

Substation: Underground

UEE Underground Substation

The UEE Underground Substation brings reliable, configurable and efficient power conversion and distribution to mining and industrial settings in an extremely durable and mobile package that handles primary switching, voltage conversion and secondary distribution.

Load specific modular feeders handle secondary distribution, and can easily be swapped out to accommodate changing distribution needs.

Welded to HSS steel, the body is manufactured from 11ga steel and coated with a durable powder-coat finish. The enclosure provides NEMA 12 protection for the internal components. NEMA 3R protection is an option.



Primary Supply Section

The primary load interrupting mechanism is a three-phase air-insulated load break switch that interrupts current with blades that travel in energy-controlling arc chutes. The load break switch utilizes a stored energy spring that charges every time the switch is closed and quickly disengages the conducting blades for safe, reliable tripping. The load break switch is also equipped with shunt-trip and blown-fuse trip mechanisms, as well as trapped key interlocks, for further ensuring safe operation.

A wire-reinforced glass window in the load break access door allows a visual check of the switch blades to verify the switch state. A line-side-connected potential transformer provides primary load break switch tripping power and voltage indication.

Power Conversion

Voltage conversion is provided by a dry type mine-duty-rated transformer. Designed to CSA C22.2 No.47, C9-02, C802.2 and to Canada Energy Efficiency NRCan 2012 Regulation (where required), the transformer windings consist of copper conductors with a class H double epoxy vacuum impregnation insulation system. The primary windings contain four 2.5% tap positions.

Secondary Distribution

The secondary distribution compartment is physically isolated from the rest of the substation and accommodates six plug-in modular feeders which connect to the low-voltage bus via tin-plated bus bar. The plug-in feeders provide a high degree of operational safety and flexibility, yet require limited maintenance down-time.

Each easily removable and interchangeable modular feeder has its own control and protection systems, and can be configured for a wide range of components including breaker feeders and motor and pump controllers. Refer to the **Typical Specification** tables on the next page for feeder options.

Station service power distribution, for both substation and customer use, is provided by a secondary transformer and distribution panel complete with circuit breakers.



Protection, Control and Indication

Primary over-current protection is provided by high-voltage fuses mounted in the primary supply section. The fuses are system specific and are isolated from the line-side compartment by a rigid insulating barrier. Blown fuse trip is provided by using a fuse striker pin to trip the primary load break switch, ensuring all three phases are disconnected in the event of a single phase fault.

Secondary over-current protection is provided by 3-phase current transformers connected to an overload relay that trips the primary load break switch in the event of an overload.

Substation ground fault currents are limited by a continuously-rated neutral ground resistor (NGR) connected to the transformer secondary star point. A ground fault relay in conjunction with the NGR provides ground fault and resistor open circuit protection by tripping the shunt trip coil of the primary load break switch.

Transformer temperature monitoring and protection is provided by a type K thermocouple connected to a digital temperature controller, which shall trip the primary load break switch in the event of a transformer over temperature.

Secondary voltage and current measurement (3-phase) are displayed by a voltmeter, ammeter and selector switch. Secondary breaker position (trip) and secondary power availability are displayed by indicator lights.

Standards

All UEE Underground Substations are designed to CSA C22.2 No. 31, C22.1, CSA M421, CSA C9 and CSA C802.2.

Options

- Secondary power factor correction capacitors.
- Remote status indication contacts.
- PLC connectivity.
- Primary circuit breaker.
- Increase of modular feeders.
- NEMA 3R protection.

Typical Specifications

Primary Voltage kV	Secondary Voltage V	Rating kVA	Secondary Bus	Secondary Bus Short Time kA
up to 15	480, 600 or custom	500, 750, 1000 or 1500 or custom	Tinned copper	25

Transformer Insulation	Transformer Temperature Rise	Transformer Windings	Transformer Primary Taps
220°C Class H, vacuum impregnated epoxy	150°C (above 40°C ambient)	Copper	4 x 2.5% (2 FCAN and 2 FCBN)

NGR Rating Amperes	NGR Monitoring
5 continuous (maximum)	Trip on NGR fault, trip on ground current

Modular Feeder Rating Amperes	Modular Feeder Trip	Modular Feeder Protection	Modular Feeder Motor Start hp	Modular Feeder: Breaker Amperes
up to 400	Shunt or undervoltage	Ground fault/ ground check	150, 250 or custom	225, 400 or custom

For additional technical details or specifications, call 1-250-497-5254 or visit www.uee.com.