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Henry Williams

Class II FSP03
SafeBox 3000 Series

Operation & Maintenance Manual

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SafeBox™

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1.1	08/10/13	D Hughes	C Stephenson	Included NWR Comments
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1.3	30/01/14	D Hughes	C Stephenson	Section 6 – Part No.s Updated
1.4	10/02/15	D Hughes	C Stephenson	Included NWR Comments

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Chapters and Appendices

Table of Figures

1 Introduction

This document is designed for use by the maintenance staff (technicians and their supervisors) to maintain (fault find, repair or replace) components of the SafeBox and associated components.

Throughout this document, references will be made to other essential information and documentation either prepared by HWL or provided from the equipment supplier/manufacturer.

After safety issues are discussed in Chapter 2 this manual follows a logical path from Description of the relevant components, equipment installation, repair/replacement, routine maintenance and finally a spare parts listing.

- **Chapter 2 Safety**
  Gives details of any relevant safety issues to be observed in the use and disposal of the equipment.
- **Chapter 3 Details of SafeBox Equipment**
  Gives details of the SafeBox 3000 enclosure and equipment.
- **Chapter 4 SafeBox Installation**
  Gives details on installation of the SafeBox and the power cables.
- **Chapter 5 Maintenance**
  Details the recommended maintenance checks required to ensure the ongoing correct operation of the system.
- **Chapter 6 Part Numbers**
  Lists the main parts of the SafeBox System complete with Supplier and Part numbers to aid in the re-ordering of spare parts.

1.1 Maintenance Policy

The SafeBox system comprises highly reliable components. However should a fault occur, the unit can be completely replaced or repaired.

1.1.1 Complete Replacement

If the SafeBox is completely replaced, note the following:

Note that this is a Class II unit and must only be replaced by another Class II unit.

1.1.2 Component Repair

Repair of the box is assumed to be limited to replacement of either failed components or wiring replacement as necessary.

To summarise, the maintenance policy is one of “Repair by Replacement” since:

- Internal components are relatively inexpensive with respect to the cost of fault diagnosis and repair.
- Most internal components are interchangeable although some disassembly will be required for access.

1.2 Competencies and Training Requirements

Staff with the responsibility for installation and maintenance of the SafeBox must hold the required Network Rail licenses.

The training will provide the skills and knowledge needed to identify faulty modules/components and the correct procedures for their replacement. Training for the repair of line replaceable units (modules) is not available. Line replaceable units, where appropriate will be returned to the manufacturer for repair or replaced from spares where repair is not practical.

1.3 Glossary of Terms and Abbreviations

EIC	Electrically Insulated Coating
Class II	See definition in Section 2.3
FSP	Functional Supply Point
HWL	Henry Williams Limited
Loc	Location/Location Case
mm	millimetres
REB	Relocatable Equipment Building
SafeBox	Enclosure containing integrated electrical components
VAC	Voltage (AC) Alternating Current

1.4 Drawing References – SafeBox 3000 Series

Circuit Wiring Schematics

- SafeBox 3004 Front 22531-3004F-II
- SafeBox 3004 Rear 22531-3004R-II
- SafeBox 3004/SA Front 22531-3004F/SA-II
- SafeBox 3004/SA Rear 22531-3004R/SA-II
- SafeBox 3008 Front 22531-3008F-II
- SafeBox 3008 Rear 22531-3008R-II
- SafeBox 3008/SA Rear 22531-3008F/SA-II
- SafeBox 3008/SA Rear 22531-3008R/SA-II
- Terminal Enclosures 22531-3000T-II

General Arrangements

- SafeBox 3004 22531-3004-II
- SafeBox 3004/SA 22531-3004/SA-II
- SafeBox 3008 22531-3008-II
- SafeBox 3008/SA 22531-3008/SA-II
- Terminal Enclosures 22531-3000T-II

2 Safety

2.1 Isolation and Risk of Electrocution

The SafeBox is designed to work with voltages up to (and including) 650VAC and as such there is a danger of electrocution once any of the covers are removed.

All electrical power feeds to the SafeBox MUST be ISOLATED and LOCKED OFF BEFORE opening any doors or removal of any of the enclosure covers.

A 650VAC supply voltage is commonly used inside power & signalling cubicles, therefore any personnel working inside these units should be appropriately trained. It should also be noted that the SafeBox 3000 Series are mounted inside a locked enclosure, which also have large caution labels clearly visible from the front.

Personnel working on any SafeBox should be appropriately trained to work with dangerous voltages and be fully conversant with the power circuitry. All connections are shrouded to prevent accidental contact with personnel (fingers etc.) however these voltage may be exposed when using tools such as screwdrivers etc.

Once Isolation has been carried out, it is essential that a proved* voltage indicator is used to recheck that all electrical equipment is dead prior to any works being undertaken.

* It is recommended to use a proving device with the voltage indicator to check for correct operation both before and after checking that the equipment to be worked upon is dead.

2.2 Class II Coating

The product is coated with a special Electrically Insulated Coating (EIC) which can withstand very high voltages (8KV/mm). This coating must remain intact in order to ensure the integrity of the insulation properties of the enclosure. There must therefore be no further holes or other cut-outs made into the enclosure body post manufacture.

2.3 Class II Definition

A Class II or double insulated electrical appliance is one which has been designed in such a way that it does not require a safety connection to electrical earth.

The basic requirement is that no single failure can result in dangerous voltage becoming exposed so that it might cause an electric shock and that this is achieved without relying on an earthed metal casing.

This is usually achieved at least in part by having two layers of insulating material surrounding live parts or by using reinforced insulation.

2.4 Lifting & Trapping

The SafeBox 3000 range are very heavy (approx 350Kg to 400Kg depending upon model) and extra care should be exercised when handling these units. The location case is fitted with external lifting eyes which should be used along with suitable lifting equipment. As per the regulations, the load should be assessed prior to any lifting being carried out.

CAUTION – Some Models of SafeBox 3000 Series enclosure may contain heavy transformers.

These not only increase the weight of the overall unit but also affect the centre of gravity.

The Manual Handling Regulations should be taken into account when lifting heavy items. Due to the obstructions underfoot in track areas, it is recommended that the removal and/or replacement of a SafeBox internal housing be carried out with a minimum of three people.

There is a risk of trapping of fingers when the cover is repositioned over the body of the SafeBox unit. It is recommended that one person positions and holds the cover whilst a second person installs the fixing screws.

2.5 Disposal of Equipment

Due consideration must be given when disposing of equipment.

Environmental regulations and standards are continually being updated and therefore a risk assessment must be undertaken at the time of equipment disposal.

None of the SafeBox components contain batteries or other toxic materials.

Although the Class II coating and other materials used in the equipment are designed to release low smoke and less toxic fumes when burnt, burning of this equipment, as a means of disposal is not appropriate.

The equipment must be disposed of in accordance with the Waste Electrical and Electronic Equipment (WEEE) Regulations

2.6 Fuse Ratings

All fuses installed into the SafeBox fuse carriers must be rated to a minimum of 690VAC.

2.7 Surge Arrestor Device Type

Only two-wire type surge arrestor devices can be used with the Class II SafeBox. See spares list for standard type installed.

2.8 Fault Conditions Required for Electric Shock

Note that in order for a person to receive an electric shock (with the main enclosure doors open but the internal enclosure doors/covers closed) the following simultaneous fault conditions must exist:

- The outer coating must be penetrated/damaged (at least to bare metal).
- The inner coating must be penetrated/damaged (at least to bare metal).
- An internal electrical fault must occur so that a live conductor touches exactly the same area where the inner coating is exposed to bare metal.
- The person must make contact with exactly the same area where the outer coating is exposed to bare metal.

3 Details of the SafeBox 3000 Series Equipment

3.1 General Information

The SafeBox 3000 Series is a Class II 650VAC distribution system designed to meet the requirements of Network Rail specification NR/L2/ELP/27409 “Product Specification for Functional Supply Points (FSP)”.

The 3000 Series can be used in the following distribution topologies:

- FSP01 – Single end fed – Radial
- FSP02 – Dual end fed – Manually Reconfigurable
- FSP03 – Dual end fed – Automatically Reconfigurable

The SafeBox 3000 Series consists of two separate insulated enclosures mounted within a railway type enclosure (location case). Each of these enclosures contains independent sections which are fitted with the required switchgear.

Generally, the front enclosure contains the incoming, bypass, & distribution switching arrangements. The rear section contains the outgoing distribution switches & terminals for the functional circuits. The lower rear section of the location case can also accept 650/110V Hybrid transformers. The quantity depends upon the size & models required.

The SafeBox 3000 Series is designed to be the unit which will terminate the incoming and outgoing 650VAC power loop cables. This is achieved using two independent gland plates with main terminals for the conductors of each power cable.

The unit is designed so that the incoming and outgoing loop feeder cable terminals are housed in separate compartments. This allows one cable to be isolated and safely worked on whilst the other is still live and powering the location signalling equipment.

The enclosures are manufactured from stainless steel which is completely covered in a special insulated paint. This insulation gives the enclosure its Class II protection properties.

The SafeBox 3000 Series can also house an optional 650VAC suppression module should this be required. Note that only two-wire type surge protection devices can be used with the Class II SafeBox.

3.2 Outgoing/Functional Circuits Configuration

The standard SafeBox 3000 Series outgoing enclosure offers up to eight ways which can be configured as required to feed either internal transformers/rectifiers or external circuits.

Up to four Transformers and/or Transformer Rectifiers can be installed into the FSP enclosure and fed directly from the distribution arrangement above.

The outgoing functional circuit ways, not used to feed transformers within the FSP may be used to feed cables to other loads (location cases) external to the FSP.

3.3 SafeBox 3000 Series Layout/General Arrangement

The photographs below show the general layouts of the SafeBox 3000 Series. This general layout is similar for all of the SafeBox 3000 Series models.

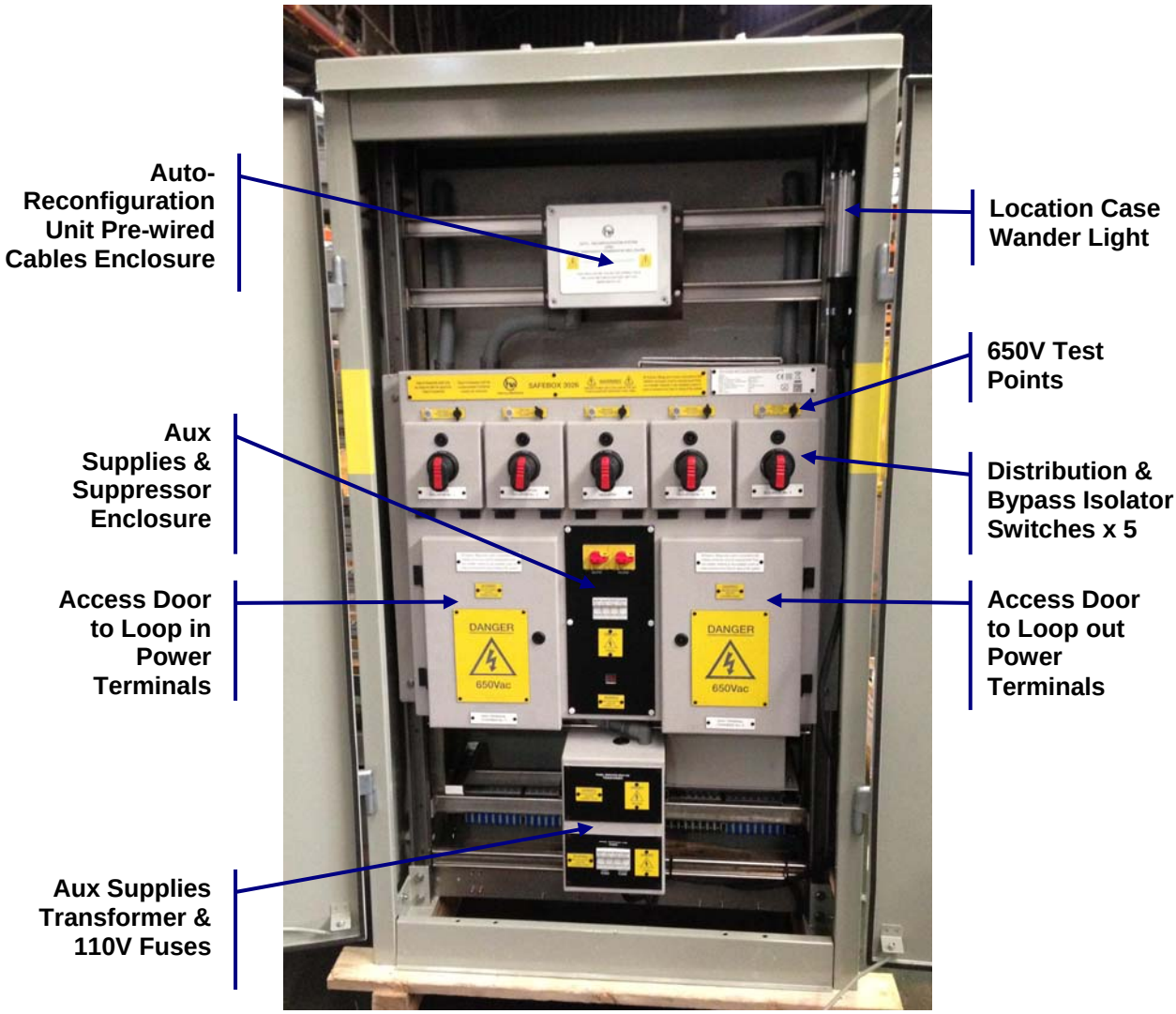

Figure 1: SafeBox 3008 Front Layout Arrangement

Figure 1 shows the general layout of the front (incoming) side applicable to the SafeBox 3008 model.

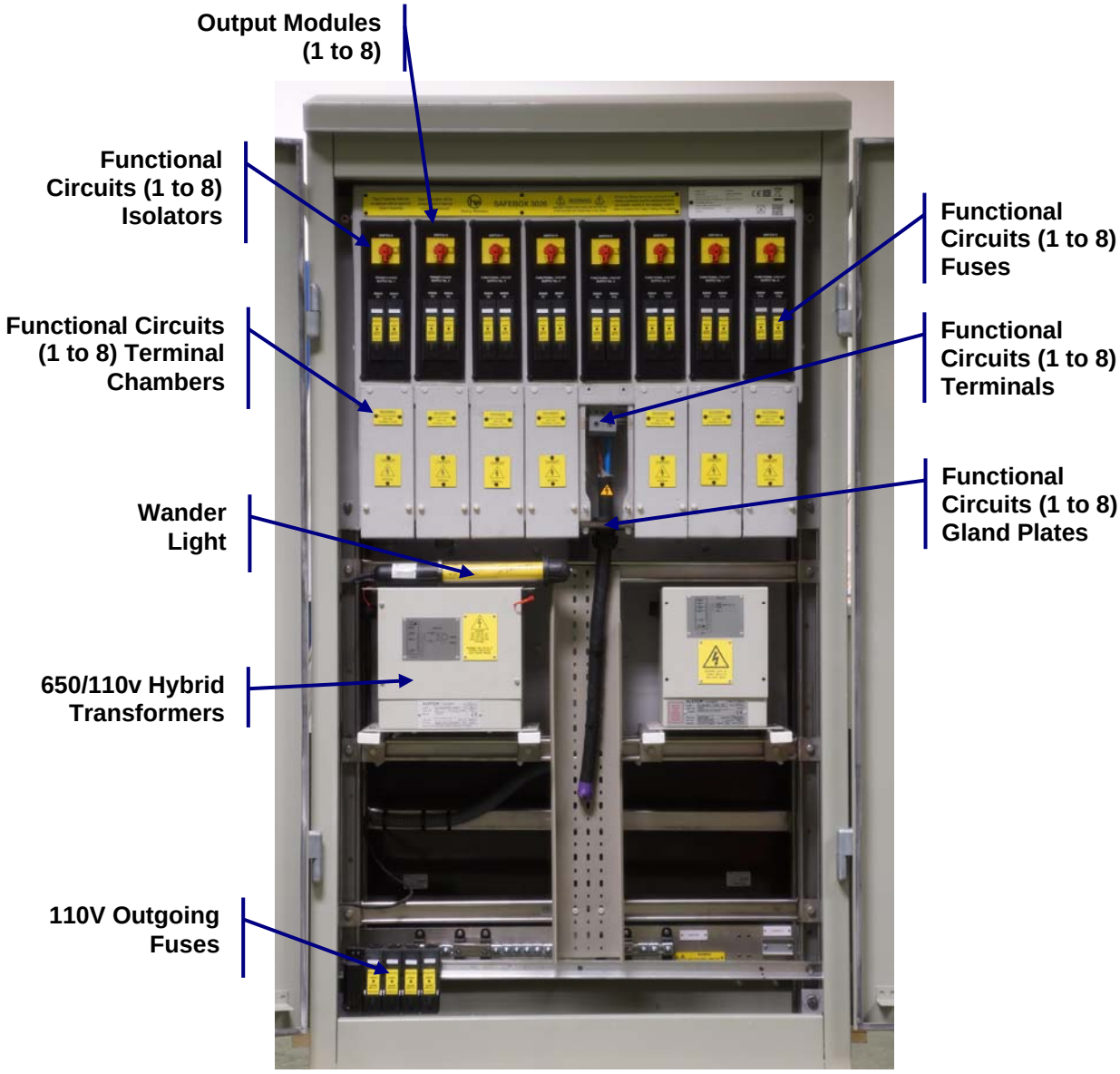

Figure 2: SafeBox 3008 Rear Layout Arrangement

Figure 2 shows the general layout of the rear (outgoing) side applicable to the SafeBox 3008 model.

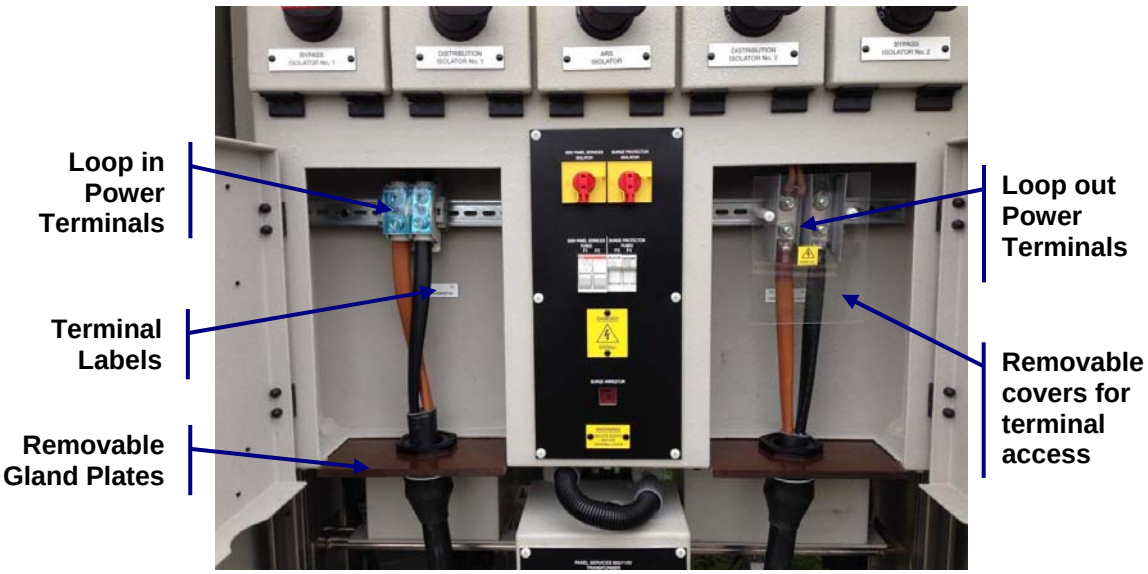

Figure 3: Power In/Out Terminal Arrangement

Note that the loop-in terminals shown above are of the tunnel type (Left Hand side) & the loop-out terminals are the standard M10 stud type (Right Hand side).

4 SafeBox 3000 Series Installation (First fit – with Power OFF)

Installation of Incoming/Loop Power Cables (with Power OFF)

The SafeBox 3000-Series has been designed to accommodate power cables up to 120mm². The terminal studs are 10mm and the correctly sized cable lugs must be fitted to suit both the cable and the terminal studs.

For recommended insulated reducers and cable glands see Figure 20.

Recommended Installation Sequence for Main Cables:

Note that the steps below should be read in conjunction with the photographs shown in Figure 4 to Figure 14:

1. Measure the length of cable to be stripped & remove outer sheath – see Figure 4.
2. Fit Cable shroud then gland over cable outer sheath– see Figure 5
3. Remove gland plate, fit cable gland & tighten – see Figure 6.
4. Form a V shape into the cable tails so that they line up with the distance between the terminals. Bend tails apart then squeeze together around a suitably sized object – see Figure 7.
5. Fit crimp lugs loosely onto the stud terminals.
6. Install gland plate back onto the bottom of the terminal chamber and mark cables for cutting length & strip length using the crimp lugs as a guide – see Figure 8.
7. Remove gland plate fixings & pull forward for easier access to cut cable tails to length – see Figure 9.
8. Once the cable ends are stripped, the bare copper ends need to be rounded using a rounding tool – see Figure 10. This enable the cable lugs to be rotated easily to orientate correctly with the terminal studs – see Figure 11
9. Push crimp lugs onto cable ends, offer up the gland plate and turn crimp lugs to line up with the terminal studs – see Figure 11.

   This is very important as it ensures that there is no stress placed on the stud terminals.
10. Lower gland plate and crimp cable lugs ensuring that the correct orientation is maintained – see Figure 12.
11. Refit gland plate, tape over crimp lugs, install lugs onto terminals, fit washers/nuts & tighten – see Figure 13.
12. Refit terminal protective touch covers – see Figure 14
13. Install the correct sized cable clamp to the cable clamping bar located in the bottom of the enclosure.

Figure 4: Measure & Strip Cable

Figure 5: Fit Shroud followed by Gland onto Stripped Cable

Figure 6: Installed Cable into removed Gland Plate

Figure 7: Forming Cable V shape

Figure 8: Cable length marked ready for cutting

Figure 9: Cable cut to length

Figure 10: Rounding Cable ends using tool

Figure 11: Orientation of crimp lugs with the terminal studs

Figure 12: Crimping Cable Lugs

Figure 13: Tape crimps & terminate cable

Figure 14: Final installation of terminated cables

General Notes on Cable Installation

- There should not be any undue stress or twisting forces on the cable terminals. The cables should be formed, rounded & crimped correctly to avoid this.
- Figure 14 shows that the tails can be crossed if they are the wrong way around once the cable is stripped.
- Both cable glands & cable clamps must be fitted to ensure a robust installation.

4.1 Installation of Internal Hybrid Transformer Primary Circuits Wiring

Terminals are provided for connection of the internal transformer primary wiring within the SafeBox 3000 Series. The wiring is connected to the terminals which are located at the bottom of each output module (functional “way” compartment) – See Figure 15.

The SafeBox fuses and terminals are numbered to correspond with the electrical schematic diagram for the relevant model. The electrical schematic diagram (which matches the model being installed) must be consulted before terminations are carried out to ensure the correct connections are made.

Pre-drilled holes can be provided in each of the gland plates to accept individual outgoing cable glands. These can be installed during the manufacturing process for the fitting of plastic conduit for the protection of the Hybrid Transformer primary wiring.

It is essential that the corresponding functional circuit isolator is OFF (and locked) and fuses are removed **before** the functional terminals covers are removed.

Once Isolation has been carried out, it is essential that a proved* voltage indicator is used to recheck that all electrical equipment is dead prior to any works being undertaken.

* It is recommended to use a proving device with the voltage indicator to check for correct operation both before and after checking that the equipment to be worked upon is dead.

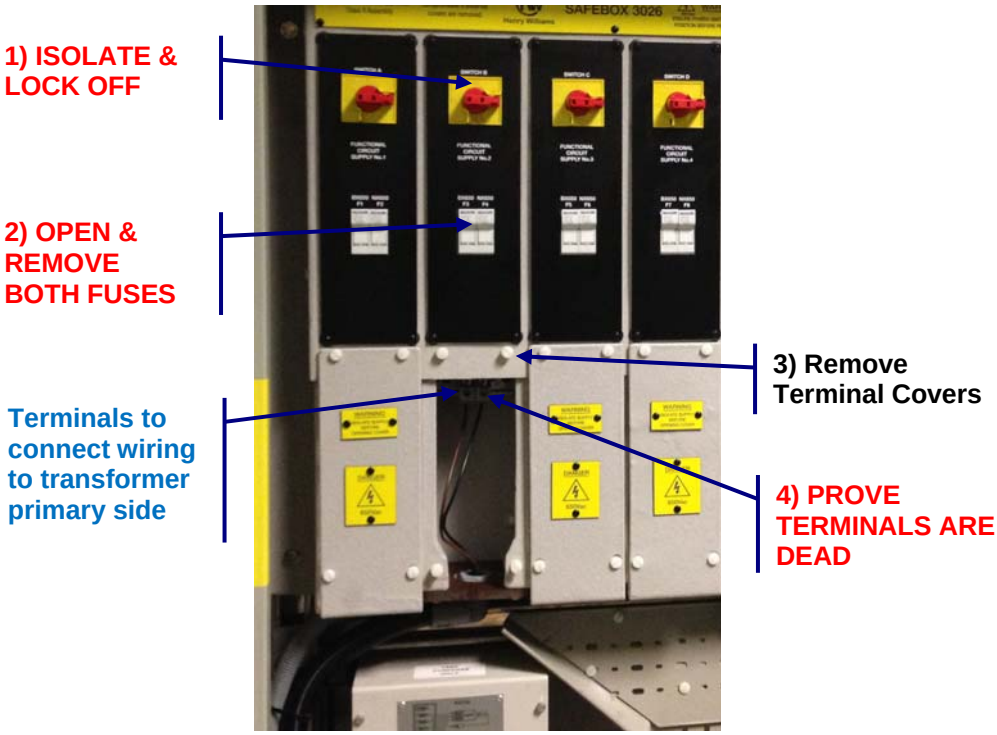

Figure 15: Termination of Hybrid Transformer Primary Feed Cables

Prior to connection of the wires for each functional circuit, the above Safety Precautions MUST be carried out.

4.2 Installation of Internal Hybrid Transformer Secondary Circuits Wiring

Outgoing fuseholders are also provided for connection of the functional circuits (from each transformer secondary) wiring within the SafeBox 3000 Series. The outgoing wiring from the FSP Hybrid Transformers are connected to these fuseholders located on the bottom rail on the rear side of the location case – see Figure 16.

Figure 16: Transformer Secondary Outgoing Fuseholders

4.3 Installation of Functional Load Circuits (650V) External Wiring

Outgoing supplies required at 650V which do not connect to internal transformers can be taken from the remaining outgoing modules.

Each outgoing module houses an isolator, two fuses and two outgoing terminals, the latter of which are provided for connection of the functional circuits wiring. The outgoing wiring is connected to these terminals which are located inside the bottom compartment (under the removable cover) of each outgoing module– see Figure 17.

Cable tray is installed within the FSP to support any wiring supplying external loads outside of the FSP.

The SafeBox fuses and terminals are numbered to correspond with the electrical schematic diagram for the relevant model. The electrical schematic diagram (which matches the model being installed) must be consulted before terminations are carried out to ensure the correct connections are made. See drawing references in Section 1.4

Pre-drilled holes can be provided in each of the gland plates to accept individual outgoing cable glands.

It is essential that the corresponding functional circuit isolator is OFF (and locked) and fuses are removed **before** the outgoing module terminal cover is removed.

Once Isolation has been carried out, it is essential that a proved* voltage indicator is used to recheck that all electrical equipment is dead prior to any works being undertaken.

* It is recommended to use a proving device with the voltage indicator to check for correct operation both before and after checking that the equipment to be worked upon is dead.

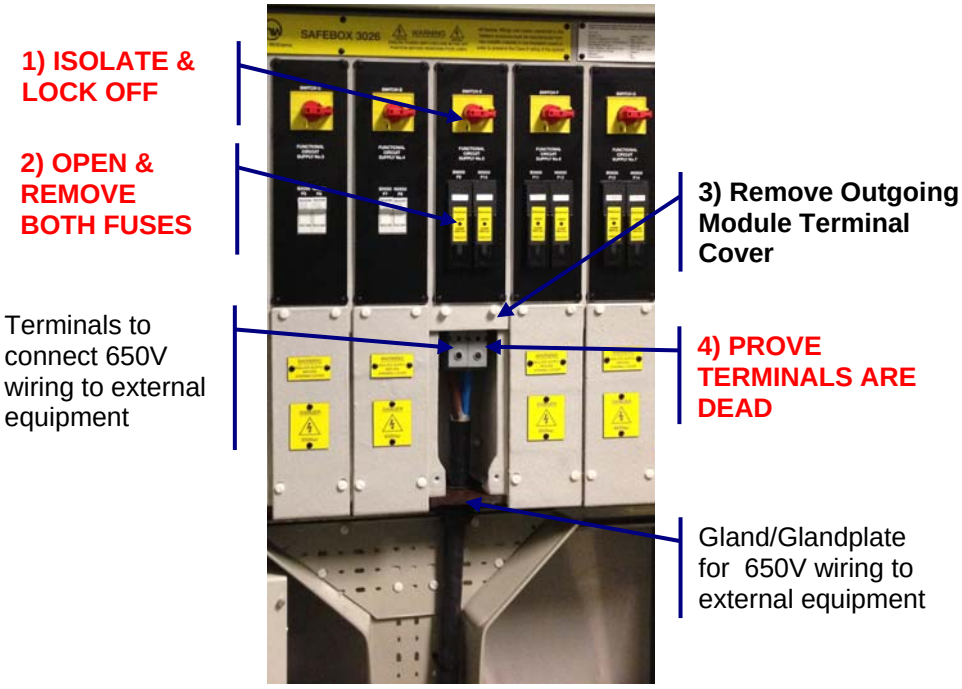

Figure 17: Termination of External Loads Feed Cable

Prior to connection of the wires for each functional circuit, the above Safety Precautions MUST be carried out.

All fuses installed into the SafeBox fuseholders MUST be rated to 690VAC

Figure 18: Secured External Loads Feed Cable

4.3.1 Terminals for Functional Load Circuits (650V) External Wiring

The terminals installed within the outgoing modules are of the screw clamp type and will be one of the two types listed below depending upon the FSP03 specification ordered:

- ABB M35/16
- ABB D70/22

The M35/16 terminals are designed to accept the following wire sizes:

- Flexible wire from 1.0mm² up to a maximum of 35.0mm².
- Rigid wire from 1.0mm² up to a maximum of 50.0mm².

The D70/22 terminals are larger and designed to accept the following wire sizes:

- Flexible wire from 16.0mm² up to a maximum of 70.0mm².
- Rigid wire from 16.0mm² up to a maximum of 95.0mm².

Under no circumstances should the incorrect terminal size be used as this could lead to cable damage, terminal damage and/or a reduction in the current rating.

The terminals can easily be changed by following the procedure below:

1. Carry out the isolation & locking off procedure as detailed in Section 4.3. This is numbered 1) to 4) in Figure 17.
2. Undo the nylon top screws & bottom nuts to release the top cover and the clear Perspex cover beneath it. See Figure 17.
3. Remember to test the terminals are dead using an approved voltage tester with proving unit.
4. Loosen the top terminal screw of each terminal and remove the two 10mm² wires from each terminal. Note that the two wires in the left-hand terminal are coloured BROWN and the two in the right-hand terminal are coloured BLUE.
5. Remove each terminal from the DIN rail using a flat blade screwdriver to release the bottom catch.
6. Replace each terminal with the new size required by attaching them to the DIN rail.
7. Insert & tighten the two BROWN wires into the left-hand terminal and the two BLUE wires into the right-hand terminal.
8. The outgoing cable can now be connected to the bottom screws of the correct size terminals.

4.4 Replacement of Incoming or Outgoing Loop Power Cables (Under Operational Conditions)

The SafeBox 3000 Series is designed so that the incoming and outgoing loop feeder cable terminals are housed in separated compartments. This allows one cable to be isolated and safely worked on whilst the other is still live and powering the location signalling equipment.

Once Isolation has been carried out, it is essential that a proved* voltage indicator is used to recheck that all electrical equipment is dead prior to any covers removed or works being undertaken.

* It is recommended to use a proving device with the voltage indicator to check for correct operation both before and after checking that the equipment to be worked upon is dead.

The diagram in Figure 19 shows three location cases, each one an FSP03 fitted with SafeBox 3000 Series equipment to terminate and distribute the 650V ring & local cables. The local transformer feed isolators are not shown in the above simplified diagram as the intention here is to focus on replacing the mains feeder loop cables.

Each cable is terminated into one of the SafeBox main terminal chambers (either Loop IN Terminals or Loop OUT Terminals in the diagram).

The SafeBox internal busbar (and hence local transformer & other functional circuit feeds) can be powered by any of the following:

a) The cable connected to the main IN terminals.

b) The cable connected to the main OUT terminals.

c) Both cables if they are both live i.e. part of the mains ring.

The status of the internal busbar also depends upon the functional state of the following switches:

a) Bypass Isolator No.1

b) Bypass Isolator No. 2

c) Distribution Isolator No.1

d) Distribution Isolator No. 2

e) The Automatic Reconfiguration System Unit (if installed)

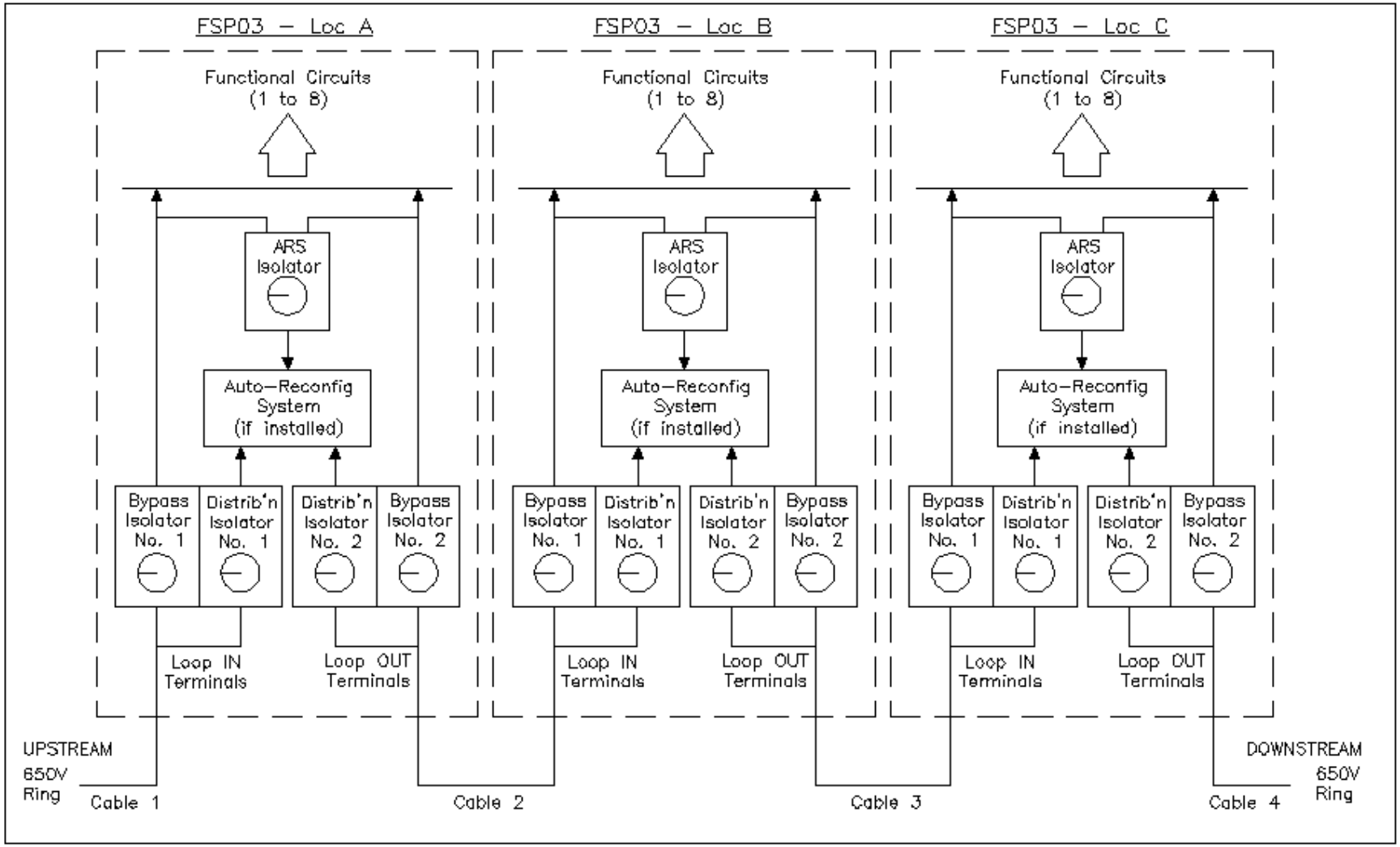

Figure 19: Ring Cable Diagram

Referring to Figure 19, it can be seen that in order to isolate one of the power feed (650V Ring) cables from the FSP then its associated Bypass Isolator ***and*** Distribution Isolator MUST BOTH be isolated.

In order to completely isolate any 650v ring cable between two FSP's, the relevant Bypass Isolator ***and*** Distribution Isolator MUST BOTH be isolated at EACH end of the cable (4 Isolators in total).

Examples of Isolation Scenarios

In the following example scenarios, please refer to the associated ring cable diagram given in Figure 19.

Note that the Switch Numbers given below refer to the standard SafeBox model 3000 Series. The actual Switch numbers may be different depending upon the FSP model installed.

It is essential to refer to the correct model wiring diagram before operating any of the SafeBox isolation switches.

Scenario Example 1 - Complete Isolation of Location B FSP

In order to fully isolate the FSP (at location B) then both cable 2 & cable 3 must be isolated from all sources of supply. This can be accomplished by switching OFF and locking OFF, BOTH of the Distribution & Isolation No.2 switches in Loc A (UPSTREAM of Loc B) and also BOTH of the Distribution & Isolation No.1 switches in Loc C (DOWNSTREAM of Loc B).

It is also essential to check the following:

a) There is no power being backfed (through the functional switches 1 to 8) from the local transformer supplies.

b) There is no power being backfed from 650V feeds to other loads from the outgoing module terminals.

Scenario Example 2 - Replacement of Cable 3

Provided the above system is part of a complete closed ring main system (i.e. power fed from both ends) then Cable 3 can be replaced without losing power to any of the three location cases.

In the diagram shown in Figure 19 Cable 3 must first be isolated from all sources of supply by switching OFF & locking OFF BOTH of the Distribution & Isolation No.2 switches in Loc B (UPSTREAM of Cable 3) and also BOTH of the Distribution & Isolation No.1 switches in Loc C (DOWNSTREAM of Cable 3).

In the SafeBox in Loc B the terminal chamber door to “OUT Terms” can now be opened allowing access to the terminations for cable 3. These terminations have a safety shroud fitted which must be removed to gain full access to the terminal securing bolts once the equipment is proved dead.

The covering safety shroud has two small holes which allow the user to ensure the terminals are dead (by use of a suitable proved test indicator) before removal of the shroud.

Similarly the SafeBox in Loc C the terminal chamber door to “IN Terms” can now be opened allowing access to the terminations for the other end of cable 3. These terminations also have a safety shroud fitted which must be removed to gain full access to the terminal securing bolts once the equipment is proved dead.

Scenario Example 3 - Replacement of Cable 2

Provided the above system is part of a complete closed ring main system (i.e. power fed from both ends) then Cable 2 can be replaced without losing power to any of the three location cases.

In the diagram shown in Figure 19 Cable 2 must first be isolated from all sources of supply by switching OFF & locking OFF BOTH of the Distribution & Isolation No.2 switches in Loc A (UPSTREAM of Cable 2) and also BOTH of the Distribution & Isolation No.1 switches in Loc B (DOWNSTREAM of Cable 2).

In the SafeBox in Loc A the terminal chamber door to “OUT Terms” can now be opened allowing access to the terminations for cable 2. These terminations have a safety shroud fitted which must be removed to gain full access to the terminal securing bolts once the equipment is proved dead.

The covering safety shroud has two small holes which allow the user to ensure the terminals are dead (by use of a suitable proved test indicator) before removal of the shroud.

Similarly the SafeBox in Loc B the terminal chamber door to “IN Terms” can now be opened allowing access to the terminations for the other end of cable 2. These terminations also have a safety shroud fitted which must be removed to gain full access to the terminal securing bolts once the equipment is proved dead.

Scenario Example 4 – Isolation of Rear Section

If it is required to isolate all power from the rear (functional) side of the SafeBox this can be accomplished by switching & locking OFF all of the following five isolators which are located on the front side:

- Bypass Isolator No.1
- Distribution Isolator No.1
- ARS Isolator
- Distribution Isolator No.2
- Bypass Isolator No.2

4.5 Load/Transformer Feed Wiring

The signalling loads/transformers wiring is connected into the terminals installed under the cover label in the top right-hand corner of the SafeBox unit – See Figure 1.

It is essential that the SafeBox is fully isolated and locked off from all supplies (See Scenario Example 1 above) **before** the terminal cover is removed.

Once Isolation has been carried out, it is essential that a proved* voltage indicator is used to recheck that all electrical equipment is dead prior to any works being undertaken.

* It is recommended to use a proving device with the voltage indicator to check for correct operation both before and after checking that the equipment to be worked upon is dead.

Once the equipment is proven to be dead, access can be gained to these terminals to install or replace load cables as required.

4.6 Cable Glands & Insulated Reducers

Class 2 enclosures cannot use any metal parts that bridge through the insulation material from outside to inside. To this end standard brass (or other metal) cable glands cannot be used in the SafeBox class 2 product range.

The SafeBox product range was designed to accept the Network Rail range of insulated reducers & cable gland kits. The SafeBox main incoming gland plates are normally pre-drilled with a 63mm diameter hole. This is the correct size to fit the insulated reducer.

For further information, recommended cable glands and insulated reducer kits are shown in Figure 20.

CLEVELAND CABLE COMPANY

CMP NR737 Insulated Reducer - Compression Glands

NR737 Insulated Reducer/ Gland - Complete Kits

Kit Component List - NR737 Reducer, M63 Back Nut, 1 x M63 Entry Thread Seal, A2 Compression Gland c/w Nylon Washer & PVC Shroud

Reducer/M63 Back Nut	PADS No.	Cleveland Part No	Nylon Washer Seal A	Nylon Washer Seal B	Gland Size	Brass or Plastic
NR/737/20	054/212125	NR737/20/B	M63	M20	20	Brass
NR/737/25	054/212126	NR737/25/B	M63	M25	25	Brass
NR/737/32	054/212127	NR737/32/B	M63	M32	32	Brass
NR/737/40	054/212128	NR737/40/B	M63	M40	40	Brass
NR/737/50	054/212129	NR737/50S/B	M63	M50	50s	Brass
NR/737/50	054/212129	NR737/50/B	M63	M50	50	Brass
NR/737/20	054/212125	NR737/20/P	M63	M20	20	Plastic
NR/737/25	054/212126	NR737/25/P	M63	M25	25	Plastic
NR/737/32	054/212127	NR737/32/P	M63	M32	32	Plastic
NR/737/40	054/212128	NR737/40/P	M63	M40	40	Plastic
NR/737/50	054/212129	NR737/50S/P	M63	M50	50s	Plastic
NR/737/50	054/212129	NR737/50/P	M63	M50	50	Plastic

CMP PRODUCTS

Link-up Registered

CMP A2 Brass Compression Glands

Cleveland Part No	PADS No.	CMP Gland Description	Size
CMPA220	054/029246	A2 20 Indoor/Outdoor Brass Compression Gland	20
CMPA225	054/029247	A2 25 Indoor/Outdoor Brass Compression Gland	25
CMPA232	057/029248	A2 32 Indoor/Outdoor Brass Compression Gland	32
CMPA240	054/029249	A2 40 Indoor/Outdoor Brass Compression Gland	40
CMPA250S	054/029250	A2 50S Indoor/Outdoor Brass Compression Gland	50
CMPA250	054/029251	A2 50 Indoor/Outdoor Brass Compression Gland	50

(NR737 c/w A2 Brass Gland Complete Kit illustrated)

Figure 20: Insulated Reducers & Cable Glands

5 Maintenance

All electrical power feeds to the SafeBox MUST be ISOLATED and LOCKED OFF prior to opening any doors or removal of the enclosure covers.

5.1 Replacement of Components

The internal components can be replaced with new on a like-for-like basis as required. For reference, the part numbers for the components used within the SafeBox 3000 Series are given in the parts table in section 6.

5.2 Annual Procedure

It is recommended that the following work be carried out yearly:

- General visual inspection as to the condition of the enclosure and components within (including wiring).
- Check that the Electrically Insulated Coating (EIC) does not show any signs of damage and in particular any exposure of the metal base material that this damage caused. See guidance given in Section 5.3
- Check presence & legibility of all I.D. labelling and warning notices.
- Check all cable connections and crimps are secure and do not show any sign of heat/burning.
- Check that all fuses are present and of the correct size (and voltage rating on 650VAC) as detailed on the electrical schematic diagrams.
- Remove, inspect, and re-insert fuses. Check carrier tightness & for signs of any burning.
- Ensure all fixing nuts, washers, bolt covers etc. are present, correct, and tight.
- Check cables and glands box for damage or evidence of water ingress.
- Give the equipment a general clean and remove any build-up of dust/debris using a brush and vacuum fitted with small nozzle.
- Before being returned to service, it is recommended to carry out a full operational check of the isolation switches.

Note that this is a Class II unit and if completely replaced, it must only be replaced by another Class II unit.

5.3 EIC Coating Damage Guidance

As the coating is applied to both the inside and the outside of the inner stainless steel enclosure body, the outer coating can take some acceptable damage before the unit requires replacing.

Note that in order for a person to receive an electric shock (with the box closed) the following simultaneous fault conditions must exist:

- The outer coating must be penetrated/damaged (at least to bare metal).
- The inner coating must be penetrated/damaged (at least to bare metal).
- An internal electrical fault must occur so that a live conductor touches exactly the same area where the inner coating is exposed to bare metal.
- The person must make contact with exactly the same area where the outer coating is exposed to bare metal.

Figure 21 shows a practical guide which has been developed by Henry Williams to help maintenance personnel understand what levels of damage are acceptable and which are not.

As can be seen below the damage guide is split up into three action levels:

Action Level 1

The amount of damage is superficial and does not completely penetrate the outer coating. This level of damage should be noted on the maintenance sheet along with its location. The damage can then be monitored during future inspections to ensure that no further worsening occurs.

It is not recommended to increase the frequency of visual inspections for this level of damage.

Action Level 2

The amount of damage is worse than that in action level 1 in that it does completely penetrate the outer coating. This level of damage should be noted on the maintenance sheet along with its location. The damage can then be monitored during future inspections to ensure that no further worsening occurs.

The unit can be put back into service with an affixed label/notice indicating what damage has been observed.

It is recommended to increase the frequency of visual inspections for this level of damage to ensure that there is no further degradation in the coating.

Action Level 3

The amount of damage is much worse than that in action level 2 in that the enclosure is completely penetrated through both the inner & outer coatings and the stainless steel body. This level of damage should be noted on the maintenance sheet along with its location.

The unit can be put back into service with an affixed warning label/notice indicating what damage has been observed.

It is recommended to replace the unit at the next available opportunity.

Note that the EIC Coating is a NON-REPAIRABLE item

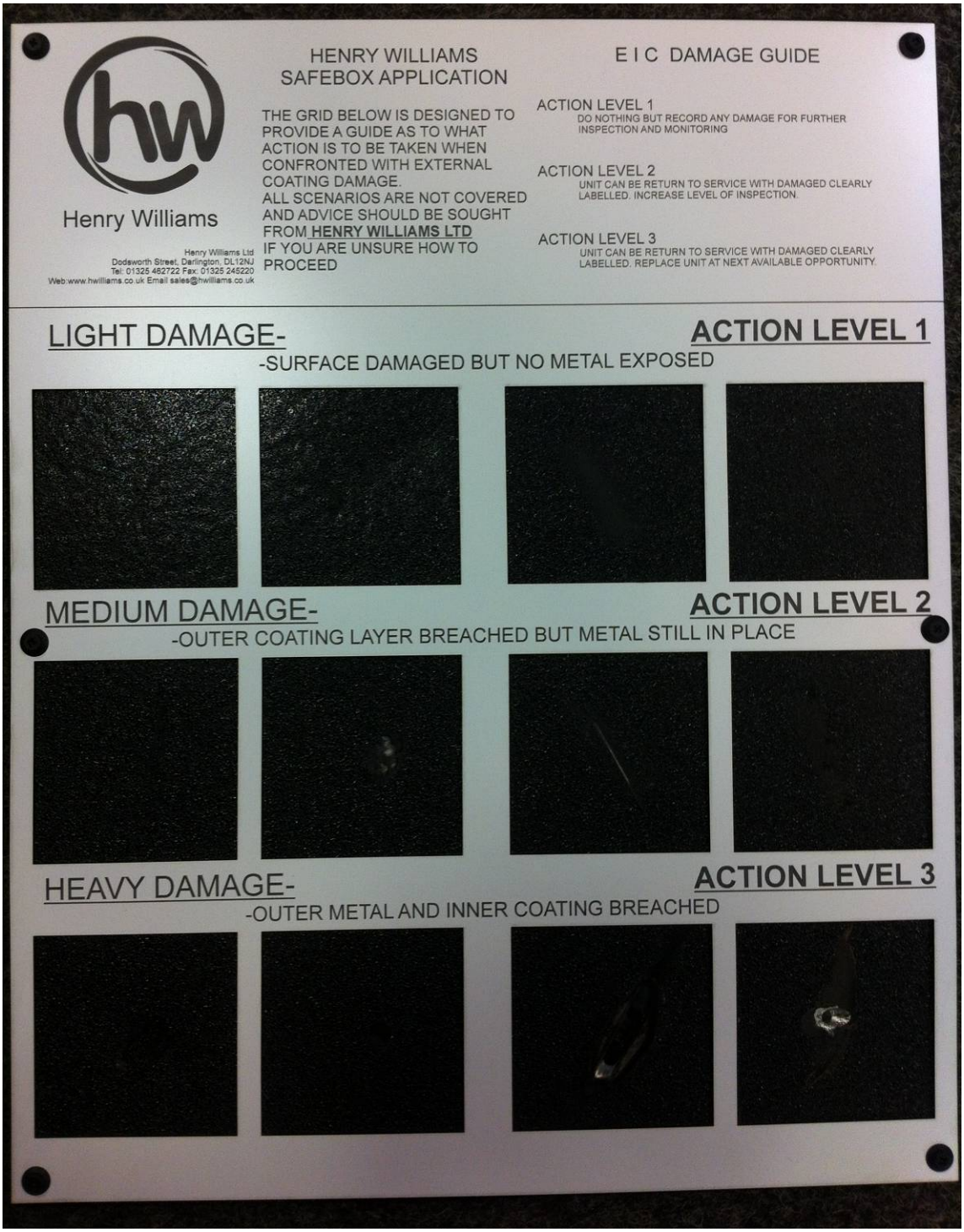

Figure 21: EIC Damage Guide

6 Part Numbers

The table below details the part numbers for the main items used in the SafeBox 3000-Series along with the description, and supplier for each item.

Description	Supplier	Part Number
3 Pole Isolating Switch – Main (125A)	ABB	OT125F3 / 1SCA105033R1001
Isolating Switch – Main 125A (Black/Red) Handle	ABB	OHB45J6 / 1SCA022380R8770
Main 125A Isolating Switch Extension Shaft	ABB	OXP6X150 / 1SCA022295R5600
3 Pole Isolating Switch – Outgoing (80A)	ABB	OT80F3 / 1SCA105798R1001
Isolating Switch – Outgoing 80A (Red/Yellow) Handle	Henry Williams Ltd.	HWSABB/OT80F3/001
Isolating Switch – Outgoing 80A Yellow Shroud	Henry Williams Ltd.	HWSABB/OT80F3/002
Stud Terminals – Main (M300/42.FF)	ABB	1SNA 115 149 R2000
Terminal Partition – Main (ECP42)	ABB	1SNA 113 692 R1700
Main Terminals – Eriflex Type (SB250)	Erico	561131
Location Case Class 2 Transformer – Aux Supplies (650/110V 80VA)	ATL Transformers Ltd.	T2852
Location Case Class 2 Heater (20W)	Stego	06030.0-00
Main Terminals Clear Safety Cover Kit	Henry Williams Ltd.	HWSMTCSCK300
Outgoing Terminals Warning Label/Cover Kit	Henry Williams Ltd.	HWSOTWLCK001

Description	Supplier	Part Number
Outgoing Terminals For 1 – 35mm² Cables (M35/16)	ABB	1SNA115124R0700
Outgoing Terminals For 16 – 70mm² Cables (D70/22)	ABB	1SNA400305R1000
25mm Hole Blanking Plugs (pack of 5)	Henry Williams Ltd.	HWS25HBP001
Spare Main Door (inc. Hinge) Left Hand	Henry Williams Ltd.	HWSDLH3001
Spare Main Door (inc. Hinge) Right Hand	Henry Williams Ltd.	HWSDRH3001
Spare Outgoing Door (inc. Hinge).	Henry Williams Ltd.	HWSDO3001
Main Door Locks (pack of 2)	Henry Williams Ltd.	HWSDLP3001
Gland Plates Large : Main Terminal Chambers (undrilled) (pack of 2)	Henry Williams Ltd.	HWSGP3L001
Gland Plates Small : Outgoing Terminal Chambers (undrilled) (pack of 2)	Henry Williams Ltd.	HWSGP3S001
Nut covers (pack of 10)	Henry Williams Ltd.	HWSNCP10001
Electrically Insulated Coating (EIC) Damage Guide Board – Maintenance Tool.	Henry Williams Ltd.	HWSEICDGB001

Protection Devices/Holders		
Camaster Fuseholder (32A)	Cooper-Bussman	CM32F
Redspot Fuseholder (32A)	Redspot	RS32P/BLK
IEC Fuseholder (30A)	ABB	E90 Series
650V Surge Arrestor Module (optional)	PD Devices	Cat: 086/047165
140V Surge Arrestor Module (optional)	PD Devices	Cat: 086/047166
110V Surge Suppressor Module (optional)	PD Devices	Cat: 086/047167