

# Types BR, BR-T, BT-D, BT-T, and BT-TF Motor Operators for Transmission and Distribution Automation



**CLEVELAND/PRICE INC.**

14000 Rt. 993, Trafford, PA 15085 (724) 864-4177

FAX (724) 864-9040

E-mail: [sales@cleavelandprice.com](mailto:sales@cleavelandprice.com)

# Automated Distribution Motor Operators (ADMO™)

## Application



The Cleveland/Price Automated Distribution Motor Operator (ADMOTM) is a simple, dependable operator for remote opening and closing of group operated distribution and transmission switches. It is available in five models to match all switching requirements:

Model	Operating Direction	Application	Special Use
BR	Reciprocating	Distribution	
BR-T	Reciprocating	Transmission	High force
BT-D	Torsional	Distribution	
BT-T	Torsional	Transmission	
BT-TF	Torsional	Transmission	High speed

The ADMO duplicates the force, speed, and travel of a manual operator and will operate existing or new installations of any make of switch.

## General Description

The ADMO is electrically operated and has provision for manual operation. The mechanism is motor driven and does not utilize hydraulics in its operation.

A single 12 volt, 33 amp-hour battery supplies power to the operator's motor, as well as the customer's radio and remote terminal unit (RTU). A power supply is also provided to accommodate RTU's requiring 24 volts DC. Without RTU and radio loads, the battery can provide hundreds of open/close cycles without recharging. A complete battery charging system is provided. The charging system can be

powered from an AC source or from solar panels. With loss of charger power, the battery can typically maintain RTU and radio loads for up to 24 hours. An electronic system provides battery overcharge protection as well as battery voltage testing. Battery and charger statuses are wired to the RTU for monitoring.



*Type BR shows with manual handle in place. Unit is mounted 10 feet above ground.*

The motor operator enclosure offers sufficient room to house most RTU's and radios. All components are accessible through the front door. The units mount easily to wood, steel, or concrete poles, and can be installed at any height on the pole, according to customer preference. The enclosure is powder coated white to provide a surface that reflects the heating rays of the sun thereby reducing heat buildup within the enclosure.

The narrow profile of the ADMO provides clearance for vehicular traffic, as well as adjacent structures. The reduced size of the ADMO also facilitates on-pole maintenance and manual operation even when the unit is mounted high on the pole. The user-friendly design makes all internal components easily accessible.

## HOW THE ADMO™ WORKS

### ADMO Operation

The ADMO may be operated locally or remotely. A selector switch located on the front control panel sets the operation mode. 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.

### Manual Operation

The ADMO is designed with provision for manual operation. A manual operation interlock is provided for operator safety. When the handle for manual operation is removed from its clips, the handle interlock switch opens

the motor control circuit. This circuitry ensures that the motor will not operate during manual operation. The position of the handle interlock switch is reported through a status indicator.

The decoupler, which allows manual operation of the motor operator, is designed so that the motor operator can only be recoupled in the position corresponding to the correct overhead switch position. When decoupled from the motor operator, the vertical operating pipe can be padlocked with the overhead switch in either the open or closed position. The decoupler for the BT motor operators is designed with a special torque relief feature that greatly simplifies coupling procedures, especially on transmission switches with long vertical operating pipe. The decoupling mechanism relieves and reestablishes the wind-up forces in the pipe.



# Type BR, BR-T

## Reciprocating Motion Distribution (Type BR) Transmission (Type BR-T)

**Safe, straight line motion, 7¼" to 13½" stroke**  
**BR rating - .4 second operation, 800 - 1400 lbs. thrust**  
**BR-T rating - 1.2 seconds operation, 1200-1800 lbs. thrust**

Coupler pins to existing linkage, or  
clamps to ¾" or 1¼" IPS pipe or 1" glass

Hanger for pole mounting

Front panel controls with close/open  
switch and local/remote switch

Electronically interlocked  
operating handle

Lock-out point

Decoupler pin

Sealed port for  
handle operation

Ribbon cable  
wiring system

Control module with  
status LED's

Power module with  
battery charger

Battery fuse

Thermostat/Heater

Battery with  
venting hose

Customer's radio

Removable access plate

Smurff™ surge protector  
and disconnecting fuses  
for incoming AC power

Open door stop

Fused AC female  
receptacle

Auxiliary switch

Motor

Instruction book

Stainless steel  
padlocked handle

Camming latch  
Spare fuses

Gasketed door  
with stainless  
steel hinge

Aluminum enclosure  
20.5"w x 26"h x 15"d  
BR, BR-T - 150 lbs.

## Power Train

The ADMO is driven by a universal, AC/DC series reversible motor. The maintenance-free motor is rated ¾ horsepower. A patented dynamic braking circuit is used to provide an extremely precise stopping point in both the open and closed positions. The braking action is initiated by two limit switches in the auxiliary switch assembly.

The torsional unit utilizes a chain driven mechanism with a locking action to maintain switch position. The reciprocating unit utilizes a chain driven mechanism that goes into toggle to provide locking action.

## ADMO Battery

The battery used in the ADMO is a lead acid type which is completely sealed. It has a pressure relief valve that only opens during excessive gas buildup. Gasses are

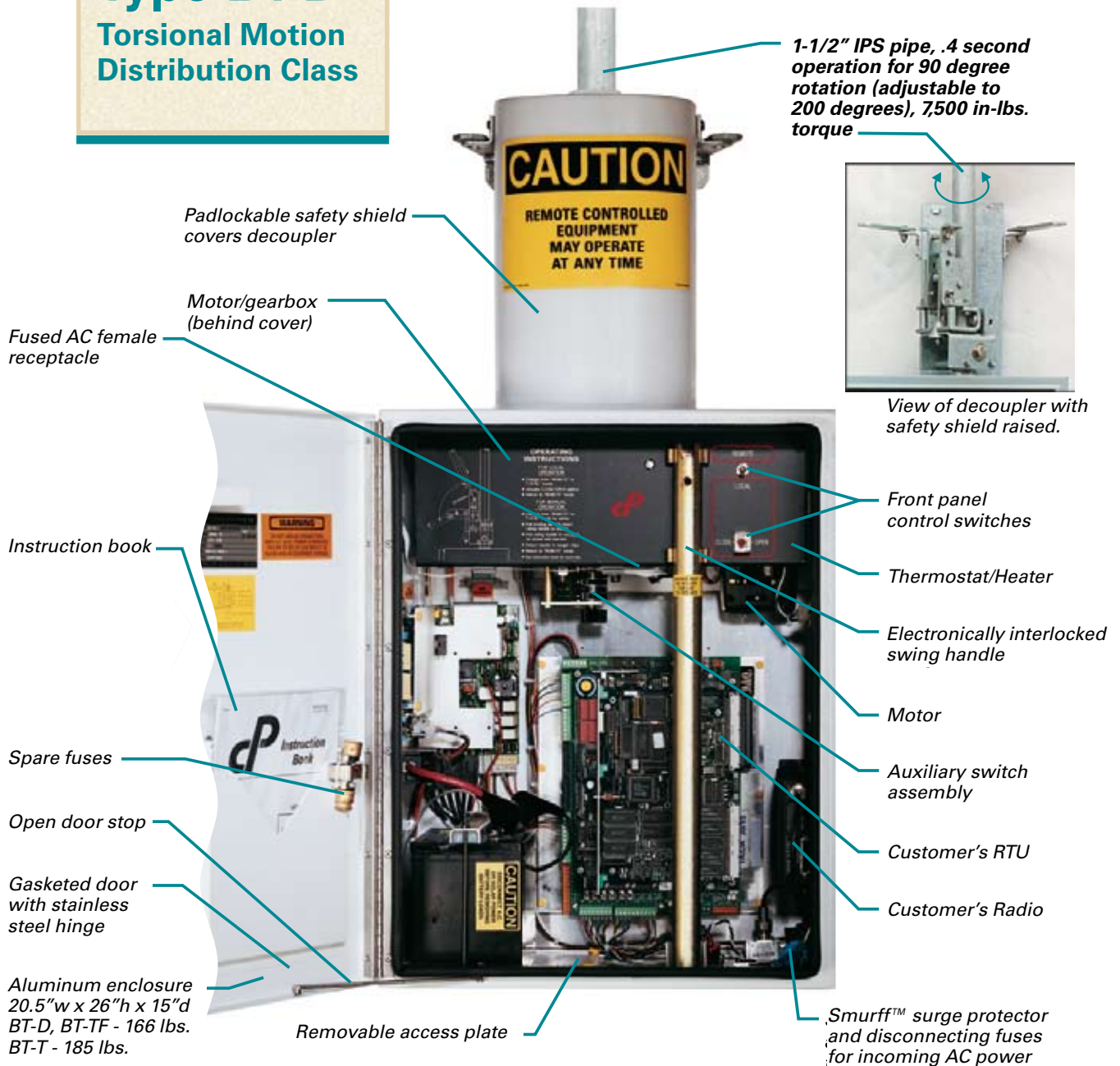
vented via a hose to the outside of the enclosure, preventing the buildup of corrosive and explosive gasses within the enclosure. The battery typically has a four to five year life depending upon duty and environment. In regions with sustained high temperatures, the life of the battery may be extended through use of the Cleaveland/Price battery cooler accessory that provides an optimal constant temperature environment.

## Charging the Battery

The ADMO has a "battery manager" charging circuit with a temperature compensation feature to prevent overcharging or undercharging the battery. The battery is charged through a rectifier, which delivers a controlled charge from the customer's incoming AC source. If an AC source is not available, a solar panel can be wired directly to the ADMO's optional solar input terminals on the BR-T,

# Type BT-D

## Torsional Motion Distribution Class



BT-TF, and BR-T models. A regulating charger is part of the ADMO's electronic control module for solar applications. The solar charging system has a 30 ampere capacity.

### Auxiliary Switches

The auxiliary switch assembly is positioned in the motor operator for ease of access. Four auxiliary switch contacts are provided—two for limiting the shaft rotation, and two for status indication. The auxiliary switches are adjustable through 360° without preset increments. Each cam that controls the make/break position of the auxiliary switch is independently adjustable. Changing the position of a cam does not disturb the position of an adjacent cam. No tools are required to adjust the auxiliary switch cams. Open/close limit switches are factory adjusted on the reciprocating units. On torsional units, the final open and closed positions of the overhead switch are easily adjusted by moving the cams.

### Circuit Boards and Connectors

The control circuits and the power circuits are located on separate boards to segregate high voltage and low voltage. 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 ADMO units. The heater runs on a 120 volt AC source.

### Surge and Electrostatic Protection

Circuits have been tested to withstand surges and electrostatic voltages in accordance with ANSI C37.90.1 and C62.41, and Mil. Std. DOC-HDBK263.



# Type BT-T, BT-TF

## Torsional Motion Transmission Class

**T**he transmission class torsional ADMO operators are available in two models, the BT-T and the BT-TF. The BT-T operates at a speed of 3.4 seconds for 180° rotation with a force output of 17,000 in. lbs. For switches that require high momentum to engage a latching mechanism, the faster BT-TF operator should be selected. The BT-TF operates at a speed of .8 second for 180° rotation with a force output of 7,500 in-lbs. Both units are provided with provision for manual operation with a swing handle. The BT-T also can be operated with an electrically interlocked handcrank. Other features are the same as the type BT-D operator.



*BT-T operating a 115kV SEECO switch.*

*Vertical pipe padlocked to lock-link*

*Pin for attaching swing handle*

*Strap or bolt hanger mounting*

*Torque relief decoupler shown decoupled*

*20:1 geared handcrank and telescoping swing handle for manual operation on BT-T, swing handle only on BT-TF*

*Customer's radio*

*Customer's RTU*



*BT-TF motor operator operating a Turner switch.*

## Control Circuit

For the most reliable operating system, the ADMO utilizes discrete logic chips and auxiliary switches to control the operation and the range of motion of the motor operator. The discrete components are hard wired into an unchangeable sequence of operation, eliminating the need to perform programming for basic operator functions. Additional functions can be added to the ADMO through programming of the RTU or the optional *Cleveland/Price Auto Actuate™* which provides transfer switch functions.

The ADMO design incorporates several "smart" elec-tronic circuit features. An electronic timer is built into the circuit for locked switch conditions caused by ice or contact welding. After a prescribed duration of stall, the timer automatically shuts off the motor before the battery fuse blows. The electronic timer then resets, allowing repeated motor operation attempts.

The smart circuits automatically check battery voltage every five minutes by disconnecting the charger and placing a resistive load on the battery. If the battery tester detects a voltage below 12.1 volts, a low voltage alarm is activated. If the battery voltage registers below 11.7 volts, the unit goes into a "No-Go" mode and a status signal is activated. If AC is not present under "No-Go", the unit becomes inoperable to prevent an underpowered switch operation. The radio and RTU remain connected.

If the ADMO 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 the RTU and radio from the circuit when the battery voltage drops to 11.2 volts. When AC power for charging is restored, the battery is automatically reconnected.

# ADMO™ Advantages



he ADMO incorporates the following critical features that are essential for automation reliability. No other motor operator offers all of these important traits.

## **Dual Power Source for the Motor**

The ADMO operates the motor from 120 volt AC as the primary power source and uses the battery as a backup. Since the motor operator uses AC as its primary power source, the motor operator will run as long as AC is present even if the battery is weak. AC and battery power are supplied to the motor concurrently so the motor operator will complete an operation without hesitation even if AC is lost during the operation. This feature maximizes the reliability of the motor operator.

## **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.

## **Stall-Out Timer with Auto-Reset**

If the motor operator is stalled (because of ice or switch mechanical problems) the unit stops trying to operate before the fuse blows. The control circuitry resets and can accept another operation command. The stall-out timer prevents the blowing of a fuse during multiple attempts to break ice. A blown fuse would make the unit inoperable and necessitate field service.

## **Options**

- Auto-Actuate™ options for transfer switching without special RTU programming
- 132 amp-hour capacity battery pack for solar applications to extend operating capability in cloudy weather
- Factory installation and wiring of customer's RTU and radio
- Factory installation of additional components such as transducers, fault relays, and special terminal blocks
- Stainless steel enclosure instead of aluminum
- Sensor cable for connecting the ADMO to the AC power source and voltage and current sensors
- Battery cooler to extend battery life in hot weather

## **Other Information**

- Detailed technical specifications are available upon request
- Customized outline drawings are provided to capture customer specifications under one style number for ease of ordering

## **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.

## **Operator Status Indications**

Several ADMO status indications are reported back through the RTU. Among the status indications are overhead switch position, local/remote switch position, manual handle placement in hanger clips, loss of AC, low battery voltage, and No-Go status. All six statuses are indicated locally via LED's on the ADMO control board. Other status indications can be added if the RTU is capable. The ADMO also has the capability to invert the status indications by changing the position of a DIP switch.

## **Dual Charger System**

On transmission class ADMO models, the battery can be charged from either an AC source or a solar source when the ADMO is supplied with the optional solar charging board.

## **Safety Features**

The ADMO is designed for public safety as well as operating personnel safety. The BT units are supplied with a protective cover so that the rotating decoupling mechanism is not exposed. The BR unit drives in a perfect linear motion from the top of the enclosure. There is no swinging operating lever to cause injury. There are also no pinch-points during operation, making the units street-level safe.

A safety interlock between the manual operating handle and motor circuit is provided. When the manual handle is out of place, the motor circuit is disabled. A status point is provided to verify the remote ready state. This status changes when the manual operating handle is removed. The safety interlock prevents electrical operation of the motor operator during manual operation, enhancing operating personnel safety.