PROFLAME2 DFC (FFRT 10) CONTROL BOARD

USE AND INSTALLATION INSTRUCTIONS

Read the instructions before use.

IMPORTANT

The Proflame DFC, is the flame ignition and control board, part of the Proflame System, which can be made of these elements:

- Standalone Proflame system
  - Proflame DFC: the flame ignition and control board
  - Proflame DFC main wirings
  - Proflame pilot assembly
  - Proflame 88# gas valve
  - Proflame power supplies

- Remotely controlled Proflame system
  - Proflame DFC: the flame ignition and control board
  - Proflame DFC main wirings
  - Proflame pilot assembly
  - Proflame 88# gas valve
  - Proflame GT* Transmitter
  - Proflame GT* Receiver
  - Proflame GT* main wirings
  - Proflame GT Fan Control Module, or power supplies
  - 540 split flow valve

in which the “#” character will be:
- “0” if a not modulating, or manual knob modulating valve is used,
- “5” if an electrical modulation valve is used,
- "6" if a manual knob modulating valve is used,

and the “*” string will be the composition of the following characters:
- “blank” if a not modulating, or manual knob modulating valve is used,
- “M” if an electrical modulation valve is used,
- “F” if the Fan Control Module peripheral is used, this will also supply power to the whole system,
- “S” if the Split Flow Valve is used.

INTRODUCTION

The Proflame DFC (Digital Fireplace Control) board is a device that allows the automatic ignition and pilot flame supervision, to command the functions of a hearth appliance.

It's configured to control the ON/OFF main burner operation, giving the choice of both IPI (intermittent pilot ignition), and CPI (continuous pilot ignition) modes.

The Proflame DFC board controls and connects directly to an automatic valve of the Proflame 880, and 885 families using low electric power
.
The power supply could come from an AC/DC wall adapter, from a 4 AA battery pack, or from both. This gives the capability to work both as a full battery, or a battery backup system.

If a remotely controlled Proflame system is used, no dedicated power to the DFC is needed, as the supply comes through the wiring connections.

Some product versions are equipped with a Pilot on Demand (PoD) software feature that shuts off the pilot flame after a period (normaly 7 days) of continous pilot operation without main burner heating request. In these versions, CPI mode is intended as "continuos pilot" for a limited time period.

GENERAL CONNECTIONS

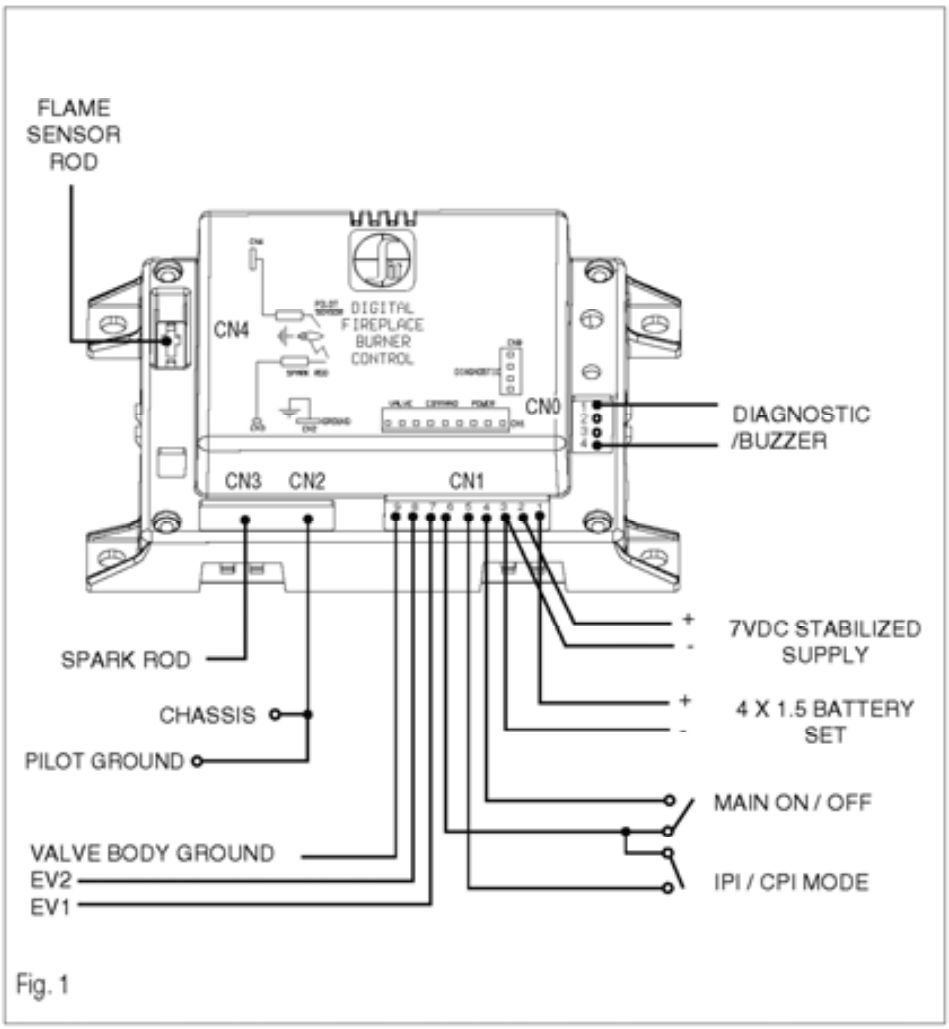


Fig. 1

MAIN TECHNICAL DATA

DFC control board	
Supply voltage	DC IN: 7Vdc - 200mA max (Class 2 power supply) BB IN: 6Vdc - 200mA max (four 1.5V size AA batteries)
Ambient temperature ratings	-18 .. +80 °C (0 .. +176 °F)
Spark voltage	>15kV
Spark energy	>0,7mJ
Spark frequency	1Hz
Tested gas types	the system has been tested for NG, and LPG gas types/mixtures
Pilot ignition source	Intermittent/Continuous
Flame Failure Response Time	10s
Recycle Time	30s
Waiting Time	2s
Inter-ignitionTime	30s
Safety Time	60s
Number of trial for ignition	2
Pilot on Demand time period	7 days (only for Pilot on Demand versions)

Please refer both to “User and Installation manuals” of “Gas Valve” and “Pilot Assembly” for:
- the recommended gas input for the pilot burner
- the electrical specifications
- the operating temperatures and the components that have to be directly exposed to flame

GENERAL CONNECTION & SET-UP GUIDE FOR PROFLAME 2 IFC BOARD

General Connection & Set-Up Guide for Proflame DFC board:

1. The DFC board should be placed in a low temperature area of the appliance.
2. Connect the pilot and control valve as indicated in fig. 2. (Stand Alone System, No Remote)
3. Connect the pilot, control valve and remote system as indicated in fig. 3. (DFC with Remote System & Wall AC Adaptor)
4. Connect the pilot, control valve and remote system as indicated in fig. 4. (DFC with Remote System & Fan Control Module Power).

FUNCTIONS

PRELIMINARY CHECK OF A STANDALONE PROFLAME SYSTEM

Before applying any power supply to the DFC board please verify that the electrical connections are in accordance to Fig. 2

Initializing the System for the first time

Set the main burner flame ON/OFF command to its OFF position.
If installed, set the pilot flame mode selector to its IPI position.
If provided, install the 4 AA batteries into the battery holder, and respect the polarity indicated on the battery holder silkscreen. Connect the battery holder to the DFC's main wiring harness.
Connect the AC/DC wall adapter to the DFC's DC-jack connector on the main wiring harness, and plug it into the wall mains supply.

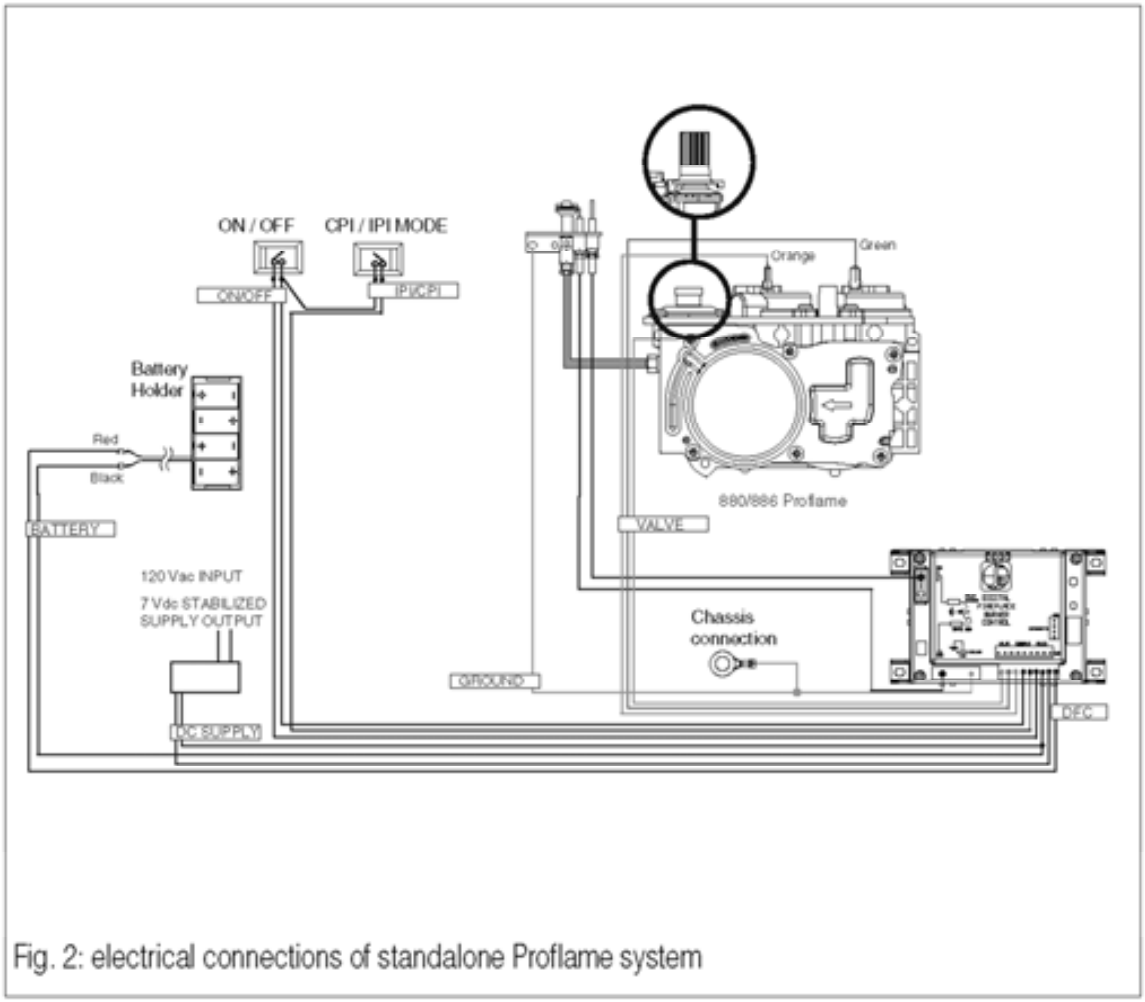


Fig. 2: electrical connections of standalone Proflame system

PRELIMINARY CHECK OF A REMOTELY COMMANDED SYSTEM

Before applying any power supply to the system, check that the electrical connections are according:

- to Fig. 3 for Proflame system with the electrical modulation, and/or the fan control module, and/or the split flow valve

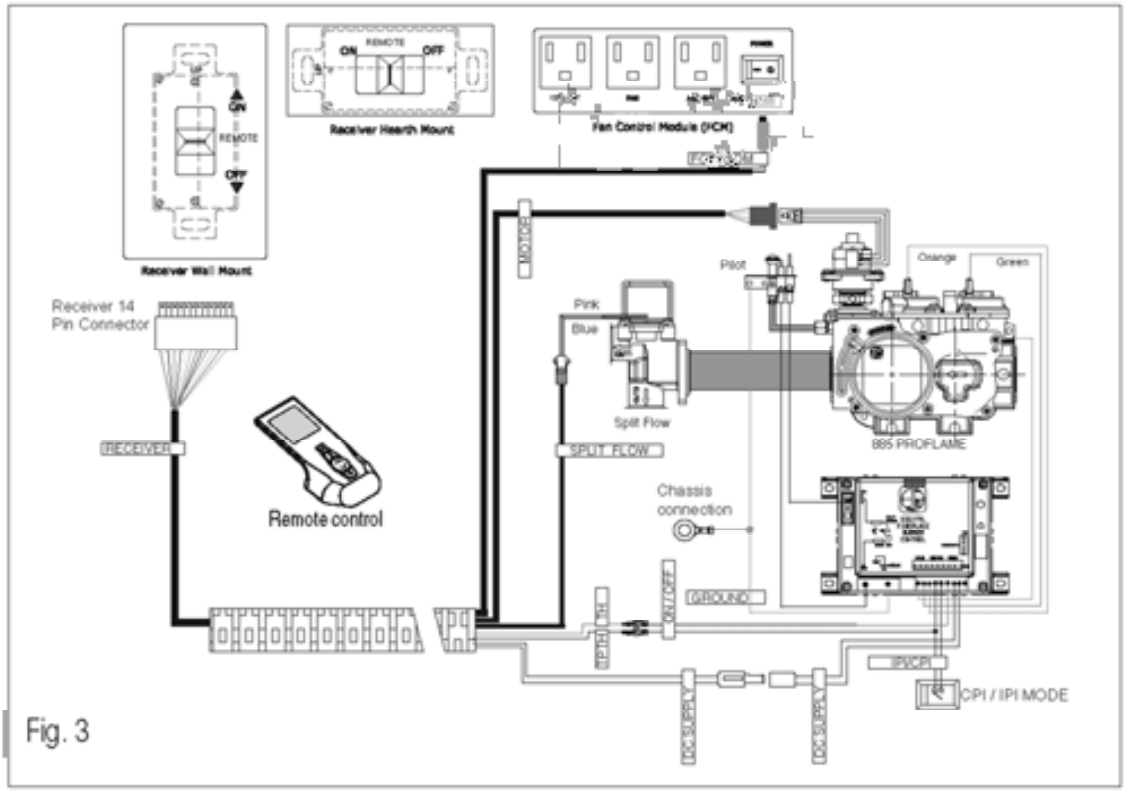


Fig. 3

- to Fig. 4 for Proflame system with the electrical modulation, and/or the AC/DC power supply, and/or the split flow valve

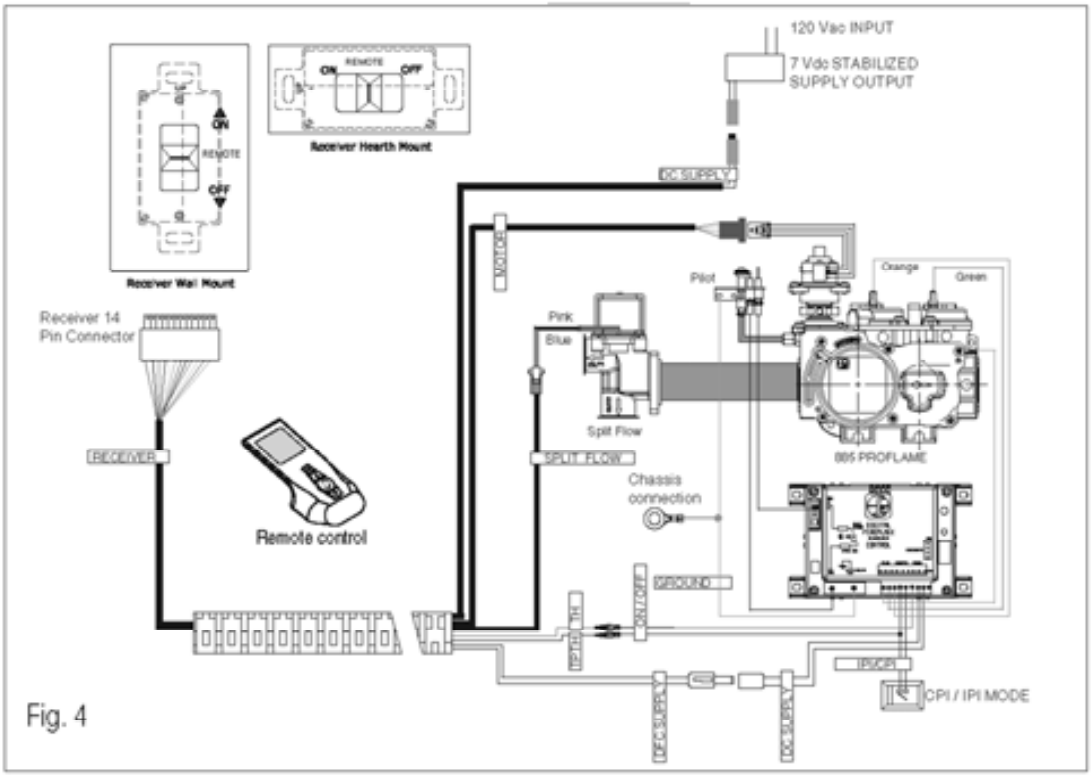


Fig. 4

INITIALIZING THE SYSTEM FOR THE FIRST TIME

Place the 3 position slider switch in the “OFF” position as indicated in Fig. 5.

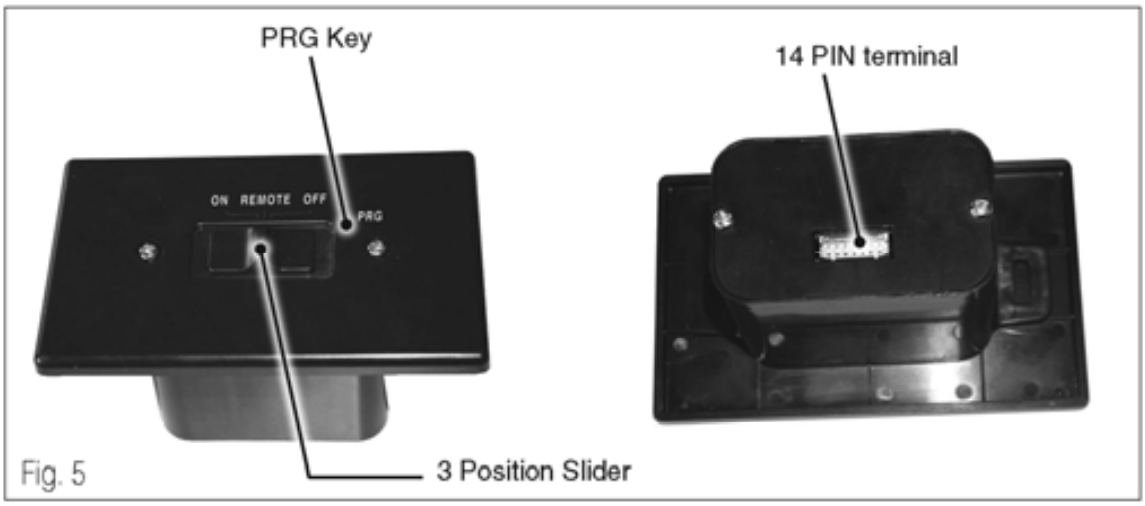


Fig. 5

Install the 4 AA batteries into the receiver battery bay. Note the polarity of the batteries and insert them into the battery bay as indicated on the Battery cover (+/-).
Using the end of a paper clip, or other similar object, press the button through the hole marked “PRG” on the Receiver front cover Fig. 5. The Receiver will “beep” three (3) times to indicate that it is ready to synchronize with a Transmitter. Install the 3 AAA type batteries in the Transmitter battery bay, located on the base of the Transmitter. With the batteries already installed in the Transmitter, push the ON button. The Receiver will “beep” four times to indicate the Transmitter’s command is accepted, and the Receiver is now set to the particular code of that Transmitter.

Push the OFF button on the Transmitter. The Receiver will “beep” two (2) times to indicate the Transmitter’s command is again accepted.

Place the 3 position slider switch on the Receiver at the “Remote” position as indicated in Fig. 5.

If installed, turn ON the fan control module, switching it to the ON (I) position.

The system is now initialized.

LOW BATTERY POWER DETECTION

Since the batteries that are mounted in the remote receiver also supply the DFC ignition board, the endurance of the system batteries depend on various factors:

- the battery pack function, full battery operation, or battery backup operation,

- the chemistry type (normal, alkaline), and the quality of the batteries,

- the number of ignitions of the appliance,

- the number of changes to the room thermostat set point.

- the temperatures at which the batteries are exposed,

- the supervised pilot flame quality,

- etc.

When the Receiver batteries are low, no “beep” will be emitted from the Receiver when it receives an ON/OFF command from the Transmitter. This is an alert for a low battery condition for the Receiver. When the batteries are replaced the “beep” will be emitted from the Receiver when the ON/OFF key is pressed (see Initialization of The System).

- in IPI (intermittent pilot ignition) mode the board upon receiving a main burner command operation, will start its functional cycle from a completely shut OFF flame state, by initially igniting the pilot flame, and keeping it under supervision before and during the main burner operation;

- in CPI (continuous pilot ignition) mode, the board will start by initially igniting the pilot flame, and keeping it permanently under supervision, then the board will be able to rapidly serve a main burner command operation.

STANDARD IDENTIFICATION: ANS Z21.20, Automatic Ignition Systems.

WARNING

Fire Hazard. Can cause severe injury or death.

The Remote Receiver causes ignition of the appliance. The appliance can turn on suddenly. Keep away from the appliance burner when operating the remote system or activating manual bypass of the remote system.

WARNING

All the parts of the system are not intended to operate in presence of water dripping, spraying, rain, etc. that could generate also by condensation or ice that melts, etc.. Otherwise means shall be provided to protect all the components.

WARNING

Battery operated device.

Read the battery instructions before installing them into the system. Do not expose any battery, or its holder, or a device in which batteries are installed, to a working temperature greater than 54°C / 129°F. Avoid battery overheating even if the working temperature of the device to which the batteries are connected is reported to be greater than 54°C / 129°F. In case of overheating the batteries will degrade their stored charge capacity, or leak corrosive liquids, or in bad cases, develop hydrogen gas and explode.

CAUTION:

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

CAUTION

Property Damage Hazard.

Excessive heat can cause property damage.

The appliance can stay lit for many hours.

Turn off the appliance if it is not going to be attended for any length of time.

Always place the Transmitter where children can not reach it.

The board reset from a volatile lock-out can be accomplished by the switching action of a thermostat or a similar device on the command input.

APPENDIX

1.Command definitions

Pilot IPI / CPI switch	Main Turn ON switch, or state of the remote control contact	Command reference name	Commanded Fireplace State
Opened, IPI	Opened, remote switch set OFF	Turn-OFF	Flames OFF
Opened, IPI	Closed, remote switch set ON	Turn-ON	Pilot + Main burner flames ON
Closed, CPI	Opened, remote switch set OFF	Pilot-ON	Pilot flame ON
Closed, CPI	Closed, remote switch set ON	Turn-ON	Pilot + Main burner flames ON

2. DFC board operation

2.1 IPI operation mode

The IPI operation mode means Intermittent Pilot Ignition. In this mode the CPI/IPI switch must be left opened.
In this mode the board can be commanded to follow the ignition sequences for both the Pilot, and the Main Burner Flame as follows:

- assume to start from a completely shut OFF fireplace, with IPI Mode initially set,
- a Turn-ON command will initiate, and bring to completion the Pilot Flame ignition sequence, then the Main Burner Flame ignition sequence is automatically commanded after the Pilot Flame is detected steadily established,
- a Turn-OFF command will determine the gas valve shutdown so both the Pilot Flame, and the Main Flame will extinguish.

2.2 CPI operation mode

The CPI operation mode means Continuous Pilot Ignition. In this mode the CPI/IPI switch must be left closed.
In this mode the board immediately completes the ignition sequence for the Pilot Flame, and then remains with the Pilot Flame ON, waiting for a command to ignite the Main Burner Flame as follows:

- assume to start from a completely shut OFF fireplace, with CPI Mode initially set,
- the Pilot Flame ignition sequence is initiated, and brought to completion, the Pilot ON state is maintained,
- a Turn-ON command will initiate the Main Burner Flame ignition sequence,
- a Pilot-ON command will shut down the Main Burner portion of the gas valve so the Main Flame will extinguish, leaving a permanent Pilot ON flame.

A Turn-OFF command is only possible by setting the IPI/CPI switch back to IPI position.

2.2.1 Pilot on Demand operation

Some product versions are equipped with a Pilot on Demand (PoD) software feature that shuts off the pilot flame after a period of continous pilot operation without main burner heating request. In these versions, CPI mode is intended as “continuos pilot” for such limited time period.
The pilot shut-off countdown is reloaded when a main burner heating request is detected or pilot request is restored.

2.3 Details about the ignition sequences for the Pilot Flame

flame source for the more powerful Main Burner Flame.

2.3.1 Turn-OFF

In this state, the gas to the appliance is cut-off by the gas valve.
In this state the IFC board will wait for a command.

2.3.2 Pilot-ON

In this state the Pilot Flame sequence is executed, and it will lead the system to a continuous Pilot flame condition through these steps:
- if the previous state was Turn-OFF,
the Pilot Flame detection is turned ON,
a Pilot Flame check sequence is completed to avoid parasitic flame detection,
the spark generator is activated,
the Pilot gas valve solenoid is set to open the gas flow to the pilot hood,
in the mean time the Main Burner gas valve solenoid is set to close the gas flow;
- if the previous state was Turn-ON,
the Pilot Flame detection is maintained ON,
the Pilot gas valve solenoid is set to keep opened the gas flow to the pilot hood,
in the mean time the Main Burner gas valve solenoid is set to close the gas flow.

2.3.3 Turn-ON

In this state both the Pilot, and the Main Burner Flames sequences are executed, and it will lead the system to a fireplace completely lit:
- if the previous state was Turn-OFF,
the Pilot Flame detection is turned ON,
a Pilot Flame check sequence is completed to avoid parasitic flame detection,
the spark generator is activated,
the Pilot gas valve solenoid is set to open the gas flow to the pilot hood,
in the mean time the Main Burner gas valve solenoid is set to close the gas flow,
the Pilot Flame is let to stabilize,
the Main Burner gas valve solenoid is set to open the gas flow;
- if the previous state was Pilot-ON,
the Pilot Flame detection is maintained ON,
the Pilot gas valve solenoid is set to keep opened the gas flow to the pilot hood,
in the mean time the Main Burner gas valve solenoid is set to open the gas flow.

2.3.4 Lockout state definition

A lockout state is reached when an ignition error occurs, in any case the lockout on this board is volatile, this means that the lockout state will remain set in memory as long as the power supplies are applied.
This could mean both an anomalous flame detection, and/or too many unsuccessful ignition tries.
This state is a safe condition for the appliance, and is entered automatically by the DFC board.
When the DFC gets into lockout state:
1. both the Pilot, and the Main Burner solenoids in the gas valve are de-energized;
2. a diagnostic code is sent through the diagnostic port: if a signalling device is applied to the port the signal could be heard or seen by the user and recognized through a numeric code.
Having no diagnostic mean, the symptom of a lockout could be verified on a not responding board by trying to set the Pilot-ON command in CPI mode, because the board will not ignite the pilot flame;
3. the DFC board will ignore any command setting, and remain into Turn-OFF state, unless the unlock command sequence is met.
The causes of lockout must be investigated under safe conditions by the user and / or the service personnel.
The return of the system to the normal operation can be done releasing the DFC board from lockout in one of the following ways:
- turning all the system power supplies OFF for a defined number of seconds, and then restoring a power supply back ON,

- a complete manual reset sequence: since the command reset sequence can be commanded through a remote receiver the lockout can be defined as Soft Lockout.

The return of the system to normal operation must be checked under safe conditions by the user and / or service personnel.

2.3.4.1 Lockout reset sequence

The command sequence to unlock the DFC board from the lockout state is the same whatever the command source is installed on the Main Turn ON command input.

Standalone system, Fig. 2:

- act on the Main Turn ON switch to put it into OFF position for at least 2s,

then put it into ON position for at least 2s,

then the DFC board will execute the internal tests and begin the ignition sequences.

Remotely commanded system, Fig. 3, Fig. 4:

- act on the Proflame GT* receiver slide switch:

set it to OFF position for at least 2s,

then set it to ON position for at least 2s,

then the DFC board will execute the internal tests and begin the ignition sequences,

or:

- act on the Proflame GT* transmitter once the GT* receiver slide switch is set to REMOTE position:

turn OFF the flame request by the transmitter and wait in OFF state for at least 2s,

then turn ON the flame request for at least 2s,

then the DFC board will execute the internal tests and begin the ignition sequences: the proper acknowledgement of the transmitted OFF/ON commands should be heard through the GT* receiver beeps.

The IPI/CPI switch will not operate to unlock the board: it could be used anyway to test if a properly supplied DFC board is in lockout because setting the switch to CPI position, the DFC will not initiate the Pilot Flame ignition.

2.4 Diagnostics

The diagnostic signalling could be provided through these diagnostic means installed on the board:

1. visually, through a LED annunciator, or
2. acoustically, through a piezoelectric buzzer, or
3. through a dedicated high speed diagnostic port.

2.4.1 Real-time diagnostic messages – LED/buzzer indications

If the optional signalling device is connected to DFC board on CN0, the following diagnostic/alert signals could be interpreted in case of a system anomaly: obviously any indication is provided until a reliable level of power supply gets to the DFC board.

The following codes appear in the reported order of priority:

DIAGNOSTIC SIGNALS					
Code	**Lockout state**	**Parasitic pilot flame detected at startup**	**DFC power supply**	**Number of Flashes Ao Buzzes**	**Pause time between signals**
C3	Yes	Doesn't care	Enough power supply to signal	3	Some seconds
C2	No	Yes	Enough power supply to signal	2	
C1	No	No	Enough power supply to signal and the battery level is betweenthe predefined minimun power supply range for the battery	1	
C0	No	No	Enough power supply for operation, battery voltage at reliable level or absent	None	-

2.5 Special sequences: automatic safety restart

Whatever the DFC board state is in, it will execute automatically a Turn OFF command within 24 hours of continued pilot flame ignition.
This command sequence will led the system to OFF state to verify the correct functioning of safety means.
After the turn OFF sequence is completed, the FBC board will re-execute the latest command.

3. DFC board behaviours under abnormal or particular conditions

3.1 A Pilot Flame is revealed before the Pilot Flame ignition sequence

The system will not proceed to the gas ignition until a pilot flame is detected lit upon the start-up for the Pilot Flame ignition sequence.

3.2 No pilot flame is established during the pilot ignition sequence

If no pilot flame is sensed during the pilot flame ignition sequence, the system will retry for a predefined number of times. A waiting period is introduced between retries to purge the unburned gas from the appliance combustion chamber. After the last try with no successful ignition, the system will shut down the gas, and enter a VOLATILE LOCKOUT.

3.3 Pilot loss of flame in Pilot-ON, or in Turn-ON states

If a loss of the pilot flame signal is sensed during a state in which the pilot flame should remain lit, the system will proceed to restore the pilot flame ignition, and will close the main burner gas valve, and will start a timer to count the time from the flame failure.
If too many repeated pilot flame signal losses are detected within the timer expiration, the system will shut down the gas, and enter a VOLATILE LOCKOUT.
If the pilot flame robustness timer elapses with the number of pilot flame losses within the predefined limit, the ignition sequence will continue normally.

3.4 Behaviour of the IFC board in relation to the power supplies

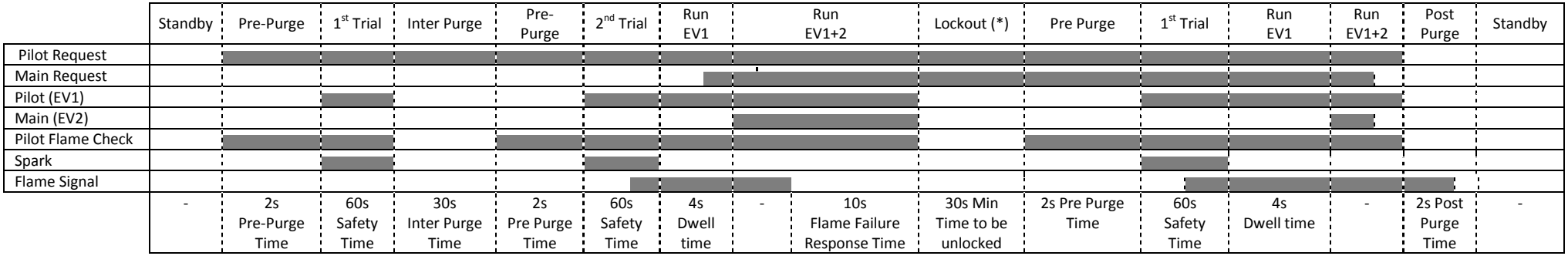
3.4.1 Operation on dropout DC supply condition: the battery backup

The battery supply is provided to connect to the system upon a permanent, or momentary AC line voltage loss that will make the DC input power supply to drop.
The DFC will continue operation in backup, so without apparent interruption, if the batteries are installed in the system, and if the battery charge level is into the specified range.
If also the battery voltage drops too much, the pilot flame start-up could become impossible and the system will proceed to shutdown.
If a low battery level is detected connected to the DFC board, it will signal this anomaly through the diagnostic BUS signalling device.

3.4.2 Operation upon the restoration of the DC supply conditions, or replacement of the batteries

If the AC line voltage comes back again, or the batteries are replaced in the system with new ones, the system will re-execute the command that was last set at its command inputs.
This means that if a thermostatic, or a manual switch is in closed position on the Turn-ON switch input, or the IPI/CPI switch is in CPI position, the DFC board will initiate the selected flame ignitions.
This is due to the fact that the DFC board assumes the command switches state as an operational mode assertion principle, and is not able to distinguish a closed contact as closed intentionally, or automatically.

TIMING DIAGRAM FOR FIREPLACE IGNITION, AND TURN-OFF SEQUENCES



The top of the above sequences is representative of a pilot request, and a full heat demand followed by final removal of main and pilot requests.

The pilot demand is satisfied only at the second trial for ignition and flame disappears during run mode.

(*) After Flame Failure Response Time expiration Lockout is entered. After at least a Recycle Time period of permanence in lockout the system can be unlocked and a new start-up sequence can initiate.

With exception of Safety Time and Flame Failure Response Time all indicated timings are at their nominal minimum value. In the transitions from one status to another some additional delay are possible due to additional internal checks.