FORNEY

IDDX Flame Detector Amplifier Manual

Publication 372001-24 Rev. A

● BURNERS ● IGNITERS ● DAMPERS ● CONTROLS

www.forneycorp.com

TECHNICAL RELEASE LOG

REV	MODIFICATION	DATE
A	Original Release	04/2021

NOTICE: Read this manual in its entirety before commencing work of any kind. Only experienced personnel familiar with this type of equipment, should install, setup, and service this equipment.

WARNING: Never use this equipment in any manner for which it was not designed. Improper use can severely impact user safety. The Forney Corporation cannot be held liable for any damages resulting from such use! Failure to heed this warning COULD result in death or serious injury.

NOTICE: The equipment serial number should be referenced any time that contact is made with Forney. The serial number can be found on the Forney Data Label/Plate (mounted on the equipment).

NOTICE: If any of the procedures or instructions provided in this manual are unclear, contact Forney for resolution. Forney Corporation offers complete, on-site service solutions to ensure proper installation, programming, commissioning, and troubleshooting.

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0.1 INTRODUCTION

This manual serves as a guideline to service technicians for the basic installation, setup, and troubleshooting of the IDDX Flame Amplifier, manufactured by Forney Corporation: 16479 Dallas Parkway, Suite 600, Addison, TX 75001.

All personnel should become thoroughly familiar with the contents of this manual prior to installing, setting-up and servicing this equipment. 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.

0.2 PROPRIETARY NOTICE

0.3 SAFETY AWARENESS

Safety is YOUR responsibility and must always be primary concern. The guidelines covered in this manual will greatly improve your ability to safely install and maintain this equipment. It is the equipment owner's responsibility to ensure that the concerned personnel fully understand and abide by all site-specific Health, Safety, and Quality protocols. Safety summaries and procedures can never replace good common sense!

0.4 PERSONAL PROTECTIVE EQUIPMENT (PPE)

All involved personnel should follow their site-specific Health, Safety, and Quality guidelines.

0.5 TYPICAL SAFETY ALERT SYMBOLS AND ACTION ICONS

ALL labels in this manual should be carefully observed, read, and understood. Standard labels are as follows:

DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Provided to notify personnel of potential damage to equipment. This label can also contain important operational information and/or tips that may be useful. These labels are not related to personal injury.

0.6 ADDITIONAL DOCUMENTATION

IDD Detector Manual

SECTION 1
EQUIPMENT DESCRIPTION

1.1 SUMMARY

The Forney IDDX flame amplifier is a flame detector amplifier designed for use with Forney IDD series of flame detectors. The IDDX Flame amplifier is suitable for use in a variety of industries such as oil, coal, gas, etc. and across several applications such as gas-fired industrial burners, utility burners, waste fuel burners, duct burners and igniters.

The IDDX flame amplifier is a stand-alone intelligent controller which includes two printed circuit boards (PCB) assembled and packaged in a covered chassis suitable for mounting on a standard DIN rail. The IDDX flame amplifier may be installed in any orientation (horizontal or vertical DIN rail). The IDDX amplifier must be installed in a controlled environment (protected from dust & excessive heat). Screw terminals are provided for electrical connections with external equipment.

The IDDX flame amplifier provides power control, signal conversion, and processing control for Forney IDD detectors (IDD II, IDD IIU, IDD IIL, Ultra). The IDDX is designed to work with any one of the following Forney flame detectors:

Detector	Forney Part Number
IDD II	3832121
IDD IIU	3832122
IDD IIL	3832123
IDD Ultra	3832129

Power printed circuit board (PCB) receives 24VDC input power from an external power source and provides 5 VDC, 12 VDC, 15 VDC, & 50 VDC power for various circuits. The 15Vdc supply, powers IDD detector heads directly while 50VDC provides bias voltage for the IDD detectors. Both 15 VDC and 50 VDC output to flame detector are protected by self-resetting fuses (PTC) .

The IDD flame detector produces an analog data signal whose amplitude and frequency vary with light intensity. This signal is amplified using an adjustable gain amplifier (0 through 15) and fed to microprocessor for signal processing. Microprocessor runs FFT algorithm to provide signal intensity at different frequencies. At regular intervals, the microprocessor compares those values with configured tuning parameters from memory. When the count value exceeds the corresponding value from memory, the microprocessor sets a flag to indicate flame presence.

The count values provide a direct measure of infrared or ultraviolet light intensity striking the respective sensors. Accordingly, an analog output signal (4-20 ma) is provided to drive flame intensity meters or for use in a control system. Analog output is driven by internally generated 15 Vdc and is protected by a self-resetting fuse (PTC). The minimum and maximum scale values are user adjustable based on customer requirements.

NOTICE: Analog output is generally representative of the flame intensity and are intended for display on the operator console only. Analog output signal is not representative of quality of combustion and must not be used as 'loss of flame' input to safety control loop of the Burner Management System.

The IDDX amplifier includes a self-check feature for flame detection system. Once flame is detected, at user selected interval, IDDX runs a self-check routine to validate proper functioning of the system. During self-check, 50 VDC Bias voltage to detector is removed for a brief period while processor monitors detector signal to drop below flame relay drop out set point. If the flame signal from detector fails to drop below the drop out set point, CPU triggers fault LED to lit, Flame relay to deenergize, Fault relay to deenergize and locks out IDDX amplifier in fault state until manually reset by technician by pressing RESET push button.

Fault relay is normally energized to provide fail safe output and deenergizes on detection of fault. Thus, fault relays contacts are in closed state until any fault is detected. The IDDX amplifier checks for broken wire or disconnected IDD detector head or loss of 15 VDC power to detector and triggers fault alarm when such condition persist.

Any fault detected by firmware in the IDDX amplifier, generates a corresponding error message that can be downloaded to the Termiflex/ SmartDisplay®. Any failure will be continually broadcast until reset pushbutton is pressed.

The IDDX Flame Amplifier faceplate has six (6) status LEDs to display real-time operating conditions:

Flame (Green)	Steady when the Flame Relay is in "ON" state.
Alarm (Red)	Steady when the Detector faults; off otherwise.
WDT (Green)	Flashing every second indicates normal operation; off during processor internal fault except when detector is disconnected.
P1 (Green)	Steady when Profile Select Input 1 is ON; off otherwise.
P2 (Green)	Steady when Profile Select Input 2 is ON; off otherwise.
Self-CHECK (Green)	Blinking on every period value set on Self check timer; off otherwise.

Power PCB installed on the base includes terminals for wiring as well as LEDs for troubleshooting

LED 4 (Yellow)	Steady when 24 VDC input power is present.
LED 11 (Yellow)	Steady when 15 VDC output power to Detector head is present.
LED 10 (Yellow)	Steady when 5 VDC output power is present.
LED 1 (Yellow)	Steady when 50 VDC output power to detector head is present.

Operating Profile Select Inputs:

Two (2) profile select inputs are available for selecting up to four (4) different profiles, numbered from 0 to 3 stored in its non-volatile memory. Each profile select input is sourced (5 VDC) from the detector itself and must be wired to a potential free contact controlled by BMS or other control system. Do not connect external power to profile select input terminals.

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. Each profile contains a full set of operating parameters see Table 210 Operating Profiles.

The amplifier 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”.

Table 2-10 Profile Select Input Encoding

Profile Select 1 J12-TB 1	Profile Select 2 J12-TB2	ACTIVE PROFILE
OPEN	OPEN	Set 0
CLOSE	OPEN	Set 1
OPEN	CLOSE	Set 2
CLOSE	CLOSE	Set 3

Operating Modes

All operating profiles are initialized via a profile flag and with the default settings shown.

Table 2-11 Operating Profiles

Termiflex Display	Mode 1: IDD PPS only	Setting Range
IDD GAIN	0	0 through 15
SPECTRAL RANGES	1	
CORNER 1	80 Hz	12 -1024
CORNER 2	200 Hz	12 -1024
WEIGHT 1	1	1 through 9

Table 2-11 Operating Profiles

Termiflex Display	Mode 1: IDD PPS only	Setting Range
CORNER 3	1024 Hz	12-1024
CORNER 4	1024 Hz	12-1024
WEIGHT 2	1	1 through 9
IDD PICKUP- PPS	500	1-4095
IDD DROPOUT- PPS	100	1-4085
IDD ANALOG LOW- PPS	0	0-3000
IDD ANALOG HIGH- PPS	3000	0-4095
FFRT	3.8 Seconds	1,2,3.8
CHECK DELAY	120 Seconds	30 to 600 seconds

A serial communication port is located on the front of the IDDX. This port enable communication between the microprocessors on the board and a hand-held Termiflex/ SmartDisplay® via RS422 communication protocols.

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.

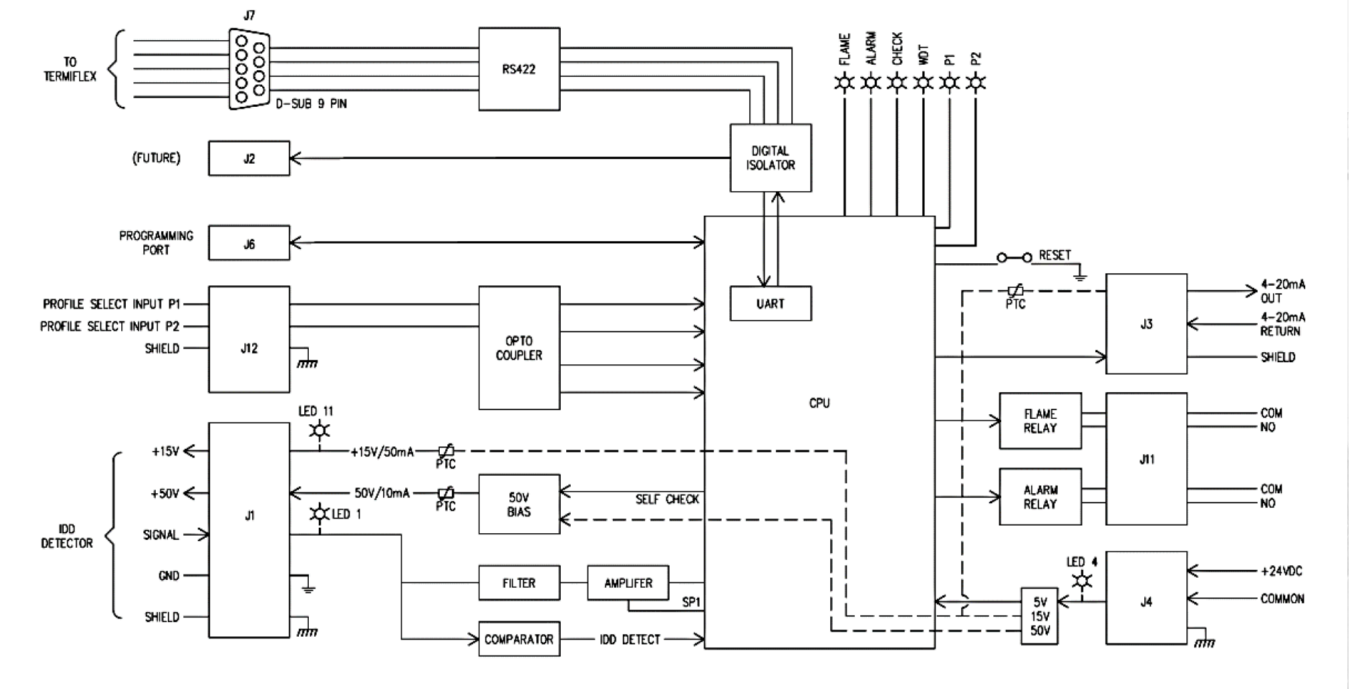
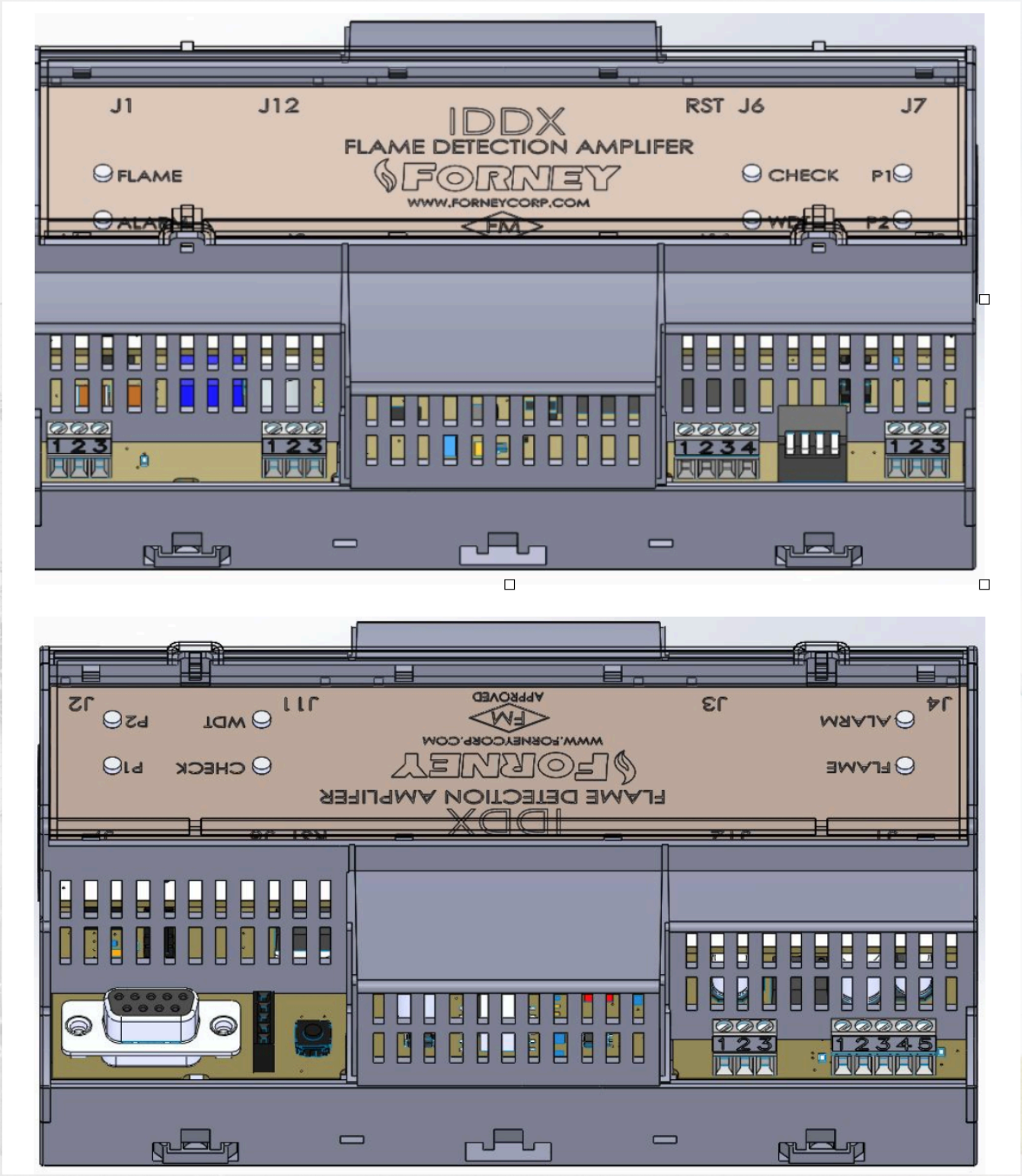
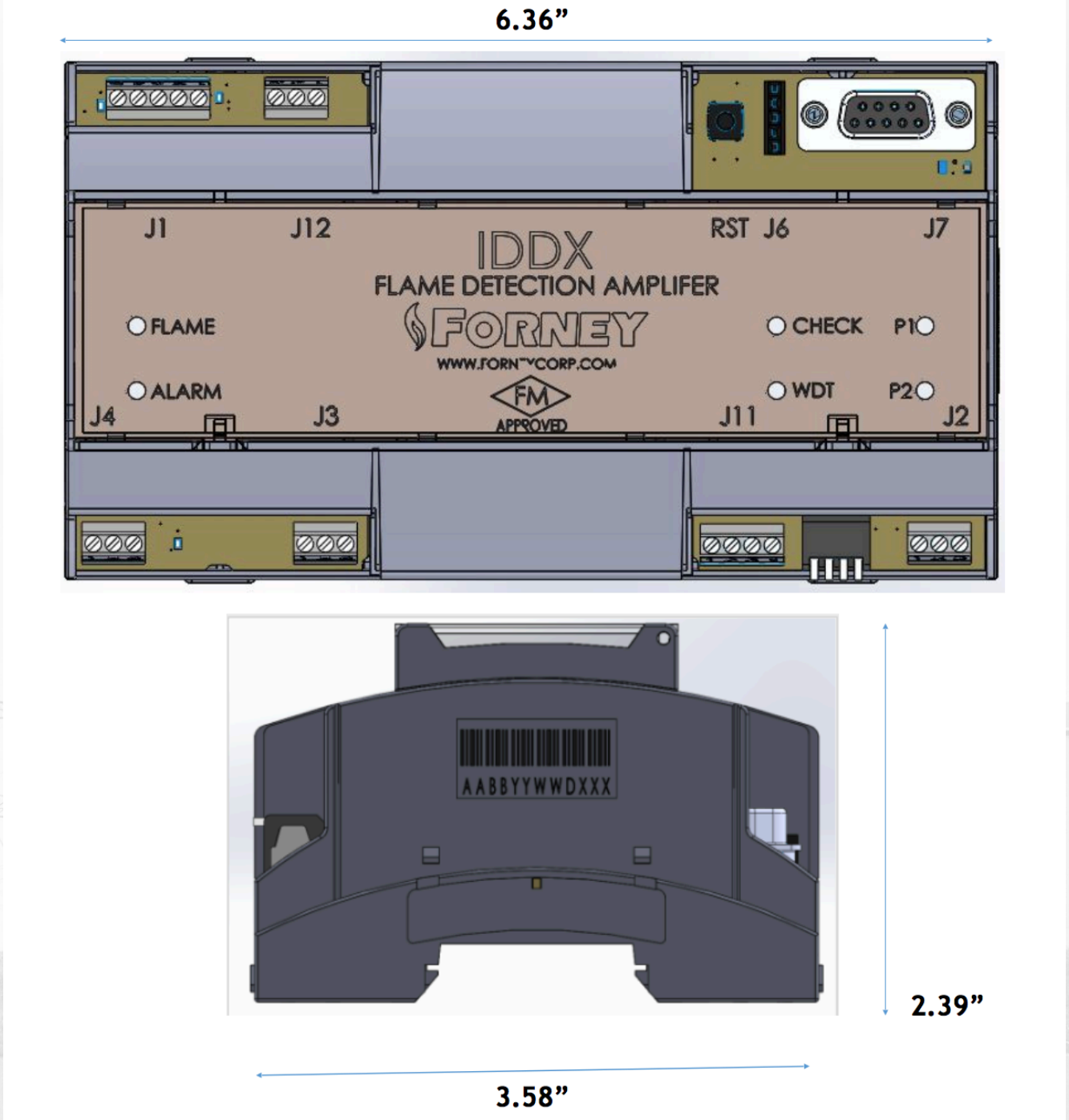


Figure 1 – IDDX Flame Amplifier



1.2 DIMENSIONS

Figure 2 - IDDX Flame Amplifier Dimensions in inches



1.3 TECHNICAL DATA

Electrical

Power Supply:	24 VDC (+/-10%)
Steady State Current:	265 mA
Inrush Current:	1 A
Power Consumption:	6.5 Watt
External In-line Fuse:(Required)1	1A Fuse (Customer Furnished)
Terminal Size:	18 AWG
Heat Dissipation:	4 Watt
Flame Relay:	1 (fail safe)
Contacts: (External 500 mA Fuse Required in series)	SPST, 250VAC/5A
Conformal Coating:	No
Relay Operating Cycle:	> Min 20 X 106 Operations
Flame Failure Response Time (FFRT):	1, 2, 3, 3.8 second (user adjustable)
Fault Relay:	1
Analog Output:	One Sourced 4-20 mA, Load resistance <= 500 Ohm
Profile Selection Digital Inputs:	2 Self-Powered Inputs
Communication (Wired):	RS-422 (Termiflex)

Mechanical

Housing Material:	Engineered Polymer
Weight:	0.62 lbs. (280 gms.)
Degree of Protection:	IP20, NEMA 1

Environmental

Ambient Operating Temperature:	32°F to 140°F (0°C to 60°C)
Ambient Storage and Transportation Temperature:	68°F to 122°F (20°C to 50°C)
Relative Humidity:	RH 95% 104°F (40°C)

Compatible 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)

1.4 CODES, STANDARDS, AND AGENCY APPROVALS

The IDDX Flame Amplifier is designed to meet several industry codes and standards. Subsequently, the CE, UL, IEC, FM, and ATEX approvals have been obtained.

Table 1 - Codes and Standards

Code/Standard	Description
Enclosure Type	IP 20
Factory Mutual 7610	Approval Standard for Combustion Safeguard and Flame Sensing System
ANSI/UL 94	Flame Resistant UL 94 Compliant
RoHS	Directive 2002/95/EC

SECTION 2
EQUIPMENT INSTALLATION

The purpose of this section is to ensure that the IDDX Flame Amplifier is installed using recommended Forney practices.

2.1 LOCATION

- The IDDX Flame Detector Amplifier must be installed in a cabinet rated to NEMA 12 ingress protection or better to ensure it is protected from heat, dust, and moisture ingress.
- If installed in an unventilated cabinet, forced exhaust / colling air fans may be required depending on ambient conditions and heat loading.
- Where ambient temperatures are expected to exceed specified limits, cabinet must be installed in a controlled environment.
- Ensure that the IDDX Flame Amplifier and associated cabling is located at a safe distance from high voltage lines or other sources of electrical noise.

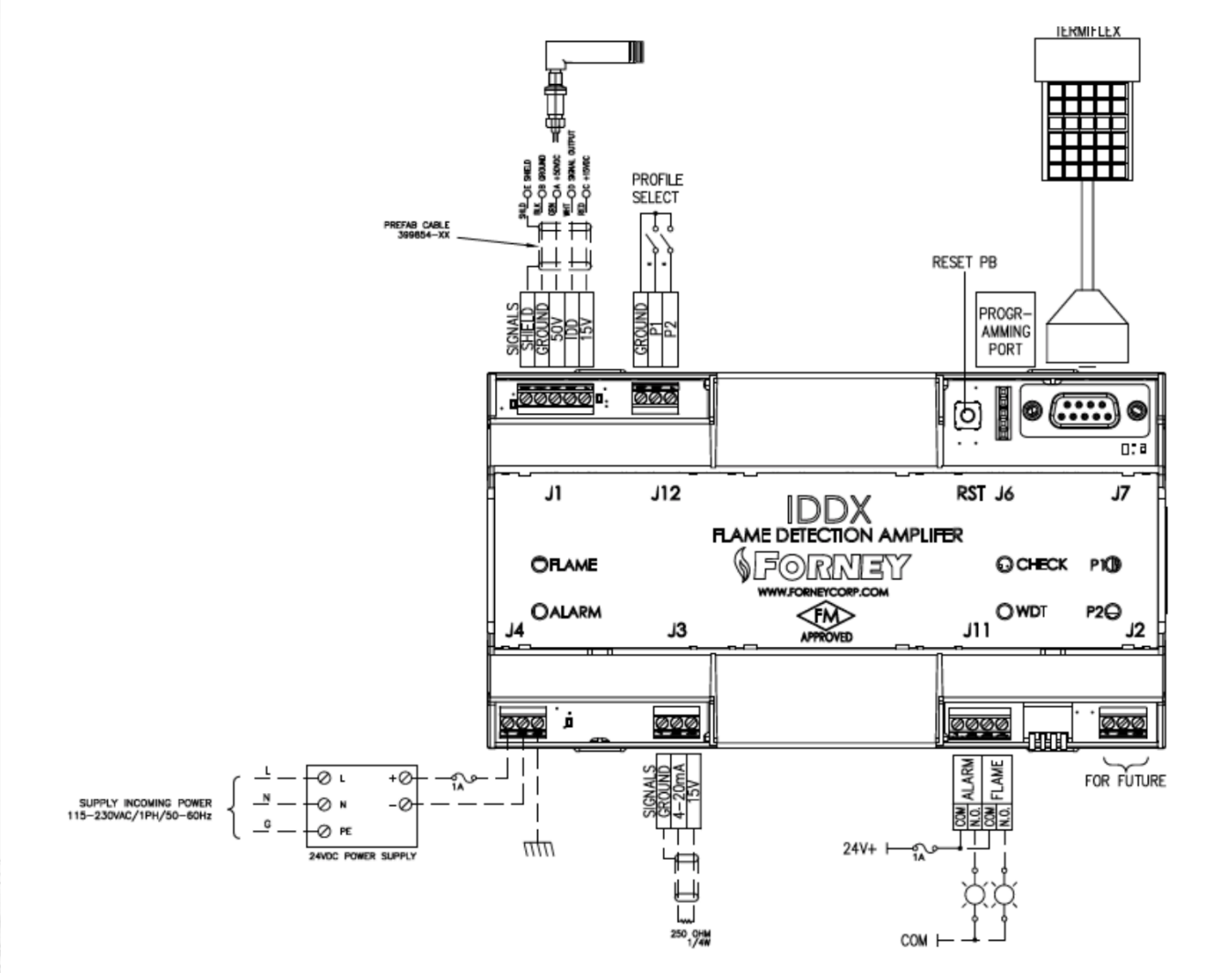
2.2 REQUIRED SITE-SERVICE CONNECTIONS

The IDDX Flame Amplifier requires a 24VDC input from an instrument quality power supply. Forney strongly recommends use of 24 VDC input power source with low output ripple voltage to keep power supply induced noise to minimum.

NOTICE: Ensure that the supply voltage matches the information provided in section 1.3 Technical Data prior to connecting power to the unit.

2.3 WIRING

Figure 8 – IDDX – WIRING DAIGRAM



Voltage	Internal PTC Fuse	Description
50V	10mA/0.5W	Sensor Bias Supply
15V	50mA/30V/0.6W	Sensor Logic Supply
15V	50mA/30V/0.6W	4-20mA

Figure 9 – IDDX – Internal Self Resetting Fuse details

PINOUT SUMMARY:

PIN	Signal	Function
J4 Connector - 24V Supply		
1	24VDC (+)	Input Power Supply Positive Wire
2	COMMON	Input Power Supply Negative Wire
3	Earth / Shield	System Earth / Chassis Ground
J3 Connector - External DCS		
1	GND	Electrical Ground return for DCS
2	4-20mA	IDD flicker signal, 4-20mA return PPS
3	15V	15VDC + for DCS System
J11 Connector - Relay		
1	ALARM COM	Common for External BMS system
2	ALARM NO	Normally Open for External BMS system
3	FLAME COM	Common for External BMS system
4	FLAME NO	Normally Open for External BMS system
J2 Connector - Reserved for Future Use		
1	GND	Electrical Ground return for System
2	B	Reserved for Future Use
3	A	Reserved for Future Use
J1 Connector - IDD Head Connector		
1	Shield	Chassis (cable shield)
2	GND	Electrical ground return for detector
3	50V	+50 VDC Bias/5mA
4	IDD	IDD Detector signal
5	15V	+15 VDC for IDD detector
J12 Connector - Master/slave and Profile Inputs		
1	GND	Electrical ground return for External system
2	P1	Binary 1, Add all for 0-3 Profile Select
3	P2	Binary 2, Add all for 0-3 Profile Select
J6 Connector - ISP		
1	ICSP	In system Programming to flash new firmware
J7 Connector - Termiflex		
1	Termiflex	Connecting termiflex for user interface

SECTION 3
SETUP AND CONFIGURATION

The purpose of this section is to ensure that the IDDX Flame Amplifier is properly setup and configured, using recommended Forney practices.

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 IDDX 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	? 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 IDDX 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 and 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 IDDX returns to normal operating mode. This is indicated by the WDT LED starting to flash. Pressing the reset button ensures the IDDX has returned to normal operation.

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. The numeric key 1 is pressed to set IDD 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

IDD Channel Tuning

If MODE 1 is selected, a sequence of IDDX channel tuning screens will follow. If available, use the USB oscilloscope to facilitate IDD tuning. An oscilloscope with FFT is more effective in determining the lower and upper corner frequencies; pick-up and dropout points; and analog output low and high points.

IDD Gain

To avoid saturation, the gain must be set to midrange or below. If the flame signal is clipped by excessive amplification, its spectrum is corrupted, making the flame on/off decision 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 0, 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 3-2 & 3-3 will apply so as not to saturate the amplifier. "<<" need to be avoided as this a high signal strength near 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 15, where 15 corresponds to the maximum GAIN of 32x. Gain setting should be as low as possible, typically 0, to ensure safety.

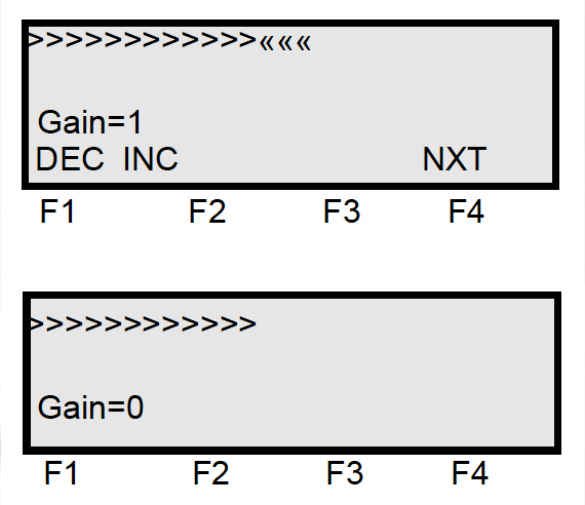


Table 3-2 IDD Gain Range

Gain Value	Multiplying Factor
0	0.65
1	1
2	1.3
3	2
4	2.6
5	3.25
6	4
7	5
8	5.2
9	6.5
10	8
11	10
12	10.4
13	16
14	20.8
15	32

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.

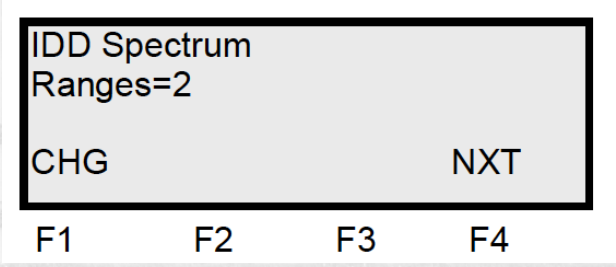
IDD Frequency Ranges

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.

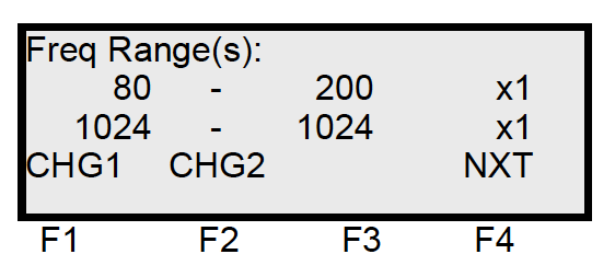
The incoming detector head signal may be tuned in 1 or 2 ranges. The ranges cover from 12Hz to 1024HZ. The system defaults to 1 range. If 2 ranges are chosen, adjust them both, upper and lower ends, but NO overlapping of frequencies is allowed.

Press F1 - CHG then type “2” (to change from 1 range to 2 ranges)
Press F4 - NXT



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.

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

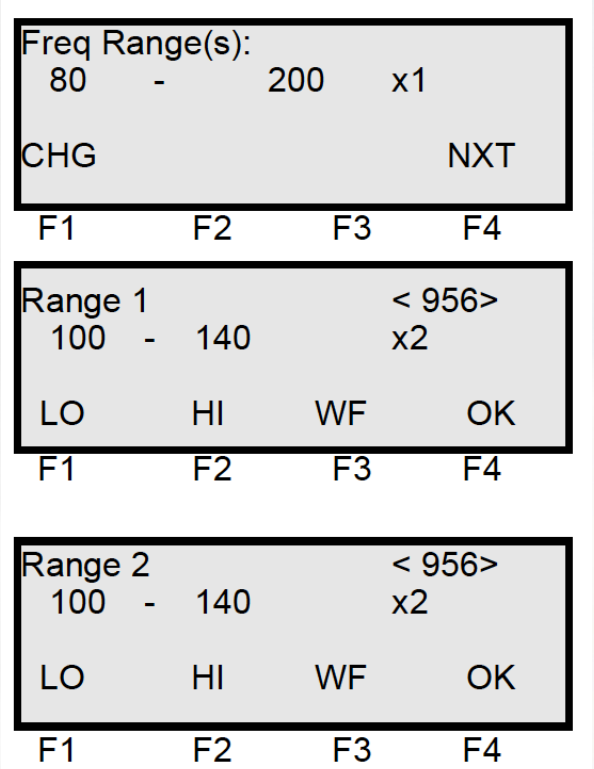


The next screen will display the acceptable limits for the parameter to be changed and will not accept any values out-of-range (12-1024 Hz). The corner frequencies entered must be numbers evenly divisible by 4 or the system will reduce the value entered to the next smaller value that is evenly divisible 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.

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 is 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.

Table 3-3 Weight Factor Range

Termiflex WF	Multiplying WF
1	1
2	1.5
3	2
4	2.5
5	3
6	3.5
7	4
8	4.5
9	5

IDD Pick-Up and Dropout Points

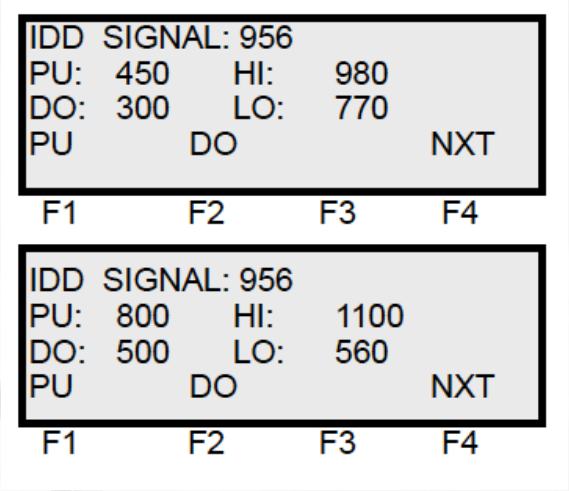
This screen displays:

• 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 4095. 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).

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, it displays the pick-up and dropout points that were just programmed in the last section for reference. 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 IDD Signal screen and the low to a value lower than the dropout (DO) value, which would be 1100 & 300.

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

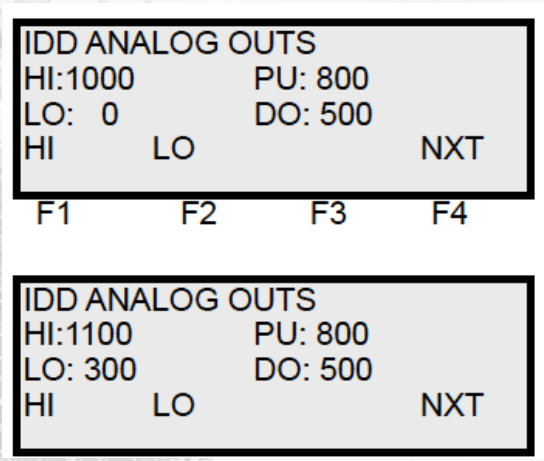
Press F1 - HI - type in “1100”

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.

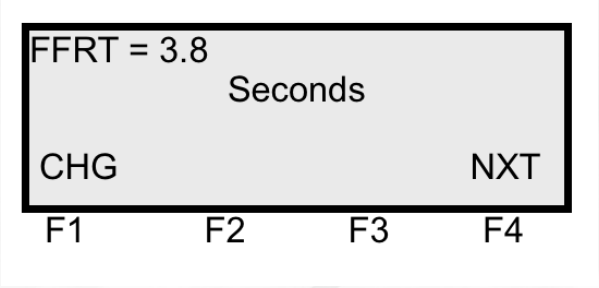
Flame Failure Response Time Delay for Modes 1

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:

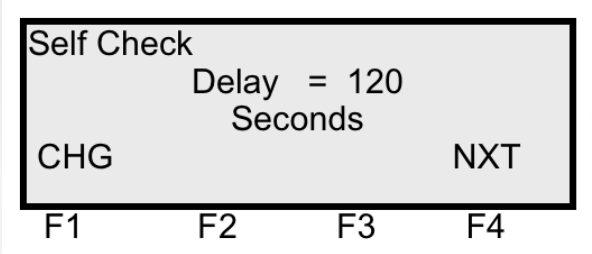
• Flame failure occurs following the FFRT delay if the detector’s signal falls and stays below its programmed dropout point.

• 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.

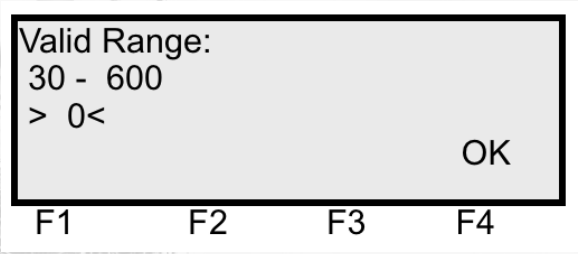
Self-Check Cycle Time for Modes 1

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.

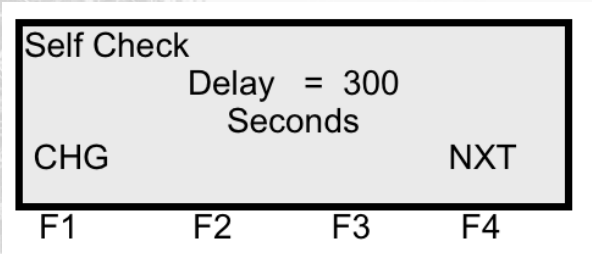


Example set SELF CHECK Delay to 5 minutes.

F1 - CHG - type in 300

F4 - OK

F4 - NXT



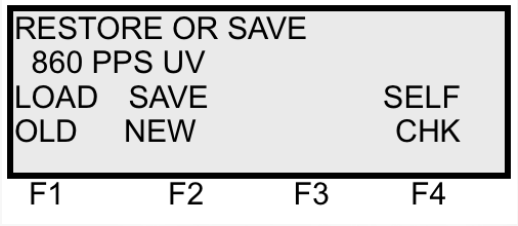
Note:

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.

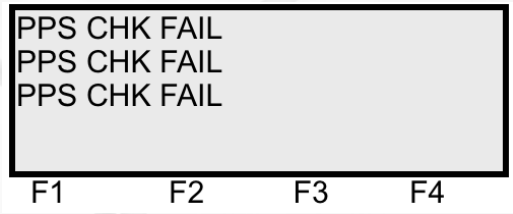
Saving Configuration

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.

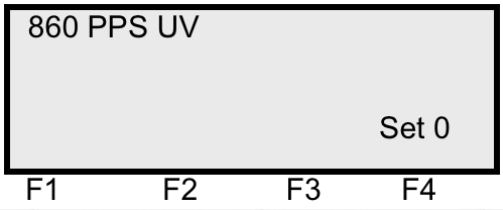


If the SELF CHECK fails, the unit does a lock out, to fail safe, as required. Press the RESET button on the front panel to restore the original settings, and start again.



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 after 2 seconds.

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.

Analog Outputs

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

• The analog outputs 4-20mA is linearly scaled between the programmed low and high points respectively. These will output minimum (4mA) if the input channel is off or the signal level is at or below the programmed low point and will read full scale (4-20mA) if the signal level is at or above the programmed high point.

• No hardware zero or span adjustments are provided.

• 4-20mA output support Total load of 500 Ohm external load.

Caution:

The analog outputs are not intended for control of safety critical processes.

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 is displayed on Termiflex . Power off/on or a Reset is required to restart the system. Refer to Sec 4.2 for guidance on troubleshooting.

WARNING: To ensure safe and reliable flame detection, it is the responsibility of the commissioning engineer to perform all flame failure testing after programming the detector. Ensure that the detector correctly detects the target flame (Flame “On” Condition) and recognizes the target flame off (Flame “Off” Condition).

SECTION 4
SERVICE AND TROUBLESHOOTING

This section reviews general service and provides basic guidelines for handling and storage of the equipment.

4.1 SERVICE

Coordination

Performing service on this equipment could impact more personnel (plant, yard, etc.) than just those that maintain this equipment. Therefore, it is advisable to get approval from site-leading personnel prior to performing service on this equipment.

Handling

The IDDX Detector amplifier consists of delicate electronic circuitry. Therefore, it is advisable to discharge any “static” electricity prior to handling the unit. Additionally, the IDDX Detector amplifier should be handled delicately, without aggressive bumping, dropping, etc.

Storage

It may be necessary to remove this equipment from service for extended periods of time. The IDDX Flame Amplifier should be stored in its shipping box. See section 1.3 Technical Specifications for storage temperature and humidity ranges. Normal static precautions should also be taken in handling parts sensitive to electrostatic discharge (ESD).

Regular visual inspections should occur to ensure they are continuously protected from the harsh elements during storage.

4.2 TROUBLESHOOTING

If the flame detection system fails, isolate the fault to the flame detector and the cable between the detector, and the cable. The following instructions provide general guideline for troubleshooting:

1. WDT LED Off :
2. No Signal
3. Alarm LED On
4. 4-20 MA at 0 ma
5. Brown Out Message on Termiflex
6. No Change in Profile
7. Flame LED On & Flame Relay Contact Open
8. Alarm LED Off & Relay Contact Open
9. Brown Out

If IDD detector is disconnected, ALM LED will turn on, but to differentiate with ALARM Condition, WDT LED will be flashing along with ALM LED steady ON.
On Self check Cycle failure, only ALM LED will turn on.

Symptom	Indicator	Possible Cause	Remedy
Self Check Cycle Fail	ALM LED ON IDD CK FAIL Message on Termiflex	IDD Signal Too High (>3000) leading to Sensor Saturation	Reduce Gain, Weight Factor, Adjust sighting
		Drop count (DO) too low	Increase Dropout count value towards Pickup count.
		High Gain Value / Weight Factor Value	Reduce Gain / WF Value
	50VDC bias LED1 Steady ON during Check-cycle	50 V bias voltage does not go to 0 VDC during self-Check duration	Replace IDDX Contact Forney Support
Sensor Disconnect	ALM LED ON & WDT LED Flashing	Loss of IDD Detector Signal	Check wires on J1 Connector. Check quick disconnect of IDD detector is secure. Check Detector cable wiring for continuity.
		Loss of 15VDC. LED11 is Off.	Replace IDDX

Symptom	Indicator	Possible Cause	Remedy
Frequent Watch Dog Failures or Chirping Flame Relay	Flame Relay chirps or Watch Dog LED Flash Slowly	Detector not properly grounded	Ground the detector to a clean ground (instrument ground if possible).
Frequent system reset (Brown Out)	ALL LEDS Resets together frequently.	High AC / Inductive Load on Alarm or Flame relay contacts	Install Surge suppressor across relay contacts.
		Radio Frequency by a cable of a Motor/Switch/ Noise-Source	Install Detector away from any possible noise source Isolate & eliminate sources of electrical noise
4-20mA Signal Loss	Steady 4mA output 15VDC (LED11) off.	No Feedback to DCS System / PLC Monitoring System.	Check 15VDC using DVM @J3 connector with respect to GND. Remove external wiring from terminals and measure mA current. Check 4-20 ma return wire is not grounded at DCS end or DCS is not providing 24 VDC on these terminals.
No Change in Profile	No change in Profile LEDs status of P1 & P2.	External PLC System and Amplifier GND not common.	Check connection with J12. Verify control system contacts wired to P1, P2 terminal are potential free when disconnected from IDDX. Manually Connect P1 / P2 signal to GND and Check Profile Status on Termiflex / LEDs.
BMS system Fails for Flame Detection	Flame LED On & Flame Relay Contact Open	Input Power not sufficient to pick up relay.	Check for Loose wiring. Check Input power using DVM. It should be >21VDC.
BMS system Fails for Alarm Detection	Alarm LED Off & Relay Contact Open	Input Supply not sufficient to pick up relay.	Check for Loose wiring. Check Input power using DVM. It should be >21VDC.
IDDX Amplifier Non-operational	WDT LED OFF All power LED ON.	Firmware suspended.	Manually Reset / Power ON-Off Amplifier.
		Firmware Not Loaded.	Contact Forney Service/Support team
	All LEDs Off.	24VDC Supply is disconnected.	Check Input supply Voltage using DVM. Verify Polarity

SECTION 5
AFTERMARKET

5.1 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 Forney's Aftermarket Department and provide the contract number or the customer purchase order number.

5.2 PARTS AND ACCESSORIES

To order IDDX Flame Amplifiers or associated equipment, contact Forney's Aftermarket Department via any one of the following methods and furnish the following information.

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

1. Contract number
2. Customer purchase order number
3. For each part ordered, provide the following information:
    a. Part number*
    b. Part description*
    c. Quantity required

* Refer to Section 1.4 of this manual for part numbers and descriptions

NOTICE: Forney is NOT responsible for materials returned without proper authorization and identification. Exercise care in packing the materials/units to be returned. The shipper will be advised of any damage due to improper packing and no further action will be taken in connection with this material return until the shipper provides clearance for further disposition.

NOTICE: Prices and specifications are subject to change without notice.

SECTION 6
APPENDIX

6.1 COMMON ACRONYMS

A	Amps
AWG	American Wire Gauge
BAS	Building Automation System
BMS	Building Management System
CW/CWW	Clockwise / Counter-Clockwise
DCS	Distributed Control System
ELV	Extra Low Voltage
ESD	Emergency Shut-Down
ESD	Electrostatic Discharge
FO	Fiber Optics
FR	Flame Relay
HD	High Definition
Hz	Hertz
IP	Ingress Protection
IR	Infrared
kHz	Kilohertz
LED	Light Emitting Diode
mA	Milliampere
NPT	National Pipe Thread
NPTF	National Pipe Thread Fine
OEM	Original Equipment Manufacturer
P/N	Part Number
PLTC-ER	Power Limited Tray Cable - Exposed Run
PSI	Pound (of force) per Square Inch
PTFE	Poly(tetrafluoroethylene) = Teflon
PVC	Polyvinyl Chloride
RMA	Return Material Authorization
SCFM	Standard Cubic Feet per Minute
SELV	Safety Extra Low Voltage
UNC	Unified National Coarse
UNF	Unified National Fine
UV	Ultraviolet
VAC	Volts of Alternating Current
VDC	Volts Direct Current

6.2 COMMON REGULATORY AGENCIES

ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATEX	Atmosphere Explosibles (EU) Explosive Atmosphere
CE	Conformité Européenne (European Conformity)
CEC	Canadian Electrical Code
EN	European Norm
EOTA	European Organization for Technical Assessment
FM	Factory Mutual (Approval)
IEC	International Electro-Technical Commission
ISO	International Organization for Standardization
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NRTL	Nationally Recognized Testing Laboratory
OSHA	Occupational Safety Health Administration
UL	Underwriters Laboratories