

SECO DC DRIVES

August 2004

www.DanaherMotion.com



Seco
AC/DC Drives

Mechanical and Electro-Mechanical Product Solutions by Danaher Motion

New Name, Established Brands

Danaher Motion's wide range of motion control systems and components offer customers an unprecedented choice in selecting the right solution to match their particular application requirements. Our product innovations have been improving the efficiency and productivity of complex manufacturing operations for over 60 years through trusted brand names such as Dover, Kollmorgen, Pacific Scientific, Portescap and Thomson in industries as diverse as semiconductor, aerospace and defense, mobile-off-highway, packaging, medical and robotics.

In addition, Danaher Motion, through Motion Engineering (MEI), offers powerful integrated motion control solutions with its industry-leading, multi-axis motion platforms and SynqNet™ communications network for ultra-reliable machine performance. From software and controller, through the communications network to drives and I/O devices, to mechanical and electro-mechanical products, Danaher Motion differentiates itself in the marketplace by designing standard and custom solutions to satisfy the most demanding application requirements.

Our growing family of leading motion control products and application expertise tells only half the story. With a worldwide service and support infrastructure, our field service engineers and support teams are available to assist whenever they are needed. It is part of Danaher Corporation's unrelenting focus on its customer. That's why more and more design engineers are turning to Danaher Motion to meet their motion control requirements.

Danaher Motion Values

- Application Expertise
- Broad & Innovative Motion Control Products and Systems
- Customer Focus
- Customizable Products and Services
- Motion Control Pioneers with Global Staying Power
- Operational Excellence



KOLLMORGEN



Portescap™

THOMSON™

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BRONCO II and Washdown Series

Designed for tough rugged applications, Bronco II DC drive is designed to control shunt wound or permanent magnet DC motors. It may be used in applications requiring single phase input of 1/4 - 1HP 115 VAC or 1/2 - 2HP 230 VAC. The controller is available in a NEMA 4/12 enclosure, NEMA 4x or as an open chassis unit designed for panel mounting.

Features

- Speed regulation ± 0.5 - 1%
- Dual voltage input
- Circuit protection
- Torque control
- Field programmable jumpers



S2000 SERIES

The SE2000 non-regenerative DC drive is designed to control shunt wound or permanent magnet field DC motors from 1/4 to 5HP. It is an excellent choice for winders, conveyors, printing presses, stretch wrap machines and other applications requiring a flexible DC drive with isolated logic.

Features

- Isolated 4-20mA or 0-10 VDC control signal
- Tachometer generator feedback
- Torque slope control
- Diagnostic capabilities
- Control relay



Q7000 SERIES

The Q7000 is designed for full wave, regenerative applications with permanent magnet or wound field DC motors. The Q7000 is ideal for maintaining motor speed when an overhauling load attempts to increase the motor's speed. It provides continuous braking torque with no power dissipation assuring repeatable, controllable braking to rest.

Features

- Fullwave 4-quadrant operation
- 7 selectable performance features
- Electronic reversing
- 7 control adjustments
- Positioning accuracy

DC Motor Selection Charts 42

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	Bronco B160	SE2000	Q7000
HP-115 V	.25 - 1	.25 - 1	.25 - 1
HP-230 V	.5 - 2	.5 - 5	.5 - 5
Type	Non-regenerative	Non-regenerative	Regenerative
Enclosure	NEMA 4/12, 4X	NEMA 4/12	NEMA 4/12
Reversing	Yes	Yes	Yes
Isolated logic	No	Yes	No
Torque mode	Yes	Yes	Yes
Dynamic braking	No	Yes	N/A - Regenerative drive
Contactors	No	Yes	No
Protection	Fuses	Circuit breaker	Fuses
Overload	150% for 60 sec	150% for 60 seconds	150% for 60 seconds
Speed regulation	± 2%	± 2%	± 1%
Tachometer feedback	Yes	Yes	Yes
Pulse feedback	No	Yes	Option
Listings	UL, cUL	UL, cUL	UL, cUL (except Q7006)
Options			
Process follower	Yes	Yes	Yes
Fault module	No	Yes	Yes
Digital follower	No	Yes	No
Controlled deceleration	No	Yes	Yes
Torque slope	No	Yes	No
PID control	No	No	Yes
Limit switch traverse	No	No	Yes
Typical Applications			
Material Handling	✓	✓	✓
Machine Tools			✓
Web Processing		✓	✓
Take-up			✓
Mixers	✓	✓	
Winders		✓	✓
Conveyors	✓	✓	✓
Printing Presses		✓	✓
Stretch Wrap Machines			✓
Food Processing	✓		
Chemical Processing	✓	✓	
Waste Water Treatment	✓	✓	

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M5000 Digital 3-Phase DC Drives - 5-2000 HP

The M5000 Series Digital 3-Phase DC Drive is a programmable, microprocessor based variable speed DC drive. It allows keypad control of each parameter. Digital readout provides on-line monitoring of drive operation. Ideal for many drive applications including wire and cable, packaging/converting, machinery and material handling. Improved circuit board technology has added standard features, including serial communications and a field-weakening controller for constant power and extended speed range applications.



AC Adjustable Speed Drives, SV Flux Vector Drive Series

The AC drive that performs like a DC drive at no additional cost. The SV3000 Series flux vector drives can achieve the same performance as DC drives but are equally at home in machines usually driven by conventional AC drives. By using a motor-mounted encoder and encoder interface card, the SV3000 performance surpasses that of most DC drives and approaches that of Servo.

Its versatility makes it ideal for many drive applications including pulp and paper, wire and cable, packaging/converting machinery, material handling, metal forming, plastics, textiles, food processing equipment, spindles, cut-offs, winders, and unwinders.



Engined Motion Product (EMP)

The EMP (Engined Motion Product) is a pre-packaged solution for linear/positioning applications. Features include:

- Stepper or Servo Motion Controller
- Rugged NEMA 12 Enclosure
- Easy to install and commission
- User-friendly Operator Interface



All-Digital Fusion FX 4000 AC Servo Drive/System

The FX 4000 all-digital drive combines the four most useful motor control technologies into one package: high performance AC flux vector drive, high HP servo drive, programmable motion controller and programmable logic controller (PLC). Available in either enclosed NEMA 4 /12, NEMA 1 or open chassis, the FX 4000 is ideal for controlling AC induction, AC synchronous and brushless DC motors from one to 350 HP. The FX 4000 is extremely application flexible with easy to set-up and monitoring.



Bronco II Standard Features



Listed



Listed for use in Canada

Speed Regulation

Regulation by armature voltage feedback or tachometer generator feedback (non-reversing models only).

Dual Voltage Input

(115/230 VAC)

Each model can be connected to either of two line voltages 1/4, 1/2, 3/4 and 1HP motors @115VAC input or 1, 1-1/2 and 2 HP motors @ 230VAC.

Circuit Protection

Transient voltage protection by Metal Oxide Varistor (MOV).

Torque Control

Controls motor armature current for applications requiring torque or tension control.

Local or Remote Operator Control

Flexible, compact...fits where you want it.

Open Chassis Unit Availability

For convenient mounting of one or several drives in an enclosure.

Field Programmable Jumpers

Allow the Bronco II to be quickly modified to match available plant line voltage, select motor HP, and to select the feedback signal required.

AC Line Protection Fuse

Fault protection...eliminates a costly replacement.

Full wave power conversion circuit with 2 (SCR) and 3 diodes providing NEMA Code K, DC armature supply

Insures optimum motor performance, cooler motor operation and longer life.

IR Compensation Adjustment

Improves speed regulation in armature voltage feedback mode.

Control Relay with 3-wire Start/Stop Circuit

Prevents automatic restart after power outage for increased safety. (May be reconnected for line start operation if required.)

Jog at Potentiometer Speed

Set the Bronco II speed potentiometer at a desired speed and jog the motor to allow easy set up of the machine process.

Field Supply for Shunt Wound Motors

Permanent magnet field or shunt wound field motors...Bronco II is the right one.

Enclosure

Choice of totally enclosed, cast aluminum enclosures to meet NEMA 4, NEMA 12 and NEMA 4X standards. Incredibly rugged DC drives for the most critical industrial environment—dust tight, oil tight and water resistant.

Maximum and Minimum Speed Adjustments

Limit speeds available at operator's control.

Adjustable Acceleration (1 to 5 seconds)

Easy-to-set for smooth, linear speed control.

Bronco II Washdown Duty

A new standard in adjustable speed DC Drives

Specifically designed for food processing and other industries where the motor and control are constantly exposed to high pressure washdown to maintain cleanliness.

The Bronco II Washdown Duty DC Drives convert single phase AC line voltages of either 115 or 230 VAC to variable DC for armature voltage speed control of permanent magnet or shunt wound DC motors from 1/4 to 2 HP.

- Rugged
- Reliable
- Versatile
- Accurate
- Economically priced



Listed



Listed for use in Canada

The white enclosure of the washdown Bronco II is FDA approved and meets NEMA 4X.

- Totally enclosed
- Cast aluminum
- Epoxy coated
- Gasketed cover
- Stainless steel captive screws



Proven Danaher Motion Dependability

- Full wave power conversion circuit with 2 SCR's and 3 diodes with NEMA K configuration allows cooler motor operation.
- IR compensation improves speed regulation in armature voltage feedback mode.
- Control relay with 3-wire start/stop circuit prevents automatic restart after power outage for increased safety. (May be reconnected for line start operation if required.)
- Full two year warranty.



For AC motors, the Bronco VFD line is available. Consult factory or visit our website for details.



Bronco II

Select the model that best fits your application needs.

Input Line Voltage	HP	Run/Stop			Run-Jog Fwd-Rev	Torque Control	External Signal		External Signal Isolation Follower Option Kit
		Chassis	Remote Enclosed	Local Operator			Local Operator	Local Operator	
115 VAC Single Phase	1/4 – 1	B161S	B162 B162WD	B160 B160WD	B163 B163WD	B165 B165WD	B169 B169WD	B168 B168WD	BWC36015
230 VAC	1/2 – 2								

⁽¹⁾Note:

WD = Washdown Duty Broncos provide the same features as non-washdown models with the exception of the epoxy finish and stainless exterior hardware.

Models

Model B160 / B160 WD

NEMA 4/12 enclosure with Start/Stop, Run/Jog switches and Speed potentiometer mounted on enclosure front cover.

Model B161S

Chassis for mounting in customer supplied enclosure.

Model B162 / B162 WD

NEMA 4/12 enclosure for use with a remote operator control.

Model B163 / B163 WD

NEMA 4/12 enclosure with Start/Stop, Run/Jog, Forward/Reverse switches and Speed Potentiometer on enclosure front cover.

Model B165 / B165 WD

NEMA 4/12 enclosure with Start/Stop, Forward/Reverse switches and Torque Potentiometer on enclosure front cover.

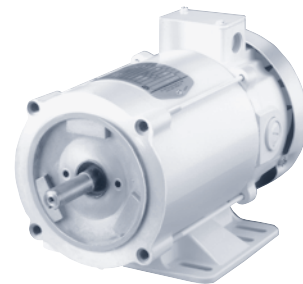
Model B168 / B168 WD

Same features as Model 169 described below, except the front panel mounted Speed Potentiometer trims the speed signal when operated in the automatic mode.

Model B169 / B169 WD

External isolated signal follower in NEMA 4/12 enclosure with Start/Stop and Auto/Manual switches mounted on enclosure front. Controls motor speed from either a grounded or ungrounded signal — 4-20mA, 1-5mA, 0-10 VDC, 0-14 VDC, 0-100 VDC in auto mode, or from the speed potentiometer in manual mode.

WD = Washdown Enclosure



Ratings

Horsepower Range	115 VAC	1/4–1 HP
	230 VAC	1/2–2 HP
AC Line Input Voltage	115 or 230 VAC $\pm 10\%$	
AC Line Frequency	50/60 Hz ± 2 Hz	
115 VAC Supply		
Armature Voltage	0–90 VDC	
Field Voltage	50/100 VDC	
230 VAC Supply		
Armature Voltage	0–180 VDC	
Field Voltage	100/200 VDC	
Service Factor	1.0	
Duty	Continuous	
Maximum Load Capacity	150% for 1 minute	
Line Protection	Fuse	

Operating Conditions

Ambient Temperature	
Chassis Model	0–55°C
Enclosed Models	0–40°C
Relative Humidity	5–95% non-condensing
Altitude	To 3300 feet (1000m)

Performance Characteristics

Speed Range	30:1 with armature voltage feedback 50:1 with tach-generator feedback
Speed Regulation (As % of motor base speed) for 95% load change	
Armature Voltage Feedback	$\pm 2\%$
Tachometer Feedback	1/2–1%

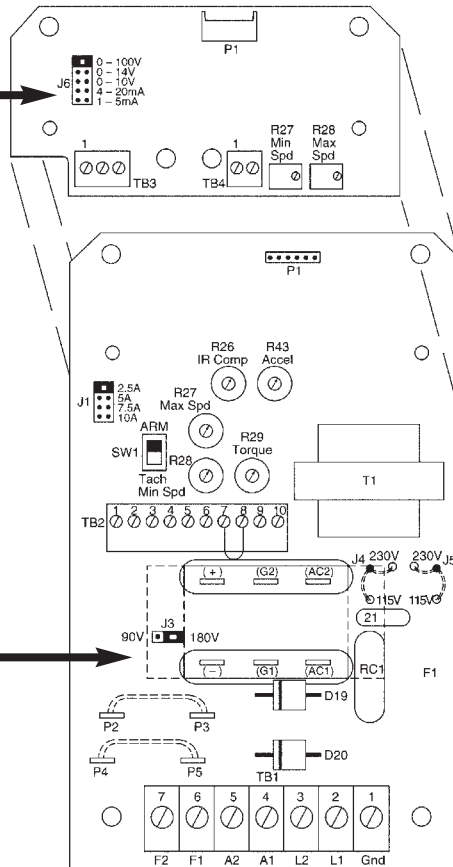
Adjustments

Current Range	2.5, 5, 7.5, 10 Amps DC
Nominal	(Adjustable to 150% of each range)
Maximum Speed	75–110% of motor base speed
Minimum Speed	0–30% of motor base speed
IR Compensation	Adjustable
Acceleration	1–5 seconds (Linear, 0 to top speed)

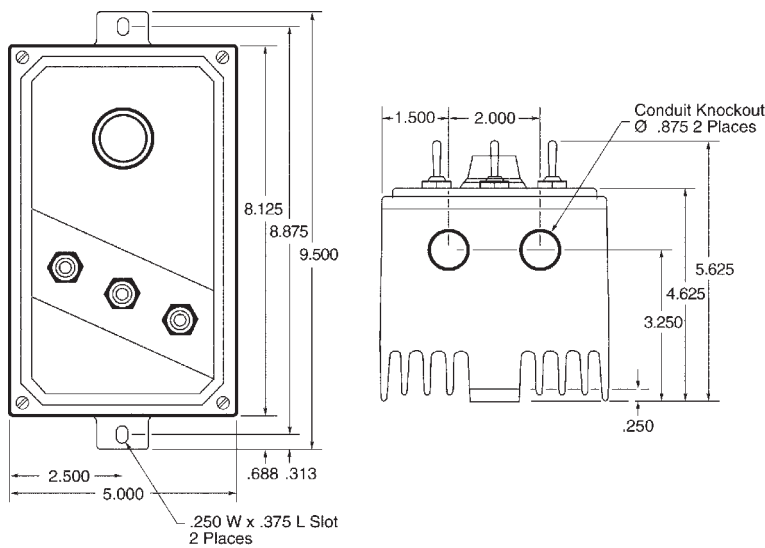
External Signal Isolation Follower Kit (Model BWC 36015) is standard on Models B168 and B169. It can be used for installation on chassis or remote enclosed units. It allows motor speed to be controlled from a grounded or ungrounded external signal: 4-20mA, 1-5mA, 0-10 VDC, 0-14 VDC, or 0-1000 VDC. There is a provision for auto/manual operation if required.

**Model BWC 36015
Process Follower Board**
Standard on Models B168 and B169. Optional for customer installation on models B161S or B162.

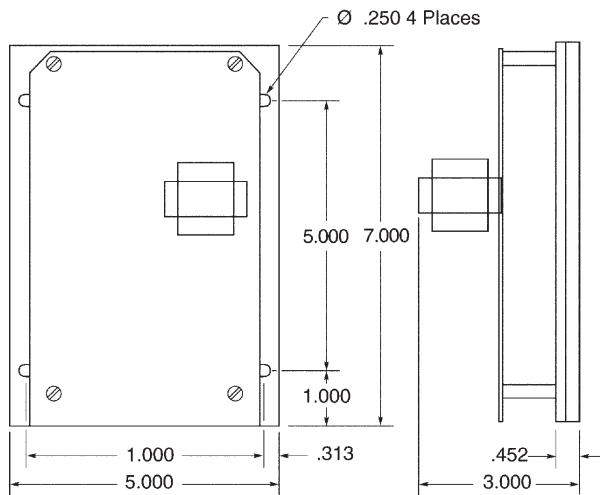
PC Board Assembly
Standard on all Bronco II models



Enclosed Models B160, B162, B163, B165, B168 & B169 and "WD" versions

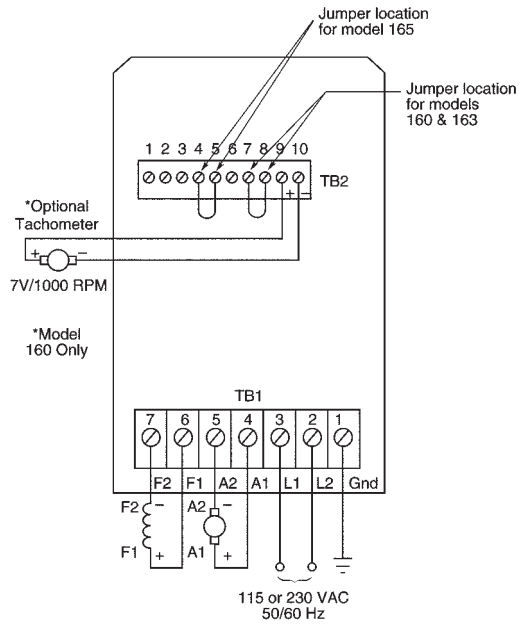


Chassis Model B161S

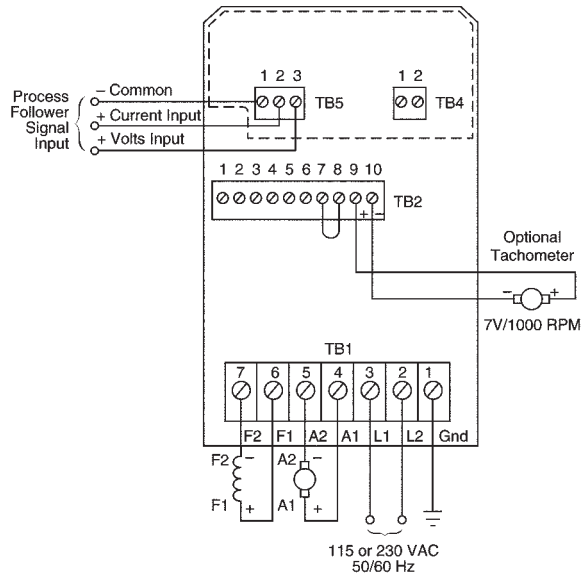


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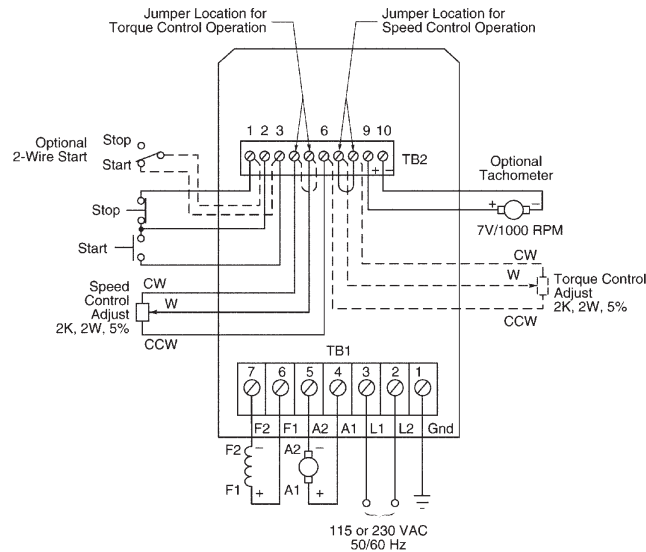
Models B160, B163 & B165



Model B168 & B169



Model B161S & B162



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SE2000 Standard Features



Listed



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Non-regenerative, DC drives are designed to control shunt wound or permanent magnet field DC motors from 1/4 to 5 HP.

Isolation

Accepts isolated 4–20mA or 0–10 VDC control signal. Control circuit is isolated from main circuit potential for improved safety and use in multi-motor systems.

Tachometer Generator Feedback

For improved speed regulation, unit will accept feedback from an analog tach generator or digital pulse tach generator or magnetic pickup. Full wave power conversion circuit with two SCR's and three diodes providing NEMA Code K, DC armature supply insures optimum motor performance, cooler motor operation and longer life.

Circuit Protection

Transient voltage protection by MOV. All models, except Power Unit have AC circuit breaker for line protection.

Chassis Unit

Dead front construction. Hinged cover provides easy access to all components.

Jog

Jog at separately adjustable speed.

Diagnostic Status

- Power on LED
- Trip LED
- Torque Limit LED
- Run LED
- Field Loss LED

Torque and Slope Control

Precise setting of motor torque and slope control to give increasing torque/decreasing speed characteristic above fixed torque limit for simple center winder applications. Control relay with three wire Start/Stop circuit. All models have control relay to prevent automatic restart after power outage for increased safety (may be reconnected for line start operation if required).

Field Supply with Field Loss Circuit.

Overcurrent Protection

Timed overcurrent trip circuit for motor protection.

AC Supply Frequency

- Allows drive to be operated on 50 Hz or 60 Hz supply.
- Enclosed models meet NEMA 4/12 specifications.

Selectable Programming

Jumper selectable to program drives for specific motor or application:

Voltage

Selects 115 or 230 VAC supply
Armature voltage 90 or 180 VDC

Current Scaling

Selects 5 current ranges of motor HP

Acceleration/Deceleration Time

Selects range of adjustment control to 30 seconds

Torque or Speed Control

Selects mode of either motor speed or motor torque controlled by operator's potentiometer

Overcurrent Trip

Timed, instantaneous or disabled

- 1.0 seconds
- 60 seconds
- No trip

Field Loss Protection

For shunt wound motors

Internal/External Pre-Set Jog

Allows jog speed to be set internally or externally

Motor Speed Regulating Feedback

- By armature voltage; $\pm 2\%$ speed regulation
- By 7 VDC/1000RPM analog tachometer;
 $\pm 0.5\%$ speed regulation
- By 50 VDC/1000RPM analog tachometer;
 $\pm 0.5\%$ speed regulation
- By 60 PPR digital tachometer, $\pm 0.5\%$ speed regulation
- By 120 PPR digital tachometer, $\pm 0.5\%$ speed regulation

Adjustments

Customer adjustments match control to application.

Maximum Speed

Limits speed available to operator

Minimum Speed

Minimum motor speed

IR Compensation

Improves motor speed regulation in armature feedback mode

Acceleration

Sets time to reach full speed

Deceleration

Sets time to decelerate to zero speed

Torque

Sets motor torque available (current limit)

Slope

Produces increasing torque as speed decreases

Jog

Sets separate jog speed

Ratings

Horsepower Range	
115 VAC	1/4–1 HP
230 VAC	1/2–5 HP in two models
AC Line Input Voltage	115 or 230 V \pm 10%
AC Line Frequency	50/60 Hz \pm 2 Hz, Single Phase
DC Output Voltage	
115 VAC Supply	
Armature	0–90 VDC
Field	50/100 VDC
230 VAC Supply	
Armature	0–180 VDC
Field	100/200 VDC
Service Factor	1.0
Duty	Continuous
Max. Load Capacity	150% for 1 min.
Line Protection	Circuit Breaker (except Power Unit)
Speed Reference Signal Voltage	0–10 VDC
	4–20mA grounded or ungrounded
Feedback Signal	0–14 VDC from 7V/1000 tach generator
	0–85 VDC from 50V/1000 tach generator
	60 PPR from MTK magnetic pickup
	120 PPR from MTK magnetic pickup
Current Range	
SE2002	2, 3, 4, 6, 10 amps DC nominal
SE2005	5, 7.5, 10, 15, 25 amps DC nominal

Operating Conditions

Ambient Temperature	
Chassis Model	55°C
Enclosed Model	40°C
Relative Humidity	95% non condensing
Altitude	To 3300 ft. (1000m)

Performance Characteristics

Speed Range	30:1 (arm fdbk)
	50:1 (tach fdbk)
Speed Regulation (As % of motor base speed) for 95% load change	
Armature Voltage	\pm 2%
Tachometer Feedback	\pm 0.5% (depending on tach generator)
Acceleration/Deceleration	
Range A	By current limit
Range B	3–30 seconds
Range C	0.3–3 seconds

Adjustments

Current Range (Torque)	15–150%
Maximum Speed	70–105% of motor base speed
Acceleration	0.3 to 30 seconds
Deceleration	0.3 to 30 seconds
Minimum Speed	0–30% of motor base speed
Preset Jog	0–100% of motor base speed
IR Compensation	Improves load regulation in armature feedback mode
Torque Slope	Increasing torque to decreasing speed relationship above a fixed torque limit

SE2005



SE2102



SE2222



SE2342



Models	Input Line Voltage	HP	Model Numbers		
Power Unit Consists of control board SCR power bridge and terminals.	115 VAC 1 Phase 230 VAC	1/4–1 1/2–2	SE2002 (replaces C8500 and C8600)		
	230 VAC 1 Phase	3–5	SE2005 (replaces C8800)		
			Chassis	NEMA 4/12	NEMA 4/12 with Operators
Basic On-Off Power Unit with single pole AC line circuit breaker.	115 VAC 1 Phase 230 VAC	1/4–1 1/2–2	SE2102	SE2122	SE2132
	230 VAC 1 Phase	3–5	SE2105	SE2125	SE2135
Run-Brake Model Models include motor contactor and dynamic braking, with AC line circuit breaker.	115 VAC 1 Phase 230 VAC	1/4–1 1/2–2	SE2202	SE2222	SE2232
	230 VAC 1 Phase	3–5	SE2205	SE2225	SE2235
Reversing-Brake Models include forward and reversing contactors with anti-plugging and dynamic braking, with AC line circuit breaker.	115 VAC 1 Phase 230 VAC	1/4–1 1/2–2	SE2302	SE2322	SE2342
	230 VAC 1 Phase	3–5	SE2305	SE2325	SE2345

Models:**Power Unit**

Consists of control board, SCR power bridge, and terminals. Drop-in replacement for the SECO Challenger series.

Basic On-Off

Power Unit with single pole AC line circuit breaker. Two pole breaker is standard on all 3 - 5 HP models and all enclosed models..

Run-Brake

Models include motor contactor and dynamic braking.

Reversing-Brake

Models include forward and reversing contactors with anti-plugging and dynamic braking.

Notes:

- **Standard Features:** 3 wire start-stop logics, isolated input, 4–20mA/0–10 VDC control input, jumper selectable, internal/external jog, accel/decel range, over current trip, field loss, analog or digital tachometer feedback, adjustable pre-set jog, accel, decel, min speed, max speed, IR comp, torque limit, torque slope, LED indication for field loss, run, power on, overcurrent trip, torque limit.
- **POWER UNIT:** Includes standard features only.
- **BASIC ON-OFF:** Includes standard features, chassis base and AC line circuit breaker.†
- **RUN-BRAKE:** Includes standard features, chassis base, armature contactor, dynamic braking and AC line circuit breaker.†
- **REVERSING-BRAKE:** Includes standard features, chassis base, forward and reverse armature contactors, anti-plug circuitry, dynamic braking and AC line circuit breaker.†
- **NEMA 4/12:** Enclosed units include door mounted AC line circuit breaker and power on indicator.†
- **NEMA 4/12 WITH OPERATOR CONTROL:** Enclosed units include door mounted AC line circuit breaker and power on indicator, start, stop, run/jog, auto/man, switches and speed potentiometer for the basic on-off or run-brake models; a forward start and reverse start function is included on reversing brake models.†

†Two pole breaker is standard on all 3–5 HP models and all enclosed models.

Options	Description	Factory Installed M/N Suffix	Field Installed Kits M/N
2 Pole Circuit Breaker	Enables both input lines to be disconnected. Require by some local Electrical Codes (std. on 3 & 5 HP models and on all enclosed models.	- 1*	SE2999-1*
Enhanced Process Follower	Speed control by external signal, 4-20mA, 10-50mA, 0-14 VDC, 0-100 VDC.	- 2*	SE2999-2*
Digital Signal Follower	Speed control by external digital pulse signal from MTK magnetic pick-up, Hall Effect sensor or encoder.	- 3**	SE2999-3**
Controlled Deceleration Stop	Drive follows deceleration ramp on Stop command. Two stopping modes are available — Ramp or Dynamic Braking if additional Stop button is used	- 4**	SE2999-4**
Fault Module	Shuts down drive and provides output signal if Tach Loss, Field Loss or Overcurrent failures occur.	- 5**	SE2999-5**
External Torque/Slope	Allows the motor torque and slope control to be externally adjusted.	- 6**	SE2999-6**

* This option applies to 2HP chassis models only

** Any two of these options may be applied to any model except power units

Enhanced Process Follower (SE 2999-2)

General Description

The Enhanced Process Follower option module increases the SE 2000 following capacity by adding 0-14VDC, 10-50mA input signal capability as well as gain and zeroing adjustments and the ability to apply direct or inverse signals.

Specifications

Input Signal:
 0-10 VDC DC, 4-20 mA DC input impedance 50 ohm
 0-14 VDC DC, 10-50 mA DC input impedance 20 ohm
 0-100 VDC

Output Signal:
 0-10 VDC

Input Connections

Connect input reference to TB5 with polarity as shown. Minimum voltage or current to TB5-1 and maximum voltage or current to TB5-2.

Jumper/Switch Selection

Select correct switch position of SW2 for the input signal being used. All other switches must be in the OFF position.

Input Signal	SW2 Switch Selection
0-100 VDC	Positions 1 & 2 On
0- 14 VDC	3 & 4 On
0- 10 VDC	5 & 6 ON
0- 50 mA	7, 8 & 9 ON
4- 20 mA	7, 8 & 10 ON

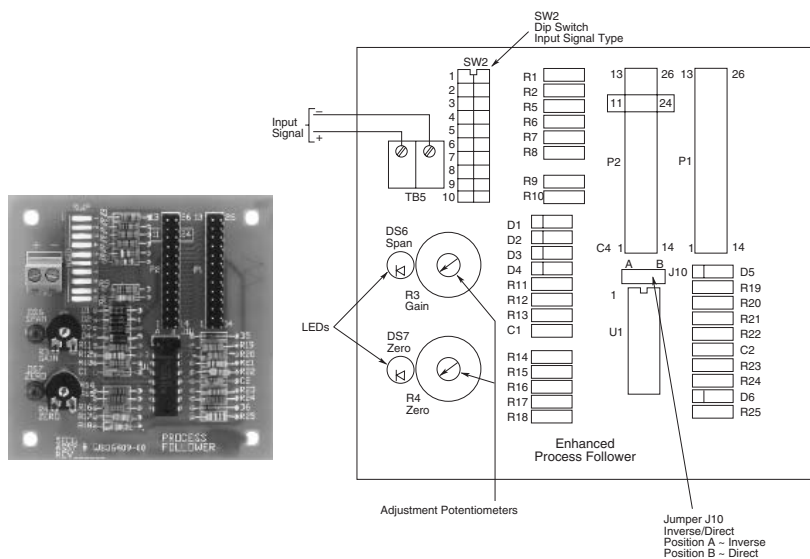
Jumper J10, Inverse/Direct Mode

This feature allows either Direct or Inverse operation. In Direct mode the minimum voltage or current input produces the minimum motor speed. Maximum voltage or current input, will provide maximum motor speed. In Inverse mode, minimum input reference produces maximum output speed and maximum input produces minimum output speed.

Drive Operation

Mode	Jumper Position	Input Signal	Motor RPM
Direct	B	0 VDC	0 RPM
		10 VDC	1750 RPM
Inverse	A	0 VDC	1750 RPM
		10 VDC	0 RPM

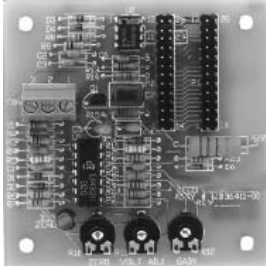
Component Location



Digital Signal Follower (SE 2999-3)

General Description

The Digital Signal Follower option adds the ability to follow a reference signal generated by magnetic pulse tach pick-up, Hall Effect sensor, or an encoder.



Specifications

Input Signal:

Designed primarily for 60 pulse per revolution magnetic pulse tachometers. (Seco's MTK series.) Minimum and maximum frequency range for full voltage output is 1200 Hz to 3600 Hz. Minimum to maximum voltage input range is 0.1V to 100V. In addition to magnetic pulse tachometers, encoders and Hall Effect devices can be used.

Output Signal: 0 to 10 VDC

Input Connections

Magnetic Pulse Tachometer

TB6 Position 2 - Feedback Signal Input

Position 3 - Common

Hall Effect Devices, Encoders

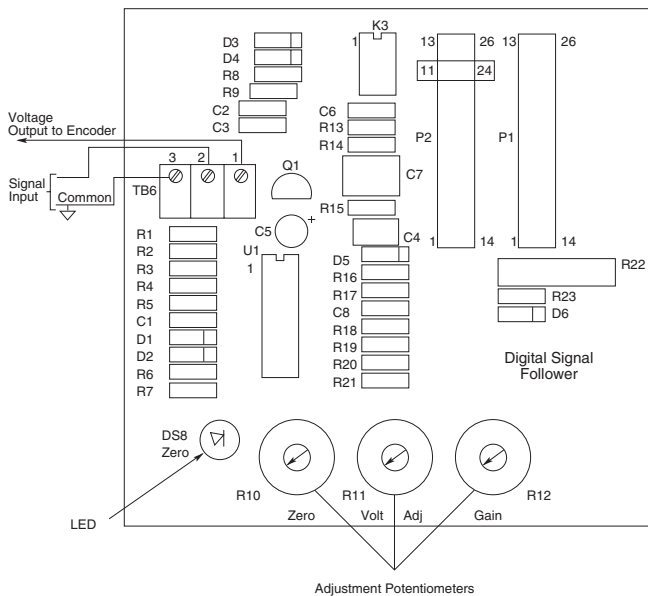
TB6 Position 1 - Voltage Source (+5 - +12V)

@ 20 mA

Position 2 - Feedback Signal Input

Position 3 - Common

Component Location



Controlled Deceleration Stop (SE 2999-4)

General Description

When it is necessary for the motor to follow a deceleration rate on a stop command this option is applied. Additionally, two stopping modes are available—Ramp or Dynamic Braking if an additional stop push button is used.

Specifications

The Controlled Deceleration Stop option expands the selection of stopping modes for the SE2000 by using two stop pushbuttons.

To understand the difference between the standard model and this option, refer to the following information.

Without the Controlled Deceleration Stop option, a linear deceleration rate, as set by the deceleration pot, is achieved only by reducing the reference input to a lower level.

As in all non-regenerative DC motor controllers, the minimum adjustable deceleration time is the coast-to-rest time. The deceleration adjustment allows you to extend the time the motor

takes to reach a slower speed or stop.

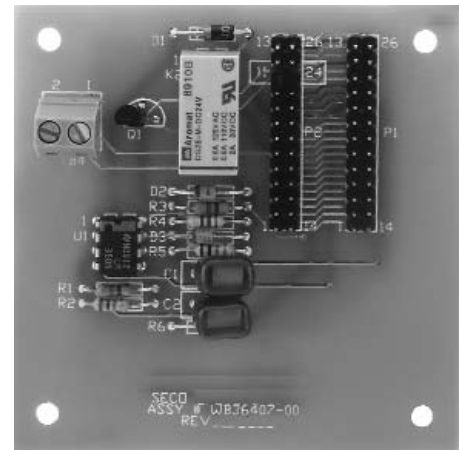
If the Stop Input 1 was initiated during the linear deceleration, as initiated by Stop Input 2, the coast-to-rest or dynamic braking mode would override the deceleration ramp and become the method of stopping the motor.

Connection

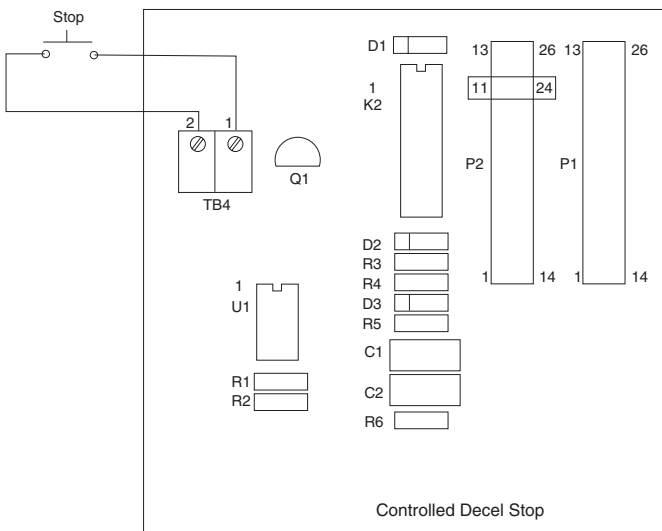
A normally-open momentary contact Stop pushbutton or contact is connected to TB4, positions 1 and 2.

Stopping Mode When Stop Is Activated

Drive Model	Standard Model	Standard Model with Option	
— Power Unit On-Off	Coast-to-Rest	Stop Input 1 Coast-to-Rest	Stop Input 2 Linear Decel (Set by Decel Pot)
Run-Brake Reversing Brake	Dynamic Braking	Dynamic Braking	Linear Decel (Set by Decel Pot)



Component Location



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Fault Module (SE 2999-5)

General Description

The Fault Module option provides output signals with shutdown protection in the event of tachometer loss, field loss or overcurrent.

Specifications

The Fault Module includes three types of drive fault detection protection.

- Overcurrent – Inverse Time Overcurrent
- Field Loss – Detects Loss of Field Current
- Tach Loss – Detects Loss of Tach Feedback

Fault Trip Indication – LED Indicator/Trip Relay

- Overcurrent Trip LED
- Field Loss LED
- Tach Loss LED
- Fault Indication – Form C Relay Contacts, relay picked up during a fault

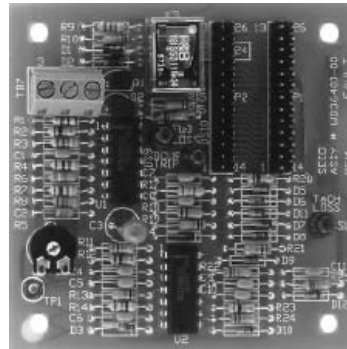
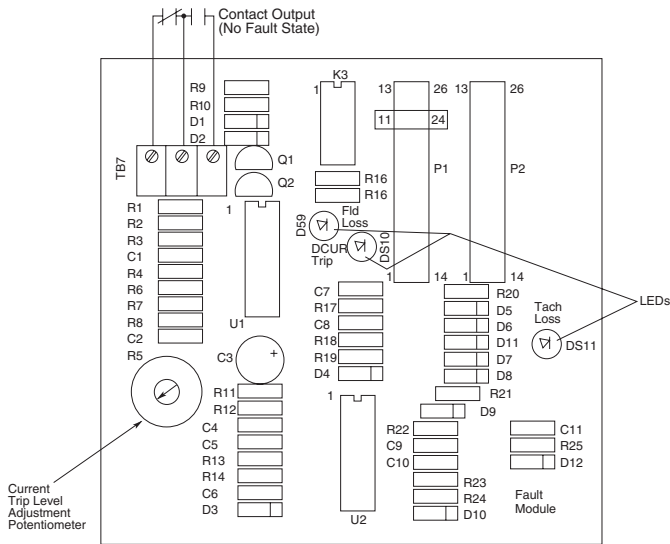
Once a fault trip has occurred, the drive will be inhibited and the motor will coast-to-rest. The specific Fault LED and Fault Indication Relay will be maintained until the STOP input is operated or AC power is disconnected.

Connections

The Fault Indication Relay, K3, is accessible via TB7, Terminals 1,2, and 3.

TB7	1 N.O.
	2 COM
	3 N.C.

Component Location



Enhanced External Torque Slope Option (SE 2999-6)

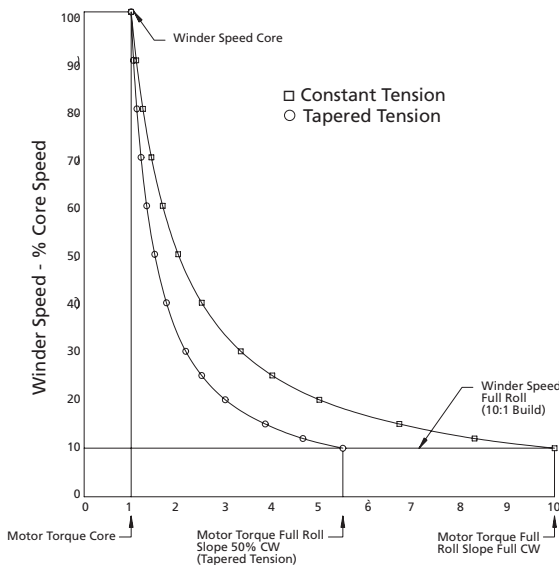
General Description

The Enhanced External Torque Slope option provides controlled tension for basic center-wind applications. Constant or tapered tension can be achieved with inertia compensation and alternate stop torque to prevent slack.

Specifications

- Terminal connections for External Torque and Slope pots for center-wind tension control

- Torque - Slope adjustment independent of line speed (over 10:1 range) when 0 - 10 VDC Line Speed signal is available
- Internal alternate Torque adjustment; selected by contact closure
- Internal Stop Torque adjustment (0 to 100%) is enabled below pre-set speed (adjustable 0 to 100%) and indicated by LED
- Slope function produces non-linear winder speed/motor torque curve required for constant tension (see Fig. 1)
- Simple set-up: LED eliminates need for meter



Motor Torque - X Core Torque

Fig. 1 - Winder Speed vs. Motor Torque

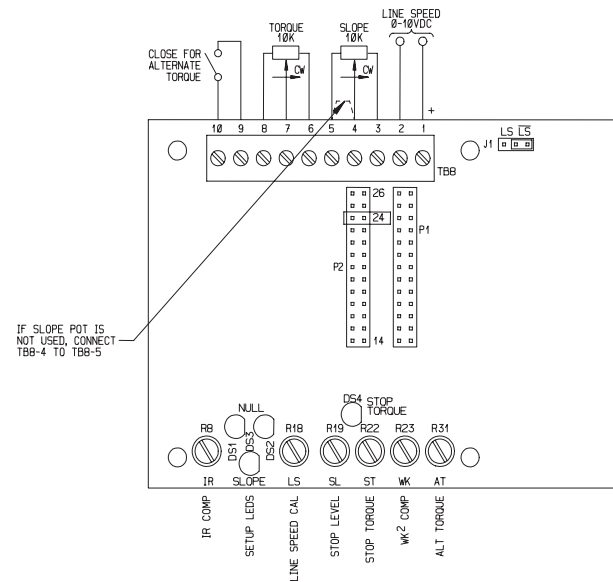
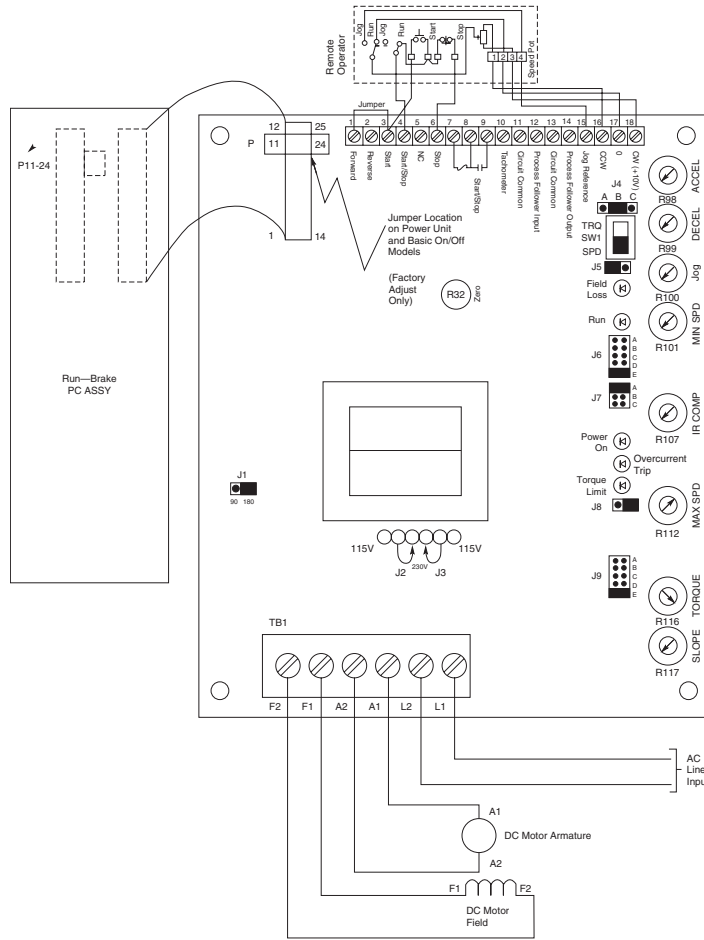


Fig. 2 - Adjustments and Connections

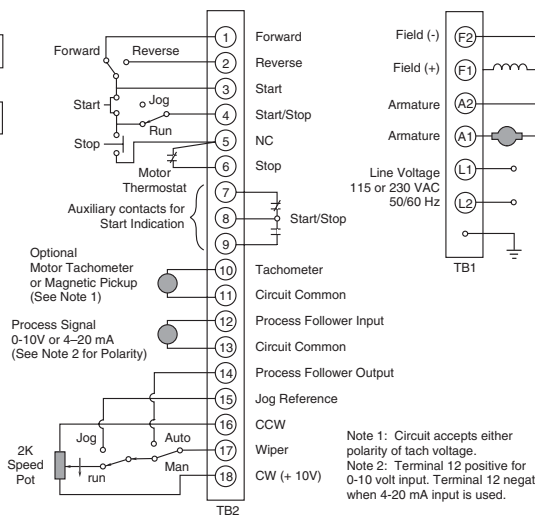
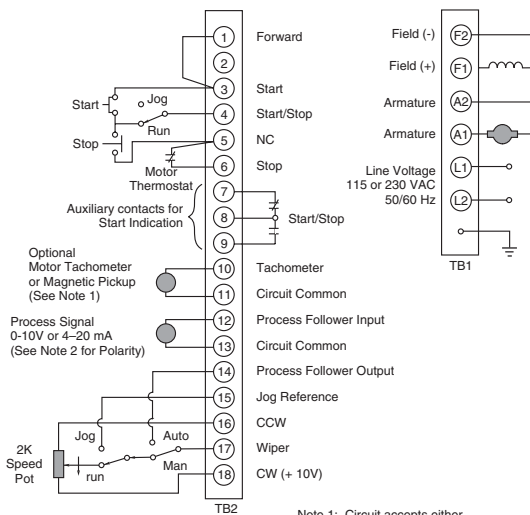
Jumper and Adjustment Locations



SE2000

Basic On-Off or Run Brake Models

Reversing Brake Models



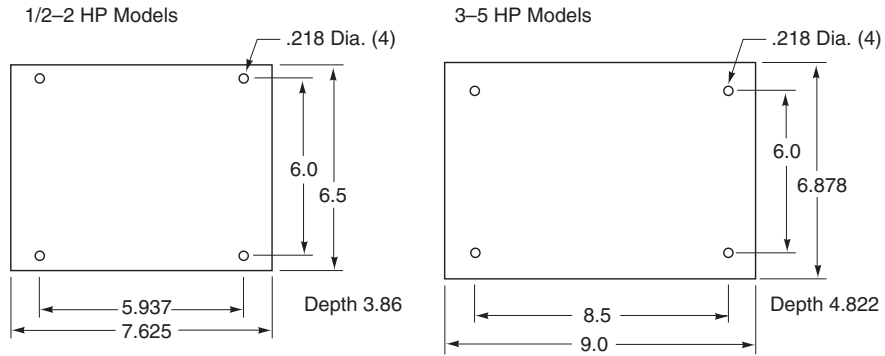
Note 1: Circuit accepts either polarity of tach voltage.
 Note 2: Terminal 12 positive for 0-10 volt input. Terminal 12 negative when 4-20 mA input is used.

Three Wire Start/Stop with Reversing, Tachometer, Run/Jog, Auto/Man and Motor Thermostat.

Note 1: Circuit accepts either polarity of tach voltage.
 Note 2: Terminal 12 positive for 0-10 volt input. Terminal 12 negative when 4-20 mA input is used.

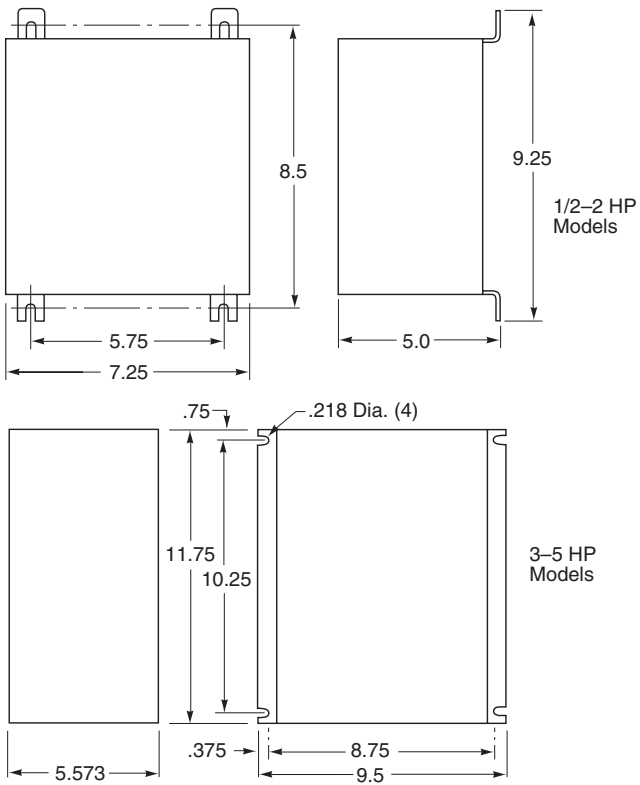
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Power Unit

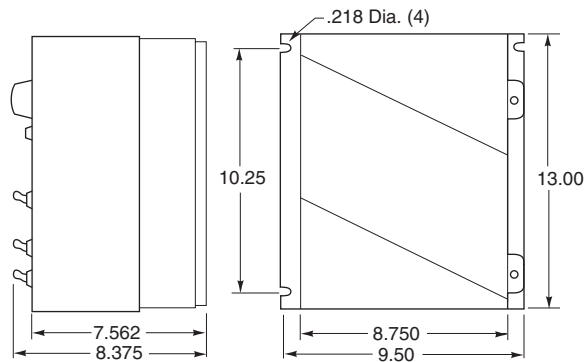


Chassis

- Basic On-Off or Run Brake Models
- Reversing Brake Models
- 1/2 HP Models
- 3 - 5 HP Models



Enclosed Unit - All Models



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Q7000 Standard Features



Listed*



Listed for use in Canada*

Full Wave 4-Quadrant Operation

Provides smooth motoring or braking torque in either direction of rotation.

Seven Selectable Performance Features

- 115V/230V AC Input
- Accel/Decel Range
- Internal/External Jog Reference
- HP Select
- Overcurrent Trip Select
 - Timed/Instantaneous/Disable
- Motor Field Type
 - PM or Shunt Wound
- Feedback Type

* Except Q7006

Electronic Reversing

Regenerative Braking

Motor acts as a generator and produces braking torque.

Seven Control Adjustments

Max. speed, forward and reverse acceleration, IR compensation, forward and reverse current limit, response characteristic.

For use with Shunt Wound or Permanent Magnet DC Motors

Complete Electrical Protection

1/4 to 5 HP

150% full load current available for 1 min.

115/230 VAC Input

Positioning Accuracy

4-quadrant control provides positioning easily adapted to specific programming needs.

Total Control

Controlled acceleration and deceleration. Smooth, consistent, accurate...ideal for web tensioning applications.

- Chassis or NEMA 4/12 Enclosure

The Quadraline 7000 series is a full wave, regenerative DC drive designed to operate shunt wound or permanent magnet DC motors from 1/4 HP to 5 HP.

Regenerative drives are the ideal answer for:

- Maintaining motor speed when an overhauling load attempts to increase the motor speed
- Providing continuous braking torque with no power dissipation
- Repeatable, controllable braking to rest
- Rapid, repetitive reversal of motor rotation

The Quadraline 7000 models are packed with features, designed and manufactured to the highest quality standards and available from your local SECO distributor at an economical price.

Designed for either Permanent Magnet or Wound Field Motors

Field supply is standard.

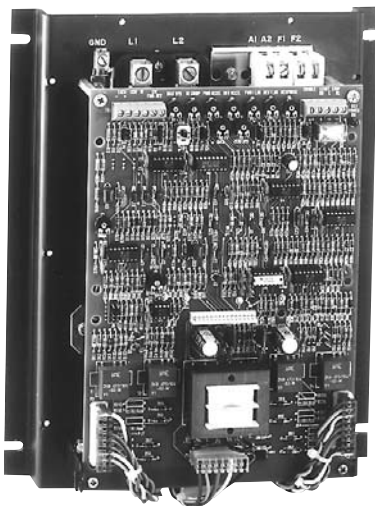
Allows use of a wide range of motors.

Full Wave Four Quadrant Operation

Provides smooth motoring or braking torque in either direction of rotation.

Selectable Features

Selected by programming jumpers to program drives for specific motor or application:



AC Supply— selects 115V or 230 VAC

Current Scaling— selects current range to match control to a particular motor HP Rating

Speed Feedback— selects armature voltage feedback or tach—generator feedback for improved speed holding

Acceleration/Deceleration Time— selects range for adjustment control up to 30 secs

Torque or Speed Control— selects mode of either motor speed or motor torque controlled by operator's potentiometer

AC Supply Frequency— allows drive to be operated on 50 Hz or 60 Hz supply

Regenerative Braking

Motor acts as a generator and provides braking torque.

The braking energy is returned to the AC power line, not dissipated as heat.

Electronic Reversing

Allows rapid and continuous cycling without any moving parts in the control.

No mechanical contactors required.

UL® Listed Ratings

Horsepower range

115 VAC 1/4–1 HP

230 VAC 1/2–5 HP

150% full load current available for 1 minute.

Adjustments

Customer adjustments to match control to application:

Maximum speed— limits speed available at operator's control

Forward Acceleration— sets time to reach full speed in forward direction— is also reverse deceleration time

Reverse Acceleration— sets time to reach full speed in reverse direction— is also forward deceleration time

IR Compensation— improves motor speed regulation in armature feedback mode

Forward Current Limit— sets maximum current available in forward direction to limit motor overload

Reverse Current Limit— sets maximum current available in reverse direction to limit motor overload

Response— sets response characteristic of control for higher performance applications

Protection

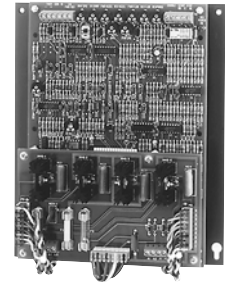
Input AC line fuses protect control from line or load faults.

MOV's protect unit from voltage transients on AC power line.

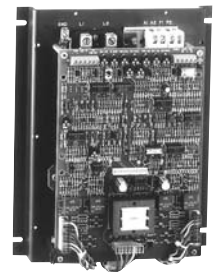
Options

- NEMA 4/12 enclosure
- Fault module
- Bipolar isolated input module
- Independent Individual control of forward accel and decel and reverse accel and decel rates
- AC pulse tach feedback

Ratings	Q7006	Q7002	Q7005
Horsepower Range			
115V	1/8–1/2	1/4–1 HP	Not Used
230V	1/4–1	1/2–2 HP	3–5 HP
AC Line Input Voltage	115 or 230 V ±10%	115 or 230 V ±10%	115 or 230 V ±10%
AC Line Frequency	50/60 Hz ± 2 Hz Single Phase	50/60 Hz ± 2 Hz Single Phase	50/60 Hz ± 2 Hz Single Phase
115 VAC Supply			
Armature Voltage	0–90 VDC	0–90 VDC	Not Applicable
Field Voltage	50/100 VDC	50/100 VDC	Not Applicable
230 VAC Supply			
Armature Voltage	0–180 VDC	0–180 VDC	0–180 VDC
Field Voltage	100/200 VDC	100/200 VDC	100/200 VDC
Service Factor	1.0	1.0	1.0
Duty	Continuous	Continuous	Continuous
Maximum Load Capacity	150% for 1 min.	150% for 1 min.	150% for 1 min.
Line Protection	Fuses	Fuses	Fuses
U.L. Listed	No	Yes	Yes



Q7006



Q7002



Q7005

Operating Conditions

Ambient Temperature			
Chassis Model	0–55° C	0–55° C	0–55° C
Enclosed Model	N.A.	0–40° C	0–40° C
Relative Humidity	_____	5–95% non-condensing	_____
Altitude	_____	to 3300 ft. (1000m)	_____

Performance Characteristics

Speed Range	50:1	50:1	50:1
Speed Regulation (% of motor base speed) for 95% load change			
Arm. Voltage Feedback		±1% to ± 2% (depending on motor)	
Tach. Feedback		±1/2 to 1% (depending on tach generator)	
Acceleration (forward or reverse)			
Range A	_____	Linear .3–3 seconds (to full speed)	_____
Range B	_____	Linear 3–30 seconds (to full speed)	_____

Adjustments

Current Range (nominal–adjustable to 150%)	1.0, 1.5, 2.0, 3.0 5.0 Amps	2, 3, 4, 6, 10, Amps	15, 25 Amps
Maximum Speed	_____	70–105% of motor base speed	_____
IR Compensation	Adjustable	Adjustable	Adjustable

Options

Description

Isolated Input VDC, 1 to 5mA or 4 to 20mA	Bipolar, input–output with selectable inputs for 0 to ±10 VDC, 0 to ±14 VDC, 0 to ±100
Fault Module	Contact outputs—trips on overcurrent, overvoltage or field loss
Independent Acceleration/Deceleration Control	Forward acceleration, forward deceleration, reverse acceleration, reverse deceleration, 4 potentiometers
AC/Pulse Tach Feedback	Converts signals from AC tachometer or pulse generator to direction sensitive DC voltage for improved speed regulation

Quadraline 7000 Series

Input Line Voltage	HP	Basic On/Off			External Signal			Zero Position Dancer Control	
		Chassis	NEMA 4/12	NEMA 4/12 w/ Operators	Chassis	NEMA 4/12	NEMA 4/12 w/ Operators	Chassis	NEMA 4/12
115 VAC 1 Phase	1/8–1/2	Q7006	N/A	N/A	Q7006–1	N/A	N/A	Q7006–5	N/A
230 VAC 1 Phase	1/4–1	Q7006	N/A	N/A	Q7006–1	N/A	N/A	Q7006–5	N/A
115 VAC 1 Phase	1/4–1	Q7002	Q7022	Q7032	Q7002–1	Q7022–1	Q7042–1	Q7002–5	Q7022–5
230 VAC 1 Phase	1/2–2	Q7002	Q7022	Q7032	Q7002–1	Q7022–1	Q7042–1	Q7002–5	Q7022–5
230 VAC Phase	3–5	Q7005	Q7025	Q7035	Q7005–1	Q7025–1	Q7045–1	Q7005–5	Q7025–5

Run/Jog–Forward/Reverse

Includes enclosure if specified with or without operator devices. Operator devices include: Start-Stop switch, Run-Jog switch, Forward-Reverse switch, single turn Speed Setting Potentiometer and Power Light.

External Signal

Includes isolated signal follower accepting 4–20 mA, 1–5mA, 0–±10 VDC, 0–± 14 VDC or 0–±100 VDC reference signal inputs and enclosure if specified with or without operator devices. Operator devices include: Start-Stop switch, Run-Jog switch, Forward-Reverse switch, Auto-Manual switch, single turn Speed Setting Potentiometer, and Power Light.

Zero Position Dancer Control

For tension applications such as an unwind, rewind or tension infeed with a zero position dancer or load cell includes PID function. This feature is used in special applications usually involving web-processing equipment.

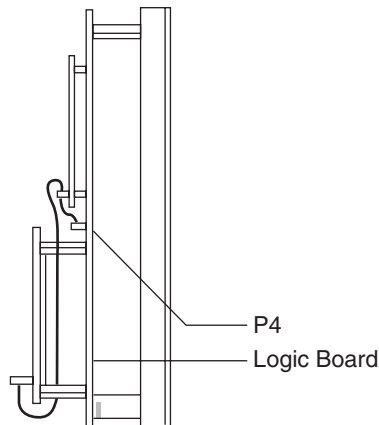
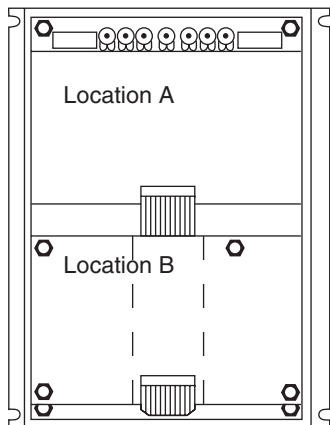
Requires application approval prior to sale.

Options	Description M/N Suffix	Factory Installed Kits M/N	Field Installed
Bipolar Isolation	Bipolar input - output with selectable inputs for 0 to ± 10 VDC, 0 to ± 14 VDC, 0 to ± 100 VDC, 1 to 5mA or 4 to 20mA	-1	Q7999-01
Fault Module	Contact outputs - trips on overcurrent, overvoltage or field loss	-2	Q7999-02
Independent Acceleration/ Deceleration Control	Forward acceleration, forward deceleration, reverse acceleration, reverse deceleration, 4 potentiometers	-3	Q7999-03
AC/Pulse Tach Feedback	Converts signals from AC tachometer or pulse generator to direction sensitive DC voltage for improved speed regulation	-4	Q7999-04
Zero Position Dancer Control		-5	Q7999-05
Mounting and connecting hardware for 2 option kits		Not Required	Q7098-00
Pivot Point Sensor (for use w/zero position Dancer controlled models)		—	APT 2043-00

Factory or Field Installed

Installation

Each version of the Q7000 control (except the Q7006) has provision for mounting up to two option boards. Q7006 units have room for one option board. If one option board is fitted, it will be in position A in Figure A. The second option board will be fitted in position B. Reference Figure A.



- A.** For field installation of one option, the correct mounting hardware will be supplied with the option kit.
- B.** For field installation of two options, an additional mounting kit Q7098-00 for location B is required.

Bipolar Isolation - (Q7999-01)

General Description

The Bipolar Isolation Option Board provides an isolated interface between the Q7000 and Reference control signals. The Option Board mounts easily to the Q7000 Control Board via stand-offs and a ribbon cable.

Specifications

Input Signals:

Current	Voltage
1–5mA DC	0 to ±10 VDC
4–20mA DC	0 to ±14 VDC
	0 to ±100 VDC
Output voltage:	0 to ±10 VDC

Operation and Adjustment

Jumper Selection

Select input range

For voltage input, connect input wires to the V IN and COM (common) positions on TB40.

Jumper J40 as follows:

Jumper Position	Voltage Input Range
0–10 VDC	0 to ±10 VDC
0–14 VDC	1 to ±14 VDC
0–100 VDC	0 to ±100 VDC

For current input, connect input wires to the IIN and COM (common) positions on TB40.

Jumper J40 as follows:

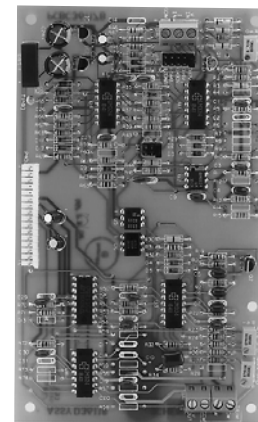
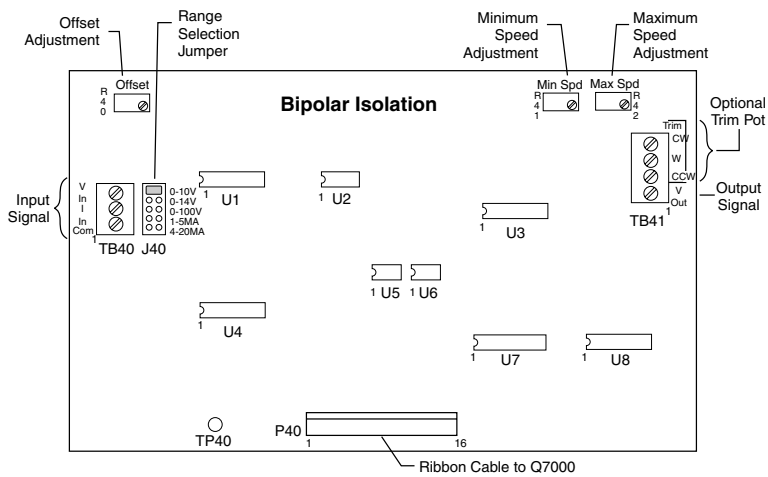
Jumper Position

1–5mA DC

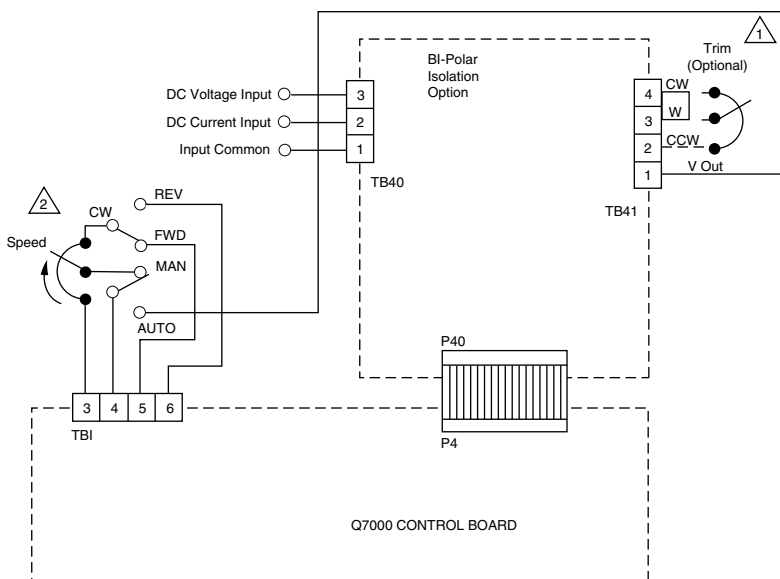
4–20mA DC

Ensure Jumper J41 is in position A.

Component Location



Connection Diagram



1. If optional trim pot is used, remove jumper from TB41-3 and 4.

2. Mounted on the enclosure door of External Signal Models equipped with this provision.

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Fault Module - (Q7999-02)

General Description

The Fault Module Option Board provides adjustable overvoltage and overcurrent as well as field loss protection for the Q7000 series of DC motor controllers. The overcurrent protection can be jumpered for either instantaneous overcurrent trip or timed overcurrent trip. (An overload will eventually cause an overcurrent trip with the time to trip decreasing as the current level increases when the timed mode is selected.) An open collector transistor output is provided to indicate when an overload is present. Four Red LED's are on the board, to indicate overcurrent trip, overvoltage trip, field loss trip, and overload.

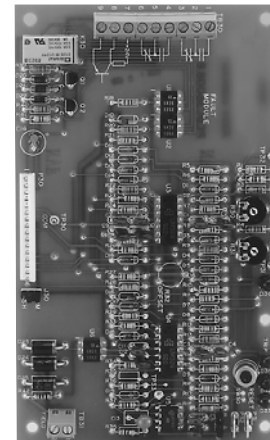
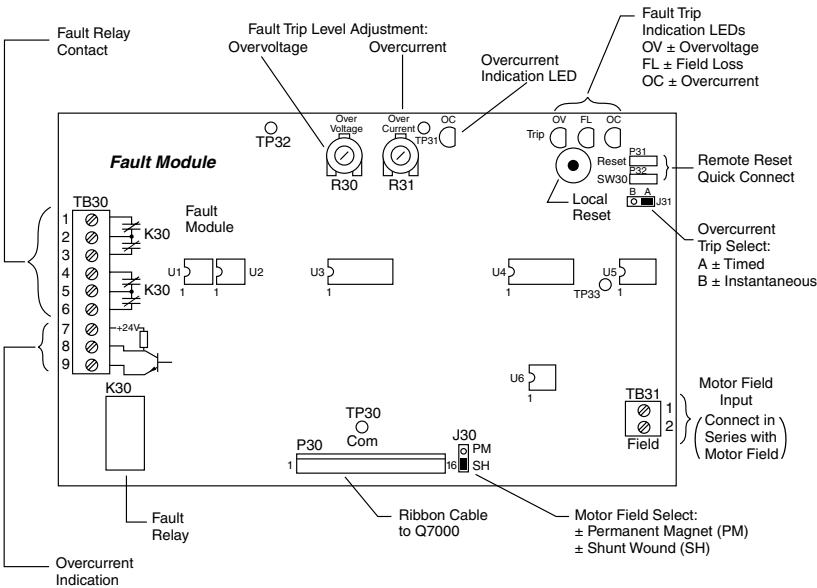
Two form C contacts are provided from the fault relay that change state in the event of a fault trip. An on-board reset pushbutton or quick connect connections are provided for resetting the drive after a fault occurs. When a fault occurs, the drive is disabled, turning off the SCR power bridge, the motor will coast to a stop. If the fault relay contacts are wired into the stop circuitry, the Stop/Start relay in the Quadraline 7000 controller will drop out.

Specifications

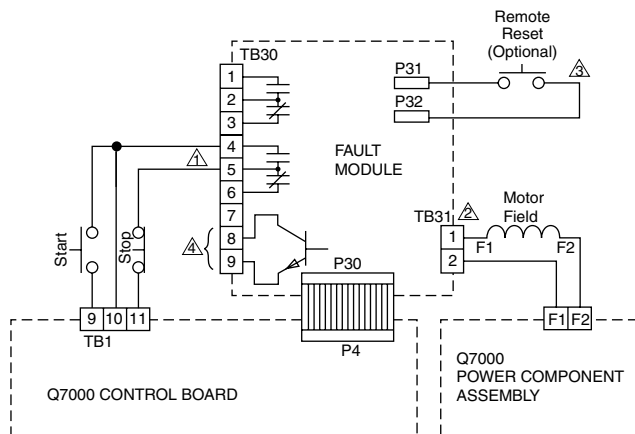
- Adjustable Instantaneous or Timed Overcurrent Trip. Current trip setting 30 to 150% rated current.
- Adjustable Overvoltage Trip. Voltage trip setting 10 to 150% rated voltage.

- Field Loss, detects loss of field current.
- Fault Relay, with 2 form C contacts, that is energized when power is applied and no faults are present.
- Open Collector Output signifying an overcurrent condition is present. Timed overcurrent trip will occur if the overload remains (Overcurrent LED D30 indicates output is on.) This circuit can handle 250mA (24 VDC max.) when the output is pulled down to zero during an overload.
- Four Red LEDs
 1. Overcurrent Trip
 2. Overcurrent voltage
 3. Field Loss Trip
 4. Overcurrent Present

Component Location



Connection Diagram



Notes:

1. Fault relay contacts are shown in trip or power off condition. Connect contact in series with stop circuit as shown to activate stop function when trip occurs. If this connection is not made, control is disabled when trip occurs and will start when trip circuit is reset.
2. No connection is required for PM motor.
3. Close contacts to reset trip circuit.
4. Overcurrent indication: Open collector output sinks up to 250mA if current exceeds overcurrent level. (24 VDC max.)

Independent / Acceleration / Deceleration - (Q7999-03)

General Description

The standard Q7000 Series DC controller has a single forward acceleration adjustment pot and single reverse acceleration adjustment pot. The Forward Acceleration pot also sets the acceleration rate in the forward direction, and the deceleration rate in the reverse direction, i.e. both of these rates will be the same. Conversely, the Reverse Acceleration pot also sets the deceleration rate in the Forward direction, again, both rates are the same. Two modes of Accel/Decel control can be programmed with this option. The first, or Mode A, provides two acceleration adjustment pots and two deceleration adjustment pots. This allows for independent adjustment of the forward acceleration rate, forward deceleration rate, reverse acceleration rate and reverse deceleration rate.

The second, Mode B, allows two different Accel/Decel rates to be selected by an outside sourced contact closure. Like the Basic Quadraline 7000 the Forward Acceleration and Reverse Deceleration rates are identical as are the Reverse Acceleration and Forward Deceleration rates. The Mode B difference allows the ability to switch through contact change from either of two sets of adjustments, thereby giving two entirely different rates rather than the single rate allowed with the basic Quadraline 7000 controller. The adjustment setting for acceleration determines the amount of time the motor controller will take to drive the motor from standstill or zero speed up to maximum speed. The adjustment setting for deceleration determines the time the motor controller will take to brake the motor from maximum speed to zero.

Specifications

Accel/Decel Time Range:

Jumper Selectable for each pot (J21–J24)
 F Range .3–3 seconds (zero to full speed)
 S Range 3–30 seconds (zero to full speed)

Operating Modes:

Jumper Selectable (J20)

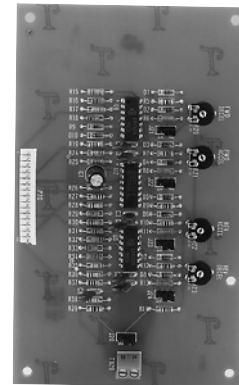
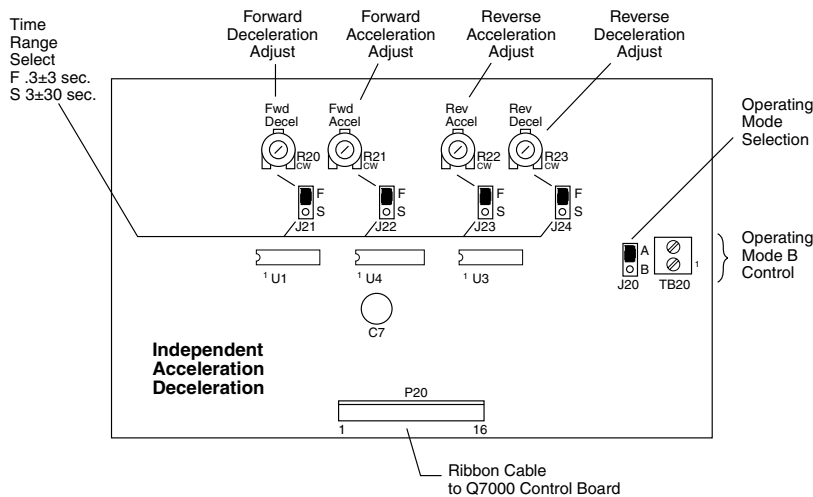
A Mode:

Acceleration Forward	R21
Deceleration Forward	R20
Acceleration Reverse	R22
Deceleration Reverse	R23

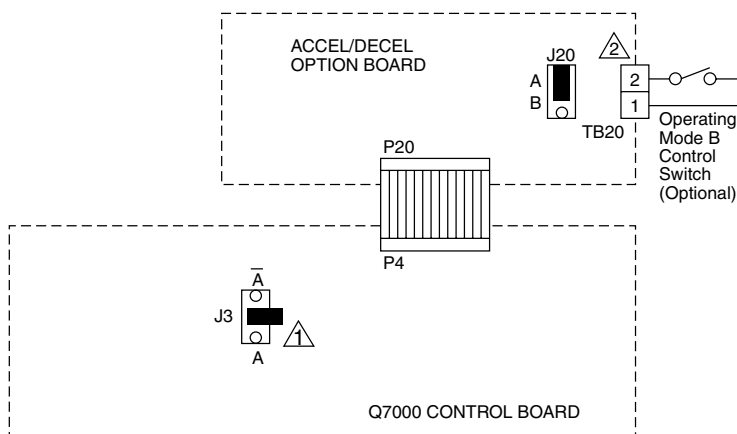
B Mode:

Pot operation in the B Mode is controlled by a contact closure or jumper on TB20.

Component Location



Connection Diagram



Notes:

1. Fault relay contacts are shown in trip or power off condition. Connect contact in series with stop circuit as shown to activate stop function when trip occurs. If this connection is not made, control is disabled when trip occurs and will start when trip circuit is reset.
2. No connection is required for PM motor.
3. Close contacts to reset trip circuit.
4. Overcurrent indication: Open collector output sinks up to 250mA if current exceeds overcurrent level. (24 VDC max.)

A/C Pulse Tach Feedback - (Q7999-04)

General Description

The AC/Pulse Tach Option board allows the use of either an AC tachometer or a magnetic pulse tach for speed feedback to the Q7000. A ring tach, such as the MTK series used with the DS 9000 Digital Front End, can be used. The standard drive requires a DC analog tachometer 7 VDC/1000 RPM, or 50 VDC/1000 RPM, if a tachometer is to be used. If an encoder is to be used, please consult Seco Electronics for adjustment.

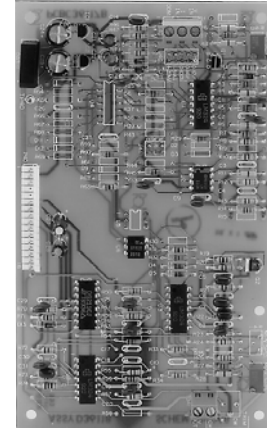
Specifications

Input Signal

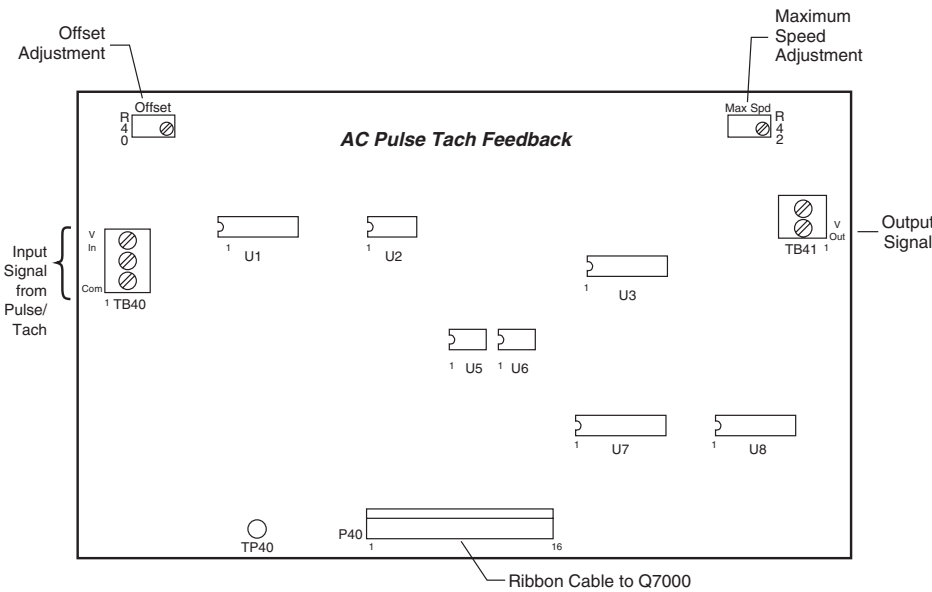
- Primarily designed for 60 pulse per revolution pulse tachometers. Maximum frequency input is 3600 Hz. Minimum frequency for full output voltage is 1200 Hz.
- Maximum voltage input 100V.

Output signal

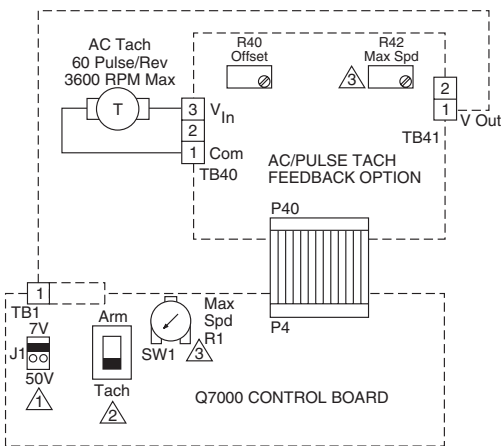
- 0 to 10 VDC.



Component Location



Connection Diagram

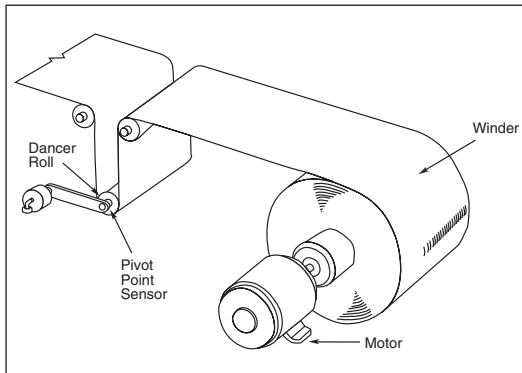


Notes:

1. Place jumper J1 in 7V position.
2. Select tach feedback mode. (SW1)
3. Adjust R42, max. speed to set maximum motor speed. (R1, max. speed on Q7000 control board should be set fully CCW)

Zero Position Dancer Control - (Q7999-05)

Component Location



General Description

The zero position dancer option board provides dancer control for either an unwind, rewind or infeed tension control system. In a dancer system, closed loop control is accomplished because the web completes the path between the motor and the dancer. With the zero position dancer option board, (hereafter referred to as the ZPD Board) the dancer remains in a fairly constant position throughout the run.

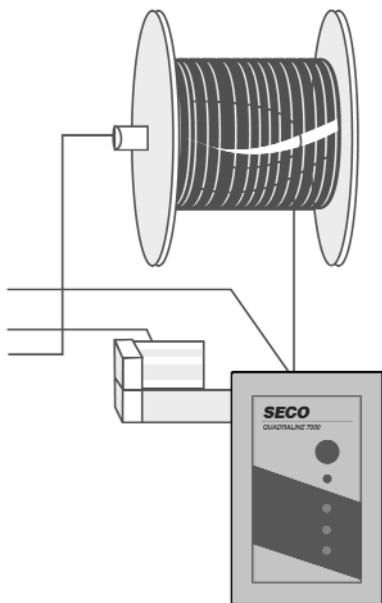
The purpose of the ZPD board is to stabilize the system and keep the dancer in a fixed position, thus maintaining tension within a given tolerance range. The pivot-point sensor, coupled to the pivot point of the dancer arm, generates a signal to the ZPD board signifying the position of the dancer arm and the direction and velocity of any dancer arm movement. The Dancer Position potentiometer adjusts the dancer zero point electrically within the control. Terminals are

provided for a remotely mounted Dancer Position potentiometer. The adjustments contained on the ZPD board enable the system to be fine tuned to the exact parameters of the application to provide optimum control and stability.

Specifications

- Dancer pot (Pivot point sensor)
1 k OHM min., 20k OHM max.

Traversing Package - (Q7042-07)



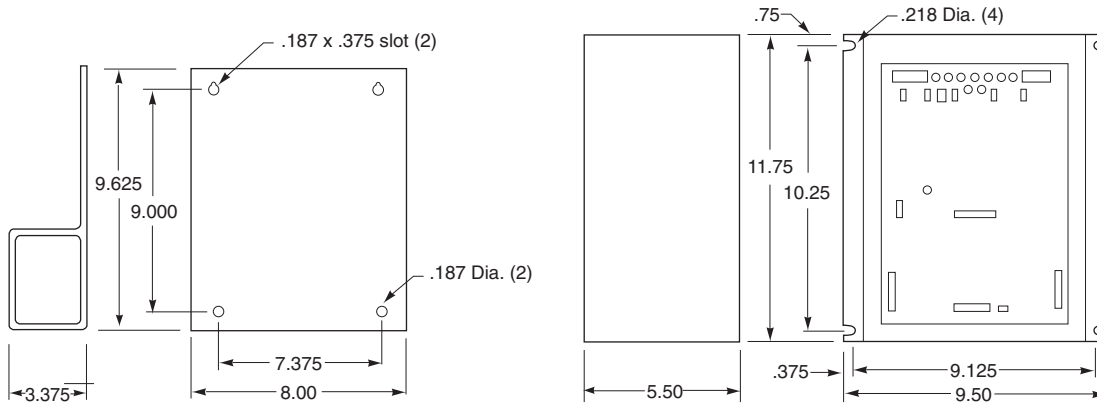
Q7042-7 Traversing Package

For simple oscillating or traversing applications using linear actuators, this unit offers inputs for limit switch reversal. Features include Jog, Local/Remote operation for extend and retract, inputs for over-travel limit switches (2) and end of stroke limit switches, 90 VDC brake output, and load meter output. Adjustments include retract dwell time, extend dwell time, brake engage level, and all standard Q7000 adjustments. Operating modes include one-shot (extend/retract), continuous reversal, and manual jog.

Chassis

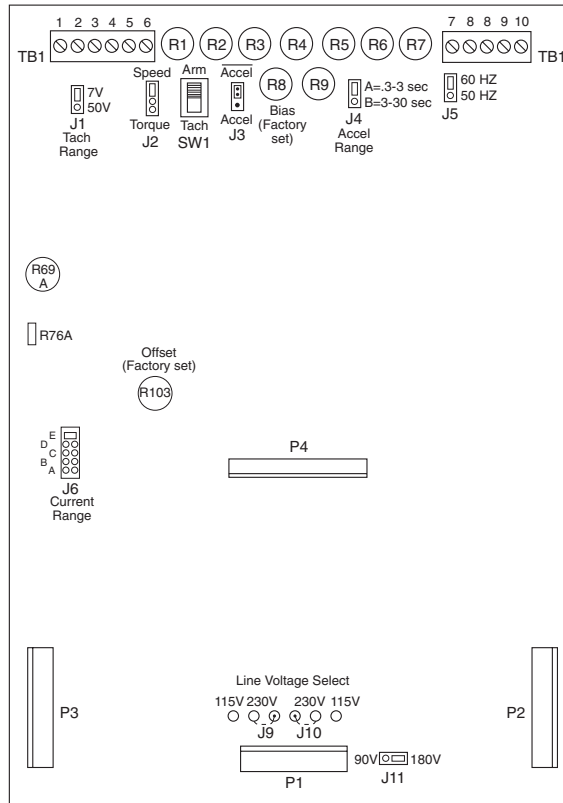
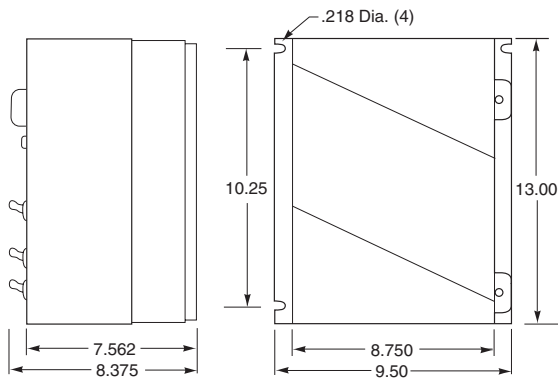
Q7006

Q7002 / 7005



Enclosed

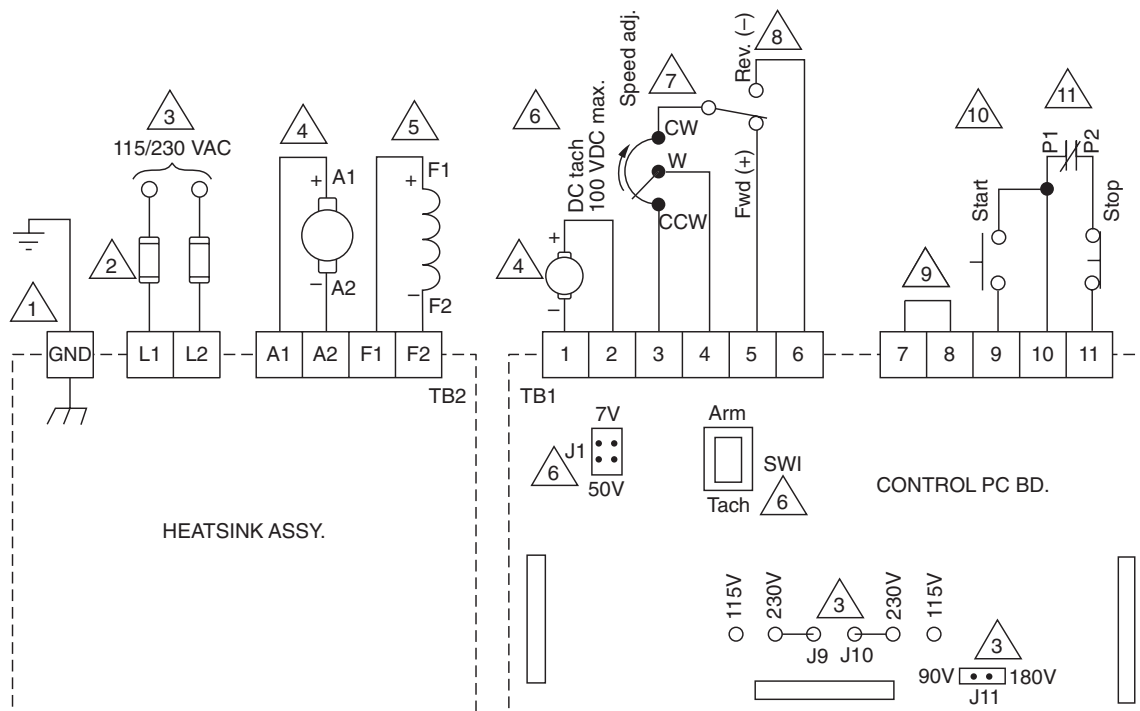
Adjustment Locations



- R1—Max speed
- R2—IR comp
- R3—Fwd accel
- R4—Rev accel
- R5—Fwd I limit
- R6—Rev I limit
- R7—Response
- R9—Zero Speed

Dimensions are listed in inches.

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Notes:

1. Ground control per local and national codes.
2. Customer supplied line fuses; size for protection of AC line wiring and transformer per local and national codes.
3. Programming jumpers J9, J10, and J11 on control board must be positioned for 115 or 230 VAC line.
4. Polarity shown is for positive speed reference voltage at TB1-4 (fwd direction).
5. For PM motors, no connection is necessary to F1 and F2.
6. DC tachometer (7VDC/1000 RPM or 50 VDC/1000 RPM) is optional; when used, select tach feedback mode (SW1) and tach voltage level (J1).
7. Speed adjust potentiometer: 2KW to 10KW.
8. Selector switch determines direction of motor rotation. For Bi-directional operation without switch. Connect CCW potentiometer lead to TB1-6.
9. TB1-7 and 8 must be connected together to enable control; jumper is factory installed. Open this circuit to disable control.
10. Start (n.o.) and stop (n.c.) momentary pushbuttons are used for conventional 3-wire control. If 2-wire control is required, connect maintained switch or contact between TB1-9 and TB1-11.
11. If motor thermostat (P1, P2) is available, connect in series with stop pushbutton as shown.

How To Order

Selection charts for DC motors, available from Danaher Motion, are listed on the following pages. For more complete specifications and dimensional information, contact customer service.

Motor charts specify:

Horsepower

Motor Type (Manufacturer)

B = Baldor

G = General Electric

P = Pacific Scientific

Frame Size

Motor Enclosure

TE = Totally Enclosed

FC = Fan Cooled

NV = Non Ventilated

WD = Washdown Duty

'C' Face Size

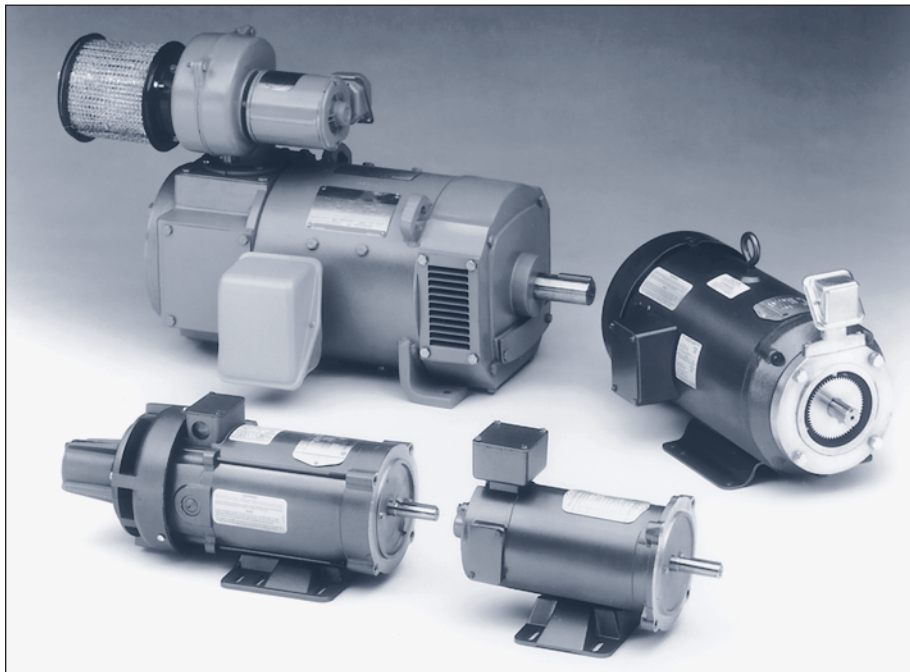
Armature Voltage

Model Number

Non-Listed Motors

Non-listed motors are available, but specific information is required.

1. Motor horsepower
2. RPM
3. Frame size
4. Volts, armature
5. Volts, field or PM
6. Enclosure
7. Conduit location, F1, F2 etc.
8. Thermostat
9. Accessory endshield
10. 'C' face
11. Delivery requirements
12. Special application or environmental considerations and other important information.



The washdown duty DC motors are specifically suited for tough environments where washdown is essential to maintain cleanliness. These motors are selected to function as a companion with the appropriate WASHDOWN DUTY BRONCO II D.C. Drive Controller.

Features

12 Standard Washdown Duty DC Motors

- White Epoxy finished, FDA-approved
- Moisture resistant wire
- 90 or 180 VDC armature
- Permanent magnet field
- 1750 RPM
- Totally enclosed
- Sealed and corrosion protected to meet the environments found in food and other industries demanding high levels of cleanliness

NOTES:



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1/4 to 1 HP, 90 VDC Armature, 1750 RPM

HP	MFG		Enclosure	MOTOR ONLY		MOTOR W/7 VDC TACH	
	Code	Frame/C-face		P/N	Wt (lb)	P/N	Wt (lb)
1/4	P	56C	TENV	MOD2431	18		
1/4	B	320P/56C	TENV	MOD6211200	24	MOD6211231	29
1/4	G	56HAA/56C	TENV	MOD6110210	21		
1/4	P	56C	TENV/WD	MOD2419	22		
1/2	P	56C	TENV	MOF2434	22		
1/2	B	336P/56C	TENV	MOF6211200	32	MOF6211231	37
1/2	G	56KAA/56C	TEFC	MOF6210210	29		
1/2	P	56C	TENV/WD	MOF2420	26		
3/4	P	56C	TEFC	MOG2749	30	MOG2749-T7	35
3/4	B	428P/56C	TEFC	MOG6211100	39	MOG6211131	44
3/4	G	56PAA/56C	TEFC	MOG6210210	39		
3/4	P	56C	TENV/WD	MOG2757	41		
1	P	56C	TEFC	MOH2751	30	MOH2751-T7	35
1	B	435P/56C	TEFC	MOH6211100	44	MOH6211131	49
1	G	56SAA/56C	TEFC	MOH6210210	44		
1	P	56C	TENV/WD	MOH1751	41		
1	B	435P/56C	TEFC/WD	MOH6211300	44		

1/4 to 1 HP, 180 VDC Armature, 1750 RPM

HP	MFG		Enclosure	MOTOR ONLY		MOTOR W/7 VDC TACH	
	Code	Frame/C-face		P/N	Wt (lb)	P/N	Wt (lb)
1/2	P	56C	TENV	MOF2438	27		
1/2	B	336P/56C	TENV	MOF711100	31	MOF7111131	36
1/2	G	56KAA/56C	TEFC	MOF7210210	29		
1/2	P	56C	TENV/WD	MOF2738	27		
3/4	P	56C	TEFC	MOG2750	23	MOG2750-T7	28
3/4	B	428P/56C	TEFC	MOG7211100	38	MOG7211131	43
3/4	G	56PAA/56C	TEFC	MOG7210210	39		
1	P	56C	TEFC	MOH2752	29	MOH2752-T7	34
1	B	435P/56C	TEFC	MOH7211100	44	MOH7211131	49
1	G	56SAA/56C	TEFC	MOH7210210	44		
1	G	146ATC	TEFC	MOH7210800	56	MOH7210831	63
1	P	56C	TENV/WD	MOH2389	41		
1	B	435P/56C	TEFC/WD	MOH7211300	44		
1 1/2	P	145TC	TEFC	MOI2753	64	MOI2753-T7	69
1 1/2	B	536P/145TC	TEFC	MOI7211100	67	MOI7211131	72
1 1/2	G	148ATC	TEFC	MOI7210800	68	MOI7210831	75
1 1/2	P	145TC	TENV/WD	MOI2390	65		
1 1/2	B	536P/145TC	TEFC/WD	MOI7211300	67		
2	P	145TC	TEFC	MOJ2754	75	MOJ2754-T7	80
2	B	548P/145TC	TEFC	MOJ7211100	74	MOJ7211131	79
2	G	149ATC	TEFC	MOJ7210800	79	MOJ7210831	86
2	P	145TC	TENV/WD	MOJ2342	84		
2	B	548P/145TC	TEFC/WD	MOJ7211300	75		
3	P	145TC	TEFC	MOK2755	87	MOK2755-T7	92
3	B	649P/184TC	TEFC	MOK7211100	116	MOK7211131	121
3	G	1412ATC	TEFC	MOK7210800	105	MOK7210831	112
5	B	681P/1810ATC	TEFC	MOL7211100	164	MOL7211131	171

Note: All motors are capable of 20:1 constant torque speed range. "WD" indicates washdown duty.

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1/4 to 1 HP, 90 VDC Armature 100/50 VDC Field, 1750 RPM

HP	MFG Code	Frame/C-face	Enclosure	MOTOR ONLY		MOTOR W/7 VDC TACH	
				P/N	Wt (lb)	P/N	Wt (lb)
1/4	B	413D/56C	TEFC	MOD1211700	23	MOD1211731	28
1/2	B	420D/56C	TEFC	MOF1211700	29	MOF1211731	34
3/4	B	428D/56C	TEFC	MOG1211700	36	MOG1211731	39
1	B	535D/56C	TEFC	MOH1211700	52	MOH1211731	57

1/2 to 1-1/2 HP, 180 VDC Armature 200/100 VDC Field, 1750 RPM

HP	MFG Code	Frame/C-face	Enclosure	MOTOR ONLY		MOTOR W/7 VDC TACH	
				P/N	Wt (lb)	P/N	Wt (lb)
1/2	B	420D/56C	TEFC	MOF2211700	29	MOF2211731	34
3/4	B	428D/56C	TEFC	MOG2211700	24	MOG2211731	39
1	G	146ATC/140TC	TEFC	MOH2210800	50	MOH2210831	57
1	B	535D/56C	TEFC	MOH2211800	51	MOH2211831	56
1	G	L182ACY/180TC	TENV	MOH2110100	80	MOH2110131	87
1 1/2	G	148ATC /140TC	TEFC	MOI2210800	61	MOI2110831	68
1 1/2	G	186ACY/180C	TENV	MOI2110100	102	MOI2110131	109
1 1/2	B	636D/180C	TEFC	MOI2211400	84	MOI2211431	89

2 to 5 HP, 180 VDC Armature 200/100 VDC Field, 1750 RPM

HP	MFG Code	Frame/C-face	Enclosure	MOTOR ONLY		MOTOR W/7 VDC TACH	
				P/N	Wt (lb)	P/N	Wt (lb)
2	G	149ATC/140TC	FC	MOJ2210800	71	MOJ2210831	78
2 [†]	B	646D/184C	TEFC	MOJ2211400	98	MOJ2211431	103
2	G	L186ACY/180C	TENV	MOJ2110100	128	MOJ2110131	135
3	G	189ATC/180TC	TENV	MOK2110100	162	MOK2110131	169
3	G	1412ATC/140TC	TEFC	MOK2210800	95	MOK2210831	102
3	B	7544D	TEFC	MOK2211100	163	MOK2211131	168
5	G	CD2110ACY*/210C	TENV	MOL2110700	289	MOL2110731	296
5 [†]	B	9143D*/256UCZ	TEFC	MOL2211100	304	MOL2211131	311

*Motors have 1-1/8" shaft diameter.

† Motors have a single voltage 200 VDC field only.

Note: All motors are capable of 20:1 constant torque speed range.



Seco
AC/DC Drives



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