

TYPICAL SPECIFICATIONS

PRG6 RESETTEABLE FAULT INTERRUPTERS (RFI)

This specification outlines the requirements for a three phase, group operated, 50/60 Hz Padmount Resettable Fault Interrupter (RFI) switch utilizing SF6 PufferPak switches for load interruption and SF6 vacuum breaker switches for fault interruption tested to ANSI C37.72 or ANSI C37.60 featuring deadfront, compact, sealed, corrosion resistant construction for padmount installations.

A. GENERAL:

Each switch shall have _____(Qty) PufferPak ways and _____(Qty) fault interrupter ways.

The unit will include welded flange 200Amp deepwell or 600 Amp apparatus bushings per ANSI/IEEE 386. (Bolted and gasketed bushings are not acceptable) A one-line diagram, indicating the circuit configuration, number of switched ways, and type of bushings required will accompany this specification.

Switches must be furnished factory filled with an electrical grade of non-toxic, non-flammable SF6 gas, conforming to ASTM D-2472. A pressure gauge, which provides visual status of the insulating dielectric, must be included.

The completed unit must be capable of withstanding internal failure without explosion or fire and shall be capable of being mounted in any position for best cable training and operation.

B. SWITCH CONSTRUCTION:

The switch shall use deadfront, compact, sealed construction. A corrosion-resistant stainless steel tank shall enclose the contact system, interconnecting bus, operating mechanisms, and bushings. The switch must be maintenance free, all welded construction, eliminating the use of gasketed seals. T.I.G. inert gas welding with stainless steel filler rod shall be used to eliminate pinhole leaks and corrosion.

The operating shafts must be sealed by a flexible stainless steel bellows (O-ring seals are not acceptable).

Unless otherwise specified, cable connections, and operating accessories shall be located so only single side access is required for operation and installation. Operating handles shall be capable of being removed and stored or permanently attached.

Movement of the operating handles will actuate an internal spring mechanism causing the switch/interrupter contacts to open or close and latch into position in quick make quick break operation. The spring operator will use compression springs for long life and will provide positive position indication.

The PufferPak switch contacts and interconnecting bus shall be plated copper with Belleville washers and locking fasteners to provide consistent pressure at bolted connections. The contacts shall be self-aligning, wiping type, incorporating tungsten copper arcing tips to prevent wear. The load interrupters use a puffer contact system for fast arc extinction along with a special internal absorbent shall be used for improved performance and to prevent arc by-products.

The Resettable Fault Interrupters (RFI) shall incorporate vacuum technology and be capable of interrupting fault currents up to the rated maximum. The interrupter shall use a flux shifter for tripping and be manually resettable with no consumable parts. (i.e. fuses). As a safety precaution, the interrupter will incorporate a trip-free mechanism to prevent the possibility of holding the interrupter closed under a faulted condition, with no reaction through the switch handle.

The RFI mechanism shall be a true three-phase group operated device with no mechanical link between phases. An overcurrent condition on any phase will initiate the interrupter to trip open all three phases. The RFI interrupter will also act as a three phase, group operated loadbreak switch.

A viewing window with indication of the interrupter contact position shall be provided.

C. TRIP CONTROLS:

Overcurrent sensing shall be accomplished with an electronic trip control. The controls shall use current transformers external to the tank to sense the load currents. The current transformers will provide power to the electronic trip control. No external power shall be required. The current transformers shall be dual ratio 600:0.5A and 200:0.5A. In order to provide immunity to system voltage disturbances (i.e. transients) the control will not be sensitive to system voltage conditions. The control shall be fully operable and meet the specified time-current curves when energized. Trip controls are available in two formats, VFD with keypad and rotary switch selection.

The **vacuum fluorescent display (VFD)** shall be legible at -40°C without the need for a heater (Operating range -40°C to $+65^{\circ}\text{C}$). The external current transformers on the switch will energize the display, when load current is flowing. In the event the switch is de-energized, a 9V-lithium battery shall be included to allow operation of the display and keypad for data gathering and parameter setting. The keypad shall be used to select the following parameters: TCC Fuse Curves, TCC Fuse Rating, Instantaneous Trip, Ground Fault Pick-Up, Ground Fault Delay and Protection Mode. The **VFD** shall display the above data as well as the cause of trip. The electronic control shall have the ability to store up to 64 different TCC curves. Trip selection to be available in 12 positions from 10 to 450 amps.

Instantaneous trip values shall be in multiples of 1.5-12 times the current transformers primary ratings in increments of 50% of the current transformer primary rating with values from 300A to 7200A. Ground fault trip settings shall range from 10-30% of the current transformer primary rating in increments of 5% of the current Transformer primary rating. Ground fault time delay shall be selectable in 10 settings from .05 to 1.0 seconds.

A RS232 port shall be provided for communication with external devices.

A manual trip button shall be supplied to electrically trip the interrupter. Provisions for remote trip shall be provided.

The **Rotary Selector Switch** control shall be used for 200 amp maximum loads. There shall be 10 fuse selections ranging from 30 to 200 amps. LED indication will be provided to show cause of the last trip. Also, an intermittently blinking LED shall indicate “ready” status.

A RS232 communication port shall be provided to read real time current and fault current.

Status contacts for remote SCADA indication shall be provided. A manual trip push-button for electrically tripping the interrupter shall be provided, with provision for remote trip.

D. ELECTRICAL RATINGS AND STANDARDS:

The switches and/or interrupter shall be designed, tested and built per applicable sections of ANSI C37.72, ANSI C37.71 and ANSI C37.60 Standards. The assembled switch assembly shall be rated:

	PUFFER	PUFFER	RFI	RFI
Maximum Design Voltage, KV	15.5	27	15.5	27
BIL Impulse Withstand, KV	95	125	95	125
Open Gap BIL Flashover Withstand, KV	200	200	95	125
One Minute AC Withstand, KV	35	60	35	60
Fifteen Minute DC Withstand, KV	66	96	53	78
Load Interrupting, Amps	600	600	600	600
Asymmetrical Momentary & Three Operation Fault Close, KA. (Optional Ratings)	22.5 (32) (40)	22.5 (32) (40)	19.2	19.2
Symmetrical One Second Rating, KA. (Optional Ratings)	15 (20) (25)	15 (20) (25)	12	12
Continuous Current, A.	600	600	600	600
Overload Interrupting Capability, A	3,000	2,500	12,000	12,000

E. STANDARD COMPONENTS

- Padmount Enclosure will be 12-gauge mild steel, tamper-resistant single side access with 3-point latch, double doors and a hinged hood. Equipped with stainless steel hardware, wind stops, padlock provisions and a penta-head bolt. The enclosure will be completely removable from the switch to facilitate installation, maintenance and, if necessary, replacement. Enclosure to be painted Munsell#7.0GY 3.29/1.5 and meet ANSI C57.12.28.
- Removable Operating handles with padlock provision in the open and closed position, capable of operation by hookstick or rope with direction of movement clearly indicated.
- Stainless steel nameplates providing information including ratings, contact position indication, circuit configuration and phase identification.

- Colour coded pressure gauge for visual indication of normal operating range, enclosed in a protective housing to prevent damage.
- Viewing window which provides fault interrupter position status.
- Brass fill valve for field addition of SF6 protected and sealed with a removable cap.
- Clamp type ground lugs, one for each set of bushings.
- Stainless steel switch tank for maximum corrosion resistance.
- 200 Amp deepwell or 600 Amp apparatus welded bushings, with protective shipping caps (elbows and inserts furnished by user).
- Lifting and mounting provisions.
- Parking stands on 200 Amp ways. (Padmount Only)

F. OPTIONAL FEATURES:

- Visible break with contacts visible through viewing windows. (PufferPak only)
- Visible break by external neon voltage indicator lights.
- Operating handles orientation adapters.
- Mechanical or key interlocks.
- Fault interrupter remote status.
- Low pressure sensing device.
- Operation counters.
- Manual switching with remote cable operator. (PufferPak Only)
- Motor-operators for local, remote or SCADA switching.
- Motor-operators, voltage and current sensors for Automatic Load Transfer Switching.
- Wall mounted parking stands. (Vault/Subsurface Only)
- SF6 refill kit complete with regulator and hose.

G. FACTORY PRODUCTION TESTS:

100% production testing shall include a mass spectrometer leak test, contact resistance, mechanical operation, AC one minute withstand and corona extinction tests as well as bulk SF6 moisture content.

H. CABLE ENTRANCES:

Switches will include 200Amp deepwell or 600A apparatus welded bushings per ANSI/IEEE 386.