IPB-AL

# BECK® ELECTRIC ACTUATORS

## FOR INDUSTRIAL PROCESS CONTROL


# ALUMINUM INDUSTRY

BECK VIDEO
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## Rugged & Dependable with Consistently Precise Control in Demanding Applications

The dependability and precise control capability of Beck drives have made them a standard in nearly 150 aluminum facilities worldwide with over 6,000 drives installed. Beck drives deliver maintenance-free operation in temperature extremes and other harsh conditions common to the aluminum industry.

Beck drives provide tight, responsive position control under the most demanding modulating conditions. This precise control makes Beck drives a key element for improved process efficiency, reduced energy costs and reduced emissions.

*Pre-melt Furnace Gas & Air Valves*

*Melting Furnace Gas Valve*

*Furnace Combustion Air Damper*

*Water Control Valve*

On the cover: Alcan's Alma Works Smelter, Quebec, Canada

## Installing New or Retrofit Beck Drives Results in Immediate Cost Savings

Beck damper drives and valve actuators improve reliability and process efficiency as soon as they are installed. They improve process control, thereby reducing waste and virtually eliminating costly maintenance.

Beck Sales Engineers can assist you with every step of the process, from model selection to setup and installation. All Beck drives are shipped from the factory fully calibrated as specified. Drives can be supplied with fabricated mounting bases or mounted to valves for drop-in installation.

Whether equipping a new facility or upgrading an existing system, maximize the efficiency of your plant by specifying Beck, the proven choice of modern plants throughout the world.

**Typical applications for Beck drives include:**

### *Extraction Process*

**Boilers**
- Combustion Air Dampers
- Fuel Valves
- Feedwater & Steam Valves

**Digesters**
- Steam Valves
- Caustic Valves
- Slurry Valves

**Washers & Thickeners**
- Product & Underflow Valves

**Kilns**
- Combustion Air Dampers
- Fuel Valves

### *Reduction Process*

**Raw Materials**
- Baghouse Dampers (air flow balancing)

**Potlines**
- Cell Exhaust Dampers

**Anode/Carbon Ovens**
- Fuel Valves
- Flue Exhaust Dampers

### *Fabrication*

**R-type Furnaces**
- Fuel & Waste Gas Valves
- Air & Exhaust Dampers

**Incinerators**
- Fuel and Air Valves

**Melting Furnaces**
- Fuel Valves
- Air & Exhaust Dampers

**Holding/Alloying Ovens**
- Fuel Valves
- Air & Exhaust Dampers

**Casters**
- Water Valves

**Heating Furnaces**
- Combustion Air Dampers
- Fuel Valves

**Reheat & Pusher Furnaces**
- Combustion Air Dampers
- Fuel Valves

**Soaking Pits**
- Combustion Air Dampers
- Fuel Valves

**Annealing Furnaces**
- Gas & Air Valves

*Kiln Reverse Air Fan Damper*

***Contact a Beck Sales Engineer at 215-968-4600 to find out more about the best drives for your installations.***
***Visit our website at www.haroldbeck.com.***
***E-mail: sales@haroldbeck.com***

## The Beck Motor:
### *No Burnout, Continuous Duty*

The unique motor is one of the features that sets Beck actuators apart from other typical electric actuators. Beck's no burnout motor ensures that the actuator is available 100% of the time. There are no duty cycle limitations typical of most electric actuators, so the Beck actuator tracks the control signal perfectly, greatly simplifying loop tuning.

The Beck motor:

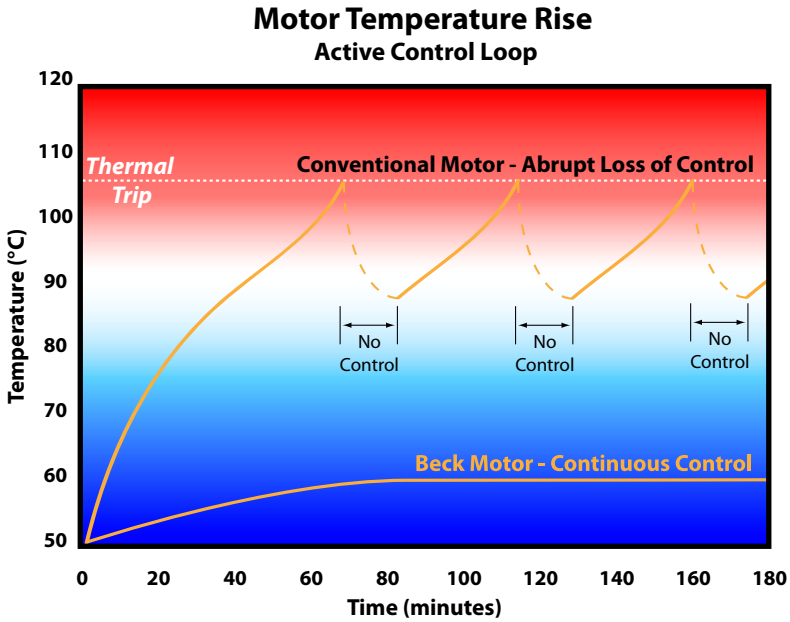
- Reaches full speed and torque in milliseconds—eliminating dead time.
- Stops instantaneously—eliminating coast and overshoot.
- Provides extremely accurate, repeatable positioning with no required maintenance.
- Draws very low current (0.16 to 3.0 A in most applications) permitting easy integration with UPS systems.

And . . .

- Never overheats or burns-out; even under demanding modulating or stalled conditions.

*Furnace Hopper*

***Tested in an active modulating loop, conventional motors rose rapidly in temperature, tripping thermal overload devices and becoming unavailable for extended time intervals. Only the Beck motor remained stable for continuous operation.***



## Digital Electronics: Repeatable Control, Simple Operation, and Diagnostic Capabilities

Our field-proven electronics provide excellent position control in response to modulating control signals. This maximizes control loop performance by ensuring that the drive responds exactly as the control loop requires.

The DCM is equipped with a local interface panel for pushbutton calibration functions without the need for external devices or software. LED diagnostic lights display a number of status conditions.

The DCM is also equipped with a HART® communications interface to provide bidirectional digital communications over the existing analog demand wiring—providing access to the added functions and information without interfering with control or requiring new wiring. Communications can be established either remotely or locally using any standard HART®-based communication tool. Optionally, the DCM can be equipped with Foundation Fieldbus® or Profibus PA® communication capability. In addition, the DCM is compatible with common asset management systems.

A serial interface also allows for drive configuration changes, drive information reporting and assistance in troubleshooting.

Beck's Contactless Position Sensor (CPS) also resides within the drive, and provides reliable internal position feedback to the DCM for position control. The DCM also uses the sensor signal to source a 4–20 mA external position signal for remote monitoring of drive position. Unlike typical position sensors, the CPS does not wear due to its contactless design.

HART COMMUNICATION PROTOCOL

FOUNDATION

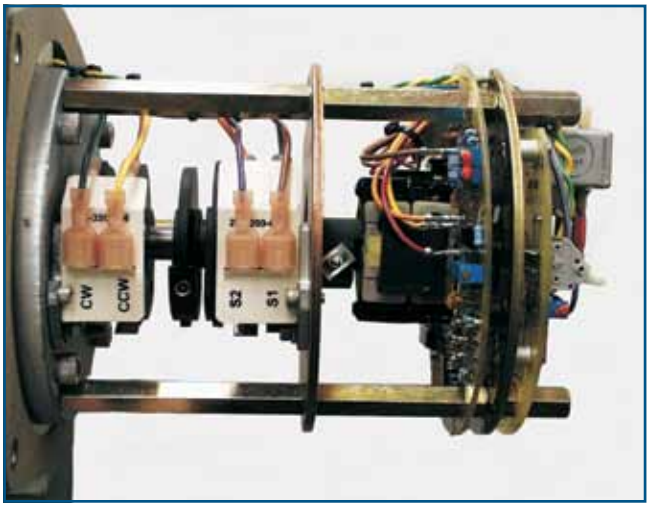
## Over-travel Limit Switches

Beck drives include heavy-duty, single-pole, double-throw (SPDT) switch mechanisms for electrical over-travel protection. Switch cams will not slip because each is mounted to the shaft by an integral, tangential clamping means—with no set screws to mar the shaft.

Every drive is equipped with two over-travel limit switches. Optionally, drives can be equipped with up to four auxiliary switches that can be set to operate at any desired point of drive travel, thus providing discrete inputs for control or indication.

Common throughout most Beck drive models, the SPDT switches provide the following:

- A maximum rating of 6 A at 120 V ac (three times the maximum motor current for most models) to ensure long life.
- Auxiliary switches are field-adjustable with infinite positioning throughout the drive's travel range.
- May initiate secondary functions or provide remote indication of drive position.



## Drive Train: Power and Durability

Beck's durable gear train maintains accurate, consistent positioning even under the demanding conditions of an active control loop.

- Gear trains employ a unique, all spur gear construction using only heat-treated alloy steels and ductile iron.
- Efficient, wide-faced spur gears ensure long life and eliminate wear-induced backlash and positioning inaccuracies common in worm gear and "Scotch-yoke" designs.
- Integral self-locking mechanism ensures that drives hold a minimum of 200% of rated torque with the motor de-energized.
- Durable design provides up to 4 days of protection against intermittent or extended accidental stalls.
- Stall protection is provided by the DCM. If the motor tries to run in one direction for more than 300 seconds, the DCM will shut off power to the motor and a status indication LED will activate indicating a stall.

## Local Manual Control

All Beck drives are built with local positioning capabilities. An electric Handswitch allows electrical local operation of the drive, while a convenient Handwheel, or Handcrank on some high torque drives, allows manual positioning of the drive output shaft without electric power.

The electric Handswitch allows the drive to be positioned locally and is very useful for the initial setup of the drive and linkage. It also serves as a diagnostic tool or a backup control device in the event the loop controller or demand signal malfunctions.

Even in the absence of power, and with full load applied, the drive output shaft can be manually positioned using the easy-to-turn, spoke-free Handwheel. No clutch mechanism is required and mechanical stops protect against manual overtravel.

## Housing: Superior Protection and Convenient Access to Components

Beck drives feature a cast aluminum body with individual compartments to protect components from moisture and dirt, and allow easy access for installation and calibration.

- Precision-machined aluminum alloy castings with corrosion-resistant polyurethane paint provide a rugged, dust-tight, weatherproof Type 4X enclosure.
- Individual compartments protect all major components: Motor, DCM, CPS, gear train and installation wiring terminal board.
- Gasketed covers provide extra protection for abusive indoor environments and harsh outdoor climates.
- Each compartment can be accessed without exposing other components to the environment.
- Output and Handwheel shafts are sealed with weatherproof, double-lip cartridge seals.

*Group 11 drive with the gasketed control end cover removed*

## Linkage: Beck Linkage Kits and Link-Assist™ Program Ensure the Best Connection

The unique design of the crank arm allows infinite position adjustment to simplify installation.

Engineered linkage kits are available to complete the connection from the crank arm to the damper. Once the connection is made, the linkage length may be adjusted, simplifying the final mechanical calibration. Also, Beck rod ends incorporate a bearing to compensate for some lateral misalignment.

Beck's Link-Assist™ program provides a printout showing the optimum drive and linkage configuration for the application. The linkage arrangement can be characterized to match the torque profile of the application. Request this free service to save time, simplify installation and ensure the best performance at the lowest possible cost.

*Mixing Air Bottom Damper*

## GENERAL SPECIFICATIONS

| | |
|---|---|
| Drive Power | |
| Model 11 | 120 V ac, single-phase, 60 Hz (50 Hz Optional)<br>(208, 240, 380, 416, 480 & 575 V ac, 60 or 50 Hz Optional) |
| Model 14 & 29 | 120 V ac, single-phase, 60 Hz (50 Hz Optional)<br>(240 V ac, single-phase, 60 or 50 Hz Optional) |
| Model 75 | 120 V ac, single-phase, 60 Hz (50 Hz Optional) |
| Output Torque/Thrust | |
| Model 11 | Up to 1,800 lb-ft (2 440 N•m) |
| Model 14 | Up to 4,000 lbs of thrust (17 800 N) |
| Model 29 | Up to 6,100 lbs of thrust (27 134 N) |
| Model 75 | Up to 80 lb-ft (108 N•m) |
| Operating Conditions | –40° to 185° F (–40° to 85° C)<br>0 to 100% relative humidity |
| Input Signal Options | 4–20 mA or 1–5 V dc for digital control |
| Communication Interface Options | HART® protocol, Foundation Fieldbus®, Profibus PA®, local pushbutton/LED panel and RS-232 Serial Commands |
| Position Feedback Signal | 4–20 mA |
| Action on Loss of Input Signal | Stays in place (all models) or moves to a preset position (configurable with some models) |
| Action on Loss of Power | Stays in place, manual Handwheel operation |
| Enclosure | Type 4 or 4X (depending on specific model).<br>Models approved for use in Hazardous classified locations are also available—contact a Beck Sales or Application Engineer for details. |


BECK® HAROLD BECK & SONS, INC.

*11 TERRY DRIVE • NEWTOWN, PENNSYLVANIA 18940 • USA*
*PHONE: 215-968-4600 • FAX: 215-860-6383 • E-MAIL: sales@haroldbeck.com*
*www.haroldbeck.com*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