Bulletin DB-111B12

TP-C2
Motor Operator

CLEAVERLAND / PRICE INC.
14000 Rt. 993, Trafford, PA 15085 (724) 864-4177
FAX (724) 864-9040
Email: sales@cleavelandprice.com
The Cleaveland/Price TP-C2 is a high torque motor operating mechanism designed to operate disconnect switches requiring torsional drive. The TP-C2 enables remote control of the disconnect switch as well as local electrical and manual operation. Manual operation is by handcrank or optional swing handle. The TP-C2 easily mounts to any structure and is interchangeable with the Cleaveland/Price GHC wormgear operator.

The TP-C2 is the culmination of years of experience and input from users and incorporates improvements and features most desired by the electrical power industry. The motor operator is simple and user friendly. All internal components of the motor operator are accessible through the front door, eliminating the need for removable side panels. The motor control circuit, auxiliary switches, and heater are factory wired to terminal blocks located at the front of the operator enclosure. Terminal blocks for customer wiring are set at an angle for ultimate accessibility. Connecting wires are clearly marked for identification. The solid state controls switch heavy DC motor currents without erosion of relay contacts.

Wiring is modularized into three groups: auxiliary switch contacts, motor, and control circuits. The motor and control circuits are connected through heavy-duty pin connectors. This modular approach allows the quick changing of any component and the addition of selected accessories.

Fuses for the motor, control circuit, and heater are conveniently located at the front of the enclosure. The fuses are of the disconnecting type and provide an open gap for AC/DC isolation.


**External Features**

1. **Grounding Provision**
   A clamp-on ground strap is provided for grounding the vertical pipe. A grounding lug is provided at the bottom of the enclosure.

2. **Decoupler**
   The TP-C2 is equipped with a “torque-relief” decoupler as a standard feature.
   When the coupling handle is pulled down, the torque-relief decoupler releases the torsional load from the vertical pipe. No tool or initial manual operation is required to relieve this force and decouple the motor operator from the vertical pipe. The coupling connection is designed so that the vertical pipe can only re-couple to the motor operator in the correct position.

   An optional swing handle can be pinned to the coupling handle for manual ice chopping operation when the motor operator is decoupled from the vertical pipe.

3. **Provision for Padlocking**
   When the vertical pipe is decoupled from the motor operator, the vertical pipe can be padlocked in place with the switch in the open or closed position. The decoupler handle is also padlockable in the coupled position.

4. **Pipe Connector**
   The connection between the motor operator and the vertical operating pipe is a clamping device with stainless steel piercing set screws that prevent slippage. The connector can be ordered for either 1½", 2", or 2½" IPS pipe.

5. **External Mechanical Stop**
   Rugged mechanical stops are provided to prevent over-travel of the torsional pipe during manual handcrank operation. The stops are built into the motor operator assembly and do not require structure support. The stops are adjustable to the final position of the airbreak switch.

6. **Weatherproof Aluminum Enclosure**
   The motor operator enclosure is made of marine grade aluminum for corrosion resistance. The NEMA 3R rating of the enclosure assures weatherproof construction. The enclosure is powder-coated ANSI 61 gray. Custom enclosures are available.

7. **Gasketed Door**
   The enclosure door is fully gasketed to prevent entrance of dust or moisture. The door is equipped with a corrosion resistant stainless steel continuous hinge and padlockable handle. An interior pocket is provided for holding instructions and drawings. A clip is provided on the door for storing spare fuses.

8. **Removable Conduit Plate**
   An aluminum conduit plate is provided for field drilling and routing of power and control wiring.
Close-Open Switch
The close-open switch is a seal-in momentary toggle switch for local electrical operation of the motor operator. The switch has a guard to prevent unintentional operation.

"Fast stop" Button
A stop button enables emergency stopping and small movements while adjusting the switch. The TP-C2 stop button is appropriately sized and positioned for quick stopping. After stopping, an open or close command can be executed.

Interlocked Shutter Cover
The shutter cover, used to access manual operation, is electrically interlocked with the motor to prevent motor operation while the shutter is raised. Lifting the shutter opens the motor control circuit and allows insertion of the handcrank.

Local/Remote Switch
The Local/Remote toggle switch permits both on-site and off-site electrical operation of the disconnect switch. In both the local and the remote modes, the control relays are sealed-in to prevent execution of a conflicting command before an open or close operation is completed.

Manual Handcrank
A handcrank is provided for manual operation. When engaged, the handcrank connects to the wormgear drive. It is conveniently and securely stored on the face of the control panel behind the padlockable door.

Auxiliary Switch Contacts
The TP-C2 is standard equipped with a four contact auxiliary switch assembly. Two contacts are motor limit switches and two are provided for customer use. Up to fourteen additional contacts can be supplied in the contact assembly. The contacts can be wired as normally open or normally closed. Contacts have a "snap action" to provide superior interruption of heavy current regardless of the speed of the rotating cams. Interrupting ratings as high as 10 amps on DC inductive circuits are available when specified.

The make/break position of each auxiliary switch contact is controlled by an independently adjustable cam. The cams are adjustable through 360° without preset increments. The auxiliary switch assembly is designed for quick and easy adjustment without tools and factory training. Changing the position of a cam does not disturb the position of adjacent cams, and loosening and tightening of set screws on individual cams is unnecessary.

Since the motor operator is supplied with a decoupler, a type AS-C or AS-T external auxiliary switch assembly is suggested to assure true remote indication of switch position when the motor operator is uncoupled from the operating pipe. The external auxiliary switch assembly is driven by the vertical operating pipe and not the motor drive shaft. These contacts will always give true indication of switch position.
Internal Features

Control Circuit
The TP-C2 utilizes an advanced design, state of the art control circuit. Mechanical relays are not used to interrupt motor current. Power interruption is by solid state components with a mechanical relay in series that provides the assurance of an open circuit. Heavy arcing on relay contacts is eliminated - a proven breakthrough for long-term performance.

The control circuit provides a sealed-in feature as well as electrically interlocked directional relays. The circuit is intrinsically safe, with no possibility of two contacts closing at the same time.

Motor
The operator is powered by a maintenance-free, single phase AC/DC reversible motor rated 3/4 hp. Motor overload protection is provided by a fuse. A circuit breaker and thermal overload relay are available as options. Operating personnel are protected from the chain and sprocket drive mechanism by the removable front panel.

Drive Mechanism
A combination chain drive and wormgear are used to power the output shaft. The chain driven wormgear mechanism is superior to spur gear mechanisms during heavy ice duty.

Braking
The TP-C2 uses a patented dynamic braking system to provide ultra-precise, repeatable, service-free braking action. Braking is initiated by limit switches or the stop button. With the dynamic braking system, there is no brake shoe or solenoid maintenance. Back-travel of the vertical operating pipe is prevented by the high ratio wormgear drive, which effectively locks the switch in the open and closed positions.

Heater
A 250 watt anti-condensation heater is provided in the motor operator enclosure. A safety touch guard is provided on the heater. The heater is thermostatically controlled and supplied with a disconnect function via the pullout fuse. An energy-saving humidistat is available as an option. The heater can be powered from a 120 volt or 240 volt source, as specified by the customer.

Application Note: Interlocking with a Motor Operator

A motor operated switch can be interlocked with other devices. Electrical operation can be prevented by electrically interlocking the motor operator with a circuit breaker. To accommodate electrical interlocking, pre-wired terminal block positions are provided to integrate the circuit breaker auxiliary switch into the motor control circuit. A key interlock may be mounted on the door of the motor operator enclosure to prevent access to the manual handcrank.

Alternately, a key interlock may be located on the vertical operating pipe to prevent operation of the switch. An electrically interlocked auxiliary switch must be provided on the key interlock to open the motor control circuit when the key interlock locking bolt is extended.

Precaution must be taken when a motor operated switch is provided with a mechanically interlocked grounding switch. An auxiliary switch located on the vertical operating pipe of the ground switch should be specified for interlocking with the motor control circuit of the main switch to prevent motor operation when the ground switch is closed.
Operating Specifications

### Standard Features

- Torque-relief decoupler
- Weatherproof, dustproof, and rustproof NEMA 3R enclosure
- Padlockable stainless steel enclosure handle
- Non-cast, adjustable mechanical stops
- Removable conduit entrance plate
- Handcrank for manual operation
- Local/Remote control switch
- “Fast stop” button
- Dynamic braking for electrical stop
- Fused control and motor circuit
- Thermostatically controlled 250 watt heater
- Two auxiliary switch contacts for customer use
- 4/0 ground strap

### Ordering Information

Customer must specify:

- Control voltage ______ AC or DC
- Heater voltage ______ V.
- Torque rating ______ in.-lbs.
- Size of vertical operating pipe 1½” / 2” / 2½” IPS
- Desired optional features

---

### Catalog Number Table

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Rated Voltage</th>
<th>Min. Operating Voltage</th>
<th>Max. Operating Voltage</th>
<th>Torque In-lbs. at Rated Voltage</th>
<th>Typical Running Current</th>
<th>Locked Rotor Current</th>
<th>Operating Time 180° rot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C11A008G01</td>
<td>24 V.</td>
<td>22 V.</td>
<td>31 V.</td>
<td>20,000</td>
<td>40 A.</td>
<td>110 A.</td>
<td>5.4 sec.</td>
</tr>
<tr>
<td>C11A008G02</td>
<td>24 V.</td>
<td>22 V.</td>
<td>31 V.</td>
<td>30,000</td>
<td>40 A.</td>
<td>110 A.</td>
<td>9 sec.</td>
</tr>
<tr>
<td>C11A008G03</td>
<td>48 V.</td>
<td>36 V.</td>
<td>56 V.</td>
<td>10,000</td>
<td>8 A.</td>
<td>55 A.</td>
<td>5.4 sec.</td>
</tr>
<tr>
<td>C11A008G04</td>
<td>48 V.</td>
<td>36 V.</td>
<td>56 V.</td>
<td>18,000</td>
<td>8 A.</td>
<td>55 A.</td>
<td>10 sec.</td>
</tr>
<tr>
<td>C11A008G05</td>
<td>48 V.</td>
<td>36 V.</td>
<td>56 V.</td>
<td>20,000</td>
<td>8 A.</td>
<td>55 A.</td>
<td>9 sec.</td>
</tr>
<tr>
<td>C11A008G06</td>
<td>48 V.</td>
<td>36 V.</td>
<td>56 V.</td>
<td>30,000</td>
<td>8 A.</td>
<td>55 A.</td>
<td>9 sec.</td>
</tr>
<tr>
<td>C11A008G07</td>
<td>250 V.</td>
<td>180 V.</td>
<td>280 V.</td>
<td>20,000</td>
<td>4 A.</td>
<td>11 A.</td>
<td>5.4 sec.</td>
</tr>
<tr>
<td>C11A008G08</td>
<td>250 V.</td>
<td>180 V.</td>
<td>280 V.</td>
<td>30,000</td>
<td>4 A.</td>
<td>11 A.</td>
<td>11 sec.</td>
</tr>
<tr>
<td>C11A008G09</td>
<td>125 V.</td>
<td>90 V.</td>
<td>140 V.</td>
<td>10,000</td>
<td>6 A.</td>
<td>35 A.</td>
<td>5.4 sec.</td>
</tr>
<tr>
<td>C11A008G10</td>
<td>125 V.</td>
<td>90 V.</td>
<td>140 V.</td>
<td>10,000</td>
<td>6 A.</td>
<td>35 A.</td>
<td>5.5 sec.</td>
</tr>
<tr>
<td>C11A008G11</td>
<td>125 V.</td>
<td>90 V.</td>
<td>140 V.</td>
<td>11,000</td>
<td>6 A.</td>
<td>35 A.</td>
<td>11 sec.</td>
</tr>
<tr>
<td>C11A008G12</td>
<td>125 V.</td>
<td>90 V.</td>
<td>140 V.</td>
<td>11,000</td>
<td>6 A.</td>
<td>35 A.</td>
<td>9 sec.</td>
</tr>
<tr>
<td>C11A008G13</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>10,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>2.5 sec.</td>
</tr>
<tr>
<td>C11A008G14</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>10,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>5.4 sec.</td>
</tr>
<tr>
<td>C11A008G15</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>11,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>5.5 sec.</td>
</tr>
<tr>
<td>C11A008G16</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>11,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>3.5 sec.</td>
</tr>
<tr>
<td>C11A008G17</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>20,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>5 sec.</td>
</tr>
<tr>
<td>C11A008G18</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>20,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>11 sec.</td>
</tr>
<tr>
<td>C11A008G19</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>20,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>11 sec.</td>
</tr>
<tr>
<td>C11A008G20</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>30,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>11 sec.</td>
</tr>
<tr>
<td>C11A008G21</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>30,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>11 sec.</td>
</tr>
<tr>
<td>C11A008G22</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>30,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>11 sec.</td>
</tr>
<tr>
<td>C11A010G01</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>30,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>11 sec.</td>
</tr>
<tr>
<td>C11A010G02</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>30,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>11 sec.</td>
</tr>
<tr>
<td>C11A010G03</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>30,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>11 sec.</td>
</tr>
<tr>
<td>C11A010G04</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>30,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>11 sec.</td>
</tr>
<tr>
<td>C11A010G05</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>30,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>11 sec.</td>
</tr>
<tr>
<td>C11A010G06</td>
<td>120 V.</td>
<td>109 V.</td>
<td>177 V.</td>
<td>30,000</td>
<td>6 A.</td>
<td>20 A.</td>
<td>11 sec.</td>
</tr>
</tbody>
</table>
Options

Optional Features

- Additional auxiliary switch contacts
- Operations counter
- Switch position indicating lights
- Weatherproof external GFI
- Enclosure lamp
- Customer specified terminal blocks
- Custom control circuit
- Swing handle for ice breaking
- Stainless steel enclosure
- NEMA 4X rated enclosure
- Windowed position indicator
- External auxiliary switch assembly
- Circuit breaker instead of fuse
- Internal grounding bus
- Auxiliary switch assembly with lagging contacts
- Variable speed control module
- Operation delay with delay in process indicator
- Combination Thermostat/Humidistat
- Other optional features are available. Contact the factory for more information.

Variable Speed Control Module

High kV switches may draw a very large arc when closing in the presence of magnetizing or line charging current or due to coupling capacitance of higher voltage parallel lines. Typically, users want to minimize the amount of arcing time when operating a switch to prevent a phase to phase fault. To accomplish this, the switch must be closed very quickly until an arc horn is engaged and then the speed must be immediately reduced to prevent the switch blade from bouncing open due to impact. Cleaveland/Price offers a variable speed control module that can set two blade speeds for the desired operating affect when closing or opening a switch. Throughout the operating sequence, the full torque rating of the motor operator is maintained regardless of speed setting.

Operation Delay Module

When operating locally, a time delay before switch operation gives utility personnel time to go a safe distance from the switch if necessary. The TP-C2 can be supplied with a time delay module integrated into the front panel control. The delay can be set from 0 to 99 seconds. An LED indicates that an operation delay is in progress.

Combination Thermostat/Humidistat

Typically, heaters are controlled by a thermostat that turns the anti-condensation heater on when the temperature reaches dew point. However, the humidity may be low and the heater could be running needlessly. By using a heater control that looks at both temperature and humidity, a more energy efficient system is utilized.

Cleaveland/Price offers a combination thermostat/humidistat in motor operators that will turn on the heater only when the temperature and humidity reach the point where the humidity will condense. By using the combination thermostat/humidistat, utilities can save money and conserve power on their system.
### Dimensions

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>20,000 in-lbs and less</td>
<td>12.00</td>
<td>13.12</td>
<td>4.12</td>
<td>7.75</td>
<td>4.00</td>
<td>4.50</td>
</tr>
<tr>
<td>30,000 in-lbs</td>
<td>14.00</td>
<td>15.11</td>
<td>4.75</td>
<td>10.00</td>
<td>6.00</td>
<td>6.00</td>
</tr>
</tbody>
</table>

Dimensions in inches