

GENERAL FEATURES FOR SEISMICALLY CERTIFIED SWITCHES

Since 1905, G&W has provided custom power solutions to electric power users around the world. G&W has a wide selection of reliable, quality switching and fault interrupting products to meet the most stringent customer requirements, including those requiring seismic testing and certification. For seismically active areas requiring a device for load switching, line sectionalizing or fault interruption, G&W can provide a solution for distribution system switching and protection. When specifying switchgear for seismically active areas, consider these features:

Maximum Operator Safety

SF6 gas is a nontoxic, nonflammable switching dielectric. Dead-front switch construction eliminates any exposed live parts. Spring-assisted mechanisms assure quick-make, quick-break operation. Viewing windows permit visual verification of open or closed contacts. Tamper-resistant enclosures utilize penta-head bolts and padlocking provisions. Specially designed frames and enclosures provide robust support for switches installed in seismically active areas.

Minimal Maintenance

G&W SF6 switches are corrosion-resistant, totally sealed and factory filled. They eliminate the need for field adjustments of critical contact areas or concerns with environmental contamination or intrusions. A periodic check of the pressure gauge is all that is required.

OSHPD Certified — OSHPD, the Office of Statewide Health Planning and Development, is a government agency in California. Part of its mission is to assure the safety of buildings used by healthcare providers. By International Building Code and California Building Code standards, switchgear is considered to be a nonstructural component that is permanently attached to a building or property. Switchgear used in these facilities must undergo seismic testing on a shaker table before being certified for use. The certification process requires the manufacturer to develop a test plan in conjunction with a Professional Engineer specializing in seismic applications. Prototype switches must be built and tested and upon successful completion of the testing, receive an OSP number (OSHPD Special Seismic Certification Preapproval number) from OSHPD. G&W has a family of switches pre-certified for use on OSHPD projects. We have tested to the highest level of seismic certification available

from OSHPD - level 3 (2.5g). The switches are designed per the guidelines of ASCE (American Society of Civil Engineers) standard 7-05 Chapter 13. These guidelines cover the design of non structural components installed in a building. The switches also underwent a test regime specified by ICC-ES-AC-156 (International Code Council Evaluation Services Acceptance Criteria) which specifies the shaker table test inputs applied to the switches. G&W switches can be used in any OSHPD project, in any location in California, and in any location within the building or property. These designs can be supplied without any additional testing, which greatly shortens the leadtime to provide the switchgear.

Application Versatility

Switch designs are available for two-position (close/ open), 3-phase, load break and resettable vacuum fault interrupter switches. Single or multiple sources can feed multiple loads. Bus tie configurations are available permitting multiple sources to feed different loads within the same switch.

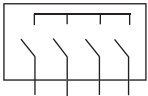
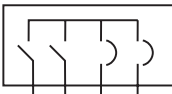
Mounting Flexibility — G&W can provide padmount, vault, or equipment room type switchgear with seismic certification. Design options include operating handles and bushings mounted for access from the front of the device (front access) or with operating handles on the front with high voltage connections on the bottom of the switch tank (bottom access). Designs equipped for pad mount applications feature enclosures that are removable for easy switch installation.

Bushing Variety — G&W switches for seismically active areas include either an apparatus type bushing or 200A deep well bushing. Also available is the 600A G&W Quik Change apparatus bushing. It is the industry's only field replaceable bushing which can save considerable time and expense should it become damaged during elbow installation.

Visible Break — Load break switches incorporate a visible break of all three phases for operator safety and compliance with many local operating practices.

Over Current Protection — Switches are available with optional overcurrent protection up to 25kA symmetrical. These switches include simple to use electronic controls to provide many settings for over current protection. The controls are self powered from current transformers sealed within the switch tank.

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FEATURES AND OPTIONS OF LOADBREAK AND FAULT INTERRUPTING SWITCHES WITH SEISMIC CERTIFICATION TYPE PNI SWITCHES

Load Break Switches

G&W model PNI loadbreak and fault interrupting switches combine the total cost and operating benefits of electronically controlled, resettable overcurrent protection with the safety and maintenance benefits of a totally sealed, dead-front, SF6 insulated device. The switches are designed for automatic three phase fault interruption with manual load break for systems rated 15.5kV, 27kV, or 38kV; 630A and 900A load break and continuous current; and 25kA symmetrical fault interrupting ratings. Designs include single side access to provide the smallest possible foot print for confined areas.

Fully Tested — Switches are designed and tested per applicable sections of IEEE C37.72, C37.74 C37.60, and IEC 265 standards.

Seismically Certified - In addition, these switches are designed to ASCE 7-05 and tested to ICC-ES-AC-156. ASCE 7-05 Chapter 13 defines the seismic forces the switchgear must withstand during a seismic event. ICC-ES-AC-156 defines the acceptance criteria for the Shaker Table test the switchgear must pass to obtain the seismic certification. The switches are suitable for use in seismically active areas.

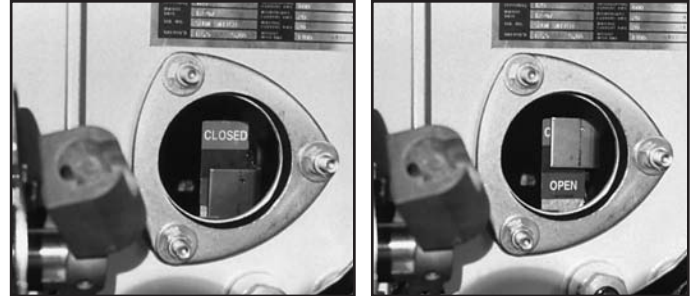
Features

Robust, Corrosion Resistant Construction – Switches come standard with a ¼” thick mild steel tank. The tank comes painted in two-part epoxy paint for good corrosion resistance. 304/304L stainless steel is available for environments requiring extra corrosion resistance. Switch tanks use welded and gasketed seals and provide extremely robust construction. G&W switchgear provide decades of reliable service.

Padmount, vault, or equipment room applications – Switches can be equipped with a 12-gauge galvanized steel enclosure. For maximum corrosion resistance, 304 stainless steel. Enclosures can be painted any color but standard colors include dark green (Munsell 7.0GY3.29/1.5) or light gray (ANSI 70). The switches can also be ordered without an enclosure for indoor applications.

Three Phase Switching — All G&W type PNI switches use G&W’s patented linear puffer style load break switch mechanism and Type NI resettable vacuum fault interrupter. The linear puffer is a 2-position device (close/ open) and is ideal for heavy duty manual load break switching applications rated through 35kV, 630A and 900A continuous, and 40kA asymmetrical short circuit. Switches are tested to 1200 load breaks and 2000 mechanical operations. G&W’s linear puffer style contact system provides extremely efficient, high speed arc extinction for maximum service life. The model NI vacuum interrupters consist of three vacuum bottles mechanically linked to a single spring-assisted operating mechanism. Once initiated, the interrupting time of the vacuum bottles is approximately 3 cycles (50 millisecond). A position

indicator (open-green, closed-red) is driven by the operating mechanism and is visible through a viewing window for indication of contact position. The mechanical linkage assembly provides a “trip-free” operation permitting the vacuum interrupter to interrupt independent of the operating handle if closing into a faulted circuit.



▲ Position indicators for the type NI resettable vacuum fault interrupter provide visible verification of contact position through viewing windows.

Available Bushings - G&W has either apparatus or deep well style bushings available to make high voltage connections to the switch. For 600A applications, G&W offers our Quik Change Apparatus Bushing. This is the industry’s only field replaceable apparatus bushing. This unique feature can prevent a switch from needing to be returned to factory should a bushing become damaged during installation or service. Standard T-body elbow connectors are compatible with G&W apparatus bushings. G&W also offers 200A deep well bushings, which require the use of 200A inserts and 200A elbow connectors.



▲ Pressure gauge and fill valve

Pressure Gauge – The pressure gauge is a “GO-NO-GO” style which is color coded to simplify verification of proper operating conditions.

Overcurrent and Fault Protection — G&W type PNI switches include solid state electronic controls that are powered from current transformers sealed inside the switch tank. The control monitors the current from each phase and activates a trip solenoid to open the vacuum bottles if an over current or fault condition is sensed. The VI Controls permit accurate, consistent protection curve characteristics compared to conventional fuses. The controls include common time current curves (TCC) for power fuses, relays and fuse links (oil fuse cutouts). Two control types are available and include the following features:

G&W Type 2 VI control is the standard control for all type PNI switches. It includes simple to use dials and dip switches to program its many protective features.

- Phase overcurrent
- Time Delay for phase overcurrent
- Ground fault protection
- Instantaneous current
- Inrush current
- Last cause of trip indicator
- 30 TCC curves pre-programmed into the control



▲ Type 2 control

The G&W Type 3 Control is available for seismically active applications. The Type 3 Control is equipped with a vacuum fluorescent display and keypad for programming. The control can also be programmed via computer using G&W's easy to use programming software.

The Type 3 Control includes the following features:

- Phase overcurrent
- Time Delay for phase overcurrent
- Ground fault protection
- Instantaneous current
- Inrush current
- Minimum response time
- 16 event sequence of event report
- 30 TCC curves pre-programmed into the control



▲ Type 3 control

Options:

Low SF6 Remote Monitoring Devices – G&W can provide an optional low pressure monitoring device set at 5 psig for remote indication of internal tank pressure. It can also be used for low pressure control lockout. One Form C contact is provided and can be wired to a factory supplied junction box.

Ground Lugs – Every G&W switch comes with grounding provisions for elbow, cable, and system grounds but switches can also include bronze, eyebolt style ground lugs for 4/0 maximum conductor cable.

Auxiliary Contacts – Auxiliary contacts can be provided for remote monitoring of switch contact positions. The leads can be terminated to an optional junction box mounted on the switch's padmount enclosure. A maximum of two auxiliary switches can be installed per way.

Mounting Flexibility – PNI switches come standard with 24" minimum bushing height but can be increased to 42" for applications where more space is needed to train cables.

Typical Applications

G&W PNI switches provide a direct replacement for power fused air and vacuum-in-oil switchgear. Some ideal applications include:

Transformer and Motor Protection – The three phase trip feature and high continuous current make G&W type PNI switches ideal for protecting three phase motors and transformers.

Available 900A Loop Switching – For 15kV and 25kV applications 900A loop switching is accomplished using the latest puffer technology. Tap switching through 630A and up to 25kA symmetric fault protection is accomplished using resettable, electronically controlled vacuum interrupters. The vacuum interrupters also function as load break switches.

Metal Clad Switchgear Replacement – Front access designs can provide up to six 25kA symmetric protected fault interrupter ways for a compact, economical alternative to metal clad and metal enclosed lineups.

LOADBREAK AND FAULT INTERRUPTING SWITCHES WITH SEISMIC CERTIFICATION

RATINGS FOR G&W TYPE PNI SWITCHES

Voltage Class (kV)	15	25	35
Maximum design voltage (kV)	15.5	27	38
BIL Impulse (kV)	110	125	150
1 Min Withstand AC (kV)	35	60	70
1 Min Withstand Production test rating AC (kV)	34	40	50
15 Min Withstand DC (kV)	53	78	103
Continuous and load break current (A)	630*	630*	630
Momentary Current (kA) asym	40	40	40
Fault-Close 3-times (kA) asym	40	40	40
1 Sec Current (kA) sym	25	25	25
Load break switch open gap withstand (kV)	200	200	200
10 operation overload interrupting capability (A) for load break switch	3000	3000	3000
Operations load interrupting endurance (15kv) at 600A for load break switch	1200	1200	1200
Mechanical Operations	2000	2000	2000
Symmetrical interrupting rating (kA)	25	25	25

* Available 900A Continuous and load break rating on the load break ways of switches used in loop applications.



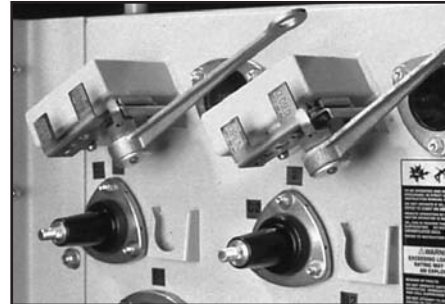
▲ PNI52-376-25-53F shown

IEEE C37.60

Fault Interrupting Duty

Total number of fault interruptions: 116

Percent of Maximum Interrupting Rating	Approx. Interrupting Current, Amps	No. of Fault Interruptions
15-20%	5,000	44
45-55%	12,500	56
90-100%	25,000	16



▲ Hookstick operable load break handle.

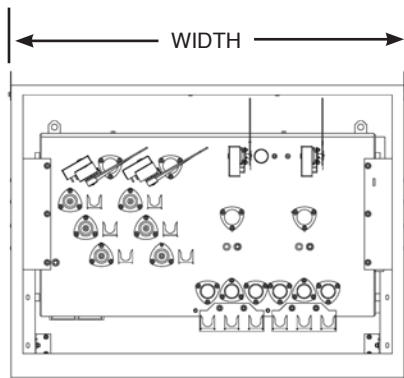


▲ Interrupter with hotstick operable handle.

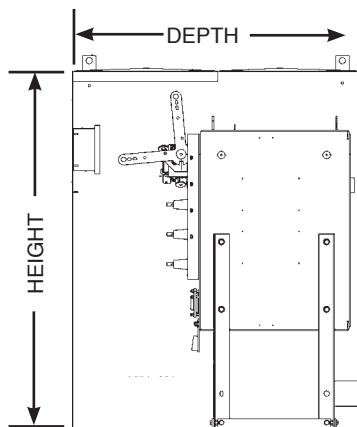


▲ Load break switch visible break.

ONE-LINES AVAILABLE FOR G&W TYPE PNI SWITCHES



Model PNI-9F



For PNI styles:
height = 65" (1651mm), (up to 90")
depth = 55" (1397mm).

*The catalog number of the switch will change to designate a 900A rated loop switch. For example, the catalog number for 630A PNI32 is PNI32-376-25-6F. The 900A loop switching version of this device will have a catalog number of PNI32-379-25-6F.

Model	One-line Diagram	Voltage (kv)	Catalog Number	Approximate	
				Width in (mm)*	Wt. w/SF ₆ lbs (kg)
4F		15	PNI20-376-25-4F	48 (1207)	1500 (682)
		25	PNI20-386-25-4F	48 (1207)	1500 (682)
		35	PNI20-396-25-4F	48 (1207)	1500 (682)
5F		15	PNI21-376-25-5F	48 (1207)	1550 (705)
		25	PNI21-386-25-5F	48 (1207)	1550 (705)
		35	PNI21-396-25-5F	48 (1207)	1550 (705)
6F		15*	PNI32-376-25-6F	63 (1588)	1920 (873)
		25*	PNI32-386-25-6F	63 (1588)	1920 (873)
		35	PNI32-396-25-6F	63 (1588)	1920 (873)
7F		15	PNI31-376-25-7F	63 (1588)	2050 (932)
		25	PNI31-386-25-7F	63 (1588)	2050 (932)
		35	PNI31-396-25-7F	63 (1588)	2050 (932)
9F		15*	PNI42-376-25-9F	78 (1969)	2300 (1045)
		25*	PNI42-386-25-9F	78 (1969)	2300 (1045)
		35	PNI42-396-25-9F	78 (1969)	2300 (1045)
11F		15*	PNI43-376-25-11F	78 (1969)	2400 (1091)
		25*	PNI43-386-25-11F	78 (1969)	2400 (1091)
		35	PNI43-396-25-11F	78 (1969)	2400 (1091)
12F		15	PNI41-376-25-12F	78 (1969)	2400 (1091)
		25	PNI41-386-25-12F	78 (1969)	2400 (1091)
		35	PNI41-396-25-12F	78 (1969)	2400 (1091)
43F		15	PNI43-376-25-43F	93 (2350)	2750 (1250)
		25	PNI43-386-25-43F	93 (2350)	2750 (1250)
		35	PNI43-396-25-43F	93 (2350)	2750 (1250)
51F		15	PNI51-376-25-51F	93 (2350)	2900 (1318)
		25	PNI51-386-25-51F	93 (2350)	2900 (1318)
		35	PNI51-396-25-51F	93 (2350)	2900 (1318)
52F		15*	PNI52-376-25-52F	93 (2350)	2800 (1273)
		25*	PNI52-386-25-52F	93 (2350)	2800 (1273)
		35	PNI52-396-25-52F	93 (2350)	2800 (1273)
53F		15*	PNI53-376-25-53F	93 (2350)	2750 (1250)
		25*	PNI53-386-25-53F	93 (2350)	2750 (1250)
		35	PNI53-396-25-53F	93 (2350)	2750 (1250)
54F		15*	PNI54-376-25-54F	93 (2350)	2650 (1205)
		25*	PNI54-386-25-54F	93 (2350)	2650 (1205)
		35	PNI54-396-25-54F	93 (2350)	2650 (1205)
62F		15*	PNI62-376-25-62F	108 (2731)	3300 (1500)
		25*	PNI62-386-25-62F	108 (2731)	3300 (1500)
		35	PNI62-396-25-62F	108 (2731)	3300 (1500)
63F		15*	PNI63-376-25-63F	108 (2731)	3200 (1455)
		25*	PNI63-386-25-63F	108 (2731)	3200 (1455)
		35	PNI63-396-25-63F	108 (2731)	3200 (1455)
64F		15*	PNI64-376-25-64F	108 (2731)	3100 (1409)
		25*	PNI64-386-25-64F	108 (2731)	3100 (1409)
		35	PNI64-396-25-64F	108 (2731)	3100 (1409)
65F		15*	PNI65-376-25-65F	108 (2731)	3000 (1364)
		25*	PNI65-386-25-65F	108 (2731)	3000 (1364)
		35	PNI65-396-25-65F	108 (2731)	3000 (1364)