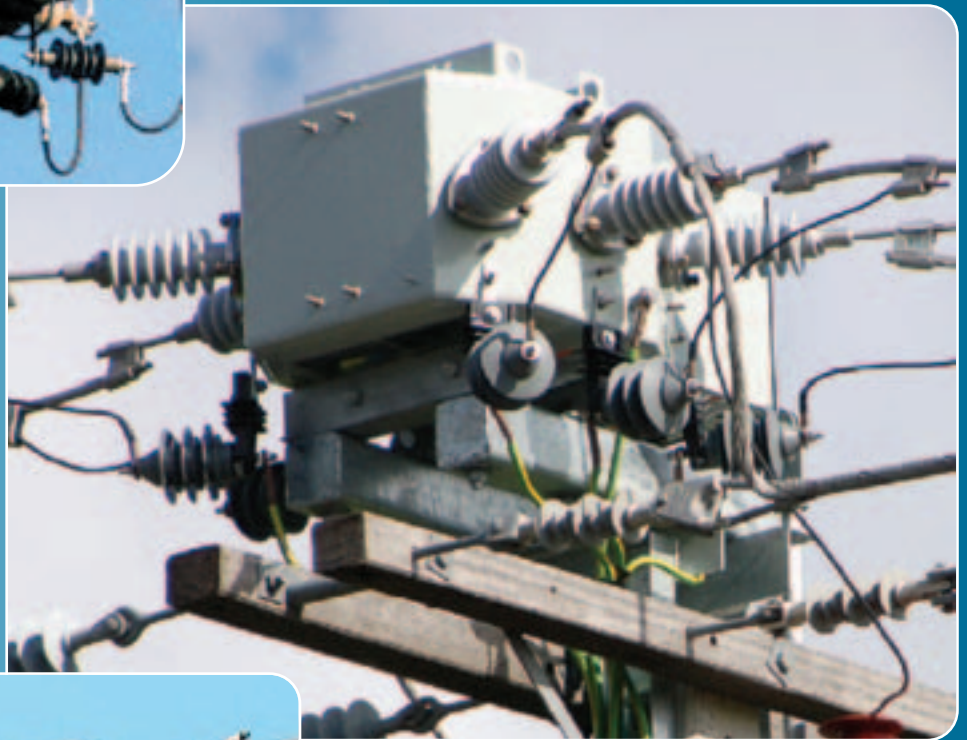


**OVERHEAD
SF₆ INSULATED
SWITCHING SOLUTIONS**

For applications through 38kV



- Load break switching to 630A
- Manual or automated solutions
- Automatic sectionalizing
- Mounting flexibility
- Custom solutions since 1905

WORLDWIDE EXPERIENCE AND WORLDCLASS PERFORMANCE



G&W Electric headquarters located in Blue Island, Illinois USA.

G&W's SOLUTION ADVANTAGE

Since 1905, G&W has been providing high quality electrical products and innovative system solutions to utilities and electrical power users around the world. Considered a pioneer in the evolution of today's switchgear, cable splicing and termination technology, G&W has become the first in our industry to achieve both the prestigious ISO 9001:2000 and ISO 14001 certifications. By combining extensive product development with state-of-the-art manufacturing, G&W continues to set the standard for quality switching and fault interrupting products. Whether the application involves load switching, line sectionalizing, fault interruption or distribution automation, G&W offers a solution for overhead distribution system switching and protection.

LOAD BREAK SOLUTIONS

G&W overhead load break switches are designed with all critical contact components totally protected from the environment within a sealed-for-life (per IEC standards), welded steel enclosure. Because contacts are totally sealed, they are not subject to corrosion caused by salt

or other airborne contaminants. Icing, which can hamper proper operation of exposed switching mechanisms, is also not a concern. SF₆ is used because it is a safe, nontoxic, nonflammable, stable dielectric with excellent arc quenching properties. G&W overhead load break switches are durable and maintenance-free assuring a long service life without recurring maintenance costs.

A variety of load break switch designs are available for manual or electrically operated load switching for systems through 38kV.

Other features include:

- Testing to ANSI and IEC standards.
- Bushing flexibility
- Ease of automation

Compared To Air Break Switches

G&W overhead load break switches can provide:

- An economical alternative with superior, mechanical and electrical performance.
- Totally sealed contact systems eliminating environmental corrosion and icing concerns.

- Significant increase in the number of load break operations which is especially important in automation schemes where the number of switching operations typically increases.
- Minimal maintenance.
- Ease of automation.

FAULT INTERRUPTING SOLUTIONS

For applications requiring over-current protection, G&W offers a variety of automatic reclosers and sectionalizers. Solid dielectric, three phase vacuum reclosers are available through 38kV, 800A continuous, 12.5kA symmetrical interrupting. Various bushing configurations permit application versatility. Reclosers work directly with the popular Schweitzer SEL 351R control and others. See separate catalog for detailed information.

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OVERHEAD SWITCHING APPLICATIONS

SWITCH APPLICATIONS

Switches play a fundamental role in improving distribution reliability. By applying switches in strategic locations on the distribution system, faults can be isolated while minimizing the outage area, loads can be distributed according to system conditions, critical loads can be kept on line, individual protective devices or sections of line can be bypassed during routine maintenance, and loads can be dropped to prevent overloading the source. In short, switches are typically used to reconfigure a distribution system to minimize outages and increase system reliability.

MANUAL SWITCHING

By installing manually operated switches, a user can economically redistribute power during times of planned outages for routine line maintenance, equipment replacement, or even seasonal load adjustments. Manual switches can also be used to isolate faults in areas where immediate power restoration is not necessary, or to perform an emergency sectionalizing function to quickly restore power to the customers affected by a power outage.

G&W offers a variety of switch styles depending on system ratings and automation requirements, if applicable. G&W switches do not require de-energizing the system prior to switching so customer service is not disrupted.

AUTOMATED SWITCHING

By adding a motor actuator and controller to the switch operating mechanism, the user can perform all of the functions of a manually operated switch without having to dispatch a crew to the switch site. Various automation control packages are available to suit many application requirements.

Local Control

Adding a motor actuator and a stand-alone electronic motor controller can provide simple push-button operation from ground level.

Fault Isolation

When combined with a stand-alone control and sensors, a switch can be used as a self-contained automatic sectionalizing device for automatic fault isolation. Different sectionalizing controls with voltage and/or current sensors are available. Typically automatic sectionalizers utilize either time-current sensing or time-voltage sensing controls which can be used for opening line sectionalizers, or controls which require a combination of voltage with current sensing. All of these logic schemes require a fault interrupting device to be upline from the sectionalizing switches. The protective device must be either locked out or programmed for a specific reclose interval plus a time safety factor to allow the switch to operate.

Tie Switches

For tie applications, the switch control senses a voltage loss on either the source or the load side to determine whether or not to close in from a normally open condition between two different sources. A time component is generally required in the control logic to insure the loss of voltage on either of the sources is permanent. Once the voltage on one source has been lost for a pre-programmed period of time, the tie switch will close in restoring power to the de-energized line.

Current sensors can be added to the tie switch to tell a controller that a fault exists when the main contacts are closed. For a normally open tie, the tie may close into a fault upon loss of voltage on one feeder. The control "knows" of the faulted condition and would not open unless it detects a loss of voltage on the faulted feeder side signifying the upline protective device has operated.

On a normally closed tie, the switch control would use similar logic, but no fault closing would be necessary prior to isolating the fault.

Tie switches can also be applied to automatically bypass a feeder which has locked out due to a failure, planned outage or a faulted line. If the switch closes into a fault, the tie switch would open once the upline protective device has opened, de-energizing the line.

Loop Schemes

Loop schemes generally consist of two or more sources tied into a distribution system to assure backup power is available if the primary feeder is lost. The scheme utilizes sectionalizing and tie switches to automatically isolate the fault and restore power to all areas unaffected by the fault quickly and reliably using the same principles and methods described previously.

Automatic Transfer

For critical load applications such as hospitals, processing plants, military bases, etc., automatic transfer schemes are common. For overhead systems, this scheme requires two switches, voltage and current sensors and a voltage-time controller. Basically, a loss of voltage on the primary source is sensed and initiates the controller to open the primary and close the alternate source switch to automatically restore power. Current sensing is used to prevent closing into a load side fault. G&W offers a variety of automatic transfer packages.

SCADA / Distribution Automation

Switches can perform the above functions either autonomously or through a SCADA system where the switch controls incorporate RTUs for interfacing with a master station. A variety of SCADA applications are available which employ either a master-slave or peer-to-peer communications architecture.

630A LOAD BREAK WITH 20kA MOMENTARY

ROTARY PUFFER SWITCHES



G&W's overhead Rotary Puffer (RP) switches are ideal for manual load break switching, standard speed (5 seconds per operation) automatic transfer or automated sectionalizing on systems rated through 27kV, 630A continuous, 32kA peak and 20kA asymmetrical short circuit. The switches are tested to applicable sections of ANSI and IEC standards.

FEATURES

Refer to G&W's Solution Advantage section, page 3 for general features.

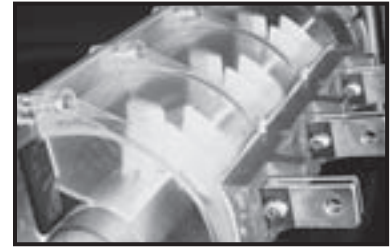
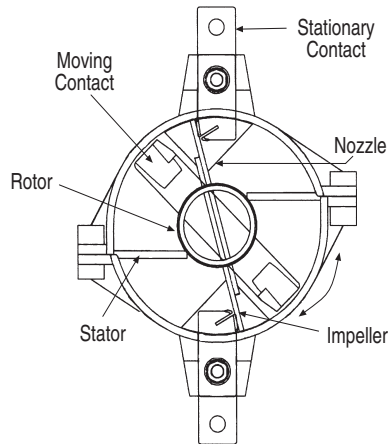
Economical Package — The manual overhead RP switch is G&W's most cost effective alternative to traditional gang operated air break switches.

Ease of Operation — The rotary puffer mechanism is extremely easy to operate whether from a bucket truck or ground level operator. The handle can be padlocked in the open or closed position. Downrod assemblies are available.

Self-disengaging Motor

Actuator — For applications requiring motor control, an exclusive motor actuator assembly permits easy manual operation if control power is lost. The main shaft automatically disengages from the motor gear assembly after each electrical operation permitting virtually effortless manual operation.

ROTARY PUFFER CONTACT PRINCIPLE



RP Contact Module

The stationary contacts and the multi-chamber rotor (an assembly of interlocking parts which form a rotational framework including moving contacts) are housed in a clear cylindrical shell. The stationary contacts are supported independent of the cable entrance bushings, eliminating possible misalignment resulting from tank deflections. Each rotating contact simultaneously disengages from two stationary contacts per phase, providing improved interrupting capability as compared to single break contact systems.

As the rotor tube assembly turns to disengage the moving contacts, SF₆ gas is compressed between the impeller and stator. The shell, phase barrier and rotor tube also act to confine the gas for proper compression and flow. The compressed SF₆ gas is directed through the nozzle into the arc zone. The SF₆ flows across the contacts cooling the arc over the length of the nozzle. The cooling action is increased by the higher pressure (due to compression) and the flow of gas which constantly provides a supply of cool SF₆ into the arc zone.

At current zero, the temperature of the arc is reduced to the point of deionization. The SF₆ gas rapidly recovers dielectric strength withstanding the system recovery voltage across the contacts. As the rotor tube assembly turns to engage the moving contacts with the stationary contacts, the impeller induces a flow of SF₆ gas between the contacts to minimize prestrike.

Visible Open/Close — The color coded main contact position indicator (green-open, red-closed) is easily visible from the ground. The indicator is connected directly to the main contact drive shaft assembly assuring accurate contact status.

Refer to Automation, Typical Specifications and Accessories sections for more details.



▲ Contact position indicator

630A LOAD BREAK WITH 20kA MOMENTARY

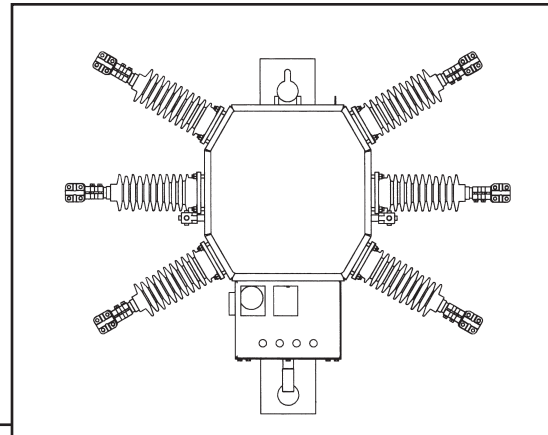
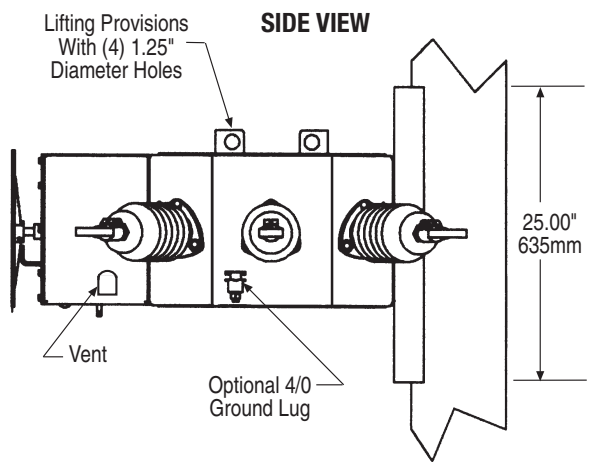
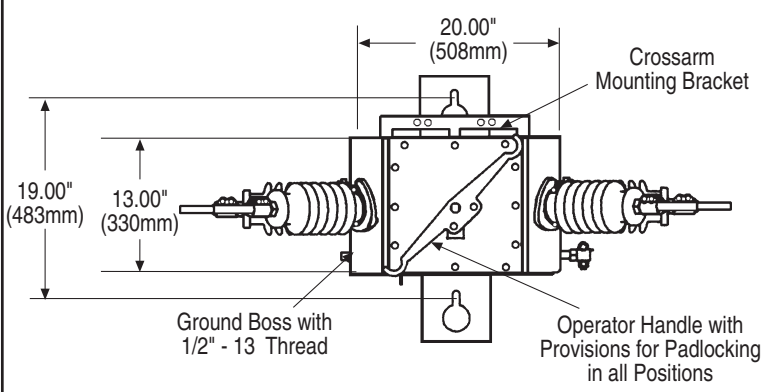
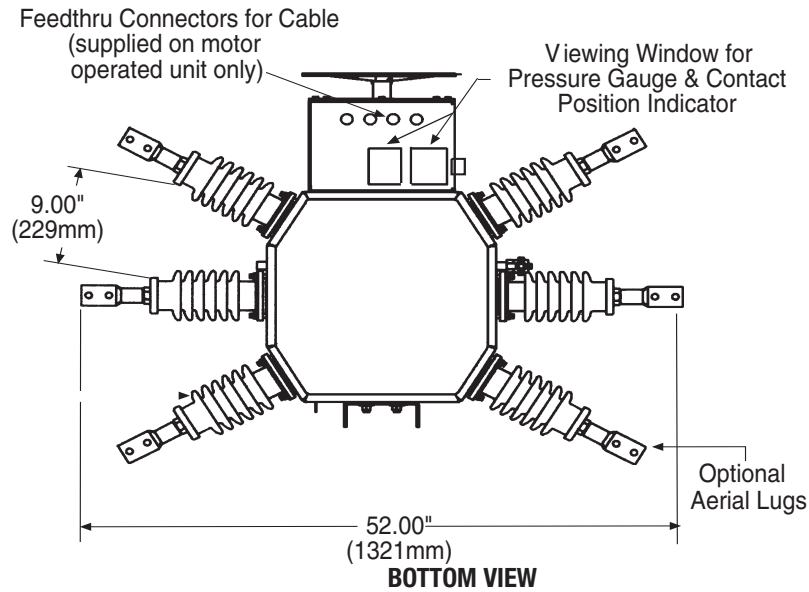
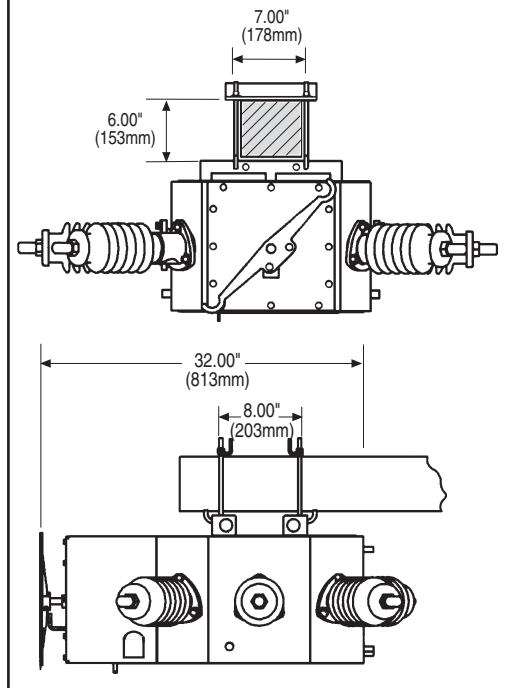
ROTARY PUFFER SWITCHES (CONT.)

Approximate Dimensions 15.5kV with Pole Mounting Bracket

| One-line Diagram | Voltage Max kV | Catalog Number | Approximate Weight w/SF ₆ lbs. (kgs) |
|------------------|----------------|----------------|---|
| | 15.5 | ORA21-376-20RP | 235 (107) |
| | 27 | ORA21-386-20RP | |

Crossarm Mounting

Kit includes two galvanized, predrilled angle channels, four stainless steel J bolts and hardware.



Typical Vertical Mounting

630A LOAD BREAK WITH 20kA MOMENTARY

TYPICAL SPECIFICATIONS ROTARY PUFFER SWITCHES

GENERAL

This specification covers the requirements for manual load interrupting SF₆ rotary puffer (RP style) switches for overhead applications.

Design Ratings and Standards

Switches shall be designed, tested, and built per applicable sections of ANSI and IEC standards. Certified test reports shall be provided. The manufacturer shall be ISO 9001:2000 and 14001 certified. The switch assembly shall be rated:

| | | |
|--|------------|------------------|
| Maximum design voltage, kV | 15.5 | 27 |
| Impulse level (BIL), kV | 110 | 125 |
| One minute withstand (dry), AC kV | 50 | 60 |
| 10 second withstand (wet), AC kV | 45 | 50 |
| 15 minute withstand, DC kV | 53 | 78 |
| Continuous and load break current, Amps | | 630 |
| Momentary current, kA asym..... | | 20 |
| Fault-close current, kA asym (3 times)..... | | 20 |
| One second current, kA sym | | 12 |
| Operations load interrupting endurance at 600A..... | | 500 |
| Mechanical endurance, operations | | 2000 |
| Maximum gas leakage test, cc/second | | 10 ⁻⁷ |

The above ratings apply to the switch assembly and may be reduced depending upon the entrances chosen. Also see Rating and Standards, page 15.

Switch Construction

Switch contacts and cable entrance terminations shall be contained in a single welded, mild steel tank with entrances internally connected by tin plated copper. The protection degree of the switch tank shall be IPX7 rated. Switches shall be shipped filled with SF₆ gas at approx. 9 psig (60kPa).

Switch Contacts

Switch contacts shall be of a rotary puffer design made with copper alloy contacts with silver plating to assure permanent, low contact resistance. Each rotating contact simultaneously disengages from two fixed contacts, thus providing two break points per phase which gives improved interrupting capability as compared to switches with only a single set of break contacts. Contact travel shall be 90° to assure efficient arc extinction and a wide open contact gap. Arcing is confined away from the main contact surfaces. The stationary contacts shall be supported independent of the cable entrance bushings, eliminating possible misalignment. Temperature rise shall not exceed ANSI C37.71 and IEC 265-1 standards for this type of device.

Switch Operation

Each switch shall be equipped with spring assisted operating mechanism capable of providing quick-make, quick-break operation. The mechanism shall be capable of delivering sufficient torque and shall be provided with latches for each position to achieve the published load interrupting, fault closing, and momentary ratings. All switch positions shall be clearly identified and padlockable.

The operating mechanism shall be actuated from outside the switch tank by a permanently attached operating handle or motor actuator. The operating shaft shall be made of brass for maximum corrosion resistance. A double "O" ring type operating shaft seal shall be used for a leak resistant, long life seal. Ambient temperature range shall be -30°C to +40°C (-22°F to +104°F).

Standard Components

For a manual switch the following shall be included:

- 1) Eleven gauge mild steel tank painted light gray with stainless steel and brass fasteners.

- 2) Two lifting eyes.
- 3) Crossarm or pole mounting bracket and hardware.
- 4) Grounding provisions.
- 5) Gas pressure gauge and fill valve.
- 6) Three line diagram and corrosion resistant nameplate.
- 7) Spring operator.
- 8) Manual operating handle.
- 9) Colored contact position indicator (open/green, closed/red).
- 10) Padlock provisions for open and close positions.
- 11) Porcelain bushings with copper conductor and hoodnut.
- 12) Lightning arrester provisions.
- 13) Operations counter.

Mounting

Switches shall be equipped with (check one):

- Crossarm mounting kit
- Polemount bracket (horizontal)
- Polemount bracket (vertical)

Options

The following options shall be supplied:

- Stainless steel tank.
- Low pressure warning device.
- Temperature compensated gas density gauge
- 4/0 brass ground lug.
- NEMA 2-hole aerial lugs.
- NEMA 4-hole aerial lugs.
- Clamp style aerial lugs.
- Overpressure relief device.
- Wildlife protectors.
- Lightning arresters.
- Potential transformers.
- Current transformers (600:5) (500:1) (1000:1)
- Down rod operator kit. Does not include rods.
- Motor actuator
- Analog voltage sensors.
- 600A porcelain bushings with copper rod.
- 600A apparatus bushing with elastomeric insulator and (AL) (CU) rod.
- 600A apparatus bushing with (AL) (CU) rod.
- Automation accessories.

630A LOAD BREAK WITH 40kA MOMENTARY

LINEAR PUFFER SWITCHES



G&W's overhead Linear Puffer (LP) load break switches are designed for operation on distribution systems rated through 38kV, 630A continuous and 40kA asymmetrical short circuit. LP switches can accommodate almost every user switching requirement. The switches are designed and tested to applicable ANSI and IEC standards.

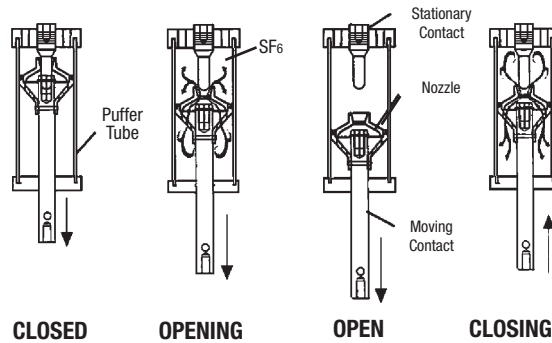
FEATURES

Refer to G&W's Solution Advantage section, page 3 for general features.

Heavy Duty Ratings — LP switches are designed for rugged duty applications. Switches are tested and rated to 40kA rms asymmetrical momentary and fault close, 1200 loadbreak operations at full rated current and 2000 mechanical operations.

Visible Open/Close — A color coded contact indicator (green-open, red- closed) is standard and easily visible from ground level. An optional viewing window is available permitting visible verification of contact position for all 3 phases.

LINEAR PUFFER CONTACT PRINCIPLE



The stationary contact and piston assembly (containing the moving contact and nozzle) are housed in clear cylindrical tubes. These are mounted in a modular three-phase assembly which is independent of the switch tank. The stationary contacts are supported independent of the cable entrance bushings, eliminating possible misalignment resulting from tank deflections. The nozzle directs the flow of SF₆ and has a converging/diverging geometry (see photo) which improves the arc interruption capability.

As the contacts separate, the SF₆ is compressed by the piston assembly and directed into the arc zone by the nozzle. The compressed SF₆ flows across the contacts and around the arc established by the separating contacts. The cooling action of the gas is increased by the higher pressure (due to compression) and the flow which constantly provides a supply of cool SF₆ into the arc zone.

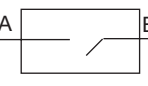
At current zero the temperature of the arc is reduced to the point of de-ionization, ceasing the flow of current. The SF₆ rapidly recovers dielectric strength withstanding the system recovery voltage across the contacts.

As the contacts are closing, the piston assembly compresses the SF₆ between the contacts. This increases the dielectric strength of the gap, minimizing prestrike. The contacts are designed using a tulip bayonet construction (see photo). The sliding action of the contacts on engagement provides a self cleaning action of the main current carrying surfaces. The contact fingers are designed for increasing contact pressure with increasing current for proper operation during momentary or close-into-fault conditions. The contacts have arc resistant copper tungsten tips to minimize erosion of material during load switching and prevent damage to the main current transfer area of the contacts.

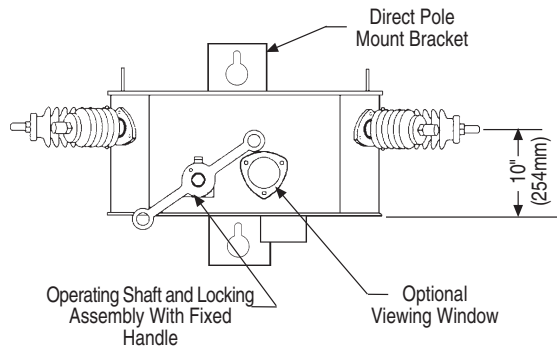
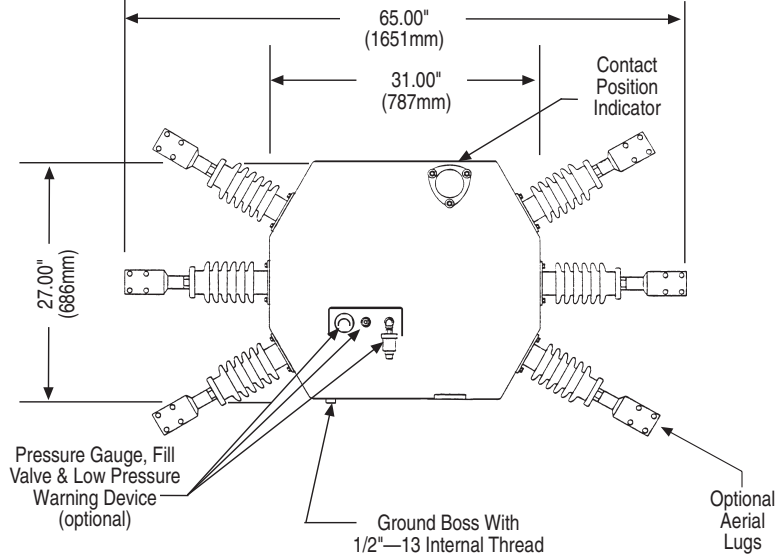


▲ Contact position indicator

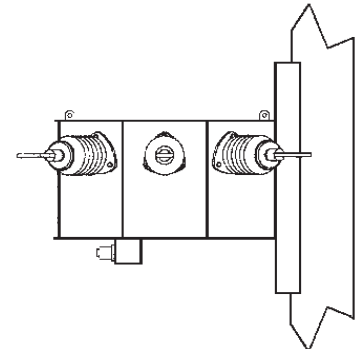
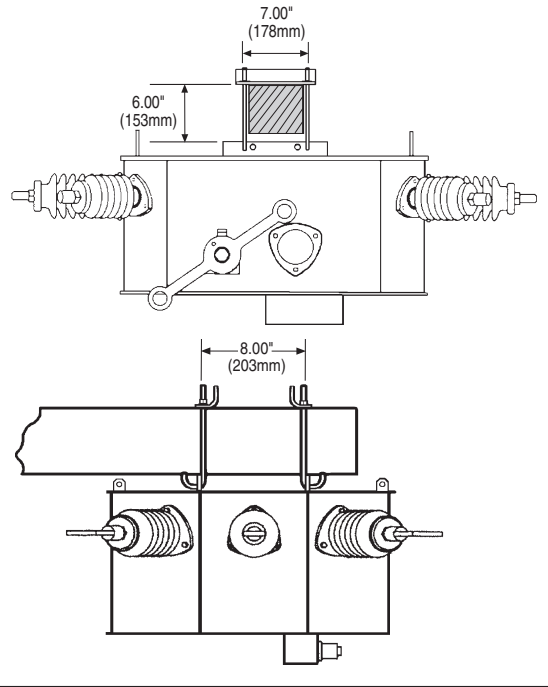
630A LOAD BREAK WITH 40kA MOMENTARY

| One-line Diagram | Voltage Max kV | Catalog Number | Approximate Weight w/SF ₆ lbs. (kgs) |
|---|----------------|----------------|---|
|  | 15.5 | ORA21-376-40PI | 285 (130) |
| | 27 | ORA21-386-40PI | |
| | 38 | ORA21-396-40PI | |

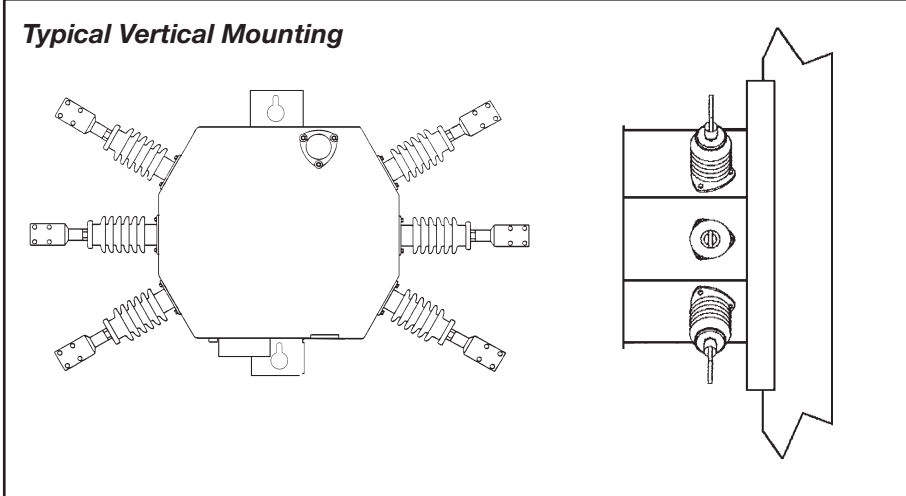
Approximate Dimensions (15.5 kV)
Typical Horizontal Mounting



Crossarm Mounting
Kit includes two galvanized, predrilled angle channels, four stainless steel J bolts and hardware.



Typical Vertical Mounting



630A LOAD BREAK WITH 40kA MOMENTARY

TYPICAL SPECIFICATIONS LINEAR PUFFER SWITCHES

GENERAL

This specification covers the requirements for manual load interrupting SF₆ linear puffer (LP style) switches for overhead applications.

Design Ratings and Standards

Switches are to be designed, tested, and built per applicable sections of ANSI and IEC standards. Certified test reports shall be provided. The manufacturer shall be ISO 9001:2000 and 14001 certified. The switch assembly shall be rated:

| | | |
|--------------------------------------|--------------------|------------------|
| Maximum design voltage, | | |
| kV | 15.527 | 38 |
| Impulse level (BIL), | | |
| kV | 110125 | 150 |
| One minute withstand (dry), | | |
| AC kV | 5060 | 70 |
| 10 second withstand (wet) | | |
| AC kV | 4550 | 60 |
| 15 minute withstand | | |
| DC kV | 5378 | 103 |
| Continuous and load break current, | | |
| Amps..... | | 630 |
| Momentary current, | | |
| kA asym | | 40 |
| Fault-close current, | | |
| kA asym (3 times)..... | | 40 |
| One second current, | | |
| kA sym | | 25 |
| Open gap withstand, | | |
| kV | | 200 |
| 10 operating overload interrupting . | | |
| capability, Amps..... | | 3000 |
| Operations load interrupting | | |
| endurance at 600A..... | | 1200 |
| Mechanical endurance, | | |
| operations | | 2000 |
| Maximum gas leakage test, | | |
| cc/second | | 10 ⁻⁷ |

The above ratings apply to the switch assembly and may be reduced depending upon the entrances chosen. Also see Rating and Standards, page 15.

Switch Construction

All switch components and entrances shall be assembled in a single welded, mild steel tank. Entrances

shall be internally connected by copper wire ropes and copper bus capable of handling momentary and continuous current duty. The protection degree of the switch tank shall be IPX7 rated. Switches shall be shipped filled with SF₆ gas at approx. 9 psig (60kPa).

Switch Operation

Each switch shall be equipped with an internally mounted rotary type operating mechanism capable of providing quick-make, quick-break operation. The mechanism must be capable of delivering sufficient torque and shall be provided with latches for each position. The mechanism shall use compression type springs to assure long life and reliability. All switch positions are to be clearly identified and padlockable. The operating mechanism shall be actuated from outside the switch tank by an external operating handle. The operating shaft shall be made of stainless steel for maximum corrosion resistance. A double "O" ring type operating shaft seal shall be used for a leak resistant, long life seal. Ambient temperature range shall be -30°C to +40°C (-22°F to +104°F).

Switch Contacts

Switch contacts shall be linear puffer style tulip-bayonet design and made of plated, high-conductivity copper alloy with arcing tips of copper/tungsten alloy. The contacts shall be designed such that arcing does not occur in the area of main current interchange and contact pressure will increase with increasing current flow. The contact nozzle shall have a converging/diverging geometry which improves the flow of SF₆ into the arc zone. Contact travel shall be three inches and have sufficient open contact separation to assure efficient arc extinction and to withstand field DC testing levels and maintain BIL levels. The stationary contacts shall be supported independent of the cable entrance bushings. Temperature rise shall not exceed ANSI C37.71 and IEC 265-1 standards for this type of device.

Standard Components

For a manual switch the following shall be included:

- 1) Eleven gauge mild steel tank painted light gray with stainless steel and brass fasteners.
- 2) Two lifting eyes.
- 3) Crossarm bracket and mounting hardware.
- 4) Grounding provisions.
- 5) Gas pressure gauge and fill valve.
- 6) Three line diagram and corrosion-resistant nameplate.
- 7) Spring operator.
- 8) Manual operating handle.
- 9) Position indicator.
- 10) Padlock provisions for open and close positions.
- 11) Porcelain bushings with copper conductor and hoodnut.
- 12) Lightning arrester provisions.

Mounting

Switches shall be equipped with:

- Crossarm mounting kit
- Polemount bracket (horizontal)
- Polemount bracket (vertical)

Options

The following options shall be supplied:

- Stainless steel tank.
- Low pressure warning device.
- SF₆ density switch.
- Temperature compensated gas density gauge
- 4/0 brass ground lug.
- NEMA 2-hole aerial lugs.
- NEMA 4-hole aerial lugs.
- Clamp style aerial lugs.
- Overpressure relief device
- Wildlife protectors.
- Lightning arresters.
- Potential transformers.
- Current transformers (600:5) (500:1) (1000:1)
- Down rod operator kit . Does not include rods.
- Analog voltage sensors.
- 600A porcelain bushings with copper rod.
- 600A apparatus bushing with elastomeric insulator and (AL) (CU) rod.
- 600A apparatus bushing with (AL) (CU) rod.

AUTOMATION SOLUTIONS

CONTROLS

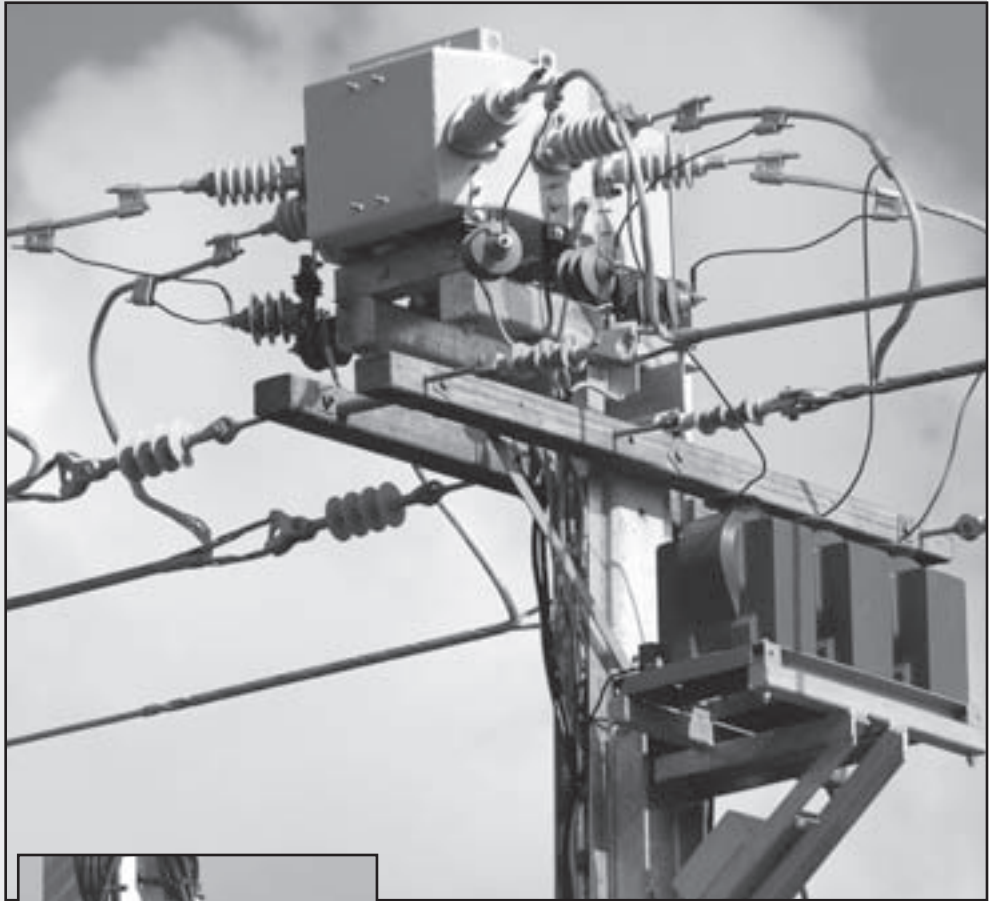
Various electronic controls are available providing:

- Local pushbutton operation and contact indication.
- Remote control and monitoring interface.
- NEMA 4X enclosure
- Batteries and charger. An AC supply (110 or 220 V, customer supplied) is required.
- Automatic lockout if SF₆ pressure is below preset value.
- Local / Remote Selector Switch
- Provision for customer supplied RTU

Automated Sectionalizing

For automated sectionalizing applications, G&W overhead switches can be provided with the popular Schweitzer SEL-351R control already programmed to accept customer system parameters.

Consult factory for automatic transfer solutions.



▲ 15kV model RP switch with lightning arresters and potential transformers.



▶ SEL-351R for sectionalizing applications.



AUTOMATION

G&W offers a full-range of automation products and services that can be customized to fit your requirements, your budget, and your schedule.

SCADA-Ready Switches

These switches are ordered with the very minimum requirements for future automation. Since our manual switches were designed with future automation in mind, most additional automation components can be easily, and economically added – when you are ready.

Motor Operated Switches

These are switches ordered with motor operators and controllers for local electronic operation. All controls are ready for connection to an RTU for complete remote automation.

Fully Automated Switches

These are motor operated switches and controls with an RTU, communication device, and any required voltage and current sensing. G&W will integrate and test these components as a package for your unique application.

Automation Consulting

Not sure how to improve your system reliability? Not certain which switch configuration is right for your application? Not to worry. G&W will help you select the products that best fit your needs.

AUTOMATION ACCESSORIES

G&W can supply a number of accessories to further enhance the functionality of your automated switch. Most are available for upgrades on existing manual switches – so you can add-on to and upgrade your system at your pace.

Voltage Monitoring

G&W can supply voltage sensors that indicate the presence or loss of voltage for a feeder. Alternately, we can provide potential transformers (PTs) for analog voltage measurements. These analog measurements, when coupled with analog current measurements, can provide real-time load and metering values. The PTs may be connected external to the switch, or connected inside an SF6 switch tank.

Current Monitoring

G&W can supply internal or external current transformers (CTs) for both overcurrent protection monitoring as well as metering analog values.

SF6 Pressure Monitoring

For SF6 switches, we can provide either a low pressure warning device or, if cold temperatures are normal in your area, a density switch to indicate the unlikely event of a low dielectric condition.

Faulted Circuit Indicators (FCIs)

Monitoring unprotected load taps for downstream faults is a necessity for automated switches. Faulted circuit indicators can be ordered to provide indication of a downstream fault, thereby preventing operation into a fault.

Customer-Specified Accessories

G&W can integrate other monitoring, control, or data acquisition devices with our switches and automation products. Bring us your requirements, we'll deliver your solution.



▲ RP style switch with motor actuator.



▲ 15kV, model RP switch with lightning arresters and potential transformers.

ACCESSORIES AND OPTIONS

GAS PRESSURE GAUGE AND FILL VALVE (STANDARD)

Color coded to simplify verification of proper operating conditions. A Schraeder type fill valve permits refilling in the field. The gauge and fill valve are made of brass.



▲ Pressure gauge and fill valve

TEMPERATURE COMPENSATED GAS DENSITY GAUGE (OPTIONAL)

The color coded device measures internal tank gas density for maximum precision of switch operating conditions.



▲ Temperature compensated gas density gauge

LOW PRESSURE WARNING DEVICE (OPTIONAL)

Permits remote indication of internal tank pressure. One N.O. and one N.C. form C contact is provided for wiring by the customer.



◀ Low pressure warning device

SF₆ DENSITY SWITCH (OPTIONAL)

For LP switches only. Permits remote indication of gas density to assure proper pressure/temperature operating conditions. One N.O. and one N.C. form C contact for wiring by the customer.



▶ Ground lugs

GROUND LUGS (OPTIONAL)

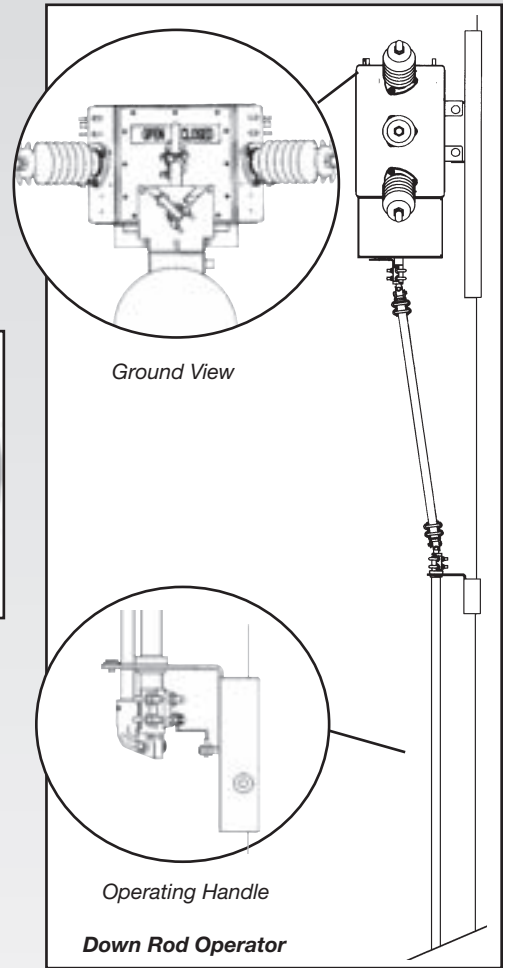
Lugs are bronze, eyebolt style for 4/0 maximum conductor cable.

VIEWING WINDOWS (OPTIONAL)

For LP switches only. Windows are available for verification of open contacts for all three phases.

AERIAL LUGS (OPTIONAL)

Standard lugs are tin plated copper.



Ground View

Operating Handle

Down Rod Operator

OVERPRESSURE RELIEF DEVICE (OPTIONAL)

Overpressure relief devices permit channeled release of any vented pressure.

DOWN ROD OPERATOR (OPTIONAL)

Down rod operating mechanisms are available to permit ground level manual operation.

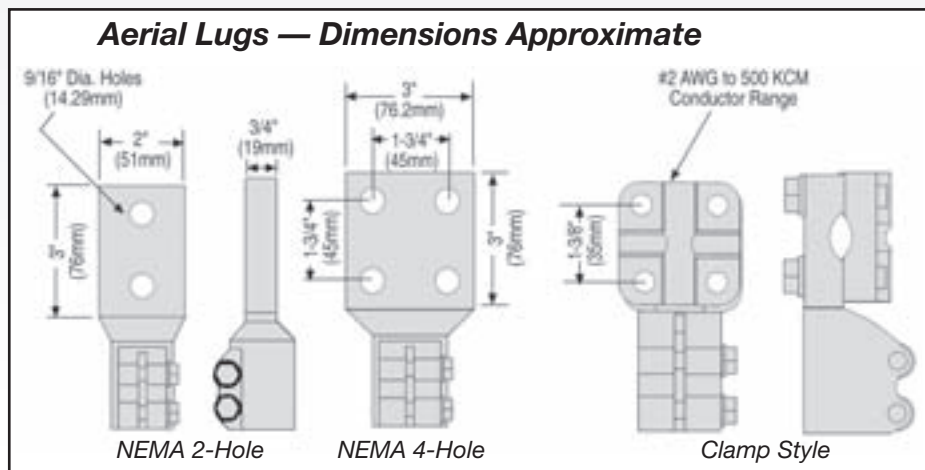
WILDLIFE PROTECTORS (OPTIONAL)

UV stabilized polyethylene wildlife protectors are designed to fit over lightning arrester or insulator skirts to protect from flashover caused by any wildlife interference.

OPERATION COUNTERS (OPTIONAL)

Operations counters are available and viewable through a window located on the switch tank.

Aerial Lugs — Dimensions Approximate



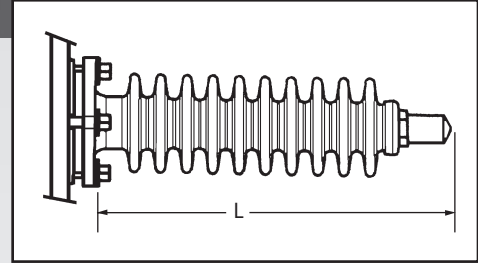
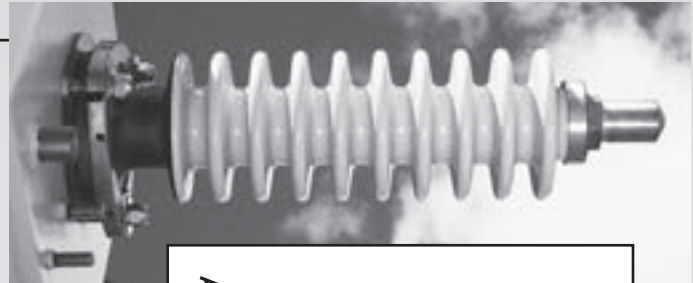
ACCESSORIES AND OPTIONS

PORCELAIN BUSHINGS

For RP and LP Switches

Solid porcelain bushing with copper conductor designed to applicable ANSI/IEEE standards. Standard hoodnut is copper with 1.06" (27mm) dia. hood).

| kV | L in. (mm) | Creepage in. (mm) | I-g Strike in. (mm) | I-I Strike, in. (mm) | |
|------|----------------|----------------------|------------------------|----------------------|--------------|
| | | | | RP | LP |
| 15.5 | 10.4" (264) | 14" (356) | 6.2" (157) | 10" (254) | 11" (279) |
| 27 | 14.4" (366) | 23.5" (597) | 10.2" (259) | 12" (305) | 12" (305) |
| 38 | 17.7" (450) | 36.2" (919) | 14" (356) | -- | 14" (356) |

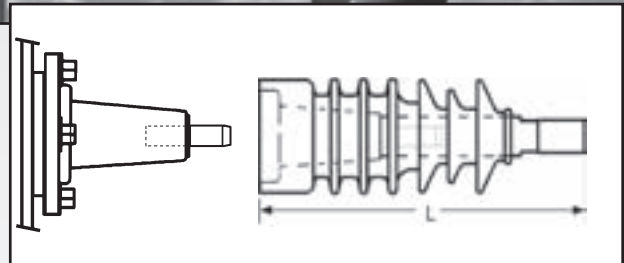


SILICONE BUSHINGS

FOR RP AND LP SWITCHES

Welded apparatus bushing with a one piece, screw-on silicone insulator designed to applicable ANSI/IEEE standards. Standard conductor is aluminum for both. Insulator conductor has a .75" (19mm) dia. tin plated aluminum stud for aerial connection. Copper conductor is optional. Extra creepage silicone insulators available.

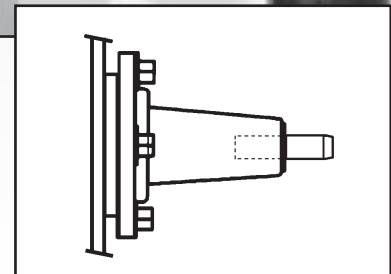
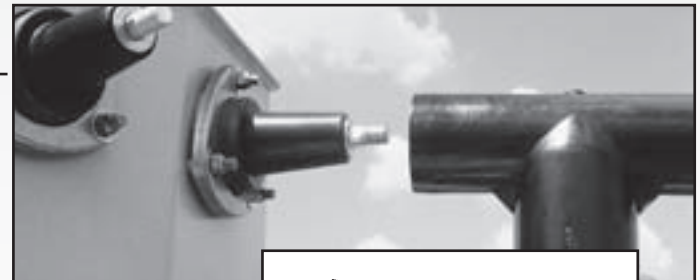
| kV | L in. (mm) | Creepage in. (mm) | I-g Strike in. (mm) | I-I Strike, in. (mm) | |
|------|---------------|----------------------|------------------------|----------------------|--------------|
| | | | | RP | LP |
| 15.5 | 11" (279) | 15" (381) | 9" (229) | 11" (279) | 11" (279) |
| 27 | 15" (381) | 26" (660) | 14" (356) | 14" (356) | 14" (356) |
| 38 | 20" (508) | 38" (965) | 18" (457) | -- | 16" (406) |



APPARATUS BUSHINGS

For RP and LP Switches

Epoxy apparatus bushing for elbow connectors designed to applicable ANSI/IEEE standards. Standard conductor is aluminum (CU optional). A threaded tin plated aluminum stud is standard (CU optional).



RATINGS AND STANDARDS

IEC STANDARDS

| Insulation level | <u>RP Style</u> | <u>LP Style</u> |
|--|-----------------|----------------------|
| - rated voltage, kV | 1224 | 122436 |
| - withstand voltage, 50Hz | | |
| - between phases and against earth, kV..... | 2850 | 285070 |
| - across the isolating distance, kV..... | 3260 | 326080 |
| - lightning impulse withstand voltage | | |
| - between phases and against earth, kV..... | 75125 | 75.....125.....150 |
| - across the isolating distance, kV..... | 85145 | 85.....145.....195 |
| Current ratings | | |
| - rated normal current, A | 630630 | 630630.....630 |
| - mainly active load breaking current, A (500 CO operations) | 630630 | NA.....NANA |
| - mainly active load breaking current, A (1200 CO operations) | NANA | 630630.....630 |
| - closed loop breaking current, A | 630630 | 630630.....630 |
| - line-charging breaking current, A | 2525 | 404040 |
| - cable-charging breaking current, A | 2525 | 404040 |
| - no-load transformer breaking current, A | 2121 | 212121 |
| Short circuit ratings | | |
| - short-time withstand current, I _{th} , kA 3s | 1212 | 161616 |
| - peak withstand current, I _{dyn} , kA | 31.5 31.5 | 646464 |
| - short-circuit making current, peak value, kA | 31.5 31.5 | 646464 |

ANSI STANDARDS

| Insulation level | | |
|---|--------------|----------------------|
| - nominal voltage class, kV | 1525 | 1525.....34.5 |
| - rated maximum voltage, kV | 15.527 | 15.52738 |
| - rated continuous current, A | 630630 | 630630.....630 |
| - rated impulse withstand voltage, kV..... | 110125 | 110125.....150 |
| Industrial frequency withstand voltage test | | |
| - 1 min. dry, kV..... | 5060 | 506070 |
| - 20 s, wet, kV | 4550 | 455060 |
| - DC, 25 min. withstand, kV | 5378 | 5378103 |
| Breaking tests | | |
| - rated continuous and load-interrupting current, A | 630630 | 630630.....630 |
| - line charging breaking current, A | 2525 | 404040 |
| - cable charging breaking current, A | 2525 | 404040 |
| - no-load transformer breaking current, A | 2121 | 212121 |
| Short-time and making current tests | | |
| - short-time current, asymmetrical, rms kA. | 2020 | 404040 |
| - short-time current, 1 s, symmetrical, kA | 1212 | 252525 |

