

Bulletin DB33A04

PAD™ **Controller for** **Padmount Switches**



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Padmount Switch Automation Distribution (PAD™) Controller

Application

The Cleaveland/Price PAD is a simple, dependable control package for integrating padmounted switches of any manufacturer into a customer's SCADA system.

The PAD package consists of a controller and a motor mechanism housed in a common enclosure. The package is available as a single switch controller or as a multiple switch controller to operate two-way, three-way, or four-way switches.

The PAD mounts easily to the customer's padmount switch without the need for field drilling or switch enclosure modification. The mechanism can be installed in minutes and there is no need to take the switch out of service during installation.

General

The PAD enclosure provides sufficient room to house both the RTU and radio. All components are accessible through the front door. The controller's aluminum enclosure is powder coated switchgear green to closely match the color of the switch enclosure.

The easy to install PAD mounts to the switch's manual operating location and has provision for manual operation. Open and closed travel for the motor is set via the pushbutton travel adjustment controls within the controller.

A single 12 volt, 33 amp-hour battery contained within the controller supplies power to the motor assembly and also supplies power to the radio and remote terminal unit (RTU). A power supply is also provided to accommodate RTU's requiring 24 VDC. The battery and 120 VAC charging voltage combine to provide concurrent power sources for the motor, enabling the motor to run even in the presence of a weak battery if AC is available.

A complete temperature compensating charging system is provided. With loss of charger power, the battery can typically maintain RTU and radio loads for 24 hours. An electronic system provides battery overcharge protection as well as battery testing function. Status indications are wired to the RTU for switch position, battery condition, and controller status monitoring.

HOW THE PAD™ WORKS

PAD Operation

The PAD may be set for local or remote operation via the selector switch located on the front control panel. The position of the selector switch is reported through a status indicator. The open/close switch for local operation is also located on the front control panel. Open and closed status signals are provided.

Control Circuit

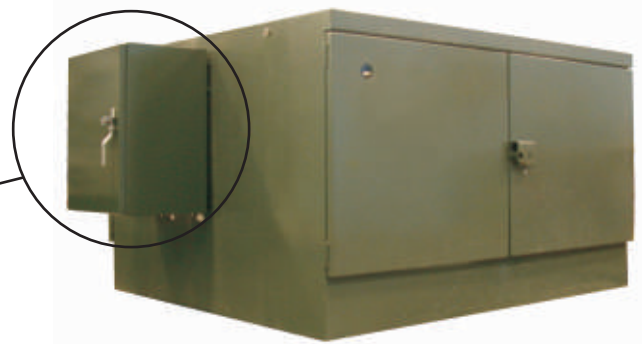
For the most reliable operating system, the PAD utilizes discrete logic chips to control the operation of the motor mechanism. Additional functions can be added to the PAD through programming of the RTU or specifying the Cleaveland/Price Auto-Actuate™ option, which provides transfer-switching functions. Open and close status signals are provided. Open and close motor travel settings are adjusted from the front panel controls.

The smart circuits automatically check the battery condition every five minutes by disconnecting the charger and placing a resistive load on the battery. If the battery tester detects a voltage below 12.2 volts, a low voltage alarm is activated. If the battery voltage registers below 11.8 volts, the unit goes into a "No-Go" mode and becomes inoperable to prevent an underpowered switch operation. A "No-Go" status signal is activated. The radio and RTU remain connected. The low voltage alarm with AC present is an indication that the battery needs to be changed.

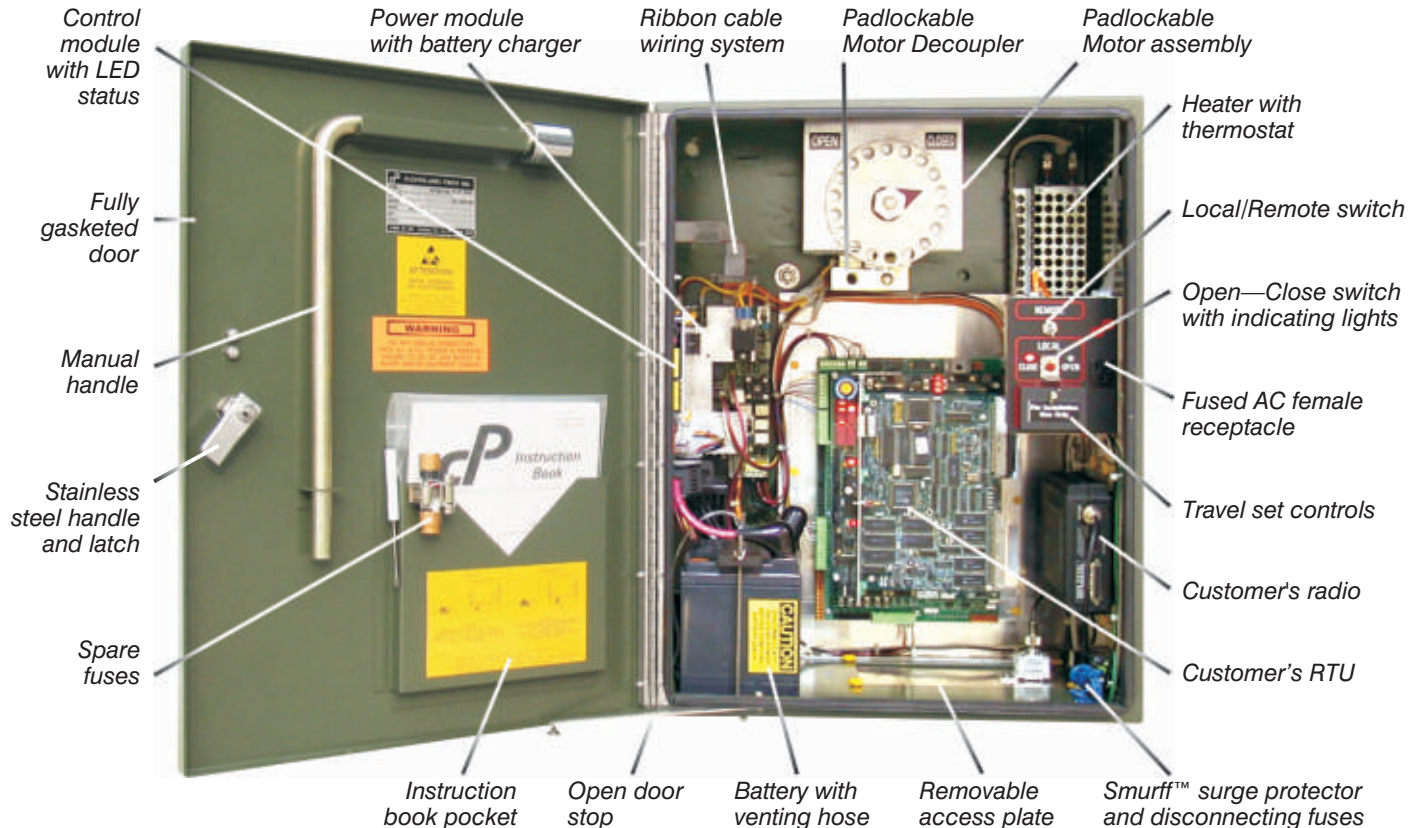
If the PAD charging circuit loses its power source, a loss of charge alarm is activated. If the charging source is lost for an extended period of time, the RTU and radio will continue to draw current and thereby drain the battery. To prevent battery damage, an "auto-disconnect" isolates all loads from the circuit when the battery voltage drops to 11.0 volts. When AC power for charging is restored, the battery is automatically reconnected.

PAD™ Controller Features

The PAD controller enclosure is rated NEMA 3R. The enclosure is constructed from a corrosion resistant aluminum alloy and is powder-coated for additional durability. The continuous hinge and door handle are made from stainless steel. The door of the enclosure is fully gasketed to keep moisture out of the enclosure.



A single-motor controller is shown below. A controller that can handle up to 4 motors is available.



PAD Battery

The battery used in the PAD 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. The battery typically has a four to five year life depending upon duty and environment.

Charging the Battery

The PAD has a "battery manager" charging circuit with a temperature compensation feature to prevent overcharging or undercharging the battery. The battery is charged through a transformer and rectifier, which delivers an electronically regulated charge from the customer's AC source.

Circuit Board and Connectors

The control circuits and the power circuits 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.

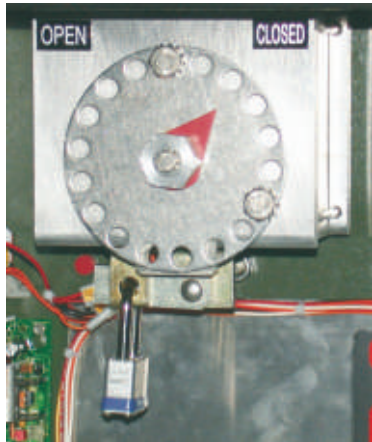
Heater and Thermostat Protection

A thermostatically controlled 250 watt heater is provided in all PAD units. The heater runs on a 120 volt AC source.

Surge and Electrostatic Protection

Circuits have been tested to withstand surges and electrostatic voltages beyond the values set by ANSI C37.90.1 and C62.41, and Mil. Std. DOC-HDBK263.

PAD™ Motor Assembly Features



Decoupler shown padlocked in the decoupled position

The PAD motor assembly incorporates all of the features that you would expect in the best controller in the industry.

The motor assembly features:

- Open and close travel limits set via the simple travel adjustment controls within the controller.
- Motor decoupler that will re-couple only when the motor and switch are in sync.
- Provision for padlocking the motor with the switch in the open or closed position.
- Stall-out timer.
- Provision for manual operation (manual handle provided).
- Adjustable mechanical stops.

PAD™ Advantages

Automatic Battery Testing

The battery is monitored almost continuously using a smart circuit. A 12 ampere load is applied to the battery every five minutes and the battery voltage is measured with the battery charger off. The test duration is very short so the energy drain on the battery is minimal. Since the testing is done automatically there is no need for the customer to implement a command system to periodically perform a battery test.

Automatic Load Disconnect

Under the battery loads of the radio and RTU, battery voltage will decline when AC is lost. All loads are dropped when the automatic load disconnect threshold voltage is reached. This feature is especially important when storms cause extended loss of AC, as many batteries can be ruined within 36 hours. The automatic load disconnect prevents deep discharge of the battery which causes damage and necessitates battery replacement.

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. No-Go is automatically removed when AC is restored.

Options

- Multiple switch control
- "Auto-actuate" options for transfer switching without special RTU programming
- Factory installation of customer's RTU and radio
- Battery cooler to maximize battery life (120 VAC source required)
- Additional features and capabilities are available upon request

Travel Set Controls

Simple travel control setting is performed through pushbuttons located on the front panel. Travel set can be accomplished in less than a minute. Adjusting limit switches is never necessary.

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.

Operator Status Indications

PAD status indications including padmount switch 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 via LED's on the PAD control board. Additional status indications can be provided if the RTU is capable. Status indications can be inverted by changing the position of a DIP switch.

Dual Power Source for the Motors

The PAD motors operate from 120 volt AC as a primary power source and uses the battery as a backup. Since the motors use AC as their primary power source, the motors will run as long as AC is present even if the battery is weak. This feature maximizes the reliability of the control system.



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