TERRACENE INTERNATIONAL

FLARE GUARD MODEL 377

REMOTELY MOUNTED FLARE STACK MONITOR
IDEAL, ECONOMICAL SOLUTION FOR FAILED THERMOCOUPLES
USES INDUSTRY ACCEPTED UV TECHNOLOGY
DESIGNED FOR INSTALLATION IN HAZARDOUS LOCATIONS

- **Simplified one person installation requiring no plant down time**
- **Standard model comes with internal sighting optics**
- **High reliability, self checking UV detection system**
- **Correct operation confirmed by internal diagnostics, continuous 1 second updates reported at panel**
- **RS-485 data communication to plant control system**
- **Flare status, alarm, self check and current loop outputs**
- **No moving parts and does not require periodic detector calibration**

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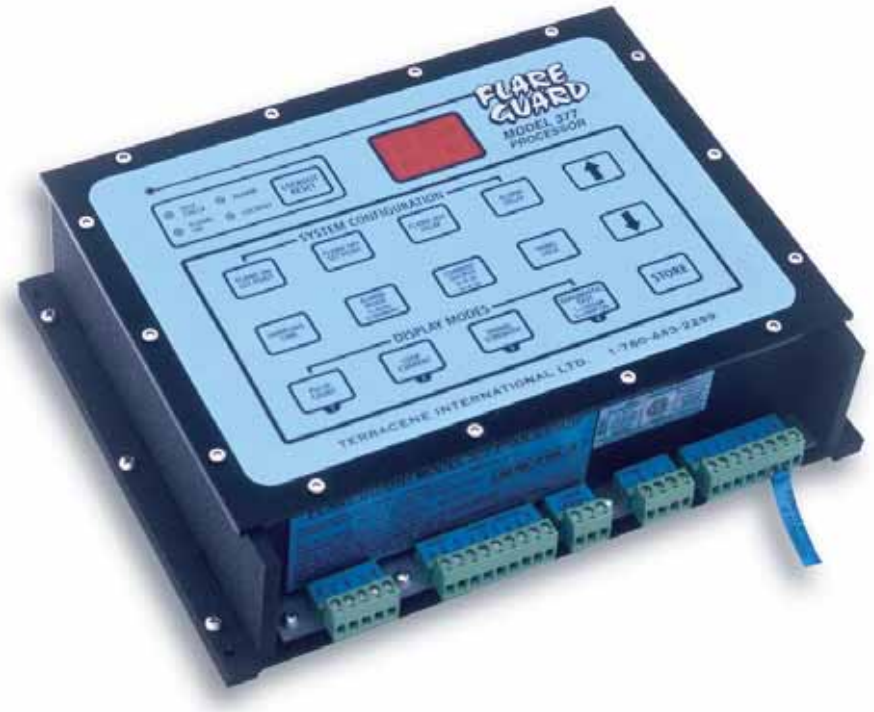
FLARE GUARD MODEL 377

The Flare Guard Model 377 is the best choice for flare monitoring and pilot confirmation. The M377 uses a combination of proven UV technology, detector self checking, auto-diagnostics, and data integrity verification to ensure reliable and safe operation.

The M377 is designed for installation in harsh industrial environments. The sturdy two axis mount, internal, sighting optics and standard features that minimize the time and cost of installation.

By scanning in a narrow portion of the UV band, the M377 provides higher signal to noise ratios that other detection technologies. Signatures from the sun and other stray sources of thermal energy are eliminated.

Contact Terracene International or an authorized Rep for installation diagrams or a model 377 manual.



System Specifications

Model 377 Viewing Head

Range:	Up to 1000 feet
Field of view:	9 foot target at 1000 feet
Sighting:	Internal targeting optics. Signal strength indicator
Detector:	UV, self checking
Power:	24 VDC, 200 ma max Supplied by remote Panel
Output:	RS-485, CRC encryption
Cable:	Armored, HL, FT4
Temperature:	-40C to +55C
Area Class:	General or HL CL1, DIV2
Installation:	Two axis base mounts on flat surface of 2" pipe.

Model 377 Remote Panel

Power:	120 or 230 VAC mains and/or 24 VDC Automatic selection of DC during mains failure
Input:	RS-485 data from Viewing Head
Outputs:	1) Three independent form c relays for self check flame, and alarm conditions 2) 4-20 ma or 0-20 ma current loop signal Proportional to pilot/flare intensity 3) RS-485 data to Plant DCS
Cable:	Armored, HL, FT4
Temperature:	-40C to +55C
Area Class:	General Area
Installation:	Mount in instrument room or NEMA 4 enclosure 4000 foot maximum length for low capacitance cable.

Terracene International Ltd.
Instrumentation Sales, Design, and Service.
#100, 18016 - 105 Ave.
Edmonton, Alberta
T5S 2P1
Web: www.terracene.com
Phone: 1-780-443-2299
Toll Free: 1-888-433-2299
Fax: 1-780-484-6074
e-mail: info@terracene.com

Terracene International

Flare Guard Model 377
Flare Stack Pilot Monitor

Installation Manual
and User Guide.

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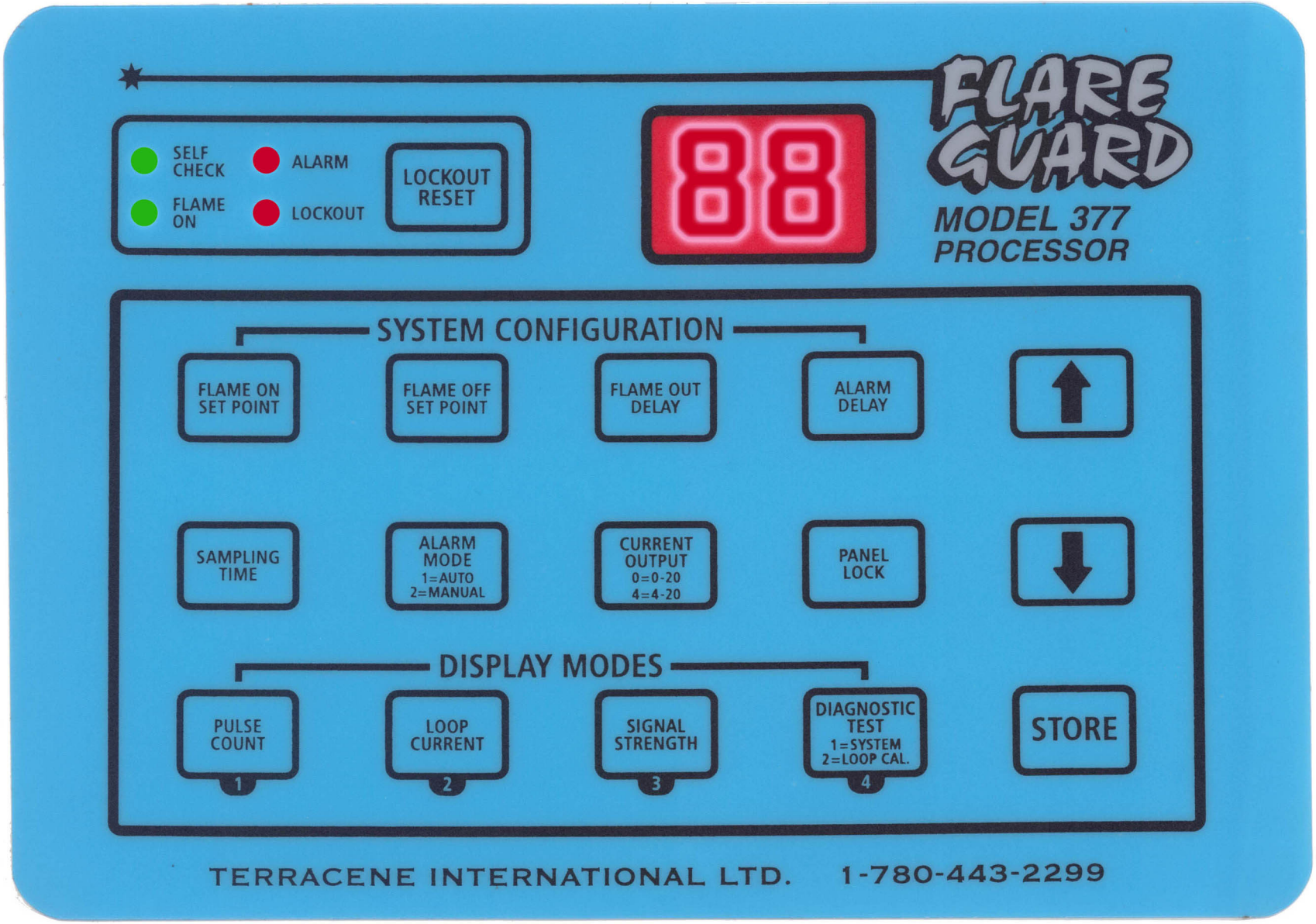
SELF CHECK
ALARM
FLAME ON
LOCKOUT
LOCKOUT RESET
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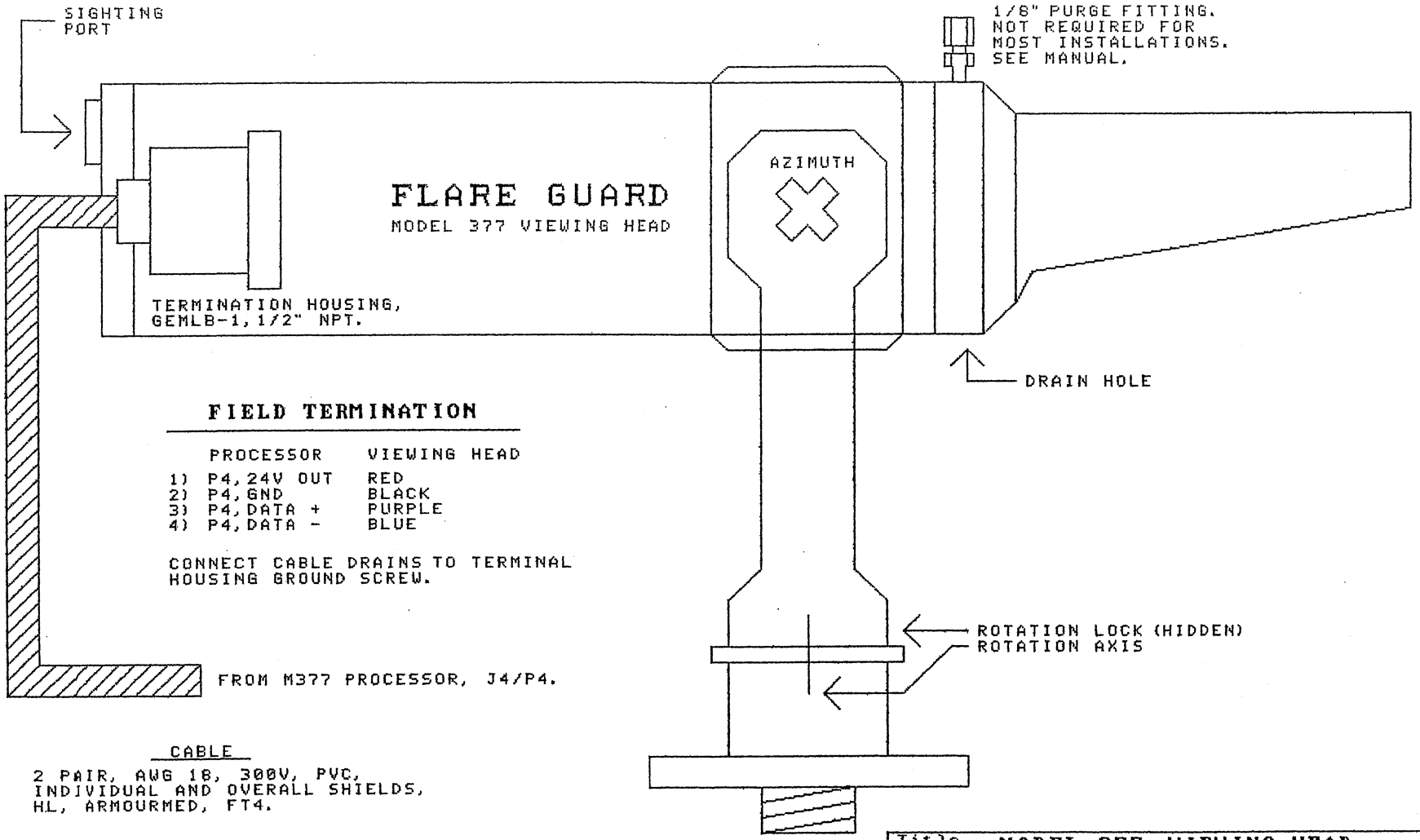
FLARE GUARD
MODEL 377 PROCESSOR
SYSTEM CONFIGURATION
FLAME ON SET POINT
FLAME OFF SET POINT
FLAME OUT DELAY
ALARM DELAY
SAMPLING TIME
ALARM MODE 1=AUTO 2=MANUAL
CURRENT OUTPUT 0=0-20 4=4-20
PANEL LOCK
DISPLAY MODES
PULSE COUNT 1
LOOP CURRENT 2
SIGNAL STRENGTH 3
DIAGNOSTIC TEST 1=SYSTEM 2=LOOP CAL. 4
STORE
TERRACENE INTERNATIONAL LTD. 1-780-443-2299



FIELD TERMINATION

	PROCESSOR	VIEWING HEAD
1)	P4, 24V OUT	RED
2)	P4, GND	BLACK
3)	P4, DATA +	PURPLE
4)	P4, DATA -	BLUE

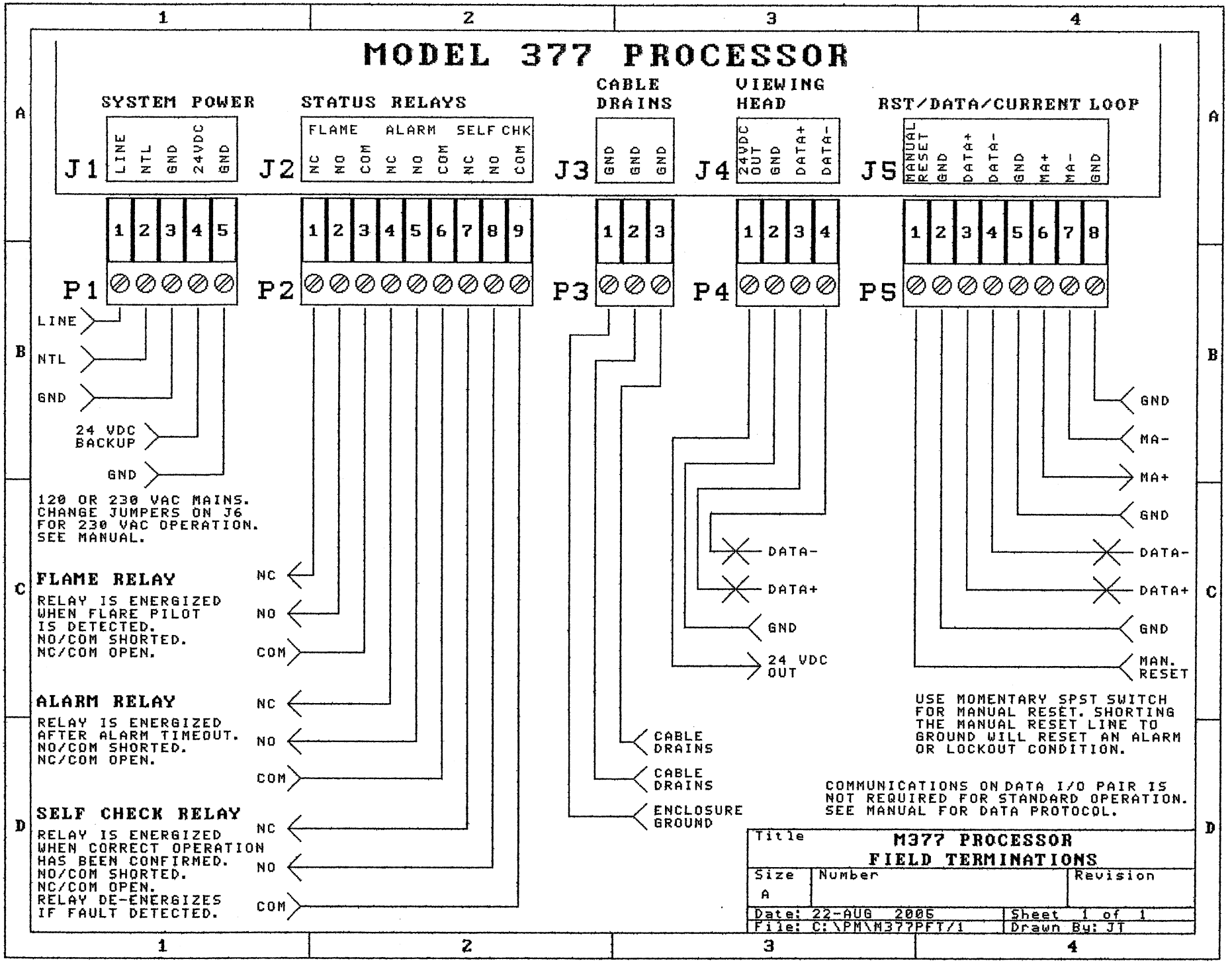
CONNECT CABLE DRAINS TO TERMINAL HOUSING GROUND SCREW.

CABLE

2 PAIR, AWG 18, 300V, PVC, INDIVIDUAL AND OVERALL SHIELDS, HL, ARMOURMED, FT4.

Title	MODEL 377 VIEWING HEAD VIEWING HEAD INSTALLATION	
Size A	Number	Revision
Date: 26-JUN 2005		Sheet 1 of 1
File: C:\PM\M377VHIN/1		Drawn By: JT

MODEL 377 PROCESSOR



Title	M377 PROCESSOR FIELD TERMINATIONS	
Size A	Number	Revision
Date: 22-AUG 2005		Sheet 1 of 1
File: C:\PM\M377PFT/1		Drawn By: JT

Flare Guard Model 377

This is the installation manual and user guide for the Flare Guard Model 377. Please review before installing the system.

1.) Introduction.

The Flare Guard Model 377 is an electro-optical instrument designed for monitoring flares. It can be used to confirm pilot status and/or flare intensity. The Viewing Head can be installed in Class 1, Division II, Hazardous locations. The Remote Processor is designed for installation in General Class areas and should be housed in a Nema 4 or 4X enclosure if mounted outdoors.

The Remote Processor stores all set-up parameters. See page 5 for parameter detail. We recommend that installers review the parameter detail before installation.

2.) Site Planning.

Careful site planning is required to achieve optimum system performance. Installation time and cost can be reduced substantially by giving due consideration to:

a.) Visibility of flare pilots.
b.) Distance to flare.
c.) Viewing Head elevation angle.
d.) Annual Weather conditions.
e.) Prevailing Winds.
f.) Length of cable runs.
g.) Ease of access.

If possible, a pre-installation test should be performed to confirm that minimum signal strength can be obtained at the intended location for the Viewing Head. The system is capable of monitoring low fire pilots provided that the system count rate is no less than 1 every two seconds, but a minimum count rate of two to five per second is desirable. Presence of sufficient signal should be confirmed before committing to the expense of permanent cable installation.

Worst case scenarios are that the Viewing Head location above ground must be increased in order to monitor wrap-around pilots and/or increasing the pilot fuel flow to obtain minimum required signal strength from weak or shrouded pilots. Monitoring from ranges beyond 1000 feet, 305 meters, is possible.

For pilot monitoring, the critical performance criterion for all mounting locations is the pilot visibility. The signal source is near the flame root and may be partially blocked by some pilot shrouds. Proper location of the Viewing Head is the solution for all situations involving weak signals.

If you are having difficulty in obtaining satisfactory signal levels please call Terracene International at 1-780-443-2299. The Technical Staff will be able to assist.

3.) Viewing Head Installation.

*** Critical Caution ***

Do not look through the Sighting Port if the Sun is in view. Eye damage may result. Wait a few minutes for the sun to move out of the optical path. Check by putting your hand near the port and verify that a bright spot does not appear.

I.) Select a suitable location for the Viewing Head. Refer to para 2, Site Planning. Distance to the flare stack should be minimized to ensure sufficient signal strength. An elevation angle of less than 45 degrees is preferred. In the case of extreme weather conditions involving heavy rain or snow, it is best to mount the Viewing Head upwind of the flare stack thus reducing the possibility of lens blockage. It may be necessary to use purge air to clear the lens by using the 1/8 " air line fitting located at the front of the Viewing Head. Keep opening capped with a 1/16" pipe plug if not used.

II.) Mount the Viewing Head on a flat surface or 2" pipe ensuring that the mounting is sufficiently sturdy to resist movement due to wind or vibration.

III.) Terminate the Viewing Head cable at the Viewing Head terminal box ensuring that the termination box cover gasket is installed. Use the union to rotate the terminal box to an upright position thus reducing the possibility of leakage. Secure the cable so that movement of the cable does not transmit to the Viewing Head but still allows free movement of the Viewing Head while aiming.

4.) Remote Processor Installation.

I.) Select a suitable location for the Remote Processor considering length of cable runs, availability of power and ease of access. Mount in a Nema 4 or 4X enclosure if used outdoors.

II.) Terminate the Viewing Head cable at the remote processor.

III.) Connect the Remote Processor outputs to the monitoring / control system. The minimum requirement is connection of the flame relay. Use other outputs as required.

* * * Critical Procedure * * *

If the current output is being monitored then remove the local termination resistor connected to the mA output. Do not remove the termination resistor if there is no other loop termination otherwise a Self-Check failure will occur.

IV.) **Ensure that the power source is off.** Connect the power cable to Remote Processor. The primary power is 120 VAC mains. Optional backup is 24 VDC. Verify that all cable terminations are correct before proceeding.

5.) Processor Setup for Aiming of Viewing Head.

I.) Apply power to the Remote Processor. The power up initialization sequence is a display test followed by a Viewing Head test. E1 is shown on the display until the Viewing Head test has completed. When the start up test has completed the Self-Check LED will flash once per second.

II.) Set process parameters as follows. Refer to page 5, para 8, for description and use of push buttons.

1.) Flame On Set Point: 5.

2.) Flame Off Set Point: 0.

3.) Flame Out Delay: 10 seconds.

4.) Alarm Delay: 1.0 minutes.

5.) Sampling Time: 1 second.

6.) Alarm Mode: 1, Auto.

7.) Current Mode: 4, 4-20 mA.

8.) Display Mode: 1, Pulse Count.

III.) Verify that the Self-Check LED is flashing.

6.) Viewing Head Aiming.

I.) Orientation of the Viewing Head cable can affect the balance of the Viewing Head. For ease of aiming, the balance point can be adjusted by changing the position of the Viewing Head in the mounting collar. Adjust as necessary.

* * * Critical Procedure * * *

Do not look through the Sighting Port if the Sun is in view. Eye damage may result. Wait a few minutes for the sun to move out of the optical path. Check by putting your hand near the port and verify that a bright spot does not appear.

* * * Critical Procedure * * *

Contact the control room and request appropriate flare status/conditions. For pilot monitoring, only the pilots should be on during aiming.

II.) Loosen the azimuth and elevation locks. Aim the Viewing Head by looking through the Sighting Port. Note that the image is inverted. Observe the Signal Strength LED located inside the rear of the sighting optics. Adjust aim to obtain the maximum flashing rate. A minimum flashing rate of once every two seconds is required, but a minimum of two to five is preferable. For strong signals the LED will not flash, but will get brighter. Exercising care and patience while aiming will enable the system to monitor very weak pilot signals.

Note: There is a delay of one second between the Viewing Head scan and the Led output, so the aiming procedure should be done slowly. This is particularly important for locking onto weak signals.

Tighten locks. Verify LED activity. Re-aim as necessary. Relocate if required or increase pilot fuel flow to obtain minimum acceptable signal strength.

7.) Processor Setup for normal operation.

Note: Refer to page 5, para 8, for description and use of push buttons.

I.) Verify that the Display Mode selection is Pulse Count, Sampling Time is 1 second, and Flame Out Delay is 10 seconds.

II.) Adjust the Sampling Time to obtain a minimum Pulse Count of five, optimum count being greater than twenty. Minimum count is one every two seconds. The internal sampling filter has a time constant of four seconds and a fast decay of two seconds. Allow five to six seconds to stabilize after changing the Sampling Time.

III.) Adjust the Flame On Set Point to approximately one half of the displayed Pulse Count.

IV.) Adjust the Flame Off Set Point to approximately one quarter of the displayed Pulse Count.

V.) Observe the Pulse Count for at least one minute to confirm the signal level and stability. The stability of the count depends on aiming, pilot/flare strength, and fluctuations in output. Perform steps II, III, and IV until reliable flame on is achieved.

VI.) Adjust the Flame Out Delay as required. For weak signals increase the delay to achieve stable Flame On status.

VII.) Adjust Alarm Delay as required.

VIII.) If current output is being monitored, then the loop integrity can be verified by using the loop calibration function. Select diagnostics mode 2, Loop Calibration. Use Up/Down to select the desired current output. Press Store. Press Store again to exit. When finished select display mode 1, Pulse Count.

Note: To check the plant control system limit alarms use the 0.0 and 24.0 mA selections.

8.) Setting and storing parameters.

There are 16 push buttons on the M377 Processor. They are used to view, change, and store the parameter settings. Function, operation, and optimum settings for each push button are as follows:

I.) Flame On Set Point.

Function: Setpoint for flame detection.

Operation: Press push button. Stored setting is displayed. Auto-exit in five seconds if no change is made. Press Store for immediate exit or use Up/Down to adjust. Press Store to save.

Optimum Setting: Approximately 1/2 of minimum displayed Pulse Count.

II.) Flame Off Set Point.

Function: Setpoint for trip from flame on to flame off.

Operation: Same as (I).

Optimum Setting: Approximately 1/4 of minimum displayed Pulse Count.

III.) Flame Out Delay.

Function: Time delay in seconds from when the Pulse Count falls below the Flame Off Set Point to when the Flame Relay and Flame On Led trip to flame off.

Operation: Same as (I).

Optimum Setting: Four. Fluctuating flare pilots may cause nuisance trips. Increase as necessary.

IV.) Alarm Delay.

Function: Time delay in seconds, up to 59, or minutes from 1.0 to 9.5, from when the Flame Relay and Flame On LED trip to flame off and when the Alarm Relay and Alarm Led trip to Alarm.

Operation: Same as (1).

Optimum Setting: 30 seconds to 5 minutes. This delay is used to confirm that the pilots are out and that a pilot ignition sequence should be initiated. Alternatively, the delay can be used as an auto-ignition timeout to prevent an auto-fire ignitor from damage due to continuous attempts to re-ignite a failed or out of service pilot.

V.) Sampling Time.

Function: Signal aquisition time in seconds. The system will show higher signal levels as the Sampling Time is increased since the signal pulses are accumulated over a longer period. This is an accumulate, then average, filter that is used to keep the system locked on to pilots that have an unstable or fluctuating intensity.

Operation: Same as (1).

Optimum Setting: One to Five. Adjust to obtain a Pulse Count of five or more. See page 4, para (II). Increase if signal strength is low or if nuisance trips are occuring.

* * * Critical Procedure * * *

The Pulse Count will change if the sampling time is changed.
After changing, observe the Pulse Count for one minute.
Change the Flame On and Flame Off setpoints as required.

VI.) Alarm Mode.

Function: Selects auto or manual reset of alarm relay.

Auto - The system automatically returns to flame on when the flame is restored. The Alarm Relay and Alarm LED will automatically reset.

Manual - The system goes into a locked out state after the Alarm Relay times out. The Flame Relay is locked out. The system will not return to Flame On even if the flame is restored. This mode is selected if alarm annunciation is required before an ignitor sequence is initiated. The lockout is locally reset by pressing the Lockout Reset button at the Processor or remotely reset by momentarily shorting the Manual Reset connection to ground with a momentary switch at the plant control system.

Operation: Same as (1).

Optimum Setting: Auto. Use manual reset only if alarm annunciation is required.

VII.) Current Mode.

Function: Selects output range of current loop. Select 4 - 20 or 0 to 20 mA.

Operation: Same as (I).

Optimum Setting: 4 -20 mA.

Note: The current output is linearly proportional to the displayed Pulse Count.

4 - 20 mA. Output = (Pulse Count / 99) x 16 + 4 mA.

0 - 20 mA. Output = (Pulse Count / 99) x 20.

VIII.) Panel Lock

Function: Used to prevent undesired changes of the stored parameter settings. When enabled, the settings can be viewed, but not changed. Pass code is 0377. Enter the code to change from unlocked to locked or from locked to unlocked. i.e. the Panel Lock status toggles each time the code is entered.

Operation: Press Panel Lock. C1 is displayed.
Adjust to 0. Press Store. C2 is displayed.
Adjust to 3. Press Store. C3 is displayed.
Adjust to 3. Press Store. C4 is displayed.
Adjust to 7. Press Store. "PL" is displayed for locked or "PO" for unlocked.

Optimum Setting: User specific.

IX.) Display Modes.

Mode 1. Pulse Count. Function: Display will show the Pulse Count.

Operation: Select. Push Store.

Optimum Setting: Preferred mode if current loop is not being monitored.

Mode 2. Loop Current. Function: Display will show mA output.

Operation: Select. Push Store.

Optimum Setting: Preferred mode if current loop is being monitored.

Mode 3. Signal Strength. Function: Display will show Signal Strength of 0 to 10.

Operation: Select. Push Store.

Optimum setting: Use periodically to confirm minimum signal level of 1.
Re-select Mode 1 or Mode 2 when finished.

X.) Diagnostic Test.

Function: Initiates Diagnostic test.

Operation: For manual Diagnostic Check: select, adjust to 1, press Store.
For Loop Calibration: select, adjust to 2, press Store. See page 5, para, (VIII).

Optimum Setting: Use periodically to confirm system status. The system automatically performs an internal diagnostic check once every second.

Diagnostic Codes: "F" and the test number will be on the display followed by "P" for pass or "F" for fail.

F1. System Self-Check. P or F.

F2. Loop Termination. P or F.

F3. Viewing Head communication link. P or F.

F4. Viewing Head Self-Check. P of F.

F5. Viewing Head detector voltage. P or F.

F6. Viewing Head temperature. P or F.

F7. System Overflow. P or F. Cycle power to reset.

F8. Viewing Head Temperature in degrees C. "F8", then temperature.

F9. Detector voltage setpoint. "F9", then high byte, then low byte. Optimum, "9", "6".

XI.) Lockout Reset.

Function: Used to manually annunciate and reset a lockout condition. See page 6, para VI.
Manually resets the Alarm Relay and alarm timer.

Operation: Press/release. There is no need to push Store.

Optimum Setting: No preferred setting. This is a momentary switch.

Warranty

Terracene International Ltd. warrants to the purchaser of each new Flare Guard Model 377, that any part thereof which proves to be defective in material or workmanship within one (1) year from date of delivery will be repaired or replaced at no charge, if the system is returned to us in Edmonton, Alberta with all freight charges prepaid.

If a performance problem should occur, contact your local representative or the Flare Guard office toll free at (888) 433-2299.

This warranty does not cover defects resulting from accident, alterations, improper use, or failure of the purchaser to follow the installation procedures as outlined in this instruction manual.

This warranty is in lieu of any and all other warranties, expressed or implied, all of which are hereby excluded.

Terracene International Ltd. shall in no event be liable for any special, indirect, or consequential damages whatsoever and neither assumes nor authorizes any person to assume for it any other obligation or liability.