FTPC interlock system

Version 1.00 Gaspare Lo Curto 9/2/2000

1 Introduction

The FTPC does not present serious safety issues. It is a gas detector which uses a 50%/50% mixture of Ar and CO_2, non-flammable gases. Its total volume is about 600 l and it is small in comparison with the volume of the wide angle hall or the assembly area, therefore it does not present a risk for asphyxia. The water cooling system is kept at a pressure $300mbar$ below atmospheric pressure, therefore a damage in the water conducts would not generate a water leak. The FTPC interlock system makes maximum use of the facilities provided by the STAR Global Interlock System (SGIS, STAR note CSN 0361B) and uses the same conventions: 24V on the interlock line means that no alarm has been issued, an open circuit means that an alarm condition has been detected.

2 Requirements

The FTPC interlock system is required to take adequate action in the case in which events such as fire/smoke or water leak or detection of flammable gas or a serious malfunction of the FTPC equipment happen.

3 Response to fire and smoke

3.1 Detection

Detection of fire or smoke in any area is performed by the SGIS.

3.2 Action

In the case of fire or smoke the SGIS would switch off the power to the interested area irrespectively of the subdetector system present in that area. No action is therefore needed by the FTPC interlock system.

4 Response to flammable gas detection

4.1 Detection

Detection of flammable gas in any area is performed by the SGIS.

4.2 Action

The SGIS removes any possible cause of ignition in the area affected by the alarm, irrispectively from the subsystem involved. No action is therefore needed by the FTPC interlock system.

5 Response to water leak

5.1 Detection

Detection of water leaks in any area is performed by the SGIS.

If requested water detection could be provided along the FTPC water lines by mean of the Tracetek system which would be provided by the STAR control group.

5.2 Action

If water is detected in the platform the SGIS would cut power to the rack row where the leak has been detected. No action is therefore required from the FTPC interlock system.

If water is detected in the STAR detector the SGIS issues an alarm and the FTPC would power down immediately its high voltage and low voltage power supplies.

	FTPC cooling	FTPC gas	STAR water	STAR fire	STAR flam. gas
Low Volt.	F		F	S	S
High Volt.	F	F	F	S	S

Table 1: Interlock response to alarms. an F indicates that the FTPC interlock system would take care of switching off the FTPC system indicated on the left column, an S means that the SGIS would do it; otherwise the system is not switched off.

6 Response to FTPC alarms

The FTPC interlock system would provide two alarm conditions which have to be cleared for the safe operation of the detector. Alarms will be issued in case of a malfunction of the cooling system or of the gas system.

7 FTPC cooling system alarm

7.1 Detection

Malfunction of the cooling system would be detected by the PLC controlling the cooling process. A rack containing the cooler, the pump and the cooling controls will be positioned on the north platform. Communication of the alarm condition from this rack to the FTPC interlock system in the south platform will be achieved through a cable going from the south platform to the FTPC cooling rack in the north platform to an isolated relay. Another cable would go from the other end of the isolated relay back to the south platform and the FTPC interlock system. In this way the connection would maintain the grounding requirements for the experiment (STAR note CSN 0202A). While concerning about capacitive coupling, has to be taken into account that the length of these cables is of the same order of magnitude as the path needed to reach the detector from the south platform.

7.2 Action

Power will be cut immediately to the FTPC high and low voltage power supplies, the slow control will be notified.

8 FTPC gas system alarm

An Ar rich mixture significantly reduces the dielectric rigidity of the gas and could cause sparks which could damage the detector. For this reason an alarm is issued to switch off the high voltage. There is no need to switch off the low voltage; during this period indeed the user can safely run pulser tests for example or any other test which does not involve the high voltage.

8.1 Detection

The PLC which controls the gas system would detect any malfunction and in particular it would issue an alarm in case the mixture is too Ar rich. The $24V$ interlock signal will be transmitted to the south platform using one of the free spighets in the optical fiber connection used by the SGIS.

8.2 Action

Power will be cut immediately to the FTPC high voltage power supplies, the slow control will be notified.

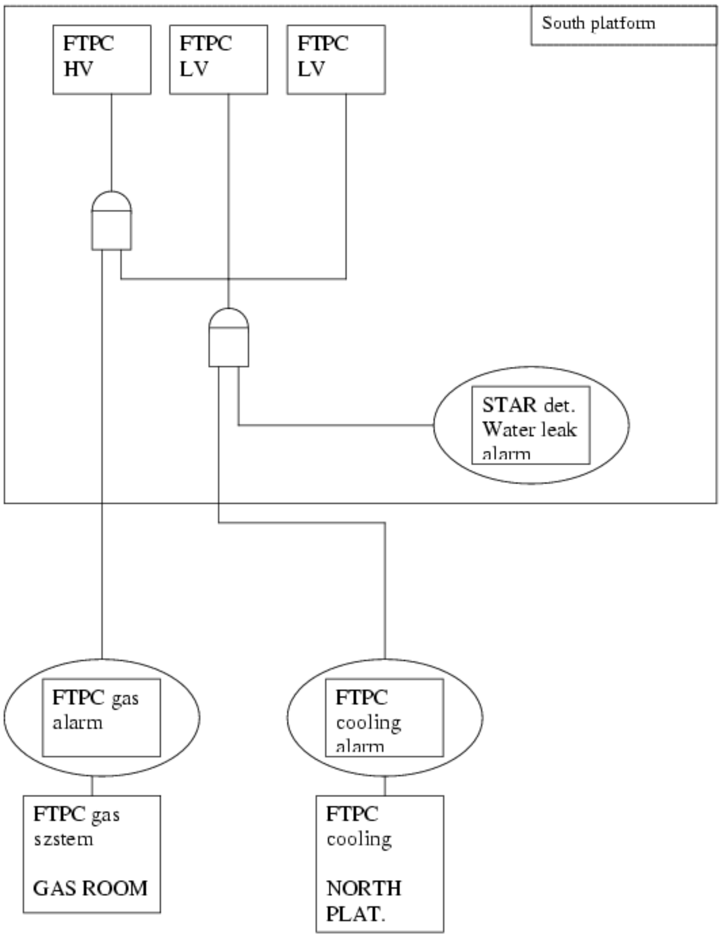

Figure 1: A schematic of the FTPC interlock logic.