

Title: **SPECIFICATION FOR THE
INTERFACING OF THE NEW
PROTECTION AND CONTROL
EQUIPMENT TO THE GAS
INSULATED SUBSTATIONS BAY
MARSHALLING KIOSK**

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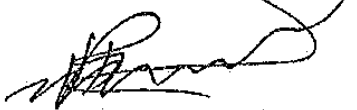


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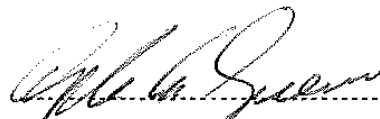


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1. Introduction

This document describes Eskom's overall requirements for the interface cubicle or junction box and extent to which they should be applied to Gas Insulated Substation (GIS) for a typical Breaker and Half substation configurations.

2. Supporting clauses

2.1 Scope

2.1.1 Purpose

The purpose of this report is to describe Eskom's interface requirements for the Bay Marshalling Kiosk (BMK) in order to standardize the wiring that will interface with existing Process interface units designs.

2.1.2 Applicability

This report shall apply to PTM&C within Eskom Group Technology.

2.2 Normative/informative references

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

Copies of the latest revisions of Eskom documents will be supplied by the purchaser and will form part of the enquiry documentation.

2.2.1 Normative

- [1] 240-50807380 Rev 5 - Specification for Gas Insulated Switchgear and associated auxiliary equipment

2.2.2 Informative

Not applicable.

2.3 Definitions

2.3.1 General

| Definition | Description |
|------------------------|---|
| Extra-High Voltage | EHV designates extra-high voltage usually from 220kV and above |
| High Voltage | HV denotes high voltage from above 33kV to no more than 132kV |
| Process Interface Unit | Also referred to as a "digital merging unit" or binary input/output device, an Intelligent Electronic Device (IED) that collects binary data from process devices, typical electrical primary plant equipment, by way of status contacts and process and publish this data to other IED's in digital format (e.g. IEC 61850-based communication). The device similarly converts digital commands from other devices /IED's into electrical control signals to the primary equipment |
| Marshalling Panel | Provides cross wiring functionality between field instruments and the control system. By having this type of interface, input and output issues can be quickly identified and maintenance personnel can perform routine functions in the field without jeopardizing the heart of the control system |

2.3.2 Disclosure classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

| Abbreviation | Description |
|--------------|---|
| AC | Alternating Current |
| AIS | Air Insulated Switchgear |
| BMK | Bay Marshalling Kiosk |
| EHV | Extra- High Voltage |
| GIS | Gas Insulated Switchgear |
| HV | High Voltage |
| IEC | International Electrotechnical Commission |
| IED | Intelligent Electronic Device |
| IJB | Interface Junction Box |
| JB | Junction Box |
| kV | kilo-Volt |
| MCB | Miniature Circuit Breaker |
| PD | Plug disconnecter |
| PIU | Process Interface Unit |
| IJB | Interface Junction Box |
| JB | Junction Box |
| kV | kilo-Volt |
| MCB | Miniature Circuit Breaker |
| PD | Plug disconnecter |
| PIU | Process Interface Unit |
| SME | Subject Matter Expert |

2.5 Roles and responsibilities

Protection Technology and Support shall utilise this document as basis for the Breaker-and-a-half and double busbar interface scheme design evaluation reference.

2.6 Process for monitoring

The protection technology & support subject matter experts (SMEs) and the custodian will monitor the compliance to this report.

2.7 Related/supporting documents

Not applicable.

3. Requirements

3.1 Introduction

The new Protection and Control solution interfaces with the primary equipment via fibre and Process Interface Units (PIU). In the case of a normal conventional substation / Air Insulated Switchgear (AIS), these PIU are located in the junction boxes (JB) installed in the EHV and /or HV yards. PIU's typical installed on or near the primary equipment with which they exchange data.

Separate drawings were created for the GIS Interface application that include the interface requirements from GIS and also the additional equipment that includes the PIU's (Main 1 and Main 2) that is required to be fitted within the BMK as well as space requirements needed. The drawing shows the extent to which protection system will interface with primary plant through process interface units. It should be noted that the arrangements given in these drawings are typical as was applied in conventional substation. The actual final requirements may vary in detail according to the requirements of the particular circuit as specified.

3.2 PIU Interface requirements

The interface panel shall form part of the offered BMK.

- The accommodation and connection of the PIUs should be in a 19" inch rack arrangement.
- The cubicle/panel arrangement shall offer the benefits of minimal site installation times and PIU replacement requirements.
- Electrical connections between PIU devices and with the site should be at the same interface cubicle.
- Interconnections shall be identified in line with the requirements for the dependent local end markings.
- The interconnections are to be recorded on an appropriate schedule or diagram.
- A single isolation link shall be provided in each circuit breaker tripping circuit between the protection trip relay contacts and circuit breaker trip coil. The link shall be monitored by the trip circuit supervision system as indicated in the interface panel circuitry (see attached drawings).
- Ensure all interfacing terminations to the PIU's grouped together.
- The size of box shall be determined as per BMK requirement.

3.3 Interface Panel layout

The marshalling kiosk shall be placed at such a height that it becomes convenient for any person to work on terminal blocks. Placement position of marshalling kiosk is to be indicated in related drawing. All incoming and outgoing connections in the marshalling kiosk shall be properly marked with ferrules.

The layout offered shall consider the following space requirements:

3.3.1 Front panel

- 2 x 6u PIU (Main 1 & Main 2- visible separated) plus label spacing. These to be mounted on the front panel – 19 inch rack mount.
- Indication lamps for Main 1, Main 2 and common area healthy status monitoring.
- MCB's –
 - 10A , AC, C-curve
 - 16A , AC, C-Curve
 - 2 x 6A , DC , B-curve

- 1 x 16A , DC , B-curve
- 2 x Isolating switch , DC
- Socket outlet , 16A rating

3.3.2 Back Wall

The female plug disconnectors shall be mounted at the back wall of the cubicle.

- 2 x 16 way – Harting , *part numbers provided in the provided drawings*
- 8 x 32 way – Harting , *part numbers provided in the provided drawings*
- 2 x Patch Boxes
- *Auxiliary relays as per draft design provided*
- *Diodes as per draft design provided*
- *Snubber circuits as per draft design provided*
- *Terminal rail – X6.1 – X6.55 (This is for inter-panel/circuit connections)*

3.3.3 Side Wall

The terminal block to be used shall be of best quality, rust proof and suitable for climatic condition at site.

- Terminal blocks shall be 1000V grade and of continuous rating to carry the maximum expected current on the terminal. Insulating barrier shall be provided between the terminals. The terminal blocks shall have locking arrangement to prevent its escape from the rails. Spare terminals are to be provided as per draft design and these spare terminals shall be uniformly distributed on all terminal rows as indicated.
- All terminal blocks shall be suitable for connecting minimum of 2 nos. 4 sq.mm copper flexible.
- Terminal rails with terminals as per draft design provided (X1 – X5)

3.4 Construction/wiring instructions

- All wiring shall be 600/1000V, 1.5 sq.mm except AC heater and motor supplies (to isolation MCB's) which shall be 4 sq.mm.
- Earthing leads shall be 2.5 sq.mm
- All wires shall be terminated with hook blade lugs.
- Connections to PD's to use bootlace lugs
- Wires shall be numbered on both ends as indicated in the attached drawing.
- Design shall be such that there shall not be any interference between the wiring entering from below and any terminal blocks or accessories mounted inside the junction box.
- MCB's to be wired with source –side on top

3.5 Plug disconnector assembly instructions

- All IJB side (Female) Harting connectors to be assembled with terminal 1 bottom left hand corner.
- All PIU side Harting connectors will be assembled with hood cable entry from the top and terminal inserts to match corresponding female assembly (*Purchaser will free issue the male part together with loom and PIU already wired*).
- Guide pins and Bushings always applied to corner screw position only.

- Plug Disconnectors (PD's) to be coded based on the PD number in the application as indicated in the attached drawing (viewed from the mating faces of the connectors).
- Each **16-way** plug disconnector consists of the following parts:

| IJB side | Description | Quantity | Part Number | Manufacturer |
|----------|---|----------|----------------|--------------|
| JB Side | Han-A Metal Bulkhead housing | 1 | 09 20 016 0301 | Harting |
| JB Side | Han-A Screw terminal insert-female (1-16) | 1 | 09 20 016 2812 | Harting |
| JB Side | Guide Pin | 2 | 09 33 000 9908 | Harting |
| JB Side | Guide Bushing | 2 | 09 33 000 9909 | Harting |

- Each **32-way** plug disconnector consists of the following parts:

| IJB side | Description | Quantity | Part Number | Manufacturer |
|----------|--|----------|----------------|--------------|
| JB Side | Han-A Metal Bulkhead housing | 1 | 09 20 032 0301 | Harting |
| JB Side | Han-A Screw terminal insert-female (1-16) | 1 | 09 20 016 2812 | Harting |
| JB Side | Han-A Screw terminal insert-female (17-32) | 1 | 09 20 016 2813 | Harting |
| JB Side | Guide Pin | 2 | 09 33 000 9908 | Harting |
| JB Side | Guide Bushing | 2 | 09 33 000 9909 | Harting |

3.6 Free issue items

The below listed items will be free issued by the purchaser:

- 2 x PIU with wired loom and male part of the Plug disconnector (PD) – 6U in size
- 2 x Patch boxes/panels – 43.4mmH x 190mmW x 116mmD

3.7 Panel Colour

The outside of the interface junction box shall be coloured with same colour as that of Bay Marshalling kiosk. The purchaser junction box colour is G-29 and shall apply.

4. Authorization

This document has been seen and accepted by:

| Name and surname | Designation |
|--------------------|---|
| Richard Mccurrach | Senior Manager – PTM&C |
| Andre De La Guerre | Technology and Support Manager (Protection) – PTM&C |
| Thys Bower | Senior Consultant – PTM&C |
| Stuart van Zyl | Chief Engineer – PTM&C |
| Tony Sheerin | Project and Support Engineering Manager –PTM & C |

5. Revisions

| Date | Rev. | Compiler | Remarks |
|---------------|-------------|-----------------|----------------|
| February 2019 | 0 | B. Qwabe | Draft issue. |
| February 2019 | 1 | B. Qwabe | First issue |

6. Development team

The following people were involved in the development of this document:

- Bongani Qwabe
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7. Acknowledgements

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