

Substation Design Instruction

ABB SLK low voltage switchgear

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SUBSTATION DESIGN INSTRUCTION

PRIMARY SYSTEMS

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SDI 251 ABB SLK low voltage switchgear

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1.0 PURPOSE

This standard provides technical and reference information to assist with the safe design, installation, commissioning, operation and decommissioning of ABB (Brown Boveri) SLK low voltage switchgear.

2.0 SCOPE

This instruction provides information and reference documentation to assist in the safe design, installation, commissioning, operation and decommissioning of ABB (Brown Boveri) SLK low voltage switchgear. This instruction deals only with the standard units that were previously approved for use by Endeavour Energy in the distribution network as detailed in 5.1.2.

The scope of this document provides reference to the various lifecycle stages of the switchgear and therefore should be read in conjunction with the references of 3.0 and :

- Mounting and construction requirements: refer MCI0006
- Earthing design, construction and testing: refer EDI100
- Specification of new equipment: refer ETS0068
- General details and minimum design requirements: refer SDI101 and MDI0028
- Testing and commissioning: refer SDI120
- Ongoing maintenance requirements: refer SMI101
- Standard drawing requirements: SAD0001

This switchgear is designed specifically for use in aluminium distribution cubicles and is not suitable for use in distribution substations (such as padmount or indoor) due to the size, special backplane connection system for mounting and insulation.

Note:- This equipment is no longer purchased for new installations but could be used for extension or modification to existing installations, refer to MCI 0006 and the product approval system for the latest style of equipment used.

3.0 REFERENCES

- Company Policy 9.2.2 - Network Protection
- Company Policy 9.2.5 - Network Asset Design
- Company Policy 9.7.1 - Network Asset Constructions
- Company Policy 9.8.3 - Network Operations
- Company Policy 9.9.1 - Network Asset Maintenance
- Company Policy 9.2.10 - Network Asset Ratings
- Company Procedure (Supply Management) GSU 0006 - Disposal of surplus goods and materials
- Company Procedure (Health & Safety) GSY 0051 - Health and safety incident management
- Division Procedure (Network) GNV 1062 - Granting dispensation from network standards
- ENA National Electricity Network Safety Code (Doc 01-2008)
- NSW Work Health and Safety Act 2011
- Company Network Management Plan 2009-2014
- Equipment Technical Specification ETS 0071 – Distribution fuses

- Substation Design Instruction SDI 101 – Distribution substations: general details and minimum requirements
- Mains Construction Instruction MCI 0006 – Underground distribution : Construction standards manual
- Mains Design Instruction MDI 0028 – Underground distribution network design
- AS/NZS 3947.3:2001 – Low voltage switchgear and controlgear – Switches, disconnectors, switch-disconnectors and fuse combination units
- ABB *FastLine* distribution system 400-2500A user manual

4.0 DEFINITIONS AND ABBREVIATIONS

A full list of definitions is contained in SDI 101.

5.0 ACTIONS

5.1 General

5.1.1 Introduction

SLK switchgear is modular low voltage switchgear. It consists of a base plate with integrated busbar and plug-in 160 Amp and 400 Amp feeder fuse strips. As it is plug-in switchgear, many arrangements are possible; including one (1) 400 Amp with up to nine (9) 160 Amp feeder fuse strips on one board (refer to section 5.2 for complete details).

The main technical features are:

- Three-pole enclosed operating mechanism.
- Configurable 400A or 160A combination fuse strips.

For further description, operation and maintenance instruction on SLK switchgear refer to the operating instructions "ABB *FastLine* distribution system 400-2500A user manual" from ABB. These instructions form an integral part of this document.

5.1.2 Product approval and stock codes

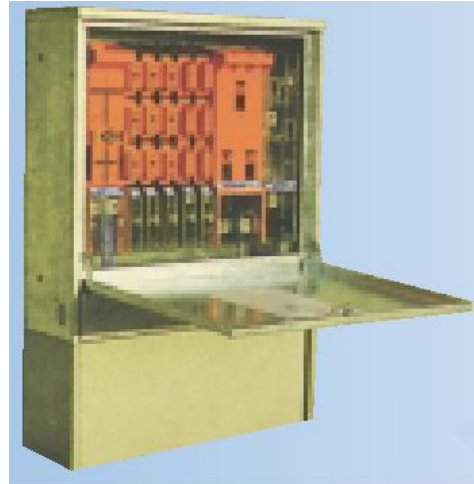
Endeavour Energy no longer approve or purchase these units for new distribution panels.

The following units are still available for maintenance use in Endeavour Energy's network:

Stock Code	Manuf. Ref. No.	Item Description
1076413	-	Aluminium Distribution Fuse Pillar Cabinet 900mm wide
1081123	-	Aluminium Distribution Fuse Pillar Cabinet 700mm wide
1076437	SLK-160	160A fuse switch module for DFP - DIN 00
1076449	SLK-400	400A fuse switch module for DFP - DIN 02
SB10037	-	Fuse base plate-250mm wide
SB10045	-	Fuse base plate-400mm wide

5.1.3 Dimensions, weight and description

Two (2) sizes of aluminium distribution cubicle are available, 900mm and 700mm wide. The depth is approximately 230mm and it is approximately 1295mm tall.



5.1.4 Technical specification

SLK LV switchgear is rated at 440V. The specifications at 440V are:

Insulation levels	Busbar + Incoming Isol.	Feeder fuse Isolator
Rated voltage	440V	440V
50Hz one (1) minute power frequency withstand Ph to E	2.5kV	2.5kV
1.2/50 μ s lightning impulse withstand (BIL) Ph to Earth	15kV	15kV
Rated frequency	50Hz	50Hz
Insulation resistance at 1kV DC	20M Ω	20M Ω

Manufacturer rated currents - Busbars	250mm/400A	600mm/630A 800mm/630A
Busbar material	Aluminium	Copper
Rated normal current	400A	630A
Rated one sec. withstand current	50kA	50kA
Manufacturer rated currents - Fuse strips	SLK 160	SLK 400
Rated normal current	160A	400A
Breaking capacity at 500V	380A	1200A
Short circuit making current	50kA	50kA
Rated one sec withstand current	50kA	50kA
Fuse link DIN size	00	2

5.1.4.1 De-rating factors

The rated currents of switchgear are determined under standard test conditions specified in AS/NZS 3947-2001, which have little relation to conditions encountered in service in Endeavour Energy. Enclosure in a cubicle, attachment to other units, and high ambient temperatures all contribute to the need to de-rate equipment.

The table in clause 5.1.4.3 (below) gives the maximum allowable continuous current ratings for this switchgear under various service conditions. Failure to observe these limitations could result in serious damage to, or destruction of, equipment along with reliability concerns to customers.

5.1.4.2 Derating labels

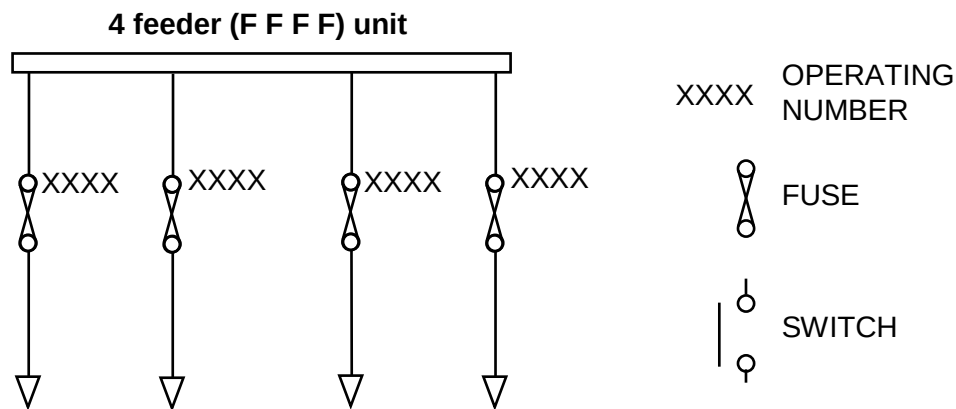
Labels shall be fitted to the front of the equipment which states the maximum rating of the equipment in line with the installation condition indicated in clause 5.1.4.3 below.

5.1.4.3 In service current ratings

Service location	Fuse strip type	Fitted with solid link	Fitted with 400A fuse-links	Fitted with 250A fuse-links	Fitted with 160A fuse-links
Aluminium distribution cubicle	400A fuse strip	375A	290A	190A	---
	160A fuse strip	150A	---	---	110A

Note: Feeder loads must be monitored to ensure that total current does not exceed these ratings.

5.1.5 Single line diagram - Operating diagram symbol



5.1.6 Accessories

The accessories listed below can be ordered from ASEA Brown Boveri, if required.

5.1.6.1 Insulated spanner

An insulated hexagonal spanner is required for the mounting of fuse strips and fastening cable clamps.

5.1.6.2 Busbar cover

The busbar cover is installed over the exposed busbar on the baseplate in lieu of a fuse strip. Each cover is 50mm wide.

5.1.6.3 Labelling

Labels to identify the LV switch number are to be fitted to the front lower area of the board.

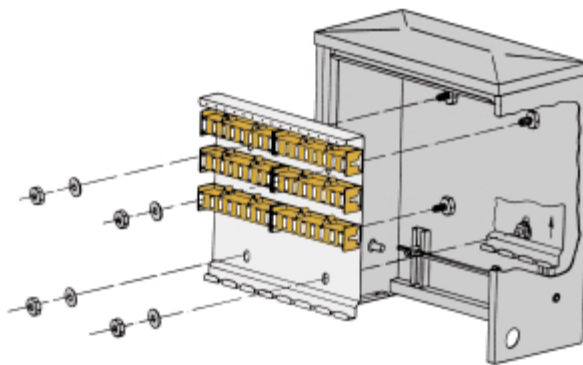
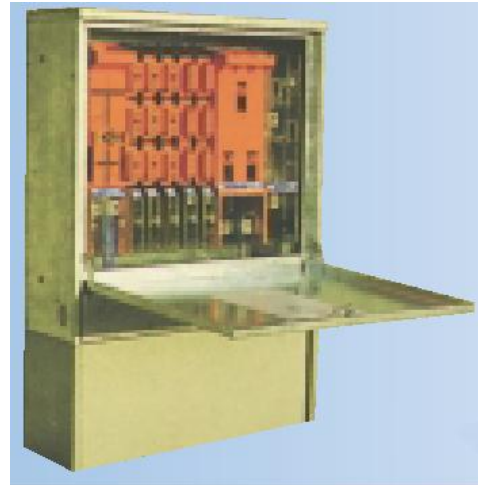
5.2 Installation

5.2.1 General

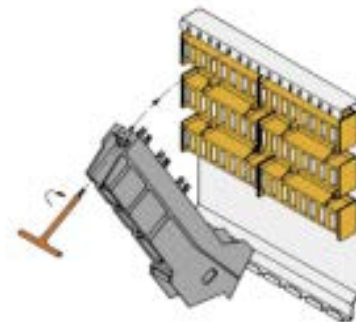
5.2.1.1 Aluminium distribution cubicle

The aluminium distribution cubicle can be installed in any of three (3) ways to suit the work situation.

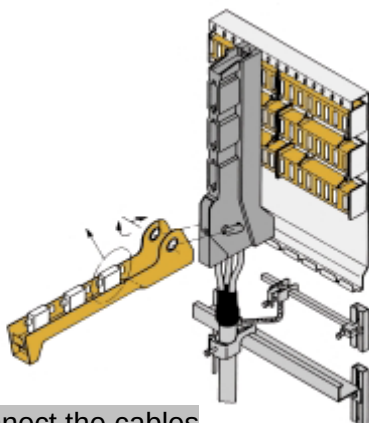
1. On a precast concrete base.
2. Mounted direct on a wall or building.
3. Recessed into a wall or building.



1: FS busbar assembly plate bolted into a cable distribution cabinet



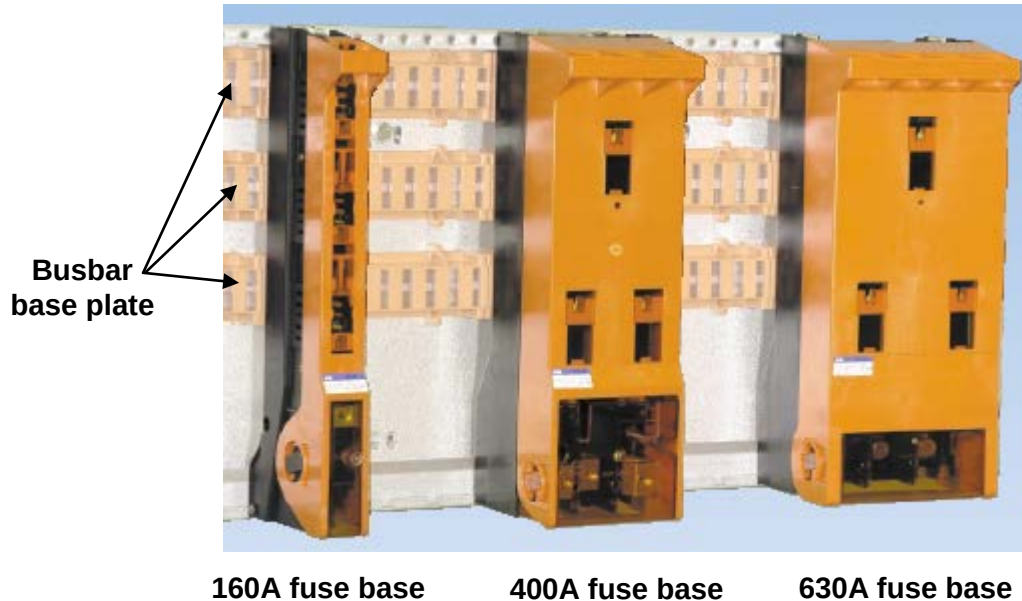
2: Plug the module into the FS, FD, FM or FST busbar assembly plate



3: Connect the cables
4: Hook the front cover with fuses on the base and switch in to ON position

5.2.1.2 Standard base plates

The base plate consists of a hot dipped galvanised steel base with three (3) copper or aluminium busbars and protective shrouds. Three (3) sizes of base plates are available. The 600/630A and 800/630A base plates are supplied with the 700mm and 900mm wide cubicles. The 250/400A base plate is available individually for use in zone substations.



a) 250/400A base plate

The base plate is 250mm wide and can accommodate the following arrangements of fuse strips. They include:

- 1 x 400A and 2 x 160A fuse strips
- 5 x 160A fuse strips

b) 600/630A base plate

The base plate is 600mm wide and can accommodate several arrangements of fuse strips. They include:

- 1 x 400A and 9 x 160A fuse strips
- 2 x 400A and 6 x 160A fuse strips
- 3 x 400A and 3 x 160A fuse strips
- 4 x 400A fuse strips

c) 800/630A base plate

The base plate is 800mm wide and can accommodate the following arrangements of fuse strips. They include:

- 5 x 400A and 1 x 160A fuse strips
- 4 x 400A and 4 x 160A fuse strips

5.2.1.3 Feeder fuse strips

a) 400 Amp feeder fuse strip

The 400 Amp feeder fuse strip is suitable for both copper and aluminium cables for 95mm² up to 240mm² (refer to Section 5.2.2 for information on cabling).

The feeder fuse strip can be fitted with size 2 DIN fuses and links (refer to section 5.1.4.3 for ratings).

b) 160 Amp feeder fuse strip

The 160 Amp feeder fuse strip is suitable for both aluminium and copper cables from 10mm² up to 95mm² (refer to section 5.2.2 for complete information on cabling.)

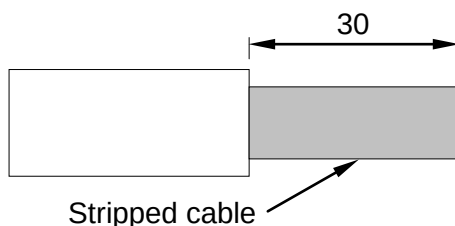
The feeder fuse strip can be fitted with size 00 DIN fuses and links (refer to section 5.1.4.3 for ratings).

5.2.2 Cable terminations

Cables are terminated into a clamped arrangement.

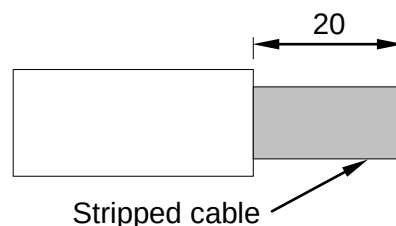


To ensure that the cable strands do not spread, leading to a high resistance joint, it is important that all cables are cut to be terminated as shown below. Cable clamps are to be tightened to 25Nm.



Stripped cable

400 Amp fuse strip



Stripped cable

160 Amp fuse strip

5.2.2.1 Cable sizes

The preferred maximum size of cable that can be accommodated is either three (3) core or single core cable, up to 240mm², however, cable sizes up to 300mm² can be accommodated, if required.

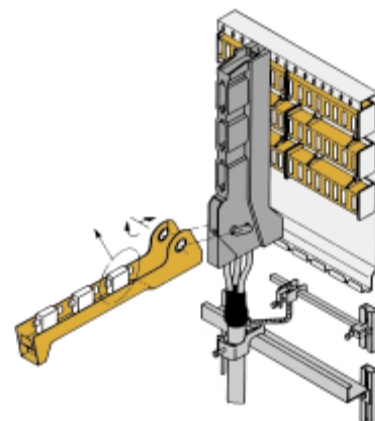
5.2.2.2 Cable clamping

Suitable cable clamps are to be used to secure cables to the *Unistrut* rail provided at the bottom of each unit (refer to MCI 0006 for cable termination details).

5.3 Operation and switching

The three (3) individual LV fuses are captive in the one (1) operating handle.

During operation of the handle all three (3) phases are switched.



6.0 AUTHORITIES AND RESPONSIBILITIES

The **Chief Engineer** has the authority and responsibility for approving this instruction and approving variations to the requirements of this instruction.

The **Manager Primary Systems** has the authority and responsibility for endorsing and recommending changes and revisions to this instruction.

The **Network Substations Manager, Primary Systems** shall be responsible for revising and updating this instruction in accordance with Company Policy and Procedures.

Regional Managers shall be responsible for ensuring that all works carried out by Regional employees conform to the requirements of this instruction.

7.0 DOCUMENT CONTROL

Documentation content coordinator:	Network Substations Manager
Documentation process coordinator:	Branch Process Coordinator