



**CTG**

Power Systems Intl., LLC

## **NEW 15kV Substation Circuit Breakers**

Technical Specification



**CTG POWER SYSTEMS INTNL., LLC**

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The following Substation Breaker is designed, assembled, and tested in accordance with IEEE standards. Substation Breakers will conform to RFQ specifications and drawings except as noted within the Technical Offering.

Product	
Substation Breaker:	OD3Mag™ per IEEE Std C37.04/09-2018
Construction:	Outdoor
Exterior Finish:	ANSI 70 (Outdoor)
Ratings	
Max Voltage:	15.5kV
System Voltage:	12.47kV
Switchgear System:	3 Phase, 3 Wire, Grounded
Rated Current:	2000A
Rated Short-Circuit Current:	25kA
Lightning Impulse Withstand	125 kV
Rated Frequency:	60 Hz
Phase Bus	
Bus Material:	98% Copper, full-round edge
Bus Plating:	Silver
Bus Hardware:	Grade-5 Steel, zinc plated
Ground Bus:	¼" x 2" copper, run the entire length of the switchgear assembly.
Vacuum Interrupter	
VI Pole Mounting:	Housed in Encapsulated Epoxy
Mechanism:	Magnet Actuator with Control Module + Charging Capacitor
Roof Bushing	
Roof Bushing Material:	Porcelain
Controls	
DC Control Power Voltage:	125 Vdc (Provided by Others)
AC Control Power Voltage:	120 Vac (Provided by Others)
Wiring	
Control Wire:	NEC type SIS, 600V, UL-Listed, Class K, tin-plated copper, single conductor multi-stranded #14 AWG minimum.
CT Secondary:	Harness, #12 AWG, assembly wired to shorting type terminal block.
Ground Wire:	#12 AWG minimum, green in color
Wire Terminal:	Pre-insulated ring-tongue
Wire Markers:	White with printed black lettering, matching the connection diagrams.
Terminal Blocks:	Din-Rail Mount, 600V, 30A with bolt connections
CT Shorting Type TB's:	6-pole, 600V, 30 amps, phenolic barrier terminals, nickel-plated brass, with shorting bar and screws
Additional Features	
Production Test Report:	Breaker
UL Label:	Not Required
Warranty:	Five (5) Years



## **TECHNICAL OFFERING**

### **Magnetic Actuator**

OD3MAG™ uses single-coil magnetic actuators to drive the vacuum interrupters open and closed. There is one actuator per phase. The actuators may be electrically ganged for three-phase operation, or they may be operated independently for single-phase operation. The actuators are mechanically ganged for three phase operation via external trip handle (see Section 1.4.8) The actuators are located at the bottom end of the vacuum bottle pole-assembly, and they are linked to the vacuum interrupters via direct drive push rods. They are energized with stored energy from locally mounted capacitors located in the low voltage compartment. This design reduces the number of moving parts in the pole-assembly and requires minimal maintenance over the lifetime of the outdoor breaker.

### **Control Board Assembly**

Control board assembly houses the components responsible for governing and driving the breaker operations. It is comprised of a circuit board (controller), an electrolytic capacitor, and housing which mounts to the center panel of the low voltage cabinet. Breaker control power, either 48VDC, 125VDC or 120VAC, is wired to the controller power supply terminals. The power electronics required to drive the magnetic actuators are located on the control board. The controller performs monitoring functions that include breaker pole coordination, capacitor voltage health, and lockout/interlock. TRIP and CLOSE signals are binary inputs into the controller from the user's protection & control scheme. The Operator interface includes a blue READY light that indicates the overall health of the breaker. Local OPEN and CLOSE pushbuttons are available for Operators on the housing of the control board assembly. These pushbuttons should be used for maintenance or testing purposes only. For a complete list of inputs and outputs and details of the control board wiring, refer to the LM-MRD-006 OD3MAG™ Control Module Product Manual.

### **Cabinet Assembly**

The OD3Mag™ outdoor breaker utilizes a robust cabinet made of mild steel that has been designed to minimize penetrations. The cabinet height is adjustable in 3-inch increments. The high voltage doors on either side of the OD3MAG™ cabinet are removeable and retained by two (2) bolts. There is a lifting-handle on each of the high voltage cabinet doors for easy handling, and upper hangers are positioned to guide the cabinet into place while it's being installed. Pole position indicators are visible through the front horizontal channel that separates the high and low voltage compartments. The low voltage doors, found on both sides of the cabinet, are designed with stainless steel lift-off hinges, a three-point door latch, and padlock provisions.

### **Nameplates**

Nameplate will be laminated plastic secured with stainless steel screws. Characters will be block type black letters on a white background.



## **TECHNICAL OFFERING**

### **Bushings**

The OD3MAG™ breaker has six roof-mounted, extra-creep, wet-process porcelain bushings rated for 15kV system voltage, and 125kV BIL. The bushings produce 25.2” of external creep and have an overhead stud connector with #12 UNF threads. The bushing studs may accommodate NEMA 2-hole, NEMA 4-hole, or clamp style cable connectors.

### **Grounding**

The standard breaker includes four (4) NEMA 2-hole drilled aluminum pads on the roof and Six (6) Stainless Steel Pads on the legs for grounding. Any voltage transformers used should be grounded to the main ground wire leading from the breaker to an external ground lug. To ground the control cabinet, use the external ground connector provided which accepts a #6 – 2/0 AWG conductor. Ground the control cabinet to the main ground wire from this external connector. All ground wire used must be #6 AWG minimum.

### **Wiring**

All switchgear wire used for relaying, metering and controls will be UL listed as NEC type SIS, 600V, 90 deg C, tin-plated copper, multi-stranded single conductor. Minimum wire size will be #14 AWG. All ground wires will be a minimum #12 AWG, green in color. Wire ends will terminate with pre-insulated ring-tongue lugs on all screw type terminals, unless prohibited by device design. Terminal blocks will be rated for 600V, 30 amps minimum. CT secondary wires will terminate to shorting type terminal blocks.

### **Finish**

The finish coating will be gray (ANSI# 70). All parts to be finished will be pre-cleaned, dried, and coated with baked-on polyester power paint applied electrostatically. Finish process will apply to external parts. The coating shall have a corrosion resistance of 3000 hours at 5% salt spray.

### **Factory Testing**

The standard factory test will be performed on all circuit breaker elements and switchgear assemblies in accordance with IEEE std C37.09-2018 & IEEE Std C37.20.2-2015. Reports of factory testing will be issued with instruction books. Factory will test relays, meters and control circuits based on standard factory setting. No relay/meter programming is included with standard factory testing.

### **Submittals**

All engineering data will be provided for review prior to the start of manufacturing. Engineering data will be created with MS-Word and/or MS-Excel submitted in PDF-format. All drawings will be created using SolidWorks CAD software submitted in PDF-format.

### **Quality Assurance**

The intent of our quality assurance program is to provide assurances that the finished switchgear and circuit breakers perform and conform to all applicable specification and drawings prior to shipment and that all items reach their destination in a condition ready for service. It is also the intent of the quality control system to employ sufficient controls throughout the various stages of manufacturing, assembly, wiring and test to assure quality level of the finished product. The manufacturing facility is ISO 9001 and 9002 certified.