Operator’s Manual

Fire Extinguishing
Control Panel
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5. PANEL FAULT TROUBLE-SHOOTING GUIDE

    (Fire Extinguishing Control Panel)
1 GENERAL

1.1 Introduction

This manual serves to provide only the basis operator’s information on the operation of the Fire Extinguishing System. To ensure continuous reliability of the system, it is recommended that an agreement to carry out regular maintenance of the installation be made with a competent and qualified contractor trained to service and maintain this system.

Arrangements should be made such that a qualified person is available on call to provide service in the event of any emergency arising at the installation. For more details on maintenance, please refer to the section on routine maintenance covered in this manual.

1.2 System Description

This Fire Extinguishing System utilises the PATENT Compact Fire Extinguishing Control Panel. The system comprises a Fire Extinguishing Control Panel, which perform the task of processing the input signals and thereafter transmit the output signals or initiates other auxiliary functions. The panel is usually sited outside the protected room prominent location clearly visible from the entrance.

Input devices are used to cause a change in panel status. These devices may be the combination of Remote Electrical Manual Release Call Points, Remote Mechanical Release Control Switches (if provided), Heat/Smoke Detectors or Remote Abort Station.

Output devices are used to provide an audio & visual warning. Output devices commonly used are alarm bells, electronic sounders, strobe light, “Evacuate” flashing sign and “Gas Discharged” flashing sign. These three components: Input Devices, Control Panel and Output Devices form the backbone of a Fire Extinguishing System.

The detection system of Fire Extinguishing Systems operates on a “Dual Risk Zone” basis. These zones are groups of input devices grouped in accordance to the locality they are protecting. In the event of a Fire/Fault condition, the location where the signal had originated will be defined by the respective indication on the panel. It is therefore important to be familiar with the zoning of the protected area. A zoning diagram (or zone chart) is usually provided for this purpose.

The Fire Extinguishing Control Panel is provided with a feature that continuously monitoring the continuity of the input/detection, output/sounder circuits and Electrical actuator circuits to ensure integrity of the system. It is also equipped with a battery back-up supply (lasting at least 24 hrs) in the event of an incoming supply failure.
2 FRONT PANEL DESCRIPTION

2.1 Indicators Description

a) Power On (Green) : System energised by Mains and/or Standby Battery
b) System Fault (Amber) : General Fault Indicator
c) Alarm Silenced (Amber) : Alarm Silenced Indicator,
d) Count Down : Timer Count Down Indicator for
   60 sec (Green) : 60 second Indicator
   30 sec (Green) : 30 second Indicator
   20 sec (Red) : 20 second Indicator
   10 sec (Red) : 10 second Indicator
   Discharged (Red) : Gas Discharged Indicator
e) Zone Fire A / B (Red) : Zone in fire condition
f) Zone Fault A / B (Amber) : Zone in fault condition (Line open / Line short)
g) Remote Release (Red) : Remote Extinguishant Release station activated
h) Remote Release Fault (Amber) : Remote Release Station Line Open or Short
i) Remote Aborted (Amber) : Remote Extinguishant Abort station activated

2.2 Control Switches Description

a) Zone A / B Isolate (Green) : To isolate zone detection circuit
b) Remote Release Isolate (Green) : To isolate Extinguishant Release signal
c) Firing Abort (Green) : To abort firing of Actuator
d) Auxiliary Isolate (Green) : To isolate 1st and 2nd alarm auxiliary output
e) Alarm/Fault Silence (Orange) : To silence Alarm Bell / Buzzer
f) Reset (Brown) : To normalise the system
   (Note: Silence alarm sounder before RESET)
g) Indicators Test (Blue) : To test the working condition of all LEDs & Buzzer
3 OPERATING INSTRUCTIONS

3.1 Normal Operating Conditions

Under normal operating conditions,

a) Green “Power On” LED lighted.
b) Green, Countdown indicator LED lighted (indicating the Pre-set time)
c) No other indicator should be lighted.
d) The panel should be completely silent.
e) All alarms should be silent.

3.2 Fire Alarm Condition

The detection configuration of the Fire Extinguishing System is arranged on a “Dual Risk/Cross Zone” basis. The 1st detection will occur when any detector is activated. The 2nd detection will occur when another detector connected to the other detection circuit of the same grouped zone is activated.

1st Detection observations

a) Red “FIRE” LED of the activated detection circuit lighted.
b) Alarm Bell output activated.
c) “Evacuate” sign flashing output activated.
d) Strobe Light output activated.
e) Fire Signal contact output activated.
f) 1st Auxiliary Detection contact output activated.

2nd Detection observations

a) Red “FIRE” LED of the other activated detection circuit lighted.
b) Siren output activated.
c) “Gas Discharged” sign flashing output activated.
d) 2nd Auxiliary Detection contact output activated.
e) Green, Countdown indicator LED (“60 Sec or 30 Sec”) starts countdown.

Upon expiry of timer countdown

a) Actuator output activated. (Gas Discharged)
b) Red “Discharged” LED lighted.
c) “Gas discharged” sign flashing output become steady.

Note:
Actuator output will be de-energised on next 30sec after firing actuator.
3.2.1 To Inhibit Discharge

3.2.1(a). Inhibit by REMOTE ABORT Station

a) Press remote “EXTINGUISHANT ABORT” switch
b) Amber “Remote Aborted” LED lighted.
c) Countdown timer stop and countdown indicator LED back to Pre-set time
d) “Gas Discharged” sign flashing output goes off.
e) System in aborted condition

Note: To initiate discharge, release “EXTINGUISHANT ABORT” switch

3.2.1(b). Inhibit by Local FIRING ABORT Switch

a) Press local green latching “Firing Abort” switch
b) Built-in LED of Firing Abort switch lighted
c) Countdown timer stop and countdown indicator LED back to Pre-set time
d) “Gas Discharged” sign flashing output goes off.
e) System in aborted condition

Note: To initiate discharge, de-press “Firing Abort” switch

3.2.2 Silencing the Alarm

To silence the alarm, carry out the following procedures;
   a) Press orange momentary “Alarm / Fault Silence” switch
   b) External sounders and buzzer silenced
   c) Panel remains in alarm state until reset

3.2.3 Resetting the System

Before the system is reset, the cause of the alarm must be investigated and duly rectified. In the case of a false alarm, make sure that there is no incident of fire before resetting the system.

a) Re-instate the affected devices to normal
b) Press brown momentary “Reset” Switch
   c) After resetting, the panel will resume to normal operating condition, assuming that there are no other events to cause another alarm and the original cause of the alarm being rectified.
3.3 Fault Conditions

The panel is equipped with a self-diagnostic feature that checks itself and indicates a wide range of possible faults. In the event of a fault the following will be observed;

   a) An amber LED of the respective zone fault lighted and/or
   b) An amber “System Fault” LED lighted
   c) Panel buzzer sounding

3.3.1 Silencing the Fault

If the fault cannot be rectified, it may be silenced by carrying out the following:

   a) Press orange momentary “Alarm / Fault Silence” switch
   b) Panel buzzer silenced
   c) Panel remains in fault state until fault rectified

3.3.2 Resetting the System

The cause of the fault should be investigated and rectified. If it is due to a mains supply failure, the system will normalise when the power supply resumes. Some faults are internal to the system and are not covered in this manual. The operator will have to contact the maintenance or service contractor. Once the fault(s) are rectified, the panel will reset itself.

3.4 Zone/Auxiliary Isolations

This function is executed when isolation of the respective zone(s) and/or auxiliary functions is intended. Zone isolation will render the respective zone(s) in-operative and will not be affected by the change in condition of the related input device(s).

Note : It is not possible to perform a zone isolation when an alarm condition has already occurred in the respective zone.

To carry out zone/auxiliary isolation:

   a) Press green latching “ISOLATE” for zone or “Auxiliary Isolate” switch
   b) Built-in LED in above switch lighted
   c) Zone(s)/auxiliary function remains in isolated state until normalised

To normalise zone/auxiliary isolation;

   a) De-press respective switch to normalise
   b) Built-in LED in above switch goes off
   c) Zone(s)/auxiliary function back to normal operation state

Note: Press brown momentary “Reset” switch before normalise the isolation of zone(s).

3.5 Indicators Test

This is provided to test the working condition of the visible (LEDs) and audible (Buzzer) indicators

   a) Press the blue momentary “Indicators Test” switch
   b) All built-in LED in switches as well as all the LED indicators lighted and Buzzer sounds
   c) Release the switch to normalise

Operator’s Manual for Compact Fire Extinguishing Control Panel
4. EMERGENCY OPERATING INSTRUCTIONS

4.1 In The Event Of An ALARM Condition

Identify the location where the alarm had originated by referring to the zoning diagram. Proceed to the respective location to investigate the cause of the alarm.

If a FIRE is discovered

a) Call 995 to notify the Singapore Civil Defence Force immediately
b) Try to control or extinguish the fire by using the fire hose reel or extinguisher. This should be done only when personal safety is not endangered.

If it is a FALSE alarm

a) Be very sure that there is no incident of fire
b) Silence the alarm by pressing the orange momentary “Alarm/Fault Silence” switch
c) Re-instate the respective zone to normal
d) Press the brown momentary “RESET” switch to re-instate the system to normal

4.2 In The Event Of a FAULT Condition

The panel buzzer will emit a continuous warning with indication of the respective panel faults.

a) Press the orange momentary “Alarm/Fault Silence” Switch to silence the Buzzer.
b) The panel will reset itself when the fault is cleared.
c) Notify the maintenance department or the respective maintenance contractor.
5 ROUTINE MAINTENANCE

5.1 Introduction

In order to ensure safe and continuous reliability of the fire alarm system, it should be regularly tested and serviced. Routine testing and maintenance should only be carried out by competent personnel trained in this field and armed with the appropriate equipment to do the job.

5.2 Maintenance Responsibilities

The owner of the fire extinguishing system is responsible for ensuring that it is correctly maintained so that it is in proper working conditions at all times. This will involve arranging for the system to be checked, tested and serviced in accordance with the requirements as described in the Singapore Standard CP 10 : 1993 – Code of Practice for the installation and Servicing of Electrical Fire Alarm Systems.

The recommendations covered in section 5.4 of this manual may conflict or may require additional tests/checks to be performed as imposed by the local authorities. Where such conflicts occur, the local authority regulation should be followed.

5.3 Operator Duties – Log Book Entries

The fire alarm system should have a log book associated with it, it is used to record details of all alarm (genuine, practice, test or false), faults, service tests and routine attention given. A format is recommended in CP 10 : 1993.

The operator is responsible for recording all events raised by the system into the log book. The log book is an important record of the history of the system and should be kept up to date by the operator and the maintenance personnel.

5.4 Routine Checks and Tests

The recommended maintenance procedures can be divided into the following categories:

a) 5.4.1 Daily check
b) 5.4.2 Weekly checks
c) 5.4.3 Monthly checks
d) 5.4.4 Annual checks

5.4.1 Daily Checks

The following checks should be made everyday by the panel operator to ensure that the system is operating normally.

a) Check that only the green “Power On” LED is lighted. All other indicators should be off and the panel completely silent. If a fault has occurred and the panel buzzer sounding, the appropriate indicator will light up
b) Record the fault (s) detected
c) Determine the area affected by the fault and decide whether special attention (such as fire patrols) are required in that area
d) Determine the reason for the cause of the fault or note the activities immediately prior to the cause of the fault in the area affected
e) Silence the fault buzzer as described in section 3.3.1
f) Inform the maintenance contractor responsible for servicing and arrange for repair

### 5.4.2 Weekly Checks

Weekly checks may be made by the operator or by the maintenance or contractor responsible for servicing the installation. The following checks are recommended.

a) Check that all LEDs / Indicators are operational by carrying out a “Indicators Test” as described in section 3.5
b) Isolate auxiliary functions as described in section 3.4 and abort the firing Actuator as described in section 3.2.1(b) or taken out the actuator from the cylinder so as to prevent the initiation of the auxiliary functions
c) Carry out a simulated fire alarm condition by activating any detector. Always activate a different zone each week to ensure a more uniform test on of the system.

Note:
It may be necessary to contact the alarm monitoring company prior to activating the alarm to warn them of the simulated fire condition being tested and also to check with the monitoring company after completion of test to ensure that the fire alarm signal was received and the system reset.

d) Check that all sounders are working and the panel conditions as described in section 3.2 are observed
e) Silence and reset the panel as described in section 3.2.2 and 3.2.3
f) Check the battery condition and the voltage reading by the use of a Multi-Meter
g) On completion of the above tests, ensure that all switches are in the correct operating position
h) Rectify all faults (if any) immediately
i) Record in the log book that the above tests has been conducted

### 5.4.3 Monthly Checks

In addition to the weekly checks, the following inspection and testing procedures are to be carried out each month. Any corrective action that has not yet been taken should be noted and carried out.

a) Simulate fire condition in detection zone one by one. Silence and reset one zone followed by the next (similar to that as described in section 5.4.2.c). Check that all auxiliary functions are executed as according to that as intended during a fire situation. Reset system after this test.
b) Simulate fire condition in both detection zones one by one. This time silence the activated detection zone followed by the simulation of a fire condition of the next detection zone. Check that all auxiliary functions are executed as according to that as intended during a fire situation. Reset system after this test.
c) Short or remove the detector line of both detection zones one by one. The buzzer should sound together with “System Fault” and “FAULT” indication lighted at the respective zone. The buzzer should sound whenever a new zone is shorted or removed. The buzzer should be silenced when the short is removed or replace the detector line.
d) Open the Actuator Line or remove the “Actuator Fuse”. The buzzer should sound together with “System Fault” and “Actuator Fault” indications lighted. The panel should be silenced when “Alarm/Fault Silence” switch is activated. Normalise the open or replace “Actuator Fuse”, the system should normalise itself.

e) Short the Bell Line or remove the “Bell Fuse”. The buzzer should sound together with “System Fault” and “Bell Fault” indications lighted. The panel should be silenced when “Alarm/Fault Silence” is activated. Remove the short or replace “Bell Fuse”, the system should normalise itself.

f) Short the Siren Line or remove the “Siren Fuse”. The buzzer should sound together with “System Fault” and “Siren Fault” indications lighted. The panel should be silenced when “Alarm/Fault Silence” is activated. Remove short or replace “Siren Fuse”, the system should normalise itself.

g) Isolate a zone in accordance to the procedures as described in section 3.4. Trigger a device in that respective zone. It should have no alarm effect on the panel. Normalise the isolated zone.

h) Check battery and terminals condition.

i) Disconnect the battery supply. The “Power On”, “System fault” indicators and “Battery Fault” indicator should be lighted and the buzzer sounding. Connect back the battery, system should normalise itself.

j) Switch off incoming mains supply. The “Power On”, “System Fault”, “Mains Fault” and “Charger Fault” indicators should be lighted and the buzzer sounding. The standby battery should take over the supply to the system. Resume the mains supply and system should normalise itself.

k) Check earth leakage function by applying a short between the positive leg of the detector line and earth (chassis). The buzzer should sound together with “System Fault” and “Earth Fault” indications lighted. Repeat, using the negative leg of the detector line. The buzzer should sound together with “System Fault” and “Earth Fault” indications lighted.

l) Check that the panel is in a clean and operative condition.

m) Visually inspect the condition of the components, terminations and cables.

n) Ensure that all faulty components are properly replaced.

o) Record in the logbook any circuit that require repair and arrange accordingly.

p) Ensure that all switches are in the correct operation position.

q) Record in the log book that the above tests has been conducted
5.4.4 Annual Checks

The annual checks should include all the inspections and testing as described in sections 5.4.1, 5.4.2 and 5.4.3. In addition, the following should be carried out.

a) The maintenance/servicing personnel should arrange to check the operation of at least 20 percent of the detectors in an installation each year. The selection of detectors to be tested should be spread over as many zones as possible and should be made in such a way that all detectors in an installation should have been checked at least once in 5 years.
   The checking of the detectors should take the form of either:
   (i) The testing of a detector in-situ or
   (ii) The removal of a detector and its replacement by a detector, which has been checked and calibrated by the supplier.

b) Circuits requiring automatic voltage regulated supplies should be checked to ensure correct operation and voltage output.

c) Where the heat-sensitive element of thermal detectors or the enclosure of other detectors are found to be coated with paint or any material likely to affect the operation of the detectors, such material should be cleaned off or if necessary have the detector replaced.
   Note: In certain environments it may be necessary to clean and adjust smoke detectors at more frequent intervals.

d) Record in the logbook any fault(s) identified and that the above tests had been conducted.