



PROFLAME0 DFC (FFRT 5) CONTROL BOARD

USE AND INSTALLATION INSTRUCTIONS



Read the instructions before use.

IMPORTANT

The “Proflame0 DFC” is the flame ignition and control board part of a “Proflame” system which can be made of these elements:

- Proflame0 DFC (the flame ignition and control board)
- Proflame0 DFC wire-harness kit (main connection cable + pilot grounding connection)
- Proflame pilot assembly
- Proflame 88# gas valve
- USB power adapter / bank (5Vdc-250mA / 10.000mAh) with Micro-USB connector cable

The wild character “#” is intended for one of the following alternatives

- “0” , if a gas valve version without modulation is used.
- “5” , if a gas valve version with electrical modulation is used.
- "6" , if a gas valve version with manual knob modulation is used.

INTRODUCTION

The Proflame0 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.

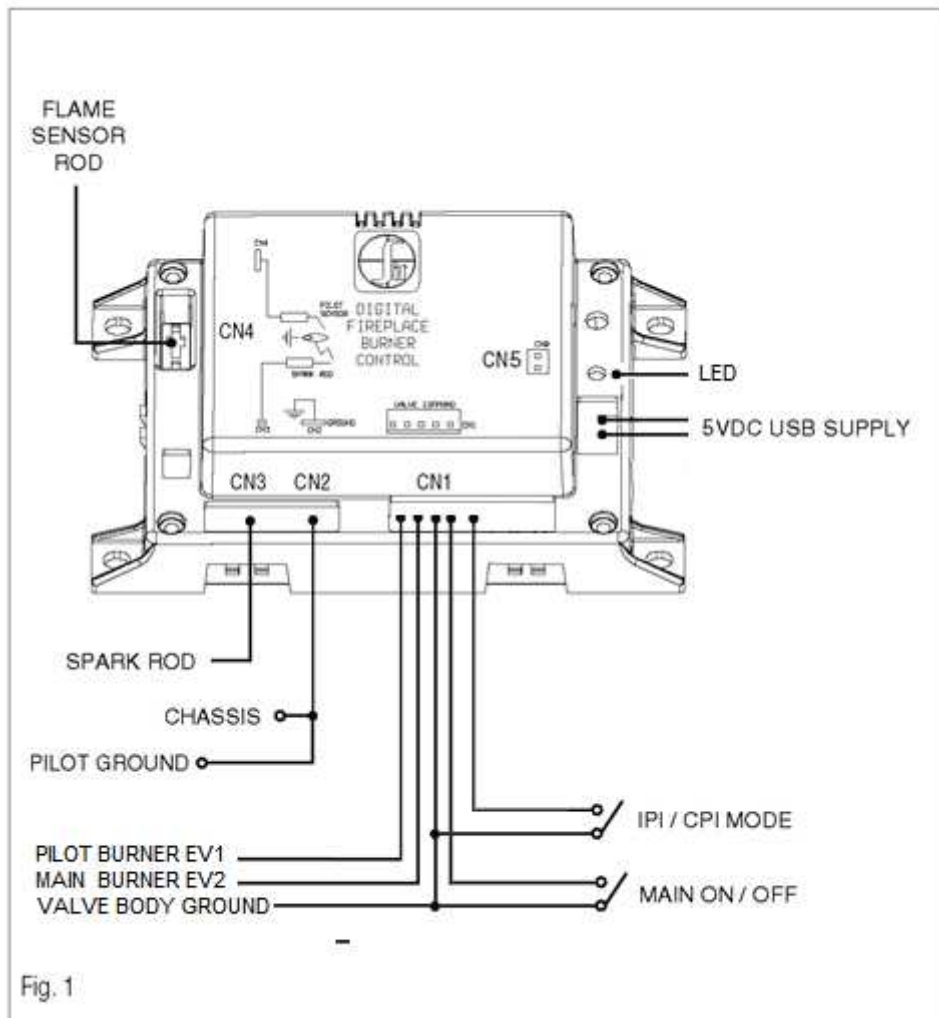
It's configured to control the ON/OFF main burner operation, giving the choice of both IPI (intermittent pilot ignition), and CPI (continuous pilot ignition) modes.

The Proflame0 DFC board controls and connects directly a Proflame 88x automatic gas valve using low voltage electrical power.

The electronic board is designed to be supplied by a 5Vdc-250mA USB power adapter or from a power bank device to work as a battery backup system. Also a 6Vdc power supply, coming from 4x1,5V AA batteries, is possible but without any care for the power consumptions.

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

GENERAL CONNECTIONS



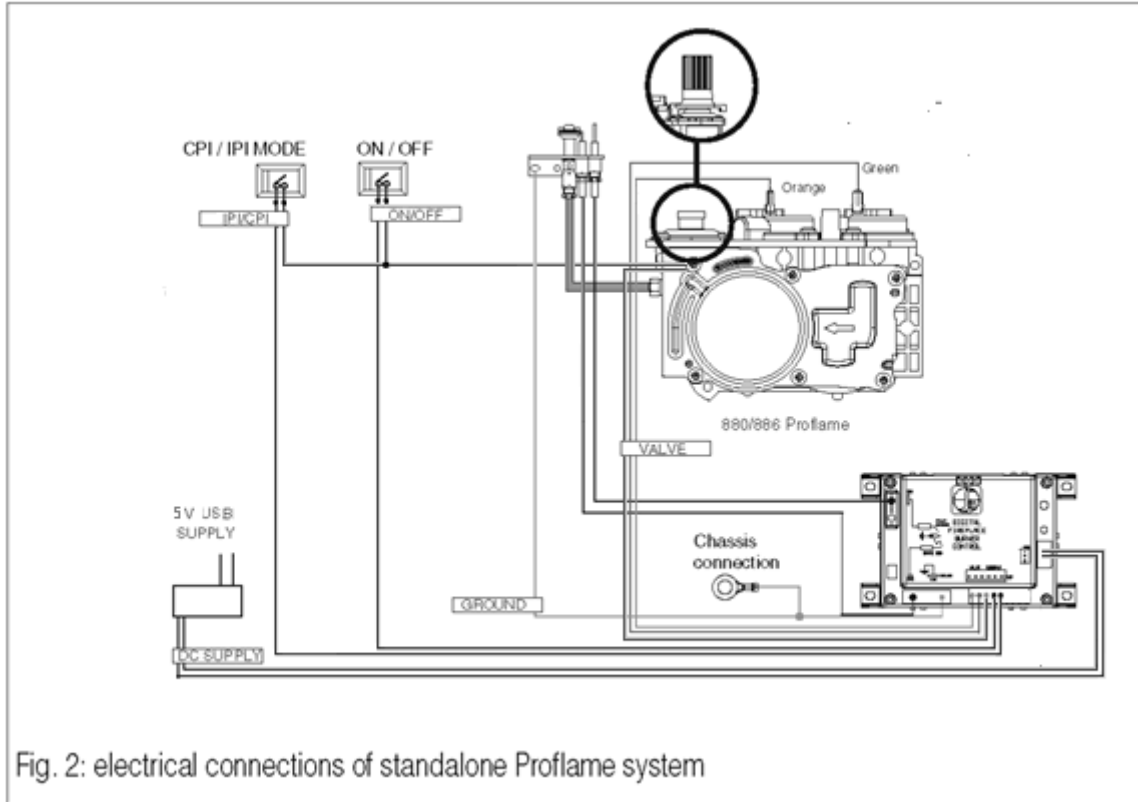
MAIN TECHNICAL DATA

Proflame0 DFC control board		
Supply voltage	5..6Vdc - 250mA max (5V-USB Class 2 Power Supply / 4 x 1.5V 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 with NG, and LPG gas types/mixtures	
Pilot ignition source	Intermittent (and Continuous only for "Pilot on Demand" versions)	
Flame Failure Response Time	5s	
Recycle Time	15s	
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)	
Max length of connections	Power Supply	< 5m (depending by power supply adapter/cable)
	Gas-Valve	< 0.50m
	Pilot-Assembly	< 0.85m
	On-Off Switch	< 10m
	CPI-IPI Selector	< 1m
<p>Please refer both to "User and Installation manuals" of "Gas Valve" and "Pilot Assembly" for:</p> <ul style="list-style-type: none"> - 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 		

SET-UP GUIDE FOR PROFLAME0 ELECTRONIC BOARD

General Connection & Set-Up Guide for Proflame0 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



PRELIMINARY CHECKS

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 selector to OPEN position.

If available, set the CPI/IPI selector for pilot flame mode to OPEN position.

Connect the Micro-USB connector to the DFC's power input and plug the adapter into the wall mains supply.

FUNCTIONS

The device is designed to work in cooperation with a Proflame 88x gas valve for the control of main and pilot burners with ignition and supervision of the flame at pilot burner.

A "MAIN ON/OFF" input for clean contact is dedicated to the activation/deactivation of the main burner that system take care to open exclusively in presence of flame at pilot burner.

Additionally, only for models with "Pilot On Demand" option, another input for clean contact ("IPI/CPI") allows the independent activation of the pilot burner alone (without main burner).

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 on and under supervision before and during the main burner operation until main burner command removal.

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

The endurance of the system with power bank or batteries depends on various factors:

- the efficiency and capacity of the power bank device
- the chemistry type and the quality of the batteries,
- the number of ignitions of the appliance,
- the temperatures at which the batteries are exposed,
- the supervised pilot flame quality,
- etc.

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

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

Power bank and other operated device.

Read the battery operated device instructions before installing it into the system. In order to avoid any risk for fire, leak of corrosive liquids or explosion, do not expose the device over its limits considering also the more restrictive temperature during re-charge. Avoid any device overheating also for the consequent degrade in capacity and operative life.

WARNING

Batteries

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 keep command controls where children cannot reach them.

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

Pilot on Demand (PoD) is a software feature that shuts off the pilot flame after a period of continuous pilot operation without main burner heating request. In these versions, CPI mode is intended as "continuous pilot" for such limited time period. The pilot shut-off countdown is reloaded when a main burner heating request is detected or continuous 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 DFC 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 signalling device (LED) where the user can recognized a numeric code. Having no way to see the diagnostic signal, 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 removing and restoring heating requests (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.

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.

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 visually through an on-board LED annunciator. The following diagnostic/alert signals, reported in order of priority, could be interpreted in case of a system anomaly:

DIAGNOSTIC SIGNALS					
Code	Lockout state	Parasitic pilot flame detected at startup	DFC power supply	Number Of Flashes	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 power level is under the admissible minimum	1	
C0	No	No	Enough power supply for operation, with supply voltage at reliable level	None	-

Obviously any indication is provided until a reliable level of power supply gets to the DFC board.

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 lead 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

In standard versions, if a loss of the pilot flame signal is sensed during a state in which the pilot flame should remain lit, the system proceeds with the pilot flame re-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.

Differently, the "FFRT" versions adopt an extended flame failure response time and, in case of loss of the pilot flame, the system waits up to this timeout expiration entering directly in VOLATILE LOCKOUT without performing any additional attempt for pilot re-ignition.

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

3.4.1 Operation with batteries or with power bank when mains AC supply dropout

An USB power bank device can be adopted in order to ensure the supply in case of momentary AC line voltage loss that will make the USB power supply to drop. The DFC will continue operation in backup, so without apparent interruption, while supply voltage input is detected in the expected range. If the power bank / batteries voltage drops too much, the pilot flame start-up could become impossible and the system will proceed to shutdown.

If a low voltage supply level is detected connected to the DFC board, it will signal this anomaly through the diagnostic signalling device.

3.4.2 Operation upon restoration of mains AC supply conditions or batteries replacement

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

	Standby	Pre-Purge	1 st Trial	Inter Purge	Pre-Purge	2 nd Trial	Run EV1	Run EV1+2	Lockout (*)	Pre Purge	1 st Trial	Run EV1	Run EV1+2	Post Purge	Standby	
Pilot Request																
Main Request																
Pilot (EV1)																
Main (EV2)																
Pilot Flame Check																
Spark																
Flame Signal																
	-	2s Pre-Purge Time	60s Safety Time	30s Inter Purge Time	2s Pre Purge Time	60s Safety Time	4s Dwell time	-	5s Flame Failure Response Time	15s Min Time to be unlocked	2s Pre Purge Time	60s Safety Time	4s Dwell time	-	2s Post Purge Time	-

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.