

# **BECK**<sup>®</sup>

## **drive specification guide**





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## Common Features of Beck Drives

Outstanding features combine to produce the durable and precise performance of Beck drives. This section describes many of the features common to all Group 11 and 14 drives.

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## Group 11 Rotary Damper Drives

Versatile Group 11 drives included in this guide are available in a range of torque outputs from 15 to 5,200 lb-ft. Beck offers linkage kits for easy field mounting to dampers, fluid drives, and other final control elements.

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## Group 22 Rotary Drives

Beck Group 22 drives are ideally suited for large fan damper applications requiring up to 8,000 lb-ft torque. Microprocessor-based electronics provide added flexibility and features.

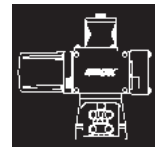
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## Group 11 Quarter-Turn Valve Drives

Beck Group 11 valve drives provide reliable, precise control of quarter-turn valves. These units are available with valves as factory-mounted assemblies, ready for pipeline installation.

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## Group 14 Linear Valve Drives

Beck Group 14 linear drives are designed specifically for globe valves. A unique Tight-Seater™ design is used to ensure tight shut-off by maintaining rated thrust (340 to 4,000 lbs) at the end of travel.

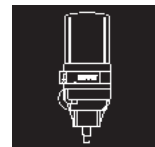
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## Group 31 Compact Valve Drives

Beck Group 31 drives provide exceptional power and control in a small package. They are ideal for direct-coupling to small ball, plug, and butterfly valves.

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Factory assistance, linkage kits and computer sizing facilitate installation.

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# INTRODUCTION

*Beck's reliable control electronics, unique mechanical design features and expert applications assistance can help you meet your process control requirements.*

## INDUSTRY'S CHOICE FOR PRODUCT AND SERVICE EXCELLENCE

Beck drives have earned a reputation in electric utility, pulp/paper, cement, steel and other process industries for precision, reliability and outstanding low maintenance durability over decades of service. In addition, Beck's employees are known for their commitment to providing on-time delivery, thorough personal service, technical assistance and parts support for the life of the drives.

Beck drives are designed for reliable, responsive control in modulating and open/close applications. Beck drives share common features which account for their unparalleled on-line performance.

This guidebook will help you specify the ideal control drive for your applications and illustrates the characteristics of the standard models, along with various options offered.

### Industries Served

Beck drives are used by the following industries for precise, reliable positioning of valves, dampers, fluid couplings and other final control elements:

- Wood products
- Electric power
- Cement and lime
- Pulp and paper
- Water and wastewater treatment
- Glass
- Minerals
- Chemical/petrochemical
- Steel
- Aluminum and other metals
- Food and beverage



# PROCESS CONTROL IMPROVEMENT

## Engineered to the High Performance Standards of Today's Sophisticated Control Instrumentation

To fully utilize the power and performance capabilities of today's process control instrumentation, the final control element must be positioned quickly, precisely and consistently. Beck electronic control drives provide instantaneous response with the precision and repeatability necessary to fully utilize control system capabilities.

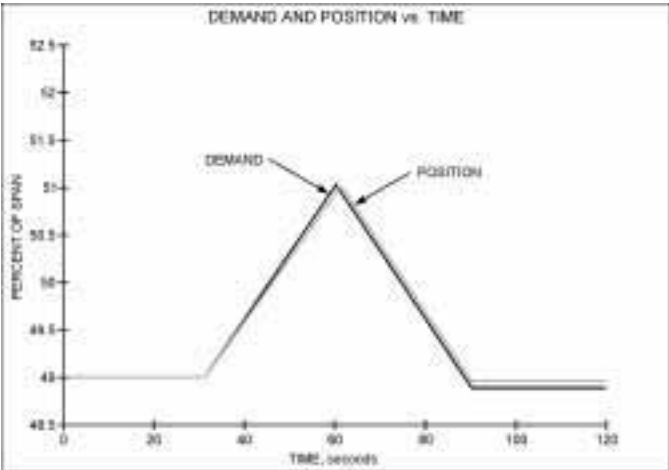
As the emphasis in industry continues to focus on improved quality and efficiency, and as environmental pressures continue to expand, the need for improved process control performance will also continue to broaden. Industry will respond by continuing to make large capital investments in state-of-the-art instrumentation and advanced control

technologies. However, real performance improvements will only be realized if the final control element is up to the task. Frequently, the inconsistent and sluggish performance of pneumatic actuators or the unreliability of typical electric actuators is the limiting factor in the performance of the control loop. Therefore, when it is necessary to improve process control performance, the first step is to improve final control element performance.

Beck drives maximize final control element performance, providing responsive, repeatable actuation. Beck's unique design—incorporating a no-burnout motor, efficient spur gearing and accurate, durable electronics—enables the Beck drive to start and stop instantly, virtually eliminating dead time and overshoot regardless of load or process conditions.



**Figure 1-1**  
*Pneumatic actuator response to a 2% ramping demand*



**Figure 1-2**  
*Beck control drive response to a 2% ramping demand*



## More Consistent and Precise than Pneumatics

Beck control drives eliminate the performance bottlenecks created by inconsistent and nonlinear pneumatic actuator performance, which typically varies as a function of frictional and dynamic load, process conditions, the condition of the valve or damper and the performance of actuator accessories such as I/P transducers, regulators and positioners. Unlike pneumatic actuators, Beck drives provide consistent and repeatable positioning.

Figure 1-1 shows the response of a pneumatic diaphragm valve actuator to a 2% ramping demand signal representative of a control signal modulating the valve. The response demonstrates actuator dead time and overshoot often referred to as “stick and slip.” It is not unusual for stick to completely prevent actuator response to the small demand changes typical of continuous process control.

Figure 1-2 shows the response of a Beck Electronic Control Drive to the same demand. The Beck drive tracks the demand closely, eliminating dead time and the significant overshoot associated with the pneumatic actuator. This type of performance gain in the actuator could be the difference between an uncontrollable flow loop and a tightly controlled one.

Throughout this brochure, the phrase “continuous operation” refers to the drive’s ability to operate continuously when required for accurate process control, especially during start-up, load changes and process upsets. However, excessive modulation due to process noise, electrical control signal noise, or control signal aliasing will shorten the life of the drive as well as the valve or damper. For this reason, the control loop should be properly analyzed and tuned to avoid excessive or unwarranted modulation.

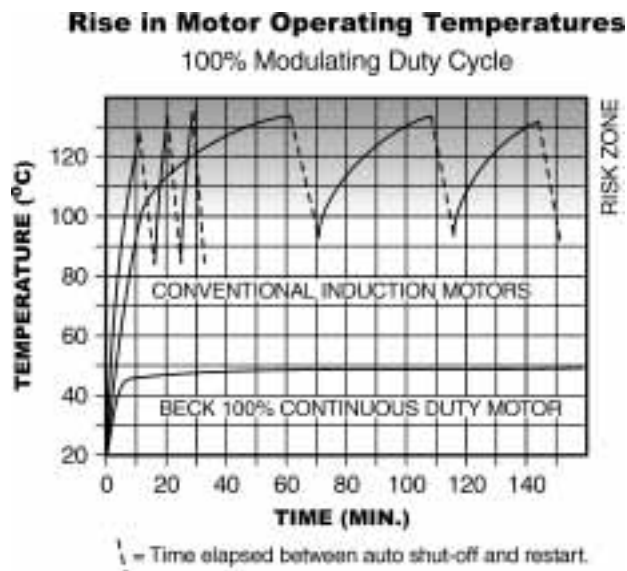
## More Reliable than Conventional Electric Actuators

Beck drives incorporate a no-burnout motor, an efficient spur gear drive train and accurate, durable electronics. This unique design eliminates the performance limitations typical of electric actuators, including overheating motors, trips, worm gear wear-induced backlash, coasting and other positioning inaccuracies.

Beck-built drive motors are specifically designed to provide instant acceleration and deceleration for extremely precise positioning in modulating applications. These reliable motors do not burn out or overheat even under the demanding conditions of an active control loop.

Figure 1-3 illustrates the cool, stable operation of the Beck drive motor in comparison with conventional single-phase and three-phase motors. Tests were conducted under a 100% duty cycle to simulate maximum control loop activity. The temperature in the conventional motors quickly rose to a dangerous level, tripping the thermal overloads, rendering the motor unavailable for control.

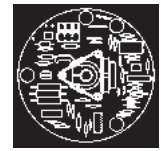
The Beck motor, in contrast, slowly rose in temperature under these service conditions, remaining stable and continuously available for process control.



**Figure 1-3**

*Cool, stable operation of the Beck control motor*





# COMMON FEATURES OF BECK DRIVES\*

*These proven design features combine for precise, dependable control.*

## BECK CONTROL ELECTRONICS

Beck drives offer the benefit of a total control package, utilizing reliable electronics to match the speed and precision of your process instrumentation.

Modulating drives are equipped with Beck's Digital Control Module (DCM), which controls the position of the drive according to the input signal it receives. A position feedback signal is delivered to the DCM from the position sensing device (Beck's Contactless Position Sensor (CPS)). This signal is continuously compared to the demand input signal. A change in the input signal results in an immediate repositioning of the drive to balance the two signals.

The DCM is a direct replacement for the analog Electronic Signal Receiver (ESR) that has been the standard on all Beck drives. Since the DCM is our latest design, the features of the ESR will no longer be highlighted. Please contact Beck for information on ESR equipped drives.



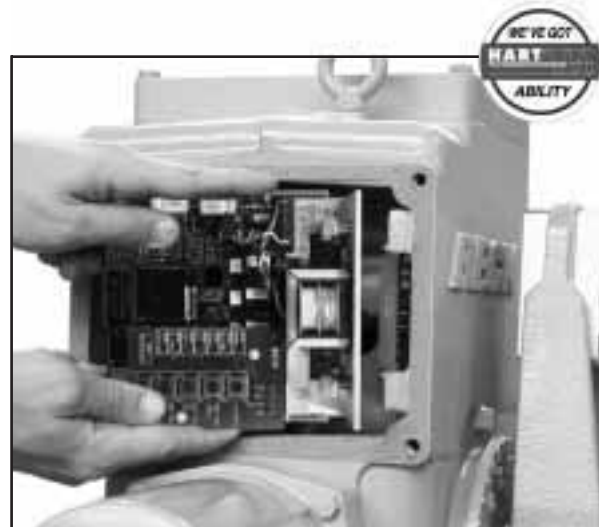
*Beck drive with CPS cover removed*

*\*The features and capabilities described in this section apply to Beck Group 11 and Group 14 drives only. Some, but not all, of these apply to the Group 31 (pages 63–75) and Group 22 drives pages 31–42.*

## Digital Control Module (DCM)

Beck's DCM provides modulating control of the drive in response to standard control system signals. Notable features include:

- Convenient user interface for calibration and drive status.
- HART® compatible electronics are available.
- Receives control signals directly, eliminating the need for contact protection devices, relays, switches and reversing starters.
- Designed to operate continuously at temperatures from -40° F to as high as 185° F (-40° to 85° C).
- Initiates shaft movement in steps ranging from 0.10% to 0.25% of span, depending on the timing of the gear train.
- Standard deadband is 0.6% of span, with sensitivity of 25% of deadband, and can be increased or decreased.
- Two or more Beck drives can be operated by a single signal source, for series, parallel or split range operation.



*DCM board*

## Position Feedback Indication

Beck's patented Contactless Position Sensor (CPS) provides reliable control feedback with infinite resolution.

- Utilizes a unique ferrite magnetic design with no contacting or wiping surfaces to wear or intermittently lose contact.
- The ferrite rotor is driven directly by the output shaft through anti-backlash gearing.
- A 4–20 mA position feedback signal is available as an option for remote indication.

On some control options, a film potentiometer is available for position sensing and feedback. See pages 14 and 15 for a descriptive overview of the control options available.



## Control Features of Group 11 and Group 14 Drives

### Hold Position Upon loss of AC Power Supply

Beck drives stay in place in the event of loss of AC power, to maintain process consistency.

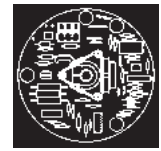
- A unique self-locking mechanism provides holding capacity greater than 200% of rated drive torque.
- When power is restored, the drive will automatically respond to the control signal, and move to the position specified.

### Pre-Determined Action Upon Loss of Input Signal

Beck drives equipped for modulating control have the ability to move to any predetermined position upon loss of signal (LOS) from the control system, with AC power supplied.

The Digital Control Module (DCM) may be easily configured for any action thanks to its flexible, microprocessor design.

Modulating drives utilizing the Electronic Signal Receiver (ESR) can also be field modified to provide a series of LOS functions; including stay in place, move forward to travel limit and reverse to travel limit. However, since the ESR is based on analog technology and is not programmable (like the DCM), these modifications require physical changes.



### **Uninterruptible Power Supply for Operating During AC Power Outage**

The uniquely low power consumption of Beck drives permits the use of various standard uninterruptible power supplies for operation during loss of AC power. Beck Sales Engineers can provide you with specifications on UPS equipment recommended for Beck drives.

### **Stall Protection**

Stall protection is standard on all control option 9 drives, and optional on others. If the motor tries to run in one direction for more than 300 seconds, power to the motor is shut off and an error light will activate indicating a stall. The 300 second stall time can be modified, if desired. Stall time values can be configured anywhere between the minimum of 30 seconds and the maximum, default value of 300 seconds.

### **Split Signal Operation for Control of Multiple Drives**

Beck drives can be calibrated to produce a full travel response for as little as 25% of the full demand signal range. This allows up to 4 drives, wired in series or parallel, to respond to different segments of the control signal range. Therefore, sequencing drives is easy, and does not require multiple control signals or additional hardware.

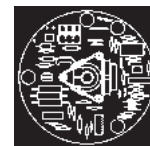
### **Factory Calibration**

To simplify field installation, all Beck drives are set-up and calibrated to the customer specification written into the equipment order. No electrical adjustments are required before installation.



**TABLE 2-1: General Specifications**

<p><b>Input Power</b>                  120 V ac, single-phase                  240 V ac, single-phase</p> <p><b>Operating Conditions</b>                  -40° to 85° C. (-40° to 185° F.), 0% to 99% relative humidity</p> <p><b>Isolation</b>                  Demand Input and Position Feedback signals are isolated from the ground and the ac power line.</p> <p><b>Action on Loss of Power</b>                  Stays in place.</p> <p><b>Action on Loss of Input Signal (Power On)</b>                  Stays in place or, on some drives, is field configurable to move to any preset position.</p> <p><b>Limit Switches</b>                  Two SPDT switches (one for each direction of travel) provide over-travel protection.</p> <p><b>Auxiliary Switches</b>                  Up to four 6 A, 120 V ac switches available. Switches are labeled S1 to S4 and are cam-operated and field-adjustable.</p> <p><b>Handswitch</b>                  Permits local electrical operation, independent of controller signal. Standard on all units. An optional auxiliary contact can be used to indicate that the Handswitch is in "AUTO" mode or to sound an alarm if it is taken out of "AUTO".</p> <p><b>Modulating Control</b></p>			
	<b>DIGITAL CONTROL MODULE (DCM)</b>	<b>ELECTRONIC SIGNAL RECEIVER (ESR)</b>	<b>DIRECT AC</b>
Input Signal Options	See Table 2-2, Control Option 9	See Table 2-2, Control Option 7 & 8	N/A
Adjustability for Split Range Operation	4 to 1	2 to 1	N/A
Deadband	0.6% of span (configurable)	0.6% of span	N/A
Minimum Step	0.1% typical	0.15% typical	0.1° Function of control system capabilities
Feedback Options	See Table 2-2, Control Option 9	See Table 2-2, Control Option 7 & 8	See Table 2-2, Control Option 5 & 6
Stall Protection (Protects drive and driven elements under stall conditions)	Standard. Integral to electronics. Time to stall is configurable from 300 seconds down to 30 seconds.	<b>Optional.</b> Requires a Stall Protection Module (SPM) to shut off power to the motor.	
<p><b>Notes:</b> (1) HART® communication is available on select Beck drives—contact a Beck Sales or Application Engineer for details.</p> <p>(2) Models approved for use in Hazardous classified locations are available—contact a Beck Sales or Application Engineer for details.</p>			



**TABLE 2-2: Control Option Specifications**

<b>Control Option</b>	<b>Control Mode</b>	<b>Available Control Input Ranges</b>	<b>Installed Position Sensor</b>	<b>Position Feedback Availability</b>	<b>Auxiliary Switches for Customer Use</b>
9	Modulating	4–20 mA 1–5 V dc	CPS-2	4–20 mA	2 (optional)** 4 (optional)**
8	Modulating	4–20 mA 0–5 mA 1–5 mA 10–50 mA 1–5 V dc -10–10 V dc	CPS-2	None 4–20 mA 0–5 mA 1–5 mA 10–50 mA 1–5 V dc -10–10 V dc	2 (optional) 4 (optional)
7	Modulating	4–20 mA 0–5 mA 1–5 mA 10–50 mA 1–5 V dc -10–10 V dc	Potentiometer	Auxiliary (1000 ohm) Potentiometer (optional)	2 (optional) 4 (optional)
6	Modulating	120 V ac	CPS-2	4–20 mA 0–5 mA 1–5 mA 10–50 mA 1–5 V dc -10–10 V dc	2 (optional) 4 (optional)
5	Modulating	120 V ac	Potentiometer	(1000 ohm) Potentiometer	2 (optional) 4 (optional)
4	5-position	120 V ac	None	None	*
4	3-position	120 V ac	None	None	2 (optional)*
3	2-position (open/close)	120 V ac	None	None	2 (optional)* 4 (optional)

\*The standard over-travel limit switches have extra contacts which can be used for external signaling in 2, 3, or 5 position control modes.

\*\*Group 22 drives are provided with 2 auxiliary switches as standard.

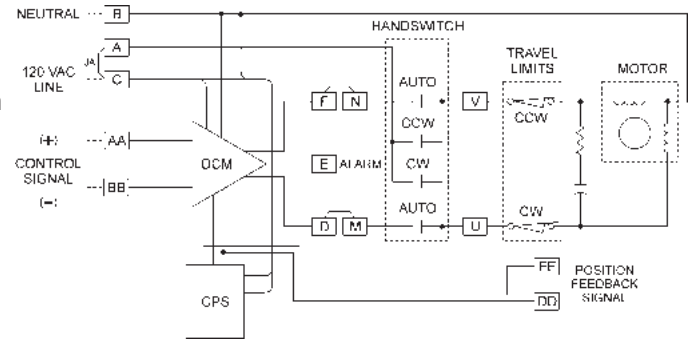
## Control Options for Beck Group 11 and Group 14 Drives\*

### Modulating Option 9

#### Digital Position Control with Contactless Position Sensing

The Beck DCM positions the drive in proportion to an input current or voltage signal, and the CPS provides integral feedback for the DCM. A 4–20 mA position feedback signal is available for remote indication.

The DCM may be used to provide pre-determined positioning of the drive upon loss of input control signal.

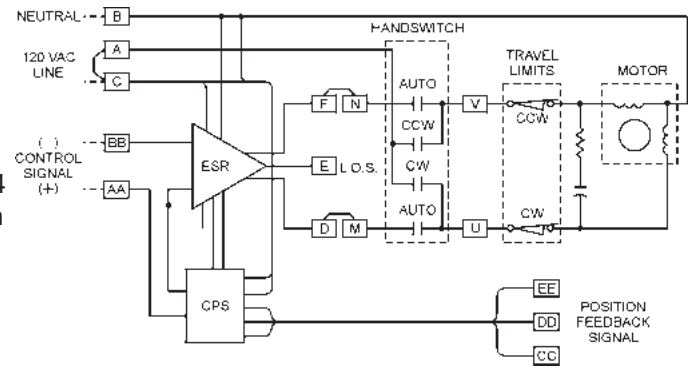


### Modulating Option 8

#### Analog Position Control with Contactless Position Sensing

The Beck ESR-4 positions the drive in proportion to an input current or voltage signal, and the CPS-2 provides integral feedback for the ESR-4 and isolated feedback for remote position indication (also available without external feedback).

The ESR-4 may be used to provide pre-determined positioning of the drive upon loss of input control signal (see page 10).

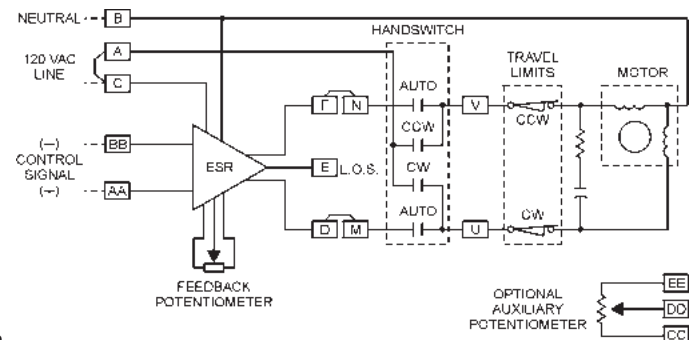


### Modulating Option 7

#### Analog Position Control with Potentiometer Position Sensing

The Beck ESR-4 positions the drive in proportion to an input current or voltage signal. A film potentiometer is used in place of the CPS-2 for position sensing and internal feedback to the ESR-4.

An optional auxiliary potentiometer, requiring external power, may be added for remote position indication or control. The ESR-4 may be used to provide predetermined positioning of the drive upon loss of input control signal (see page 10).



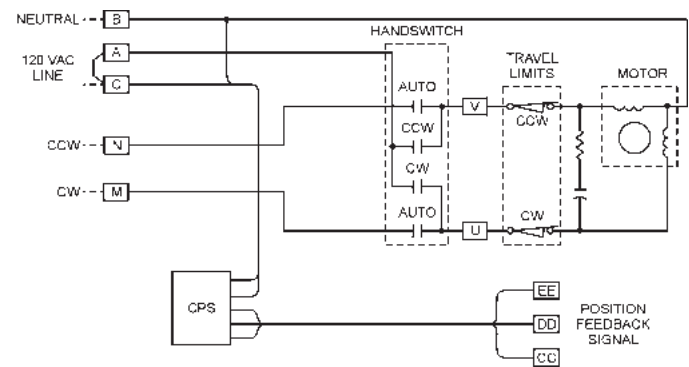
### Modulating Option 6

#### Direct AC Control with Contactless Position Sensing

Control option 6 features clockwise / counterclockwise control from a remote automatic controller or manual switches.

The CPS-2 provides a feedback signal for remote position indication.

If the available 120 / 240 V ac control voltage is not able to supply enough current to operate a drive, a Relay Board must be added to the control compartment.



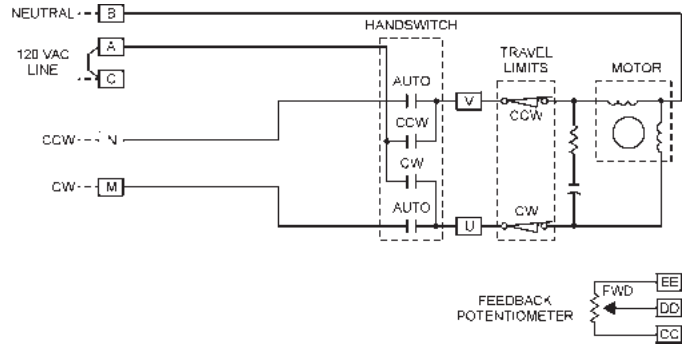


### Modulating Option 5

#### Direct AC Control with Potentiometer Position Sensing

Actuated in clockwise or counterclockwise from a remote location or manual switches, this configuration includes a 1000 ohm film potentiometer for remote feedback. An optional auxiliary 1000 ohm potentiometer can be added as an additional remote position indication.

If the available 120 / 240 V ac control voltage is not able to supply enough current to operate a drive, a Relay Board must be added to the control compartment.



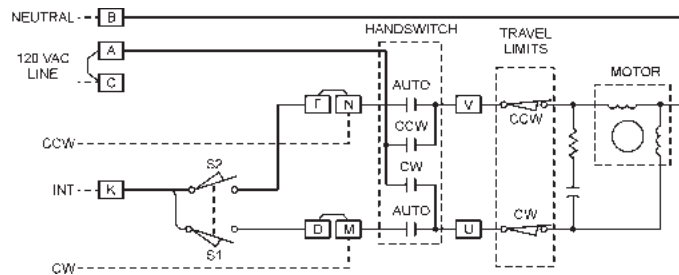
### Multi-Position Option 4

#### Direct AC Control with Cam-Operated Switches to Stop Drive Travel

Option 4 incorporates adjustable cam-operated switches to stop the drive in 6 positions (two end-of-travel, four intermediate positions), or 3 positions (one intermediate position). 4-position and 5-position control can also be attained using a different number of switches.

Standard end-of-travel switches have extra contacts that can be used for external signaling or interlocking.

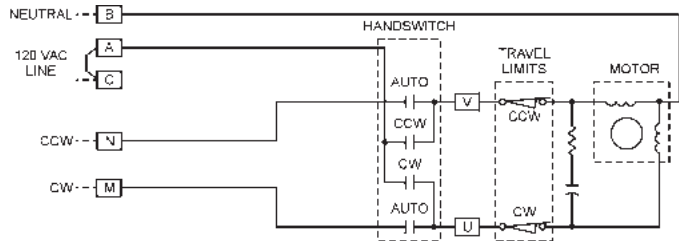
Configuration shown: BASIC 3-position.



### Open / Close Option 3

#### Direct AC Control

For simple open / close operation, Option 3 includes two limit switches, which stop the drive at each end of travel and may also be used for external signaling.

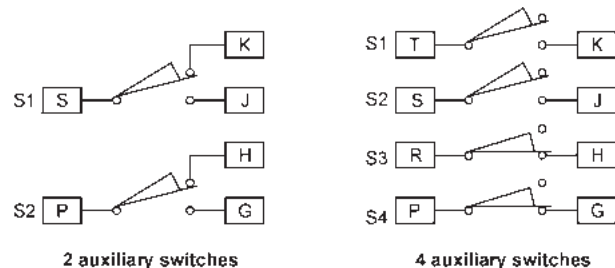


### 240 V ac Operation

All of the options described on this page and the previous page are available for 240 V ac operation instead of 120 V ac operation.

### Auxiliary Switch Terminals

Auxiliary switches may be added for control or annunciation functions. See Table 2-2, page 13, for availability. Switches are rated at 6 A 120 V ac. They may be factory-set or field-adjusted to operate at any point in the drive's travel.



\*NOTES: Regarding drive shaft travel direction for Group 14 drives: CCW = Extend and CW = Retract.

Diagrams are functional—customer wiring may vary. Certified wiring diagrams can be provided for the drive you select.

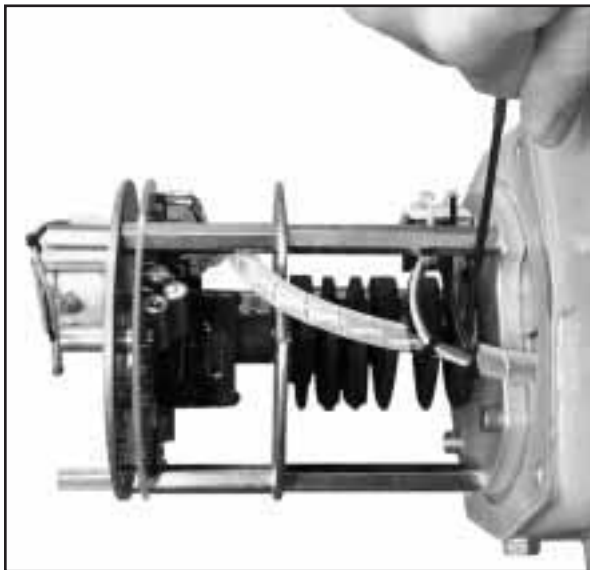
# ELECTRICAL FEATURES

## Beck Drive Motor:

### Precise, Reliable Control

Together with Beck's control electronics and rugged gear train, Beck motors provide the precise, reliable positioning required for modern control loops.

- Never overheats or burns out, even under demanding modulating control or stalled conditions.
- Reaches full speed and torque in less than 50 milliseconds and stops within 25 milliseconds, eliminating deadtime.
- Provides extremely accurate positioning in modulating applications.
- Will not coast or overshoot the desired position.
- Low current draw of 0.16 A to 3.0 A, and therefore low power consumption, eliminates the need for relays and permits the use of uninterruptible power supplies.
- Maintenance-free with double-lipped, grease-sealed bearings.



## Electric Handswitch:

### Time-Saving Local Operation

Dampers or valves may be operated at their individual locations with the built-in electric Handswitch. This saves time during installation and troubleshooting, allowing on-line adjustments to be made quickly and easily by bypassing the electronics in the drive and control system.

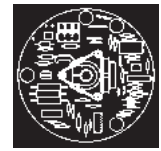
The Handswitch also serves as an electrical backup in the event of control system failure.

### Auxiliary and Over-travel Limit Switches:

Two over-travel limit switches and up to four auxiliary switches are provided on Beck drives.

- SPDT switches rated for a minimum of 6 A at 120 V ac, (three times maximum motor current for most models) to ensure long life.
- Field-adjustable to operate at any point in the drive's travel range.
- May initiate secondary functions or provide remote indication of drive position.
- Eliminates unreliable and maintenance-intensive proximity switches.





# MECHANICAL FEATURES

## Drive Train:

### Power and Durability to Maximize Control Availability

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

- Gear trains employ a unique, all spur gear construction of heat-treated alloy steels and ductile iron.
- Efficient, wide-face spur gearing essentially eliminates wear-induced backlash and positioning inaccuracies.
- Durable design provides up to 4 days of protection against intermittent or extended accidental stalls.
- Integral self-locking mechanism ensures that drives hold a minimum of 200% of rated torque with the motor de-energized.

## Manual Handwheel:

### Convenient Manual Control Without Declutch

An easy-to-turn, spoke-free Handwheel is incorporated into the Group 11 and Group 14 design to allow manual operation during installation or power outages.

- Handwheel can be used to move valves and dampers to any position smoothly and easily under full load conditions.
- Mechanical stops in housing prevent manual overtravel.
- The motor operates at 72 or 120 RPM, so the Handwheel poses no safety hazard.



## 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 NEMA 4X enclosure. Models approved for use in Hazardous classified locations are available—contact a Beck Sales or Application Engineer for details.
- Individual compartments protect all major components: Motor, DCM, CPS-2, gear train and installation wiring terminal board.
- Each compartment can be accessed without exposing other components.
- Gasketed, precision-machined covers provide extra protection for harsh indoor and outdoor environments.
- Output and Handwheel shafts are also sealed with weatherproof, double-lip seals.

## Mounting Versatility:

### Beck Drives can be Mounted in any Orientation for Greater Installation Flexibility

Beck drives are configured and lubricated in such a way that they may be mounted in any convenient position. This flexibility allows drives to be installed in hard-to-fit locations.

As long as housing compartments remain accessible, there is virtually no limit to the way in which Beck drives may be installed.





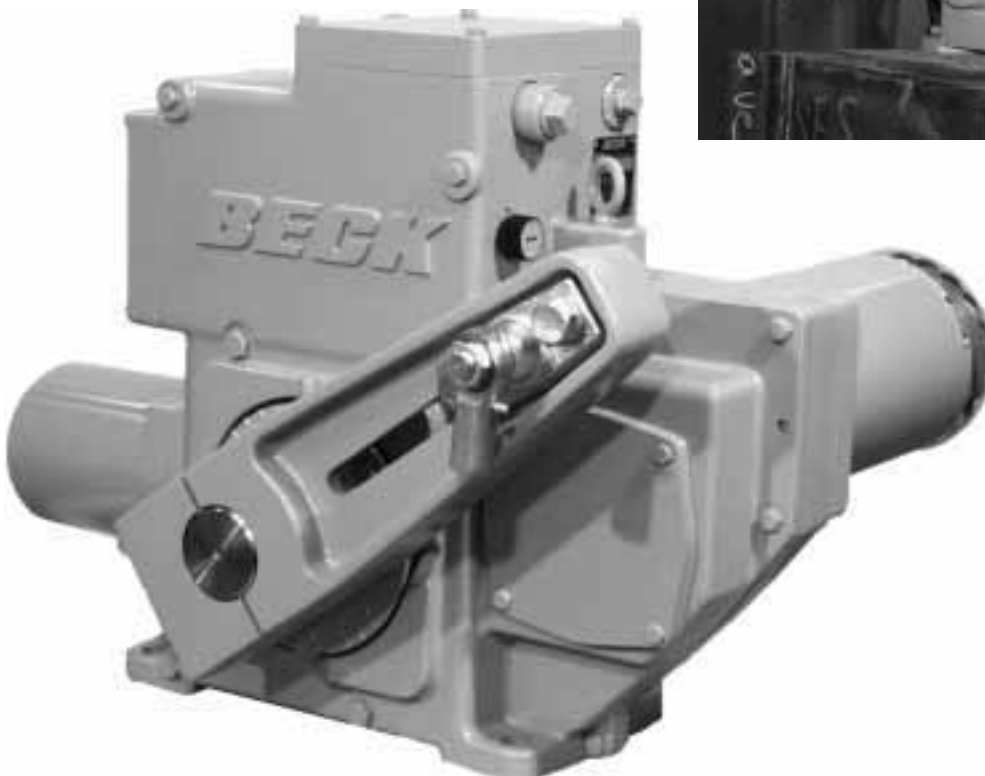


# GROUP 11 ROTARY DAMPER DRIVES

*Provide accurate, dependable control for a wide variety of damper applications.*

## INTRODUCTION

In thousands of installations throughout the world, Group 11 drives have proven themselves with dependable on-line availability. Ideally suited to hot, dusty or high-humidity environments in indoor or outdoor installations, Beck Group 11 drives operate continuously without burning out or overheating, and respond to control signals in milliseconds. These features help keep fuel costs down and maximize product throughput by increasing efficiency and improving control.



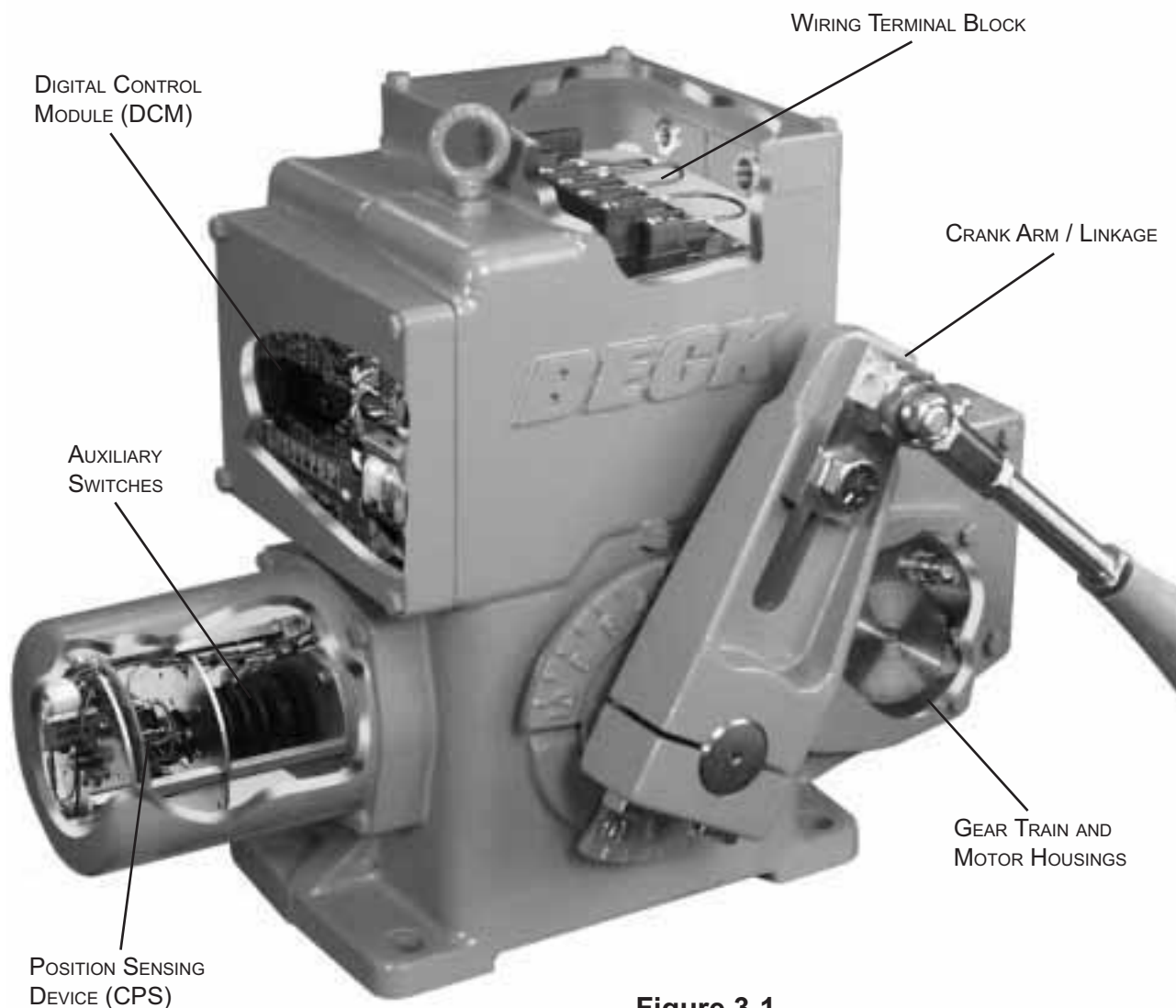
# INSTALLATION

The simple modular configuration of Beck Group 11 drives makes them easy to install and service. Drives can be mounted in any position.

- Five individual compartments house the motor, digital control module, contactless position sensor, gear train and wiring terminal block.
- Link-Assist™ computer program helps you specify the ideal linkage arrangement for your application (see Appendix).
- Linkage Kits, available from Beck, simplify installation to dampers and other final control elements (see Appendix).

## Field-Adjustable Linkage

The heavy-duty crank arm of Beck Group 11 drives can be field-adjusted to start travel anywhere in the 360° range. Designed for modulating control, there are no keyways or splines to wear and develop backlash. The zero point of the Group 11's reversible travel index is easily moved to the starting point of the crank arm, and shows degree of travel in either direction. The forged rod-end fitting may be field-adjusted to any point in the cast slot of the crank arm. Special linkage arrangements (see Appendix) allow total application versatility for connection directly on, or remote from the driven load.



**Figure 3-1**

*Group 11 damper drive components*

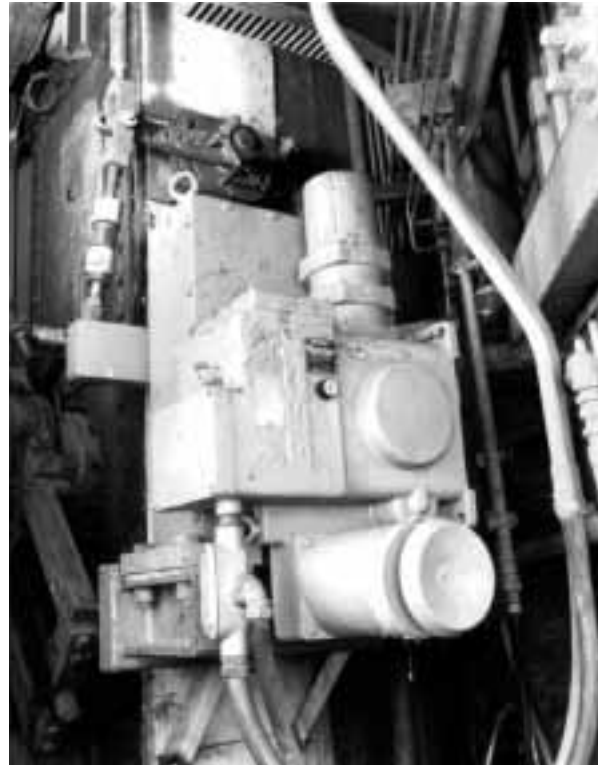


## RELATED APPLICATIONS



### Gate Dampers

A multi-revolution Group 11 drive is available for those applications in which a gravity-type gate must be raised or lowered in response to signal changes. Often used to regulate differential pressure by controlling balancing dampers on the hot exhaust side of furnaces, Beck drives provide high accuracy and quick response even when continuously modulating. This results in greater fuel economy and longer refractory life.



### Burner Tilts

For modulating large dynamic loads such as multiple burner tilt arrays, Beck Group 11 drives provide up to 5,200 lb-ft of torque. Exceptionally stable, Beck drives provide repeatable positioning control for maximum boiler efficiency.

Beck Sales and Application Engineers are available to help you select the right drive for your installation.



### Fluid Drives

Beck Group 11 drives are ideal for use with variable speed fluid drives on pumps and fans. They provide exceptional stability and repeatability under the live load of the scoop tube. These features deliver the precise positioning ability essential for optimum performance.

# SPECIFICATIONS

Figure 3-2: Model 11-150 Outline Dimension Drawings

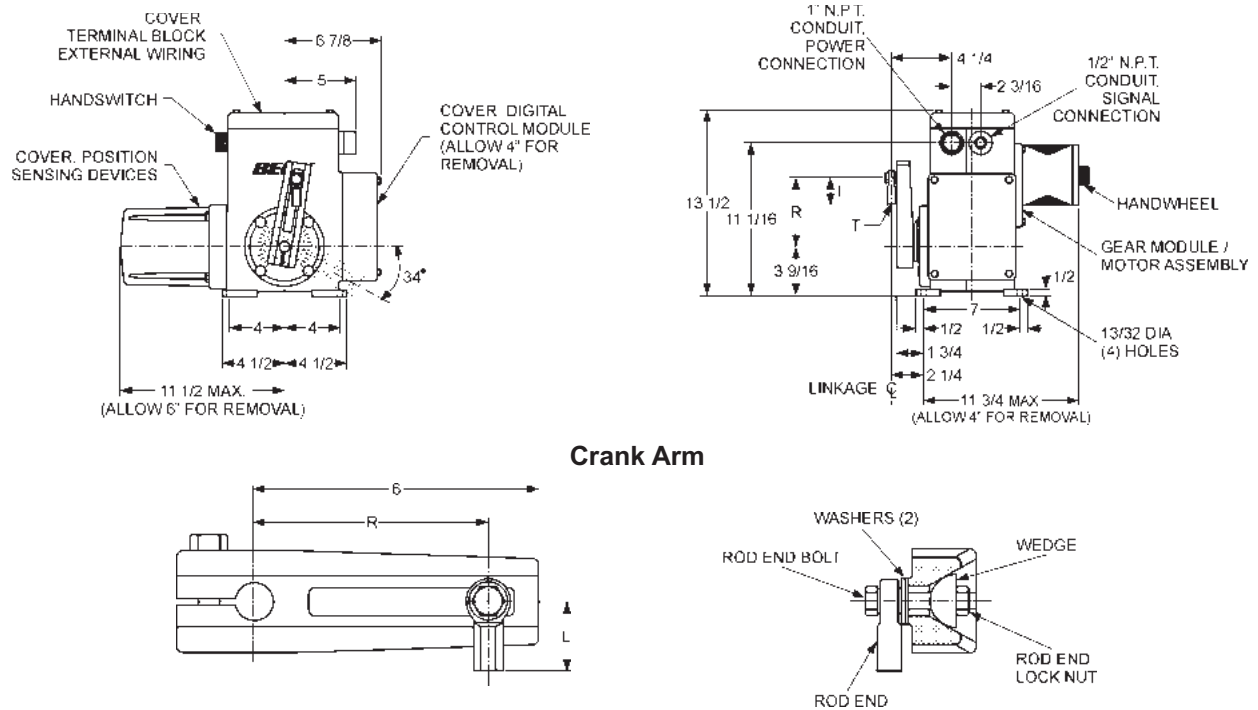
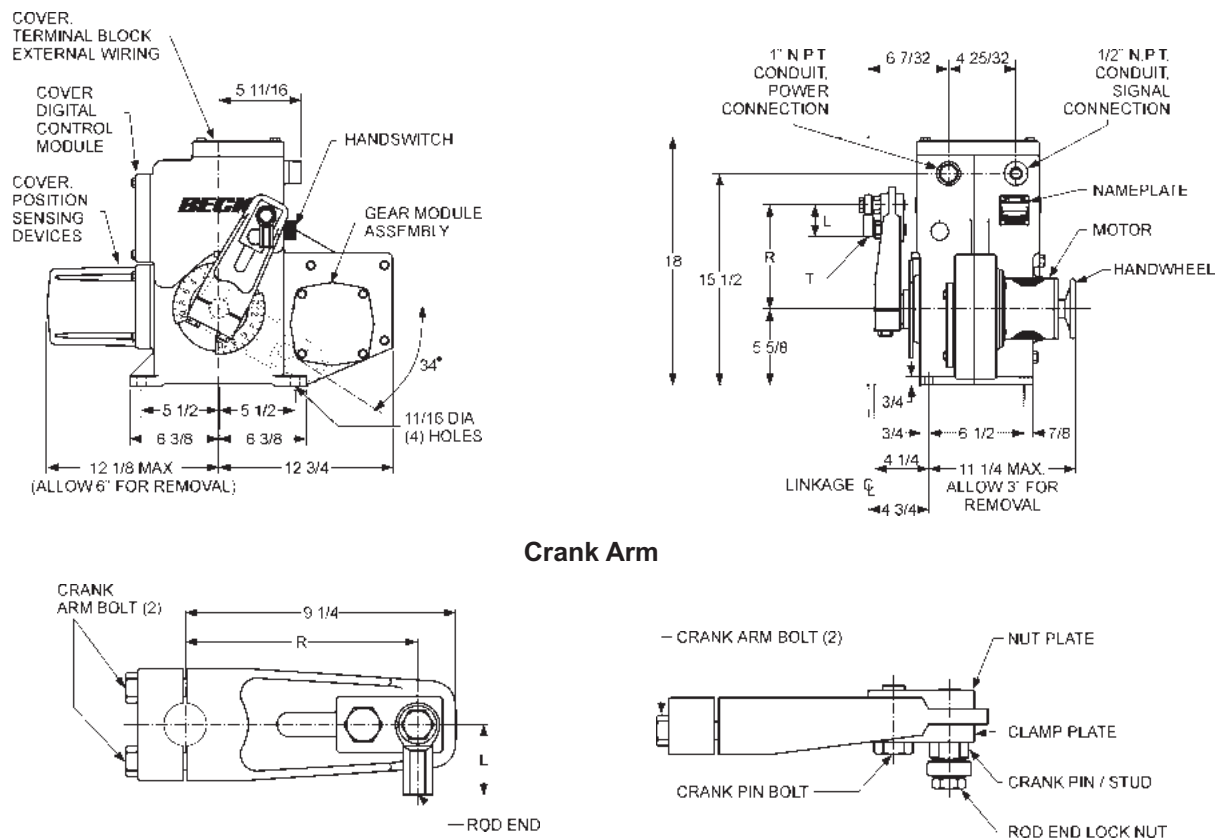


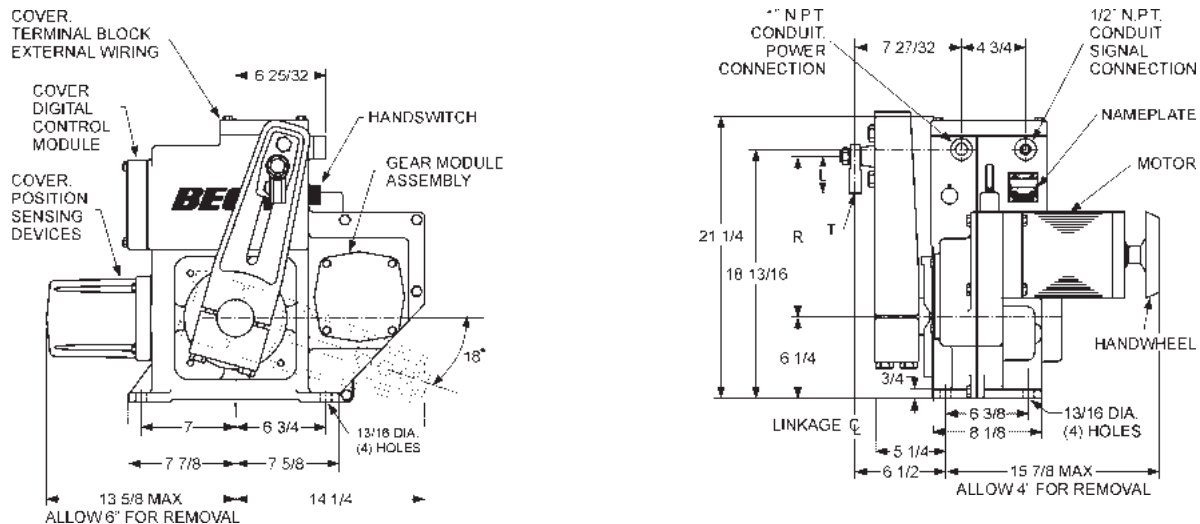
Figure 3-3: Models 11-200, 11-300 Outline Dimension Drawings



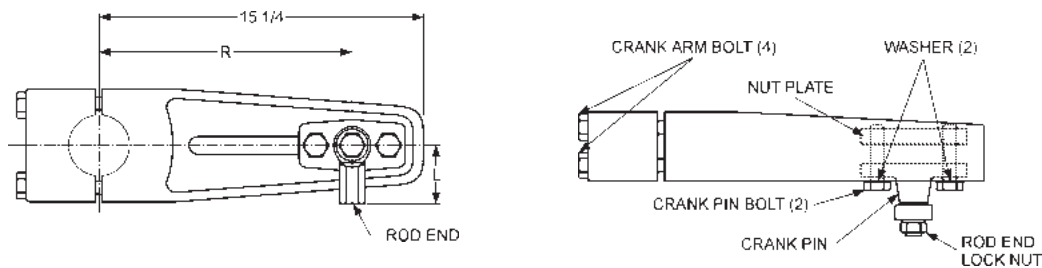


**Figure 3-4: Model 11-400 Outline Dimension Drawings**

Note: Model 11-430 outline dimensions are different -- contact a Beck Sales or Application Engineer for details.



**Crank Arm**



**TABLE 3-1: Mechanical Specifications**

Beck Drive Model No.	Approx. Weight (lb)	Output Shaft Dia. (in)	Crank Arm Part No.	Crank Arm & Rod End Supplied as Standard			
				Crank Arm Radius (adjustable)	Rod End Length	Rod End Internal Thread	Max. Overhung Load (lb)
				"R" Dim.	"L" Dim.		
11-150	50	3/4	10-3491-05	1 1/2 to 5 1/8	2 1/8	1/2-20 x 1 1/8	750
11-200	120	1 1/2	14-7330-26	3 1/2 to 8	2 1/8	1/2-20 x 1 3/16	3000
11-300	125	1 3/4	14-8010-34	3 1/2 to 8	2 1/2	5/8-18 x 1 1/2	4500
11-400	270	2 3/4	14-8018-02	6 to 12	2 7/8	3/4-16 x 1 3/4	9000
11-430	790	3 15/16	12-9681-XX*	See note*	5 3/8	1 1/2-12 x 2 5/8	30000

Drives may be mounted in any orientation.

All dimensions are in inches, metric dimensions available on request.

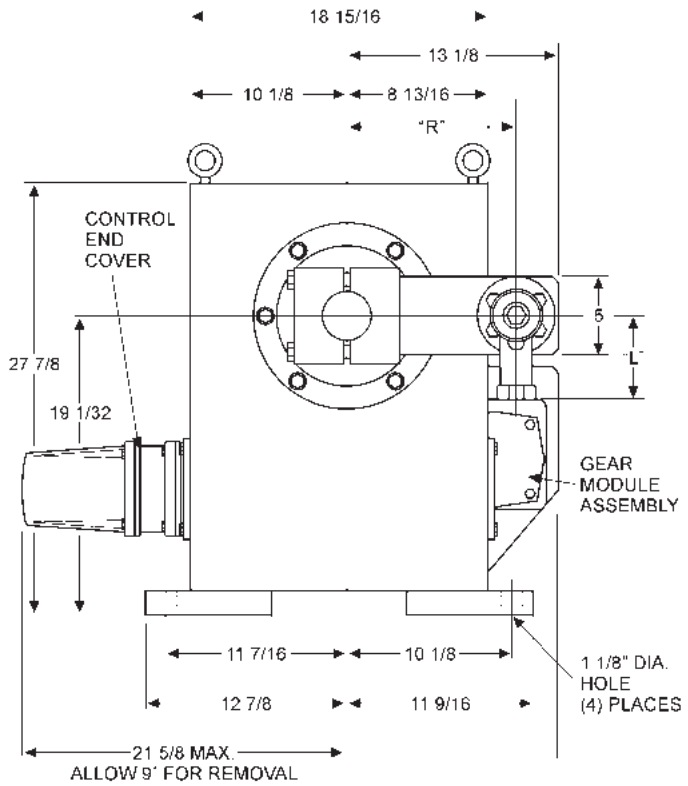
All dimensions are subject to change. Request certified dimensional drawings for the drives you select.

\*Crank arm used is dependent upon the requirements of the application. The available radius is between 6 7/16 and 10 7/16 in.

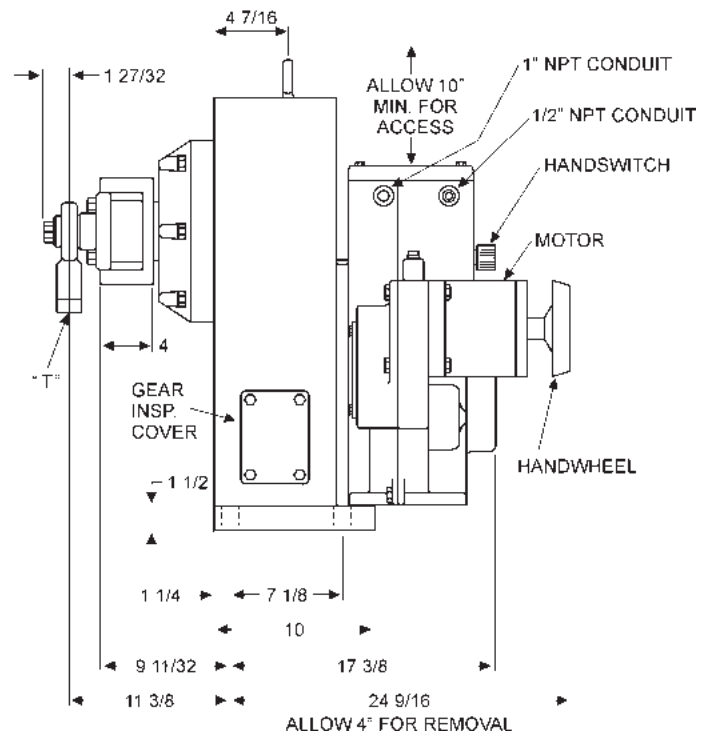




### Orientation B

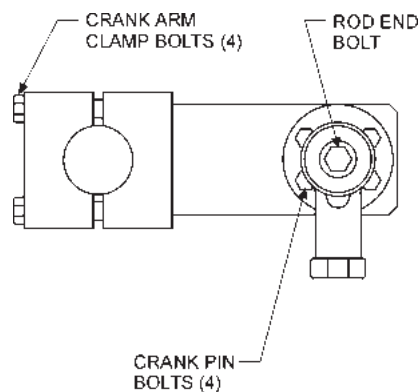


**Front View**



**Side View**

### Crank Arm Component Identification



**TABLE 3-2: Torque, Timing, Motor Current<sup>1</sup>**

Basic Model	Torque (lb-ft)	Timing(sec./100°) Linkage-Connected Drives @ 60 Hz <sup>4,5</sup>	Motor Current (A) <sup>2,5</sup> @ 120 V ac 60 Hz <sup>3</sup>
11-15_	15	11	.32
	20	20	.17
	40	20	.32
	40	40	.17
	60	60	.17
	80	40	.32
	80	90	.17
11-20_	125	20	.56
	125	40	.35
	175	60	.35
	250	40	.56
	250	75	.35
11-30_	300	40	.56
	300	100	.35
	400	60	.56
	550	75	.56
	650	100	.56
11-40_	350	24	1.30
	550	40	1.30
	650	24	2.20
	800	60	1.30
	1000	24	3.00
	1000	40	2.20
	1000	75	1.30
	1500	100	1.30
	1800	36	3.00
1800	60	2.20	
11-43_	2900	72	3.00
	2900	120	2.20
	5200	108	3.00
	5200	180	2.20

<sup>1</sup> For corresponding dimensional data, see pages 22–25.

<sup>2</sup> The unique design of Beck motors has starting and stall currents that approximate the running current, so thermal overload protection is not required -- just provide normal short-circuit protection.

<sup>3</sup> 50 Hz motor currents do not exceed 120% of 60 Hz levels.

<sup>4</sup> For crank arm/linkage mechanical specifications, refer to Table 3-1, page 23.

<sup>5</sup> Drive current @ 240 V ac is approximately 1/2 the 120 V ac current (motor current does not change @ 240 V ac -- the motor always runs off of 120 V ac).

<sup>6</sup> Timing for 50 Hz = 1.2 times 60 Hz.



## How to Specify

Beck Group 11 drives are available in five basic models, and are furnished with a crank arm and rod end for linkage connection. When the drive is to be used in a multi-revolution mode, a sheave is furnished instead of a crank arm for use with wire rope. The following instructions are intended to make it easy to specify and order Beck Group 11 drives. If questions arise concerning additional options or control modes, contact your Beck Sales Engineer.

All Beck drives are shipped calibrated to the customer specifications written into the equipment order.

Complete instruction manuals are furnished with each drive order. These manuals provide the detailed information required for correct installation, typical wiring and mechanical connections, and drive operation; as well as data for making field modifications in the drive train and control signal functions. Each Beck drive is also supplied with a customized wiring diagram and installation guide.

### 1. Determine Required Parameters:

- (a) Basic model number from Table 3-2:  
11-\_\_ \_\_
- (b) Control option from Table 2-2, page 13:  
\_\_
- (c) Torque (lb-ft) from Table 3-2:  
\_\_ \_\_ \_\_ \_\_
- (d) Timing (sec./100°) from Table 3-2:  
\_\_ \_\_ \_\_
- (e) Number of auxiliary switches from Table 2-2, page 13: \_\_

### 2. Specify Full Model Number:

Using the information above, fill out the full model number according to the following formula:

11-	(a)	(b)	-	(c)	-	(d)	-	(e)
Basic Model	Control Option	Torque (lb-ft)		Timing (sec./100°)		No. of Aux. Switches		

### 3. Provide the Following Additional Information:

- a. Desired control input signal, from Table 2-1, page 12.
- b. Desired power (120 or 240 V, 60 or 50 Hz).
- c. Direction of rotation desired on increasing signal: Clockwise (CW) or Counterclockwise (CCW).
- d. Desired optional control features, from page 10.

### 4. State Whether or Not Beck is to Supply Linkage (See page 80).

### 5. Send Your Order Directly to:

HAROLD BECK & SONS, INC.  
2300 Terry Drive  
Newtown, PA 18940 USA

For applications assistance, contact a Beck Sales or Application Engineer ...

Phone: 215-968-4600

Fax: 215-860-6383

E-mail: sales@haroldbeck.com

## Suggested Specifications

Use the following as a guideline when specifying Beck Group 11 rotary drives.

### Basic Drive Unit

Control drive shall have integrated electronics and be able to operate in ambient temperatures of -40°F. (-40°C.) to 185°F. (85°C.).

The drive shall be furnished with a 120 volt AC, single phase, \_\_\_ (50 or 60) Hz, synchronous motor. Motor shall be capable of withstanding 60 starts / stops per minute or a temporary stall condition without overheating. Design of the motor shall be such that electrical and thermal overloads are not required.

Motor bearings shall be maintenance-free. Motor shall be non-coasting with instant magnetic braking, and shall be self-locking and self-releasing without the use of a separate brake winding, mechanical brake or worm gear mechanism. Control drive shall be designed to stay in place upon loss of power and shall be capable of holding a load equal to at least 200% of the model's rated output. The drive motor shall be a TENV with Class H insulation.

Control drive shall be rated for \_\_\_ lb-ft torque output. Stall torque shall be self-limiting, not exceeding two and one half times the rated torque; torque switches shall not be required. Drive shall operate \_\_\_ (CW or CCW) on increasing signal, with timing of \_\_\_ seconds for full 100° rotation. Gear train shall have high efficiency spur gears constructed of heat treated alloy steel or ductile iron only. Readily available gear modules shall provide for a range of torque and timing combinations within the drive's rated capacity, and shall be field-interchangeable. Drive train parts shall be lubricated with a premium, heavy-duty lithium-based lubricant. No oil baths shall be used for lubrication. Control drives shall be able to operate in any mounting orientation.

Two SPDT over-travel limit switches shall be provided for over-travel protection. In addition, the drive shall have \_\_\_ (none, two, four) auxiliary SPDT switches which are infinitely adjustable over the full range of travel. Switches shall be rated for 6 amps at 120 volts AC. Drive shall have integral mechanical stops capable of limiting travel of the drive and load, with or without the drive motor.

A low-speed, disc-type motor Handwheel shall permit manual operation of the drive without electrical power and without a declutching mechanism.

A five-position, drive-mounted electric Handswitch shall be provided to permit local electrical operation of the unit for control adjustment or operation on loss of control signal. With the Handswitch in AUTO mode, drives shall respond to control signals automatically.

Enclosure shall be totally enclosed, cast, weatherproof, dust-tight, NEMA 4X construction. All field connections shall be made at one terminal compartment. Separate conduit entrances shall be available for power and control wiring.





## Drive Control Options

### **Modulating mA or V dc Analog Control Input:**

Drive shall provide modulating control through an integral, digital control module which positions the drive in proportion to the (\_\_\_ mA range or \_\_\_ V dc range) control input signal.

The control module shall be capable of initiating shaft movement in steps down to 0.1°.

Standard control features should include:

- Field-configurable, pre-determined action upon loss of input signal
- Stall protection
- Split signal operation for control of multiple drives
- External position feedback signal



### **Modulating Direct AC Control:**

Drive shall be operated by direct AC control power either from an automatic controller or by manually operated switches, with continuous positioning capability over the range of operation. Drive shall be capable of starting and stopping instantaneously for high-resolution positioning.

### **Multi-Position Direct AC Control:**

Drive shall provide \_\_\_ (3 to 6) discrete positions upon closure of an automatic controller or by manually operated switches, with provision for adjustable predetermined position settings, and have a positioning repeatability of 0.1% over the range of operation.

### **Open / Close Direct AC Control:**

Drive shall provide open / close operation to preset travel limits upon closure of an automatic controller or by a manually operated switch, and have a 0.1% position repeatability, with end-of-travel limits adjustable over the full range of travel of the drive.

### **Position Feedback Specification**

Drive shall be equipped with a contactless position sensing device and be capable of providing an isolated feedback signal with a 4–20 mA or 1–5 V dc range. The sensing device shall have infinite resolution.





# GROUP 22 ROTARY DRIVES

*Provide high torque capability in a compact, modular design featuring advanced digital electronics and traditional Beck reliability.*

## INTRODUCTION

Group 22 control drives offer excellent performance in a maintenance-free design, plus the added flexibility and features provided by microprocessor-based electronics.

Ideally suited for large fan damper applications, model 22-309, 22-409 and 22-809 drives are capable of modulating both static and dynamic loads up to 8,000 lb-ft of torque, even in the harshest of environments.



Group 22 installation is simple due to a compact, weatherproof body design which houses all the components, including the advanced control module.

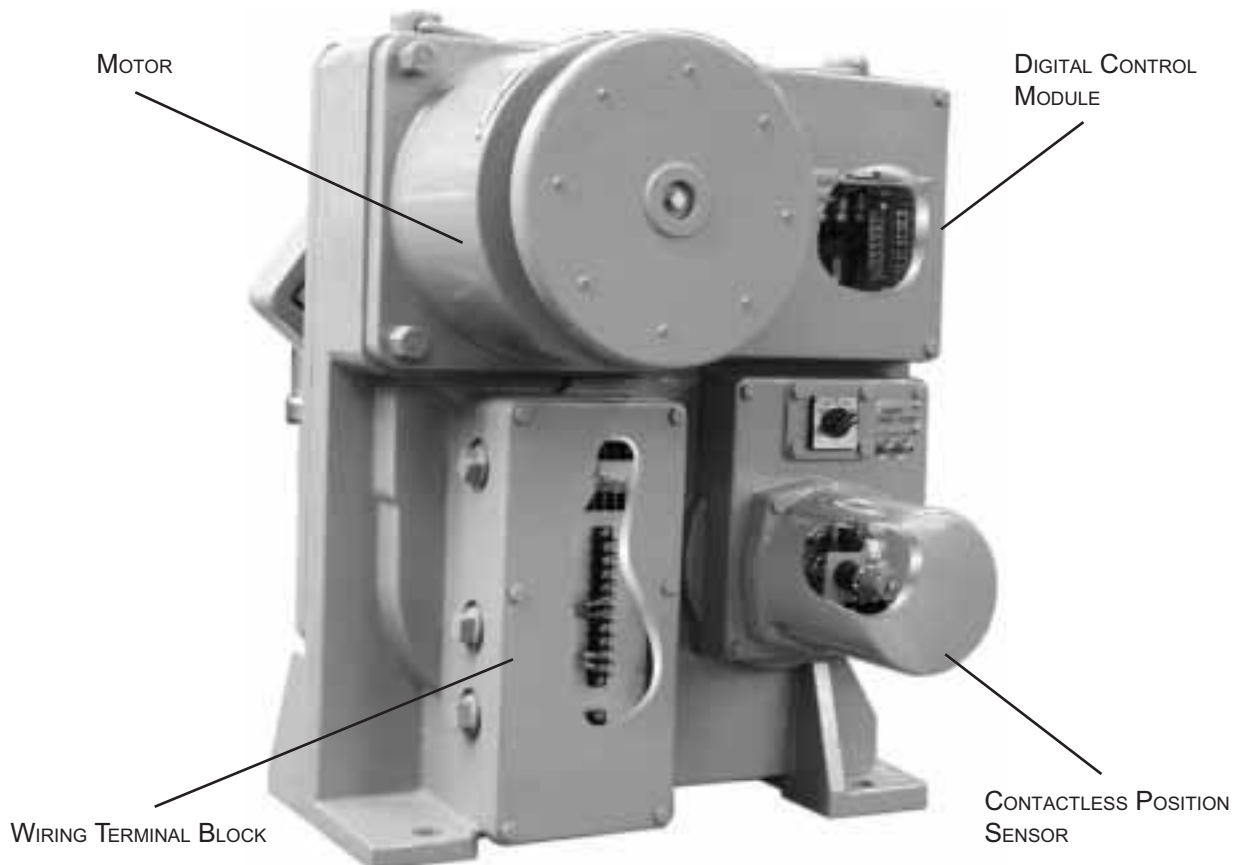
# INSTALLATION

The simple modular configuration of Beck Group 22 drives makes them easy to install and service.

- Four individual compartments house the motor, wiring terminal block, contactless position sensor and digital control module.
- Link-Assist™ computer program helps you specify the ideal linkage arrangement for your application (see Appendix).
- Linkage Kits, available from Beck, simplify installation to dampers and other final control elements (see Appendix).
- Drive configuration can be adjusted utilizing a push button control panel or via HART® communications.

## Field-Adjustable Linkage

The heavy-duty crank arm of Beck Group 22 drives can be field-adjusted to start travel virtually anywhere in the 360° range. The zero point of the Group 22's reversible travel index is easily moved to the starting point of the crank arm, and shows degree of travel in either direction. The forged rod-end fitting may be field-adjusted to nearly any point in the cast slot(s) of the crank arm. Special linkage arrangements (see Appendix) allow total application versatility for connection directly on, or remote from the driven load.



**Figure 4-1**

*Group 22 rotary drive components*



## MECHANICAL FEATURES

### Gear Train:

#### Proven Durability

Beck Group 22 drives utilize a high-efficiency gear train designed for long life and minimal wear. The precision-cut spur gears are fabricated from heat-treated alloy steel and ductile iron.

### Self-Locking Mechanism (SLM):

#### Back-driving Protection

A Self-Locking Mechanism is an integral part of the Group 22 drive system. The SLM is a coupling that transmits motor torque to the gear train in either direction, but instantly locks in place when the motor is de-energized; thus preventing back-driving by dynamic loads.

### Manual Handwheel:

#### Convenient Local Operation

A manual Handwheel (and Handcrank on model 22-809 drives) is standard on all Group 22 models for use during installation and testing, or during power outages. This Handwheel does not require a declutch mechanism for operation and turns at a safe, slow speed.

### Adjustable Crank Arm:

#### Easy Installation and Setup

For ease of installation on any application, the Group 22 crank arm can be easily positioned to start anywhere in the full 360° rotation of the output shaft. To further facilitate proper installation and setup, the crank arm radius is easily adjustable through a wide range of values.

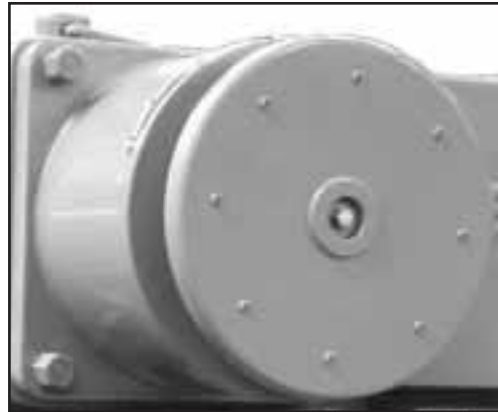


# ELECTRICAL FEATURES

## Motor:

### No Burnout

The Beck Group 22 drive motor design allows for precise control, with low current draw and no duty-cycle limitations. The drive's onboard control electronics directly feed the motor windings, thus eliminating external motor starters or remote mounted electronics. In addition, the motor does not coast or overshoot and will not overheat—even under continuous modulation.



Motor with Handwheel



Electric Handswitch

## Handswitch:

### Complete Local Control

The Group 22 is equipped with an electrical override Handswitch to aid in setup and installation. It provides local control of the drive independent of external control signals.

## Auxiliary Switches:

### Easily Adjustable Trip Points

All Group 22 drives include two non-dedicated SPDT switches, which are cam-actuated directly by the output shaft. Wiring connections are provided in the drive terminal compartment, allowing for easy access. The switch trip points are easily adjusted in the field to operate at any point in the drive travel rotation.



Contactless Position Sensor and Auxiliary Switches



# CONTROL AND OPERATING FEATURES

## State-of-the-Art Design

The Group 22 combines years of experience in drive design with the latest technologies to provide all of the performance and reliability customers expect from Beck drives in an even more flexible, powerful and easy-to-use package.

In addition to drive control, the microprocessor-based electronics provide a host of features and functions. Some of the advanced features include:

- Error-based variable speed operation for precise positioning performance.
- A unique position compensating algorithm and variable speed inverter provide consistent positioning of the drive down to 0.1° movements.
- Configurable emergency full stroke speeds.
- Two-way digital communications via HART protocol or RS-232 serial connection.
- Simplified calibration without any mechanical or electrical adjustment.
- Drive diagnostics and operating statistics available locally or remotely.
- Live torque measurement and overtorque protection.
- Stall protection with configurable stall time setting.
- The choice of linear or square input signal characterization.
- Configurable action on loss of demand input signal.
- Easy configuration, setup and documentation of drive operating parameters.
- All operating parameters including temperature can be displayed via HART.
- Read/write parameters including tag and descriptor information, last calibration date, and model and serial numbers are saved on board.
- Ability to restore all drive calibration and setup information to the factory "as-built" configuration.



# SPECIFICATIONS

TABLE 4-1: Model 22-309, 22-409 and 22-809 General Electronic Specifications

<b>Output Torque and Timing</b>	
<b>22-309</b>	3,000 lb-ft, 30–300 (configurable) sec./100°
<b>22-409</b>	4,000 lb-ft, 15–300 (configurable) sec./100°
<b>22-809</b>	8,000 lb-ft, 15–300 (configurable) sec./100°
<b>Drive Power</b>	
<b>22-309</b>	120 or 240 V ac, single-phase, 50 or 60 Hz, 6 A max.
<b>22-409</b>	208 V ac, three-phase, 50 or 60 Hz, 1 kV A
<b>22-809</b>	208, 240, 480 or 575 V ac, three-phase, 50 or 60 Hz, 2 kV A
<b>Weight</b>	
<b>22-309, 22-409</b>	490 lbs
<b>22-809</b>	1,100 lbs
<b>Operating Conditions</b>	
	–40° to 85° C. (–40° to 185° F.)
	0 to 99% relative humidity
<b>Demand Input Signal Range</b>	
	4–20 mA, 1–5 V dc
<b>Minimum Step</b>	
	0.1° typical
<b>Linearity</b>	
	±1% of span, max. independent error
<b>Hysteresis</b>	
	0.25% of span at any point
<b>Demand Input Signal Characterization</b>	
	Linear: Drive output shaft moves proportionally to the input signal.
	Square: Drive output shaft moves proportionally to the square of the input signal.
<b>Position Feedback Signal</b>	
	4–20 mA
<b>Isolation</b>	
	Demand input and position Feedback signals are isolated from ground and the ac power line. Signal buffering provides 24 V dc isolation between the Demand and Feedback signals.



***Overtorque Protection***

If the output torque of the drive exceeds 115% of the drive rating, the motor will shut off (feature can be enabled / disabled).

***Action on Loss of Input Signal (Power On)***

Stays in place or runs to any preset position (configurable).

***Stall Protection***

If the motor tries to run in one direction for more than 300 seconds (configurable from 30 to 300 seconds), the motor will shut off.

***Over-travel Protection Switches***

Two SPDT, one for CW and one for CCW limit of output shaft travel. Standard switch setting allows for 100° of travel.

***Non-dedicated Switches (Field Adjustable)***

Two SPDT, rated for 1 A, 250 V ac

***Handswitch***

Permits local electrical operation, independent of Demand input signal.

***Handwheel (and Handcrank on the 22-809)***

Provides manual operation without electrical power.

***Enclosure***

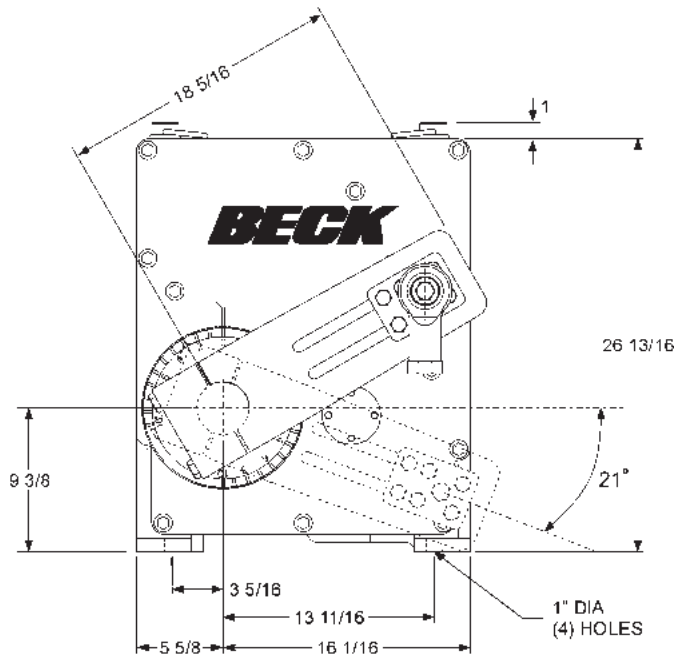
Precision-machined aluminum alloy castings, painted with corrosion-resistant polyurethane paint, provide a rugged, dust-tight, weatherproof enclosure.

***Mounting Orientation***

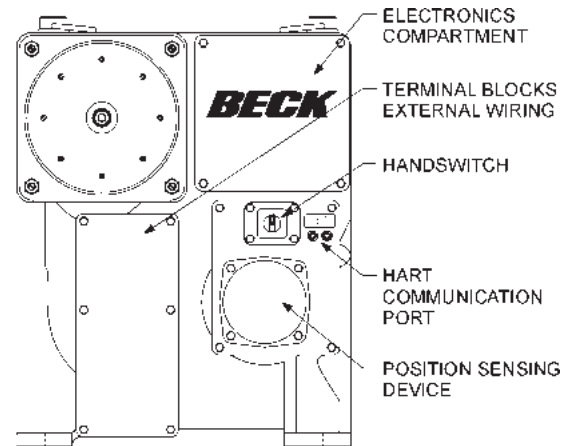
Upright, as depicted in outline dimension drawings on pages 38–39.

# SPECIFICATIONS

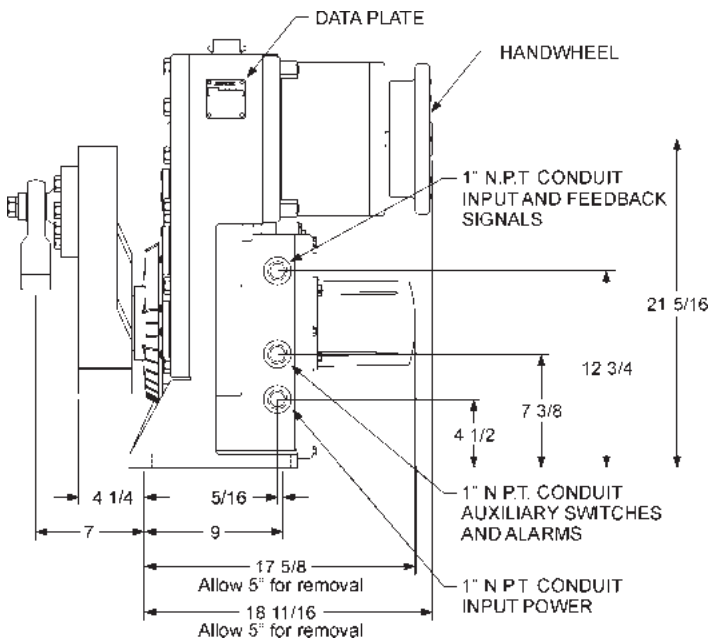
Figure 4-2: Models 22-309, 22-409 Outline Dimension Drawings



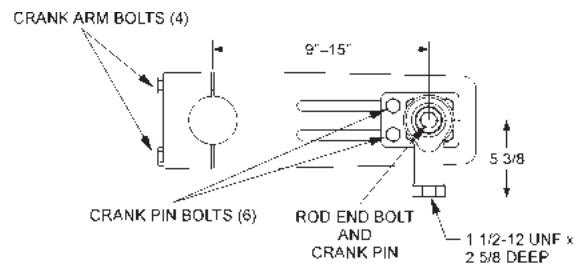
Front View



Rear View



Side View



Crank Arm

Beck Control Drive Model	Torque (lb-ft)	Timing (sec/100°)	Net Wt (lbs)	Output Shaft Dia. (In.)
22-309	3,000	30-300	490	3 1/2
22-409	4,000	15-300	490	3 1/2

Crankarm		Maximum Overhung Load (lbs)
Crankarm Part Number	Crankarm Radius (Adjustable)	
14-8022-02	9"-15"	15,000



## How to Specify

Beck Group 22 drives are available in two basic models, and are furnished with a crank arm and rod end for linkage connection. The following instructions are intended to make it easy to specify and order Beck Group 22 drives. If questions arise concerning additional options or control modes, contact your Beck Sales Engineer.

All Beck drives are shipped calibrated to the customer specifications written into the equipment order.

Complete instruction manuals are furnished with each drive order. These manuals provide the detailed information required for correct installation, typical wiring and mechanical connections, and drive operation; as well as data for making field modifications, including drive control signal functions. Each Beck drive is also supplied with a customized wiring diagram.

### 1. Specify Full Model Number:

Using the information from Table 4-1 (page 36) and Figures 4-2 and 4-3 (pages 38–39), specify which model is appropriate for your application:

\_\_\_ 22 - 309 - 3000 - \_\_\_ - 2  
(30–300)\*

OR

\_\_\_ 22 - 409 - 4000 - \_\_\_ - 2  
(15–300)\*

OR

\_\_\_ 22 - 809 - 8000 - \_\_\_ - 2  
(15–300)\*

\* Timing is configurable—choose desired speed from available range.

### 2. Provide the Following Additional Information:

- Desired control input signal, from Table 4-1, page 36.
- Desired power, from Table 4-1, page 36.
- Direction of rotation desired on increasing signal: Clockwise (CW) or Counterclockwise (CCW).
- Desired Digital Control Module (DCM): Local Interface or HART® compatible.

### 3. State Whether or Not Beck is to Supply Linkage (See page 80).

### 4. Send Your Order Directly to:

HAROLD BECK & SONS, INC.  
2300 Terry Drive  
Newtown, PA 18940 USA

For applications assistance, contact a Beck Sales or Application Engineer ...

Phone: 215-968-4600

Fax: 215-860-6383

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





## Suggested Specifications

Use the following as a guideline when specifying Beck Group 22 rotary drives.

### Basic Drive Unit

Control drive shall be rated for \_\_\_\_\_ (3,000 for 22-309, 4,000 for 22-409 or 8,000 for 22-809) lb-ft torque output. An increasing demand signal shall cause the control drive to rotate \_\_\_\_ (CW or CCW).

Model 22-309 control drive shall operate from \_\_\_\_ (120 or 240) volt AC, single phase, \_\_\_\_ (50 or 60) Hz. The timing for 100° rotation of the control drive output shall be adjustable down to 30 seconds.

Model 22-409 control drive shall operate from 208 volt AC, three phase, \_\_\_\_ (50 or 60) Hz, 1 kV A. The timing for 100° rotation of the control drive output shall be adjustable down to 15 seconds.

Model 22-809 control drive shall operate from \_\_\_\_ (208, 240, 480 or 575) volt AC, three phase, \_\_\_\_ (50 or 60) Hz, 2 kV A. The timing for 100° rotation of the control drive output shall be adjustable down to 15 seconds.

Control drive shall have integrated electronics and be able to operate in ambient temperatures of -40°F (-40°C) to 185°F (85°C).

Control drive shall have typical minimum movements of 0.1 degrees, and shall be able to make movements of this size at a 100% duty cycle on a time basis without overheating the electronics or motor. (Motor shall be capable of withstanding unlimited starts / stops per minute or an indefinite stall). Design of the motor shall be such that electrical and thermal overloads are not required. Motor shall be non-coasting with instant magnetic braking without the use of a separate brake winding or mechanical brake.

Control drive shall monitor output torque and be able to stop on over-torque conditions. Torque switches shall not be required. Torque information shall be available to a computer system as a numeric value with a resolution of 2% or finer.

A low-speed, disc-type motor Handwheel (and Handcrank on model 22-809 drives) shall permit manual operation of the drive without electrical power and without a declutching mechanism.

A five-position, drive-mounted electric Handswitch shall be provided to permit local electrical operation of the unit. Local control can permit or override remote control signals.

The control drive will automatically stay in place on loss of power, and can be set to stay in place on loss of control signal. Optionally, the control drive may be set to move to any customer specified position on loss of the control signal (with power still applied).

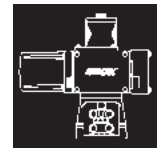
Two electrical over-travel protection switches shall be provided. The actuation points of these switches shall be field adjustable. In addition, two undedicated SPDT switches shall be provided for indication of drive position. The actuation points of these switches shall be field adjustable, the wiring points of these switches shall be accessible in the customer terminal area, and the switches shall be rated for 1 amp at 250 volts AC.

Integral mechanical stops shall be provided, and shall be capable of limiting the travel of the drive and load, with or without power.

All bearings and gears shall be permanently lubricated. Motor bearings shall be maintenance-free. Gear train shall have high efficiency spur gears constructed of heat treated alloy steel or ductile iron only. No worm gear mechanisms shall be used in the drive train and all parts shall be permanently lubricated.

Control drive shall be TENV, and shall be weatherproof and dust-tight. All field connections shall be made at the customer terminal area. Separate conduit entrances shall be provided for power wiring and control wiring.





# GROUP 11 QUARTER-TURN VALVE DRIVES

*Engineered for precise control of quarter-turn valves.*

## INTRODUCTION

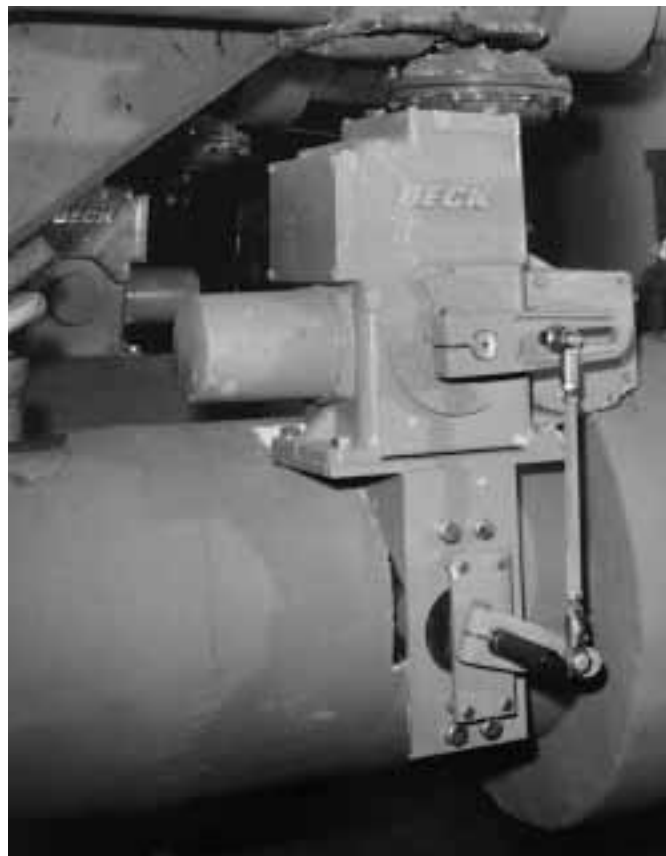
Precise, reliable and consistent positioning of control valves is of critical importance in maintaining overall process control.

Beck's unique ability to quickly, accurately and consistently track the control signal allows you to fully utilize your control system's capabilities. This ability can significantly decrease process variability, improve product quality and reduce operating costs.

In thousands of applications around the world, Beck valve drives have a field-proven track record for high reliability, maintenance free operation and consistent operation over decades of service.

Group 11 valve drives are engineered for direct-coupling on quarter-turn ball, plug and butterfly valves. They may also be installed using specially engineered crank arm and linkage arrangements.

Valves and drives may be ordered together as pre-engineered assemblies ready for drop-in installation; or, drives can be supplied separately along with the necessary hardware for field installation on existing valves.



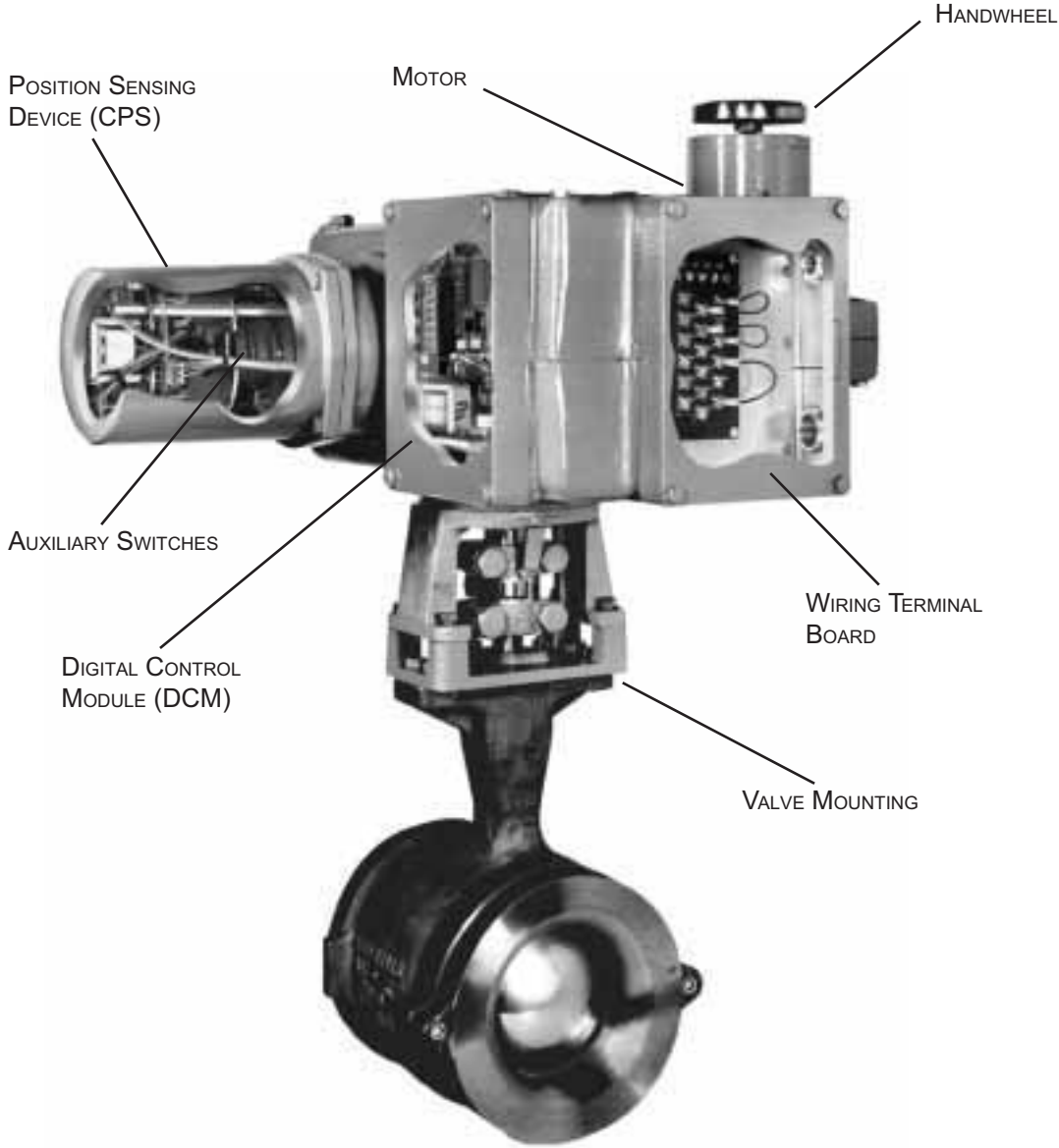
# INSTALLATION

Beck drives are designed to be simple to install on both new and existing valves. Pre-engineered coupling and linkage kits can be provided to meet your specific needs (see page 80).

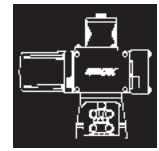
Every Beck drive is shipped from the factory set up and calibrated to the specifications written into the equipment order. Instruction manuals are provided to help ensure a trouble-free and long-lasting installation. Beck Sales Engineers will assist you in specifying the appropriate drive and mounting arrangement.

## Factory-Mounted Assemblies

Beck will supply Group 11 drives mounted to valves using a pre-engineered coupling or linkage arrangement. These unitized assemblies are fully tested and ready for simple drop-in installation.



**Figure 5-1**  
*Group 11 valve drive components*



## Mounting Arrangements

### Direct-Coupled Configurations

A factory machined coupling is used to connect the drive directly to the valve. This configuration is compact in design and is ideal for applications where a constant torque is desired over the full 90° range of travel (see Outline Drawings, pages 46–49, for typical mounting options).



### Crank Arm / Linkage Configurations

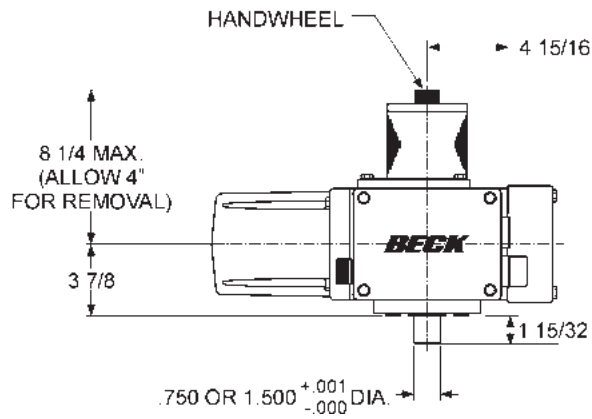
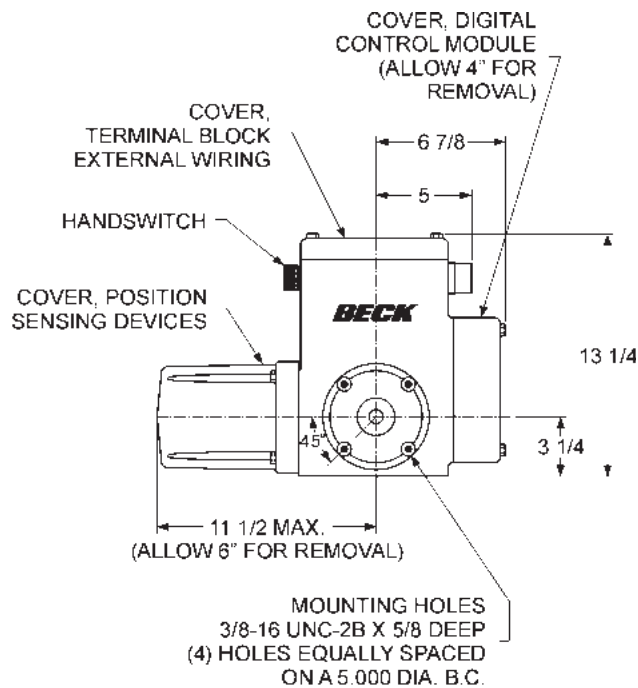
Valve / drive assemblies may be specified with crank arm and linkage mounting arrangement. This design allows 100° drive travel, thus providing variable torque distribution and increased seating effectiveness.

- With linkage characterization, high seating torques can be obtained for certain valve types.
- Standard bracket and linkage mounting hardware is available for most popular valve types.
- Custom mountings are easily handled allowing Beck drives to be economically mounted to virtually any rotary valve.
- Link-Assist™ computer program helps you specify the ideal arrangement for your application (see Appendix).

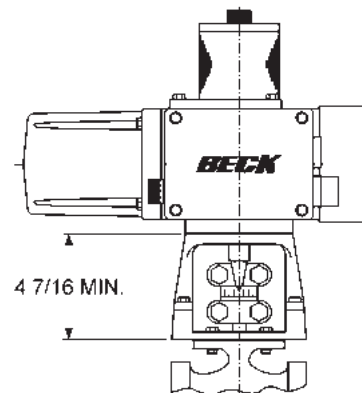
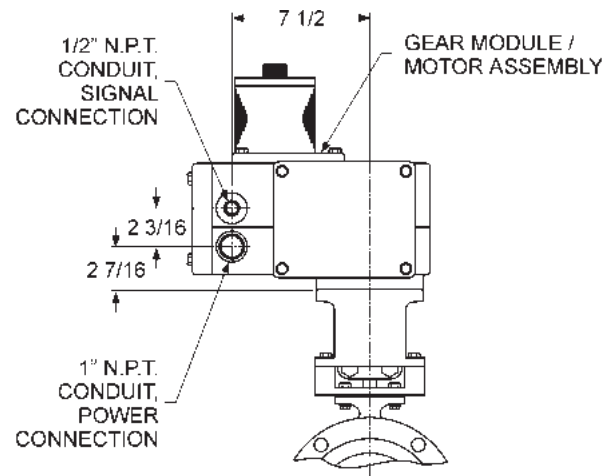


# SPECIFICATIONS

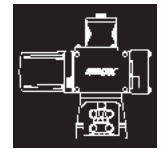
Figure 5-2: Model 11-160 Outline Dimension Drawings



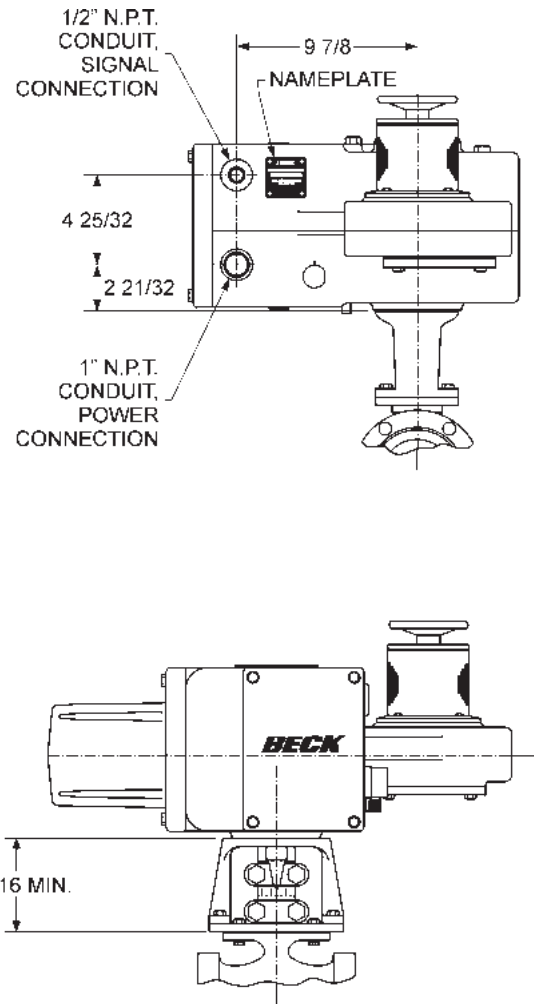
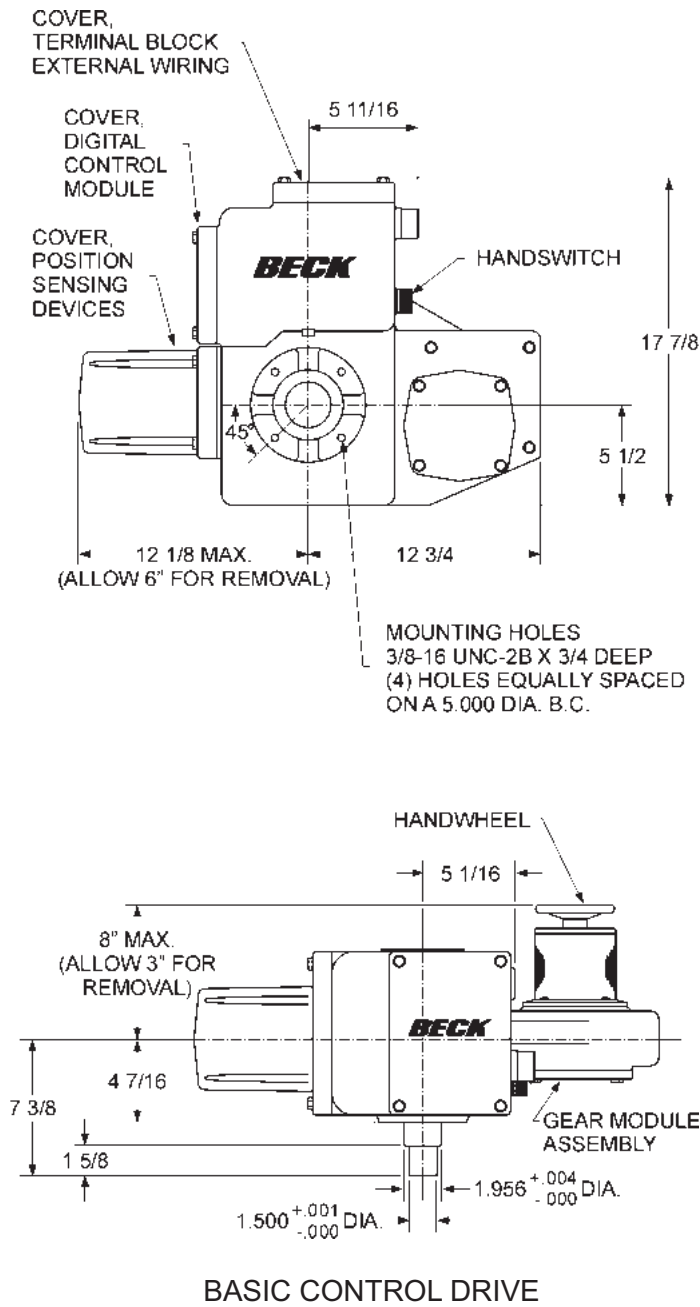
BASIC CONTROL DRIVE



TYPICAL VALVE MOUNTING

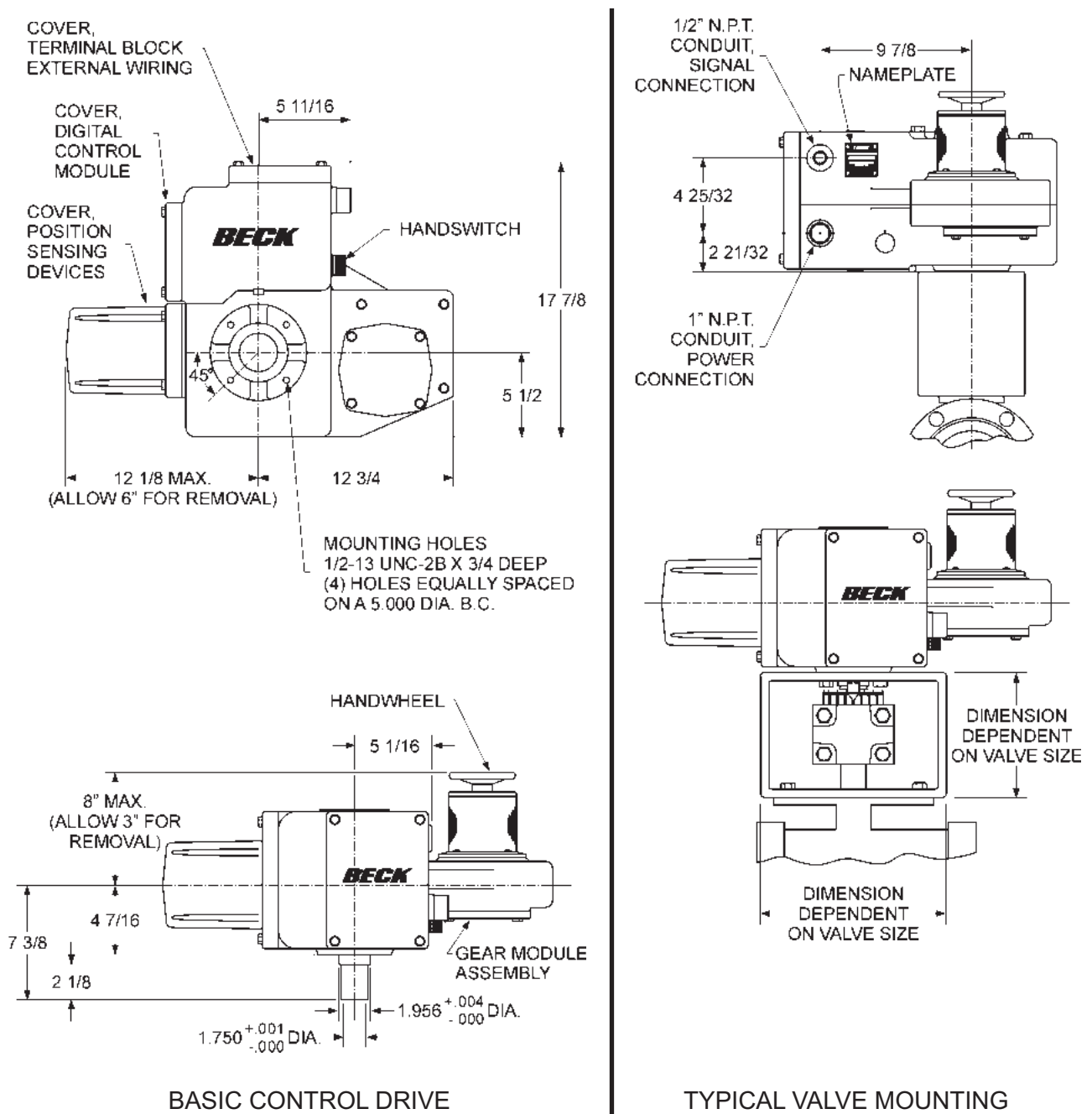


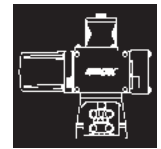
**Figure 5-3: Model 11-260 Outline Dimension Drawings**



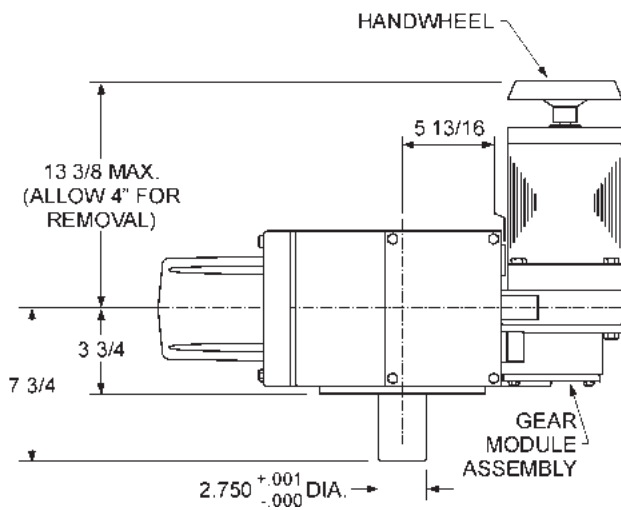
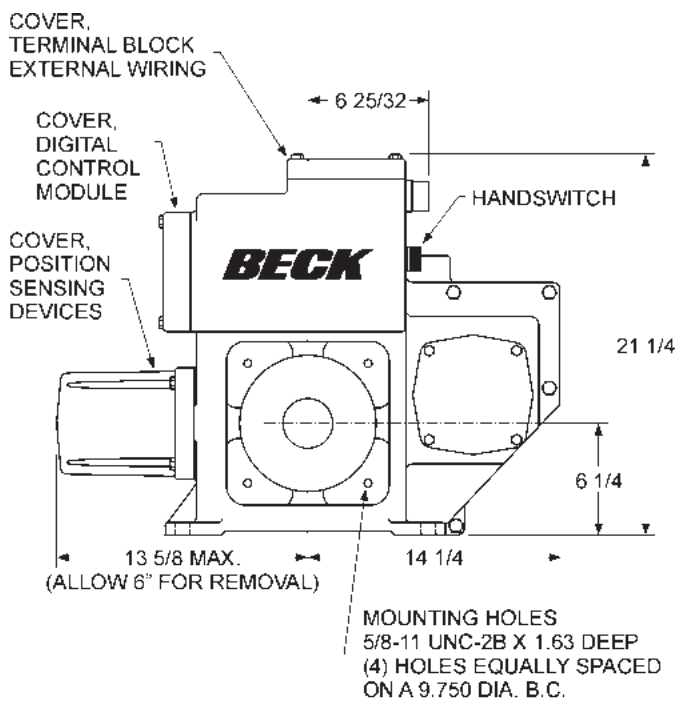
# SPECIFICATIONS

Figure 5-4: Model 11-360 Outline Dimension Drawings

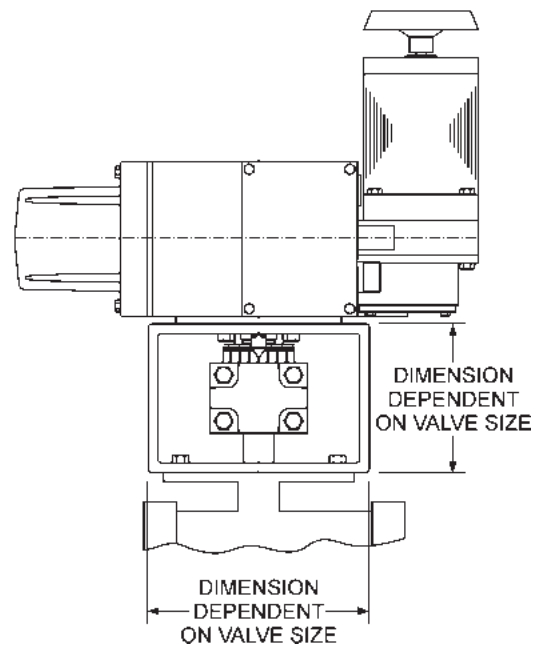
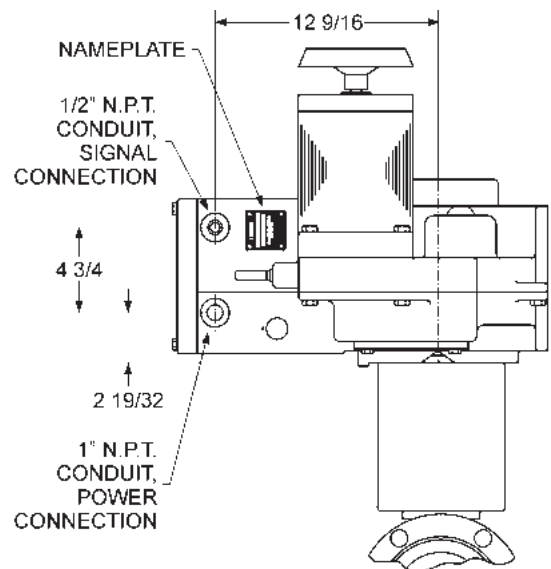




**Figure 5-5: Model 11-460 Outline Dimension Drawings**



**BASIC CONTROL DRIVE**



**TYPICAL VALVE MOUNTING**

**TABLE 5-1: Mechanical Specifications**

Beck Drive Model No.	Approx. Weight (lb)	Output Shaft Dia. (in)
11-160	56	3/4 or 1 1/2
11-260	115	1 1/2
11-360	115	1 3/4
11-460	270	2 3/4

Drives may be mounted in any orientation.  
All dimensions are in inches, metric dimensions available on request.  
All dimensions are subject to change. Request certified dimensional drawings for the drives you select.

**TABLE 5-2: Torque, Timing, Motor Current<sup>1</sup>**

**DIRECT-COUPLED FOR 90° ROTATION**

Basic Model	Torque (lb-ft)	Timing (sec./90°) @ 60 Hz <sup>6</sup>	Motor Current (A) <sup>2,5</sup> @ 120 V ac 60 Hz <sup>3</sup>
11-16_	15	10	.32
	20	18	.17
	40	18	.32
	40	36	.17
	60	54	.17
	80	36	.32
	80	81	.17
11-26_	125	18	.56
	125	36	.35
	175	54	.35
	250	36	.56
	250	68	.35
11-36_	300	36	.56
	300	90	.35
	400	54	.56
	550	68	.56
	650	90	.56
11-46_	350	22	1.30
	550	36	1.30
	650	22	2.20
	800	54	1.30
	1000	22	3.00
	1000	36	2.20
	1000	68	1.30
	1500	90	1.30
	1800	32	3.00
	1800	54	2.20

**LINKAGE-CONNECTED FOR 100° ROTATION**

Basic Model	Torque (lb-ft)	Timing (sec./100°) @ 60 Hz <sup>6</sup>	Motor Current (A) <sup>2,5</sup> @ 120 V ac 60 Hz <sup>3</sup>
11-15_	15	11	.32
	20	20	.17
	40	20	.32
	40	40	.17
	60	60	.17
	80	40	.32
	80	90	.17
11-20_	125	20	.56
	125	40	.35
	175	60	.35
	250	40	.56
	250	75	.35
11-30_	300	40	.56
	300	100	.35
	400	60	.56
	550	75	.56
	650	100	.56
11-40_	350	24	1.30
	550	40	1.30
	650	24	2.20
	800	60	1.30
	1000	24	3.00
	1000	40	2.20
	1000	75	1.30
	1500	100	1.30
1800	36	3.00	
1800	60	2.20	

<sup>1</sup> For corresponding dimensional data, see pages 46-49.

<sup>2</sup> The unique design of Beck motors has starting and stall currents that approximate the running current, so thermal overload protection is not required -- just provide normal short-circuit protection.

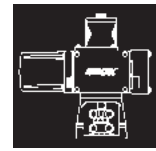
<sup>3</sup> 50 Hz motor currents do not exceed 120% of 60 Hz levels.

<sup>4</sup> For crank arm/linkage mechanical specifications, refer to Table 3-1, page 23. For corresponding dimensional data, see pages 22-25.

<sup>5</sup> Drive current @ 240 V ac is approximately 1/2 the 120 V ac current (motor current does not change @ 240 V ac -- the motor always runs off of 120 V ac).

<sup>6</sup> Timing for 50 Hz = 1.2 times 60 Hz.





## How to Specify

The following instructions are intended to make it easy to specify and order Beck Group 11 drives. If questions arise concerning additional options or control modes, contact your Beck Sales or Application Engineer.

All Beck drives are shipped calibrated to the customer specifications written into the equipment order.

Complete instruction manuals are furnished with each drive order. These manuals provide the detailed information required for correct installation, typical wiring and mechanical connections, and drive operation; as well as data for making field modifications in the drive train and control signal functions. Each Beck drive is also supplied with a customized wiring diagram.

### 1. Determine Required Parameters:

- (a) Basic model number from Table 5-2:  
11-\_\_ \_\_
- (b) Control option from Table 2-2, page 13:  
\_\_
- (c) Torque (lb-ft) from Table 5-2:  
\_\_ \_\_ \_\_ \_\_
- (d) Timing (sec./90° or 100°) from Table 5-2: \_\_ \_\_ \_\_
- (e) Number of auxiliary switches from Table 2-2, page 13: \_\_

### 2. Specify Full Model Number:

Using the information above, fill out the full model number according to the following formula:

11-	(a)	(b)	-	(c)	-	(d)	-	(e)
Basic Model	Control Option	Torque (lb-ft)		Timing (sec./90° or 100°)		No of Aux. Switches		

### 3. Provide the Following Additional Information:

- a. Desired control input signal, from Table 2-1, page 12.
- b. Desired power (120 or 240 V, 60 or 50 Hz).
- c. Direction of control drive output shaft travel (CW or CCW, looking at the output shaft) desired with increasing signal. (The resulting rotation for direct-coupled valves will be opposite that of the drive).
- d. Desired optional control features, from page 10.

### 4. Provide the Following Information for Valve Applications:

- a. Valve specification including manufacturer, size, style and materials.
- b. Characteristics of flowing media.
- c. Maximum, normal and minimum inlet pressure.
- d. Maximum, normal, minimum and shutoff pressure.
- e. Maximum, normal and minimum flow rate and direction.
- f. Line size and schedule including flange requirements.

### 5. Send Your Order Directly to:

HAROLD BECK & SONS, INC.  
2300 Terry Drive  
Newtown, PA 18940 USA

For applications assistance, contact a Beck Sales or Application Engineer ...

Phone: 215-968-4600

Fax: 215-860-6383

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

## Suggested Specifications

Use the following as a guideline when specifying Beck Group 11 quarter-turn valve drives.

### Basic Drive Unit

Control drive shall have integrated electronics and be able to operate in ambient temperatures of -40°F. (-40°C.) to 185°F. (85°C.).

The drive shall be furnished with a 120 volt AC, single phase, \_\_\_ (50 or 60) Hz, synchronous motor. Motor shall be capable of withstanding 60 starts / stops per minute or a temporary stall condition without overheating. Design of the motor shall be such that electrical and thermal overloads are not required.

Motor bearings shall be maintenance-free. Motor shall be non-coasting with instant magnetic braking, and shall be self-locking and self-releasing without the use of a separate brake winding, mechanical brake or worm gear mechanism. Control drive shall be designed to stay in place upon loss of power and shall be capable of holding a load equal to at least 200% of the model's rated output without AC power. The drive motor shall be a TENV with Class H insulation.

Control drive shall be rated for \_\_\_ lb-ft torque output. Stall torque shall be self-limiting, not exceeding two and one half times the rated torque; torque switches shall not be required. Drive shall operate \_\_\_ (CW or CCW) on increasing signal, with timing of \_\_\_ seconds for \_\_\_ (90° or 100°) rotation. Gear train shall have high efficiency spur gears constructed of heat treated alloy steel or ductile iron only. Readily available gear modules shall provide for a range of torque and timing combinations within the drive's rated capacity, and shall be field-interchangeable. Drive train parts shall be lubricated with a premium, heavy-duty lithium-based lubricant. No oil baths shall be used for lubrication. Control drives shall be able to operate in any mounting orientation.

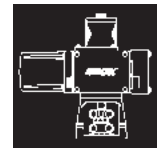
Two SPDT over-travel limit switches shall be provided for over-travel protection. In addition, the drive shall have \_\_\_ (none, two, four) auxiliary SPDT switches which are infinitely adjustable over the full range of travel. Switches shall be rated for 6 amps at 120 volts AC. Drive shall have integral mechanical stops capable of limiting travel of the drive and load.

A low-speed, disc-type motor Handwheel shall permit manual operation of the drive without electrical power and without a declutching mechanism.

A five-position, drive-mounted electric Handswitch shall be provided to permit local electrical operation of the unit for control adjustment or operation on loss of control signal. With the Handswitch in AUTO mode, drives shall respond to control signals automatically.

Enclosure shall be totally enclosed, cast, weatherproof, dust-tight, NEMA 4X construction. All field connections shall be made in one terminal compartment. Separate conduit entrances shall be available for power and control wiring.





## Drive Control Options

### **Modulating mA or V dc Analog Control Input:**

Drive shall provide modulating control through an integral, digital control module which positions the drive in proportion to the (\_\_\_ mA range or \_\_\_ V dc range) control input signal.

The control module shall be capable of initiating shaft movement in steps down to 0.1°.

Upon loss of input signal, the drive shall be field configurable to move to any predetermined position.

Standard control features should include:

- Field-configurable, pre-determined action upon loss of input signal
- Stall protection
- Split signal operation for control of multiple drives
- External position feedback signal



### **Modulating Direct AC Control:**

Drive shall be operated by direct AC control power either from an automatic controller or by manually operated switches, with continuous positioning capability over the range of operation. Drive shall be capable of starting and stopping instantaneously for high-resolution positioning.

### **Multi-Position Direct AC Control:**

Drive shall provide \_\_\_ (3 to 6) discrete positions upon closure of an automatic controller or by manually operated switches, with provision for adjustable pre-determined position settings, and have a positioning repeatability of 0.1% over the range of operation.

### **Open / Close Direct AC Control:**

Drive shall provide open / close operation to pre-set travel limits upon closure of an automatic controller or by a manually operated switch, and have a 0.1% position repeatability, with end-of-travel limits adjustable over the full range of travel of the drive.

## Position Feedback Specification

Drive shall be equipped with a contactless position sensing device and be capable of providing an isolated feedback signal with a 4–20 mA or 1–5 V dc range. The sensing device shall have infinite resolution.





# GROUP 14 LINEAR VALVE DRIVES

*Combine the benefits of precise, responsive modulation and tight shutoff for exceptional performance in globe valve applications.*

## INTRODUCTION

Group 14 drives are ideal for steam flow control, combustion control and any other application which requires more precise valve position control or faster response than pneumatic or electric actuators can deliver.

Valves and drives may be ordered together as factory-mounted assemblies, ready for drop-in installation, or drives can be supplied separately along with the necessary hardware for field installation on existing valves.



# INSTALLATION

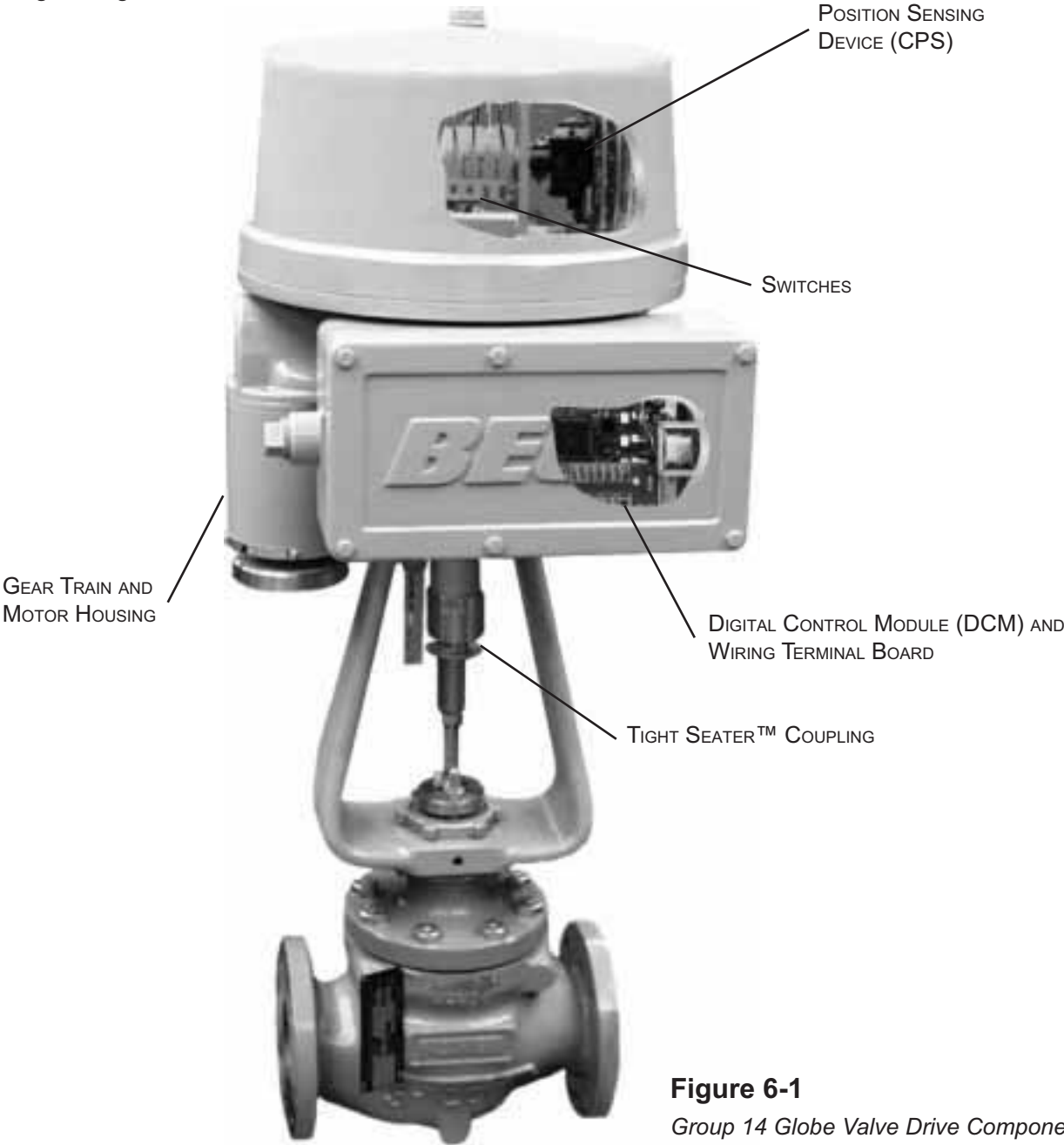
Beck Group 14 drives feature a modular configuration to simplify installation and service. All components are housed in individual compartments with heavy cast, precision-machined covers to keep out dust and moisture. As with most Beck drives, the Group 14 can be mounted in any orientation.

Every Beck drive is shipped from the factory setup and calibrated to the specifications written into the equipment order. Complete instruction manuals are provided to help ensure a trouble-free and long lasting installation.

## Factory Mounted Assemblies

Beck will supply Group 14 drives mounted to valves, fully tested and ready for simple drop in installation.

Group 14 drives are generally furnished with a standard cast yoke for globe valves with boss sizes up to 3 3/4". When the Group 14 drive is installed on valves with boss sizes exceeding 3 3/4", special yokes are built to provide sturdy, deformation-free assemblies.



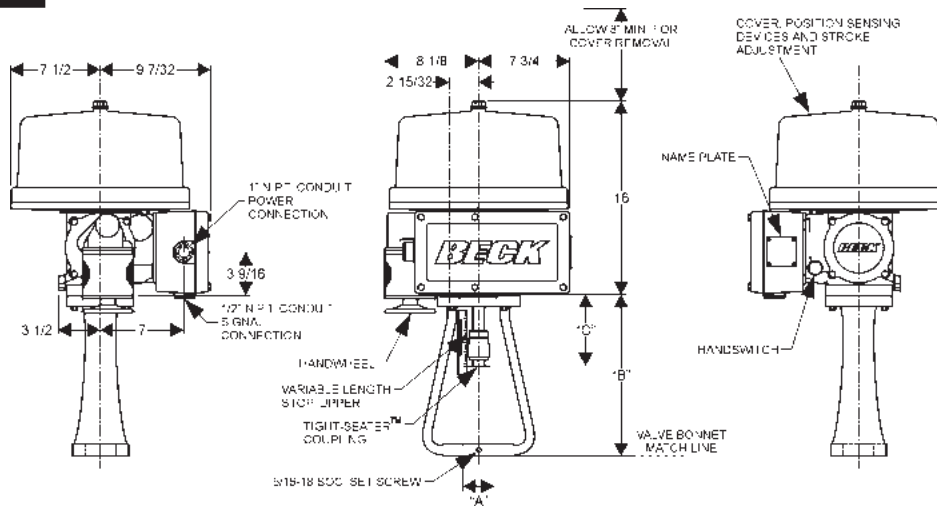
**Figure 6-1**  
*Group 14 Globe Valve Drive Components*



# SPECIFICATIONS

Figure 6-2: Group 14 Outline Dimension Drawings (5/16" to 2 1/8" travel shown)

## MODEL 14-100



## MODEL 14-200

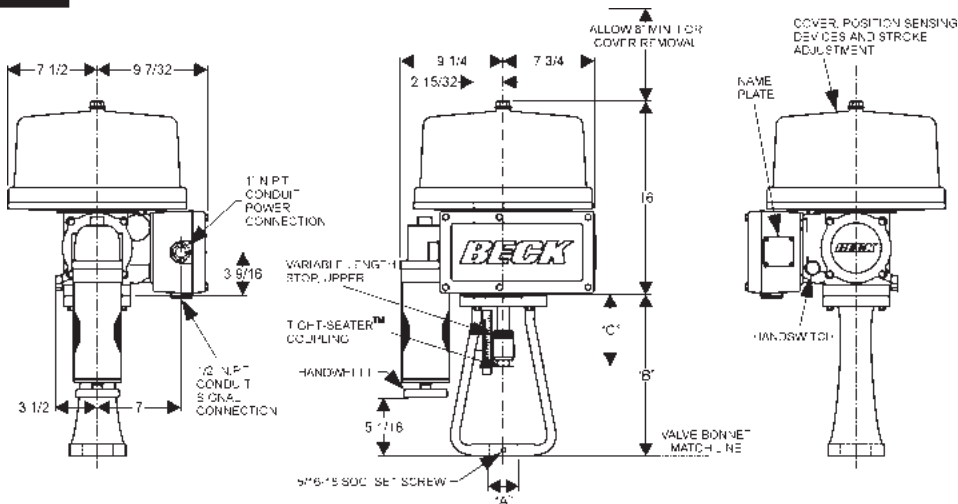


TABLE 6-1: Mechanical Specifications

Beck Drive Model No.	Drive Shaft Travel Range (in)	"A" Valve Boss Dia. Range (in)	"B" <sup>1</sup> Yoke Height (in)	"C" <sup>2</sup> Nominal Drive Shaft Extension (in)	Max. Valve Stem Extension (Valve Stem Retracted) (in)	Approx. Weight (lb)
14-100	5/16 - 1 3/4	1 - 2 5/8	8	4 3/16	5 1/2	80
	3/4 - 2 1/8	1 3/8 - 3 3/4	13 1/2	6	9 1/4	92
	3/4 - 4 1/2	1 3/8 - 3 3/4	19 13/16	12 5/16	9 1/4	100
14-200	5/16 - 2 1/8	1 3/8 - 3 3/4	13 1/2	6	9 1/4	105
	3/4 - 4 1/2	1 3/8 - 3 3/4	19 13/16	12 5/16	9 1/4	115

<sup>1</sup> Yoke height "B" is measured from the valve bonnet match line to the face of the control drive body. This dimension includes the yoke extension added to drives with strokes greater than 2 1/8".

<sup>2</sup> Nominal drive shaft extension "C" is measured from the bottom of the Tight-Seater™ coupling to the top of the yoke and does not include the yoke extension.

Drives may be mounted in any orientation.

All dimensions are in inches; metric dimensions available upon request.

All dimensions are subject to change. Request certified dimensional drawings for the drives you select.

**TABLE 6-2: Torque, Timing, Motor Current<sup>1</sup>**

Basic Model	Thrust (lbs)	Timing (sec./in.) <sup>5</sup> @ 60 Hz	Motor Current (A) <sup>2,4</sup> @ 120 V ac 60 Hz <sup>3</sup>
14-10_	340	4	.56
	425	11	.37
	600	16	.37
	650	8	.56
	800	11	.56
	1000	27	.37
	1100	16	.56
	1620	48	.37
	1800	27	.56
14-20_	2700	16	1.5
	4000	24	1.5

<sup>1</sup> For corresponding dimensional data, see page 57.

<sup>2</sup> The unique design of Beck motors has starting and stall currents that approximate the running current, so thermal overload protection is not required -- just provide normal short-circuit protection.

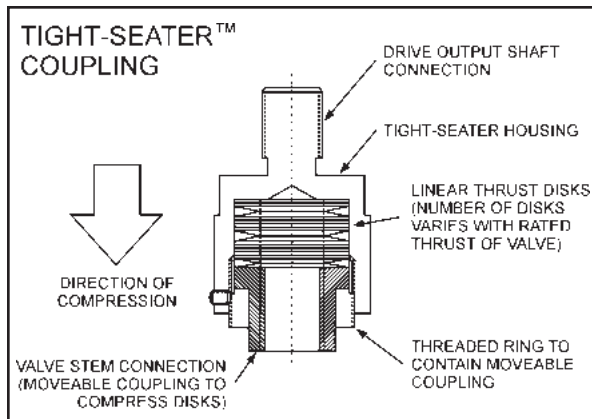
<sup>3</sup> 50 Hz motor currents do not exceed 120% of 60 Hz levels.

<sup>4</sup> Drive current @ 240 V ac is approximately 1/2 the 120 V ac current (motor current does not change @ 240 V ac -- the motor always runs off of 120 V ac).

<sup>5</sup> Timing for 50 Hz = 1.2 times 60 Hz.

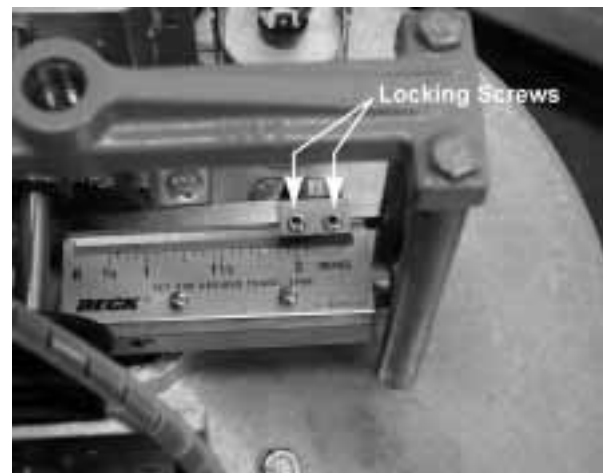
### Tight-Seater™

The unique “Tight-Seater™” coupling incorporated into every unit provides positive seating of the valve plug for tight shutoff. This device compresses the plug into the seat of the valve until the drive reaches its end of travel, for a seating force at least equal to the rated thrust of the valve. A patented self-locking mechanism holds the output shaft in position even when the motor is de-energized.



### One-Step Valve Travel Adjustment

Beck’s unique Calibar index allows fast and easy travel adjustment because position feedback devices and over-travel limit switches are all adjusted at the same time. Intermediate auxiliary switches are automatically adjusted to the same percentage of full travel.





## How to Specify

Beck Group 14 drives are available in two travel ranges and a variety of thrust and timing combinations for linear valve modulation and tight shut-off. The following instructions are provided to make it easy to specify and order Beck Group 14 drives. If questions arise concerning additional options or control modes, contact your Beck Sales Engineer.

All Beck drives are shipped calibrated to the customer specifications written into the equipment order.

Complete instruction manuals are furnished with each drive order. These manuals provide the detailed information required for correct installation, typical wiring and mechanical connections, and drive operation; as well as data for making field modifications in the drive train and control signal functions. Each Beck drive is also supplied with a customized wiring diagram.

### 1. Determine Required Parameters:

- (a) Basic model number from Table 6-2:  
14-\_\_0
- (b) Control option from Table 2-2, page 13:  
\_\_
- (c) Thrust (lb) from Table 6-2:  
\_\_ \_\_ \_\_
- (d) Timing (sec./in.) from Table 6-2: \_\_ \_\_
- (e) Number of auxiliary switches from Table 2-2, page 13: \_\_

### 2. Specify Full Model Number:

Using the information above, fill out the full model number according to the following formula:

14-	(a)	0	(b)	-	(c)	-	(d)	-	(e)
	Basic Model (1 or 2)		Control Option		Thrust (lb)		Timing (sec./in.)		No. of Aux. Switches

### 3. Provide the Following Additional Information:

- a. Desired control input signal, from Table 2-1, page 12.
- b. Desired power (120 or 240 V, 60 or 50 Hz).
- c. Direction of output shaft travel on increasing signal.
- d. Specify travel between 5/16" and 4 1/2".
- e. Size and manufacturer of valve.
- f. Desired optional control features from page 10.

### 4. Provide the Following Information for Valve Applications:

- a. Valve specification including:
  - Manufacturer
  - Size
  - Style
  - Materials
- b. Characteristics of flowing media.
- c. Maximum, normal and minimum inlet pressure.
- d. Maximum, normal, minimum and shutoff pressure drop.
- e. Maximum, normal and minimum flow rate and direction.
- f. Line size and schedule including flange requirements.

### 5. Send Your Order Directly to:

HAROLD BECK & SONS, INC.  
2300 Terry Drive  
Newtown, PA 18940 USA

For applications assistance, contact a Beck Sales or Application Engineer ...

Phone: 215-968-4600

Fax: 215-860-6383

E-mail: sales@haroldbeck.com

## Suggested Specifications

Use the following as a guideline when specifying Beck Group 14 linear valve drives.

### Basic Drive Unit

Control drive shall have integrated electronics and be able to operate in ambient temperatures of -40°F. (-40°C.) to 185°F. (85°C.).

Control drive shall be furnished with a \_\_\_ 120 volt AC, single phase, \_\_\_ (50 or 60) Hz, synchronous motor. Motor shall be capable of withstanding 60 starts / stops per minute or a temporary stall condition without overheating. Design of the motor shall be such that electrical and thermal overloads are not required.

Motor bearings shall be maintenance-free. Motor shall be non-coasting with instant magnetic braking, and shall be self-locking and self-releasing without the use of a separate brake winding, mechanical brake or worm gear mechanism. Control drive shall be designed to stay in place upon loss of power and shall be capable of holding a load equal to at least 200% of the model's rated output. The drive motor shall be a TENV with Class H insulation.

Control drive shall be rated for \_\_\_ lb thrust output. Stall thrust shall be self-limiting, not exceeding two and one half times the rated thrust; torque switches shall not be required. Drive shall \_\_\_ (extend or retract) valve stem on increasing signal, with timing of \_\_\_ seconds per inch of travel. Gear train shall have high efficiency spur gears constructed of heat treated alloy steel or ductile iron only. Drive shall include Tight-Seater™ coupling for positive valve shutoff. Gear train parts shall be lubricated with a premium, heavy-duty, lithium-based lubricant. No oil baths shall be used for lubrication. Control drives shall be able to operate in any mounting orientation.

Two SPDT over-travel limit switches shall be provided for over-travel protection. In addition, the drive shall have \_\_\_ (none, two, four) auxiliary SPDT switches which are infinitely adjustable over the full range of travel. Switches shall be rated for 6 amps at 120 volts AC. Drive shall have integral mechanical stops capable of limiting travel of the drive and load, with or without the drive motor.

A low-speed, disc-type motor Handwheel shall permit manual operation of the drive without electrical power and without a declutching mechanism.

A five-position, drive-mounted electric Handswitch shall be provided to permit local electrical operation of the unit for control adjustment or operation on loss of control signal. With the Handswitch in AUTO mode, drives shall respond to control signals automatically.

Enclosure shall be totally enclosed, cast, weatherproof, dust-tight, NEMA 4 construction. All field connections shall be made at one terminal compartment. Separate conduit entrances shall be available for power and control wiring.





## Drive Control Options

### **Modulating mA or V dc Analog Control Input:**

Drive shall provide modulating control through an integral, digital control module which positions the drive in proportion to the (\_\_\_ mA range or \_\_\_ V dc range) control input signal.

The control module shall be capable of initiating shaft movement in steps down to 0.1°.

Standard control features should include:

- Field-configurable, pre-determined action upon loss of input signal
- Stall protection
- Split signal operation for control of multiple drives
- External position feedback signal



### **Modulating Direct AC Control:**

Drive shall be operated by direct AC control power either from an automatic controller or by manually operated switches, with continuous positioning capability over the range of operational limits of valve travel. Drive shall be capable of starting and stopping instantaneously for high-resolution positioning.

### **Multi-Position Direct AC Control:**

Drive shall provide \_\_\_ (3 to 6) discrete positions upon closure of an automatic controller or by manually operated switches, with provision for adjustable predetermined position settings, and have a positioning repeatability of 0.1% over the range of operation.

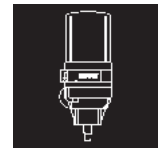
### **Open / Close Direct AC Control:**

Drive shall provide two discrete positions upon closure of an automatic controller or by manually operated switches and have a 0.1% position repeatability with end-of-travel limits adjustable over the full range of travel of the drive.

### **Position Feedback Specification**

Drive shall be equipped with a contactless position sensing device and be capable of providing an isolated feedback signal with a 4–20 mA or 1–5 V dc range. The sensing device shall have infinite resolution.





# GROUP 31 ROTARY DRIVES

*Answer the demand for high reliability and responsiveness in a small size.*

## INTRODUCTION

The Group 31 drive is designed for coupling to small quarter-turn ball and butterfly valves.

Its compact in-line design consists of an output section housing the drive train and motor, and a control module section containing the electronics. Together, these two sections provide an enclosure designed to meet NEMA 4 specifications for protection against corrosion, dust and moisture. A design that meets NEMA 7 specifications is also available.

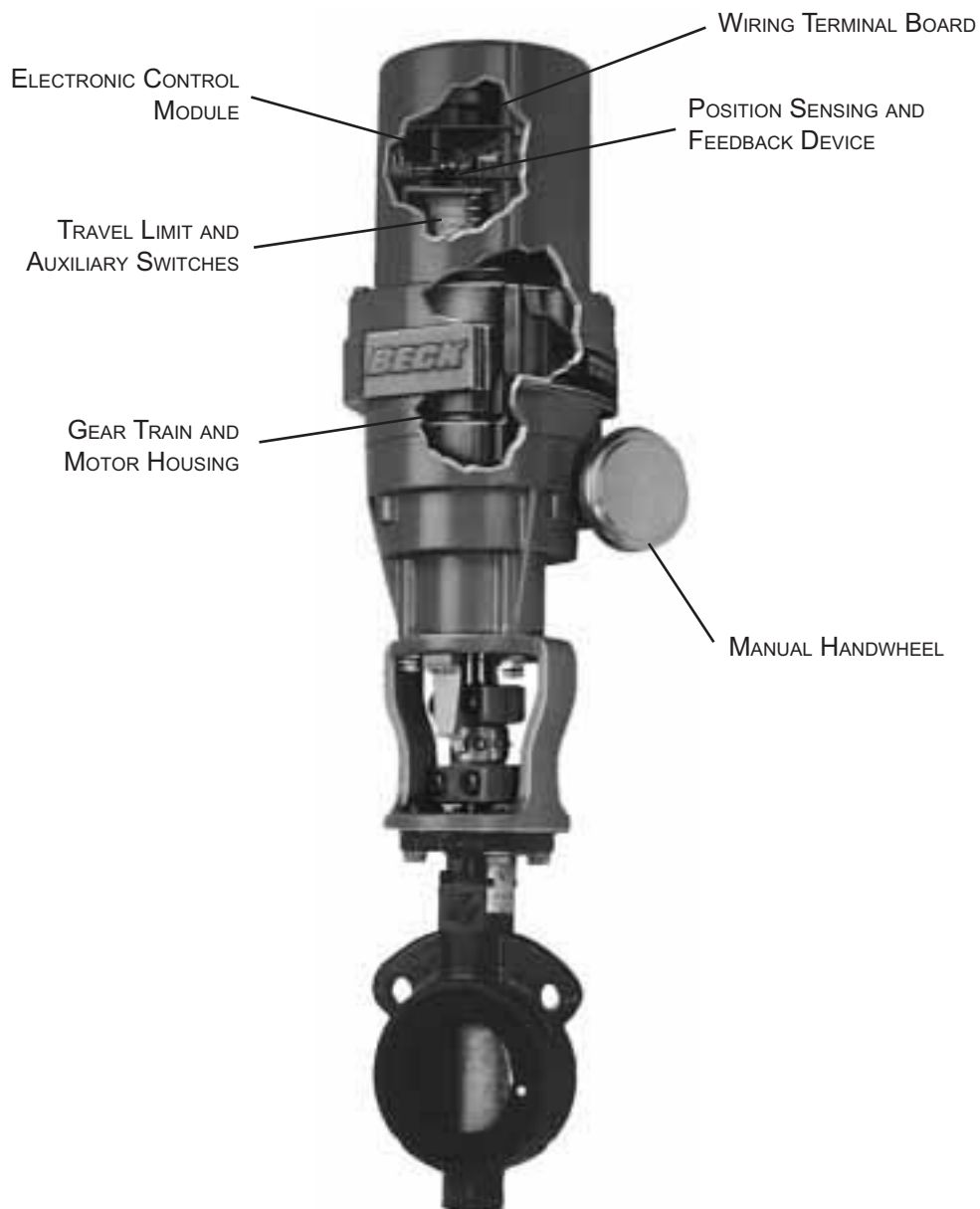


The Group 31 incorporates the same type of motor used in Beck's Group 11 and Group 14 drives, which provides millisecond response to signal commands in a modulating control loop. This no-burnout, non-coasting motor is capable of more than 60 starts per minute during process upsets and will remain cool and stable during operation for unparalleled on-line performance.

# INSTALLATION

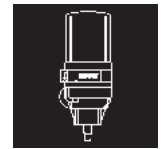
Beck Group 31 drives are designed with a single gasketed cover to enclose the control electronics and terminal connections. This arrangement is well suited for applications where accurate, reliable control is needed, but space is limited.

Beck drives are shipped calibrated to the specifications of your control system and are ready for installation.



**Figure 7-1**

*Group 31 rotary drive components*



## Factory Mounted Assemblies

The relationship of valve, control drive and mounting / coupling configuration can be of critical importance in ensuring a successful installation.

For this reason, Beck provides Group 31 drives and valves together—factory mounted and tested for simple drop-in installation. These fully integrated, unitized assemblies are pre-engineered to match the mechanical and electronic requirements of your system.



## Mounting Arrangements

### Direct-Coupled Configurations

The Group 31 drive may be coupled directly to the valve by the use of a factory machined, heat-treated coupling. This configuration is compact in design. A factory designed yoke between the drive and the valve provides rigidity and accessibility to mounting hardware. Refer to the Outline Dimension Drawing on page 71 for mounting options and dimensions.



### Crank Arm / Linkage Configurations

For applications requiring linkage connection, Beck Group 31 drives can be furnished with a machined crank arm and mounting bracket. Beck hex linkage kits may be used to simplify final connections. Refer to the Outline Dimension Drawing on page 71 for mounting options.



# MECHANICAL FEATURES

## Motor and Drive Train:

### Unequaled Availability

Beck's Group 31 rotary drives incorporate an exclusive no-burnout motor, so that on-line dependability of valves is ensured. Heat-treated alloy steel and ductile iron hypocycloidal gearing transmits torque smoothly and powerfully to the output shaft. The Beck-built control motor provides millisecond response to signal commands in a modulating control loop—eliminating the coasting and overshooting problems typical of outdated electric actuators.

The motor stator of the Group 31 drive is molded into the centerpiece, providing stable delivery of torque without overheating and without burning out.

## Mechanical Stops:

### Protection from Overtravel Damage

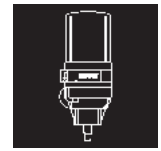
Rugged mechanical stops are furnished as a standard component of the valve mounting assembly. These stops prevent over-travel damage to valves and limit drive travel during manual cycling to maintain proper orientation of the drive output shaft with respect to switches and controls. A built-in position indicator shows the valve position.

## Manual Handwheel:

### Convenient Local Operation

A manual Handwheel is standard on all Group 31 models for use during installation and testing, or during power outages. This Handwheel does not require a declutch mechanism for operation and does not rotate during automatic operation.





# ELECTRICAL FEATURES

## Electronic Control Module:

### Accurate Position Control

Group 31 Analog Modulating drives include a single electronic control module which receives a 4–20 mA or 1–5 V dc input signal and provides a 4–20 mA or 1–5 V dc feedback for position control and indication.

- Electronic module has a deadband of 1.0% of span with sensitivity of 25% of deadband.
- The input signal span is nominally adjustable from 50% to 125% of the 4 V span, with the zero adjustable up to 120% of span, providing flexibility for split range operation.

### Limit & Auxiliary Switches

Four cam-operated switches are included as part of the control module. Two switches open the motor circuit and function as end-of-travel limit switches, and two auxiliary switches are for external signaling as required by the user. The switch cams are driven directly by the drive's output shaft for accurate control.



## Electric Handswitch:

### Convenient Local Operation

Included in the Analog Modulating models is an integral electric Handswitch, which permits safe, local operation at the valve's individual location. This feature saves time during installation and allows adjustments to be made quickly and easily.

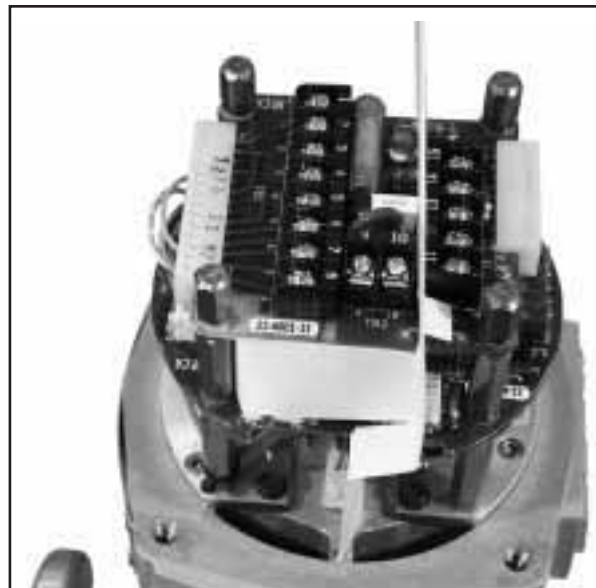
### Large Terminal Block:

#### Easy Field Wiring

The upper board on the Group 31 drive provides wiring terminals for field connection. This board is easily accessible to minimize time needed for installation wiring and testing.

### Hold Position Upon Loss of AC Power

All Group 31 drives stay in place on loss of AC power, with a minimum holding capacity of 150% of rated drive torque. When power is restored, the drive automatically responds to control signal input to move to the position specified.



# CONTROL FEATURES

Beck Group 31 drives can be specified for either open / close or modulating modes. Wiring diagrams on page 70 describe all the control options in detail.

## Position Feedback

Beck Group 31 drives equipped with feedback capability use a film potentiometer incorporated into the control module.

All modulating models feature electronic position indication. Direct AC models allow controllers to monitor drive position as the controller output directly positions the drive. Analog control modulating models provide electronic signal receiver circuitry, which compares the position indication to the control loop demand signal and provides automatic control.

## Dual Feedback Capability

All models incorporating the film potentiometer have dual feedback capability, permitting user choice of 2-wire or 4-wire field connection.

- 2-wire systems for 4–20 mA feedback, as follows.

Either:

300 ohm max. load resistance, which requires less than 35 V dc external power supply.

or:

Up to 800 ohm max. load resistance, which requires greater than 36 V dc external power supply.

- 4-wire systems utilizing 120 V ac power supplied to the drive.

Either:

4–20 mA feedback,

500 ohm max. load resistance.

or:

1–5 V dc feedback,

12,000 ohm min. load resistance.

Connections for feedback selection are made in the field and need not be specified on order.

## Low Power Consumption for Use with Uninterruptible Power Supplies

The uniquely low power draw of Beck Group 31 drives permits the use of various standard uninterruptible power supplies for operation during loss of AC power. Beck Sales Engineers can provide you with specifications on UPS equipment recommended for Beck drives.

## General Electronic Specifications

### *Input Power*

120 V ac single-phase,  
50 or 60 Hz, .5 A, 60 W

### *Operating Conditions*

-40° C. to 65° C.

### *Input Signal Options*

4–20 mA  
1–5 V dc

### *Input Signal Span Adj.*

50 to 125% of 4 V span

### *Input Signal Zero Adj.*

Up to 120% of Span

### *Deadband*

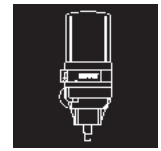
1.0% of Span

### *Sensitivity*

.2% of Span

### *Feedback Signal Options*

4–20 mA  
1–5 V dc



## **Control Features of Group 31 Drives**

### **Hold Position upon Loss of AC Power Supply**

Beck drives stay in place in the event of loss of AC power to maintain process consistency.

- Provides holding capacity greater than 150% of rated drive torque.
- When power is restored, the drive will automatically respond to the control signal and move to the position specified.

### **Pre-Determined Position upon Loss of Signal (LOS)**

The LOS feature available on Analog Modulating models provides the capability to move the valve to a predetermined position upon loss of input signal, with AC power supplied.

The control module also includes an LED display to indicate LOS events. Operational functions of the LOS feature may be specified for either of the following options:

- STALOS = Stay in place, lock in last position
- INTLOS = Move to predetermined intermediate position

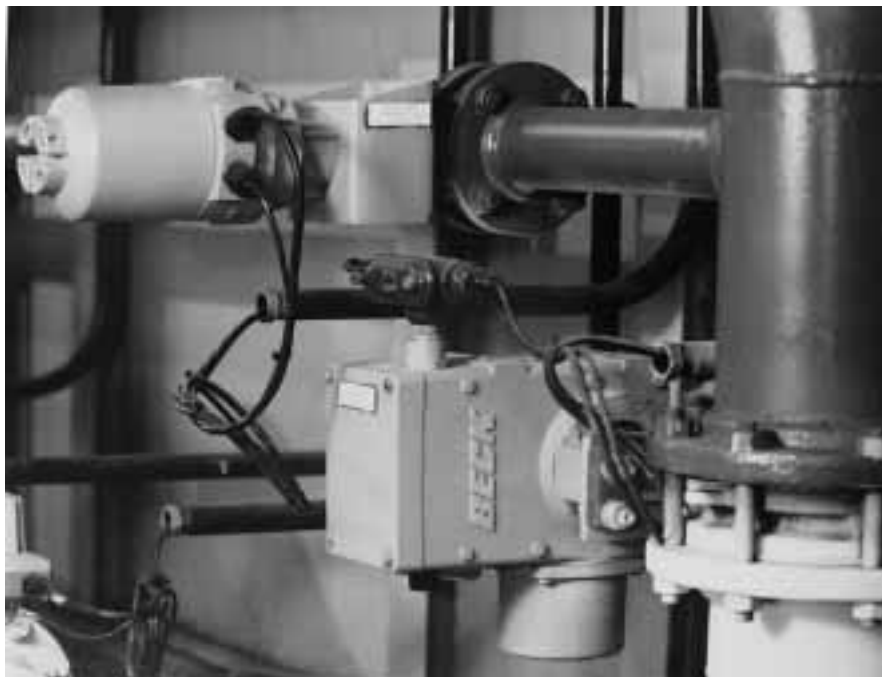
The LOS position is determined by a potentiometer which is set at the factory and can be reset in the field.

### **Split Signal for Operation of Two Drives**

On analog modulating models, the electronic module can be factory set to produce full drive travel using 50% of the control signal, permitting two drives to respond independently from the same signal source. This eliminates the need for multiple control devices or relays.

### **Stall Sensing and Protection**

The stall sensing and protection feature is standard on analog modulating models and is not available on other models. This feature provides contacts which permit remote indication of a stall condition. A stall condition exists if the drive is unable to achieve the desired position within 70 seconds. When a stall is detected, the signal contacts open and the motor power is interrupted. The stall signal contacts also open on loss of AC power, alerting the control room of drive unavailability.



## Control Options

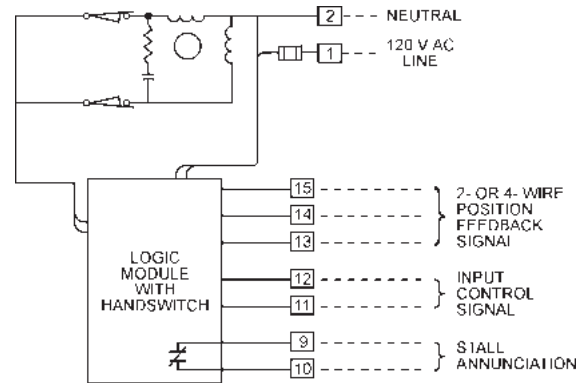
### Modulating Options 31-M30 and 31-M50 Analog Position Control with Loop Powered or Drive Powered Position Feedback Signal

Provides automatic modulation in systems using standard 4–20 mA input signal and feedback. The local electric Handswitch is standard. The LOS feature is also included along with contacts for stall sensing and annunciation.

Two auxiliary switches are provided as standard.

Terminals are provided for a field connection choice of 2-wire or 4-wire position feedback (see page 68).

Note: Dashed lines indicate customer wiring. Circuit diagrams are functional; request certified wiring diagrams for the drive you select.

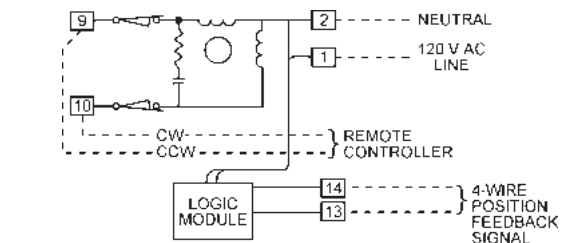
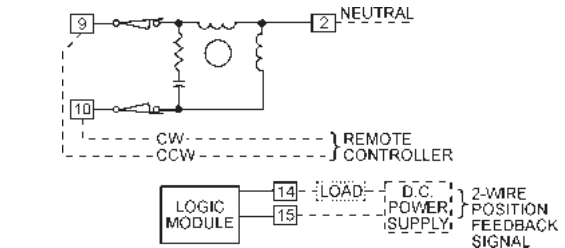


### Modulating Options 31-330 and 31-350 Direct AC Control with Loop Powered or Drive Powered Position Feedback Signal

Energized from a remote controller or manual switches, this option includes integral 4–20 mA signal output for position indication.

The top wiring diagram indicates configuration for 2-wire feedback systems. The bottom wiring diagram indicates configuration for 4-wire feedback systems (see page 68).

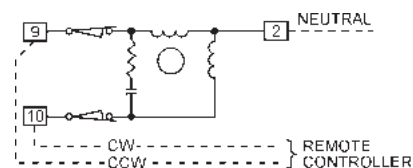
Two auxiliary switches are provided as standard.



### Open/Close Options 31-230 and 31-250 Direct AC Control

For simple open/close operation, two end-of-travel switches and two auxiliary switches for remote indication are included.

Two auxiliary switches are provided as standard.



### Auxiliary Switch Terminals

Two auxiliary switches are included in every control option in addition to the end-of-travel switches. All switches are form C, and are rated 1 A at 120 V ac.

The wiring diagram at right shows the typical configuration for auxiliary switch connections.



# SPECIFICATIONS

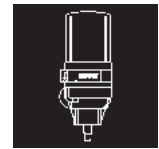


Figure 7-2: Group 31 Outline Dimension Drawing

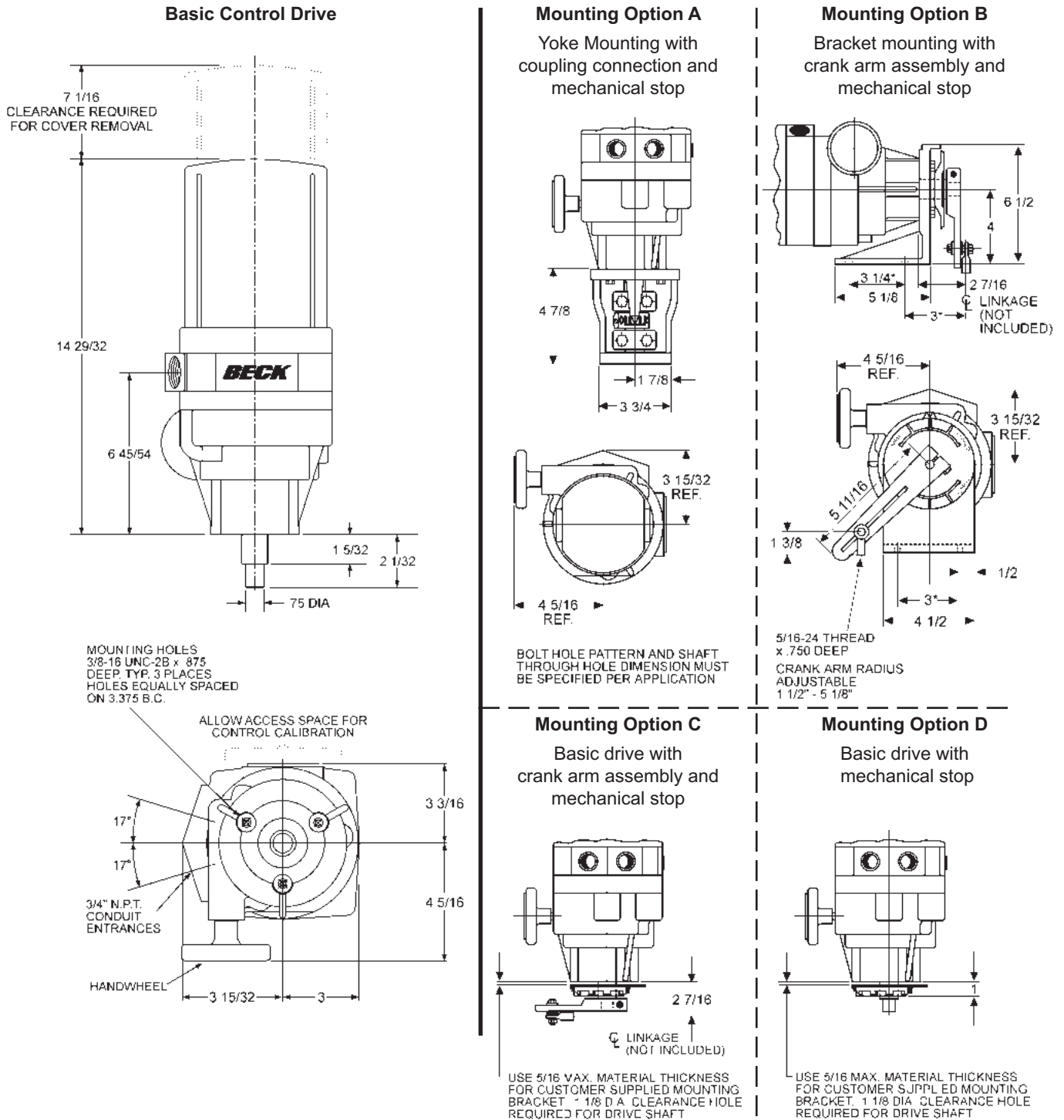


TABLE 7-1: Mechanical Specifications

Beck Drive Model	Approx. Weight (lb)	Max. Overhung Load (lb)
Group 31	36	500

Drives may be mounted in any orientation.

All dimensions are in inches; metric dimensions available upon request.

All dimensions are subject to change. Request certified dimensional drawings for the drives you select.

**TABLE 7-2: Torque, Timing, Motor Current<sup>1</sup>**

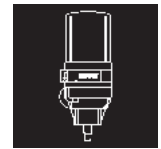
Model Number	Control Mode	Torque (lb-ft)	Timing (sec./90°) @ 60 Hz <sup>2</sup>	Handwheel	Electric Handswitch	Feedback	Input Signal
31-M30 31-M50	Analog Modulating Control	15 30	18 24	Yes	Yes	4-20 mA or 1-5 V dc	4-20 mA or 1-5 V dc
31-330 31-350	Direct AC Modulating Control	15 30	18 24	Yes	No	4-20 mA or 1-5 V dc	120 V ac
31-230 31-250	Open/Close	15 30	18 24	Yes	No	None	120 V ac

NOTE: All models include two auxiliary switches.  
Maximum drive current is 0.5 amps.

<sup>1</sup> For corresponding dimensional data, see page 71.

<sup>2</sup> 50 Hz timing data do not exceed 120% of 60 Hz data.





## How to Specify

The following instructions are provided to make it easy to specify Beck Group 31 drives. Complete wiring, operation and maintenance manuals are furnished with every drive order to make it easy for you to obtain an efficient, long-lasting installation.

All Beck drives are shipped calibrated to the customer specifications written into the equipment order.

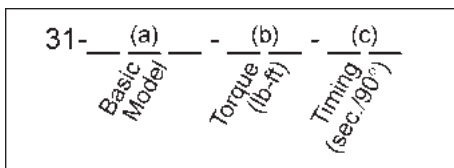
Beck Sales Engineers are available to assist you in sizing drives for your applications.

### 1. Determine Required Parameters:

- (a) Basic model number from Table 7-2:  
31-\_\_ \_\_ \_\_
- (b) Torque (lb-ft) from Table 7-2: \_\_ \_\_
- (c) Timing (sec./90°) from Table 7-2:  
\_\_ \_\_

### 2. Specify Full Model Number:

Using the information above, fill out the full model number according to the following formula:



### 3. Provide the Following Additional Information:

- a. Desired control input signal (Models 31-M30 and 31-M50 only) from Table 7-2.
- b. Desired power supply: 120 V, 60 or 50 Hz.
- c. Direction of control drive output shaft travel (CW or CCW, looking at the output shaft) desired with increasing signal (the resulting rotation for direct-coupled valves will be opposite that of the drive).
- d. Desired mounting option (A, B, C or D from the outline dimension drawing, page 71).

### 4. Provide the Following Information for Valve Applications:

- a. Valve specification including:
  - Manufacturer
  - Size
  - Style
  - Materials
- b. Characteristics of flowing media.
- c. Maximum, normal and minimum inlet pressure.
- d. Maximum, normal, minimum and shutoff pressure drop.
- e. Maximum, normal and minimum flow rate and direction.
- f. Line size and schedule including flange requirements.

### 5. Specify Whether or Not Beck is to Provide Linkage.

### 6. Send Your Order Directly to:

HAROLD BECK & SONS, INC.  
2300 Terry Drive  
Newtown, PA 18940 USA

For applications assistance, contact a Beck Sales or Application Engineer ...

Phone: 215-968-4600

Fax: 215-860-6383

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

## Suggested Specifications

Use the following as a guideline when specifying Beck Group 31 rotary drives.

### Basic Drive Unit

Control drive shall have integrated electronics and be able to operate in ambient temperatures of -40°F. (-40°C.) to 185°F. (85°C.).

Drive to provide output torque of \_\_\_\_ (15 or 30 lb-ft) to move output shaft \_\_\_\_ (CW/CCW) on increasing signal, with timing of \_\_\_\_ seconds.

Drive enclosures shall be made of precision-machined, aluminum alloy castings to provide a rugged, dust-tight and weatherproof enclosure, mountable in any orientation. Enclosure shall be rated for NEMA 4 (NEMA 7 is available). The drive shall have mechanical stops capable of limiting travel of the drive and load, with or without the drive motor; two field-adjustable limit switches shall permit setting end-of-travel limits for the driven load. The unit shall have mechanical shaft position indication.

Gear train shall have precision-cut, heat-treated alloy steel and ductile iron gears only.

Drive energized by 120 V ac 50/60 Hz, single-phase no-burnout, non-coasting motor capable of 60 starts per minute. Design of the motor shall be such that electrical and thermal overloads are not required. The drive motor shall be a TENV with Class H insulation. The stall current shall not exceed rated full load current.

Motor/gear-train combination shall be self-locking and self-releasing without the use of a separate brake winding or mechanical brake. The drive shall be capable of maintaining position when the motor is de-energized, with a minimum of 150% of rated torque.

Drive shall be furnished with two auxiliary switches in addition to end-of-travel limit switches. All switches shall be form C rated for 1 amp at 120 V ac.

Drive train parts shall be lubricated with premium, heavy-duty lithium-based lubricant. No oil baths shall be used for lubrication. Control drives shall be able to operate in any mounting orientation.

Drive shall be furnished with integral manual Handwheel. Handwheel shall be non-rotating during automatic operation and shall not require the use of a declutch mechanism.

### Drive Control Options

#### *Modulating mA or V dc Analog Control Input:*

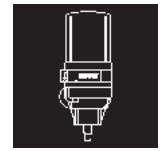
Drive shall provide modulating control through an integral, solid-state electronic signal receiver which positions the drive in proportion to the 4–20 mA range or 1–5 V dc control input signal. The electronic module shall have a deadband of 1.0% of span with sensitivity of 25% of deadband. The signal receiver span shall be nominally adjustable from 50% to 125% of the 4 V span, with the zero adjustable up to 120% of the 4 V span.

Drive shall be furnished with an integral manual electric Handswitch to permit local electrical operation for control adjustment or emergency operation on loss of control signal.

Drive shall be equipped with a stall protection function which turns off power to the motor and is activated when the drive is unable to achieve the desired position within approx. 70 seconds. Stall protection shall be activated by either a jammed condition or loss of AC power. Relay contacts will open for optional remote stall annunciation.

#### *Position Feedback Module:*

Modulating drives shall be equipped with an electronic position sensing module for remote position indication, providing a 4–20 mA or 1–5 V dc feedback signal. The feedback module shall have infinite resolution, with a linearity error of less than  $\pm 1\%$  span over full drive travel.

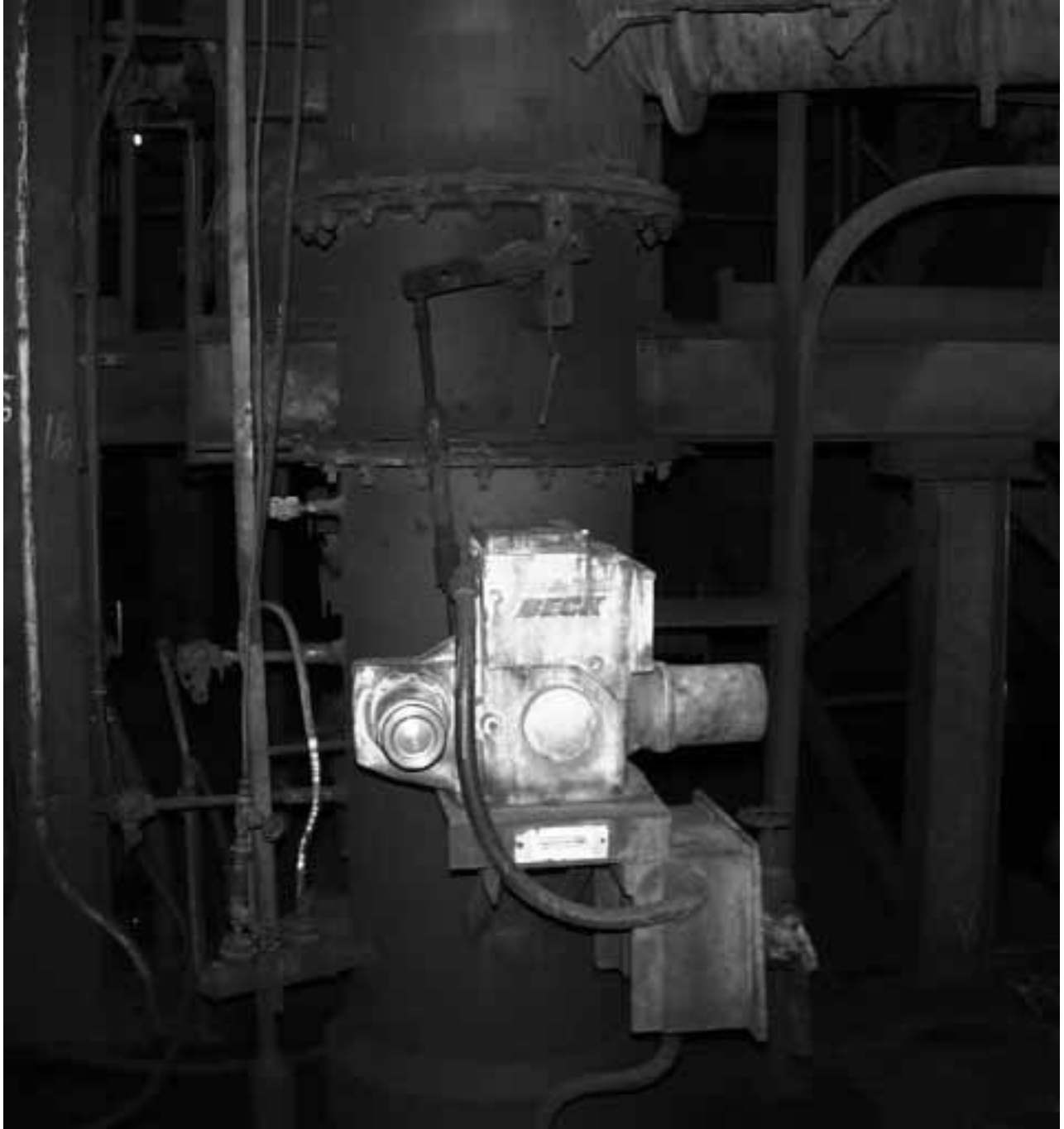


***Modulating Direct AC Control:***

Drive shall be operated by direct AC control power either from an automatic controller or by manually operated switches with continuous positioning capability over a range of operational limits for forward and reverse operation. Drive shall be capable of starting and stopping instantaneously for high resolution positioning. Drive shall include an electronic position sensing module for remote position indication generating a standard 4–20 mA or 1–5 V dc output signal.

***Open/Close Direct AC Control:***

Drive to provide open/close operation to preset travel limits upon closure of an automatic controller or by a manually operated switch, and have a 0.3% position repeatability, with end-of-travel limits adjustable over the full range of travel of the drive.





# APPENDIX

*Complete applications assistance and thorough factory support ensure precise, reliable control.*

## APPLICATION SERVICES

### Factory-Mounted Valve/Drive Assemblies

By having Beck provide valves and drives together as factory-mounted assemblies, you can obtain a unitized package ready for installation in your pipeline. Beck can supply valves to your specifications, or you can purchase the valves and have the manufacturer ship them to our factory. Beck will mount the drive to the valve and provide proper control signal settings, limit switch settings, and linkage for a complete, integral assembly.

- Mounting plates and yokes are designed for easy access to serviceable components of the valve, such as packing glands, without the need for time-consuming disassembly.
- Linkage is computer-designed to provide maximum torque where needed, often reducing the drive size and resultant cost. See the section on Link-Assist™, on page 78.

### Field Mounted Assemblies to Revitalize Equipment On-Line

Upgrading your process control system with Beck drives can result in significant improvements in product throughput because of tighter control, improved availability and consistent positioning accuracy.

Beck Sales Engineers can provide you with all the information, parts and services needed for a smooth retrofit on existing equipment. Beck can furnish standard or custom linkage kits and mounting hardware for dampers, valves and fluid drives. Step-by-step instructions shipped with each order ensure trouble-free installation.



*Old pneumatic actuator*



*Beck replacement drive*

## Link-Assist™ Uses the Drive's Full 100° Travel for Optimum Torque Distribution

Beck Group 11 drives may be specified to travel 100 degrees—regardless of full travel of the driven equipment—for enhanced control of damper or valve position. This feature also allows full flexibility in arranging the drive's torque to be distributed for the best mechanical advantage relative to the driven load. Full 100° drive travel also provides the highest position resolution attainable using the full travel of the CPS-2 feedback device.

The Link-Assist™ computer program optimizes the configuration for the load's torque characteristics with the minimum drive size to give you the best performance at the lowest possible cost. Link-Assist™ is available for the proper selection of the rotary drive torque rating and linkage system for your valves and dampers.

To take advantage of Beck's Link-Assist™ program, provide the following information to your Beck Sales or Application Engineer:

- Load torque characteristics, including maximum torque and load arm angular position
- Load lever radius (and range, if adjustable)
- Load lever shaft rotation range
- Approximate load shaft to drive shaft center distance
- Any space limitations, mechanical interferences or mounting conditions.



You will receive the following data for your review:

- Load shaft torque profile
- Linkage length
- Load and drive crank arm radii
- Load and drive crank arm angular rotation range
- Link force
- Recommended Beck drive and linkage kit
- Data sheets to help collect and record the data are available by calling the factory or visiting our website: [haroldbeck.com](http://haroldbeck.com)



## Constant Torque vs. Variable Torque Linkage

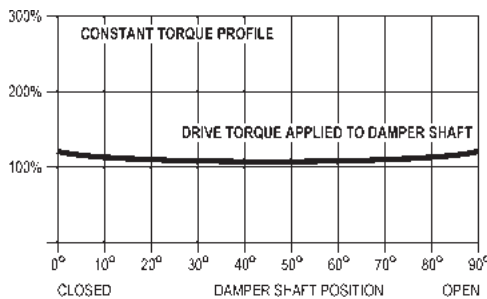
The following sections describe two examples for which the torque profiles are distinctly different. The first case explains how data is generated for constant torque over the full travel range; and the second case explains how data is formulated for variable torque profiles for which a greater degree of torque is required at one end of travel.

### Constant Torque Linkage

Constant torque profiles are typical of applications in which Beck Group 11 drives are used to drive dampers. The linkage system for these applications produces a relatively constant torque over the entire range of damper or valve rotation. The linkage is designed in such a way that the drive crank arm and driven load lever travel approximately the same relative angular range. In this example, when the damper or valve is fully closed, its shaft lever is set at 45° and the drive crank arm is set at 40° from the line of centers.

### Variable Torque Linkage

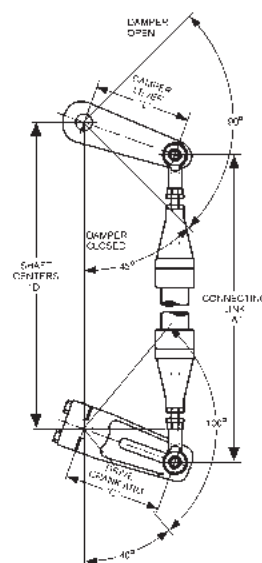
Variable torque profiles are typical of Beck Group 11 drives used for driving soft-seated valves. This application requires precise positioning of the disc in the seat and, at the same time, requires higher torque levels for seating and unseating the disc. The linkage system for these applications permits the drive crank arm to deliver a much higher degree of torque at a slower rate at the valve's closing position, producing as much as three times the drive's rated torque levels for seating and unseating.



BECK DRIVE DATA		BECK CRANK ARM DATA	
Model Number	11-400	Required Rotation	100 degrees
Rated Torque:	1000 lb-ft	Start Position:	40 degrees
		Radius "C":	7.38 inches

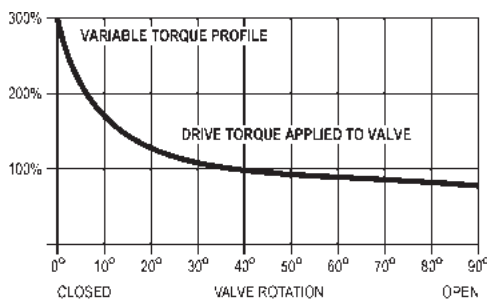
LOAD LEVER ARM DATA		LINKAGE DATA	
Required Rotation:	90 degrees	Connecting Link Length "A":	60.00 inches
Start Position:	45 degrees	Distance Between Shafts "D":	60.00 inches
Radius "L":	8.00 inches		

DRIVE CRANK ARM ROTATION degrees	LOAD LEVER ARM ROTATION degrees	LOAD LEVER TORQUE lb-ft	LOAD LEVER/CRANK ARM TORQUE RATIO	LNK FORCE lbs
0.0	0.0	1190	1.19	2483
10.0	8.6	1140	1.14	2088
20.0	7.5	1110	1.11	1884
30.0	26.6	1090	1.09	1723
40.0	35.8	1090	1.09	1647
50.0	45.0	1080	1.08	1625
60.0	54.2	1090	1.09	1653
70.0	63.4	1090	1.09	1736
80.0	72.5	1110	1.11	1889
90.0	81.4	1140	1.14	2145
100.0	90.0	1200	1.20	2575



#### System Operating Conditions

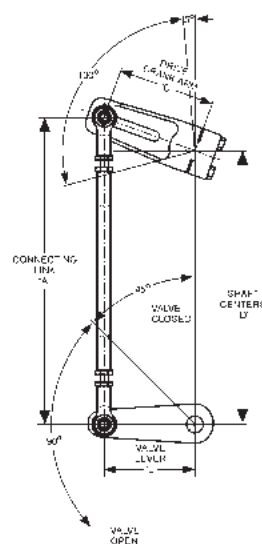
Drive Torque	= 1,000 lb ft
Center Distance "D"	= 60 in
Damper Rotation	= 90°
Damper Start Position	= 45°
Drive Rotation	= 100°
Drive Start Position	= 40°
Damper Lever "L"	= 8 in.



BECK DRIVE DATA		BECK CRANK ARM DATA	
Model Number	11-400	Required Rotation:	100 degrees
Rated Torque:	1000 lb-ft	Start Position:	5 degrees
		Radius "C":	6.59 inches

LOAD LEVER ARM DATA		LINKAGE DATA	
Required Rotation:	90 degrees	Connecting Link Length "A":	20.65 inches
Start Position:	45 degrees	Distance Between Shafts "D":	18.00 inches
Radius "L":	6.00 inches		

DRIVE CRANK ARM ROTATION degrees	LOAD LEVER ARM ROTATION degrees	LOAD LEVER TORQUE lb-ft	LOAD LEVER/CRANK ARM TORQUE RATIO	LNK FORCE lbs
0.0	0.0	2850	2.85	8934
10.0	4.3	1970	1.97	4678
20.0	10.1	1550	1.55	3644
30.0	17.1	1320	1.32	2880
40.0	25.2	1180	1.18	2462
50.0	34.1	1080	1.08	2188
60.0	43.7	1000	1.00	2009
70.0	54.0	940	0.94	1897
80.0	65.0	880	0.88	1838
90.0	76.9	810	0.81	1822
100.0	90.0	720	0.72	1845



#### System Operating Conditions

Drive Torque	= 1,000 lb ft
Center Distance "D"	= 18 in.
Valve Rotation	= 90°
Valve Start Position	= 45°
Drive Rotation	= 100°
Drive Start Position	= 5°
Damper Lever "L"	= 6 in

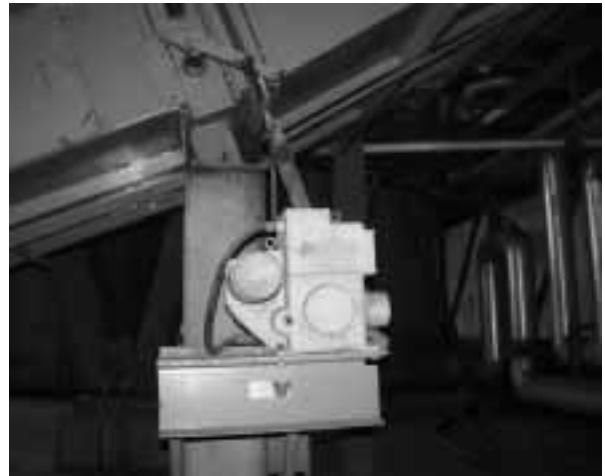
## Linkage Kits

Beck Linkage Kits are available for completing the mechanical connection from the drive crank arm to the load lever arm. Proper linkage connection is an important consideration in achieving a successful, long-lasting installation. By eliminating slop in the linkage, control is improved. Beck Sales Engineers can assist you with designing your linkage and specifying the appropriate linkage kit.

Beck Linkage Kits are designed to simplify installation of your Beck drive on any application. All Kits are provided with internal left-hand and right-hand threads to permit adjustment of linkage length of  $\pm 1 \frac{1}{2}$ " without removal from the crank arm or load lever arm.

Rod ends with bearings are used to provide long term reliability, virtually eliminate binding and wear, and provide tight control of the driven load. These rod ends allow for some lateral misalignment between the drive shaft and driven load which simplifies installation.

Linkage design considerations and specification data for Beck linkage kits are given on the following three pages.





## Linkage Design Considerations

### Linkage Kit Types

Two types of kits are available. Hex linkage kits are used when well-defined short lengths are required, and Pipe linkage kits are used for heavier loads at lengths from 22" to 120".

### Rod end alignment:

Linkage alignment must be within the maximum angle of misalignment, theta ( $\theta$ ), as shown in Table A-2.

### Torque required:

The drive torque must be greater than the total torque required by the driven load and the linkage weight. For smaller drives, the linkage weight may be a significant factor relative to drive torque. Refer to Tables A-1 or A-3 for Linkage Kit weight. Also, for Pipe Linkage Kits, add the Schedule 40 pipe weight as shown below:

#### Schedule 40 Steel Pipe

Pipe Size Inches Nominal	1	1 1/2	2	2 1/2
Weight Lbs. per ft.	1.68	2.72	3.65	5.79
Pipe O.D.	1.315	1.900	2.375	2.875

### Thrust and operating angle:

The angle between the linkage and crank arm or lever arm must not be less than 5° at the end of travel position to avoid developing excessive linkage forces.

Make sure the maximum compression or tension force in the connecting link does not exceed the maximum allowable link thrust shown below:

#### Maximum Thrust

Beck Drive Model No.	11-150	11-200	11-300	11-400
Max. Allowance Link Thrust Lbs.	750	3000	4500	9000



### Avoid "Z" Linkage arrangements:

Linkage arrangements in which the drive crank arm and load lever arm rotate in different directions are not recommended.

### Utilize Beck's Link-Assist™:

Your Beck Sales Engineer can work with you to design a proper installation and linkage assembly. Refer to page 78 for complete details about Link-Assist™.

## Hex Linkage Kits

When well-defined, short lengths are required, Hex Linkage Kits can be used. Table A-1 provides information for specifying Hex Linkage Kits.

Hex Linkage Kits include:

- Load lever rod end (the drive rod end is supplied with the Beck drive)
- Hex Linkage
- Threaded Stud (2)
- Jam Nuts (4)

The customer must supply the bolt for the load lever rod end. Use a bolt that results in the minimum clearance in the rod end. See dimension "D" in Table A-2.



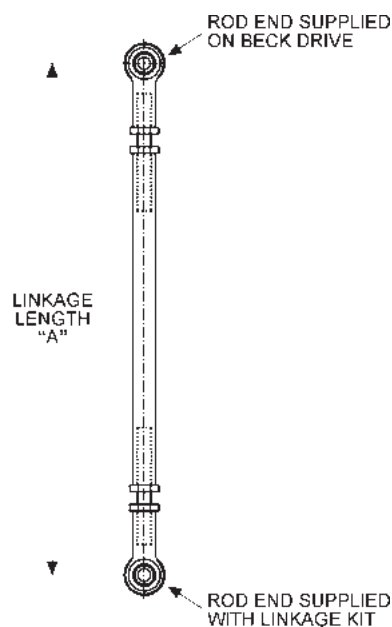
**TABLE A-1: Hex Linkage Kit Specifications**

Beck Drive Model No.	Hex Size	Linkage Length Range "A"		Linkage Kit Part Number	Approx. Weight (Lbs.)
		Min.	Max.		
31-XXX	7/16	9	12	14-7990-22	1/2
		12	15	14-7990-24	1/2
		15	18	14-7990-26	3/4
		18	21	14-7990-10	1
11-150	5/8	9.5	11.5	14-8300-22	1
		10.5	14.5	14-8300-32	1
		14.5	18.5	14-8300-04	1
		18	22	14-8300-06	2
		22	26	14-8300-16	2
11-200	5/8	9.5	11.5	14-8300-22	1
		10.5	14.5	14-8300-32	1
		14.5	18.5	14-8300-04	1
		18	22	14-8300-06	2
		22	26	14-8300-16	2
11-300	1	13.5	18	14-8860-24	2
		17.5	22	14-8860-08	3
		22	26.5	14-8860-02	4
		26.5	31	14-8860-04	5
		11-400	1	13.5	17.5
18	22	15-0110-20		4	
22	26	15-0110-03		5	
26	30	15-0110-22		6	
29	33	15-0110-02		7	

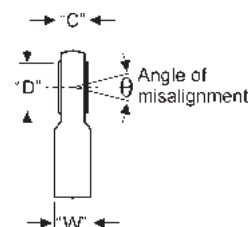
**TABLE A-2: Linkage Rod End Data**

Drive Model	31-XXX	11-150	11-200	11-300	11-400
Thread Size	5/16-24	1/2-20	1/2-20	5/8-18	3/4-16
Dim. "C"	.437"	.625"	.625"	.750"	.875"
Dim. "D"	.3125"	.500"	.500"	.625"	.750"
Dim. "W"	.437"	.750"	.750"	.875"	1.000"
Angle (θ)	14°	12°	12°	16°	14°

## Hex Linkage Assembly



## Rod End Detail





## Pipe Linkage Kits

Pipe Linkage Kits are necessary for heavier loads at lengths from 22" to 120" and are designed in consideration of compression forces at maximum rated drive torque outputs.

*Pipe Linkage Kits include:*

- Load lever rod end (the drive rod end is supplied with the Beck drive)
- Coupling (2)
- Threaded Stud (2)
- Jam Nuts (4)

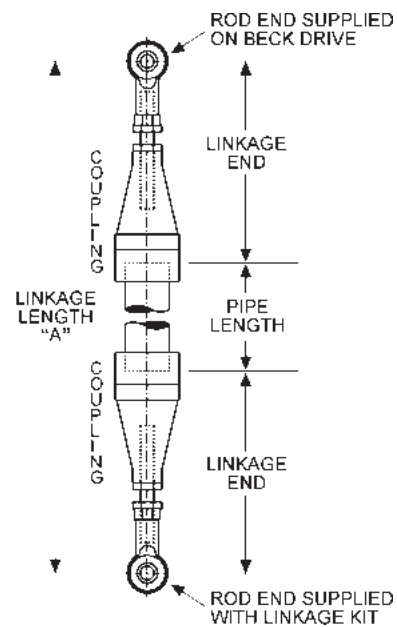
**The customer must supply the bolt for the load lever rod end.** Use a bolt that results in the minimum clearance in the rod end. See dimension "D" in Table A-2.

**The customer must also supply the length of pipe (using Schedule 40 pipe),** which can be cut and threaded in the field. Standard NPT right-hand threads must be used on both ends of the pipe length. This arrangement allows the required kit to be ordered even if the exact linkage length is not known until the drive and equipment are in place.

## Ordering and Assembly

- Obtain the approximate overall linkage length "A".
- Identify the kit part number and required pipe size from Table A-3. For lengths beyond those listed, contact your Beck Sales Engineer.
- Determine the pipe length required by subtracting "Length of 2 Linkage Ends" (see Table A-3) from linkage length "A".
- The pipe length is to be cut and threaded in the field. The final linkage assembly permits  $\pm 1 \frac{1}{2}$ " adjustment in the field.

### Pipe Linkage Assembly



Beck Drive Model No.	Linkage Length Range "A"		Beck Pipe Linkage Kit Part Number	Pipe Size & NPT Thread	Min. Pipe Nipple Length	Approx. Weight (Lbs.)*	Length of 2 Linkage Ends (tot. adj. +/- 1 1/2")
	Min.	Max.					
11-150	22	84	20-1730-05	1	1 1/2	5	20 1/2
	31	120	20-1740-06	1 1/2	1 3/4	9	29 1/4
11-200	22	45	20-1730-05	1	1 1/2	5	20 1/2
	31	84	20-1740-06	1 1/2	1 3/4	9	29 1/4
	33 1/4	120	20-1750-05	2	2	13	31 1/4
	37	120	20-1760-05	2 1/2	2 1/2	22	34 1/2
11-300	22 1/2	36	20-1730-06	1	1 1/2	5	21
	31 1/2	72	20-1740-07	1 1/2	1 3/4	9	29 3/4
	33 3/4	96	20-1750-06	2	2	13	31 3/4
	37 1/2	120	20-1760-06	2 1/2	2 1/2	22	35
11-400	23 1/4	34	20-1730-07	1	1 1/2	5	21 3/4
	32 1/4	48	20-1740-08	1 1/2	1 3/4	9	30 1/2
	34 1/2	72	20-1750-07	2	2	13	32 1/2
	38 1/4	120	20-1760-07	2 1/2	2 1/2	22	35 3/4

\*Does not include customer supplied pipe.

# APPLICATION ASSISTANCE

## Product Demonstrations

Beck Factory Sales Engineers have access to drive models for demonstration of virtually any drive features at your location. In order to arrange to see a Beck drive in your plant or office, contact Beck's Sales Department.

## Site Surveys

Beck Factory Sales Engineers are available to discuss your process control requirements. A visit to your location is often the best way to gain a thorough understanding of your needs in order to meet them most accurately and completely. Beck's analysis at the job site can help ensure that specifications are accurate—especially in the case of complex applications.

## Application Reviews

By sharing your needs with a Beck Factory Sales Engineer, you can take advantage of the best application advice for the type of control you need. This review will yield a better understanding of the versatility of Beck drives for your installations, as well as complete details on options and accessories to make the process as effective as possible.

## Installation Assistance

Our experience shows proper installation to be among the most important factors in achieving long-term, maintenance free service from your Beck drive. To ensure a trouble-free installation, we will work directly with you at each step—from drive selection to final installation. We can assist you with each of the following:

- Drive Selection. To specify the proper torque/thrust and timing.
- Mounting Base Design. Design a long-lasting installation that protects the drive and driven equipment, and provides proper access clearances.
- Linkage Design. Provide you with detailed linkage dimensions and linkage selection.

## Specification Writing

Beck provides specification writing assistance in order to help you specify and order the right drives for your applications. Beck Factory Sales Engineers will work with you to make it easier for you to obtain the proper equipment and give you confidence that no details are overlooked.





### **Valve Specification Assistance**

If you are planning to order valves, Beck Application Engineers will assist you in specifying the right valve for the application. Beck will factory-mount our control drive to the valve and ship it to you fully calibrated and ready for simple drop-in installation.

### **Spares Planning Service**

Beck Spares Planning Service is offered to assist you in stocking key spare parts. We will recommend the minimum number of parts that you should have in stock for the Beck drives you have in service—providing for fast and efficient replacement on critical units.

### **Troubleshooting Assistance**

Because Beck drives are constructed with no-burnout motors, sealed electronics and powerful gear trains, they require no periodic maintenance. In the event that a problem does occur, you can refer to detailed instruction manuals, complete with troubleshooting guide, to determine the corrective procedure. This, combined with free on-call phone assistance, will resolve almost any problem and will get you back on-line quickly.

### **Training Services**

Beck's technical personnel can provide training services at your plant location for those people involved in the operation and maintenance of control systems using Beck drives. This service includes thorough training in wiring options and general maintenance, an explanation of the flexibility and interchangeability of Beck drive components, and instruction in field modification and repair. At the close of the training session, each person involved should have the benefit of a thorough understanding of the drive's operation.





*Model 11-200 installed on a water control valve*



*Model 11-300 installed on a mixing air bottom damper*



*Model 11-400 installed on a furnace hopper diverter gate*



*Model 11-160 installed on a cylinder machine basis weight valve*



*Model 31-M50 installed on a machine chest dilution control valve*



*Model 14-100 installed on a deaerator tank make-up valve*

