UAD™
UAD-V™

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Controller and Motor Assembly for Underground Switches

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Underground Automated Distribution (UAD™) Controller and Motor Mechanism

Application

The Cleaveland/Price UAD is a simple, dependable control package for integrating underground SF_6 and vacuum switches of any manufacturer into a customer's SCADA or smart grid system.

The controller is available in submersible models for installation within the switch vault and models for above ground installation. Controller designs that operate switches with an internal spring or solenoid to open and close, as well as switches that require an external motor mechanism, are available. The Cleaveland/Price motor mechanism is a high torque device that is adaptable to any underground switch that requires an external motor. Standard speed and fast transfer motor types are offered.

The UAD controller can be supplied as a single switch controller or as a multiple switch controller to operate 2-way, 3-way, or 4-way switches. The controller can open and close switches and can drive the switch to a ground position when this option is required.

The UAD may be operated remotely by SCADA, or locally via a selector switch located on the front panel of above ground controllers. A handheld control pendant is provided for local electrical operation of vault installed controllers. Auto-transfer functions are also available.

Typical above ground controller installation

Effective Battery Management:
The key to a dependable automation system

A single 12-volt, 33 amp-hour battery contained within the controller supplies power to the remote terminal unit (RTU), communication device, and switch actuator (motor or solenoid). A power supply is also provided to accommodate devices that require 24 VDC.

A complete temperature compensating charging system is provided. The electronic system provides battery over-charge protection as well as battery testing function. The system regularly self-monitors the battery voltage to provide real-time reporting of battery condition. With loss of charger power, the battery can typically operate a switch and maintain RTU and communication loads for 24 hours.

The battery used in the UAD is a maintenance-free lead acid type that is completely sealed. It has a pressure relief valve that only opens during excessive gas buildup. Gasses are vented via a hose to the outside of the enclosure, preventing the buildup of corrosive and explosive gasses within the enclosure.

Typical vault installed controller with motor controlled G&W switch

UAD™ Controller Features

Single Motor Controller for Above Ground Installation

1. Control module with LED status
2. Power module with battery charger
3. Ribbon cable wiring system
4. Optional omni-directional antenna
5. Local/Remote switch
6. Open/close switch with indicating lights – three position control supplied when applicable
7. Fused AC female receptacle
8. Travel set controls for external motor
9. User's communications device
10. Smurff™ surge protector and disconnecting fuses for incoming AC
11. Removable access plate
12. Heater with thermostat
13. Battery with venting hose
14. Self-securing open door stop
15. Spare fuses
16. Stainless steel handle
17. Instruction book pocket
18. Fully gasketed door

The above ground UAD controller enclosure is rated NEMA 4. The enclosure is constructed from corrosion-resistant aluminum alloy and is powder-coated for additional durability. The hinge and door handle are made of stainless steel. The door of the enclosure is fully gasketed to keep moisture out of the enclosure.

The enclosure of the padmount and stanchion mount UAD is powder-coated white to provide a surface that reflects the heating rays of the sun, there-by minimizing heat buildup within the enclosure and extending battery life.

Stanchion mount UAD controller

Padmount UAD controller

UAD-V™ Controller Watertight Integrity

Single motor controller for underground installation

Building Reliability into a Vault Mounted Switch Controller

The environment in switch vaults is harsh. Vaults regularly fill with water that contain all sorts of contaminates. The Cleaveland/Price UAD-V enclosure is designed specifically to operate in this kind of environment.

The submersible vault mounted UAD-V controller enclosure is rated IP68 and features:

- Stainless steel construction
- Removable gasketed access panel
- Gore vent to allow equalization of ambient and internal enclosure pressure
- Pressure fill valve
- Lifting eyes
- Key-shaped mounting holes

The UAD-V enclosure was type tested over a period of nine months, during which it operated a UAD motor while submerged in a contaminated concoction. At the end of the test the motor was still in good operating condition and the interior of the controller was pristine. Hundreds of unit service years have proven the enclosure to be watertight.

Each UAD-V undergoes a production test that verifies that the enclosure is watertight.

Indication Lights and Communication Port

The UAD-V is supplied with bright LED lights for open/closed indication, and remote control enabled and locked out statuses. A watertight, tamper-proof RJ-45 port with padlockable cover is available for local interface with the controller's RTU.

Watertight Wiring Entrances

All wiring entrances into the UAD-V terminate to encapsulated connectors. Wiring entrance points are supplied with sealing caps that protect contacts from contamination should the external wires not be connected. Even without the caps in place, the potted connections prevent the entrance of water. External wires supplied by Cleaveland/Price are designed and manufactured to prevent the ingress of water.

Trust but Verify

The UAD-V enclosure is designed to insure its IP68 rating. To verify that the unit is watertight, the enclosure has moisture detection sensors at each interior bottom corner. The sensors will activate an alarm should there be any accumulation of water within the control enclosure.

Top View

Bottom View

Inside Floor View

UAD-V™ Handheld Control Pendant

Latch and lock feature of the control pendant

Customized handheld control for Elastimold switch

A handheld control pendant is provided with UAD-V controllers for local electrical control of the switch. Standard features of the control pendant include:

- Non-metallic submersible enclosure with padlockable door and stainless steel hanging bracket
- Stainless steel pressure vent
- 25 ft. long control cable
- Watertight cable connection
- Momentary open/close switch
- Open and close switch position indicating lights

Optional Handheld Control Functions Available

- Handheld enabled/disabled switch with local and remote status indication (padlockable in the disable position)
- Operation enabled indicating light
- Disable operation indication
- Operation ready status light
- Switch power OK status light
- 600 A. overcurrent alarm light
- Switch test button with pass/fail indicating lights
- Indicating lights for:
  - Verification of DC voltage output from controller
  - SF_6 OK
  - Phase angle OK
  - Current OK
  - Mechanical block applied to switch
- Upstream/downstream fault indicating lights
- Test light button
- Ground position control

UAD™ & UAD-V™ Advantages

Automatic Battery Testing

The battery is monitored almost continuously using a smart circuit. A load is applied to the battery every five minutes and the battery voltage is measured with the battery charger off. A status alarm will indicate low battery voltage. Since the testing is done automatically, there is no need for the user to implement a command system to periodically perform a battery test.

Automatic Load Disconnect

Under the battery loads of the RTU and communication device, battery voltage will decline when AC is lost. All loads are dropped when the threshold voltage for automatic load disconnect is reached. The automatic load disconnect prevents deep discharge of the battery, which causes damage and necessitates battery replacement.

Operator Status Indications

UAD status indications including underground motor position, local/remote control switch position, loss of AC, low battery voltage, and No-Go are reported back through the RTU. All six statuses are indicated locally via LEDs on the UAD control board. Additional statuses such as fault alarm or low gas alarm can be provided.

Circuit Board and Connectors

The control circuit and the power circuit are located on separate boards to segregate high voltage and low voltage signals for the best reliability. The printed circuit boards are conformal coated to withstand condensing humidity, open door rain, frost, and environmental pollutants. The circuit boards are connected by ribbon cables with gold-plated contacts for maximum reliability.

No-Go Function

When the battery voltage threshold for No-Go is met (after the low battery voltage alarm), the motor operator is disabled. The No-Go function prevents underpowered and incomplete operation of the switch. A No-Go status is delivered through the RTU. The function is over-ridden when AC is restored.

Stall-out Timer with Auto-Reset

If the motor operator is stalled (because of switch mechanical problems or a padlocked motor), the motor stops trying to operate before the fuse blows. The control circuitry resets and can accept another operation command.

Multi-Way Controllers

Cleaveland/Price can supply 2-way, 3-way, and 4-way switch controllers that are designed to customer specifications. With Cleaveland/Price you do not need to shoehorn your requirements into a manufacturer's standard package. Multi-way controllers are often customized to meet customers' precise needs.

In above ground controllers, each switch has its own control panel. In underground applications, each switch has its own control pendant.

3-way switch submersible controller

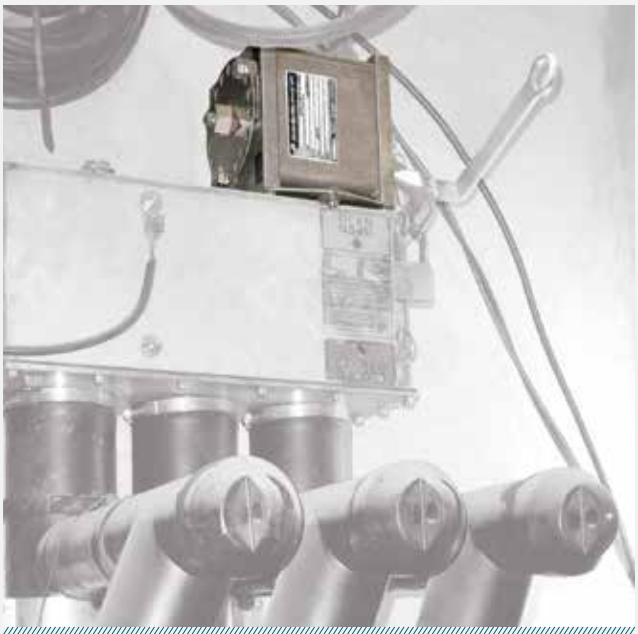
3-way switch controller with SEL protection relays

4-way switch controller

3-way switch controller with SEL protection relays, Scout RTU, and an Ethernet DeviceMaster

2-way switch controller

UAD™ Motor Features



UAD motor on an Elastimold MVS switch

The submersible UAD motor assembly is adaptable to any manufacturer's underground switch. Open and close travel limits for the motor are positioned via the easy-set travel adjustment controls within the controller. Operation time is approximately five seconds.

The motor assembly features:

- Watertight stainless steel motor housing
- 40 ft long control cable (or customer specified length)
- Watertight cable and cable connections
- Motor decoupler that will re-couple only when the motor and switch are in sync
- Provision for manual operation
- Manual operation speed governor to prevent motor winding damage
- Provision for padlocking the motor with the switch in the open or closed position
- Adjustable mechanical stops

The jacket of the motor control and the control pendant cables is made from thermoset heavy duty flame retardant material. The cables have been oil immersion tested for 60 days at 80°C per UL AWM 21098 requirements.

UAD RT motor on a Canada Power Products switch

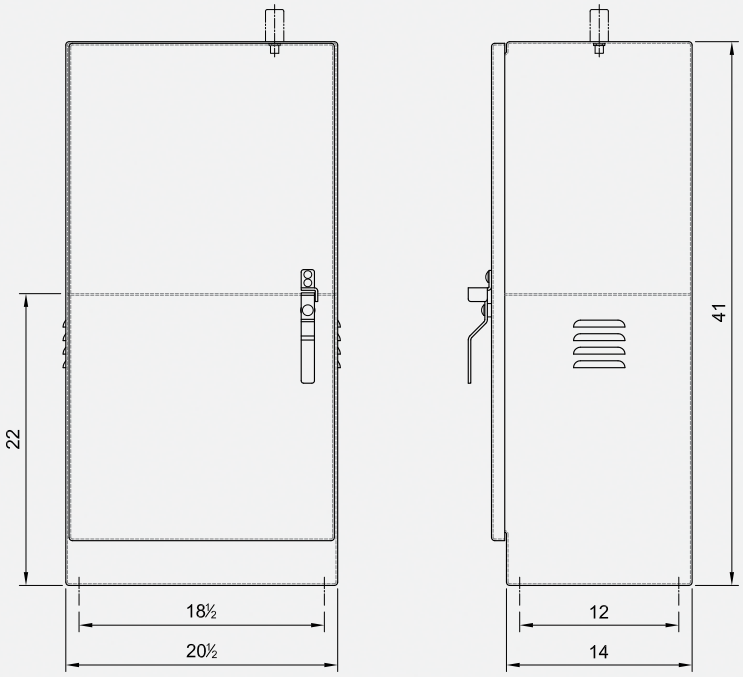
For fast transfer applications, Cleaveland/Price offers the UAD RT motor. The RT motor will drive a switch open or closed in 12 cycles to 24 cycles depending upon the switch.

The motor has a stainless steel, hinged padlockable cover that protects operating personnel from moving parts. The cover is interlocked with the controller via a proximity switch. When the cover is open, electrical operation of the motor is disabled.

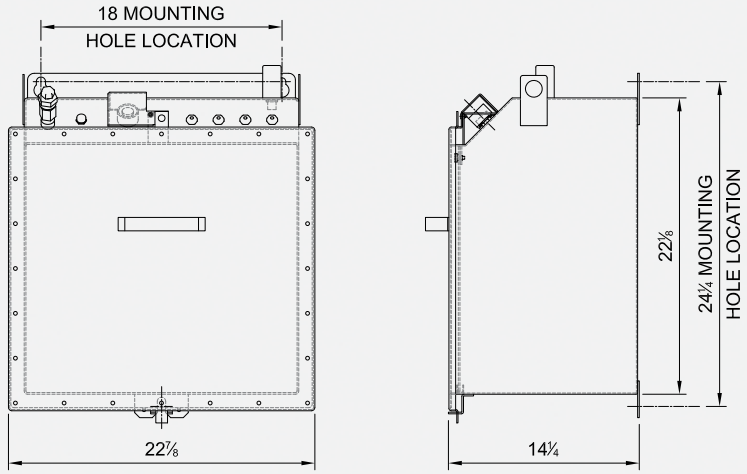
The UAD RT motor has the same quality features as the standard UAD motor noted above.

Dimensions

UAD



UAD-V



UAD Options

- Stainless steel padmount enclosure instead of aluminum
- Factory installation of customer's RTU and communication devices
- Fault indicating cable, pressure switch with cable for SF_6 switches
- Rapid transfer motor
- Sensors
- Test switches
- Additional features and capabilities are available upon request

Other Cleaveland/Price Automation Products

Cleaveland/Price designs and makes products that enable utilities to automate many devices including overhead switches, underground switches, padmounted switches, and transformers. Our automation controllers utilize a common control package that is field proven in thousands of installations. Request information on these other Cleaveland/Price products:

- BT-D for automating overhead distribution switches requiring a torsional motion
- BR for automating overhead distribution switches requiring a reciprocating motion
- BT-T for automating overhead transmission switches requiring a torsional motion
- BR-T for automating overhead transmission switches requiring a reciprocating motion
- PTAD for automating overhead distribution switches without the use of vertical pipe
- PAD for automating padmounted switches
- HHC for local electrical operation of underground switches
- SPS smart power supply to enhance communication reliability

This brochure describes our standard products and does not show variations in design that may be available. If additional details are required, contact the factory.

Cleaveland/Price reserves the right to make changes or improvements to the products shown in this brochure without notice or obligation.

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