PROFIRE PF2100I

QUICK USER GUIDE

v1.1
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1 Introduction

The PF2100I is an Incinerator Management System designed for use with incinerators and combustors where assist gas is utilized. The combustion chamber must be maintained above a certain temperature before the waste gas is permitted to flow. The PF2100I achieves this by utilizing a thermocouple to monitor the chamber temperature and a valve to control the assist gas. Once the chamber is heated up to the set temperature with the assist gas the valve for the waste gas opens.

Optional expansion cards can be added to the system to enable remote control of the system, remote monitoring, analog pressure measurement or data logging.

2 Hardware

2.1 Overview

The PF2100I uses the same hardware as the PF2100 BMS. Although the LED behavior of the PF2100I is slightly different. The PF2100I get shipped with a new keypad. The new LED labels are:

- Pilot
- Assist Gas
- Waste Gas

2.2 Wiring

The 2100I follows the same wiring convention as the PF2100 BMS with the following exceptions:

- Connect the **Assist Gas Valve** to the **Low Fire** contacts
- Connect the **Waste Gas Valve** to the **High Fire** contacts

2.3 Thermocouple Inputs

The PF2100I requires two thermocouples located in the same thermowell to operate:

- Chamber TC (Process Temp in PF2100)
- High Temp TC

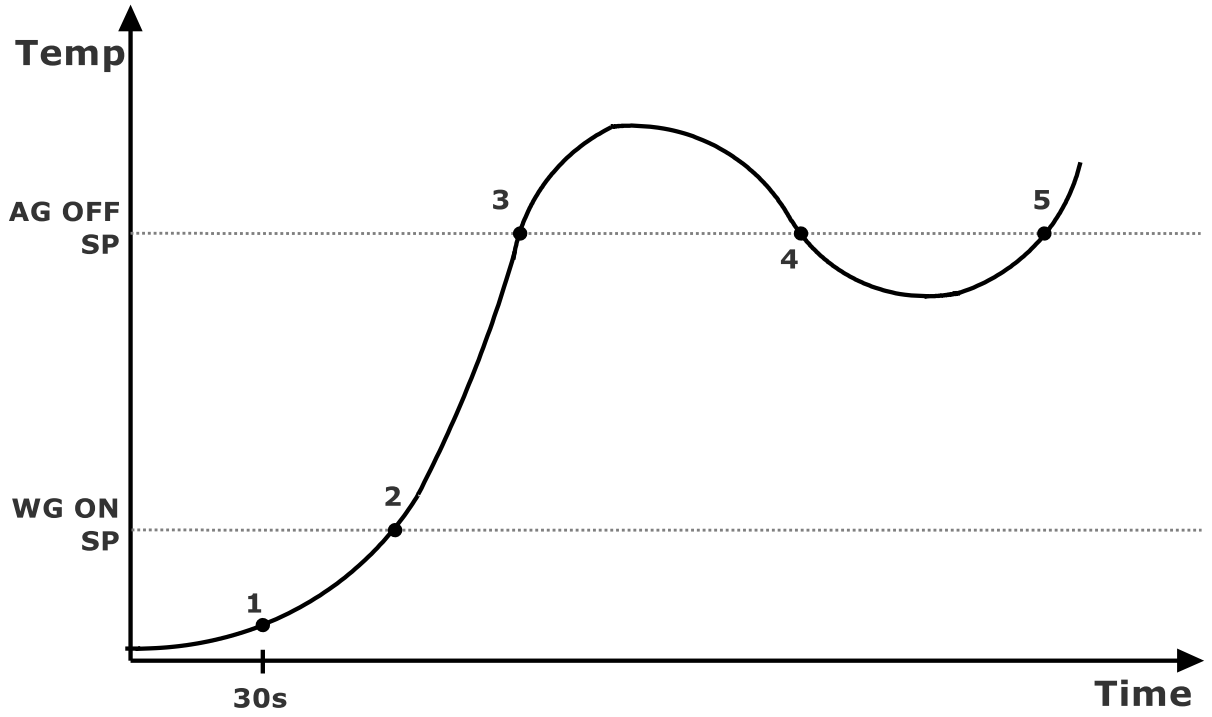
These two thermocouples are continuously compared to each other, if they do not match the system will shutdown.

The PF2100I has the ability to use the Auxiliary TC for either display purposes, or to check an additional high temp ESD condition.

3 Process Control

3.1 Overview

The following graph illustrates the PF2100I's process control when the system is started. This graph is intended as a rough overview of the process control algorithm, and as such it does not include every detail in the process control algorithm such as deadbands.



1. 30 seconds after the pilot flame is detected, the assist gas valve opens to increase the rate of heating
2. When the chamber temperature reaches the "Waste Gas On" setpoint, the waste gas valve immediately opens and incineration begins
3. When the chamber temperature exceeds the "Assist Gas Off" setpoint, the assist gas valve immediately closes. Incineration of waste gas continues
4. When the chamber temperature drops below the "Assist Gas Off" setpoint, the assist gas valve immediately opens.
5. See #3

3.2 Timing

- Fixed 30 second delay between pilot light and assist gas valve opening
- No minimum time delay between assist/waste gas valve transitions. PF2100I relies on deadband to prevent valve instability

3.3 Setpoints

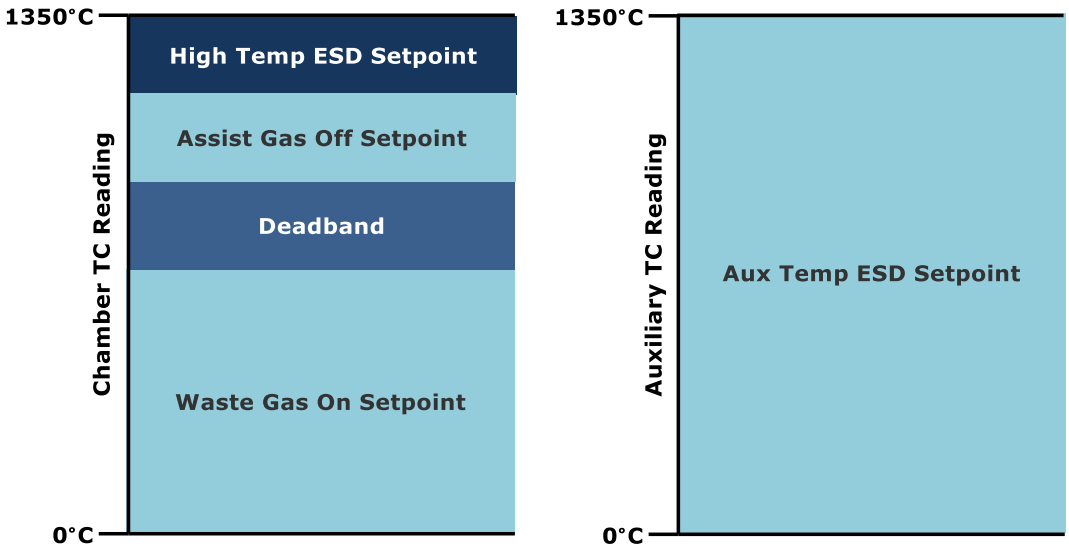
The PF2100I always requires at least three setpoints:

- "Waste Gas On" setpoint (WG ON SP):
  When the process temperature is above this setpoint, the waste gas valve opens. If the temperature drops below this setpoint the waste gas valve closes. This setpoint has no impact on the assist gas valve
- "Assist Gas Off" setpoint (AG OFF SP):
  This setpoint must be higher than the WG ON SP. If the process temperature is above this setpoint, the assist gas valve closes. If the temperature drops below this setpoint the assist gas valve re-opens. This setpoint has no impact on the waste gas valve.
- High Temp ESD

Each of these setpoints is compared against the chamber temperature (Chamber TC and High Temp TC inputs).

If an auxiliary thermocouple is connected, it can also be configured for high temp ESDs, with its temperature and setpoint handled independently from the other thermocouples.

The following diagram illustrates the setpoints used by the PF2100I:



3.4 Deadband

When the chamber temperature falls below the Waste Gas On or Assist Gas Off setpoints, the corresponding state transition is not made immediately by the PF2100I. The temperature must fall below the setpoint minus a specified deadband value before a state transition occurs. The exact behaviour is different for each setpoint:

Waste Gas On

- Fixed 2 ^{o}C (3 ^{o}F) deadband

Assist Gas Off

- Adjustable deadband from 30-200 ^{o}C (50-300 ^{o}F)
- Assist Gas Off setpoint minus the deadband must be higher than the Waste Gas On setpoint.

3.5 Shutdown/Warning/Alarm codes

Shutdown/Warning/Alarm codes are consistent with PF2100 BMS.

4 Accessories

4.1 4-20mA Output

The 4-20mA Output supports mirroring of the chamber temperature as well as proportional valve control.

The 4-20mA temperature signal is encoded according to the following:

- 4mA = 0 ^{o}C (32 ^{o}F)
- 20mA = High Temp ESD Setpoint

4.2 Proportional Valve Control

The PF2100I includes the most recent PID controller used by the PF2100 BMS.

The PID will try to maintain Waste Gas Setpoint + Deadband.

4.3 Start Contact

The Start Contact on the PF2100I behaves identically to its PF2100 counterpart.

4.4 Modbus Expansion Card Support

The PF2100I support Modbus cards with the most recent firmware versions.

The *Modbus Expansion Card Register Map,* available at www.profireenergy.com, provides descriptions of the Modbus register.

4.5 4-20mA Expansion Card Support

The PF2100I supports the 4-20mA expansion card for pressure only. The level and auxiliary inputs on the expansion card will not provide any functionality.

4.6 Data Logging Expansion Card Support

The PF2100I support Data Logging cards with the most recent firmware versions.