FORNEY

RM IDD 9000 Flame Amplifier Manual

Part# 408120-01
Publication 372001-09 Rev. H

• BURNERS • IGNITERS • DAMPERS • CONTROLS

www.forneycorp.com

INTRODUCTION

This manual contains information for the RM IDD 9000 Flame Amplifier from Forney Corporation, 16479 North Dallas Parkway, Suite 600 Addison, TX 75001. www.forneycorp.com

All personnel should become thoroughly familiar with the contents of this manual before attempting to install, operate or maintain the RM IDD 9000 Flame Amplifier system. Because it is virtually impossible to cover every situation that might occur during operation and maintenance of the equipment described in this publication, personnel are expected to use good engineering judgment when confronted with situations that are not specifically mentioned herein.

PROPRIETARY NOTICE

REVISIONS

REVISIONS	DATE	COMMENTS
A	08/2011	Initial Release
B	10/2011	Remove Flame By-pass mode - Add TES - Update Block Diagram
C	03/2012	Correct Alarm relay wiring and notes
D	05/2015	Add IDD-Ultra, update grounding section, wiring diagrams
E	01/2017	Update drawings, RMA section, remove oscilloscope section, general updates
F	1/2018	Corrected figure numbering and reference in Section 3.1.1.1
G	10/2020	Firmware 7.2 Updates & minor general updates
H	2/24/2021	Correct Alarm Relay and update Table 2.9

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SECTION 1
GENERAL DESCRIPTION

The Forney RM IDD 9000 is a rack-mounted, dual-channel flame detector amplifier. It is a stand-alone intelligent controller composed of a single printed circuit board (PCB). All inputs and outputs of the dual channels are completely independent including separate fused power feeds from load sharing power supplies in each card rack. The amplifier receives DC power from the card rack, 15Vdc and 6.5Vdc minimum. The 15Vdc supplies power to the detector heads directly, creating the 50V Bias for the IDD detectors, 4-20mA and 0-10V and powers the 4 signal relays and the logic. The 6.5Vdc supplies power the microprocessors and the Termiflex/SmartDisplay®.

The amplifier should be located in a controlled environment such as a separate equipment cabinet. Electrical inter-connection with external equipment is accomplished by means of spring-cage plugs on plug-in connectors for easy maintenance.

The amplifier provides power, control, signal conversion and processing control for the Infrared Dynamic Detectors (IDD) and Ultraviolet (UV) detectors. The RM IDD 9000 can support any of the following combination of Forney flame detector heads:

- One or two IDD heads
- One or two UV-4 heads
- One IDD head and one UV-4 head

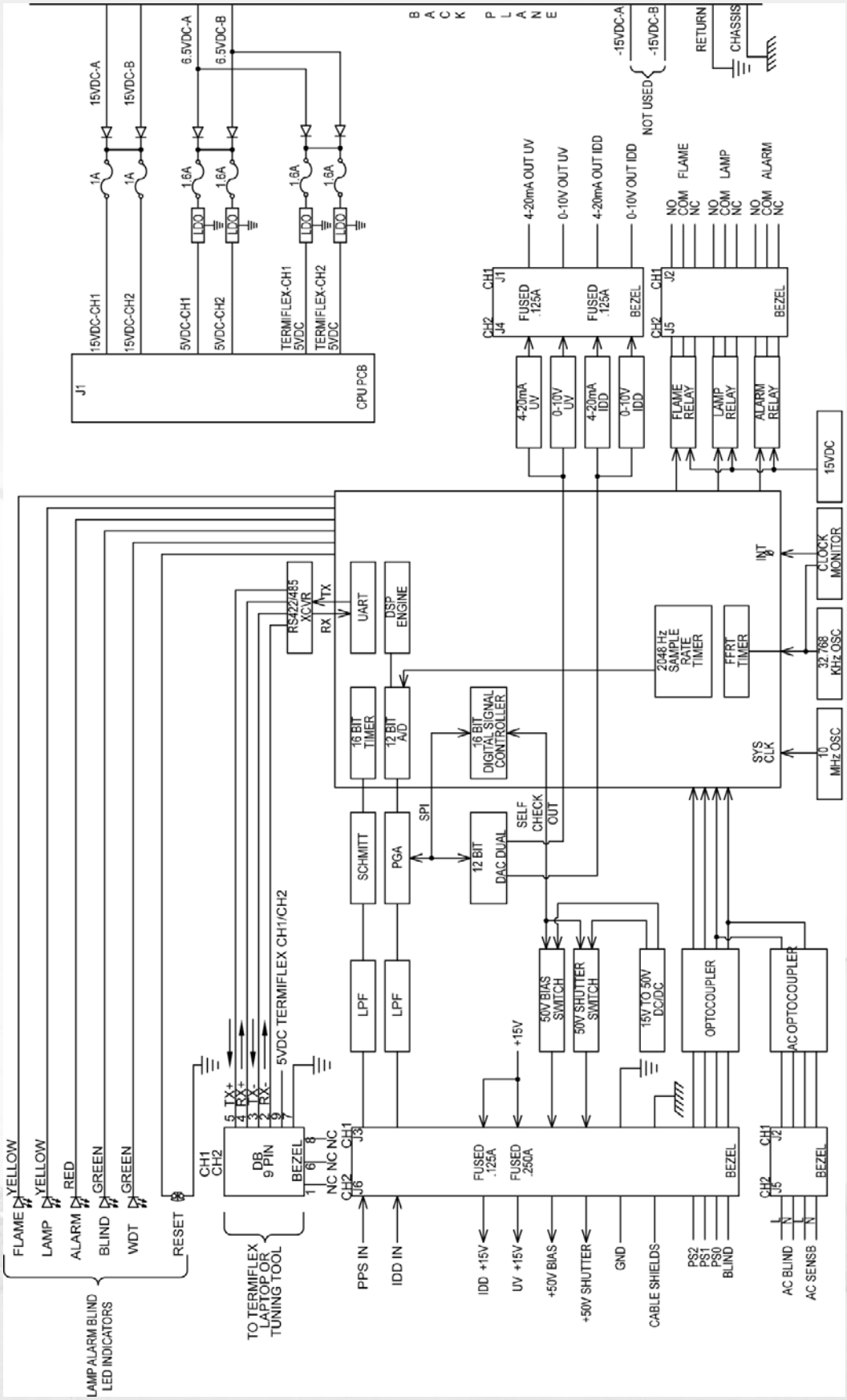
The IDD flame detector head produces an analog data signal whose amplitude and frequency vary with light intensity; the UV-4 flame detector head produces a digital pulse train whose frequency varies with light intensity. Consequently, the amplifier provides different signal-processing circuitry for these two inputs. Signal processing for the UV-4 input merely blocks low amplitude noise and then routes the pulses to the input of a digital counter. In contrast, signal processing for the IDD signal amplifies the input, generates an averaged dc voltage level and converts it into a digital pulse train output. This pulse train then serves as the input to the microprocessor.

At regular intervals, the microprocessor reads the value of the pulse counter(s) and compares those values with tuning parameters from memory. When the count value exceeds the corresponding value from memory, the microprocessor sets a flag to indicate flame presence. In addition, the count values provide a direct measure of infrared or ultraviolet light intensity striking the respective sensors. Accordingly, the PCB uses the two count values to generate separate analog output signals that can be used to drive flame intensity meters.

A serial communication port for each channel is located on the front of the RM IDD 9000. These ports enable communication between the microprocessors on the board and a hand-held Termiflex/SmartDisplay® via RS422/RS485 communication protocols. Forney also offers a Windows based software package, Terminal Emulator Software (TES), that supports diagnostics and tuning of the flame detection system. If the firmware in the amplifier detects an internal failure, it generates a corresponding error message that can be downloaded to the Termiflex/SmartDisplay®. Any failure will be continually broadcast until a reset pushbutton is pressed.

Upon completion of installation, the user must connect the Termiflex/SmartDisplay® to the amplifier and revise the tuning parameters suitable to detect the presence and absence of target flame. User-supplied tuning parameters are stored and remain unchanged until overwritten with new tuning parameters.

Figure 1-1 RM IDD 9000 Block Diagram



1.1 SPECIFICATIONS

Model: RM IDD 9000 Part# 408120-01 (with Bezel)	
Environmental Extremes	
Temperature:	0° to 60° C (32° to 140° F)
Humidity:	5% to 95% non-condensing
Power Requirements	
Logic power:	+6.5 VDC via redundant power sources, 12 Amp each. See Amp Rack Manual (Pub. #372000-96)
Analog power:	+15 VDC, via redundant power sources, 3A each. See Amp Rack Manual (Pub. #372000-96)
Power consumption:	See Amp Rack Manual (Pub. #372000-96)
Operational Characteristics	
Output relay rating (SPDT):	3 A at 125 VAC, 250 VAC & 30 VDC *3 relays are available for each Channel 1 and Channel 2 (Main Flame, Lamp & Alarm) **
Dimensions:	6 ½ x 14 x 1 ¾ inches (165.5 x 355.6 x 44.5 mm)
Flame Strength:	4-20 mA or 0-10 VDC (Resistive load up to 600Ω)
Flame Failure Response Time (FFRT):	1.0, 2.0, 3.0 or 3.8 seconds
Flame Pickup Time:	less than 2 seconds
Nonvolatile RAM:	8 complete operating profiles, Battery backed up
Compatible Flame Detector Heads:	IDD-II Filtered IR Detector (700nm - 3300nm) IDD-IIL Low Frequency IR Detector (700nm - 3300nm) IDD-IIU Unfiltered IR Detector (400nm - 3300nm) IDD-Ultra UV Detector (200nm - 425nm) IDD-UV UV Detector (300nm - 380nm) UV-4 UV Detector (190nm - 260nm)

* Alarm Relay is energized under 'No Alarm' condition.

SECTION 2
INSTALLATION

This section provides instructions and requirements for installing the Forney RM IDD 9000 assembly.

CAUTION: This board contains "STATIC SENSITIVE" components. Use standard electrostatic discharge (ESD) procedures whenever handling the PCB.

WARNING: Ensure all Flame Detector amplifiers, detectors, and cables are installed properly, and the amplifier is programmed exactly as described in this manual. DEVIATION IN ANY CASE MAY RESULT IN CATASTROPHIC FAILURES AND SEVERE DAMAGE TO EQUIPMENT AND/OR INJURY TO PERSONNEL.

2.1 RECOMMENDED TEST/TUNING EQUIPMENT AND INSTRUCTIONS

Table 2-1 list's recommended equipment and instructions for testing and tuning the RM IDD 9000. The RM IDD 9000 can be tuned either via the Termiflex/SmartDisplay® terminal or the Terminal Emulator Software (TES). Refer to Section 2.8 to program the Termiflex/SmartDisplay® terminal and Section 3 to tune the flame detection system.

Table 2-1 Tuning Equipment

Description	Manufacturer	Forney Part Number
Termiflex/SmartDisplay® terminal with 9-pin connector*	Termiflex, Inc.	408106-01
Terminal Emulator Software (TES) Kit, includes CD, cable, and DB9 to 25 adapter	Forney	92567-50
IDD and/or UV-4 flame detectors	Forney	Consult factory
Flame Simulator (simulated flame source)	Forney	FS-01

** If using an older Termiflex/SmartDisplay® terminal with a 25-pin connector (Part #364839-02) a DB25-pin to DB9-pin adapter (Part #408107-01) is required.*

2.2 MOUNTING CONSIDERATIONS

The RM IDD 9000 amplifier assembly should be installed in a card rack in an equipment cabinet. If the amplifier is installed in a location where exposure to the elements is likely, a NEMA 4 cabinet should be used. The cabinet shall be located where the amplifiers are protected from direct exposure to water, dust and sunlight where the temperature/humidity remains within the ranges listed in the specification section of this manual.

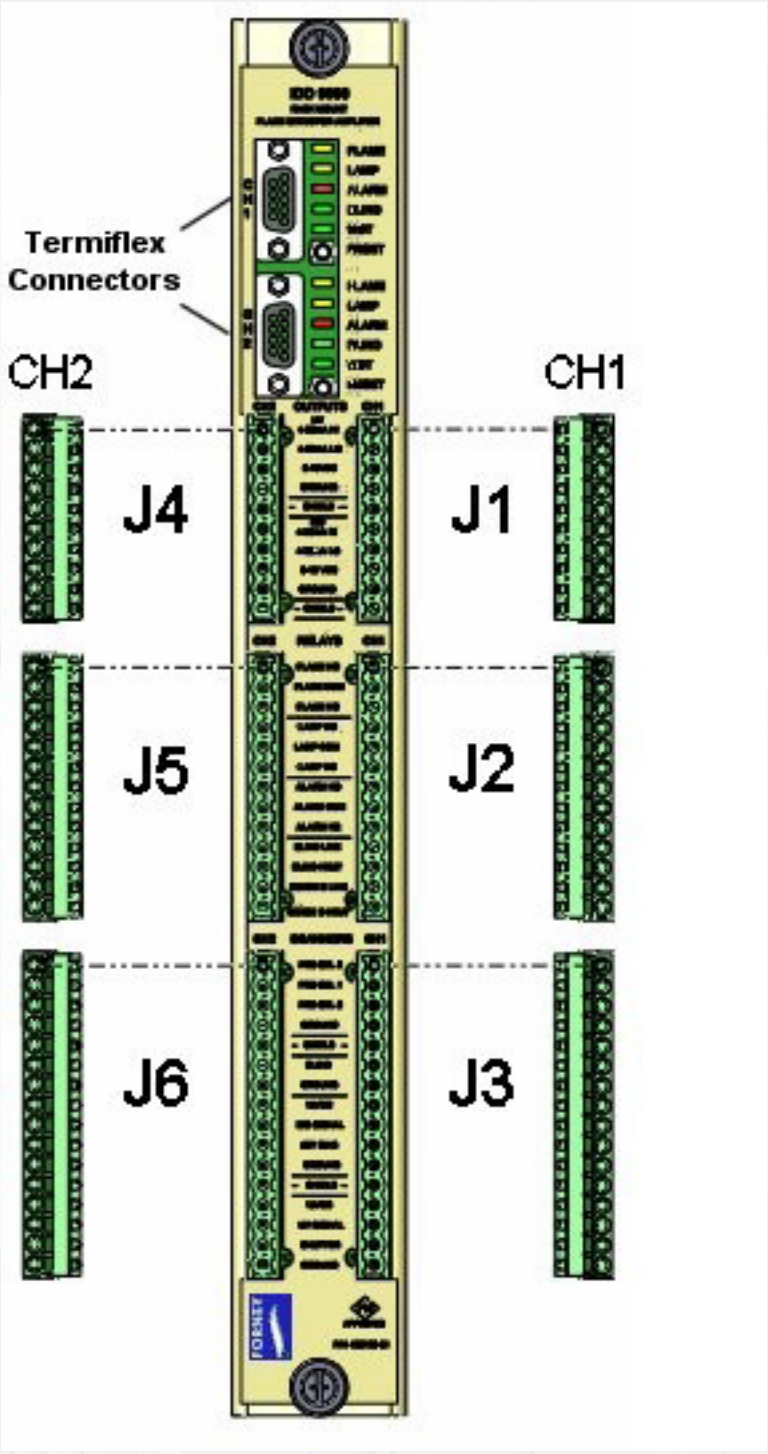
2.3 ELECTRICAL CONNECTIONS

The RM IDD 9000 includes a separate identical CPU Processor for each channel. The right side is for Channel 1 and the left side is for Channel 2. The top two (2) DB9 connectors on the Bezel are for interfacing with the Termiflex. The Top DB9 is for Channel 1, with adjacent LEDs and 'Reset' Pushbuttons. The lower DB9 is for Channel 2.

Each CPU Processor contains three external connectors (Channel 1: J1, J2, J3), (Channel 2: J4, J5, J6) on the Bezel Panel. The following tables and graphics provide a detailed list of pin-outs for these connectors.

NOTE: When using one dual channel RM IDD 9000 to replace a RM DR6101E or an RM IDD amplifier, all connections need to be wired independently/transferred from old card to new card. The power feeds are thru the Backplane connector. Power is applied upon full insertion. The card is Hot Swappable.

Figure 2-1 RM IDD 9000 External Connectors

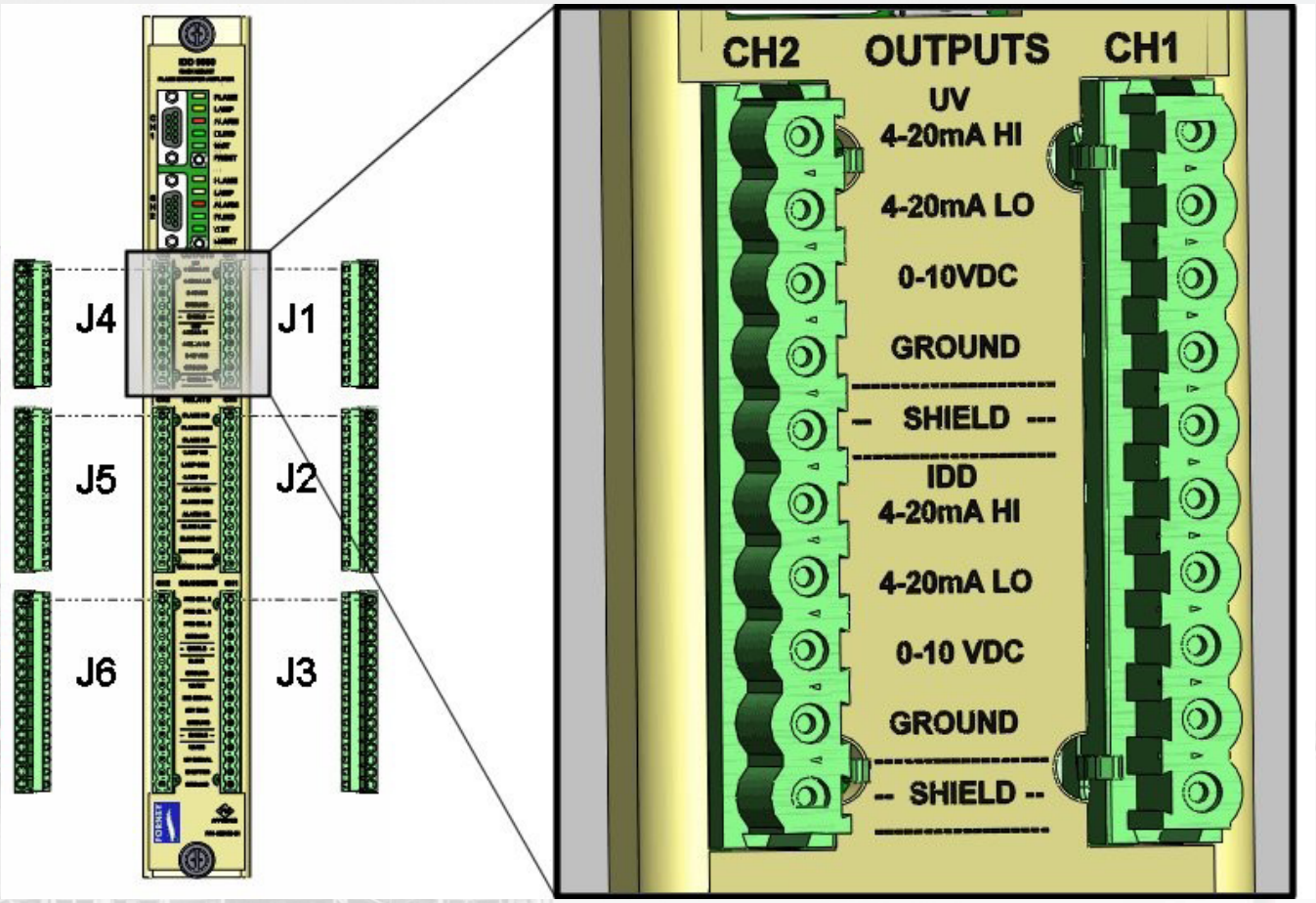


CAUTION: Connecting/wiring a UV-4 Detector to the incorrect IDD Detector terminals will damage the associated channel on-board.

2.3.1 RM IDD 9000 Pin-out Summary

2.3.1.1 Outputs

Figure 2-2 Detector Analog Signal Outputs J1 and J4



The detector analog outputs are wired to connectors J1 for Channel 1 and J4 for Channel 2, which connect to the top of the bezel panel. They are external 10-pin connectors (Part #9235315).

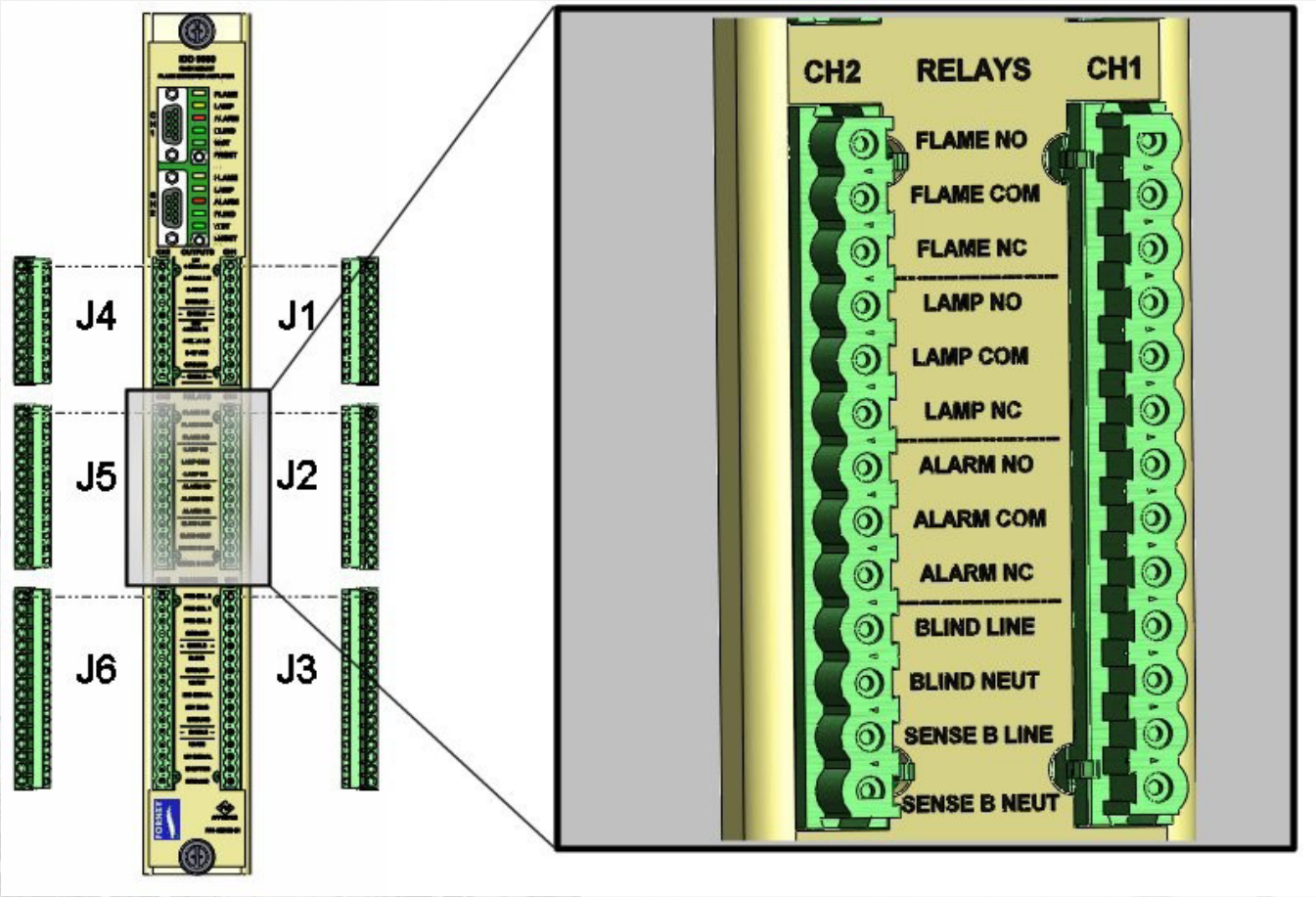
Table 2-2 RM IDD 9000 Pin-out Summary for J1 and J4

Pin	Label / Signal Name	Function
	UV	
1	4-20 mA HI	UV Signal, 4-20mA*
2	4-20 mA LO	
3	0-10 VDC	UV Signal, 0-10V analog output*
4	GROUND (Return)	Isolated Electrical Ground return for analog output
5	- - Shield - -	Cable Shield / Chassis Ground
	IDD	
6	4-20 mA HI	IDD signal, 4-20mA*
7	4-20 mA LO	
8	0-10 VDC	IDD signal, 0-10V PPS analog output*
9	GROUND (Return)	Isolated Electrical Ground return for analog output
10	- - Shield - -	Cable Shield / Chassis Ground

CAUTION: *Analog signals powered from +15VDC within amplifier and protected by 0.125A (F4). DO NOT GROUND signal return externally.

2.3.1.2 Relays

Figure 2-3 Relay Connectors J2 and J5



The Contact Outputs, Blind and Sense B Inputs, Relays connect to J2 for Channel 1 and J5 for Channel 2. J2 & J5 are external 13-pin connectors that attach to the middle of the Bezel panel. (Part #9235316)

Table 2-3 RM IDD 9000 Pin-out Summary for J2 and J5

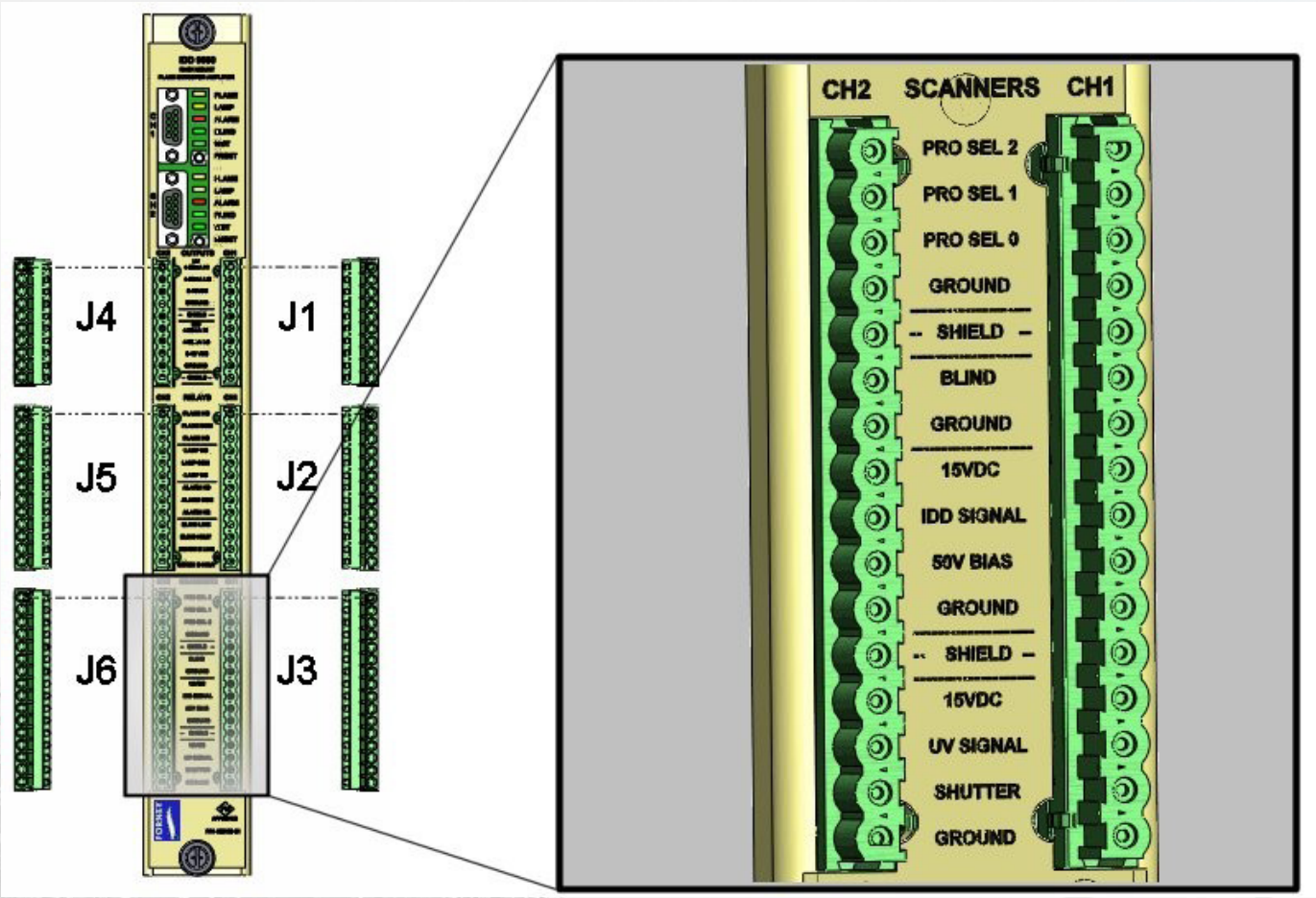
Pin	Label / Signal Name	Function	
1	Flame NO	Flame Normally Open*	
2	Flame COM	Flame Common*	
3	Flame NC	Flame Normally Closed*	
4	Lamp NO	Lamp Normally Open*	
5	Lamp COM	Lamp Common*	
6	Lamp NC	Lamp Normally Closed*	
7	Alarm NO	Alarm Normally Open**	
8	Alarm COM	Alarm Common**	
9	Alarm NC	Alarm Normally Closed**	
10	Blind Line	Blind Line (85-265VAC, external)	AC Inputs
11	Blind Neut	Blind Neutral	
12	Sense B Line	Sense B Line / Profile Select 0 (85-265VAC, external)	
13	Sense B Neut	Sense B Neutral	

* Relay energizes normally open contact & closes on flame-on state conditions.

** Alarm relay is energized under 'No Alarm' condition. Alarm relay energizes and normally open contact closes when power is applied to RM IDD 9000, if no alarm condition exists. When an alarm condition exists the alarm relay de-energizes.

2.3.1.3 Detectors

Figure 2-4 Control Inputs and Flame Detectors J6 and J3



The Control Inputs and Flame Detectors connect to J3 for Channel 1 and J6 for Channel 2. They are external 16 Pin Connectors that attach to the bottom of the Bezel panel. (Part #9235317)

Table 2-4 RM IDD 9000 Pin-out Summary for J6 an J3

Pin	Label / Signal Name	Function	
1	Profile Select 2	Binary 4, Add all for 0-7 Profile Select	Dry Relay Contacts to Ground Pin 4
2	Profile Select 1	Binary 2, Add all for 0-7 Profile Select	
3	Profile Select 0	Binary 1, Add all for 0-7 Profile Select	
4	Ground	Electrical ground return for Dry Relay Contacts	
5	- - Shield - -	Cable Shield / Chassis Ground	
6	Blind	Blind initiated by Dry Relay Contacts to Ground Pin 7	
7	Ground	Electrical ground return for Relay Contacts	
8	15 V (fused)	+15 VDC IDD detector	
9	IDD Signal	IDD flicker signal input (Approx. 7vdc for IDD's & 5vdc for Ultra's)	
10	50 V Bias	+50 VDC Bias	
11	Ground	Electrical ground return for Detector	
12	- - Shield - -	Cable Shield / Chassis Ground	
13	15 VDC (fused)	+15 VDC PPS detector	
14	UV Signal	UV pulse signal input, 0-5Vdc	
15	Shutter	Shutter power, 50Vdc pulse, 15Vdc @ 400mA hold	
16	Ground	Shutter return / Electrical ground return	

2.3.2 Amplifier Upgrade Wiring Tables

2.3.2.1 Upgrading from an RM IDD

The RM IDD amplifier is a single channel amplifier that only supports and connects to a single IDD type flame detector. The RM IDD 9000 is a dual channel amplifier. The CPU board has both Channel 1 (CH 1) and Channel 2 (CH 2). Only one RM IDD 9000 channel is needed to replace one RM IDD amplifier.

Before removing the RM IDD, label each wire with its RM IDD terminal number. The wires will not reconnect to the same terminal numbers. Disconnect the wires and remove the RM IDD; install the RM IDD 9000, which has the same footprint. The RM IDD 9000 has 6 external connectors that then connect to the amplifier. Connect wires to the appropriate RM IDD 9000 external connector by using the tables.

Table 2-5 RM-IDD to RM IDD 9000

RM-IDD Connector				RM IDD 9000 Connectors	
Pin	**Label**		**Function**	**Pin**	**Label**
				Top Connector J4 for CH2 or J1 for CH1	
24	0-10VDC	-	0-10 V OUT REF	9	Isolated Ground (Return)***
23		+	0-10 V OUT SIG	8	0-10 Vdc***
22	4-20MA	-	4-20 mA Return	7	4-20 mA Return ***
21		PWR IN	NOT USED		
20		+	4-20 mA Output	6	4-20 mA Output ***
				Middle Connector J5 for CH2 or J2 for CH1	
19	CK ALM	NC	Check Alarm Normally Closed	7	ALARM NO**
18		C	Check Alarm Common	8	ALARM COM**
17		NO	Check Alarm Normally Open	9	ALARM NC**
16	FLM LITE	NC	Main Flame Light 1 Normally Closed	6	LAMP NC
15		C	Main Flame Light 1 Common	5	LAMP COM
14		NO	Main Flame light 1 Normally Open	4	LAMP NO
13	FLM-ON 2	NC	Main Flame 2 Normally Closed	If Main Flame 2 on your RM-IDD was wired as a series safety relay, this is no longer necessary as it's wired internally on the RM IDD 9000.	
12		C	Main Flame 2 Common		
11		NO	Main Flame 2 Normally Open		
10	FLM-ON 1	NC	Main Flame 1 Normally Closed	3	FLAME NC
9		C	Main Flame 1 Common	2	FLAME COM
8		NO	Main Flame 1 Normally Open	1	FLAME NO
				Bottom Connector J6 for CH2 or J3 for CH1	
7	BLD		BLIND	6	Blind
				7	Blind Return to GND
6	SEN B		SENSE B	3	Sense B (PS0)
			BLIND and SENSE B are asserted by connecting to ground on the RM-IDD. The RM IDD 9000 has dedicated ground pins for this connection.	4	Sense B (PS0) Return to GND
5	DETECTOR	GND	Ground (Black wire)	11	Ground
4		SHD	Shield (Bare wire)	12	Shield
3		SIG	Detector Signal in (White wire)	9	IDD SIGNAL
2		+15V	Detector +15Vdc (Red wire)	8	15VDC (.125 Fused)
1		+50V	Detector +50Vdc (Green wire)	10	50V BIAS

* Optional - if your existing application uses SENS B or Fx4 you must wire as described in table and program Set 1 or 2 with the Termiflex.

** Unlike the RM-IDD amplifier, 'ALARM' Relay on the RM-IDD 9000 amplifier is energized in 'NO ALARM' condition.

*** Caution: Analog signals powered from +15VDC within amplifier and protected by 0.125A (F4). DO NOT GROUND signal return externally.

2.3.2.2 Upgrading from an RM DR6101E

The RM DR6101E and RM IDD 9000 amplifiers are both dual channel amplifiers with each channel capable of supporting an IDD and/or a UV type flame detector head. First determine the type of flame detector to be connected to each of the channels, either an IDD or a UV type flame detector. The biggest difference is that there are separate 4-20mA and 0-10Vdc, unshared dedicated outputs. This combined with twice the capacity as the RM-DR6101E makes the RM IDD 9000 connections intensive.

Jumpers in the RM DR6101E select the type of flame detector and the Termiflex/SmartDisplay is used to select detector type for the RM IDD 9000 channels.

Once the type of flame detector has been determined, remove the left and right terminal strips from the RM-DR6101E; remove the RM-DR6101E; install the RM IDD 9000 which has the same footprint. Reconnect the wires one at a time from the RM DR6101E terminal strips to the RM IDD 9000 connectors. The RM IDD 9000 has 3 External connectors per channel (6 total) that then connect to the amplifier. Connect wires to the appropriate RM IDD 9000 external connectors by using the following four tables.

Table 2-6 RM-DR6101E to RM IDD 9000

RM-DR6101E Terminal Block		RM IDD 9000		
Pin	Label	Connectors Pin		Label
		CH2	CH1	Top Terminal Block
44	CH1 4-20 mA HIGH		J1 Pin 1	UV 4-20 mA HIGH*
			J1 Pin 6	IDD 4-20 mA HIGH*
43	ANALOG GROUND RETURN		J1 Pin 2	UV 4-20 mA RETURN*
			J1 Pin 7	IDD 4-20 mA RETURN*
			J1 Pin 4	UV 0-10 Vdc RETURN*
			J1 Pin 9	IDD 0-10 Vdc RETURN*
42	CH1 0-10 Vdc HIGH		J1 Pin 3	UV 0-10 Vdc HIGH*
			J1 Pin 8	IDD 0-10 Vdc HIGH*
41	CH2 4-20 mA LOW	J4 Pin 2		UV 4-20 mA RETURN*
		J4 Pin 7		IDD 4-20 mA RETURN*
40	CH2 4-20 mA HIGH	J4 Pin 1		UV 4-20 mA HIGH*
		J4 Pin 6		IDD 4-20 mA HIGH*
39	CH2 0-10 Vdc LOW	J4 Pin 4		UV 0-10 Vdc RETURN*
		J4 Pin 9		IDD 0-10 Vdc RETURN*
38	CH2 0-10 Vdc HIGH	J4 Pin 3		UV 0-10 Vdc HIGH*
		J4 Pin 8		IDD 0-10 Vdc HIGH*
		CH2	CH1	Middle Terminal Block
37	CH 1 ALARM N.C.		J2 Pin 7	ALARM NO**
36	CH 1 ALARM COM.		J2 Pin 8	ALARM COM**
35	CH 1 ALARM N.O.		J2 Pin 9	ALARM NC**
34	CH 1 MAIN FLAME LIGHT 1 N.C.		J2 Pin 6	LAMP NC
33	CH 1 MAIN FLAME LIGHT 1 COM.		J2 Pin 5	LAMP COM
32	CH 1 MAIN FLAME LIGHT 1 N.O.		J2 Pin 4	LAMP NO
31	CH 1 FLAME N.C.		J2 Pin 3	FLAME NC
30	CH 1 FLAME COM.		J2 Pin 2	FLAME COM
29	CH 1 FLAME N.O.		J2 Pin 1	FLAME NO
28	CH 2 ALARM N.C.	J5 Pin 9		ALARM NO**
27	CH 2 ALARM COM.	J5 Pin 8		ALARM COM**
26	CH 2 ALARM N.O.	J5 Pin 7		ALARM NC**

RM-DR6101E Terminal Block		RM IDD 9000		
Pin	**Label**	**Connectors Pin**		**Label**
** Unlike the RM-DR6101E amplifier, 'ALARM' Relay on the PM-IDD 9000 amplifier is energized with 'NO ALARM' condition. Caution: *Analog signals powered from +15VDC within amplifier and protected by 0.125A (F4). DO NOT GROUND signal return externally.				
		CH2	**CH1**	**Middle Terminal Block**
25	CH 2 MAIN FLAME LIGHT 1 N.C.	J5 Pin 6		LAMP NC
24	CH 2 MAIN FLAME LIGHT 1 COM.	J5 Pin 5		LAMP COM
23	CH 2 MAIN FLAME LIGHT 1 N.O.	J5 Pin 4		LAMP NO
22	CH 2 FLAME N.C.	J5 Pin 3		FLAME NC
21	CH 2 FLAME COM.	J5 Pin 2		FLAME COM
20	CH 2 FLAME N.O.	J5 Pin 1		FLAME NO
19	CH 2 SENSE B Neutral	J5 Pin 13		AC Sense B (PS0) - Neutral
18	CH 2 SENSE B Line	J5 Pin 12		AC Sense B (PS0) - Line
17	CH 1 BLIND Neutral		J2 Pin 11	AC Blind - Neutral
16	CH 1 BLIND Line.		J2 Pin 10	AC Blind - Line
15	CH 1 SENSE B Neutral		J2 Pin 13	AC Sense B (PS0) - Neutral
14	CH 1 SENSE B Line		J2 Pin 12	AC Sense B (PS0) - Line
13	MODE SELECT Neutral	Mode Select switches from IDD to UV operation. This is redundant to Sense B, and also to the Profile Select inputs. If more alternates are required, Do Not use AC. Use instead, relay contacts to switch between any Profile Select Input and Ground.		
12	MODE SELECT Line			
11	CH 2 BLIND Neutral		J2 Pin 11	AC Blind - Neutral
10	CH 2 BLIND Line		J2 Pin 10	AC Blind - Line
		CH2	**CH1**	**Bottom Terminal Block**
9	IDD BIAS +50Vdc (Green wire)		J3 Pin 10	50V BIAS
8	CH 1 IDD SIGNAL (White wire)		J3 Pin 9	IDD SIGNAL
	CH 1 UV SIGNAL (White wire)		J3 Pin 14	UV SIGNAL
7	CH 1 IDD PWR+15Vdc (Red wire)		J3 Pin 8	15VDC (.125 Fused)
	CH 1 UV PWR+15Vdc (Red wire)		J3 Pin 13	15VDC (.250 Fused)
6	Ground (Black wire)		J3 Pin 16	Ground
5	Ground (Black wire)	J6 Pin 16		Ground
4	CH 2 IDD PWR+15Vdc (Red wire)	J6 Pin 8		15VDC (.125 Fused)
	CH 2 UV PWR+15Vdc (Red wire)	J6 Pin 13		15VDC (.250 Fused)
3	CH 2 IDD SIGNAL (White wire)	J6 Pin 9		IDD SIGNAL
	CH 2 UV SIGNAL (White wire)	J6 Pin 14		UV SIGNAL
2	IDD BIAS (50 VDC) (Green wire)	J6 Pin 10		50V BIAS
	UV SHUTTER HI (Green wire)	J6 Pin 15		SHUTTER
1	SHIELD	J6 Pin 12	J3 Pin 12	SHIELD

2.3.3 Grounding the RM IDD 9000

Proper grounding assures proper operation and is THE MOST IMPORTANT STEP in wiring the RM IDD 9000 Amplifier. Improper grounding will cause noise check failures even when wiring and tuning is correct.

WARNING: Improper grounding is the most common cause of flame detector problems.

2.3.3.1 Grounding New Applications

New applications have the shield connected to the detector head in the cable connector which ensures proper grounding of the RMIDD 9000. Do NOT ground the shield on both ends.

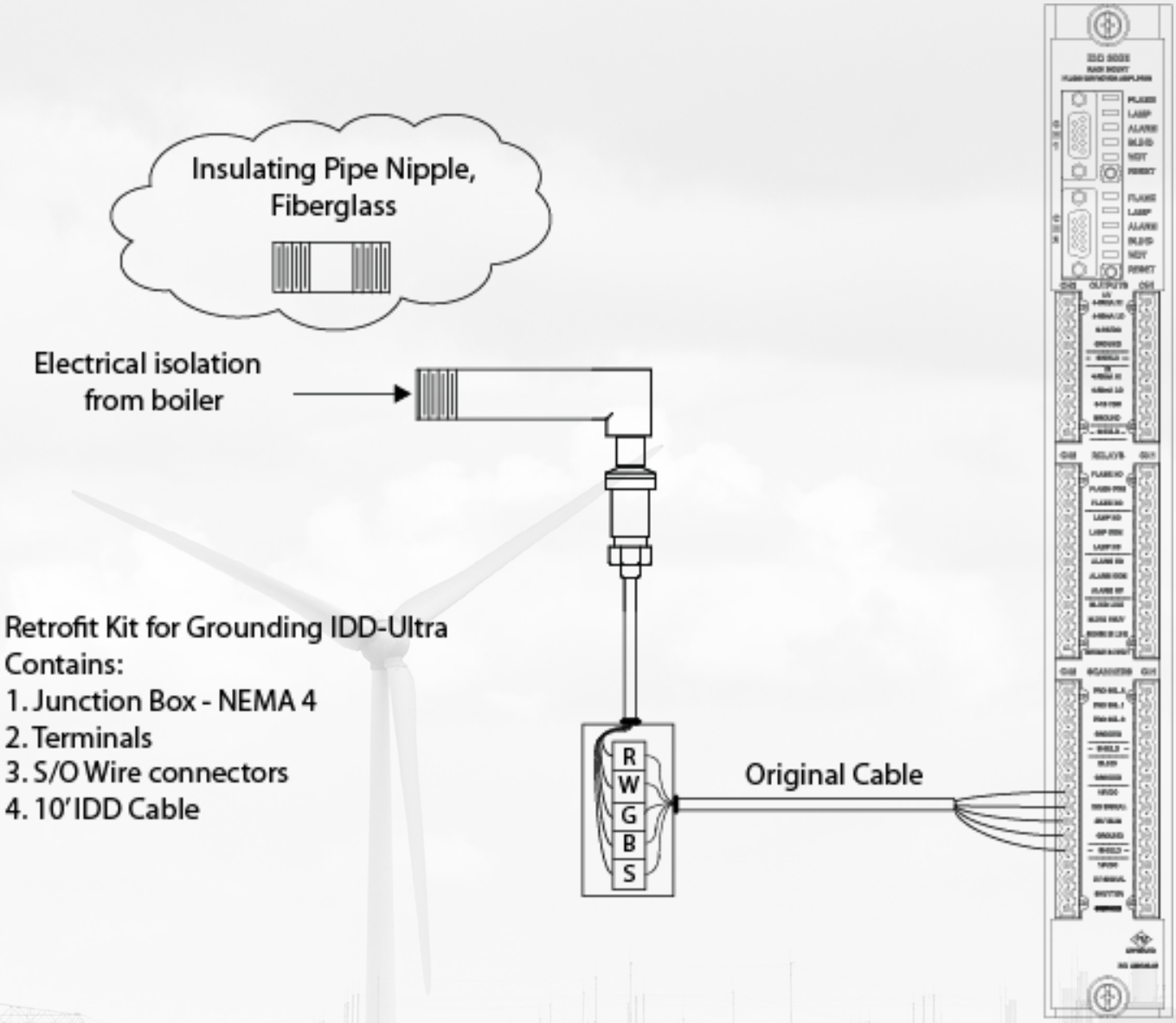
2.3.3.2 Retrofitting RM IDD 9000 with IDD-II, IDD-IIU, or UV4 Detectors

It is recommended to have a fiberglass nipple that the detector mounts onto. This is for heat and electrical isolation. Do NOT ground the shield on both ends.

2.3.3.3 Retrofitting RM IDD 9000 with an IDD-Ultra Detector

To eliminate any grounding problems with the IDD-Ultra, ground is broken between the detector head and the boiler. Any non-conducting phenolic, nylon or insulating material will shield the detector head from the boiler. The detector head casing must then be connected to the cable shield, which is connected back to the IDD 9000 Amplifier.

Figure 2-5 Grounding the RM IDD 9000 to IDD-Ultra



If the flame detector is directly installed on the sight pipe (without electrical insulating nipple), remove the shield connection to the ground on the amplifier end. Do NOT ground on both ends.

2.4 LED STATUS DISPLAYS

The RM IDD 9000 controls both local and remote status displays. The remote displays are driven through relay contacts on the board; local displays are provided by five LED's on the front of the amplifier. Table 2-8 provides a complete list of these LED's and their functions:

Table 2-7 RM IDD 9000 LED Indicators

Indicator	LED	Function
Flame	Yellow	Shows the status of the flame relay at all times
Lamp	Yellow	Shows the flame detection status (flame on/off) at all times
Alarm	Red	LED lights up if a flame detector fails self-check and other failures
Blind	Green	The Blind LED is turned on during a system self-check or if the hardware BLIND input is asserted
WDT	Green	The WDT (Watch Dog Timer) LED toggles at a half-second rate except when the system is being tuned. It indicates that the firmware program is functioning normally.

2.5 FLAME DETECTOR CONNECTIONS

Each RM IDD 9000 has 2 Channels; therefore, each RM IDD 9000 can operate 1 or 2 IDD detector heads; 1 or 2 UV-4 detector heads; or 1 IDD detector head and 1 UV-4 detector head. Connect the cable from the flame detector head to the J3 or J6 terminal at the bottom of the front bezel of the amplifier as indicated in the table and diagrams that follows:

Table 2-8 Control Inputs and Flame Detectors
(J3 & J6 - bottom of front bezel)

Amplifier Pin	Label / Signal Name		Wire Color	Flame Detector Pin
8	IDD Detector	15 VDC (fused)	Red	C
9		Signal	White	D
10		50 VDC Bias	Green	A
11		Ground	Black	B
12	Shield		Shield	E
13	UV Detector	15 VDC (fused)	Red	C
14		Signal	White	D
15		Shutter out	Green	A
16		Ground	Black	B

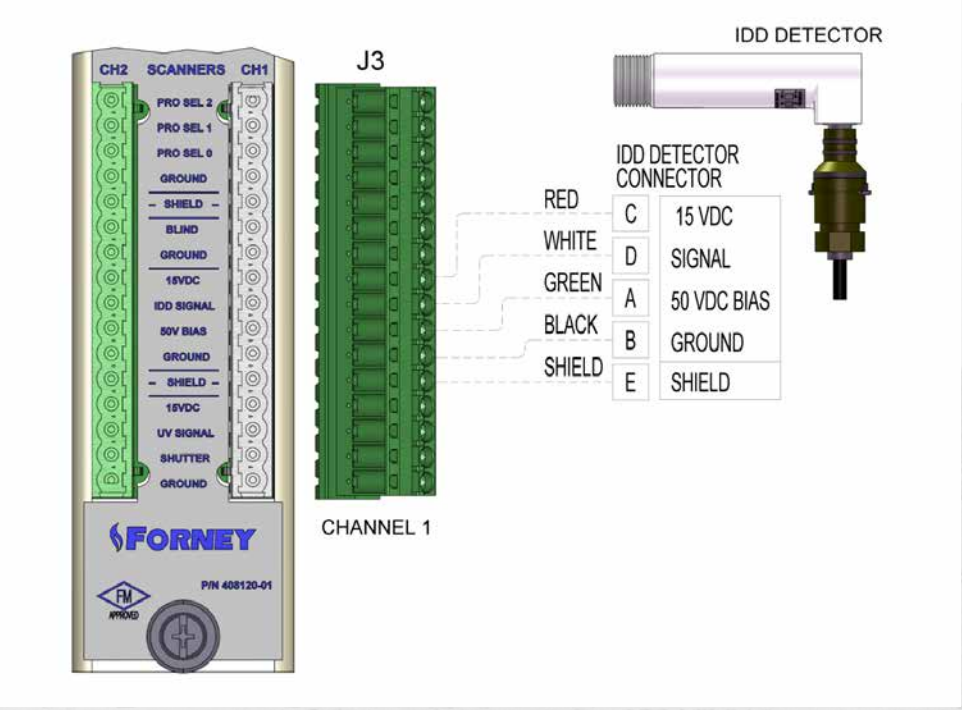
NOTE: Detector cable must in sealtight (or equivalent) conduit to avoid ingress of moisture or corrosive atmosphere to the connector.

Typical installation with sealtight fitted:

2.5.1 Connecting IDD Detector Heads

The RM IDD 9000 supports the IDD-II, IDD-IIL, IDD-IIU, IDD-J, IDD-UV, IDD-Ultra or an IDD-K. Wire each channel accordingly per IDD Detector Head as shown. Note that Channel 1 and Channel 2 connectors are a mirror image of each other.

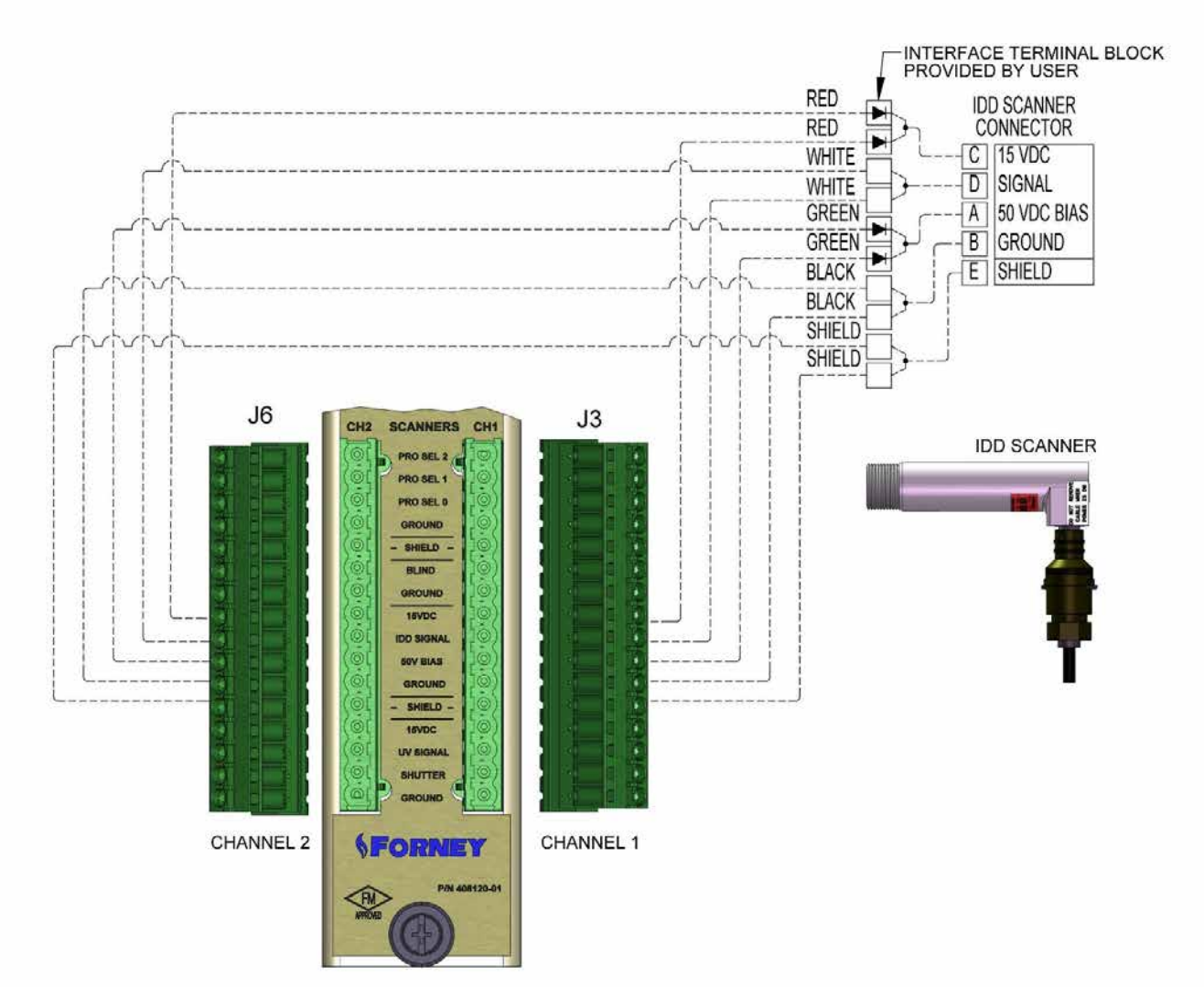
Figure 2-6 IDD Detector Head Wiring Diagram



2.5.2 Connecting One IDD Detector Head to both IDD 9000 Channels

One IDD Detector head can be wired as shown below to facilitate independent setting up a flame relay on each channel:

Figure 2-7 IDD Detector Wired to Both Channels 1 and 2 Wiring Diagram



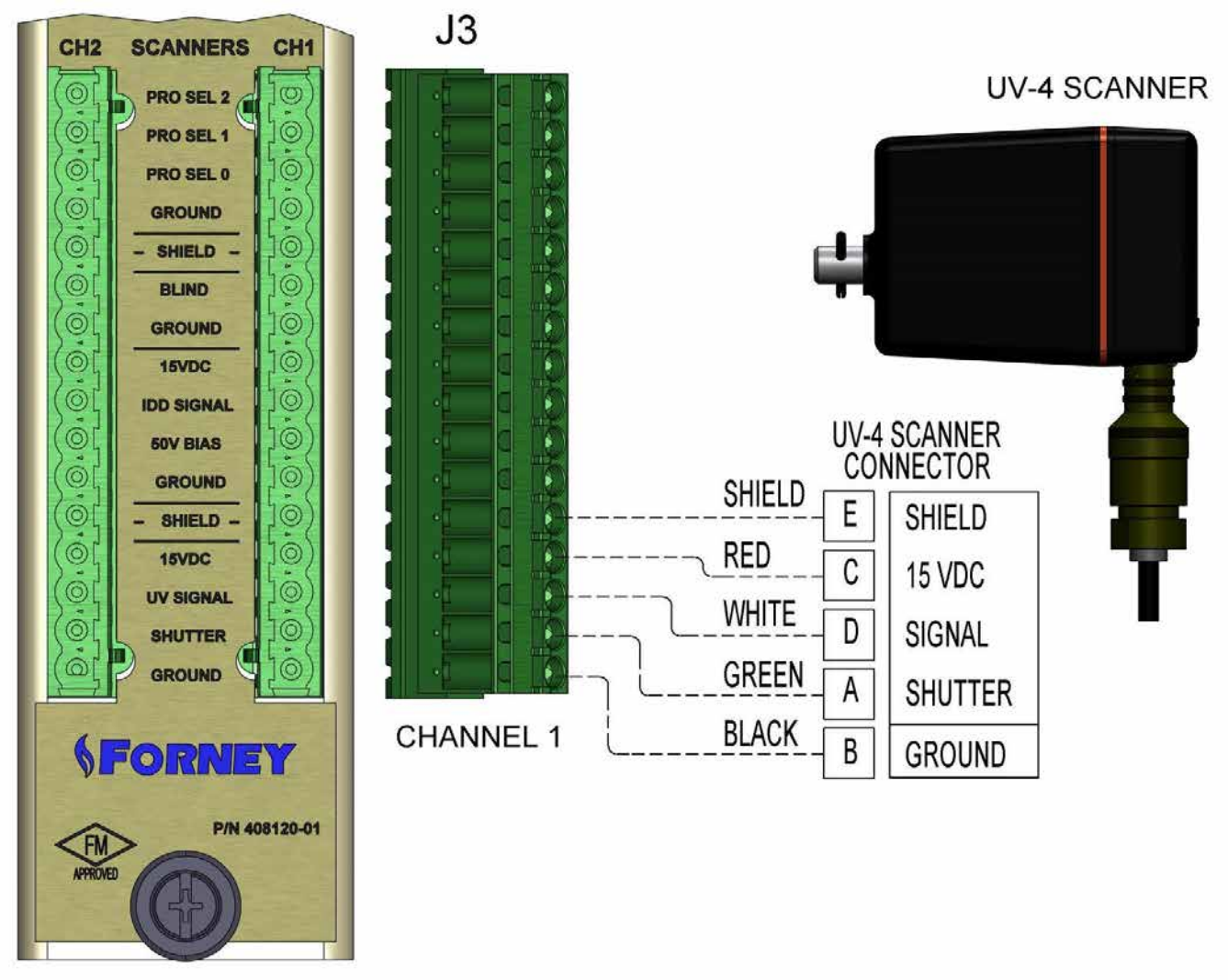
Diode Recommendation: 1N4002 to 1N4007. Axial Leaded Diodes with a 1 Amp rating, and 100V reverse bias.

NOTE: If one IDD detector is wired to both channels as shown above, both channels must be powered up together through a common switch in AC input power line.

2.5.3 Connecting UV-4 Detector Heads

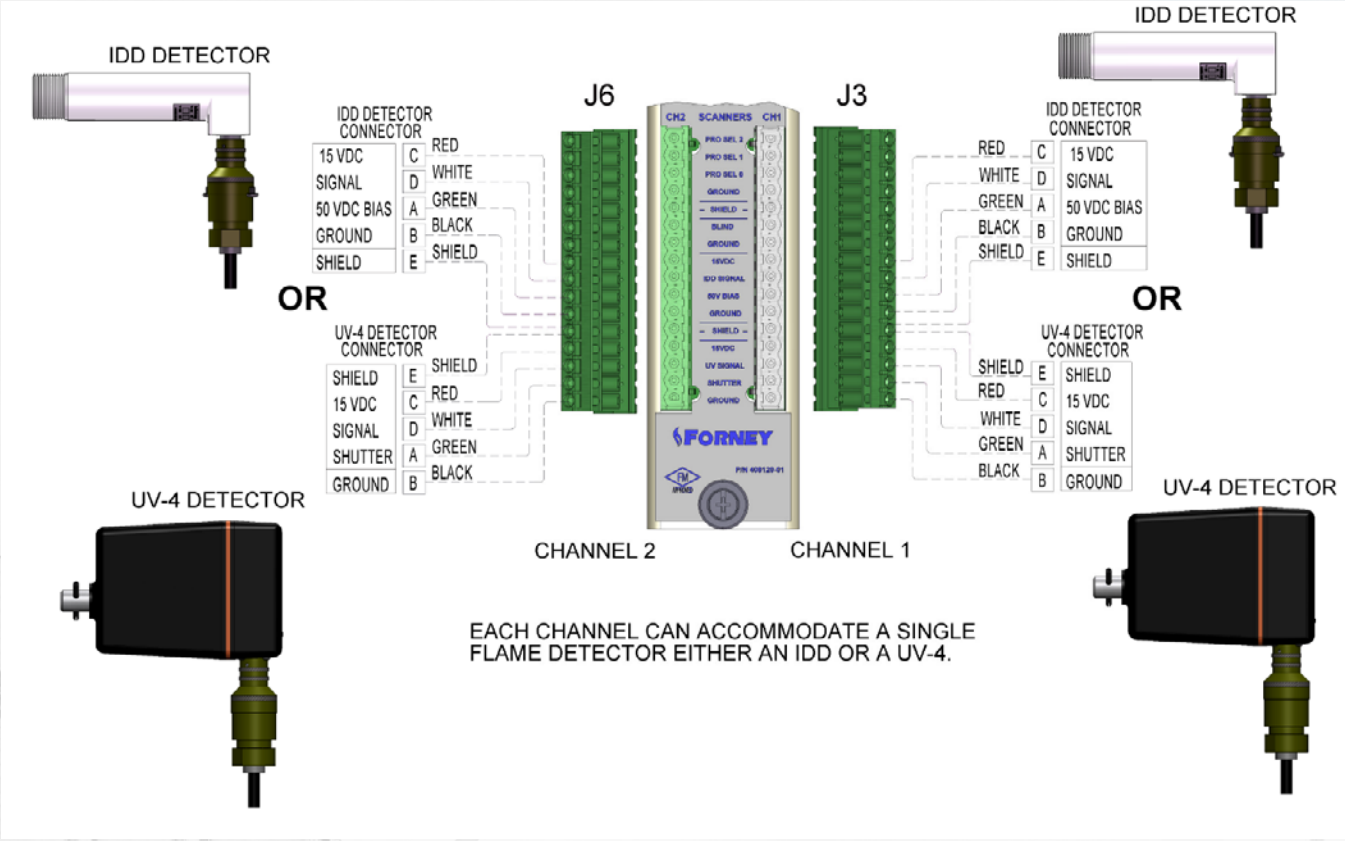
Wire each channel to a UV-4 on the RM IDD 9000 as shown. Note that Channel 1 and Channel 2 connectors are a mirror image of each other:

Figure 2-8 UV-4 Detector Head Wiring Diagram



2.5.4 Connecting an IDD and a UV-4

Either channel of the RM IDD 9000 can be wired for an IDD or UV-4 detector head. Wire according to the following diagram. Note: Each channel can only operate one detector at a time and should be wired to EITHER an IDD detector OR a UV-4 detector, not both on the same channel:



2.6 HARDWARE CONTROL INPUTS

2.6.1 Blind Input – AC Powered J2 & J5, Relay Dry Contact J3 & J6

For compatibility with installed wiring when retrofitting legacy Forney flame amplifiers, two blind control inputs are provided, an AC power activated blind input and a ground activated input. Either of these inputs can be used to activate the amplifier's blind function. The ground actuated blind input is provided with an internal pull-up resistor to hold it in the logic high (not blinded) condition, so it is only necessary to apply a ground connection to activate it. When the amplifier is blinded, the flame failure response time (FFRT) timer is not disabled and signal level comparisons to pick-up and dropout points continues, so loss of flame indication will occur following the FFRT delay.

Blind Verification Test

1. Disable the BLIND function. Use an artificial light source (an incandescent lamp for IDD mode, or a UV light source for UV mode), and verify that the appropriate FLAME LED lights.
2. Activate the BLIND function for the flame detector head(s) being used. Verify that the FLAME LED goes out.

CAUTION: : The amplifier blind function does not close the flame detector shutters or switch off the photocell bias. Therefore, the blind function cannot be used to verify noisy flame detectors that are failing self-check. All flame detectors, noisy or not, will read zero signal when the amplifier blind function is used.

2.6.2 Sense B Input – AC Powered J2 & J5, Relay Dry Contact J3 & J6

The AC powered Sensitivity B, "Sense B", operated input is provided for compatibility with installed wiring when retrofitting legacy Forney flame amplifiers. Powering the Sense B input is equivalent to grounding the PS0 "Profile Select 0" input. The amplifier will operate with Profile number 0 if the Sense B input is not powered and Profile 1 when the Sense B input is powered. Additional wiring will need to be connected to the PS1 and PS2 inputs if access to the remaining six operating profiles is desired. Activating Sense B will increase the Active Profile Number selected by one (1). Example: Active Profile 2 will advance to 3, Active Profile 4 will advance to 5, etc.

2.6.3 Operating Profile Select Inputs – J3 & J6

The RM IDD 9000 Flame Amplifier has non-volatile memory storage for eight sets of operating profiles, numbered from 0 to 7. The stored profiles are intended to allow for easy switching between commonly used burner operating conditions without requiring manual re-tuning of the flame amplifier. The active profile is selected by three 5-Volt logic level inputs, PS2, PS1, and PS0. These inputs are encoded in reverse binary. Each profile contains a full set of operating parameters see Table 2 10.

The amplifier constantly reads the profile selected by the Profile Select input code and displays the Active Profile number in the lower right corner of the Termiflex/SmartDisplay®. The Active Profile can be changed at any time other than while in the tuning loop by repositioning the Profile Select inputs. Any tuning parameter changes can be saved only to the Active Profile. Example: Active Profile 0 is displayed as "Set 0".

NOTE: It is only necessary to connect the hardwired inputs to the amplifier ground to select the desired profile.

Table 2-9 Profile Select Input Encoding

Profile Select 2 J3 & J6 pin 1	Profile Select 1 J3 & J6 pin 2	Profile Select 0 J3 & J6 pin 3	ACTIVE PROFILE
OPEN	OPEN	OPEN	Set 0
OPEN	OPEN	GROUND	Set 1
OPEN	GROUND	OPEN	Set 2
OPEN	GROUND	GROUND	Set 3
GROUND	OPEN	OPEN	Set 4
GROUND	OPEN	GROUND	Set 5
GROUND	GROUND	OPEN	Set 6
GROUND	GROUND	GROUND	Set 7

Ground is through system logic.
** Profile Select 0 function can be performed by using Sense B input as an alternative.

2.7 OPERATING MODES

NOTE: MODE 1: IDD PPS is for operating a single IDD (flame flicker) type detector only. MODE 2: UV PPS is for operating a single output pulse detector only.

All operating profiles are initialized via a profile flag and with the default settings shown in Table 2-10:

Table 2-10 Stored Factory Defaults for Profile Modes

Termiflex Display	Mode 1: IDD PPS only	Mode 2: UV PPS only
IDD GAIN	0	-
SPECTRUM RANGES	1	-
CORNER 1	80 Hz	-
CORNER 2	200 Hz	-
WEIGHT 1	1	-
CORNER 3	1024 Hz	-
CORNER 4	1024 Hz	-
WEIGHT 2	1	-
IDD PICKUP- PPS	500	-
IDD DROPOUT- PPS	100	-
IDD ANALOG LOW- PPS	0	-
IDD ANALOG HIGH- PPS	3000	-
UV MULTIPLIER	-	1
UV PICKUP- PPS	-	500
UV DROPOUT- PPS	-	100
UV ANALOG LOW- PPS	-	0
UV ANALOG HIGH- PPS	-	3000
FFRT	3.8 Seconds	
CHECK DELAY	120 Seconds	

2.8 CONFIGURING THE TERMIFLEX/ SMARTDISPLAY® TERMINAL WITH 25-PIN CONNECTOR

The RM IDD 9000 uses the same detachable Termiflex/SmartDisplay® unit for programming the amplifier as the previous Forney flame amplifiers, however the Termiflex/SmartDisplay® terminal with 25-pin must be reconfigured.

NOTE: If the Termiflex/SmartDisplay® unit has a 9-pin connector, then the factory defaults are already set as required. Do NOT reconfigure.

1. Attach the 25 to 9- pin adapter to the Termiflex/SmartDisplay® terminal.
2. To enter the Termiflex/SmartDisplay® configuration menu, press and hold the lower left blue (┌) and lower right red (┐) keys while the unit is executing its power-on-self-test. Hold both keys down until MAIN MENU display comes up.
    a. Press F1 to enter COM Menu settings
    b. Press F2 (NXT) to scroll through settings until Baud Rate = 19.2K is displayed.
    c. Press F3 (CONT) to continue to Parity. Use F1 or F2 to scroll through settings until "even" is displayed.
    d. Press F3 to continue to DATA, STOP BITS = 8, 1,
    e. Press F3 to continue to DISP SERIAL ERRORS ? Press F1 for YES
    f. Press F3 to continue to AUD SERIAL ERRORS ? Press F1 for YES
    g. Pressing F3 will take you back to the Main Menu.
    h. Press F2 for DSP - DISP CTL CHARS ? will be displayed. Use F1 and F2 to scroll through the settings until "no" is displayed.
    i. Press F3 to continue to DISP ESC CHARS ? Use F1 and F2 to scroll through the settings until "no" is displayed.
    j. Press F3 to continue to CURSOR VISIBLE ? Press F1 for "yes".

Table 2-11 Termiflex/SmartDisplay® Configuration Settings for IDD 9000 Programming (Factory Default for Termiflex with 9-pin adapter)

COM:	DSP:	KBD:
Baud: 19.2K	Disp Ctl Chars: No	Local Echo: No
Parity: Even	Disp Esc Chars: No	Key Repeat: Slow
Data, Stop Bits: 8,1	Cursor Visible: Yes	Audible Keys: Yes
DSP Serial Errs: Yes	Auto Line Wrap: Yes	Simplified KBD: No
Aud Serial Errs: Yes	New Line on CR: No	PGM Function Keys: No
	Disp Self-Test: Yes	
	Backlight Level: 0	
	Backlight On: No	

If you need to re-configure the Termiflex/SmartDisplay® for a DR6101E or RM-IDD reference the following table for appropriate settings.

Table 2-12 Termiflex/SmartDisplay® Settings for DR6101E or RM-IDD Programming (Factory Default for Termiflex with 25-pin adapter)

COM:	DSP:	KBD:
Baud: 4800	Disp Ctl Chars: No	Local Echo: No
Parity: Even	Disp Esc Chars: No	Key Repeat: Slow
Data, Stop Bits: 7,1	Cursor Visible: Yes	Audible Keys: No
DSP Serial Errs: No	Auto Line Wrap: No	Simplified KBD: No
Aud Serial Errs: No	New Line on CR: No	PGM Function Keys: No
	Disp Self-Test: Yes	
	Backlight Level: 5	
	Backlight On: No	

SECTION 3
AMPLIFIER TUNING

The amplifier tuning mode can be reached using either the handheld Termiflex/SmartDisplay® or the Forney Terminal Emulator Software (TES) installed on a laptop computer. Table 3-1 Keypad Commands summarizes the keypad commands available in the RM IDD 9000 Flame Amplifier firmware program:

Table 3-1 Keypad Commands

Function	Termiflex/SmartDisplay® Key strokes	Terminal Emulator Software (TES) Button
Enter the tuning loop	/ 1 3 Slash one three	Config
Do self-check now (Enabled approx. every 15 secs)	? Question mark	Self-Test

The three-key sequence "/13" (slash, one, three) is pressed to enter the tuning loop. The amplifier is tuned in the active mode only.

NOTE:

- During tuning, any changes that cause loss of flame indication will be transmitted to the main flame relay following the FFRT delay.
- While tuning, if the main flame relay drops, the system will not re-initiate Flame-on status until the user exits the tuning loop. If the flame lamp indicator is on when the tuning loop is exited, the system will then return to flame-on status.
- When one channel enters tuning mode, periodic self-check is suspended on both channels. On exiting tuning mode, periodic self-check operation resumes.
- The IDD 9000 Flame Amplifier allows **a maximum of 10 minutes** of use while in the tuning loop before a time-out will occur. At a time-out, the tuning loop is exited then the system returns to active operation, **any unsaved changes that were entered will be lost.**
- Upon time-out, completion of tuning or unplugging the Termiflex, the RM IDD 9000 returns to normal operating mode. This is indicated by the WDT LED starting to flash. Pressing the reset button ensures the RM IDD 9000 has returned to normal operation.

3.1 MODE

The first screen displayed in the tuning loop allows selection of the operating MODE. Each Channel of the amplifier can use a single IDD detector or a single output pulse detector (example UV-4). The numeric keys 1 or 2 are pressed to set that MODE. Press F4, “NXT” to continue.

NOTE: Any flame detector connected to the unselected mode input will receive power but is not monitored for signal level or tested during self-check

3.1.1 IDD Channel Tuning

If MODE 1 is selected, a sequence of IDD channel tuning screens will follow.

3.1.1.1 IDD Gain

The Gain setting should be as low as possible, however a minimum of 3 to 4 bars (>>>>) is recommended at a minimum firing rate. As flame strength & boiler load increases this signal will increase as indicated as raw intensity. Avoid maximum gain as much as possible. However, if not possible at high loads to bring signal down to as shown below, then normal operation is still viable. The key is not to totally saturate the signal if possible. Avoiding saturation, the gain should be set to midrange or below. If the flame signal is clipped by excessive amplification its spectrum can be corrupted, making flame discrimination difficult & unreliable.

Factory default is a gain value = “0”. Under most installations this should be sufficient gain for operation of the amplifier. The “weight factor” multiplier explained in the next section will also set output gain. If lack of gain is realized, then gain setting should be increased.

NOTE: Gain setting should be as low as possible, typically 3 to 4 bars (>>>>), to ensure safety. As boiler load increases, raw signal strength will increase. If this signal strength is too high, then gain will need to be reduced. Figure 3-1 & 3-2 will apply so as not to saturate the amplifier. “<<” should be avoided if possible as this is a high signal strength nears saturation.

For best tuning and operation, adjust the gain up or down, so the most LEFT arrows are showing and no RIGHT arrows are visible. Use the F1, "DEC" and F2, "INC" keys on the Termiflex to make adjustments. The correct GAIN setting has the signal strength indicator ">" extending from the left side to the approximate center of the display while the burner is operating. The GAIN value is stored as a number from 0 to 7, where 7 corresponds to the maximum GAIN of 32x. Gain setting should be as low as possible, typically 0, to ensure safety.

Figure 3-1 Correct Gain Setting

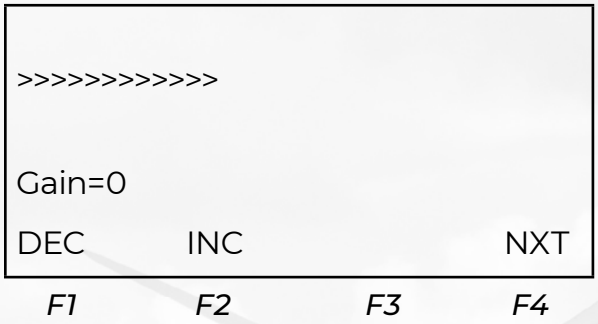
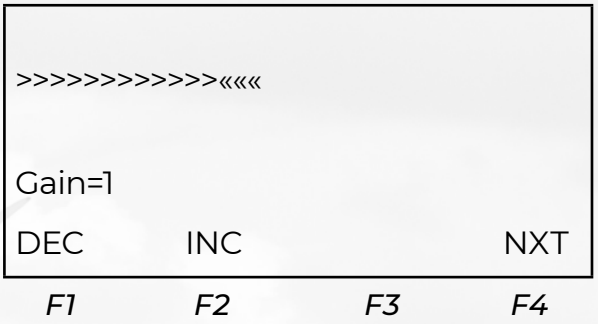


Figure 3-2 Incorrect Gain Setting

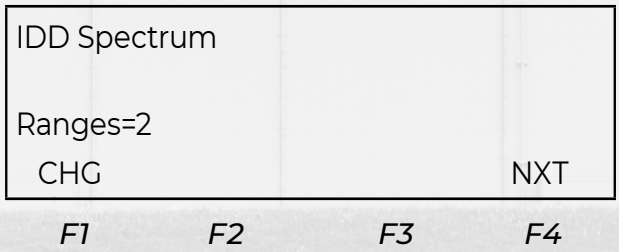


NOTE: Because the IDD signal is monitored from the A/D converter output for the purpose of setting the GAIN, (ahead of the band-width filters and weights) any subsequent adjustments to the corner frequencies or weighting factors will not affect the GAIN setting. If the flame detector is adjusted or replaced, the GAIN setting will need to be rechecked.

3.1.1.2 IDD Frequency Ranges

The Frequency Ranges allow the user to specify one or two discrete frequency ranges for inclusion into the IDD output signal level for pick-up and dropout comparisons. Each frequency range is defined by its lower and upper corner frequencies. Weight factors are also available to allow an imbalanced ratio of signal energy to be included from two ranges if desired. A single range is adequate to produce the low-pass, high-pass, or band-pass filter functions.

Additionally, two frequency ranges can be used to do combinations of low-pass, high-pass, and band-pass filter functions. This feature is available to produce a notch filter function if a difficult application requires this option.



The incoming detector head signal may be tuned in 1 or 2 ranges. The ranges cover from 12Hz to 1024HZ. The system defaults to 1 range. If 2 ranges are chosen, adjust them both, upper and lower ends, but NO overlapping of frequencies is allowed.

Press F1 - CHG then type "2" (to change from 1 range to 2 ranges)

Press F4 - NXT

NOTE: No overlap of frequencies is allowed even if only 1 range is selected the other range may limit the chosen range frequency selections.

The next tuning screen displays the lower and upper corner frequencies and weighting factors defined for the range. Press F1, "CHG" to make changes. If two frequency ranges are selected, the display will show both frequency ranges' corner frequencies and weighting factors.

Freq Range(s):			
80	-	200	x1
1024	-	1024	x1
CHG1	CHG2		NXT
F1	*F2*	*F3*	*F4*

Press F1 - CHG1 or F2 - CHG2 to edit the corner frequencies or weighting factors for range 1 or range 2 respectively.

The next screen will display the acceptable limits for the parameter to be changed and will not accept any values out-of-range (12-1024 Hz). The corner frequencies entered must be numbers evenly divisible by 4 or the system will reduce the value entered to the next smaller value that is evenly divisible by 4. For example, if the user enters 50Hz, the value will be automatically changed to 48Hz when it is accepted. Set the lower end first then the upper end.

The Weight Factor is represented by WF on the Termiflex/SmartDisplay® screen. This is the multiplier for each range. When it is felt insufficient counts exist, use this Weight Factor to improve dynamic range of PPS Counts. Weight factors are limited to integers between 1 and 9 and are permitted to be the same for each range if desired. Larger weight factors can be used as a "downstream gain" setting to increase the IDD signal value. If a narrow bandwidth is being used, the user must be careful to stay below the maximum signal value of 8190. Ranges 6 through 9 are for finer gain if in difficult applications:

Weight Factors	Values
1	1
2	2
3	3
4	4
5	5
6	1.5
7	2.5
8	3.5
9	4.5

Press F1 - CHG

F1 - LO - type in lower corner frequency i.e. “100”

F4 - OK

F2 - HI - type in higher corner frequency i.e. “140”

F4 - OK

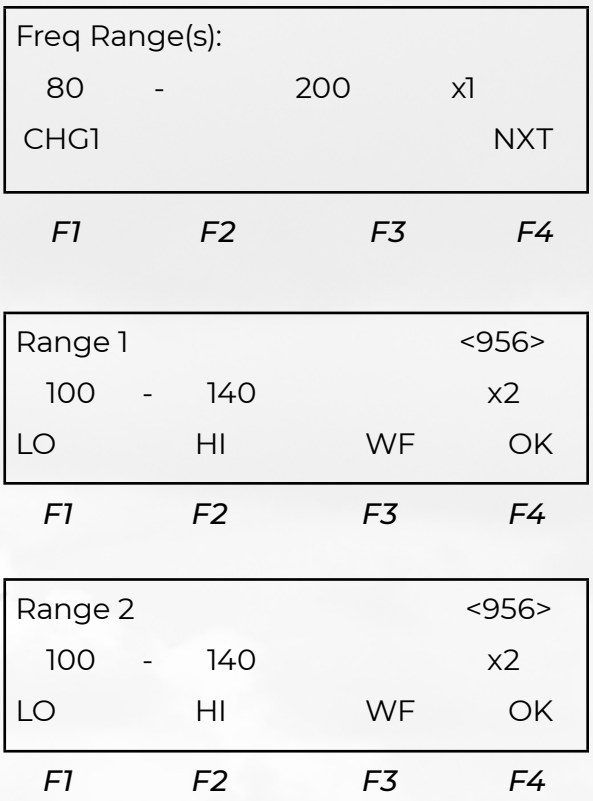
F3 - WF - type in “2”

F4 - OK

F4 - OK

F4 - NXT

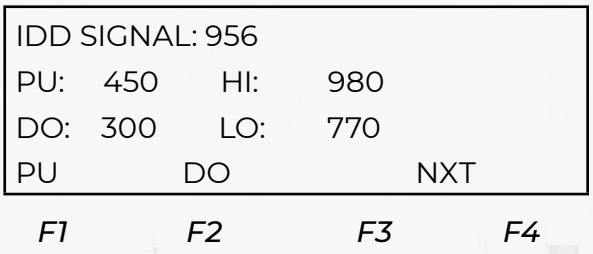
The second range, if used, must be located at higher frequencies than the first. No overlap between the two ranges are allowed. Therefore, the upper corner of the lower range cannot be specified to a frequency higher than the low corner of the upper range. Corners and WF for Range 2 are changed the same as Range 1.



3.1.1.3 IDD Pick-Up and Dropout Points

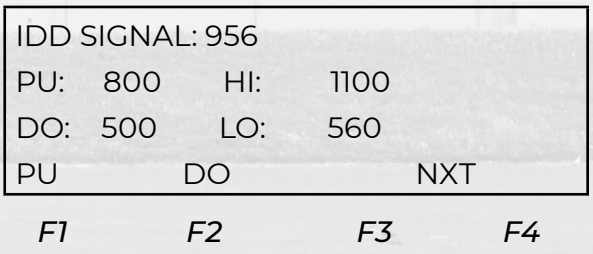
This screen displays:

- Average IDD signal level in pulses per second (PPS) using the configuration settings entered thus far (IDD SIGNAL),
- Programmed pick-up (PU),
- Dropout points (DO),
- Highest and lowest signal values seen since accessing this screen (HI and LO).



NOTE: : Linger for several minutes on the IDD SIGNAL screen to gather some trend data. Remember, the SmartDisplay/Termiflex times out after 10 minutes of activity. Notice how the high (HI) and low (LO) value range keeps expanding.

Pick-up and dropout points are limited to absolute minimum and maximum of 0 to 8190. The pick-up point should be less than the average signal value (i.e. IDD SIGNAL: 956) and greater than the minimum signal value (i.e. LO: 560). The dropout value should be less than the minimum signal value (i.e. LO: 560). The pick-up point must be greater than the dropout point.



Press F1 - PU to change the pick-up value. i.e. 800 was selected for PU (560 < 800 > 956)

Press F2 - DO to change the dropout point. i.e. 500 (500<560).

3.1.1.4 IDD Analog Output Low and High Points

The analog output value corresponds to the average of the last five instantaneous counts of signal intensity.

The IDD ANALOG OUTS screen shows the programmed values for the IDD analog output low and high points; plus, displays the pick-up and dropout points that were just programmed in the last section for reference.

IDD ANALOG OUTS			
HI: 1000		PU: 800	
LO: 0		DO: 500	
HI	LO		NXT
F1	*F2*	*F3*	*F4*

The Analog Output HI and LO will set the 4-20mA and 0-10V outputs and can be set to yield the most information to almost nothing more than ON/OFF. To convey the most information, set the HI to the actual high displayed on the IDD Signal screen and the low to a value lower than the dropout (DO) value, which would be 1100 & 300.

IDD ANALOG OUTS			
HI: 1100		PU: 800	
LO: 300		DO: 500	
HI	LO		NXT
F1	*F2*	*F3*	*F4*

To change the programmed values for IDD Analog Outputs on the Termiflex/SmartDisplay:

Press F1 - HI - type in “1100”

F4 - OK

F2 - LO - type in “300”

F4 - OK

F4 - NXT

NOTE: : The 4-20 output is not to be considered a calibrated output, to this end the output scale from the factory is set at a default value of 3000 well beyond the usable range. In order to acquire a reasonably linear output for display purposes, after the amplifier is properly set up and tested for proper flame discrimination adjust these ranges as described above.

3.1.2 UV-4 Channel Tuning

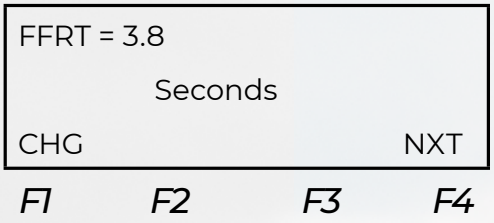
If operating Mode 2 is selected, the following screens will appear.

Screen	Values on Screen	To Make Changes	Notes
UV-4 Count Multiplier DO PU PPS 100 500 460 Multiplier = 1 DEC INC NXT F1 F2 F3 F4	Programmed Drop Out (DO) and Pick Up (PU) PPS value of the incoming signal Multiplier value	Press F1, "DEC" or F2, "INC" to change the Multiplier Press F4, "NXT" will accept the value.	Multiplier value goes from 1 to 5. It is a straight multiplier to the PPS, to boost a low count. For best tuning and operation, adjust the multiplier so the PPS Count average is at least 500.
UV-4 Channel Pick-Up and Dropout Points PPS SIGNAL: 860 PU: 500 HI: 880 DO: 100 LO: 840 PU DO NXT F1 F2 F3 F4 **NOTE:** Linger for several minutes on this screen to gather some trend data. Remember, the SmartDisplay/Termiflex times out after 10 minutes of inactivity. Notice how the high (HI) and low (LO) value range keeps expanding.	Active PPS signal level in Hz as an average Programmed pick-up points Dropout points Highest and lowest actual signal values seen	Press F1, "PU" or F2, "DO" Press F4, "NXT" will accept the value.	Pick-up and dropout points are limited to absolute minimum and maximum of 0 to 8190. The pick-up (PU) point should be less than the average signal value (i.e. PPS SIGNAL: 860). The dropout value should be less than the minimum signal. The pick-up point must be greater than the dropout point.
UV-4 Analog Output Low and High Points PPS ANALOG OUTS HI: 1000 PU: 700 LO: 0 DO: 200 HI LO NXT F1 F2 F3 F4 **CAUTION:** The analog outputs are not intended for control of safety critical processes.	Programmed values for the PPS analog output low and high points. Programmed pick-up and dropout points being used	Press F1, "HI" or F2, "LO" Press F4, "NXT" will accept the value.	The Analog Output HI and LO will set the 0-10V and 4-20mA outputs and can be set to yield the most information to almost nothing more than ON/OFF. To convey the most information, set the HI to the actual high displayed on the PPS Signal screen and the low to a value lower than the dropout (DO) value.

3.2 Flame Failure Response Time Delay for Modes 1 and 2

The next screen shows:

- FFRT setting being used. There are three choices available for the FFRT delay: 1.0, 2.0, 3.0, and 3.8 seconds.
- Press F1, “CHG” and enter 1, 2, 3, or 4 (for 3.8) to change the setting.



If only one IDD detector is connected to both channels (refer section 2.5.2), both channels must be set for identical FFRT delay.

NOTE: The maximum FFRT allowed to meet Factory Mutual (FM) standard 7610;1997 is 4.0 seconds. If the user enters 4, the system will display and use 3.8 seconds for the FFRT delay. This is done to keep the response time safely less than 4 seconds under all conditions.

The maximum FFRT allowed to meet standard EN298;2012 is 1.0 Sec.
During check cycle flame relay hold on for 2 sec regardless of FFRT (flame failure response time) settings.

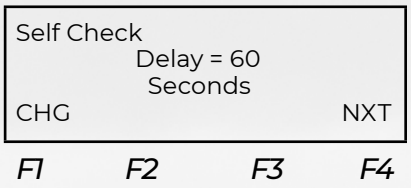
If one IDD Detector is connected to both channels of a Dual Channel Amplifier, it is recommended to set identical FFRT and Self-Check Cycle times on both channels.

Flame Failure:

- Flame failure occurs following the FFRT delay if the detector’s signal falls and stays below its programmed dropout point.
- Flame failure occurs immediately if the system fails a self-check. When a self-check is performed, the PPS count must fall below the Drop Out point, (DO) which is programmed into the amplifier during setup.
- On Flame Failure, the flame and lamp outputs turn off. The alarm output is not changed. Signal acquisition continues. Flame-on status can be re-established if the detector(s) meet the pick-up logic requirement.

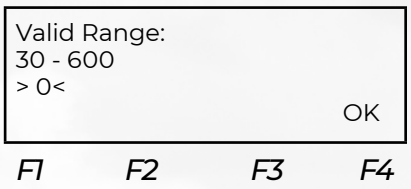
3.3 Self-Check Cycle Time for Modes 1 and 2

The next screen shows the self-check cycle time being used. This value is displayed and entered in seconds. For example, two minutes is entered as 120 seconds. The self-check cycle time is restricted to a minimum value of 30 seconds and a maximum value of 600 seconds (10 minutes).



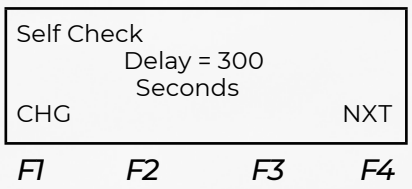
Regardless of the number of channels being used, both channels must be set to an equal Self-Check Cycle Time. If different self-check cycle times are set, the shorter of the two settings will be effective on both Channels.

During self-check the detectors are blinded for a brief interval. After a short delay, the signal levels are compared and self-check failure occurs if a detector's output is above its dropout point. The Blind function for an IDD detector head has the 50Vdc bias Voltage removed. The Blind function for a UV-4 has a 50Vdc shutter voltage fire to block the UV Tube. Both happen at the same time.



If one channel fails at any time, for any reason, the other channel will continue to operate.

Example set SELF CHECK Delay to 5 minutes.
F1 - CHG - type in 300
F4 - OK
F4 - NXT

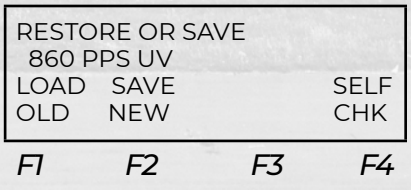


NOTE: Timed self-check is inhibited if there is no flame indication or if the system is being tuned or blinded. System performs self-check 2 seconds after detection of flame. Any self-check failure will cause immediate flame failure. The Flame and Lamp LEDs will extinguish, and the Red Alarm LED will light. The display will show a repeating error message informing the user the flame detector failed.

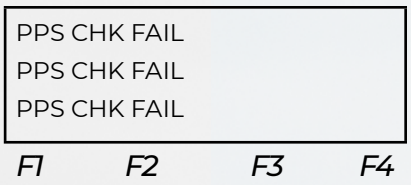
3.4 Saving Configuration

The RESTORE OR SAVE screen gives you 3 options.

- TEST your setup using F4 to do a SELF CHECK.
- SAVE your setup using F2 to do a SAVE NEW.
- DISCARD your setup using F1 to reload the PREVIOUS SETTINGS.

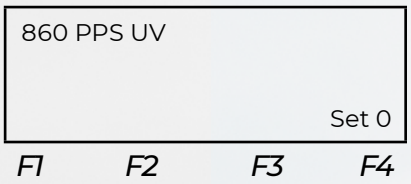


If the SELF CHECK fails, the unit does a lock out, to fail safe, as required. Press the RESET button on the front panel to restore the original settings, and start again.



If SELF CHECK passes, select SAVE NEW and you may want to sweep thru the settings again for further tweaking.

- F2 - SAVE NEW



CAUTION: If the system is left in tuning mode without saving, it will time out after 10 minutes to the previously SAVED parameters. However, if the Termiflex is removed without saving the new configurations, it will revert to the previously SAVED parameters immediately. Upon removal of the Termiflex, be sure the RM IDD 9000 has returned to normal operating mode, indicated by the WDT LED flashing. Pressing the "Reset" button ensures it has returned to normal operation.

3.5 Functions Unavailable while Tuning

The following functions are not available when inside the tuning loop:

- The self-check cycle timer is not incremented while inside the tuning loop. The timer resumes counting and the amplifier self-checks when the tuning loop is exited.
- The profile select inputs are not checked while tuning. If the profile is changed while tuning, any changes made will be lost and the new profile loaded when the tuning loop is exited.
- The blind input is not checked while tuning. If this input is changed while tuning, the blind/un-blind will occur when the tuning loop is exited.
- The watchdog timer/code is active at all times, but the WDT LED stops toggling while in the tuning loop to serve as a visual reminder that tuning is still in progress.

3.6 Analog Outputs

- The analog output value corresponds to the average of the last five instantaneous counts of signal intensity.
- The analog outputs (4-20mA and 0-10V) are linearly scaled between the programmed low and high points respectively. These will output minimum (4mA and 0V) if the input channel is off or the signal level is at or below the programmed low point and will read full scale (20mA and 10V) if the signal level is at or above the programmed high point.
- No hardware zero or span adjustments are provided.
- The 15 Volt outputs to the 4-20mA indicators are fused with 1/8-Ampere plug-in fuses accessible by removing the amplifier cover.
- The 0-10V outputs have a 1000-Ohm output resistance so these outputs can only be used with a high input-resistance indicating or logging device.

CAUTION: Analog signals powered from +15VDC within amplifier and protected by 0.125A (F4). DO NOT GROUND signal return externally.

3.7 Amplifier Shutdown/Failure

If the amplifier fails or is shutdown the main flame and lamp outputs are turned off. The alarm output is turned on. Signal acquisition stops. An error message repeatedly displays. Power off/on or a Reset is required to restart the system.

SECTION 4
MAINTENANCE

This section contains maintenance instructions for the RM IDD 9000.

CAUTION: This amplifier contains “STATIC SENSITIVE” components. Use standard electrostatic-discharge (ESD) procedures whenever handling the board.

WARNING: Ensure all Flame Detector amplifiers, detectors, and cables are installed properly, and the amplifier is programmed exactly as described in this manual. DEVIATION IN ANY CASE MAY RESULT IN CATASTROPHIC FAILURES AND SEVERE DAMAGE TO EQUIPMENT AND/OR INJURY TO PERSONNEL.

4.1 Tuning

The flame detection system should be tuned at initial installation in accordance with user instructions for the Termiflex/SmartDisplay® with the RM IDD 9000 amplifier. Following initial installation, the tuning parameters should be rechecked at periodic intervals to maintain optimum system performance.

4.2 Troubleshooting

If the flame detection system fails, isolate the fault to the flame detector head, the cable between the head or the amplifier. The following instructions provide general guideline for fault isolation.

1. Measure the voltage inputs at J1 of the RM IDD 9000 PCB. Ensure that all voltage inputs are at the correct level. (Refer to Table 2-4, page 8)
2. If the PCB fails to respond correctly, the system program may be stalled. Press the “Reset” pushbutton switch to clear the CPU, and restart the program.
3. The PCB contains 14 push-in fuses on the PCB board. If restarting the program does not resolve the problem, remove power from the system and check for open fuses. Replace open fuses as required. (Refer to Table 6-1 for a list of fuses mounted on the PCB.) If any other component requires replacement, return the PCB to Forney for evaluation.
4. Use documentation supplied with the flame detector head to isolate a fault to the head or cable.

4.3 Storage and Handling Requirements

Store the RM IDD 9000 amplifier in its shipping box until used. See the specifications section of this manual for storage temperature and humidity ranges. Normal static precautions should be taken in handling parts sensitive to electrostatic discharge (ESD).

SECTION 5
RMA/WARRANTY

Forney Corporation warrants this product to be free of defective material and workmanship. Forney will replace this equipment as long as it is being used for its intended use and is found to be defective upon receipt up to the expiration of the warranty period.

Prior to returning any material to Forney, please contact your Forney customer service representative and provide the contract number or the customer purchase order number.

SECTION 6
SPARE PARTS

When ordering spare parts, contact Forney's Aftermarket Department via any one of the following methods and furnish the following information.

Email	Phone	Fax
spares@forneycorp.com	972-458-6100 or 972-458-6142 or 1-800-356-7740 (24-hour direct line)	972-458-6600

6.1 Recommended Spare Parts

The recommended spare parts list in the table below advises of replacement parts that should be in the customer's stock.

Table 6-1 Replacement Parts

Fuse	Value	Description	Part No.
F1, F2 F3, F4	1.6A	+6.5VDC CPU Power A +6.5VDC CPU Power B	9235712
F7 F5	.125A	IDD Detector +15VDC Power A IDD Detector +15VDC Power B	9235704
F8 F6	.250A	UV Detector Power A UV Detector Power B	9235703
F9 F11 F10 F12	.125A	+15VDC UV 4-20mA Output A +15VDC IDD 4-20mA Output A +15VDC UV 4-20mA Output B +15VDC IDD 4-20mA Output B	9235704
F13 F14	1A	+15VDC A +15VDC B	9235713
F15	0.62mA	Channel 1, 50vdc bias	282055
F16	0.62mA	Channel 2, 50vdc bias	282055
		Insulating Pipe Nipple, Fiberglass	7516801
		Kit for IDD-Ultra Retrofit - Grounding	37027901

Commissioning Checklist

Forney Contract No: _____

Site: _____

Burner/Igniter No. _____

Tuning Parameter Settings

	Profile #____		Profile #____		Profile #____		Profile #____	
MODE 1	**Sense A**	**Sense B**	**Sense A**	**Sense B**	**Sense A**	**Sense B**	**Sense A**	**Sense B**
IDD GAIN								
FREQ RANGES								
CORNER 1								
CORNER 2								
CORNER 3								
CORNER 4								
WEIGHT 1								
WEIGHT 2								
IDD PICKUP- PPS								
IDD DROPOUT- PPS								
IDD ANALOG LOW- PPS								
IDD ANALOG HIGH- PPS								
MODE 2								
UV MULTIPLIER								
UV PICKUP- PPS								
UV DROPOUT- PPS								
UV ANALOG LOW- PPS								
UV ANALOG HIGH- PPS								
MODES 1 & 2								
FFRT								
CHECK DELAY								

If using more than four profiles, copy this sheet to document settings for all profiles.