



Flame Eye **FE2020**

Advanced Flame Monitoring System

Operating and Instruction Manual

Part No GEN18-4-2020

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1. General Description

1.1 Equipment

The Flame Eye FE2020 Flame monitoring system consists of a viewing head, which is mounted on the burner front and powered by remote signal processor unit. The signal processor unit is housed in an IP65 enclosure and consists of signal processing circuitry, display drive, Flame "On/Off" relays, Fault relay and 4-20mA analogue output for remote Flame indicator.

1.2 Operation

The viewing head uses a solid-state photo detector that responds to the high frequency flicker in the flame. This fluctuating signal is then converted to balance signal lines for transmission to the signal processor unit. The use of balanced signal lines enables a high rejection of electrical interference to be achieved.

2. Wiring and Installation

The wiring connection to the Flame Minder is made by PCB mounted plug-in screw connectors. The connectors allow all flexible wire up to 2.5mm to be connected.

It will be noted from the specification that the A.C input power has wide tolerances so that the voltages found in Europe and US can be accommodated.

2.1 Wiring of AC Supply

Terminals L, N and E are use for the AC power. Connect live, neutral and earth respectively to these terminals. The rated working voltage is marked on the back of the enclosure.

L	Live	Brown
N	Neutral	Blue
E	Earth (GND)	Green/Yellow

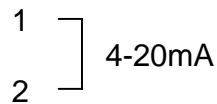
2.2 Wiring from Viewing Head

Wiring of the Viewing head is made to terminals. These are listed functionally as follows:

Control Unit	Viewing Head	Description	Colour Code
6	2	Flame Signal +	Black
5	3	Flame Signal –	Black
4	5	Self Check +	Blue
3	6	Self Check –	Brown
7	E	Signal Screen	Green/Yell
E	4	Earth	Green/Yell

2.3 Wiring for Remote 4-20mA Flame Signals

Terminal 1 and 2 provides an analogue flame signal for remote flame signal indication. This is the current driven signal so there is no limitation to wire length or size. The analogue signal is linear from 4-20mA with a limiting action taking place above 20mA.



2.4 Installation of Viewing Head.

Before beginning the actual installation, determine the best location for mounting the viewing head based upon these factors:

2.5 Boiler Pressure

The viewing head lens will withstand 5 psi. If the lens assembly is exposed to greater than 5 psi through the sighting tube then an isolation union must be used to create a positive pressure.

2.6 Boiler Temperature

The viewing head will withstand an ambient temperature of 85C. Purge air will help to reduce conducted heat through the sight tube but direct radiation can cause housing case temperature to exceed limits.

2.7 Viewing Head Alignment

The sighting of the Viewing Head should be parallel to the centerline of the Burner in the direction of the Burner flame and aimed at the root of the flame, which radiates the most intense high frequency infrared energy.

3. Flame Discrimination

Multi-burner installations require discrimination, meaning that each Viewing head responds only to the burner flame that is being monitored. Multi-burner application requires the most care in adjustment to ensure proper flame out operation under difficult conditions.

4. Worst Case Conditions.

There are two typical conditions in a multi-burner installation. These are:

4.1 Burners at Low Fire.

On the initial light up of other burners after the first burner has been established. If there is a flame out or ignition failure of this burner during its start up sequence the flame monitor will discriminate between no flame and the background flame of the established burner.

4.2 Burners at High Fire.

When the burner has reached the high Fire condition and all other burners are firing at the maximum rate. Should a burner trip out it is important that the flame monitor detects this. This means the Gain of this flame monitor must be low enough to discriminate from the other burners that are in the High Fire condition.

5. Set-up and Commissioning

5.1. On power up of the Flame Monitor. Set threshold to read 99. This will inhibit the electronic shutter inside the viewing head and thus enable steady flame signal to be displayed.

5.2. Set Gain to minimum i.e. 01

5.3. Set Channel to minimum i.e. 01

5.4. Ignite the Burner if safe firing requirements are satisfied.

5.5. Observe reading on the L.E.D's displays. If the flame signal is not more than 20 on the signal strength meter, a poor signal is being received.

5.6. Should this be the case, the most likely cause would be poor viewing head sighting alignment or insufficient gain setting.

5.7. Check sighting tube alignment and re-align it if necessary. The sighting tube should be aimed at the root of the flame, which radiates the most intense high frequency flicker energy.

5.8. Once the best sighting position has been achieved adjust the gain setting as required. In general, during the adjustments procedure the gain setting should be kept to a minimum whenever it is possible.

5.9. When correct alignment or Gain adjustment has been made, observe the flame signal LED displays. The gain should be set so that the flame signal reading is between 60 to 80. Note also the minimum 'Flame On' signal – this is to be used in step 10.

5.10. Shut down the burner and observe the flame signal LED displays read no more than 10. Ideally, it should be a reading of 0 to 7.

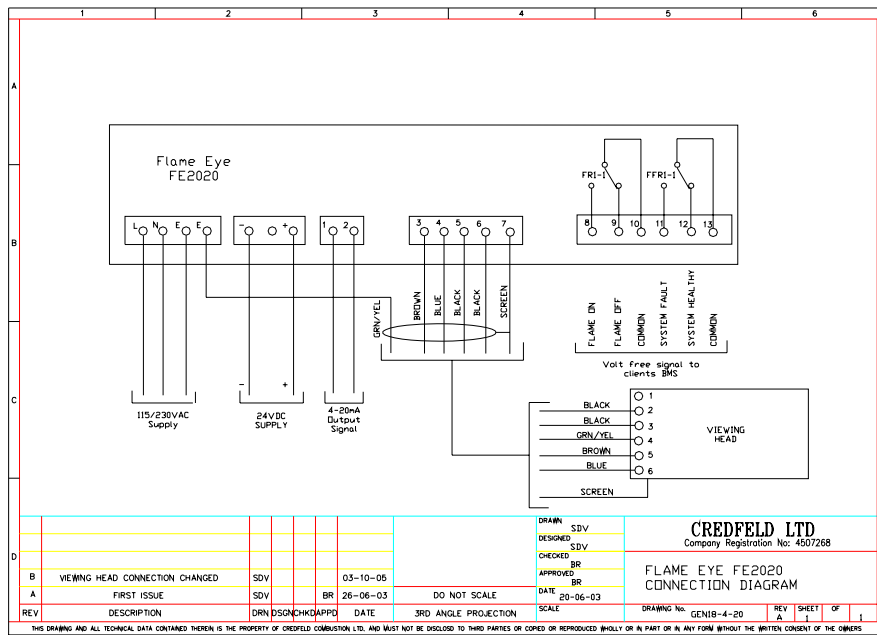
5.11. Observe the highest background flame signal. Set the 'threshold higher than the signal but below the minimum flame signal found in step 8. (e.g. background signal 10 and minimum 60 – 'set threshold to 50'.

5.12. The above adjustments i.e. step 1 to 10 should be repeated until good discrimination is achieved under worst-case conditions described earlier.

5.13. If unable to achieve discrimination from background signal set 'channel' to 2 and repeat step 5.1 to 5.11.

5.14. If still unable to achieve discrimination from background signal set 'channel' to 3 and repeat step 5.1 to 5.12. Channel setting 4 will give the most discrimination but the detected flame signal would also be the weakest.

6. Electrical Diagram



7. Specification

Electric Power Input

AC Model 115/230VAC +10% -15%, 50/60-Hz, 12VA
DC model 24VDC +10% -10%, 10 Watt

Optical

Silicon Viewing Head Type FM550SI
Spectral response 300nm to 1100nm

Environmental

Ambient Temperature - Control Unit 0C to 70C
- Viewing Head (FM550SI) 0C to 125C
Case Temperature - Viewing Head housing 0C to 85C.

Viewing Head Cable.

5 x 0.75mm Core SY Colour Coded.

Outputs from Control Unit

Flame on relay - 1 Changeover contacts rated at 2A @ 230VAC
Fault relay - 1 Changeover contacts rated 2A @ 230VAC
Analogue Flame Signal - 4-20mA for remote signals.

Flame Filter Characteristics

Channel 1	18Hz	Channel 3	72Hz
Channel 2	36Hz	Channel 4	144Hz

Self-Check

Every 30 seconds

Error Codes

E1 Internal Fault
E2 Flame On Relay Driver Fault
E3 Electronic Shutter Fault

Approvals

(CE), EN55022, EN61000-4-3

8. Viewing Head GA Drawing

