**Typical Specifications**

**DIAMONDBACK SOLID DIELECTRIC, THREE PHASE LOAD BREAK SWITCH**

PART 1- GENERAL

## DESCRIPTION

This specification covers the requirements for an electronically controlled, automatic three phase, solid dielectric vacuum load break switch for distribution systems through 29.3kV. The load break switch shall be sourced from G&W Electric Company and designated as the Diamondback load break switch (Catalog DBK386-LBS-A).

## QUALITY ASSURANCE

### Manufacturer Qualifications: The chosen manufacturer shall have at least 15 years experience in manufacturing electrical distribution equipment. The manufacturer of the switches shall be completely and solely responsible for the performance of the switch and all applicable sub-components that make up the system.

### The manufacturer shall furnish certification of ratings of the switches upon request.

### The switch shall comply with requirements of the latest revisions of applicable industry standards, including:

#### IEEE C37.74

#### IEC 62271-103 (formerly IEC 60265-1)

### The switch manufacturer shall be ISO 9001 and 14001 certified.

PART 2- PRODUCT

## SWITCH DIMENSIONS, WEIGHT, AND FRAME CONFIGURATION

### Dimensions

### The switch dimensions shall be 38” height, 34” width, and 22” depth

### Weight

* The switch weight shall be 220lbs (99kg)
* The control weight shall be 105lbs (47kg)

### Frame Configuration

The frame configuration shall be:

* Pole-mount, center bracket with provisions for lightning arrestors
* Pole-mount, side-mount horizontal bracket (alley-arm)

## SWITCH CONSTRUCTION

### Mechanism Enclosure

#### The mechanism and corresponding linkage assembly shall be housed within a stainless steel enclosure. All hardware shall be made of stainless steel or brass for maximum corrosion-resistance. The mechanism enclosure shall be painted light gray. One ground boss shall be provided on the switch for system ground. The switch open/close position indication shall be viewable from the side and bottom of the mechanism enclosure. Reflective position labels shall be an option for visibility under poor lightning conditions.

### Operation & Handles

### The operating mechanism shall be used for opening and closing of the vacuum interrupters. The open/close operation handle and lockout handle shall be made of stainless steel for maximum corrosion resistance. The operation handle shall be capable of mechanically opening and closing the mechanism without power by hook-stick. Operation of the lockout handle shall provide mechanical and electrical lockout, disabling local and remote operations until the handle is reset. The operating temperature range shall be -40°C to +65°C (-40ºF to +149ºF).

### Vacuum Bottles

#### Interruption of the load current shall be accomplished through vacuum bottles located inside of the solid dielectric modules. Vacuum Interrupters shall be encapsulated in solid dielectric insulation.

### Solid Dielectric Modules

The switch shall contain three (3) solid dielectric modules that utilize a time proven, maintenance free, solid dielectric epoxy insulation system that fully encapsulates a total of three (3) vacuum interrupters, three (3) current transformers, and six (6) voltage sensors. SF6 gas or gas monitoring is not permitted in the solid dielectric module or the respective encapsulated components within the solid dielectric.

1. One (1) single ratio current transformer (CT) shall be encapsulated into each solid dielectric module and the CT accuracy shall be +/-1%.
2. Two (2) voltage sensors shall be integrally molded into each solid dielectric module and the voltage sensing accuracy shall be +/-2%.
   1. The integral voltage sensors molded within the solid dielectric module shall be impervious to the external environment.
   2. The use of external voltage sensing devices is prohibited
   3. The integral voltage sensors shall utilize LEA (low energy analog) outputs.

### Cables

The switch to electronic control interface shall be a one (1) control cable design. The control cable shall be constructed with a thirty-seven (37) pin connector design. The control shall contain one (1) control cable interface and one (1) power cable interface. The control and power cable connectors shall contain a ¼ turn design for fast and easy coupling to connector interfaces.

### Smart Grid / Distribution Automation (LaZer)

The switch shall be automation ready, simplifying conversion for any future automation requirements. Six (6) integral voltage sensors shall be provided with the switch, permitting analog voltage reading for network reconfiguration while eliminating the need for add-on external sensors and cabling.

### Electronic Control

The switch shall be controlled using a Diamondback control with (choose one):

• SEL-651RA relay

• PNC FTU-P200 (with Ethernet port)

• PNC FTU-P200C (without Ethernet port)

• None

### Electronic Control Construction

* The enclosure shall be constructed of stainless steel.
* The enclosure shall have two (2) lifting provisions for ease of installation.
* The enclosure shall have an option for a three point latching system.
* All electronics shall be housed inside the control enclosure for easy accessibility.
* The control shall have six (6) low energy analog (LEA) voltage sensing.
* The control shall have a 50W thermostatically controlled heater
* The control shall have two convenience outlets with GFCI.
* The control shall have dead-line operation, permitting use of battery power for switch operation when AC input power is lost.
* Option for security sleeves for tamper proofing the cable connection interfaces to control.

## DESIGN RATINGS

The switch shall be rated as shown in Table 1:

|  |  |  |
| --- | --- | --- |
| Description | | Diamondback LBS  Catalog: DBK386-LBS-A |
| Rated Maximum Voltage | | 29.3 kV |
| Rated Continuous Current | | 630 A |
| Frequency | | 50/60 Hz |
| Rated Short-Circuit Current (rms, 3 sec) | | 12.5 kA |
| Rated Peak Withstand Current (9 operations) | | 32.5 kA |
| Switching  Performance Tested per IEC 62271-103 | 100% Load Current Switching  (200 operations) | 630 A |
| 5% Load Current Switching  (20 operations) | 31.5 A |
| Loop Current Switching (20 operations) | 630 A |
| 100% Cable Charging Current Switching (10 operations) | 25 A |
| 30% Cable Charging Current Switching (10 operations) | 7.5 A |
| Line Charging Current Switching (10 operations) | 1.5 A |
| Magnetizing Current Switching (10 operations) | 22 A |
| Switching  Performance tested per IEEE C37.74-2014 | 100% Load Current Switching  (10 operations) | 630 A |
| 50% Load Current Switching  (30 operations) | 315 A |
| 10% Load Current Switching  (10 operations) | 63 A |
| Loop Current Switching (10 operations) | 630 A |
| Cable Charging Current Switching (20 operations) | 15 A |
| Magnetizing Current Switching (20 operations) | 21 A |
| Impulse Withstand Voltage (1.2x50㎲) | | 150 kV |
| Power Frequency Withstand Voltage (1 min) | | 60 kV |
| Temperature | | -40ºC to +65ºC (-40ºF to +149ºF) |

**Table 1**

## FACTORY PRODUCTION TESTS

Each individual switch shall undergo a mechanical operation check, verifying contact open/close operations manually (mechanical operation) and automatically (control operation). The switch shall be AC hi-pot tested one minute across the open position and closed the position. Circuit resistance shall be checked on all phases. Current transformer ratio and polarity shall be checked on all phases. The voltage sensors shall be tested and operation verified as a system on all phases.

## STANDARD COMPONENTS

The following shall be included as standard:

* Stainless steel mechanism enclosure painted light gray
* Lifting provisions
* Grounding provision on switch and control
* Corrosion-resistant three line diagram and nameplate(s)
* Mechanical open and close operation handle
* Lockout handle with mechanical block
* AC input cable
* Control cable
* Dead-line operation permitting using the batteries located in the control for operation of the switch if AC input power is lost.
* Six (6) integral voltage sensors
* Three (3) integral current transformers

## OPTIONS

The following options shall be supplied: (mark as appropriate):

• NEMA 2-hole aerial lug

• NEMA 4-hole aerial lug

• Clamp style aerial lug (#2 – 500 kcmil)

• 4/0 brass eyebolt style ground lug

• Galvanized steel pole-mount, center bracket with lightning arrester provisions

• Galvanized steel pole-mount, side-mount horizontal bracket (alley-arm)

• Wildlife Protectors

• Lightning Arrestors

• \_ External oil filled potential transformer for 120VAC supply power

• \_\_ External solid dielectric transformer for 120VAC supply power

• SEL-651RA relay

• PNC FTU-P200

• PNC FTU-P200C

Control with SEL-651RA Options:

* 3 point latch
* AC transfer switch
* Fuse blocks
* Security sleeves
* Accessory mounting kit

## LABELING

### Hazard Alerting Signs

Appropriate hazard signs shall be applied to each unit, frame or enclosure. A Danger sign shall warn of hazardous voltage and the need for qualified operating personnel. Warning signs shall warn against product misapplication in excess ratings. Caution sign shall warn of harmful X-ray potential.

### Nameplates, Ratings Labels, and Connection Diagrams

Each switch shall be provided with a nameplate label indicating the manufacturer’s name, catalog number, date of manufacture, serial number, and ratings. Ratings listed on nameplate shall indicate the following: voltage rating, BIL, continuous current, and short circuit current.