in Table 1 will be lost.

Tool Overview

■ System Overview

Details of the entire system flame status (ON, OFF, FAULT) should be displayed on this screen. In addition to the flame status, the burner location, AMP ID and detector type (main, pilot) will be displayed.

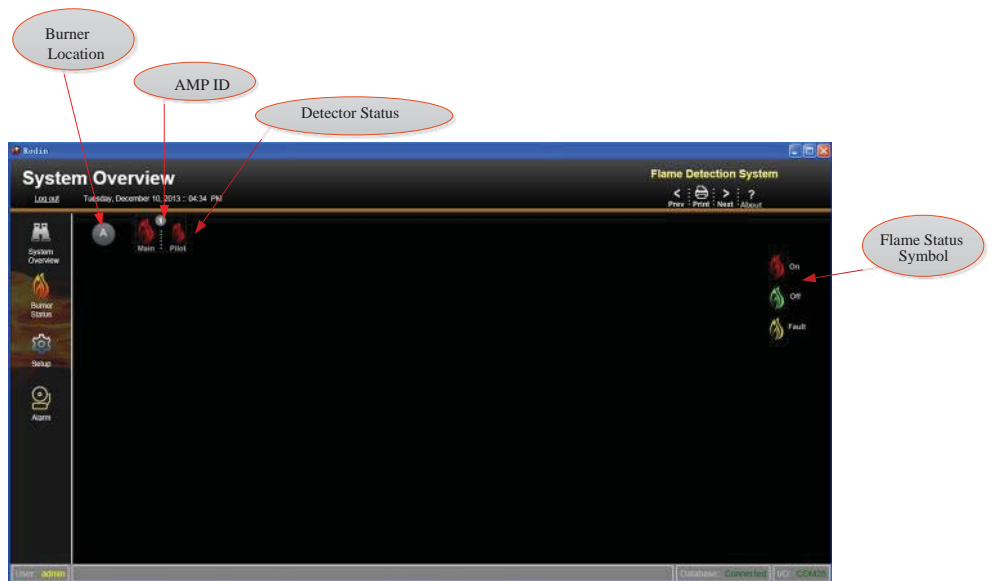


Figure 4: System Overview Screen


On the above screen, the user should notice the following rules:

1. For the flame status symbol definition, refer to the Preface Manual Convention section.
2. The burner status icon also means one AMP's measuring result, and the center number **1** icon shows the AMP ID, which is an integer number and limited from 1 to 128.
3. Icon **A** in each line is the burner's location indicator, which is capitalized and limited from A to Z.
4. There are three types of status icons showing on this screen as follows:

icon  : flame on
 icon  : flame off
 icon  : fault

Tool Overview




- Click anywhere inside the burner icon , and it will take you to the Burner Status page. From this page, the user can get information about the flame quality and configuration parameters for the main detector and pilot detector. For more details, see the Burner Status section.

■ Burner Status

Burner Status screen will consist of a single burner's status that includes the following: Burner ID, AMP ID, and Flame Quality pane (Figure 5). A user can observe the flame quality and relative configuration parameters of the main and pilot detectors. The user with administrator privilege is allowed to modify each detector's configuration parameters by right clicking on the "UserSettings" button which is located on the right side of the screen.




Figure 5: Burner Status Screen

All of burner ID definitions follow the same rule: the burner ID combines burner location and AMP ID. For example, the Burner ID  is shown in the upper left corner of the above screen. A1 indicates the burner is located at the level A with AMP ID 1. The AMP ID is displayed in the center of the main or pilot detector bracket symbol.

Tool Overview

Underneath this symbol is the Flame Quality pane displaying the flame quality information that holds the identifiable icons and symbols as shown below:

Table 2: Flame Quality Pane

Items	Description
AC	See details in the Manual Convention section
DC	See details in the Manual Convention section
Fault	Display fault code in hex format : 00 → normal xx → See details in Table 4 in the Alarm section
FR Angular Gauge	Range: 0 ~ 100
FI Linear Gauge	Range : MIN ~ MAX Flame Intensity (FI) is detected by the DC, AC and FREQ of the flame. Using the color linear gauge shows the flame intensity's level and relative thresholds: ON, OFF. The gauge color changes accordingly based on detector type: UV → Violet ; IR → Red
FQ	Range: 0 ~ 100 See details in the Manual Convention section
FREQ	Frequency: 0Hz ~ 255Hz See details in the Manual Convention section
MAX	MIN ~ 1999 See details in the Manual Convention section
MIN	0 ~ MAX See details in the Manual Convention section
OFF_TH	0 ~ ON_TH See details in the Manual Convention section
ON_TH	OFF_TH ~ 1999 See details in the Manual Convention section
Status	Flame status: ON / OFF / Fault
Type	IR or UV (detector type)
TEMP	Range: >-40°C or -40°F The unit can be converted between Celsius and Fahrenheit by clicking on the  icon.

Tool Overview

The most important information on this screen is the Flame Status. Please note that the flame intensity (FI) level is determined by the AMP via the parameters as shown in Table 3: Flame Intensity, MIN, OFF_TH, ON_TH and AC.

Table 3: Relationship between Flame Status and Flame Intensity

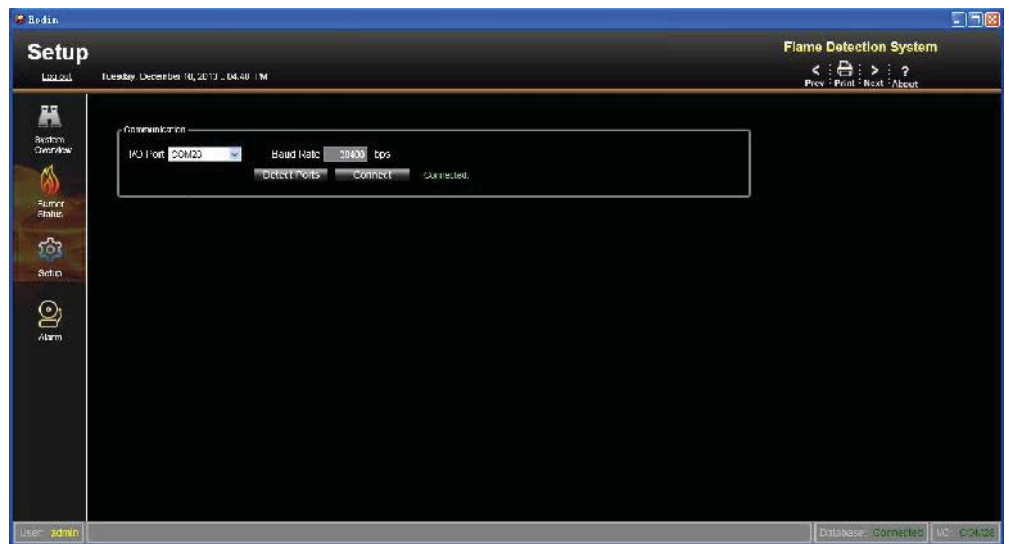
Flame Status	FLAME OFF	FLAME OFF	FLAME ON based on AC component	FLAME OFF
Flame Intensity's level	MIN	$\leq \text{OFF_TH}$	$\text{OFF_TH} \leq \text{AC} \leq \text{ON_TH}$	$\geq \text{ON_TH}$

The setting options for the main and pilot detector will be addressed in the Operation Basics section.

■ Setup

This lets the user connect the Rodin software to each EZ-FLAME detector installed in the system via a serial communication port. This function will be accessed by clicking on the “Setup” icon on the task bar.

The UT-850 (USB to RS-485) serial converter should be connected between the PC and the EZ-Flame detection system. Please ensure the driver is installed as explained in the Installation section. By clicking on the **Detect Ports** button, the Combo Box with the I/O port label will automatically display all of the I/O ports which have been detected by the PC. Select the right port, then click on the **Connect** button. The connection status message “**Disconnected**” should change to “**Connected**”.



Note: Can only be accessed by a user with administrator privilege. It is recommended to use an EZ-FLAME Networking cable UT-850 when setting up the communication port.

Tool Overview

■ Alarm

The Alarm is a powerful feature of the Rodin software. It allows a user to find any failure event that occurred during system operation by the burner ID in the top left corner of the Alarm screen. Each failure event of any AMP installed in the system will be captured and saved into a database with attributes, such as the time stamp, Burner ID, AMP ID and description. An example is shown in Figure 7.

<div> <div>Burner ID <input type="text"/></div> <div>Search</div> <div>Search All</div> <div>Save To File</div> </div>			
Timestamp	Burner ID	AMP ID	Description
2013-12-13 17:16:33	A1	1	Main scanner A1 failed on self-test
2013-12-13 17:19:31	A1	1	Main scanner A1 failed on self-test
2013-12-13 17:48:47	B4	10	Main scanner B4 failed on self-test
2013-12-13 17:55:25	B4	10	Main scanner B4 failed on self-test

Figure 7: Failure Events Display on the Alarm screen

In this example, burner A1 and B4 had failures occurred onAMP 1 and 10 at the different times. All of them failed during the self-checking test.

The left side of the Description column displays a detailed error message about what happened on a specific AMP. It covers the following failure cases:

1. *Detector failed on self-checking test*
2. *Detector temperature high*
3. *Fault has occurred on FRAM memory*
4. *Flame relay failed*



Note: The failure case shall be displayed on the Fault LED display on the Burner Status screen. However, it is shown as an error code. The error code is listed in Table 4.

Tool Overview


Table 4: Error Code

Error Code	bit0: main detector failed on self-checking test bit1: pilot detector failed on self-checking test bit2: not used bit3: FRAM bit4: main detector flame relay failed bit5: pilot detector flame relay failed bit6: main detector temperature high bit7: pilot detector temperature high
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Click on the Alarm icon on the task bar and the alarm will be displayed as shown in Figure 8. The following features are available on the alarm page.

- Search Engine

The search options of the Alarm screen allows the failure events to be sorted by burner ID. Enter the burner ID at ,

then click on the  button. Please note that clicking on the



button will restore all of the records.

Tool Overview

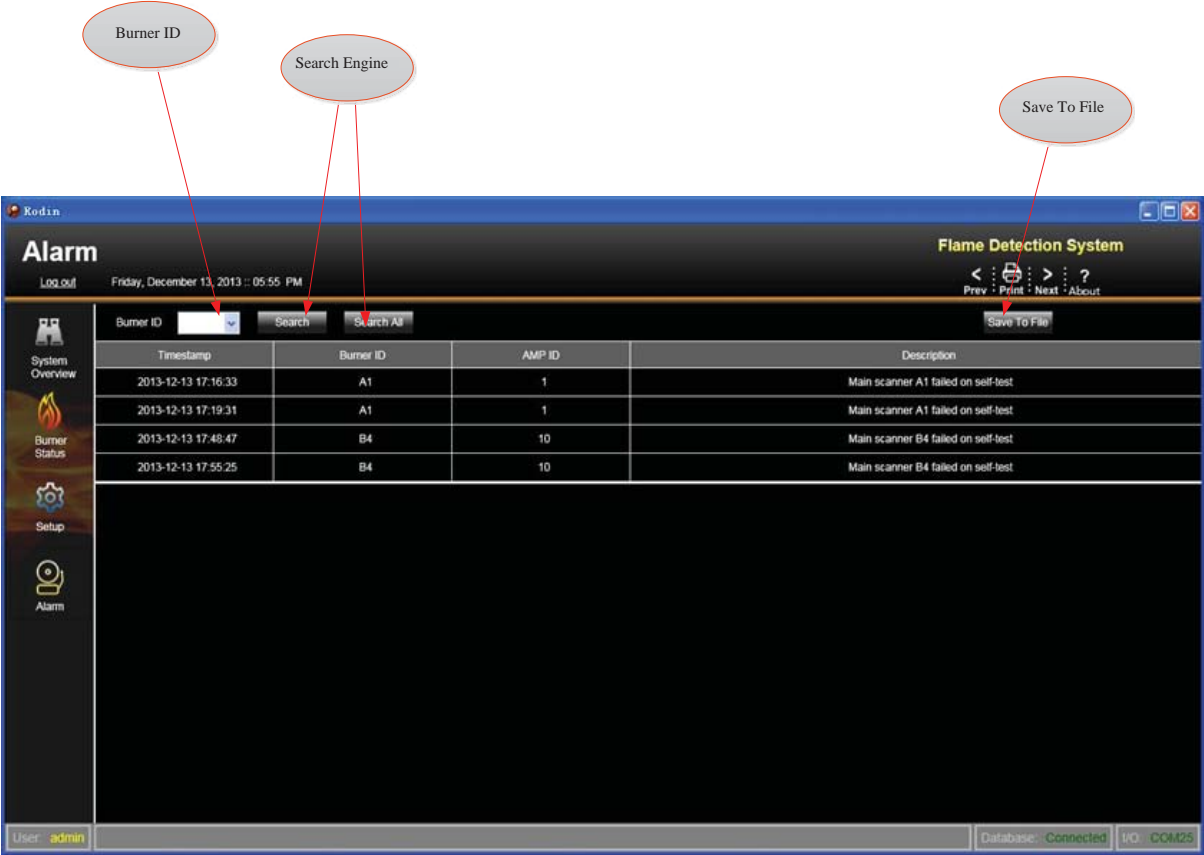


Figure 8: Alarm Screen

- Upload the alarm record
- Only a user with an administrator privilege is able to save the alarm records in a comma-separated values (CSV) file and stored in the user defined path by clicking on the **Save To File** button.

Operation Basics

This section provides a brief introduction of how the Rodin software controls and monitors all of the EZ-FLAME detectors in the system. As mentioned early, the Rodin software can display powerful real-time information of any burner's flame, such as flame status, detector self- checking and temperature, etc.

Overview

The EZ-FLAME system offers the RS-485 interface connection to a PC via USB Serial adapter called a UT-850. The PC has the Rodin software installed. All of the EZ-Flame detectors should be pre-programmed in order to get the proper flame detection performance. The system connection is shown in Figure 9.

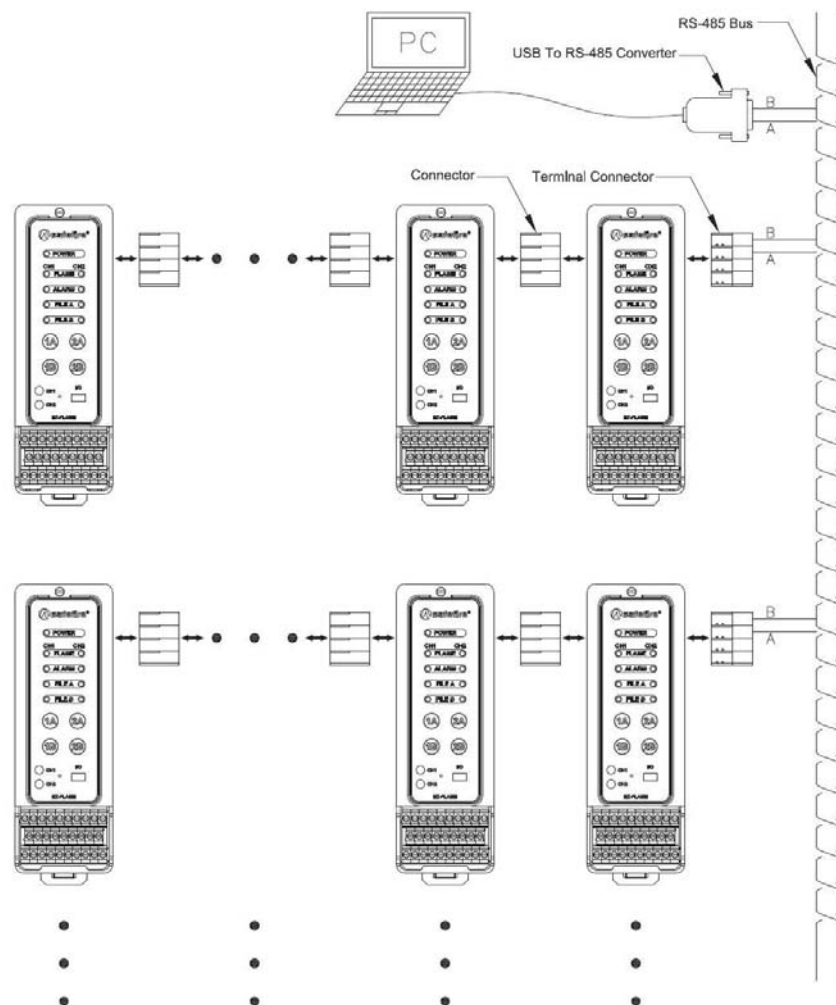


Figure 9: Rodin Software EZ-FLAME Configuration




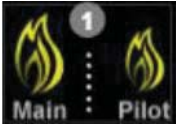
Operation Basics

Operation Procedures





This section describes the procedures necessary to monitor or manually adjust each detector's configuration parameters. The adjustment method can be used to optimize the performance of each detector connected to the system.

General Procedures

Do the following steps to ensure the Rodin software is performing properly:

1. Double click on the  icon on the PC desktop, start to run the Rodin software.
2. Once the Rodin software has started to run, log into the Rodin on the "LogIn" screen as shown in Figure 3 on page 9.
3. Click on the Setup  icon on the task menu, set up the communication between the PC and all of the EZ-FLAME detectors. See details in Setup section on page 13.
4. Check the entire system performance by clicking on the  icon on the task menu. See details in the System Overview section on page 10.
5. Check for more details of the flame status on any single burner. Open the System Overview page, then click anywhere inside burner icon , and it will bring up the Burner Status page.

Operation Basics

6. Check to see if any detector has errors by clicking on the  icon on the task menu. All of the alarm records can be sorted by clicking on  button and entering burner ID at the  or uploading into a file by clicking on the  button. See details in the Alarm section on page 15.


Adjustment Procedures

Based on the detector's performance displayed on the Burner Status screen, three adjustments listed below are available on the same screen. Each procedure is described in the section below:

- Setting Parameters for a Single Burner
- Setting Main/Pilot Detector Properties
- Modifying Detector Configuration File

Setting Parameters for a Single Burner



Please follow the steps listed below in order to set up each detector properly.

1. Click on the  on the right side of the Burner Status page, the Setting AMP parameter dialog box will appear, see Figure 10.

Operation Basics



Figure 10: Burner Status with AMP Parameter Setting Dialog Box

- Obtain the current parameters used on the AMP by clicking on the  button. If a user desires to modify the parameters according to a specific burner, simply click on the  button to finish the new parameter settings.



Note: Only a user with administrator privilege can modify the detector's parameters.

Operation Basics

Setting Main/Pilot Detector's Properties

The properties setting box is displayed on the top part of User Setting DialogBox shown in Figure 11. A user can click on the Main / Pilot tab for switching between those two detectors.

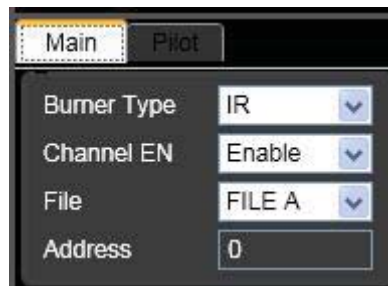


Figure 11: Detector Property Settings

Figure 11 includes the following information:

- **Burner Type:** This indicates the flame detector's type. This is based on the type of detector that will be installed on CH. #1 or CH. #2 of the AMP with ID #0.
- **Channel EN:** This is the software switcher for AMP channels. The User can turn on (enable) or turn off (disable) each channel as needed. By default, all the AMP channels are enabled. A user can disable any channel based on the channel connection status. After disabling, the flame channel icon should be hidden.
- **File:** Some typical parameter settings are saved in a specific order into a file in the AMP. There are two group files (A and B) used for each channel. Users can select the proper parameter groups based on the boiler environment.

Operation Basics

- **Address:** This shows the AMP communication address, and can be modified on the system configuration page. AMP address equals AMP ID minus 1.



Note: No AMP address can be changed after factory settings are done.

Modifying Detector Configuration File

The AMP has saved two group configuration files as FILE A and FILE B for each detector (main or pilot). The File Edit dialog box is located on the lower part of the User Setting Dialog box as shown in Figure 10.

Figure 12: Detector Configuration Parameter Settings

Operation Basics

When a user with the administrator privilege plans to modify any parameters in configuration file A or B, the certain rules need to be followed. Refer to Table 5 for more information:

Table 5: Configuration Rule

Parameters	Explanation	Range	Note
AC Gain	The gain value for AC component of the target flame	Range: [0.0001~1000] with 4 decimals Type: Real	For adjusting the AC output value in order to enhance the detectors performance.
Fc	Frequency in center of the target flame	Range: [3~126] Type: Integer	This value is decided by various factors in different burning environments.
AC ON_TH	The threshold for AC component to measure flame-on at high level	Range: [0~1999] Type: Integer	This value should be set no less than AC OFF_TH value. When the detected AC component value is higher than this value, the target flame state will be FLAME ON.
AC OFF_TH	The threshold for AC component to measure flame-on at low level	Range: [0~1999] Type: Integer	This value should be set no more than AC ON_TH value. When the detected AC component value is lower than this value, the target flame can be decided as FLAME OFF.
MAX	Set as the maximum of flame AC component, which corresponds to 20 mA from the flame analog output.	Range: [0~1999] Type: Integer	This value should be set larger than the current MIN value.

Operation Basics

Table 5: Continued

Parameters	Explanation	Range	Note
MIN	Set as the minimum of flame AC component, which corresponds to 4 mA by the flame analog output.	Range: [0~1998] Type: Integer	This value should be set smaller than the current MAX value.
Gain	The gain value for DC component of target flame	Range: [0.0001~1000] with 4 decimals Type: Real	For adjusting the DC output value in order to enhance the detectors performance.
DC ON_TH	The threshold for DC component to check flame-on at high level	Range: [-1999~1999] Type: Integer	This value should be no less than DC OFF_TH value. When the detected DC component value is higher than this value, the target flame can be determined as FLAME OFF.
DC OFF_TH	The threshold for DC component to check flame-on at low level	Range: [-1999~1999] Type: Integer	This value should be no more than DC ON_TH value. When the detected DC component value is lower than this value, the target flame can be determined as FLAME OFF.
FREQ ON_TH	The threshold for Frequency component to measure flame-on at high level	Range: [0 ~ 126] Type: Integer	This value should be no more than DC ON_TH value. When the detected DC component value is lower than this value, the target flame can be determined as FLAME OFF.

Operation Basics

Table 5: Continued

Parameters	Explanation	Range	Note
FREQ OFF_TH	The threshold for Frequency component to measure flame-on at low level	Range: [0 ~ 126] Type: Integer	This value should be no more than FREQ ON_TH value. When the detected FREQ value is lower than this value, the target flame can be determined as FLAME OFF.
OTD	On-Time Delay	Range: [1 ~ 6] Type: Integer	The time duration from flame OFF to flame ON.
FFRT	Flame Failure Response Time	Range: [1 ~ 6] Type: Integer	The time duration from flame ON to flame OFF.

Troubleshooting

- 1. After starting the Rodin software, I noticed the Port Connection status is closed all the time. What's wrong with it?**

Ensure the USB to RS-485 adapter cable UT-850 is connected to the USB port of PC.

- 2. Why can't I change the detector's configuration parameters from the User's Setting dialog box on the Burner Status Screen?**

Only the user with administrator privilege can edit those parameters.

Warning

1. The Rodin software used as the Human-Machine Interface (HMI) for the flame detectors is only effective for the pre-configured EZ-FLAME detection system. Copying the program or connecting it to other flame detection systems will be invalid.
2. Please keep the administrator password secured. Any change to parameter settings by administrator privileges must be executed by properly trained personnel. Otherwise, incorrect settings will cause the devices not to work properly.