HUBBELL® TIPS & NEWS

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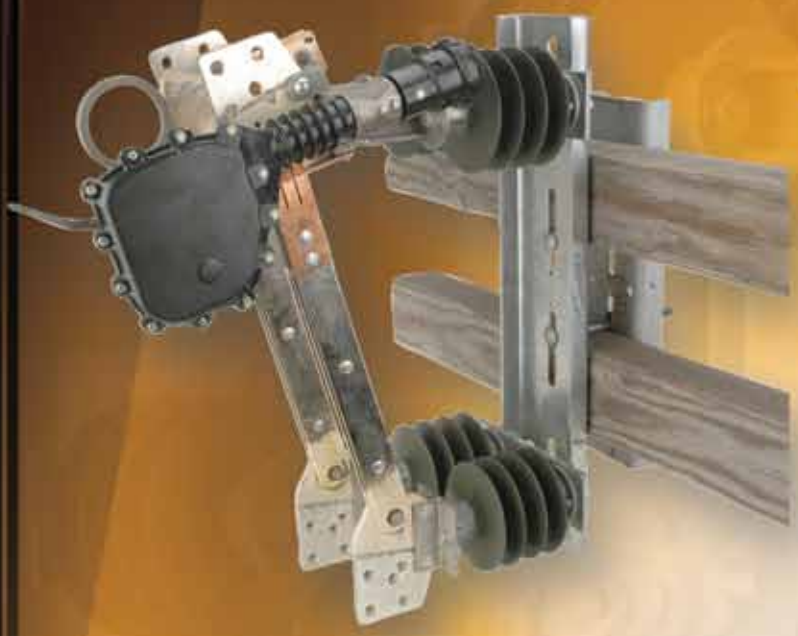
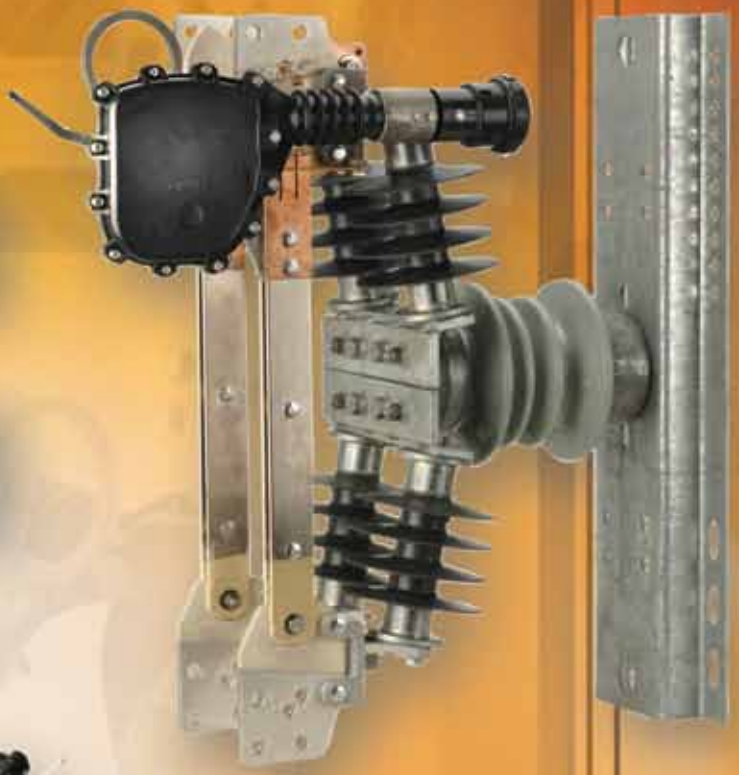
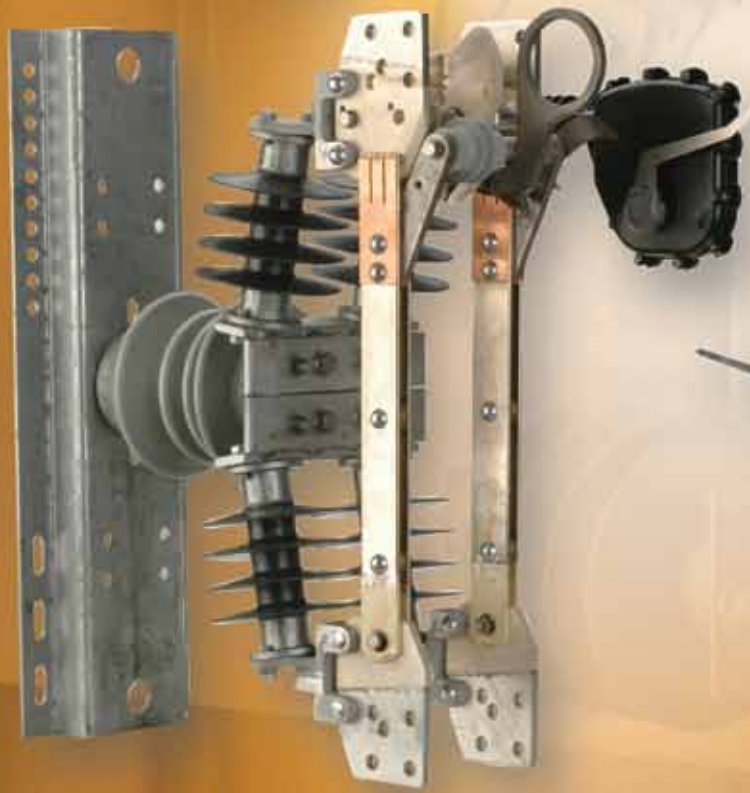
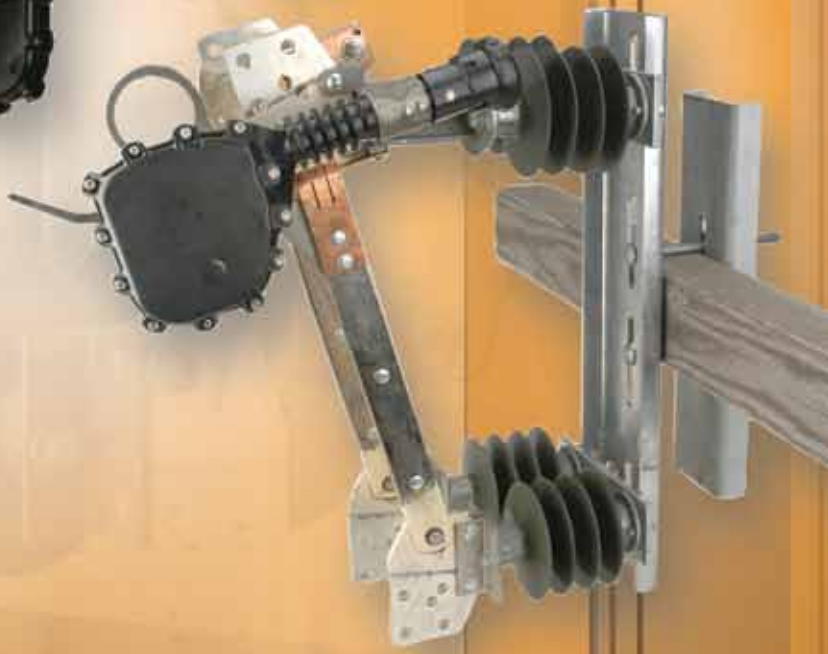








Single-Pull Regulator By-Pass Switches

perform four automatic switch operations in proper sequence

• Distribution & Station Class models • Models for 15.5kV, 27kV & 38kV

The automatic sequenced operation of a Hubbell Type BPR switch minimizes the possibility of operator error. To isolate a voltage regulator without interrupting service to the system, a single pull on the pull ring performs four switching operations in proper sequence. During closing, the automatic sequence is reversed.

Designed for application-specific advantages

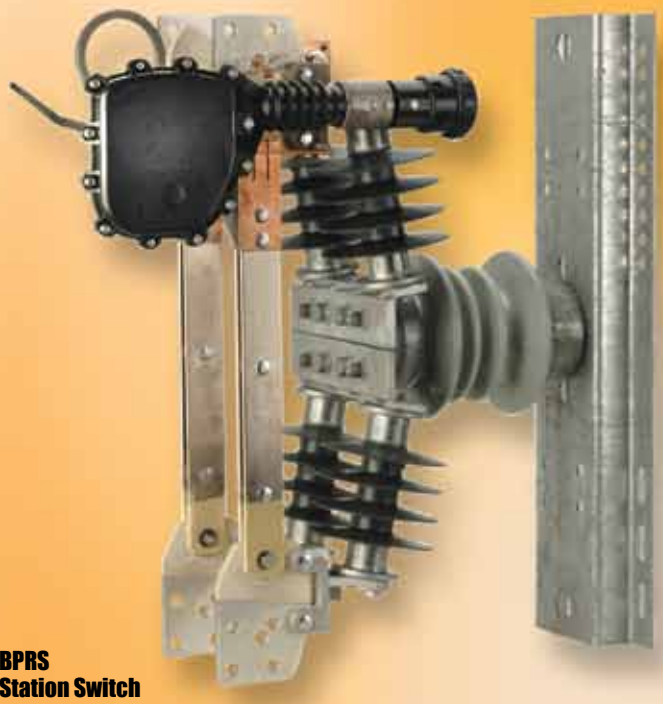
By design, the Type BPR Switch allows undisturbed continuity of service and provides an economic means for bypassing and disconnecting a distribution or substation voltage regulator for maintenance. It is designed for use with all voltage regulators that can be set on neutral for the switching operation. This includes all single- and three-phase regulators except three-phase induction regulators. The BPR Switch is automatically sequenced to bypass the voltage regulator with a single pull operation, without interrupting service to the system. That is, the voltage regulator

BPRD
Distribution Switch

Continuous Current Rating: 600 Amps

Feature —	Advantage —
• Distribution base design and resultant angled switch mounting.	• Mounts without drilling holes or additional mounting brackets. Angled mounting facilitates opening and closing operation.
• Versatile terminal pad design.	• Allows use of NEMA 2-hole or 4-hole terminals and training of incoming conductors for the most desirable connections.
• BPRS is the only single-pull 1200-Amp regulator by-pass switch available.	• Provides the reliability of single-pull operation, plus reduced size and weight for a 1200-Amp switch.
• ESP® silicone alloy rubber insulators.	• Time-proven technology for long-term performance and light weight.

Single- and Double-Crossarm mounting provisions for the BPRD Distribution Switch



BPRS
Station Switch

Continuous Current Ratings: 600 Amps and 1200 Amps

is always bypassed in proper sequence without any specific operation actions by the operator.

The BPRD Switch for Distribution voltage regulators is applied where isolation from the system is required to perform periodic maintenance. A 600-Amp rated switch, the Type BPRD is available in system application ratings of 15.5kV - 110kV LIW*, 27kV - 150kV LIW*, and 38kV - 150kV LIW* (for use on grounded-wye systems). The BPRD switch utilizes a mounting base designed for crossarms, poles and other distribution applications.

The BPRS Switch for Station Class voltage regulators is applied where isolation from the system is required to perform periodic maintenance. Available in 600 and 1200-Amp ratings switch, the Type BPRS is available in voltage application ratings of 15.5kV - 110kV LIW* and 27/38kV - 200kV LIW* (can be used on grounded-wye systems). The BPRS switch utilizes a mounting base designed for substation structures.

. . . continued

Performance Specifications

Application, Catalog No.	Design kV, Nom./Max.	Lightning Impulse Withstand, kV	Continuous Current Rating, Amperes	Peak Withstand, Peak Amperes	Short Time Withstand, Amps	Weight, lb.
Distribution, BPRD06	14.4/17.1	110	600	65,000	25,000	75
	25.0/29.0	150	600	65,000	25,000	80
	34.5/38.0†	150	600	65,000	25,000	80
Station, BPRS06	14.4/17.1	110	600	65,000	25,000	90
	27.0/29.0 & 34.5/38.0†	200	600	65,000	25,000	95
Station, BPRS12	14.4/17.1	110	1200	99,000	40,000	90
	27.0/29.0 & 34.5/38.0†	200	1200	99,000	40,000	95

†*38.0kV grounded-wye application only*

Single-Pull Regulator By-Pass Switches

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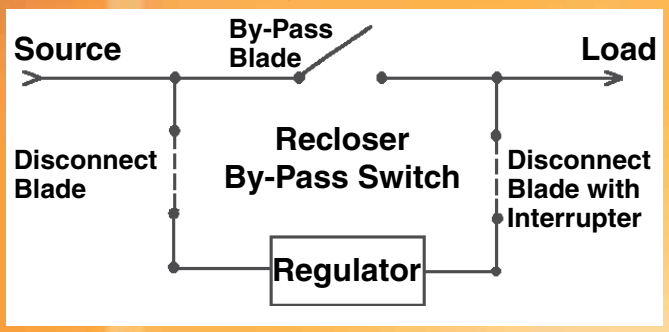
Automatic Sequenced Operation

Both the Type BPRD and BPRS are single-pull sequenced switches. A single pull on the pull ring on opening performs four switching operations (A, B, C, D) in proper sequence as shown.

During the closing operation, the automatic sequence is reversed. The enforced sequence operation minimizes the possibility of operator error.

Normal Operating Position



By-pass blade is open, disconnect blades are closed.

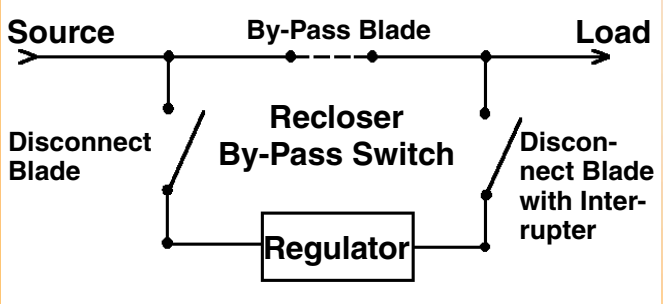
To open, a hookstick is placed in the pull ring as shown.

When the switch is fully opened, the hookstick is removed from the pull ring.

A Bypass blade closes.

B Source disconnect blade opens.

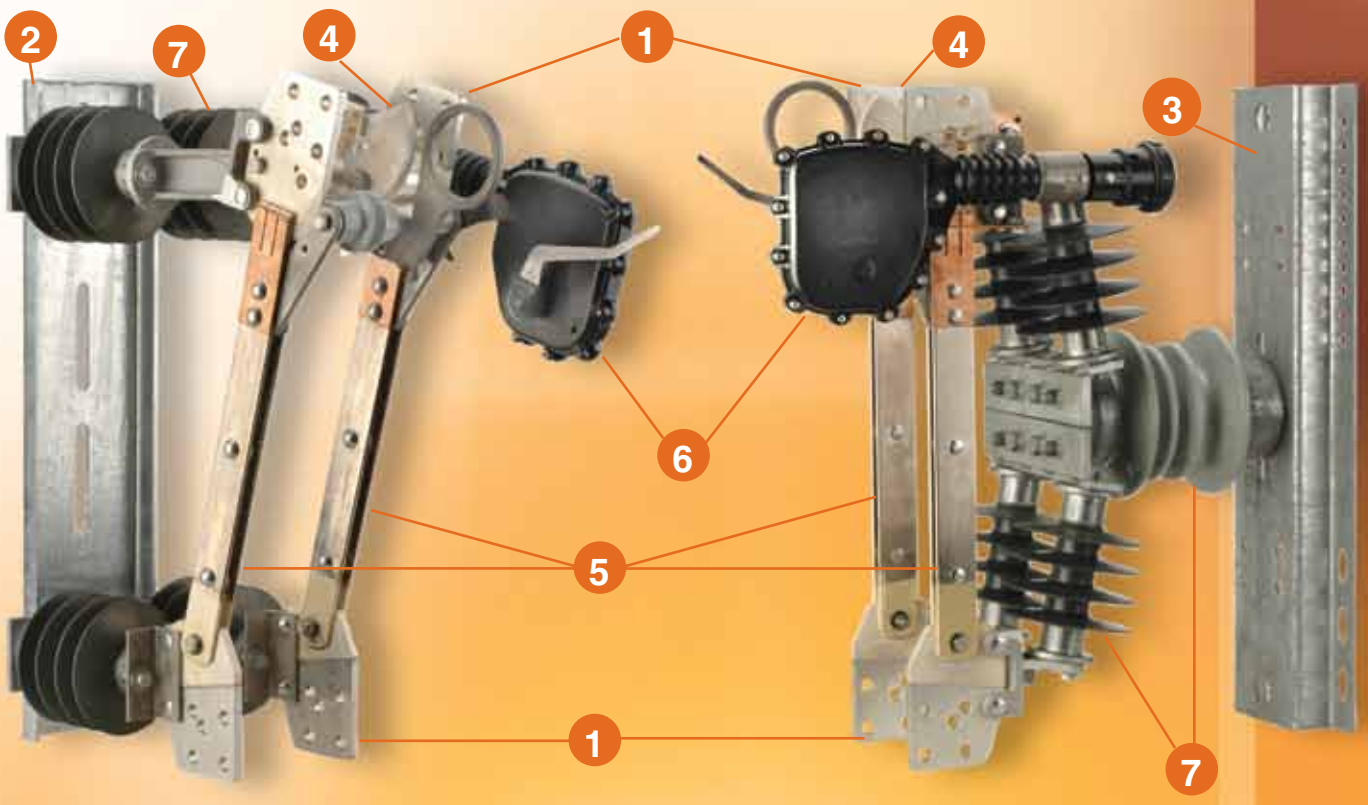
By-Pass Operating Position



Switch fully opened

C Load disconnect blade opens through interrupter.

D Interruption of regulator exciting current.



BPRD Distribution Switch

BPRS Station Switch

Components of the Type BPR Switch

1 Terminal Pads
High-conductivity tin-plated copper terminal pad accommodates NEMA two-hole or four-hole configurations. To permit "training" incoming conductors for the most convenient connections, the terminal pad design provides extra bolt holes.

2 Mounting Base, BPRD Distribution Switch
Versatile galvanized-steel base design permits mounting on distribution poles as well as single or double crossarms. Angled mounting of the base places the switch at 15° for easy opening and closing operation.

3 Mounting Base, Type BPRS Station Switch
Galvanized-steel base design permits convenient mounting on substation structures.

4 By-Pass Blade
The by-pass blade is silver-plated high-conductivity copper. It is mechanically connected to the disconnect blades to operate in proper sequence.

5 Disconnect Blades
The disconnect blades are high-conductivity copper, silver-plated at all contact areas. These blades are mechanically connected to the by-pass blade to operate in proper sequence.

6 Interrupter
Interrupter technology will properly interrupt all expected regulator exciting currents during by-pass operation.

7 Insulators
ESP® silicone alloy rubber, 2.25-inch bolt circle insulators. See Catalog page 14B-3 for further description. Type BPRS switch utilizes a TR-rated station post insulator to meet most substation requirements. ■

For more information, contact your Hubbell Power Systems representative, fax 573-682-8714 or e-mail hpsliterature@hps.hubbell.com.

OHIO BRASS ARRESTERS

PVN PVNA

PVNA:
The Ohio Brass PVNA (ANSI-Station) polymer arrester is light weight with a smaller cross section for applications where size is an issue. It is particularly suited for enclosure applications. You'll find more details in Ohio Brass Catalog Section 30.

PVN:
Use on voltages of 2.4kV through 230.kV. Light. Weight is half that of an equivalent porcelain-housed arrester. Tough. Polymer resists breakage commonly associated with porcelain. Easy to handle. Single unit design requires no field assembly. You save on labor.

Because of a reduced diameter of energized line terminals and grading rings, our PVN arresters reduce space requirements. The design also improves contamination performance over multi-unit designs. ■

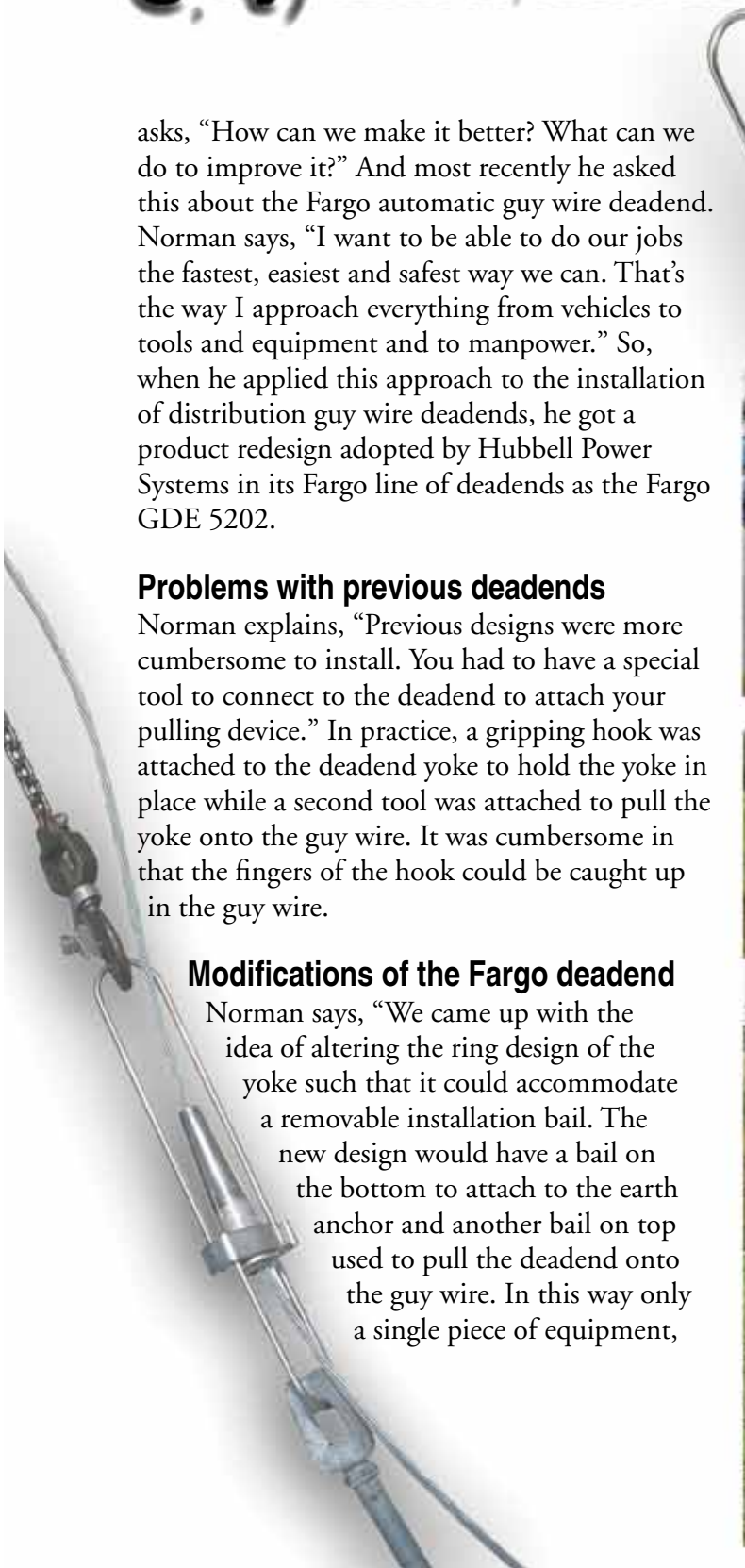
For more information, contact your Hubbell Power Systems representative, fax 573-682-8714 or e-mail hpsliterature@hps.hubbell.com.

ANDERSON™ & FARGO®

Distribution Selector Wheel

Back by demand, the new Connector Selector Wheel combines Anderson and Fargo distribution connectors information into a popular device you can use to select the right connectors for the appropriate distribution conductor sizes. We'll also be introducing an Anderson and Fargo transmission Connector Selector Wheel in the coming weeks.

Deadend redesign simplifies guy wire installation



Colquitt EMC, a not-for-profit consumer-owned electric distribution system in Georgia with 7,000 miles of 14.4 kV distribution lines strives to keep its costs as low as possible for its 33,600 members. To help Lamar Norman, manager of operations keep his maintenance costs in line, he often looks at a product and asks, "How can we make it better? What can we do to improve it?" And most recently he asked this about the Fargo automatic guy wire deadend. Norman says, "I want to be able to do our jobs the fastest, easiest and safest way we can. That's the way I approach everything from vehicles to tools and equipment and to manpower." So, when he applied this approach to the installation of distribution guy wire deadends, he got a product redesign adopted by Hubbell Power Systems in its Fargo line of deadends as the Fargo GDE 5202.

Problems with previous deadends

Norman explains, "Previous designs were more cumbersome to install. You had to have a special tool to connect to the deadend to attach your pulling device." In practice, a gripping hook was attached to the deadend yoke to hold the yoke in place while a second tool was attached to pull the yoke onto the guy wire. It was cumbersome in that the fingers of the hook could be caught up in the guy wire.

Modifications of the Fargo deadend

Norman says, "We came up with the idea of altering the ring design of the yoke such that it could accommodate a removable installation bail. The new design would have a bail on the bottom to attach to the earth anchor and another bail on top used to pull the deadend onto the guy wire. In this way only a single piece of equipment, the pulling winch or come-along, is needed to install the deadend and the grappling hook is eliminated." Once the yoke is pulled onto the wire, the come-along and the installation bail can be removed. The stamped steel jaws of the yoke will hold the guy wire thus completing the installation. The stainless steel pulling bail is re-usable.

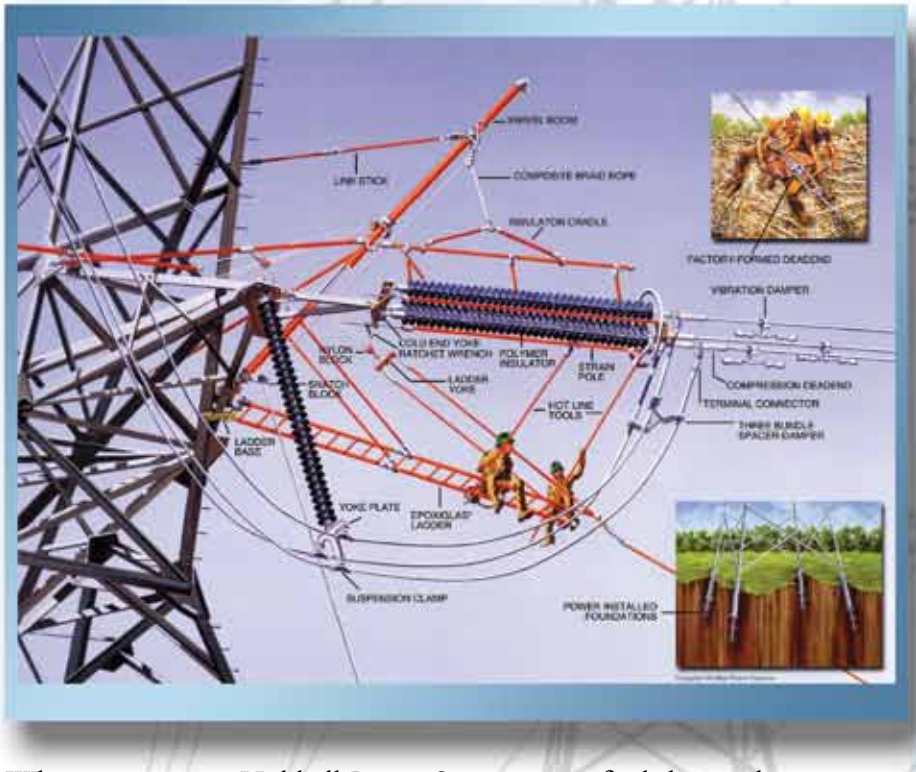
While Colquitt EMC has just started using the newly designed deadends, Norman is confident in the advantages he sees. Referring to the Fargo GDE 5202, he says, "It's time saving, labor saving and equipment saving. We need fewer tools and less manpower. With all of these factors considered, it's worth a little more money to purchase them initially because in the long run the cost will be less because of needing fewer tools and manpower."

For more information, contact your Hubbell Power Systems representative, fax 573-682-8714 or e-mail hpsliterature@hps.hubbell.com.

TRANSMISSION PRODUCTS

HUBBELL® HAS YOU COVERED

When you invest in transmission, you want as trouble-free service as you can get for the life of the line. That's where Hubbell Power Systems comes in.



When you turn to Hubbell Power Systems, you find the products you need and more. You will partner with a single supplier with more than 100 years of utility experience. A supplier whose responsible for everything including delivery, function and fit of the various products you'll be using on the project. That makes your job easier and the project less costly. Whether it's new construction or an upgrade, contact us for one order, one transaction and the back up you want.

Products

Conductor Support
- Insulators
- Hardware
- Clamps
- Deadends

Conductor Protection
- Dampers
- Spacers

Lightning Protection
- Arresters
- Consulting Service

Structure
- Anchors
- Foundations
- Guy Deadends

Maintenance
- EHV Hot Line Tools
- Tool Training
- Grounding Systems

Reliability
- Financial Strength
- Responsibility Defined
- ISO Qualified
- Testing Facilities
- Large Commitment
- Experience
- Responsive

Savings
- One vendor
- One purchase order
- Cut procurement costs
- Lower bid price
- Components fit assured
- Coordinated delivery
- Quality

We can supply 90% of the components needed on a steel tower.

CHANCE®

Involve us early in the planning, and we'll work with you to help configure your construction to be maintenance friendly. We'll help you develop your Chance hot line tool lists, and we'll verify your line is hot line tool maintainable. As the most respected name in power-installed anchors and foundations, Chance can use our geotechnical data base and soil analysis capabilities to help you pick the anchors and foundations you need well before construction begins. We'll also help you review your deadending requirements to bring your tower secure/support package together.

OHIO BRASS®

Our Ohio Brass insulator/arrester package is second to none. With Hi*Lite® transmission insulators you bring the experience of the world leader to your side. Our transmission insulators were the fist polymers commercially available. Used in conjunction with Protecta*Lite® lightning arresters, this transmission insulator/arrester package protects you from interruptions initiated by lightning. The metal-oxide Protecta*Lite arrester used in parallel with line insulators limits voltage across the insulation to a value below the insulator flashover voltage. The lightning surge current is diverted to ground in a controlled way to help avoid service interruptions. Transmission insulators available in voltages to 765kv.

ANDERSON™ & FARGO®

With Anderson and Fargo tower hardware, we'll help you coordinate the interaction of the various vibration dampers, splices, connectors, fittings and deadends you need to deliver a transmission package that cuts costs. Our Tower Pac Kits provide all the material needed including the assembly pack which includes components of one or more assemblies packed together and marked with Hubbell and customer specified assembly numbers. Another option is the Tower Pac with components of all assemblies for a given structure type packed together, palletized and marked with Hubbell and customer-specified structure type numbers.

System reliability relies on electronic sectionalizers

Annual protection upgrade ends with Sectionalizer solution

Josh P. Castonguay, E.I.
Engineering
Green Mountain Power Corporation
Colchester, Vermont

Hubbell electronic sectionalizers fit in a cutout, just as a standard fuseholder, as installed here on the Green Mountain Power Corporation system.

Our customers tell us that reliability is the most important quality of their electric service, so at Green Mountain Power we continually search for new technologies and practices that help us improve reliability. We have found that focusing special efforts on our worst circuits is the best way to make significant improvements.

Each year we identify our 20 worst circuits by ranking them according to the number of customer hours out and the number of events. We study the types of outages and then we select two or three circuits for a complete protection plan. The plan always analyzes the best use of hydraulic and electronic reclosers, fault indicators, and Hubbell fused cutouts and electronic sectionalizers.

Using Cyme analysis software, we analyze load and fault currents at all points on the circuits, and then we properly size fuses, reclosers and sectionalizers for optimal circuit protection.

Re-coordination yields results

I have come across many theories in protection from fuse saving to trip saving, ground trip, sensitive earth fault protection, among many others. I have combined a few ideas for a protection plan, varying it from circuit to circuit depending on load and available fault current.

One plan that works well is replacing large three-phase and single-phase tap fuses coming off the main line with reclosers. Usually this involves fuses that are sized 50 amps continuous and above. For single-phase taps, I have used hydraulic reclosers for their lower cost and ease of installation. For larger three-phase taps I most often use electronic reclosers. If there is little or no three phase load beyond the taps, I sometimes use three single-phase reclosers to allow single-phase tripping on the line.

With this done, I remove fast trips at the substation and usually use two or three operations for any fault on the main line. Beyond the tap reclosers, I begin a complete re-coordination of the fuses with the recloser at the head of the tap. Here, I do have fast trips and allow for some fuse saving depending on the size of the tap and number of customers.

Sectionalizer perfects the process

On more than one occasion I have run into issues with load being too great for a fuse to coordinate with an upstream recloser, or too many fuses in series.

For these situations, the cutout-mounted Electronic Sectionalizer is the perfect solution. The Sectionalizer does not require coordinating performance curves as with a fuse, but does provide higher continuous current capabilities than I could get with a fuse. There is no extra equipment to mount because the Sectionalizer is extremely easy to install, just like a fuseholder in a cutout.

I am still waiting for a fault to occur but I guess that is the catch of being a protection engineer. If you do your job right, nothing eventful actually happens.

Eliminate nuisance outages easily

The Resettable Sectionalizer is a device which has built-in intelligence to discriminate between temporary (transient) and permanent faults on distribution systems. It operates in conjunction with a back-up automatic circuit recloser or a reclosing circuit breaker. It is specifically designed for the protection of single-phase lateral lines. When installed at the beginning of a lateral, it virtually eliminates nuisance outages. Its functional concept and design greatly improve system coordination.

Traditionally, the individual laterals are protected by expulsion-type fused cutouts. These cutouts are intended to operate only during a permanent fault on the lateral by carefully coordinating the fuse links with the time-current characteristics of the upstream automatic circuit recloser or reclosing circuit breaker. Unfortunately, coordination between fuse links and upstream automatic circuit reclosers is unachievable above a few thousand amperes. Coordination, if achieved on paper, can easily change as the fault current increases due to larger capacity facilities, addition of larger substations or reconductoring. Errors in re-fusing is another way that system coordination can be lost.

A sectionalizer is a protective device which has no time-current characteristics. With no fuse curve to intersect recloser time-current characteristics, the coordination range is extended to the maximum interrupting rating of the upstream protective device.

This practical function makes the sectionalizer an ideal device for application on single-phase laterals where available fault currents make coordination unachievable with fuses. Electronic resettable sectionalizers provide the utility with an economical and easily retrofittable method of enhancing protection of the distribution system. An electronic resettable sectionalizer installed at the start of a lateral, in place of a fuse, can greatly enhance system coordination service continuity and reliability at reduced costs.

FARGO® ground rod connector improves grounding at Austin Energy and contributes to improved reliability.

By Jeff Padavick
Superintendent Transmission and North Distribution
Austin Energy, Austin, TX

After using acorn and split-bolt clamps for ground rod connections for up to 40 years, Austin Energy has changed to the exclusive use of Fargo GC-268 ground-rod connectors for distribution and transmission grounding. The strategic plan of this municipally owned utility in Austin, TX, emphasizes reliability, and a key part of that program is to improve the grounding on the T&D system. We have over 5,500 miles of overhead primary and secondary distribution lines and over 4,700 miles of underground primary and secondary lines in a service territory of 421 square miles. Our new distribution standards call for a resistance of 25 ohms or less on non-apparatus poles and 10 ohms or less on apparatus poles. We also strive to obtain 10 ohms or less on transmission. The rocky soil in this part of Texas makes it challenging to obtain a good ground, but we feel that with the new connector we will achieve these resistance levels and also get better longevity out of the connection.

Problems with previous connectors

Acorn clamps can become loose over time or be misapplied, resulting in a poor connection. If the connector is installed on the rod and is driven below ground, dirt can enter the connector and cause a bad connection and contribute to its loosening over time. We feel that we will not have these problems with the new product because of its design and ease of installation.

Features of the connector

The features that made us make the change to the Fargo GC-268 connector were its ease of installation – how easy it is to simply apply the connector to the rod and tighten the bolt with a wrench – and the large surface contact area of the connector compared to the acorn and split-bolt connectors (over twice the area). We like the way it gets snug on the rod. Having a nice round, symmetrical shape prevents it from vibrating loose.

Acceptance by crews

When introducing a new product for use on the system, it is extremely important to get buy-in or feedback from the crews. When they accept something like this, they will put them on right and use them. We recently had a safety meeting in which we discussed the Fargo connector. The crews reported that they like it. They have accepted it, and expressed that the new connector makes a better ground connection and is easier and quicker to install than previous products. ■

For more information, contact your Hubbell Power Systems representative, fax 573-682-8714 or e-mail hpsliterature@hps.hubbell.com.

Safety drives utility's control of reclosers

Permanent solution avoids trouble for temporary situations

• Type BP3 By-Pass Switches of Hubbell Power Systems

Christopher M. Chastain, P.E.
Electrical Engineer
Harrison REMC
Corydon, Indiana

The reason we chose this BP3 Switch configuration was to be able to completely bypass or disconnect the reclosers from the system. This would be to work on them or to have a visual open break whenever the crews work downline.

We have all heard horror stories of reclosers closing in on the line. This configuration should avoid that.

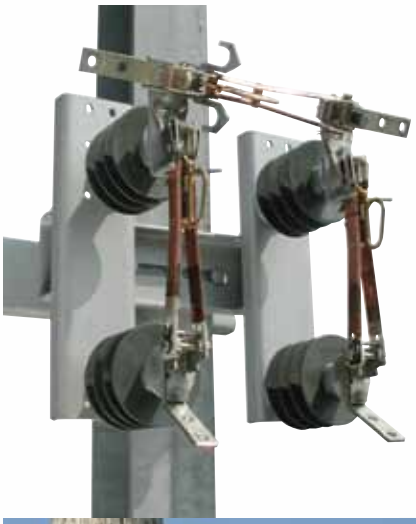
Before, our hydraulic reclosers were connected to the line by hotline clamps. That was fine for those lower-amperage-rated reclosers.

But now, our electronically controlled reclosers could be carrying a much higher current than the hotline clamps' rating. This switch configuration also makes better connections to the line than a hotline clamp.

Clean-appearing one-lift installation of three BP3 By-Pass Switches was quick and easy with three-phase mounting bracket configured by Hubbell Power Systems for Harrison REMC.

About this expanding utility system

Harrison REMC is located in southern Indiana along the Ohio River. Just west of Louisville, Kentucky, close to the Interstate 64 corridor, it now has some 21,000 members, growing around 3.5% per year. Over its 2,100 miles of line, the 12.47/7.2 kV system's peak load is 120 MW (approximately one-third commercial/industrial, with largest load at 5 MW).



Back Strap Mounting and Pole Mounting variations are available.

BP3 Switch design features and benefits

- 600 Amp rating available for 14.4kV, 25kV, and 34.5kV
- Loadbreak hooks • Right or Left opening choices
- Copper blades with silver-plated contacts
- Galvanized welded-steel base for rigid alignment
- ESP™ silicon alloy rubber insulators for maximum leakage distance and light weight

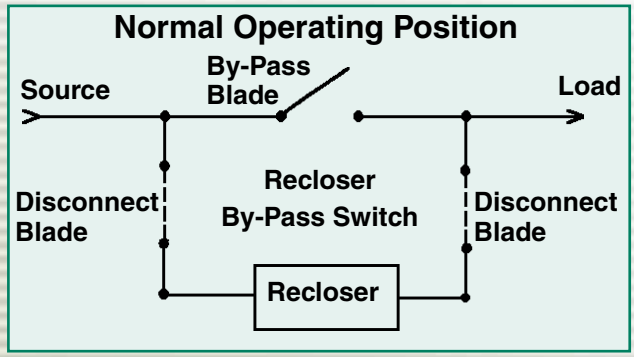
BP3 Switch operation solves problems

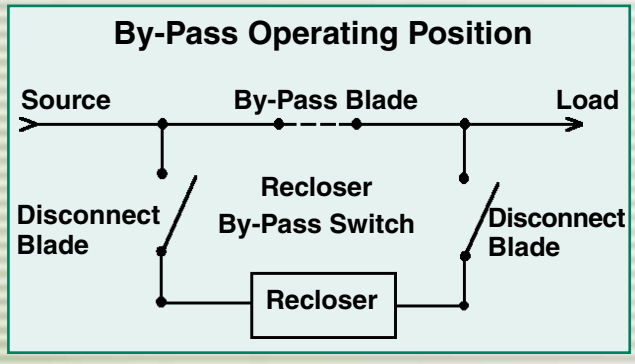
The two figures at right illustrate the BP3 By-Pass Switch operation.

In normal operation, the by-pass switchblade is open and the two disconnect blades are closed, allowing the recloser to be in the circuit.

When recloser maintenance, testing, repair or removal is required, first close the by-pass blade to provide a parallel current path. Then open the recloser's internal contacts. And last, open both disconnect blades of the by-pass switch.

In this way, service continuity is maintained and the recloser is isolated from the line. To put the recloser back in service, the switch operating procedure is reversed.





Epoxiglas® Extension Arms

• Perfect for reconductoring, changing insulators

Suspended under a crossarm by brackets, a Chance® Epoxiglas® Extension Arm supports conductors removed from the original crossarm. Each conductor is placed in a wireholder on the insulated Extension Arm for systems through 15 kV.

For applications up to 34.5 kV, install insulator M4805-7 below each wireholder. Insulators must be ordered as separate items.

For $3\frac{3}{4}$" x $4\frac{3}{4}$" crossarms only, choose from two units of $2\frac{1}{2}$"-diameter Epoxiglas and rated at 150 lb. maximum vertical load per wireholder:

- Catalog No. H4800-60 is 5 ft. long and comes with one wireholder;
- Catalog No. H4800-72 is 6 ft. long and comes with two wireholders.

For easy handling, these units weigh only $11\frac{1}{2}$ and 13 lb. (6.2 and 5.9 kg.).

For more information, contact your Hubbell Power Systems representative, fax 573-682-8714 or e-mail hpsliterature@hps.hubbell.com.

NOTE: Because we have a policy of continuous product improvement, we reserve the right to change design and specifications without notice.

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Hubbell TIPS & NEWS magazine is published to inform personnel of electric utilities and associated companies of new ideas and techniques in transmission and distribution practices. The magazine, under different titles and formats, has been published since 1932.

Your suggestions and editorial or photographic contributions are invited and may be submitted to **Hubbell TIPS & NEWS.**

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210 N. Allen Street
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CANADA • 870 Brock Road South • Pickering, Ontario L1W 1Z8 • Phone: 905-839-1138 • Fax: 905-831-6353 • e-mail: infohps@hubbellonline.com
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