Herron Substation

Group Operated Switches

RF025-01371

Technical Specifications

1 Table of Switches

Qty	Voltage	Amps (cont.)	BIL	Mechanism Type	Orientation	Operator
5	161kV	3000A	750kV	Center Break V	Horizontal	Worm Gear
1	161kV	3000A	750kV	Center Break V	Vertical	Worm Gear

2 INDIVIDUAL DATA SHEETS

2.1 Switch Type #1

This sheet is to be filled out for each type of switch.

QUANTITY of SWITCHES for this DATA SHEET: 5

Substation Name: For Stock

VOLTAGE (L-L): **161** kV
BIL: 750 kV
AMPACITY (Continuous): 3**000** A
AMPACITY (Momentary): STD
TYPE OF MECHNISM: Center **Break V**

MOUNTING: **Horizontal**

PHASE SPACING: 13 Feet

SWITCH STAND: Steel Structure Drawing Provided for reference.

OPERATOR: **GearBox (5)**

Direction of Rotation: **CCW**

SPECIAL FEATURES: N/A

Switch Tag(s): 101, 120, 123, 124, 125

Swing Handle Switches: N/A

2.2 Switch Type #2

This sheet is to be filled out for each type of switch.

QUANTITY of SWITCHES for this DATA SHEET: 1

Substation Name: For Stock

VOLTAGE (L-L): **161** kV
BIL: 750 kV
AMPACITY (Continuous): 3**000** A
AMPACITY (Momentary): STD
TYPE OF MECHNISM: **Center Break V**

MOUNTING: **Vertical**

PHASE SPACING: 13 Feet

SWITCH STAND: Steel Structure Drawing Provided for Reference.

OPERATOR: **GearBox (1)**

Direction of Rotation: **CCW**

SPECIAL FEATURES: N/A

Switch Tag(s): 16371

Swing Handle Switches: N/A

3 GENERAL REQUIREMENTS

3.1 PROPOSAL

A. The Vendor/Manufacturer shall provide a bid proposal for the listed switches (Discussed in Sections 1 & 2) and shall comply with the following specifications. The vendor/Manufacturer shall call out specifically and label as such, any exceptions to these specifications in his proposal. Non-compliance with any specification may result in bid disqualification

B. The Vendor/Manufacturer's bid shall be on a lump sum price basis for which he agrees to furnish the disconnect switches covered in the specification. ***Without limitations, it is to be understood that the prices bid are to be firm and not subject to adjustment due to changes in the costs of material, labor, or any other factors except for those specifically authorized in these specifications.***

C. The proposal shall state the time in weeks after receipt of the purchase order, when the **approval drawings** specified will be submitted to the Company.

D. The proposal shall state a firm shipping date.

E. Proposal shall state the emergency overload ratings for four (4), eight (8), and twenty-four (24) hours without loss of switch service life including deterioration or loss of operational reliability.

F. With the bid document, Bidder shall state the width and thickness of the silver plating on the switch contacts (female) and on the switch arm contact (male).

G. ***The Bidder shall furnish any drawings, pictures, or other descriptive data needed to explain fully the type of equipment proposed.*** These Drawings shall clearly indicate the kind, size, arrangement, weight, shipping breakdown, operational components, external connections, anchorages, and installation dimensions.

3.2 GENERAL

A. This specification covers the furnishing of the switches listed on the Data Sheet. The switches shall be complete with insulators, operating arms and mechanism, mounting brackets, hardware, and documentation.

B. Within this specification, "switch" refers to a disconnect switch, complete with manual or motor-operated mechanisms, all necessary piping, interphase rods, and

all assembly fasteners, including shop and field erection bolts, nuts, and station post insulators.

C. The disconnect switches and their appurtenances shall conform to this specification and shall comply with IEEE C37.32, IEEE C37.34, and NEMA standards for air switches and supports.

3.3 SPECIFICATIONS

3.3.1 Disconnect Switches

1. Disconnect switches shall be of the 3-pole group-operated type, for either vertical or horizontal mounting, equipped with ANSI 70 light gray station post insulators.

2. Mechanical strength of switch and insulators shall be coordinated with all forces to which they may be subjected during normal use and shall meet the latest applicable NEMA and USA Standards. The switches shall be designed such that no appreciable interphase forces will be transmitted to the switch support structure during switch operation. Switches shall either open or close satisfactorily under a deposit of hard ice 3/4 inch in thickness. Switch-blades shall be counter balanced to prevent them from falling closed from any open position. All materials used shall be suitable for outdoor use, demonstrating resilience to environmental factors including humidity, UV exposure, and temperature fluctuations. Documentation confirming compliance with environmental durability standards shall be provided

3. All electrical contacts shall be silver to silver to ensure high conductivity and durability. The Vendor/Manufacturer shall provide documentation verifying contact material quality and specifications, including width and thickness of silver plating on both female switch contacts and the male switch arm contact, as part of the bid submission. This information is essential to confirm the quality and longevity of contact materials in field conditions.

4. Each switch shall be equipped with stub-type arcing horns to safely divert arcs and minimize wear on the main switch contacts. Arcing horns must be designed to handle the typical operational conditions without deterioration. The Vendor/Manufacturer shall provide material specifications and design documentation for arcing horns as part of the equipment proposal

5. Terminal pads of switches shall be suitable for use with aluminum connections, and the drill pattern shall comply with NEMA pad dimensions. The typical drill pattern should allow the use of four ½-inch diameter bolts on 1 ¾ inch centers, and if different, shall be stated in the proposal. Terminals will be furnished by others.

6. If the switch is to operate at a voltage of or greater than 199 kV line to ground, 345 kV phase to phase, then adequate corona suppression shall be engineered into the switch such that detectable corona is not present at operating voltage. All designs must comply with IEEE and NEMA standards for high-voltage equipment, including verification documentation of corona-free performance at specified operating voltages.

7. If disconnect switches are specified for manual operation, they shall be designed to permit easy retrofit installation of motor-operated mechanisms without structural alterations.

8. All bearing components shall be sealed, maintenance-free, and corrosion-resistant.

9. Design must ensure that **the current path shall not pass through bearings, springs, or hardware**.

3.3.2 Operating Mechanism

1. General Requirements for Operating Mechanism

    a) Switches shall be furnished with an operating mechanism complete with vertical operating pipes, interphase rods, couplings, guide bearings, flexible braid grounding strap, and offsets as required for operation from the switch stand to provide group operations of all three blades from one operating mechanism.
    b) An indicator showing the status of the open and closed positions of the switch shall be provided at each operating mechanism for ease of operation and quick status verification.
    c) Each operating mechanism must also include padlocking provisions to secure the switch in either position for safety and operational control.

2. Manually operated switches.

    a) The switch handle or gearbox shall be designed for installation approximately 2'-6" above the switch structure foundation to facilitate operation from ground level by a single operator.
    b) Handle or gearbox mechanisms must be constructed from corrosion-resistant materials to ensure durability in outdoor environments, with minimal maintenance required.

3. Motor operated switches.

    a) Motors shall be designed for DC operation with a standard control voltage of 125VDC, unless otherwise specified on the Data Sheet. Operating time shall not exceed 10 seconds to ensure prompt response.

Motors and control components shall be housed in a weatherproof cabinet with a cabinet heater controlled by a thermostat operating on 120 or 240 VAC for humidity control and reliable performance in extreme temperatures.

b) Each motor-operated mechanism shall include an auxiliary switch with a minimum of eight (8) individually adjustable contacts (four “a” and four “b” contacts), allowing flexibility in control circuit configurations.

c) The motor operator mechanism shall be equipped with a manual handle for emergency hand-cranking. Motor operation must be electrically disconnected during manual operation to prevent unintended actuation. A mechanism for secure attachment of the manual handle shall be provided.

d) Each motor operator mechanism shall allow for manual testing directly at the cabinet, with automatic inhibition of remote control signals during manual testing to ensure safe local operation.

e) All motor-operated mechanisms must comply with the latest revision of ANSI C37.32 standards for power-operated mechanisms, ensuring consistent quality and performance across installations.

f) The motor mechanism cabinet’s centerline shall be positioned approximately 2'-6" above the switch structure foundation to facilitate easy access for maintenance and operation from ground level.

3.3.3 GROUNDING

1) The switch shall be supplied with an 18” long ground strap and the necessary hardware to attach the strap to the operating pipe and the switch stand steel.

2) The grounding strap must have an ampacity equal to or greater than a 4/0 copper conductor to ensure effective grounding.

3) All grounding components, including connectors and hardware, must be corrosion-resistant to withstand outdoor conditions and ensure long-term reliability.

4) Grounding compliance with IEEE 80 and applicable NEMA standards is required, with documentation provided by the manufacturer to verify that the grounding equipment meets or exceeds these standards.

3.3.4 EQUIPMENT NAMEPLATE

1. High Voltage Switch Nameplate

Each high voltage switch will include a nameplate affixed in an accessible location, containing the following information:

A. Manufacturer
B. Rating in amperes
C. Voltage rating (in kV)
D. Instruction book number
E. Catalog number
F. Year manufactured
G. Serial number
H. Rated short-time current (in kA)
I. Rated insulation level (BIL, if applicable)

2. Motor Operator Nameplate

Each motor operator shall have a separate nameplate, also positioned for ground-level visibility, identifying:

A. Manufacturer
B. Operating voltage
C. Control voltage (if different from operating voltage)
D. Instruction book number
E. Catalog number
F. Year manufactured
G. Serial number

3. Nameplate Accessibility Requirement

To facilitate auditing and compliance with FAC-008, all nameplates must be clearly visible from ground level. Options include:

- Secondary Nameplate – If direct mounting prevents ground-level viewing, an additional nameplate with identical information shall be mounted in a visible location (e.g. on the operator or operating pipe).
- Accessible Mounting Position – Nameplates must be positioned to ensure clear ground-level readability without ladders or additional equipment.
- Weather-Resistant Material – All nameplates must be constructed from weather-resistant materials to ensure legibility and durability in outdoor environments over the life of the equipment.

3.3.5 SWITCH TYPES

1. Vertical Break

   The Vertical Break Switch opens and closes by rotating the blade in a vertical plane. It is commonly used for high-reliability applications and locations where phase spacing does not allow center or side break switches. Its compact design and vertical orientation are ideal for limited space or high-density installations.

2. Slanted Jaw Vertical Break

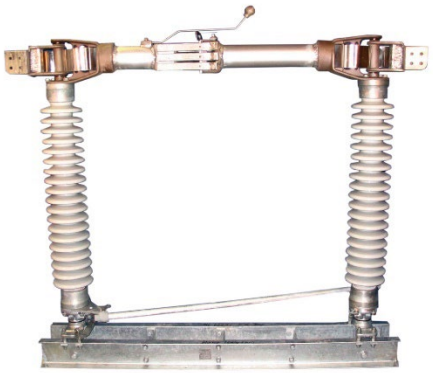
   The Slanted Jaw Vertical Break Switch operates similarly to the Vertical Break but with a slanted jaw mechanism, which allows for more efficient arc extinction and reduces wear on contact surfaces. The shorter base allows for additional phase to ground clearance distance for jumpers bending downward (e.g. to a circuit breaker bushing).

3. Center Break V

   The Center Break V Switch features a V-shaped configuration that opens in the center. It provides dual break points per phase, enhancing arc suppression and contact durability. The narrow base allows for maximum clearance to ground for jumpers.

4. Center Side Break

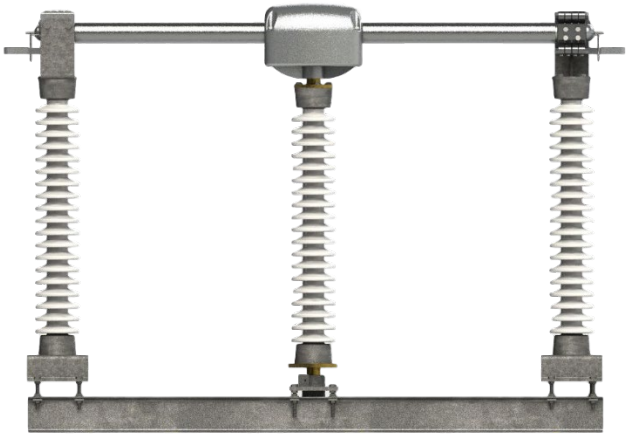
   The Center Side Break Switch rotates along a side axis, opening from the center. It is designed for robust outdoor applications, with high reliability in environments with space constraints or specific orientation needs.



5. Double End Break

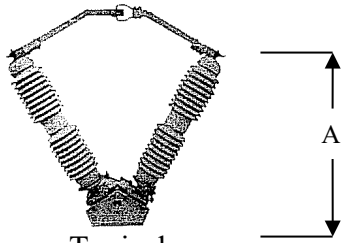
   The Double End Break Switch, often referred to as the Helicopter Switch, opens from both ends of the blade, providing two points of disconnection. This switch

type is well-suited for EHV applications (e.g., 345kV), however it may be used for any voltage.

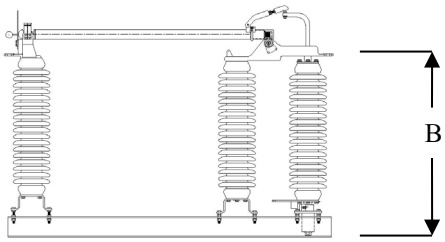


3.3.6 DIMENSIONS

The switch shall meet the dimensions as shown on the following table for the applicable voltage. That dimension shall be the distance measured from the top of the terminal pads ("paddle") to the bottom of the switch base as shown for the following basic configurations.



Typical



Typical

KV	Dimension "A" (inches)	Dimension "B" (inches)
15	25	25
69	44	44
115	64	64
138	72	72
161	80	80
230	102	102
345	130	130

3.4 PREPARATION FOR SHIPMENT AND SHIPMENT

A. All disconnect switches shall be carefully packaged, with small parts tagged and boxed in substantial containers. Suitable separators shall be placed between heavy or extra-long pieces to prevent movement during transit. Non-abrasive dunnage materials must be used to protect porcelain insulators and zinc coatings from damage.

B. Each container must be labeled with the switch type, voltage, and GRDA's purchase order number for efficient receiving and inventory management.

C. Any shipment shall include complete switches with no extra pieces or missing pieces.

D. Proposal shall be based on F.O.B. GRDA Warehouse not F.O.B. shipping point, with transportation costs included in the final price.

E. Delivery address:

Grand River Dam Authority
GRDA Transmission Warehouse
635 E Hwy 69A
Pryor, OK 74362-1128

F. Notify GRDA Inventory Manager two business days before delivery as to exact time of arrival to arrange for receiver and unloader to be present. Notify: Mr. Robert Wheeler

Robert Wheeler, Inventory Manager
robert.wheeler@grda.com
Phone: 918-824-7205

GRAND RIVER DAM AUTHORITY
GRDA Transmission Warehouse
635 E Hwy 69A
Pryor, OK 74362-1128
Telephone (918) 824-7205

3.5 CORRESPONDENCE

All technical correspondence, transmittal letters, technical information, approval drawings, final reproducible drawings, prints, and instruction books should be mailed to: Mr. Parker Rainbolt.

Parker Rainbolt, Substation Engineer III
Parker.rainbolt@grda.com
Phone: 918-610-9789

GRAND RIVER DAM AUTHORITY
9933 E. 16th Street
Tulsa, OK 74145
ATTN: Parker Rainbolt

3.6 DOCUMENTS/DRAWINGS

A. The Vendor/manufacturer shall furnish three (3) copies of outline drawings and detail and assembly drawings for approval. Each drawing submitted shall be clearly marked with the name of the project, GRDA's name, and GRDA's purchase order number. When catalog pages are submitted, the applicable items shall be indicated. These approval drawings shall be submitted as soon as possible.

B. A drawing index listing all drawings, instruction manuals, complete parts lists with identifying part numbers, and adjustment instructions for switches and motor operators shall accompany the initial submission.

C. In addition to the above drawings, the Vendor/manufacturer shall furnish reproducible copies of all drawings after any corrections made for approval as follows:

One (1) copy of drawing index
One (1) copy of each final drawing
One (1) copy of parts list

1. The Vendor/Manufacturer shall provide drawings in a current AutoCAD format (e.g., DWG) or as PDFs. Electronic files may be submitted through secure file transfer or email, as arranged with GRDA. Drawings on CD-ROMs are no longer accepted.

2. If AutoCAD drawings are not provided, the manufacturer shall provide reproducible drawings. These reproducible drawings shall be of a right reading translucent for a minimum 0.003 thickness Mylar base, wash-off type,

photographic or equal, with sufficient tooth to take pencil or ink line. The reproducible shall not exceed a maximum of 24" X 36".

3. The drawings are to be mailed to GRDA as soon as possible, and in any event, no later than six (6) weeks prior to date of shipment of equipment covered by these specifications.

4. The final drawing will show information described under approval drawings.

D. If complete bills of material are not included on above drawings, then six (6) separate copies, fully describing equipment shall be supplied as soon as possible after drawing approval.

E. Bill of material shall include a detailed list of all parts, containing part number, description of part, and identification number. The identification number will be shown on drawings such that location of each part is evident. Exploded type drawing would be desirable to show this information.

F. Six (6) copies or one (1) digital copy of all other drawings and data describing the equipment furnished shall be sent to the Company prior to shipment of the equipment.

3.7 INSTRUCTION MANUALS

A. The seller shall furnish six (6) complete and final copies of instruction manuals for each purchase order, and/or substation, and/or type of switch no later than thirty (30) days prior to shipment of the equipment.

B. Instruction manuals must include detailed information on installation procedures, any special factory or field adjustments, operation and maintenance instructions, as well as drawings and parts lists for each item of equipment provided.

D. Manuals should be provided in the manufacturer’s standard heavy-duty binders, suitable for rough field usage. Each binder’s cover must be labeled with GRDA’s name, equipment location, name of the equipment, and its basic capacity rating.

E. In addition to hard copies, electronic versions of the instruction manuals shall be provided in PDF format. Electronic copies may be submitted via secure file transfer or email, as coordinated with GRDA.

D. Where applicable, a list of recommended spare parts, including prices for each item, and a schedule of required lubricants, shall be included in the instruction manual for routine maintenance purposes.

E. All manuals shall display nameplate information and shop order numbers for each item of equipment, ensuring accurate identification and reference.

3.8 WARRANTY

Any equipment specified herein or part thereof that shall develop defects not disclosed prior to acceptance by GRDA within one year after energization or eighteen months after delivery, whichever occurs first, shall be promptly replaced by the Vendor/manufacturer free of charge to GRDA.