

4 OPERATING PROCEDURES

- 4.1 GENERAL..... 2
- 4.2 EMERGENCY SHUTDOWN..... 2
- 4.3 SAFETY PROCEDURES 3
- 4.4 PERMITS TO WORK 3
- 4.5 INCOMING ELECTRICAL SUPPLY..... 4
- 4.6 SOLAR PHOTOVOLTAIC GENERATION SYSTEM 4
- 4.7 SUB MAIN DISTRIBUTION 4
- 4.8 NEW DISTRIBUTION BOARDS 4
- 4.9 SMALL POWER INSTALLATION 5
- 4.10 LIGHTING INSTALLATION 6
- 4.11 EMERGENCY LIGHTING..... 7
- 4.12 EXTERNAL LIGHTING..... 8
- 4.13 FIRE DETECTION & ALARM SYSTEM..... 8
- 4.14 LIGHTNING PROTECTION SYSTEM 8

4.1 General

During normal operation the installed systems have been designed to require minimal user input. Power outlets simply require a plug to be inserted and the outlet switched on and light switching is primarily by light switch or PIR detectors.

Due to the simplicity and automation of the installed systems the operating procedures herein primarily refer to the initial operation or resetting of dead circuits by checking and operating MCBs and RCBOs. These procedures should only be carried out by trained and competent personnel who have an understanding of the systems being energised and its implication on other related systems.

The installed services to the new building have been energised and set to work with tests carried out to ensure correct operation and function particularly with regard to safety systems and interlocks.

When operating and setting equipment and systems a systematic approach must be taken.

Therefore it is essential that the operative understand the system controls and settings at each stage of operation, so that they can properly react to any unexpected or unforeseen condition and take the appropriate action.

The manufacturer's manuals and literature must be consulted and referenced to ensure that routines are followed particularly if there is an unexpected loss or supply or service.

For Specialist systems detailed in this Section as a minimum the authorised user should ensure the following operations and system information is available, noted and followed:

- User Pass Codes.
- Engineer Pass codes.
- Reporting of any faults, incidents or system alterations.
- Ensuring system is tested and maintained in compliance with the relevant legislation, Codes of Practice, Fire Authority or Insurance Company requirements.
- Record keeping of any events.
- Emergency Contact Numbers.

4.2 Emergency Shutdown

In a building wide emergency the supply to the whole building can be isolated at the panelboard in the ground floor Lobby as follows:

- 1. Switch OFF the Main 'Mains Switch' Isolator.** (This will disconnect the installation from the mains supply)
- 2. Switch OFF the PV Inverter** (this will disconnect the installation from the Solar Photovoltaic array)

If localised isolation is required for maintenance then a competent and authorised person should isolate the relevant MCB or RCBO at the local distribution board but if work is to be carried out within a distribution board then it should be isolated at source.

4.3 Safety Procedures

The following is a brief guide to the procedures that can be generally adopted to minimise the risk to authorised personnel as well as protecting plant and equipment from damage.

WARNING – HV & LV SWITCHGEAR CARRIES VOLTAGES THAT ARE LETHAL & MUST ONLY BE OPERATED BY AUTHORISED COMPETENT PERSONS.

ANOTHER BIG WARNING - THIS INSTALLATION HAS TWO SOURCES OF SUPPLY BEING THE MAIN GRID AND A ROOFTOP SOLAR PHOTOVOLTAIC GENERATION SYSTEM

Access to electrical distribution equipment should be restricted to authorised, trained and competent personnel who are likely to be engineering staff or qualified personnel working under the control of the engineering staff.

Prior to switching on a circuit check the equipment or outlets served to ensure equipment and switchgear are serviceable and safe to operate. If the circuit has unexpectedly stopped operating then ensure the fault-finding routines are followed. DO NOT switch or replace the protective device as not only can this endanger lives but this may cause further damage to the systems or equipment served.

When switchgear, distribution boards, or any other item of plant or equipment is out of service, unserviceable or unsafe, the item in question must be electrically isolated. All fused switches, circuit protective devices etc., must be switched off and a suitable warning notice fixed in place.

Be aware that Secondary power supply systems are provided; for instance battery backup for emergency lighting and fire alarms. These systems must have all sources of supply isolated prior to working on equipment. Remote isolation for equipment must be locked off to prevent unauthorised or inadvertent re-energisation of power.

As part of any electrical installation's operating procedures users should:

1. Check to ensure that switch rooms, and plant areas are clean and free from obstruction.
2. Check all equipment is properly secured; equipment covers and guards are in place.
3. Check to ensure that all equipment access panels and doors are closed and secured.
4. Ensure that all tools and safety equipment are serviceable and in their proper space.
5. Check that fire-extinguishers are in place and have been serviced.
6. Check that fire-extinguishing systems are serviceable.

4.4 Permits to Work

A permit to work should be required when maintenance work can only be carried out if normal safe working practices cannot be followed..... after carrying out a suitable risk assessment.

A permit to work system usually comprises a written document which specifies the extent of the works, precautions to be taken and anticipated timescale. The document will usually need to be signed and issued by a suitably experienced and qualified senior member of the

employer's staff.

4.5 Incoming Electrical Supply

The Switch Disconnecter Fuse at the main panelboard must be ON for electricity to flow from the mains grid.

4.6 Solar Photovoltaic Generation System

The system was installed by a specialist company as part of this contract. Refer to O&M manuals provided by the installer.

The PV Inverter is wired to an MCCB in the Main Panel Board. Accordingly both device switches must be in the ON position for electricity to flow to the electrical installation.

4.7 Sub Main Distribution

The entire electrical installation for each unit is served from the Main Panel Board where the Main Incoming Switch Disconnecter should be in the ON position to supply electricity to the building during normal operation.

To isolate the supply to the building turn the Switch Disconnecter OFF, which will isolate the supply to the whole building and all connected distribution boards.

If the Incoming Switch Disconnecter or an MCCB has tripped, reset by switching back to the ON position.

HOWEVER before switching on any protective device the reason for tripping should be investigated and resolved and confirmation sought that persons are not working on the isolated system or that equipment connected to the circuit cannot cause harm or damage when it is energised.

Note: When works on the installation require isolation of the entire electrical supply the PV Photovoltaic System should also be isolated from the installation.

Refer to Electrical Test Certificate. Isolation at source ensures that the relevant Sub-Distribution Board is totally disconnected from the mains supply.

There are no operating procedures other than ensuring switches at either end of the sub-main are ON if the system is operational.

4.8 New Distribution Boards

The new distribution boards are installed to serve the new electrical installation previously described and detailed on the test certificate.

Each board is fitted with an Incoming Switch Disconnecter. This 'mains switch' can be used to manually disconnect the supply to the bus bar in an emergency or as part of an isolation procedure.

Individual circuit protection is provided by RCD/ RCBOs installed within the board and rated as required for individual circuits.

The Incoming Switch Disconnecter (Mains Switch) should be ON to supply electricity to the bus bar during normal operation.

To isolate the supply to the bus bar turn the Mains Switch OFF.

If maintenance is to be carried out inside the distribution board then turning the Mains Switch OFF is NOT sufficient safe isolation. The entire supply to the board should be disconnected at source – which is noted in the sub mains section.

All installed MCB/RCD/ RCBOs need to be in the ON position to supply relevant operational circuits. To isolate individual circuits switch the relevant MCB or RCBO to the OFF position. If the Incoming Switch Disconnecter or an MCCB has tripped, reset by switching back to the ON position.

HOWEVER before switching on any protective device the reason for tripping should be investigated and resolved and confirmation sought that persons are not working on the isolated system or that equipment connected to the circuit cannot cause harm or damage when it is energised.

When it is necessary to shut down any part of the LV distribution system or equipment, the load should first be disconnected by switching off the supply at all sub-circuits, unless an emergency or out of control condition occurs.

Building Users must be advised of the planned or emergency shut down and of the services affected by a shut down before the supply is disconnected.

If the shutdown item or system needs to be investigated or worked on for an extended period and re-energising of the supply could cause a danger then the supply should be locked off using a Lock Out Tag Out system (LOTO). Isolators, Distribution Boards and CPD's all have the ability to be locked off using a padlock or proprietary locking device.

4.9 Small Power Installation

Under normal circumstances electricity will automatically be supplied to the small power outlets and fused connection units shown on the electrical drawing without user input other than the operation of the local on/off switch.

Each electrical circuit is protected by a RCD/RCBO at the distribution board providing protection in the event of short circuit or circuit overload. The user should refer to the Electrical Installation Certificate provided in Section 7 to confirm circuit details before operating any RCD/RCBO.

To operate normally, standard power outlets should be switched ON after the device is

plugged in and OFF before its removal. There is no reset facility to speak of for standard power outlets.

Switched Fused Connection Units, Rotary Isolators and Interlocked Socket Outlets are installed to supply fixed equipment and mechanical plant. In each case they should be in the ON position for these items to operate and pluggable items should be switched ON after the plug is inserted and OFF before its removal.

All socket outlets and connection units must be switched ON to work. Relevant RCBOs in the distribution board should be switched ON to provide circuit power IF the circuit is operational. If the RCBO has tripped then it can be reset by switching back to the ON position. If re-tripping occurs then there is a fault that needs to be identified.

Fault Finding

- | | |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power circuit trips | <ol style="list-style-type: none"> 1. Has any item of equipment recently been installed? Power circuits provided with RCD's monitor for earth leakage currents. This leakage current can be caused by some appliances in their usual course of operation. Check with the appliance manufacturer. 2. Check operation of circuit protective device (CPD) at Distribution Board and Test button if RCBO. 3. Has any work been carried out in the vicinity of the failure or along the route of the failed circuit prior to the failure? 4. If CPD failed, disconnect all equipment from circuit and check continuity of conductors and insulation resistance of same. Remember never replace CPD and re-energise unless fault has been identified. |
| Equipment/Appliance Failure | <ol style="list-style-type: none"> 1. Check condition of flexible cable and plug, if fitted. 2. Check fuse in plug or connection unit has not blown and correct rating. 3. Was the appliance or component operating when it failed, or did it fail to start? 4. Do other items of equipment on the same circuit still operate? 5. Has the correct operating procedure been carried out? 6. When was the last time the component/ appliance used? 7. Had there been any signs of deterioration in the performance or any increase in noise levels from the appliance/ component? 8. Has there been any maintenance work carried out prior to the failure? 9. Has anyone else investigated the failure prior to those now required to do so and if so what did they do and what did they find out? 10. Remove Appliance and consult service engineer. |

4.10 Lighting Installation

Lighting circuits can be shutdown or reset at the local distribution board by a confident and

permitted person able to switch the relevant MCB to the ON or OFF position.

If the protective device has tripped reset by switching back to the ON position. If the device trips again then there is a circuit fault requiring further investigation.

Luminaire Operation / Switching

- Generally the lighting is controlled by PIR absence detection that turn the lights on when occupied and off when unoccupied. The PIR controls are adjustable for sensitivity and time delay.

Fault Finding

Luminaire failure	<ol style="list-style-type: none">1. Do other luminaires on the same circuit still operate? If they do then:-2. Check that the fitting has not failed by unplugging and swapping it for another. Note: All installed luminaires have an LED light source so failure cannot be a blown lamp; replace fitting as necessary.3. Note that with LED luminaires it is rare that the actual LEDs fail. It is more likely to be the integral control gear.4. Check luminaire wiring connections?5. If other luminaires on same circuit are not working then:-6. Check circuit protective device (CPD) at LV Distribution Board.
-------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

4.11 Emergency Lighting

During normal operation there are no user procedures to follow.

Emergency luminaires and exit signs are connected to the relevant local lighting circuit and are designed to provide automatic emergency lighting of 3 hour duration in the event of mains power failure by way of integral battery packs and/or inverter modules.

Emergency luminaires have integral green LEDs to inform the user of battery charging or that they are in a state of readiness.

Emergency lighting test 'key switches' are installed as indicated on the drawings generally at adjacent the local distribution board. Operation of the key switch simulates failure of the local lighting circuit to enable testing in compliance with the appropriate mandatory requirements.

Note any isolation of lighting circuits that include emergency luminaires will result in their operation.

4.12 External Lighting

No user instructions to follow during normal operation.

External lighting circuit needs to be switched ON at the local distribution board for normal operation and OFF for maintenance.

External lighting control is via a daily time switch with an external photocell.

The timeclock is user adjustable in increments of 15minutes. Set points are not provided here. Generally the system will operate as follows:

Assuming that the timeswitch is set to 6am 'ON' and 8pm 'OFF' then the system will operate as follows:

- At 6am the timeswitch will turn ON and, if it is dark, the photocell will turn the lights ON via the contactor arrangement.
- At dawn the photocell will detect sufficient light levels and turn the lights OFF.
- At dusk the photocell will detect insufficient light levels and turn the lights ON
- At 8pm the timeswitch will disconnect the supply switching the lights OFF.

4.13 Fire Detection & Alarm System

During normal operation there are no user procedures to follow.

The installed system is an Analogue Addressable system where all devices are wired on a loop around the building. The 'input devices' that are the smoke sensors, heat sensors and manual call points carry on an electronic dialogue with the control panel; continuously sending back there 'analogue value'.

The main fire alarm control panel is 'Intelligent' and can decide when a device has reached its 'alarm value'. If an alarm event occurs then the Control Panel will instruct some or all of the 'output devices' to operate. The 'output devices' are the sounders, beacons and input/output devices interfaced with other systems. The Control Panel has been programmed to operate certain outputs according to which input device has been operated.

Any fault on the system will automatically be identified at the Fire Alarm Panel and should be immediately reported to the specialist Fire Alarm contractor.

The Fire Alarm Panel is supplied directly from the Main MCCB Panelboard via a key switched fused connection unit. Both the switch and the relevant MCCB should be ON for the system to operate although it should be noted that the panel has battery back-up able to maintain operation for at least 72 hours.

For any other operating procedure, refer to the comprehensive MxPro5 User manual in Section 9C.

4.14 Lightning Protection System

No operating procedures.