

# KBCC-255

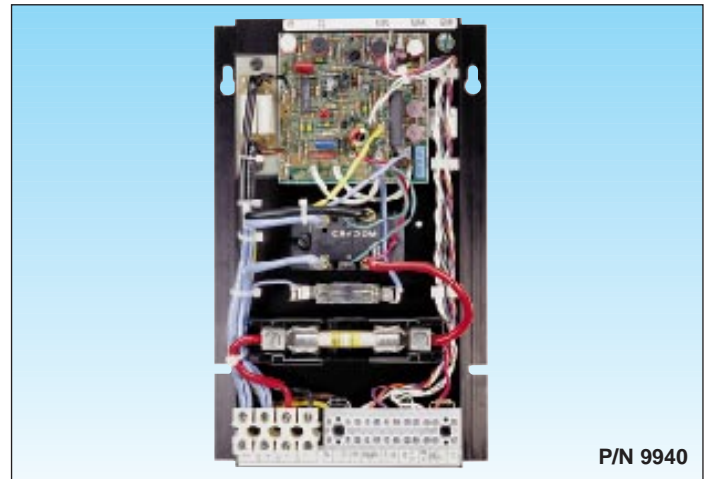
Chassis Mount Variable Speed DC Motor Control  
For Shunt Wound and PM Motors

RATED – 5 Hp @ 230 VAC – 50/60 Hz

Patented Overload Circuit

## TYPICAL APPLICATIONS

- Transfer Pumps • Door Openers
- Tapping Machines • Indexers • Conveyors
- Feeders • Robotics • Screen Presses



P/N 9940

## STANDARD FEATURES

- Built-in Armature and Control Circuit Fuses
- Trimpots: MIN, MAX, IR, CL, ACCEL, DECEL
- MOV Transient Protection
- Armature or Tachometer Feedback
- Voltage Following
- Inhibit™ and Enable Circuit
- CL LED Indicator

## SPECIFICATIONS

Speed Range (Ratio) .....	50:1
Load Regulation – Armature Feedback (0 – Full Load, 50:1 Speed Range) (% Base Speed) .....	1*
Load Regulation – Tachometer Feedback (0 – Full Load, 50:1 Speed Range) (% Set Speed) .....	1*
Line Voltage Regulation – Armature Feedback (At Full Load, ± 10% Line Variation) (% Base Speed)....	1/2*
Line Voltage Regulation – Tachometer Feedback (At Full Load, ± 10% Line Variation) (% Set Speed) .....	1/2*
Control Linearity (% Speed vs. Dial Rotation) .....	2
CL/Torque Range (% Full Load) .....	0 – 200
ACCEL/DECEL Time Range (0 – Full Speed) (Secs.) .....	1 – 10
MIN Speed Trimpot Range (% Full Speed) .....	0 – 30*
MAX Speed Trimpot Range (% Full Speed) .....	50 – 110*
IR Compensation Trimpot Range (At Specified Full Load) (Volts) .....	0 – 24
Maximum Allowable Ambient Temperature (At Full Rating °C/°F) .....	45/113
Tachometer Feedback Input Volts (Per 1000 RPM) (VDC).....	7/50

\* Performance is for SCR rated PM motors only. Lower performance can be expected with other motor types. Factory setting is for 3% load regulation. To obtain superior regulation, see instruction manual. Other factory trimpot settings are as follows: CL-150% FL, ACCEL-3 secs., MIN-(0)-speed, MAX-full speed and IR-3 volts.

## DESCRIPTION

The KBCC™ 5-Hp chassis control utilizes the KBMM™ modular control to provide a reliable variable speed SCR drive for PM and Shunt DC motors. The KBCC is a full-featured control offering adjustable linear acceleration and deceleration functions. In addition, the control contains Enable (close to run) and Inhibit™ (close to stop) circuitry. An exclusive feature found only in KB drives is Auto Inhibit®. It provides a smooth, safe start during rapid switching of the AC line.

The KBCC-255 is factory wired for armature feedback which, for most applications, provides excellent performance. For superior performance, the control can easily be converted to DC tachometer feedback. Provision is made for both 7V and 50V per 1000 RPM tachs. Reliability is enhanced by incorporating a separate 42.5 AMP DC power bridge and both armature and control circuit fusing.

The KBCC is built on a rugged aluminum heatsink, which is compact in size and easy to install. The control is supplied with a remote 5K ohm potentiometer. However, it can also be operated in a voltage following mode by supplying 0 - 9VDC *isolated* analog voltage to terminals P2 (+) and F-. Individual adjustment trimpots are provided for minimum speed (MIN), maximum speed (MAX), IR compensation (IR), current limit (CL), acceleration start (ACCEL) and deceleration (DECEL).

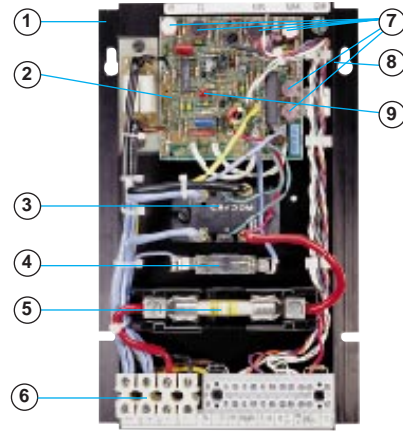
## ELECTRICAL RATINGS

Model	AC Line Voltage (VAC) ±15% (50/60 Hz)	Max. AC Load Current (RMS Amps)	Max. DC Load Current (Avg. Amps)	Maximum Horsepower [Hp, (KW)]	Fuse Size (Amps)
KBCC-255	230	38	26	5, (3.8)	40

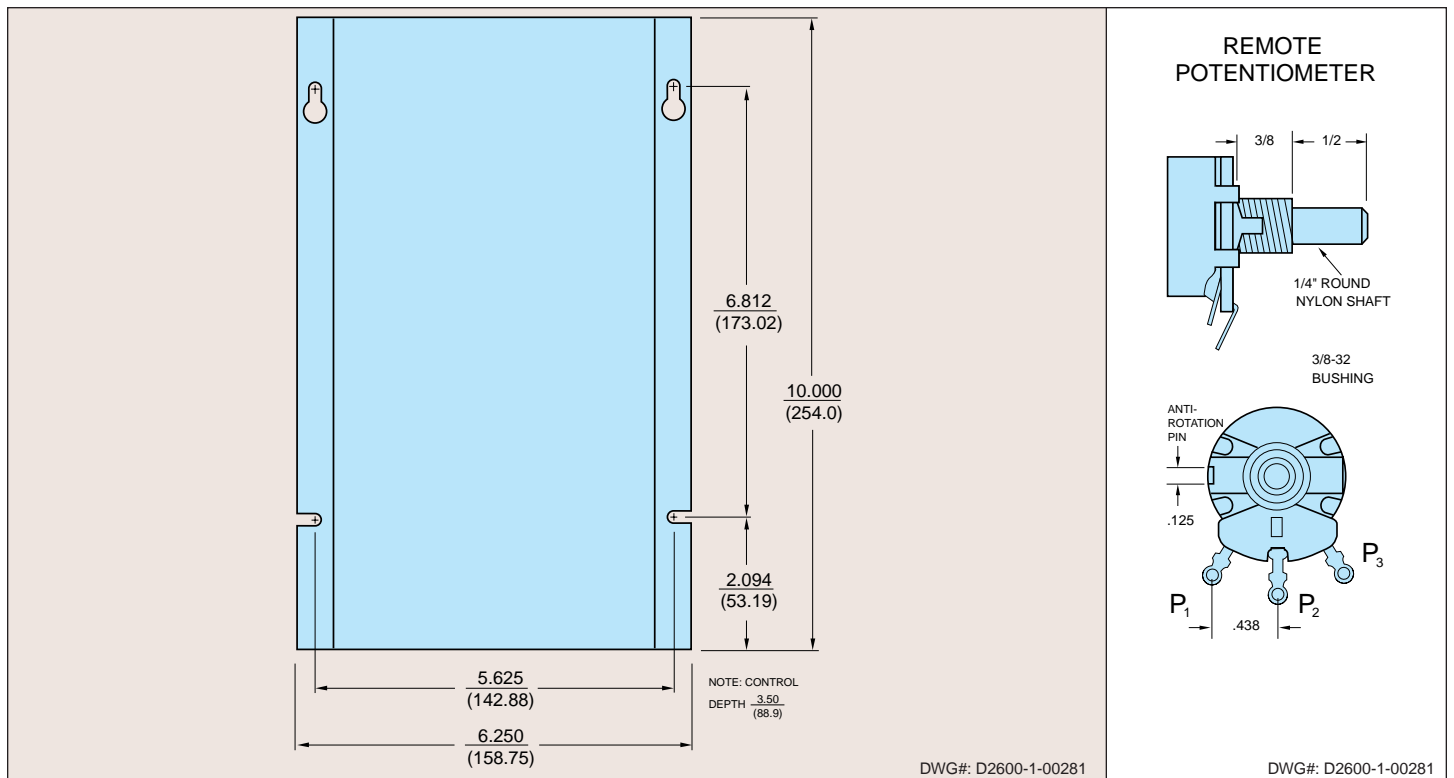
\* CE Compliance Requires CE Approved RFI Filter

## FEATURES & FUNCTIONS

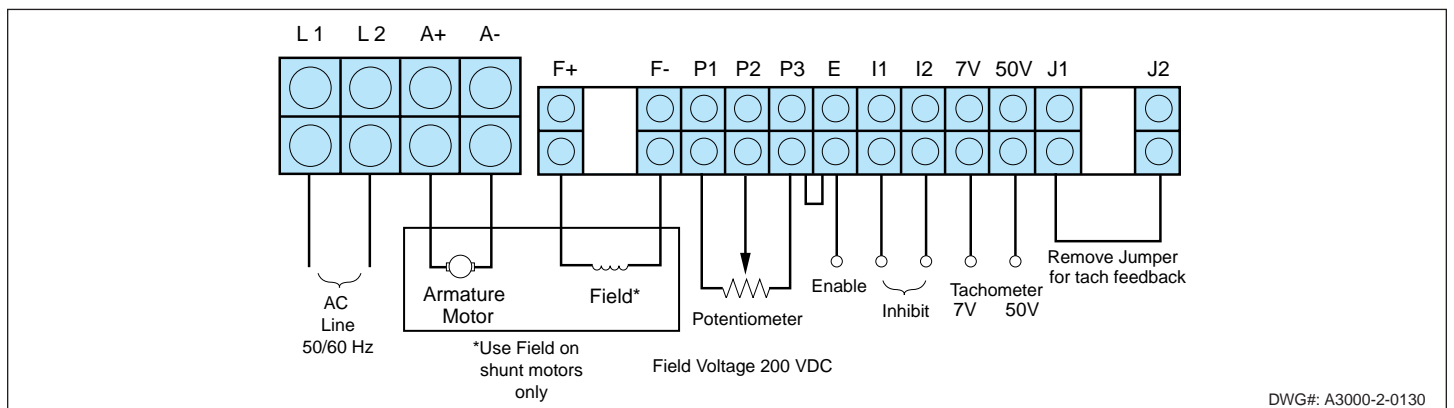
- (1) Rugged Aluminum Heatsink
- (2) KBMM Speed Control
- (3) Power Bridge Module
- (4) Control Fuse
- (5) Armature Fuse
- (6) Barrier Terminal Block
- (7) Trimpots: MIN, MAX, ACCEL, DECEL, IR and CL
- (8) Keyhole slots facilitate mounting
- (9) CL LED Indicator



## MECHANICAL SPECIFICATIONS



## CONNECTION DIAGRAM



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# KBPB™

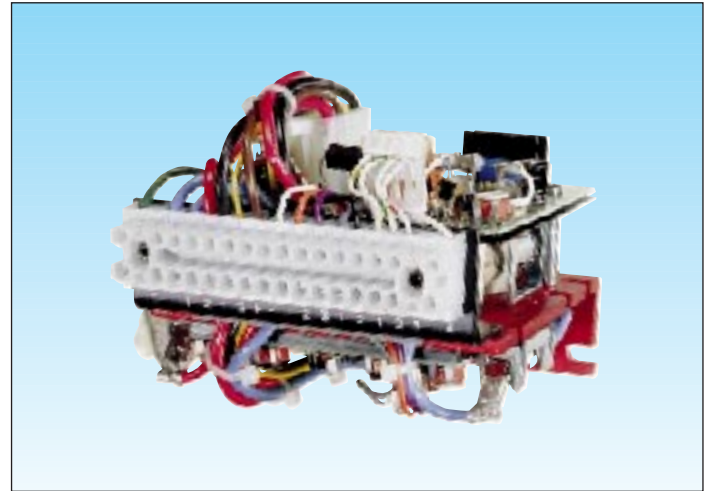
## “CYCLER”

Variable Speed — Run Brake Cycling  
 “Instant” Anti-Plug Reversing  
 for PM and Shunt DC Motors thru 3 Hp

Patented Overload and Reversing Circuit

### TYPICAL APPLICATIONS

- Back Gauges • Door Openers • Feeders
- Indexers • Robotics • Tapping Machines
- Pumps • Screen Presses • Conveyors



### STANDARD FEATURES

- Plug-in Horsepower Resistor®
- Built-in AC Line Fuse (included), Armature Fuse (distributor supplied)
- Trimpots: MIN, MAX, IR, CL, ACCEL, DECEL and Aux. Speed
- Auto Inhibit®, Inhibit™ and Enable
- MOV Transient Protection
- CL LED Indicator
- Voltage Following
- Tachometer or Armature Feedback

### SPECIFICATIONS

Speed Range (Ratio) .....	50:1
Load Regulation (0 – Full Load, 50:1 Speed Range) (% Base Speed) .....	1*
Line Voltage Regulation (At Full Load, ± 15% Line Variation) (% Base Speed) ..	1/2*
Control Linearity (% Speed vs. Dial Rotation) .....	2
CL/Torque Range (% Full Load) .....	0 – 200
ACCEL/DECEL Time Range (Secs.) .....	.2 – 10
MIN Speed Trimpot Range (% Full Speed) .....	0 – 30*
MAX Speed Trimpot Range (% Full Speed) .....	50 – 110*
Maximum Allowable Ambient Temperature (At Full Rating °C/°F) .....	40/105
Maximum Number of Starts/Stops or Reversals (Operations/Minutes) .....	10**

\* Performance is for 90V PM motors on 115 VAC and 180V PM motors on 230 VAC.  
 \*\*Based on a brake time of one (1) second. For increased operations per minute and longer brake time contact factory.

\* CE Compliance Requires KBRF-200A RFI Filter

### DESCRIPTION

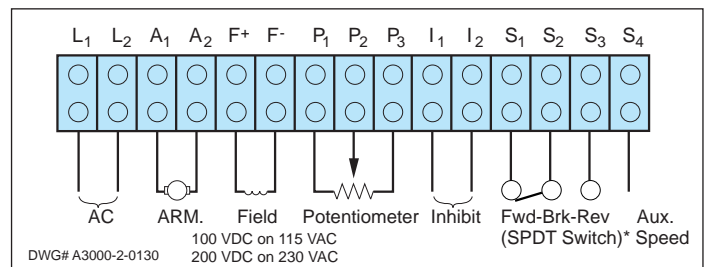
The KBPB™ “cycler” control is designed to provide anti-plug “instant” reversing, solid state dynamic braking and rapid cycling. It combines all of the features of the KBMM™ speed control with the features of the KB APRM®\*. Contact arcing is eliminated since the APRM® allows armature switching to take place only when current levels are near zero. The KBPB contains a built-in barrier terminal block and its compact size makes the control ideal for installation where space is at a premium.

All models are equipped with KB’s exclusive Plug-in Horsepower Resistor®. It eliminates the need for recalibrating IR Comp and Current Limit when the control is used on various horsepower motors. The basic ratings of the controls are enhanced with the addition of KB’s Auxiliary Heat Sink. The controls also contain Inhibit™, which allows for electronic switching of the armature voltage, and Auto Inhibit®, which provides rapid, safe switching of the AC line.

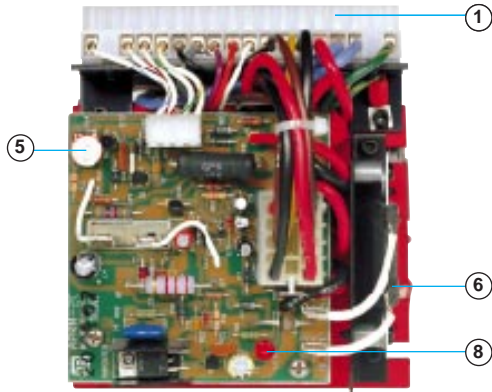
The controls can be used to drive all PM and Shunt Wound DC motors from 0-full speed by three separate methods: a 5K remote speed pot, an auxiliary speed pot (S4 terminal), or voltage following. If the control is to be operated in a voltage following mode, an *isolated* analog signal (0-9VDC) is applied to the input terminals P2 (+) and F (-). Adjustment trimpots are provided for MIN, MAX, IR COMP, CL, ACCEL and DECEL.

\* Patented.

### CONNECTION DIAGRAM



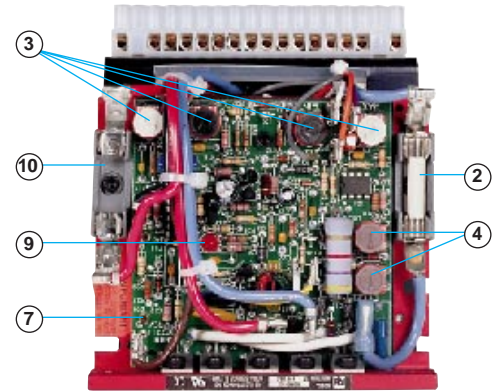
**Note:** Only 10 mA of current is switched. Any switch or relay may be used except a solid state type or a relay with capacitors or R-C networks (snubbers) across its contacts.



TOP VIEW  
(APRM™)

## FEATURES & FUNCTIONS

- (1) Barrier Terminal Block
- (2) AC Line Fuse Included
- (3) Trimpots: MIN, MAX, CL, IR
- (4) Trimpots: ACCEL, DECEL
- (5) Trimpot: Aux. Speed
- (6) Dynamic Brake Resistor
- (7) Plug-in Horsepower Resistor®
- (8) "Brake" LED
- (9) CL LED Indicator
- (10) Armature Fuse (Customer supplied)
- (11) Tach Feedback (not shown)



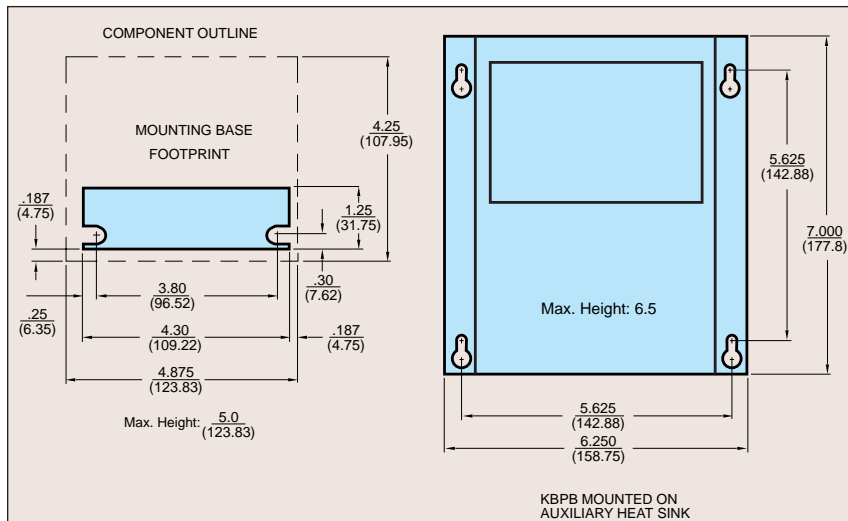
BOTTOM VIEW  
(Speed Control Module)

## ELECTRICAL RATINGS

Model Number	KB Part Number	AC Line Voltage (VAC) ±15% (50/60 Hz)	Motor Voltage (VDC)	Rating Without Auxiliary Heatsink			Rating With Auxiliary Heatsink		
				Max AC Load Current (RMS Amps)	Max DC Load Current (Avg. Amps)	Maximum Horsepower [Hp, (KW)]	Max AC Load Current (RMS Amps)	Max DC Load Current (Avg. Amps)	Maximum Horsepower [Hp, (KW)]
KBPB-125	8900	115	0 - 90	12.0	8.0	0.75, (0.6)	24.0	16.0	1.5, (1.1)
KBPB-225	8901	230	0 - 180	12.0	8.0	1.5, (1.1)	24.0	16.0	3, (2.3)

## MECHANICAL SPECIFICATIONS

INCHES  
[mm]

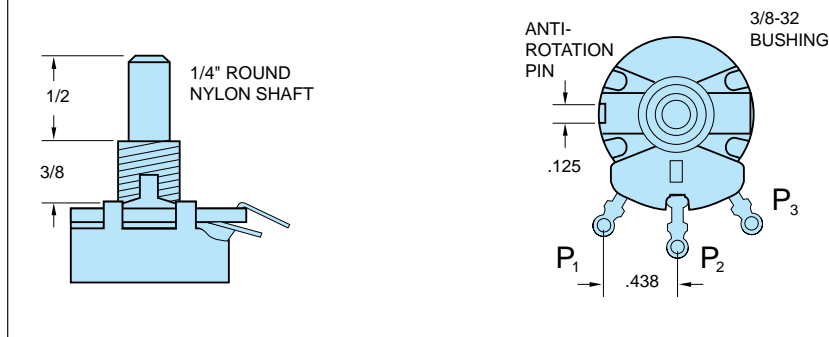


## PLUG-IN HORSEPOWER RESISTOR® CHART

Motor Horsepower Range		Plug-in-Horsepower Resistor® Resistance Value (ohms)
Armature Voltage 90 - 130 VDC	Armature Voltage 180 VDC	
1/100 - 1/50	1/50 - 1/25	1.0
1/50 - 1/30	1/25 - 1/15	.51
1/30 - 1/20	1/15 - 1/10	.35
1/20 - 1/12	1/10 - 1/6	.25
1/12 - 1/8	1/6 - 1/4	.18
1/8 - 1/5	1/4 - 1/3	.1
1/4	1/2	.05
1/3	3/4	.035
1/2	1	.025
3/4	1½	.015
1*	2*	.01
1½*	3*	.006

\* Must be used with Auxiliary Heat Sink.

## REMOTE POTENTIOMETER



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# KBPC-225D

PENTA DRIVE™

NEMA 4X, IP65

Variable Speed-Torque SCR DC Motor Control  
for Shunt Wound and PM DC Motors

1.5 Hp @ 115 VAC – 50/60 Hz

3 Hp @ 230 VAC – 50/60 Hz

Washdown and Watertight  
for Indoor and Outdoor Use



## STANDARD FEATURES

- Electronic Overload Protection
- LED's for "Power On," "Overload" and "Stop"
- Electronic Start-Stop

## JUMPER SELECTABLE FEATURES

- Control Mode: Speed, Torque
- Feedback Type: Armature, Tachometer
- Tachometer Voltage<sup>▲</sup> (VDC): 7, 20/30, 50
- Timed Current Limit: TCL, NTCL

Bold figure indicates factory setting. <sup>▲</sup> Per 1,000 RPM

## TRIMPOT ADJUSTMENTS

- Minimum speed (MIN)
- Current Limit (CL)
- Acceleration (ACCEL)
- Timed Current Limit (TCL)
- Maximum Speed (MAX)
- IR Compensation (IR)
- Deceleration (DECEL)
- Jog Speed (JOG)<sup>▲</sup>

<sup>▲</sup> Used with Run-Stop-Jog option.

## OPTIONAL FEATURES

- Signal Isolator, KBSI-240D (P/N 9431)
- Run-Stop-Jog Switch (P/N 9340)
- White Case (FDA) (P/N 9392)
- Auto/Manual Kit (P/N 9377)

## SPECIFICATIONS

AC Line Input (VAC ± 15%, 50/60 Hz).....	230
Horsepower at 115 VAC Line (Hp) [KW] .....	1.5 [1.13]
Horsepower at 230 VAC Line (Hp) [KW] .....	3 [2.25]
Armature Voltage Range at 230 VAC Line (VDC) ..	0 - 200(1)
Field Voltage at 230 VAC Line (VDC).....	200/100(2)
Ambient Temperature Range (°C) .....	0 - 45
Speed Range (Ratio) .....	50:1(3)
Load Regulation [Armature Feedback] (% Base Speed)....	±1
Load Regulation [Tachometer Feedback] (% Set Speed) ..	±1
AC Line Voltage Regulation ( % Base Speed) .....	±0.5
ACCEL and DECEL Ranges (Seconds) .....	0.1 - 15

## DESCRIPTION

The KBPC Series NEMA 4X IP65 SCR DC Motor Speed and Torque Control is designed for applications requiring washdown watertight integrity. Its housing is ruggedly constructed of die cast aluminum which is protected with an acrylic coating for the ultimate in corrosion resistance. All switches are sealed with rubber boots and the main speed potentiometer contains a shaft seal.

The KBPC state-of-the-art electronics include short circuit and transient protection to provide the ultimate in reliability. Electronic overload protection is also provided, which prevents motor burnout and demagnetization of PM motors. The control can be operated in either the speed or torque mode via a jumper selection. The KBPC contains jumper selections for feedback type (armature/ tachometer).

Standard features include Electronic Start/Stop and LED Indicator Array for "Power On," "Stop" and "Overload."

Although the KBPC is factory set for most applications, a variety of trimpots allow adjustment of the following parameters: MIN and MAX speed, Acceleration, Deceleration, Current Limit, IR Comp, and Timed Current Limit. The drive offers the ultimate in flexibility with the availability of several customer installed options. These include: Run-Stop-Jog, Input Signal Isolation. A complete instruction manual is included.

MIN SPEED Range ( % Base Speed) .....	0 - 30
MAX SPEED Range (% Base Speed) .....	60 - 120
IR COMP Range at 230 VAC Line (VDC) .....	0 - 30
CL Range ( % Range Setting) .....	0 - 180
Timed CL Range (Seconds) .....	0.5 - 15
Voltage Following Linearity (% Base Speed) .....	±0.5

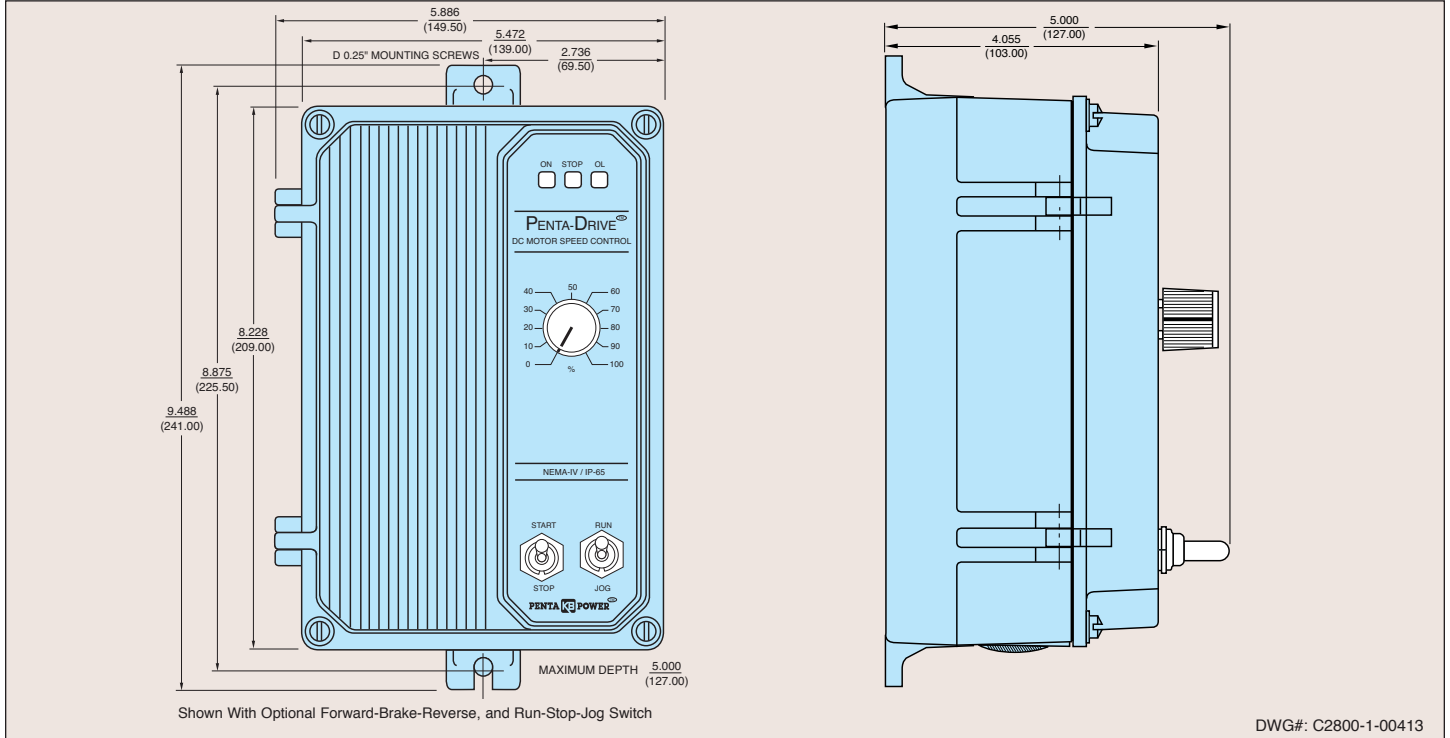
1. Maximum recommended output voltage is 180 VDC at 230 VAC. Exceeding this output voltage will cause a reduction in load regulation performance.
2. For shunt wound motor with lower field voltage, use F1 and L1 connection.
3. Consult motor manufacturers for constant torque speed range of motor. (Typical speed range for most motors is 20:1.)

\* CE Compliance Requires KBRF-200A RFI Filter

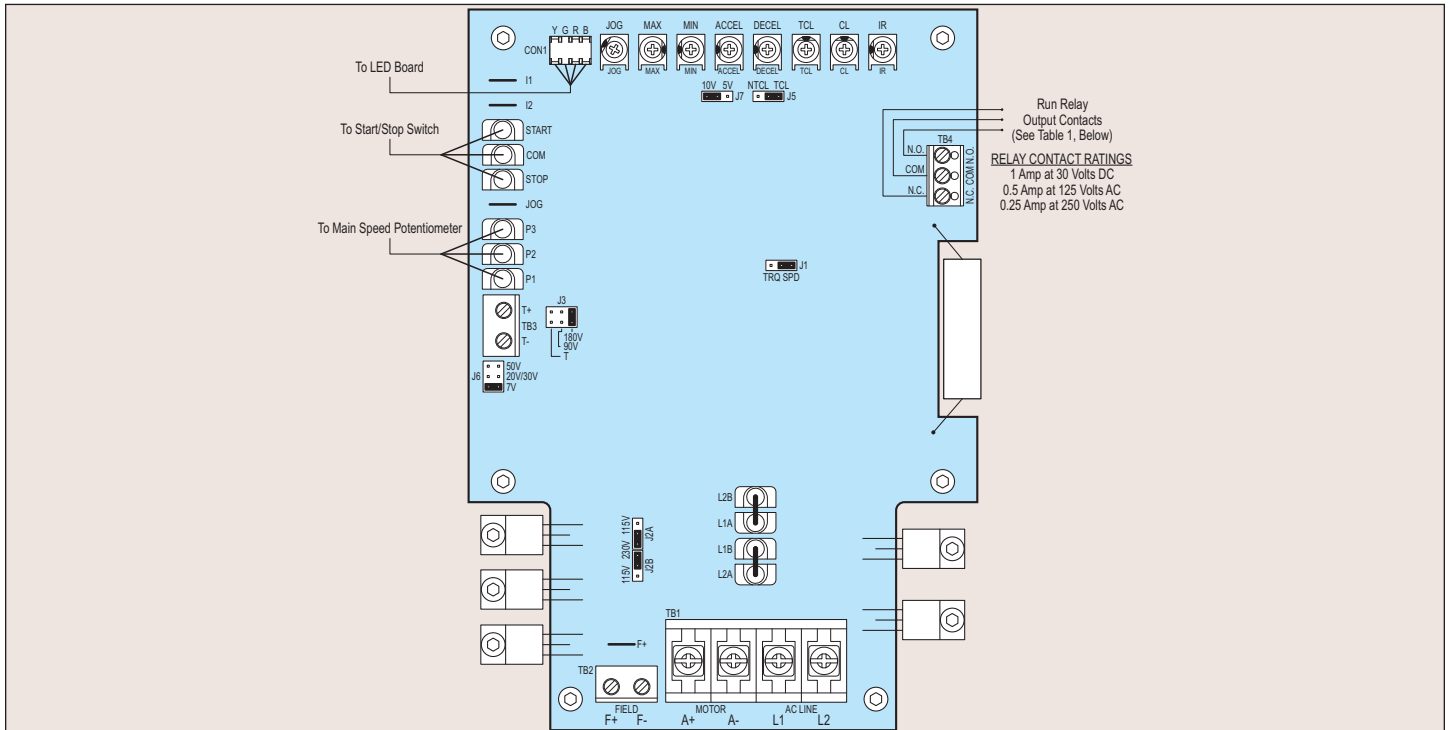
## ELECTRICAL RATINGS

Model Number	KB Part Number		Input Line Voltage (VAC-50/60Hz)	Armature Voltage (VDC)	Maximum AC Load Current (RMS Amps)	Maximum DC Load Current (DC AMPS)	Maximum Power Hp (KW)
	Black	White					
KBPC-225D	9391	9392	115	0 – 90	22	15	1½ (1.13)
			208/230	0 – 90, 180			3 (2.25)

## MECHANICAL SPECIFICATIONS INCHES [mm]



## INTERNAL CONNECTION DIAGRAM





"The Right Control  
for Your Application"

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DATA SHEET D-270

# KBPI SERIES

NEMA-4X, IP-65

## Indexing and Cycling SCR Controls for PM DC Motors

1/6 – 1 HP at 90 VDC, 1/3 – 2 HP at 180 VDC

MODEL KBPI-240D (Unidirectional)  
KB Part No. 8500

MODEL KBPI-240DR (Reversing)  
KB Part No. 8501



DESIGNED FOR INDEXING APPLICATIONS



### STANDARD FEATURES

- LED's for "Power On," Stop and Overload (OL)
- Electronic Start/Stop
- Adjustment Trimpots:  
Minimum Speed (MIN), Maximum Speed (MAX)  
Current Limit (CL), IR Compensation (IR)
- Built-in Armature Fusing

### JUMPER SELECTABLE FEATURES

- AC Line Voltage (VAC – 50/60 Hz): 115/230
- DC Armature Voltage (VDC): 90/180
- DC Current Output (Amps DC): 2 / 3.3 / 5 / 10
- Stop Function Contact: NO / NC
- Run/Stop Priority: Stop / Run

### SPECIFICATIONS

AC Line Input (VAC ± 10%, 50/60 Hz)	115, 230
Horsepower Range at 115 VAC Line	
(HP) [KW]	1/6 – 1 [ .12 – .75 ]
Horsepower Range at 230 VAC Line	
(HP) [KW]	1/3 – 2 [ .25 – 1.5 ]
Armature Voltage Range at 115 VAC Line (VDC)	0 – 100
Armature Voltage Range at 230 VAC Line (VDC)	0 – 200
Current Ranges (ADC)	2, 3.3, 5, 10
CL Trimpot Range (% Range Setting)	0 – 170
MIN Speed Trimpot Range (% Base Speed)	0 – 30
MAX Speed Trimpot Range (% Base Speed)	60 – 120
IR Comp Trimpot Range (VDC)	0 – 30
Speed Range (Ratio)	50:1
AC Line Voltage Regulation (% Base Speed)	± 0.5
Voltage Following Linearity (% Base Speed)	± 0.5
Load Regulation (% Base Speed)	± 1
Ambient Temp Range (EC)	0 – 45
Potentiometer, Front Cover (Ohms ÷ Watts)	5K – 1/3
Maximum Run/Stop Operations (Ops/Min)	30
Enclosure Type (NEMA)	4X

\* CE Compliance Requires KBRF-200 RFI Filter.

### DESCRIPTION

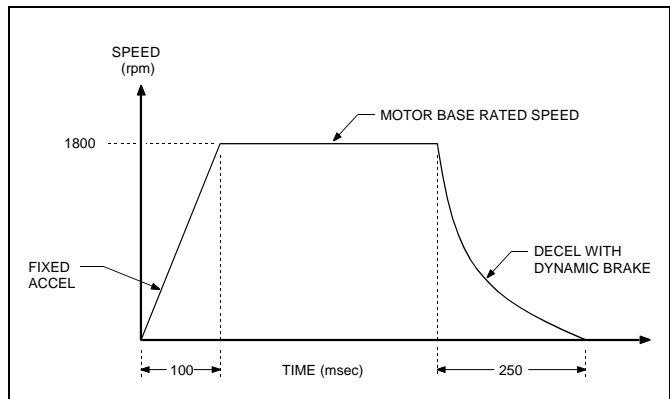
The KBPI INDEXER controls are packaged in a Nema 4X enclosure, which is ruggedly constructed of die cast aluminum. The controls are designed specifically for cycling and indexing applications.

Two models are offered which provide the choice of uni-directional or reversing operation. Both models can operate with either 115 or 230 VAC and with 90 or 180 VDC motors (proper jumper settings are required). The controls provide the user with *isolated* logic functions: STOP, JOG and RUN.

Other functions, such as cycle on demand, can easily be obtained. Another feature of the control is jumper J1 which is used for DC current selection. It automatically presets the IR Compensation and Current Limit for safe operation on various motors. Standard features include built-in armature fusing and an LED indicator array for "power on," "stop" and "overload." Model number KBPC-240DR also contains logic input for "Reverse Run" and "Reverse Jog."

The controls contain trimpots that can be used to readjust Minimum and Maximum speed, Current Limit and IR Compensation. The front panel contains a built-in 5K ohm speed potentiometer and a Run, Jog/Stop switch. Included with each control is a detailed instruction and user manual.

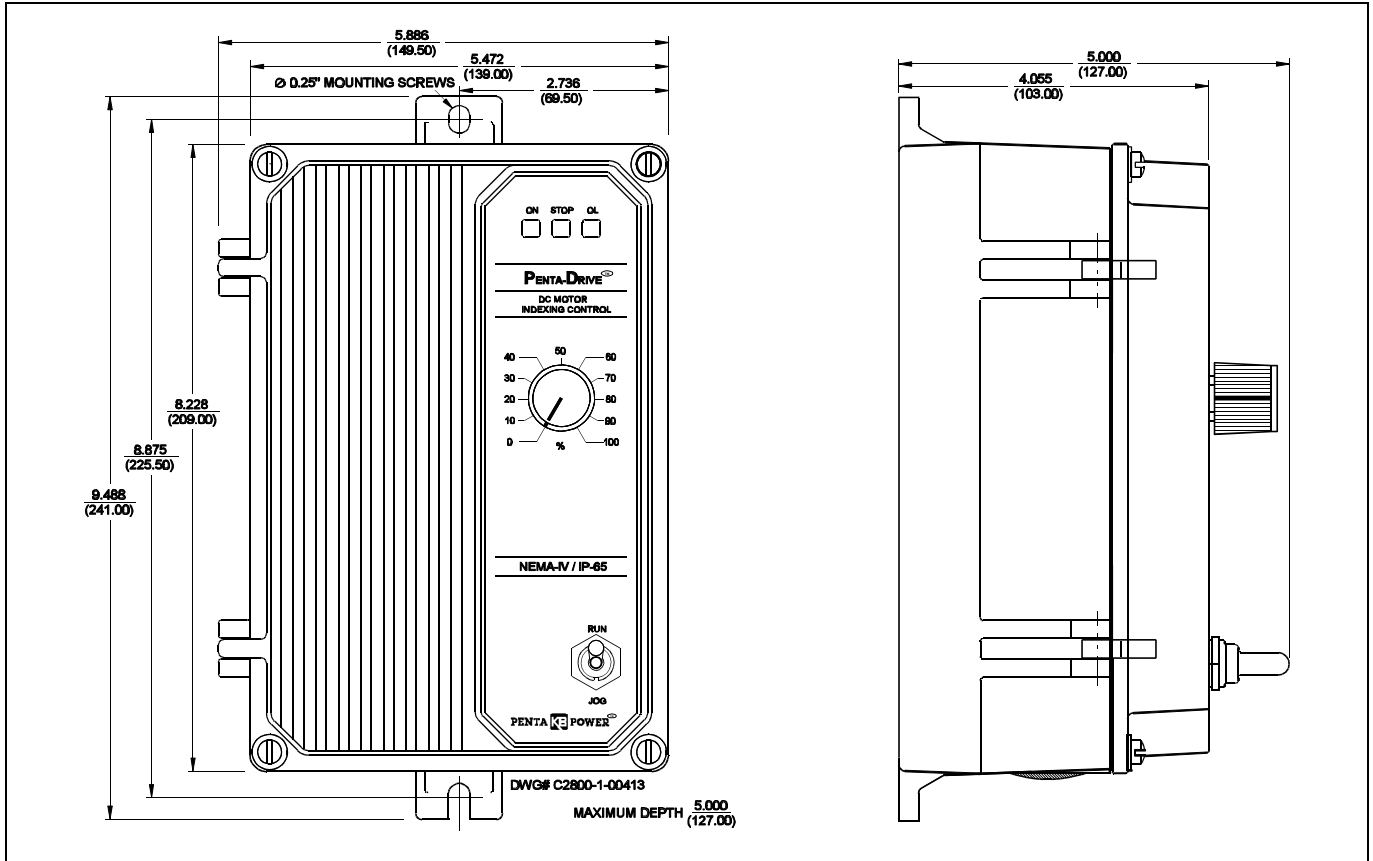
### TOTAL INDEXING PERFORMANCE



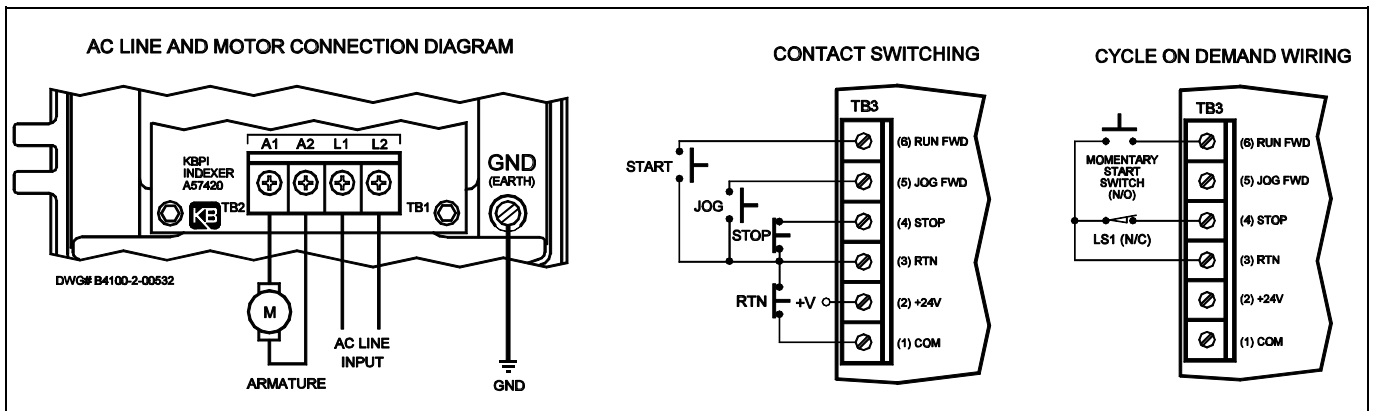
## SPECIFICATIONS

Model Number	KB Part Number	AC Line Voltage (VAC) ±10% 50/60 Hz	Motor Voltage (VDC)	Max. AC Load Current (RMS Amps)	Max. DC Load Current (DC Amps)	Maximum Horsepower HP, (KW)	Type of Operation	Logic Provided
KBPI-240D	8500	115	0 – 90	15	10.2	1, (.75)	Unidirectional	Run, Jog, Stop, Rtn
		230	0 – 180	15	10.2	2, (1.5)	Unidirectional	Run, Jog, Stop, Rtn
		230	0 – 90	15	10.2	1, (.75)	Unidirectional	Run, Jog, Stop, Rtn
KBPI-240DR	8501	115	0 – 90	15	10.2	1, (.75)	Reversing	Fwd Run, Fwd Jog, Stop, Rev Run, Rev Jog, Rtn
		230	0 – 180	15	10.2	2, (1.5)	Reversing	Fwd Run, Fwd Jog, Stop, Rev Run, Rev Jog, Rtn
		230	0 – 90	15	10.2	1, (.75)	Reversing	Fwd Run, Fwd Jog, Stop, Rev Run, Rev Jog, Rtn

## MECHANICAL SPECIFICATIONS INCHES [mm]



## CONNECTION DIAGRAMS



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# KBPW-240D

## PWM DC MOTOR SPEED CONTROL

### NEMA-4X / IP-65

#### For PM and Shunt Motors Rated:

1/50 – 3/4 HP (SCR), 1 HP (PWM) @ 115 VAC

1/25 – 1½ HP (SCR), 2 HP (PWM) @ 230 VAC

#### Rated 7.5 Amps DC, 11.5 Amps AC @ 115/230 VAC

Washdown and Watertight  
for Indoor and Outdoor Use



**Model KBPW-240D**  
**KB Part No. 8401 (Black Case)**  
**KB Part No. 8402 (White Case)**

#### STANDARD FEATURES

- Short Circuit Protection: Protects control from short circuits.
- Electronic Motor Burnout Protection: Shuts down the control if a prolonged overload condition exists.
- Active Bridge: Limits AC Line inrush current.
- Power Transistor Short Circuit Protection: Prevents high speed runaway if the power transistor shorts.
- Heat Spreader: Prevents power transistor failure during momentary overload conditions.
- LEDs: Power on (ON), Stop (STOP) and Overload (OL).
- Auto AC Line Select: Control automatically adjusts for 115 VAC or 230 VAC – 50/60 Hz.
- Start/Stop Switch: Provides electronic start/stop function.
- Output Run Relay: Indicates state of control – (Run or Stop)

#### TRIMPOT ADJUSTMENTS

- Acceleration (ACCEL)
- Deceleration (DECEL)
- Maximum Speed (MAX)
- Minimum Speed (MIN)
- Current Limit (CL)
- Timed Current Limit (TCL)
- IR Compensation (IR)
- Jog (JOG)

#### JUMPER SELECTABLE FEATURES

- J1 (T/90V/180V) selects nominal motor voltage or tachometer generator feedback.
- J2 (1.7A, 2.5A, 3.5A, 5.0A, 7.5A, also low current range) selects motor current. See general performance specifications.
- J3 (TCL/NTCL) selects timed or non-timed current limit.
- J4 (7V/50V) selects tachometer generator voltage.
- J5 (NC/NO) selects normally closed or open run relay contacts.

#### OPTIONAL ACCESSORIES

- On/Off AC line switch (P/N 9341): Disconnects the AC line.
- FWD-BRK-REV switch (P/N 9339): Provides reversing and dynamic braking.
- Run-Stop-Jog switch (P/N 9340): Selects speed setting from either main potentiometer or JOG trimpot.
- Signal Isolator KBSI-240D (P/N 9431): Provides isolation between non-isolated signal sources and the KBPW-240D.
- Anti-Plug Reversing Module APRM (P/N 9378A): Provides electronic braking and instant reversing.
- Auto/Manual Switch (P/N 9377): Selects either isolated signal (from KBSI-240D) or main speed potentiometer signal.

\*Note: Requires CE RFI filter KBRF-200A (KB P/N 9945) or equivalent.

#### DESCRIPTION

The KBPW-240D is a PWM (pulse width modulated) control in a NEMA-4X / IP-65 washdown and watertight enclosure designed to operate Permanent Magnet and Shunt Wound motors through 7.5 Amps DC. The efficient PWM waveform, operating at a switching frequency greater than 16kHz, provides almost pure DC to the motor (form factor <1.05). This provides high motor efficiency, whisper quiet operation along with less motor heating. This allows for a smaller, less costly motor to be used in most applications. Another advantage of PWM is higher output voltage (up to 130 VDC for 115 VAC lines and 220 VDC for 230 VAC lines) which provides increased motor speed.

The KBPW-240D contains pulse-by-pulse current sensing, which provides short circuit protection and prevents control damage due to commutator arcing. Permanent magnet motor demagnetization is virtually eliminated because current peaks are reduced to safe levels. In addition, the main power transistor is mounted to a heat spreader, providing enhanced heat dissipation. This eliminates over temperature cycles that cause premature transistor failure.

A unique feature of the KBPW-240D is its active bridge, which substantially reduces the AC line surge current during cycling of the AC line. This allows the control to be turned on and off rapidly without damage to critical components. The active bridge is coupled with a failsafe circuit that will shut down the control if the main power transistor shorts, preventing a dangerous high-speed runaway condition. Motor burnout is prevented with the Timed Current Limit circuit (TCL) by shutting down the control when an overload condition exists for a predetermined amount of time. A special AC line input circuit automatically adjusts the control for 115 or 230 VAC.

Standard front panel features include diagnostic LEDs (for power on, stop, and overload), Start/Stop Switch, and Speed Potentiometer. Other features include barrier terminal blocks to facilitate wiring, adjustable trimpots (accel, decel, max speed, min speed, current limit, timed CL, IR comp, and jog speed), customer selectable jumpers (motor voltage, motor current, timed current limit, and tach voltage), and an output run relay.

Optional accessories include Fwd-Brk-Rev Switch, On/Off AC Line Switch, Run-Stop-Jog Switch, Signal Isolator, and an Anti-plug Reversing Module. Quick-connect terminals are provided for easy installation of all accessories.

## MODEL KBPW-240D (KB Part No's 8401 and 8402<sup>1</sup>) – GENERAL PERFORMANCE SPECIFICATIONS

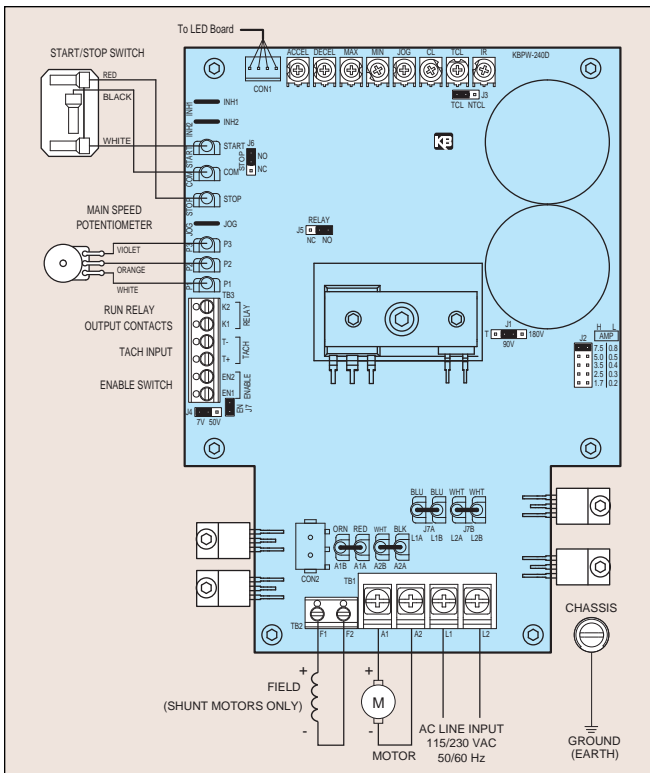
Parameter	Specification	Factory Setting
Operating Frequency (kHz)	>16	—
Operating Temperature Range at Full Rating (°C)	0 – 50	—
Current Range (High Scale) (Amps DC)	1.7, 2.5, 3.5, 5.0, 7.5	7.5
Current Range (Low Scale) (Amps DC) <sup>2</sup>	0.2, 0.3, 0.4, 0.5, 0.8	—
ACCEL and DECEL Range (Seconds)	0.5 – 10	1
Jog Speed (% Base Speed)	0 – 50	15
MIN Speed Range (% Base Speed (90VDC & 180VDC Motors))	0 – 30	0
MAX Speed Range (% Base Speed (90VDC & 180VDC Motors))	50 – 140	100
IR Comp Range at 90 Volts DC Output (ΔVolts DC at Full Load)	0 – 15	4
IR Comp Range at 180 Volts DC Output (ΔVolts DC at Full Load)	0 – 30	8
CL Range (% Range Setting)	0 – 200	150
Timed Current Limit (TCL) Range (Seconds)	0.5 – 10	5
AC Line Input Voltage (Volts AC ±10%, 50/60 Hz)	115 – 208/230	—
AC Line Regulation (% Base Speed)	0.5	—
Armature Voltage Range at 115 Volts AC Line Input (Volts DC)	0 – 130	90
Armature Voltage Range at 208/230 Volts AC Line Input (Volts DC)	0 – 130 <sup>3</sup> , 0 – 260	90
Armature Feedback Load Regulation (% Base Speed)	± 1	—
Tach-Generator Feedback Load Regulation (% Set Speed)	± 1	—
Field Voltage at 115 Volts AC Line Input (Volts DC)	100 / 50	—
Field Voltage at 208/230 Volts AC Line Input (Volts DC)	200 / 100	—
Speed Range (Ratio)	50:1	—
Voltage Following Linearity (% Base Speed)	± 0.5	—

Notes: 1. KB P/N 8402 – FDA approved white epoxy finish. 2. For low current operation, remove R35. 3. Step-down operation – Motor may have reduced brush life – Consult motor manufacturer.

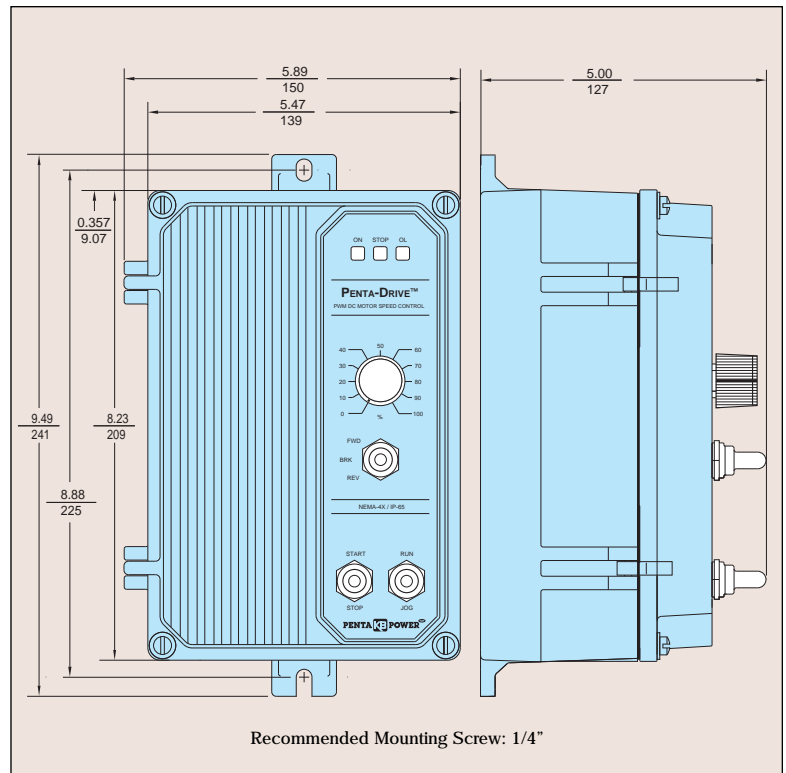
### ELECTRICAL RATINGS

AC Line Voltage (±10%, 50/60 Hz) (VAC)	Maximum Motor Voltage (VDC)	Maximum AC Line Current (Amps RMS)	Maximum DC Load Current (Amps DC)	Maximum Horsepower HP, (kW)		Field Voltage (VDC)
				SCR Rated Motors	PWM Rated Motors	
115	130	11.5	7.5	3/4, (0.5)	1, (0.75)	100
230	220	11.5	7.5	1 1/2, (1)	2, (1.5)	200

### CONTROL LAYOUT & CONNECTION DIAGRAM



### MECHANICAL SPECIFICATIONS (Inches / mm)



**KB ELECTRONICS, INC.**

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Outside Florida Call **TOLL FREE** (800) 221-6570 • **E-mail** – info@kbelectronics.com

www.kbelectronics.com

(A42102) – Rev. C – 7/2004

# KBRC-240D

## Full-Wave 4-Quadrant Regenerative Drive for Speed & Torque Control of PM & Shunt DC Motors NEMA-4X / IP-65

Rated for 1/10 - 1 HP (90 Volts DC) @ 115 Volts AC, 50/60 Hz  
and 1/5 - 2 HP (180 Volts DC) @ 208/230 Volts AC, 50/60 Hz  
Washdown and Watertight for Indoor and Outdoor Use



• Conveyors • Feeders • Packaging Equipment  
• Positioners • Textile Equipment • Indexers



### TYPICAL APPLICATIONS



Model KBRC-240D  
KB Part No. 8840  
(Black Case)  
KB Part No. 8841  
(White Case)

### STANDARD FEATURES

- **Industrial Duty Die-Cast Aluminum Case:** Available in black finish (P/N 8840) and white FDA approved finish (P/N 8841).
- **Front Panel LEDs:** Power On (ON), Stop (STOP) and Overload (OL).
- **PC Board LEDs:** Power On (PWR ON), Overload (OL), Forward Enable (FWD EN) and Reverse Enable (REV EN).
- **Run Relay:** Used to signal a warning or to shut down other equipment if the control is put into "stop" or times out in TCL.
- **Start/Stop Switch:** Provides electronic start and stop functions.
- **Barrier Terminal Blocks:** Facilitates wiring of motor, AC line, Tach-generator and run relay.

### PROTECTION FEATURES

- **AC Line Transient Protection:** Provides protection to power devices from AC line transients.
- **Auto-Inhibit<sup>®</sup>:** Allows rapid, safe cycling of the AC line.
- **Motor Burnout Protection (I x t):** Shuts down control if the motor is overloaded for a predetermined amount of time.
- **Regeneration Overspeed Protection:** Prevents power bridge failure in extreme overhauling conditions.

### TRIMPOT ADJUSTMENTS

- **Offset (OFFSET)**
- **Reverse Accel (RACC)**
- **Forward Accel (FACC)**
- **Maximum Speed (MAX)**
- **Forward CL (FWDCL)**
- **Reverse CL (REVCL)**
- **IR Comp (IR)**
- **Response (RESP)**
- **Dead Band (DB)**
- **Timed CL (TCL)**

### JUMPER SELECTABLE FEATURES

- **J1/J2 (115V, 230V):** Selects AC line input voltage.
- **J3 (A90, A180, T7, T50):** Selects motor voltage or tach feedback.
- **J4 (1.7A, 2.5A, 5A, 7.5A, 10A):** Selects motor current.
- **J5 (10V, 15V):** Selects analog input voltage.
- **J6 (SPD, TRQ):** Selects control mode.
- **J7 (S/L, NL):** Selects Linear or Non-Linear Torque Mode.
- **J8 (TCL, NTCL):** Selects current limit mode.
- **J9 (RTS, CTS):** Selects stopping mode.
- **J10 (NC, NO):** Selects run relay output contacts.
- **J11 (EN):** Enable Jumper.

### OPTIONAL ACCESSORIES

- **Forward-Stop-Reverse Switch (P/N 9485):** Provides motor reversing and regenerative braking.
- **Power On/Off Switch (P/N 9486):** Disconnects the AC line.
- **Signal Isolator SIRC (P/N 8842):** Provides isolation between a non-isolated signal voltage source and the KBRC-240D.
- **Auto/Manual Switch (P/N 9487):** Selects signal input from either the SIRC Signal Isolator or the Main Speed Potentiometer.

Note: \* Requires CE RFI filter KBRF-200A (KB P/N 9945) or equivalent.

### DESCRIPTION

The KBRC-240D is a Full-Wave Regenerative Drive in a NEMA-4X / IP-65 washdown and watertight enclosure. It is designed to operate 90 and 180 Volt Permanent Magnet and Shunt Wound DC motors in a bidirectional mode. It provides 4-quadrant operation, which allows forward and reverse torque in both speed directions. This allows the control to maintain constant speed with overhauling loads and provides rapid instant reversing and controlled braking. Because of its excellent performance, the control can replace servo drives in many applications.

The KBRC-240D has a Regeneration Overspeed Protection Circuit, which prevents failure of the power bridge in extreme overhauling conditions. Motor overload protection (I x t) will shut down control if the motor is overloaded for a predetermined amount of time. The exclusive Auto-Inhibit<sup>®</sup> circuit allows safe, smooth starting during rapid cycling of the AC line.

Due to its user-friendly design, the KBRC-240D is easy to install and operate. Tailoring to specific applications is accomplished via selectable jumpers and trimpot adjustments. However, for most applications, no adjustments are necessary.

The KBRC-240D can be operated from a two or three wire start/stop circuit or can be started from the AC line. A set of dedicated normally open or normally closed relay contacts are provided, which are activated via the start/stop circuit. They can be used to turn on or off equipment or to signal a warning if the control is put into Stop Mode or times out in TCL.

Main features of the KBRC-240D include Speed or Torque control modes. In Linear Torque mode (S/L), speed and torque vary linearly as a function of main speed potentiometer rotation or input signal. In Non-Linear Torque mode (NL), the torque is varied by the main speed potentiometer or input signal, and remains constant throughout the motor's entire speed range. In addition, Regenerate-to-Stop (RTS) or Coast-to-Stop (CTS) stopping modes are also provided.

Standard front panel features of the KBRC-240D include diagnostic LEDs (for Power On, Stop and Overload), a Start/Stop Switch and a Main Speed Potentiometer. Other features include Barrier Terminal Blocks (facilitates wiring of the AC line, motor, tach-generator and run relay), adjustable trimpots (OFFSET, RACC, FACC, MAX, FWDCL, REVCL, IR, RESP, DB and TCL), selectable jumpers (AC line voltage, motor voltage or tach feedback, motor current, analog input voltage, control mode, torque mode, current limit mode, regeneration mode, run relay and enable) and LEDs (Power On, Overload, Forward Enable and Reverse Enable).

Optional accessories for the KBRC-240D include a Forward-Stop-Reverse Switch, a Power On/Off Switch, a Signal Isolator and an Auto/Manual Switch. Quick-connect terminals are provided for easy installation of all accessories.

**MODEL KBRC-240D (KB Part Nos. 8840 and 8841') – GENERAL PERFORMANCE SPECIFICATIONS**

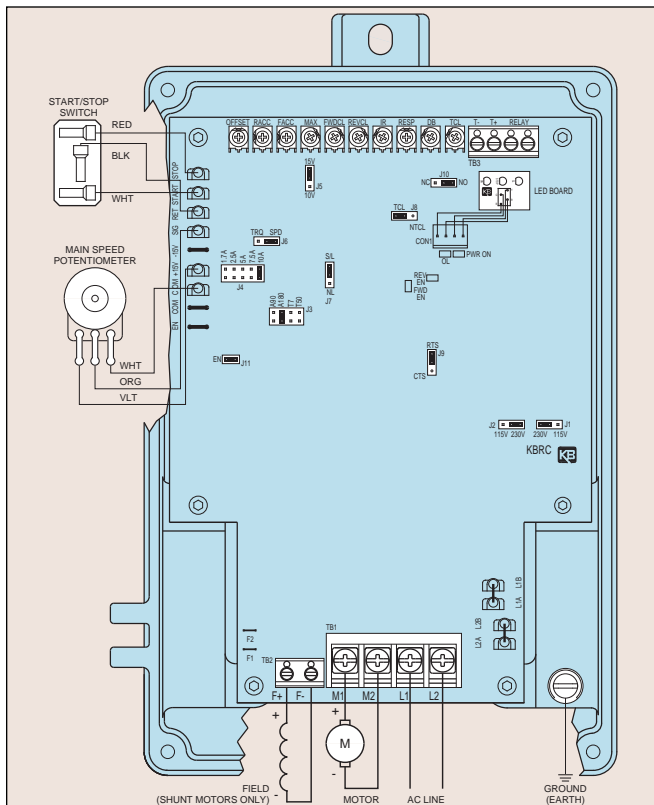
Parameter	Specification	Factory Setting
AC Line Input Voltage (Volts AC, ±10%, 50/60 Hz)	115 and 208/230	230
Armature Voltage Range at 115 Volts AC Line (Volts DC)	0 – ±90	—
Armature Voltage Range at 208/230 Volts AC Line (Volts DC)	0 – ±90 <sup>2</sup> , 0 – ±180	0 – ±180
Field Voltage at 115 Volts AC Line (Volts DC)	100/50	—
Field Voltage at 208/230 Volts AC Line (Volts DC)	200/100	—
Signal Following Input (Non-Isolated <sup>3</sup> ) Range (Volts DC)	0 – ±10, 0 – ±15	0 – ±15
Signal Following Linearity (% Base Speed)	1	—
Line Regulation (% Base Speed)	±0.5	—
Armature Feedback Load Regulation (% Base Speed)	±1	—
Tach-Generator Feedback Load Regulation (% Set Speed)	±1	—
Maximum Load Capacity (% for 2 Minutes)	150	—
Current Ranges (Amps DC)	1.7, 2.5, 5, 7.5, 10	10
Speed Range (Ratio)	50:1	—
Operating Temperature Range (°C)	0 – 45	—
Offset Trimpot (OFFSET) Range (% Base Speed)	0 – ±10	0
Reverse Acceleration Trimpot (RACC) Range (Seconds)	0.2 – 15	1
Forward Acceleration Trimpot (FACC) Range (Seconds)	0.2 – 15	1
Maximum Speed Trimpot (MAX) Range (% Base Speed)	70 – 110	100
Forward Current Limit Trimpot (FWDCL) Range (% Range Setting)	0 – 200	150
Reverse Current Limit Trimpot (REVCL) Range (% Range Setting)	0 – 200	150
IR Compensation Trimpot (IR) Range at 90 Volts DC Output (Volts DC at Full Load)	0 – 15	—
IR Compensation Trimpot (IR) Range at 180 Volts DC Output (Volts DC at Full Load)	0 – 30	10
Deadband Trimpot (DB) Range (% Base Speed)	0 – ±3	0.5
Timed Current Limit Trimpot (TCL) Range (Seconds)	0 – 15	5

**ELECTRICAL RATINGS**

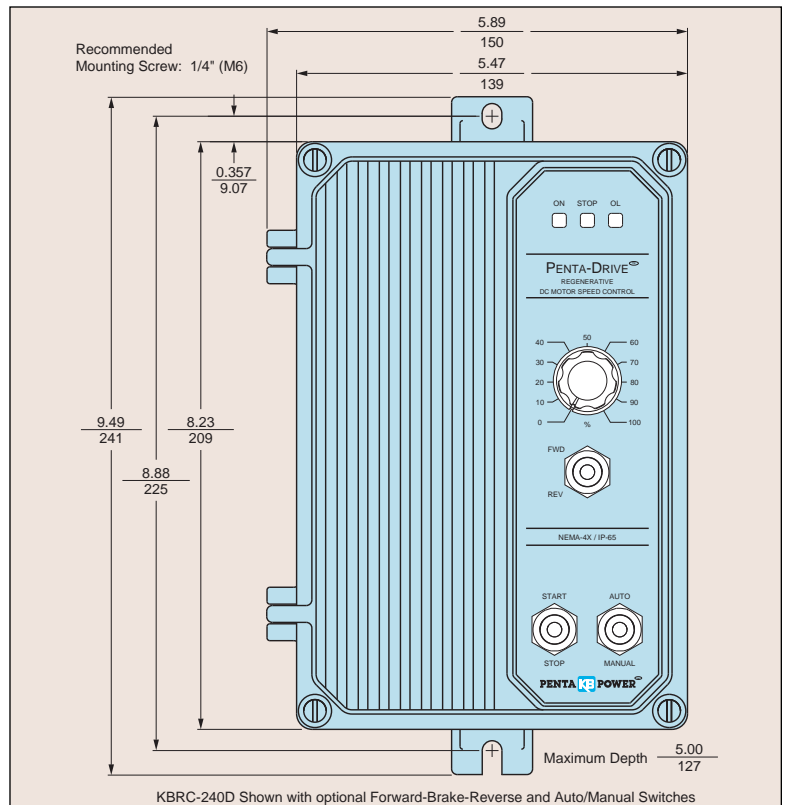
AC Line Input Voltage ±10%, 50/60 Hz (Single Phase Volts AC)	Maximum AC Line Input Current (Amps AC)	Nominal Output Voltage (Volts DC)	Maximum Output Load Current (Amps DC)	Maximum Horsepower Rating HP, (KW)
115	15	0 – ±90	11	1, (0.75)
208/230	15	0 – ±180	11	2, (1.5)
208/230	15	0 – ±90 <sup>2</sup>	11	1, (0.75)

Notes: 1. KB Part No. 8841 is white FDA approved finish., 2. Step-down operation: Motor may have reduced brush life. Consult motor manufacturer.  
3. Requires an isolated signal. If a non-isolated signal is used, install the Signal Isolator SIRC (P/N 8842).

**CONTROL LAYOUT & CONNECTION DIAGRAM**



**MECHANICAL SPECIFICATIONS (Inches / mm)**



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www.kbelectronics.com

# KBWS

## Pulse Width Modulated (PWM) Whisper-Drive™ DC Motor Speed Controls with Built-in Input Signal Isolation

### For Permanent Magnet DC Motors Rated:

1/50 – 1/2 HP (SCR), 3/4 HP (PWM) @ 115 Volts AC  
1/25 – 1 HP (SCR), 1½ HP (PWM) @ 208/230 Volts AC

### TYPICAL APPLICATIONS

- Medical Equipment • Packaging Equipment
- Web Processing • Winding Machinery
- Conveyors • Machine Tools



Model KBWS-15 Shown

### BENEFITS

- Replaces costly choke and capacitor filtering.
- Provides quieter and cooler operation.
- Extended brush life on SCR rated motors.

### STANDARD FEATURES

- **Plug-in Horsepower Resistor®:** Automatically calibrates IR Compensation and Current Limit (supplied separately).
- **Diagnostic LEDs:** Power On (PWR ON) and Current Limit (CL).
- **Short Circuit Protection:** Protects the control from a short circuit at the motor.
- **Isolated Signal Input Circuit:** Eliminates the need for an external signal isolator (accepts 0 - 5 Volts DC input).
- **Protection Features:** Undervoltage protection. MOV input transient protection. AC line inrush current limit protection.
- **Inhibit Circuit:** Provides electronic coast-to-stop.
- **Auto AC Line Select:** Control automatically adjusts for 115 or 208/230 Volt AC line input (dual voltage models).
- **Motor Voltage Selection:** Allows motor voltage to be set to 90/130 or 180 Volts DC (dual voltage models).

### TRIMPOT ADJUSTMENTS

- **Maximum Speed (MAX)**
- **Minimum Speed (MIN)**
- **Current Limit (CL)**
- **Deceleration (DEC)**
- **Acceleration (ACC)**
- **IR Compensation (IR)**

### OPTIONAL ACCESSORIES

- **DIN Rail Mounting Kit (Part No. 9995):** Allows mounting of the control to a DIN Rail.
- **AC Line / Armature Fuse Kit (Part No. 9849)**

\*Requires CE RFI filter KBRF-300 (KB P/N 9484) or equivalent.

### DESCRIPTION

The KBWS PWM (pulse width modulated) controls are designed to operate PWM and SCR rated Permanent Magnet motors ranging from 1/50 HP to 1½ HP. They operate at a switching frequency greater than 16 kHz to provide high motor efficiency and quiet operation. Another advantage of PWM is higher output voltage (up to 130 Volts DC for 115 Volt AC line and 220 Volts DC for 208/230 Volt AC line) which provides increased motor speed.

The KBWS contains pulse-by-pulse current sensing, which provides short circuit protection and prevents control damage due to commutator arcing. Permanent magnet motor demagnetization is completely eliminated because current peaks are reduced to safe levels. The controls contain an AC line inrush current limiter (ICL) which reduces the AC line surge current during startup.

Standard features of the KBWS include diagnostic LEDs (Power On and Current Limit) and adjustable trim pots (Maximum Speed, Minimum Speed, Acceleration, Deceleration, Current Limit, IR Compensation). Also provided is a connector for an Inhibit Switch and quick-connect terminals for AC line, motor armature and Main Speed Potentiometer. The Plug-In Horsepower Resistor® matches the motor characteristics to the control which eliminates the need to recalibrate the Current Limit (CL) IR Compensation (IR) trim pots.

The KBWS contains built-in isolation for all inputs. This includes signal voltage, Main Speed Potentiometer, Inhibit Circuit, and +5VDC Power Supply. The dual voltage models contain a jumper to select motor voltage and special circuitry which automatically accepts AC line input voltages of 115 or 208/230 Volts AC without having to make a jumper selection.

Optional accessories for the KBWS include a DIN Rail Mounting Kit and an AC Line / Armature Fuse Kit.



**SAFETY WARNING!** This control does not contain protection circuitry to prevent full speed runaway in the event of main power transistor failure. Therefore, the installer of this product should take proper precautions to include other means, such as mechanical disconnects, warning notices, etc., to protect the operator of the machine involved.

**Application Note:** This control is not recommended for applications where the AC line is to be rapidly cycled on and off.



Automation and Control

TABLE 1 – GENERAL PERFORMANCE SPECIFICATIONS

Description	Specification	Factory Setting
AC Line Voltage Regulation (% Base Speed)	0.5	—
Armature Voltage Range at 115 Volt AC Line Input (Volts DC)	0 – 130	90
Armature Voltage Range at 208/230 Volt AC Line Input (Volts DC)	0 – 130, 0 – 220	180
Maximum Load Capacity (% for 2 Minutes)	150	—
Switching Frequency at Motor (kHz)	>16	—
Signal Following Input Voltage Range (Volts DC)	0 – 5	—
Maximum Speed Trimptot (MAX) Range (% Base Speed)	70 – 100	100
Minimum Speed Trimptot (MIN) Range (% Base Speed)	0 – 30	0
Acceleration Trimptot (ACC) Range (Seconds)	0.2 – 10	1
Deceleration Trimptot (DEC) Range (Seconds)	0.2 – 10	1
Current Limit Trimptot (CL) Range (% Full Load)	0 – 200	150
IR Compensation Trimptot (IR) Range at 90/130 Volts DC Output (Volts DC)	0 – 10	5
IR Compensation Trimptot (IR) Range at 180/220 Volts DC Output (Volts DC)	0 – 20	10
Speed Regulation (50:1 Speed Range) (% Base Speed)	1	—
Speed Range (Ratio)	50:1	—
Operating Temperature Range (°C / °F)	0 – 40* / 32 – 104	—
Operating Humidity Range (% Relative, Non Condensing)	0 – 95	—
Storage Temperature Range (°C / °F)	-25 – +85 / -13 – +185	—

\*All models are rated at 40 °C, maximum ambient temperature, at the Rated Load Current.

TABLE 2 – ELECTRICAL RATINGS

Model	Part No.	AC Line Input Voltage (±10%,50/60Hz) (Single Phase Volts AC)	Motor Voltage (Volts DC)	Maximum AC Line Current (Amps AC)	Maximum Load Current <sup>1</sup> (Amps DC)	Maximum Horsepower Rating HP, (kW)	
						SCR Rated Motors	PWM Rated Motors
KBWS-12 <sup>2</sup>	9490	115	0 - 90, 130	4.0	2.5	1/4, (0.18)	1/3, (0.25)
KBWS-15 <sup>2</sup>	9491	115	0 - 90, 130	8.0	5.0	1/2, (0.37)	3/4, (0.5)
KBWS-22D	9492	115	0 - 90, 130	4.0	2.5	1/4, (0.18)	1/3, (0.25)
		208/230	0 - 180, 220	4.0	2.5	1/2, (0.37)	3/4, (0.5)
KBWS-25D	9493	115	0 - 90, 130	8.0	5.0	1/2, (0.37)	3/4, (0.5)
		208/230	0 - 180, 220	8.0	5.0	1, (0.75)	1½, (1)
			0 - 90, 130	8.0	5.0	1/2, (0.37)	3/4, (0.5)

Notes: 1. For ambient temperatures above 40 °C, all drives are derated 2.5% per °C. 2. Minimum Order, 100 Pieces.

TABLE 3 – PLUG-IN HORSEPOWER RESISTOR® SELECTION CHART

Motor Current (Amps DC)	SCR Rated Motor Horsepower Ranges [HP, (kW)]		PWM Rated Motor Horsepower Ranges [HP, (kW)]		Plug-in Horsepower Resistor®	
	90 Volt DC	180 Volt DC	130 Volt DC	200 Volt DC	Ω	Part No.
3.3 – 5.0	1/3, (0.25) – 1/2, (0.37)	3/4, (0.5) – 1, (0.75)	1/2, (0.37) – 3/4, (0.5)	1, (0.75) – 1½, (1)	0.1	9838
2.5	1/4, (0.18)	1/2, (0.37)	1/3, (0.25)	3/4, (0.5)	0.18	9837
1.3 – 2.0	1/8, (0.09) – 1/6, (0.1)	1/4, (0.18) – 1/3, (0.25)	1/6, (0.1) – 1/4, (0.18)	1/3, (0.25) – 1/2, (0.37)	0.25	9836
0.7 – 1.0	1/15, (0.05) – 1/10, (0.08)	1/6, (0.1) – 1/5, (0.15)	1/12, (0.06) – 1/8, (0.09)	1/6, (0.1) – 1/4, (0.18)	0.51	9834
0.4 – 0.6	1/30, (0.02) – 1/20, (0.04)	1/15, (0.05) – 1/10, (0.08)	1/20, (0.04) – 1/15, (0.05)	1/8, (0.09) – 1/6, (0.1)	1.0	9833
0.1 – 0.3	1/100, (0.007) – 1/50, (0.01)	1/50, (0.01) – 1/25, (0.03)	1/50, (0.01) – 1/30, (0.02)	1/25, (0.03) – 1/20, (0.04)	2.0	9949

FIGURE 1 – MECHANICAL SPECIFICATIONS (Inches/mm)

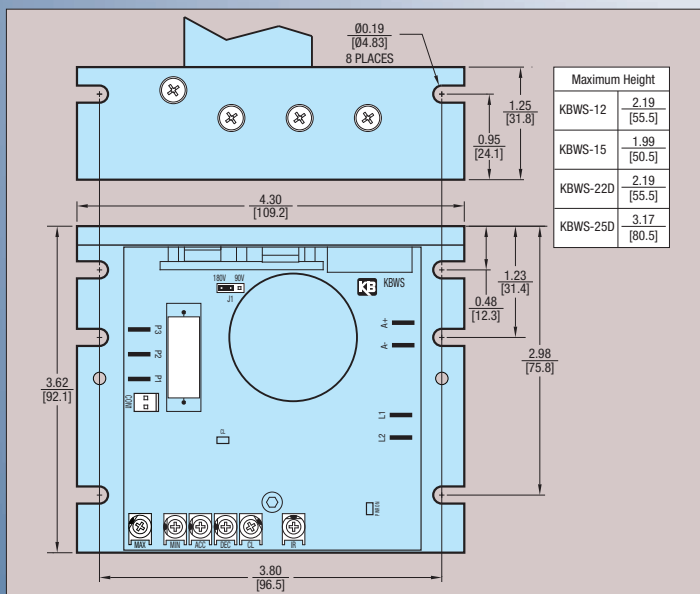
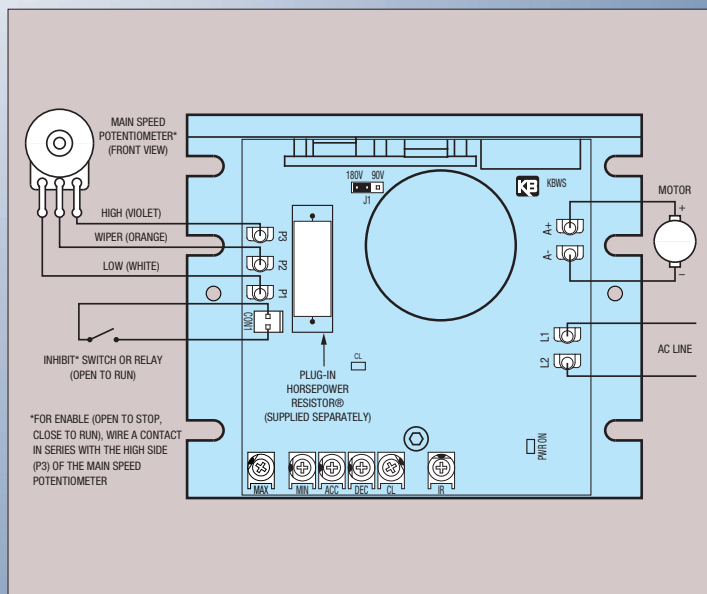


FIGURE 3 – CONTROL LAYOUT & CONNECTION DIAGRAM

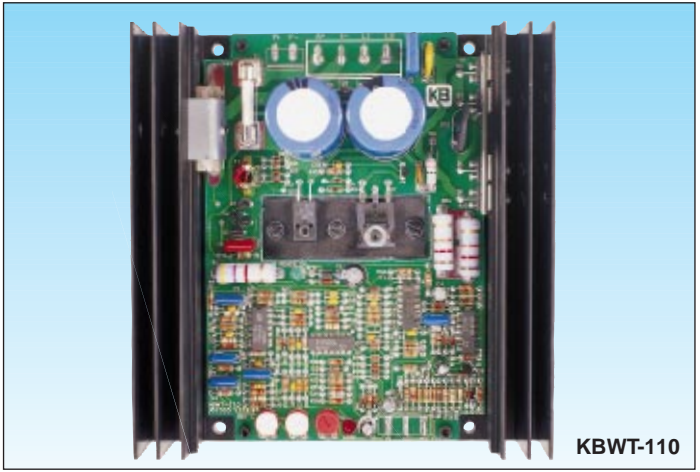


# KBWT – HIGH CURRENT PULSE WIDTH MODULATED (PWM) WHISPER-DRIVE™ DC Motor Speed Control

Specifically Designed For DC Motors  
That Require a 1.0 Form Factor

Provides Quieter and Cooler Motor  
Operation and Extended Brush Life

Replaces Costly Choke & Capacitor Filtering 



KBWT-110

## STANDARD FEATURES – All Models

- Short Circuit Protection
- Electronic Motor Burnout Protection (I x t)
- LED's for "Power On" and Overload (OL)
- Active Bridge: Provides controlled AC line inrush current limiting
- Power Transistor Short Circuit Runaway Protection
- Heat-Spreader: Prevents power transistor failure due to overloads
- Under Voltage Protection
- Adjustment Trimpots:  
Minimum Speed (MIN)<sup>▲</sup>, Maximum Speed (MAX), IR Compensation (IR)<sup>▲</sup>, Current Limit (CL)<sup>▲</sup>
- Potentiometer Safety Circuit (optional):  
Prevents startup with the AC line unless speed potentiometer is set to zero
- Armature Fuse (optional)

## SPECIFICATIONS

Speed Range (Ratio) .....	50:1
Operating Frequency (KHz) .....	>16
Form Factor (RMS/Avg Amps) .....	<1.05
Operating Temperature Range (°C) .....	0 – 45
Load Regulation (% Base Speed) .....	1*
Acceleration Range (Secs) (Fixed 0.2, 2.5, 7, 10) .....	2.5
MIN Speed Trimpot Range (% Full Speed) .....	0 – 30
MAX Speed Trimpot Range (% Full Speed) .....	50 – 100
CL Range (% Range Setting) .....	0 – 200
Motor Overload Protection Time (Secs, Fixed 3,5,10) .....	3
IR COMP Range (ΔVDC) .....	0 – 15
AC Line Voltage Regulation (% Base Speed) .....	0.5
Analog Input Voltage (Voltage Following) (VDC – Isolated) .....	0 – 5
Speed Potentiometer – 1/4 Watt (ohms) .....	5K

\*Based on motor having linear IR Comp characteristics.

## DESCRIPTION

The KBWT Pulse Width Modulated (PWM) DC motor speed controls provide excellent dynamic response to load variation. The efficient PWM waveform produces an almost pure DC current to the motor (form factor < 1.05), which has several advantages over a conventional SCR control. PWM significantly lowers audible motor noise and provides longer brush life. It also produces less motor heating allowing a smaller, less costly motor to be used for most applications. Another advantage of PWM is higher output voltage, which provides increased output speed. In addition, pulse-by-pulse current sensing provides short circuit protection and prevents control damage due to shorted motors.

A unique feature of the KBWT Series is its active bridge, which provides a substantial reduction in AC line surge current each time the control is turned on. This allows the control to be turned on or off rapidly without damage to critical components. The KBWT also contains a built-in safety circuit that will shut down the control if the main power transistor short circuits. This prevents high-speed runaway, a potential problem with competitors' controls.

The KBWT utilizes heat-spreader construction. This system provides an enhanced thermal path that eliminates overtemperature cycles which cause premature failure of the power transistors.

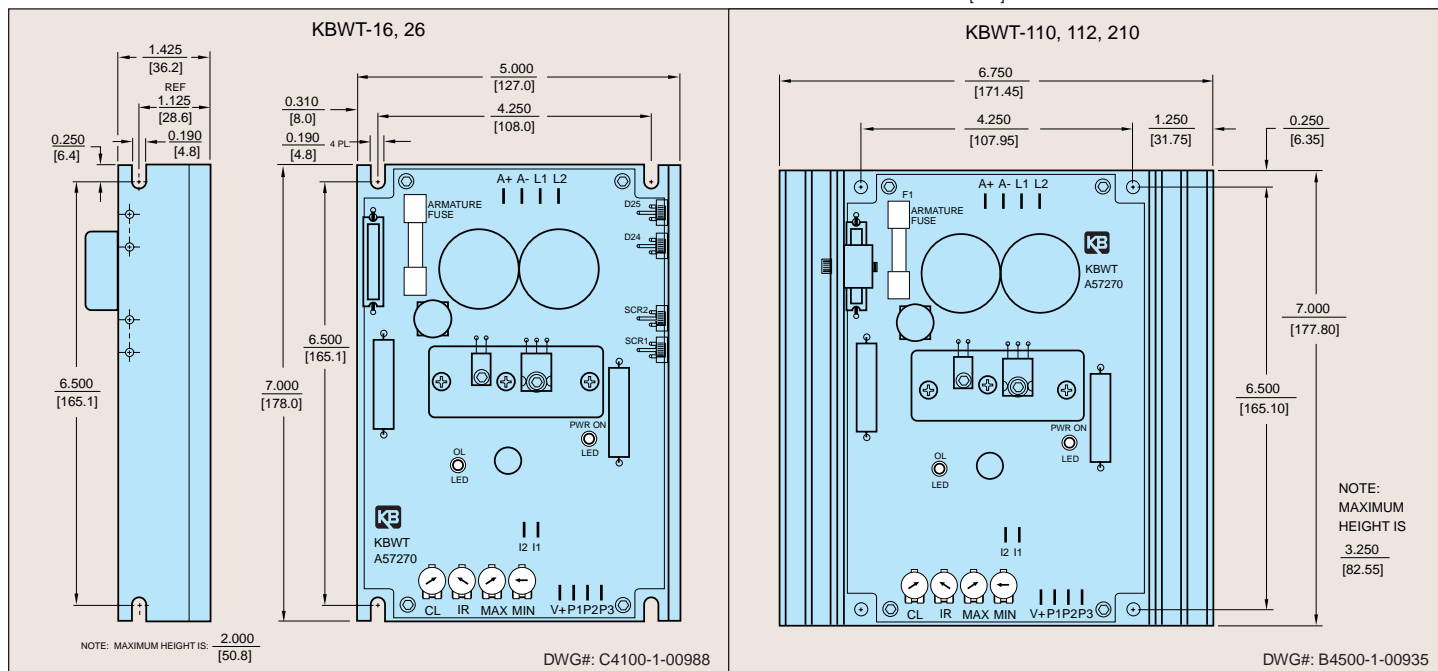
Other features of the KBWT are (I x t) motor burnout protection, which will shut the control down if the motor is overloaded for a predetermined time, and the Potentiometer Safety Circuit™ (optional), which prevents the control from starting when the AC line is applied unless the speed potentiometer is reset to zero. Diagnostic LED's for "Power On" and "Overload (OL)" indication are also provided. The control contains quick disconnect terminals as standard. A potentiometer (5K), isolated analog input signal (0-5 VDC), or PWM microprocessor output can be used to vary the output of the control.

\* CE Compliance Requires KBRF-200A RFI Filter

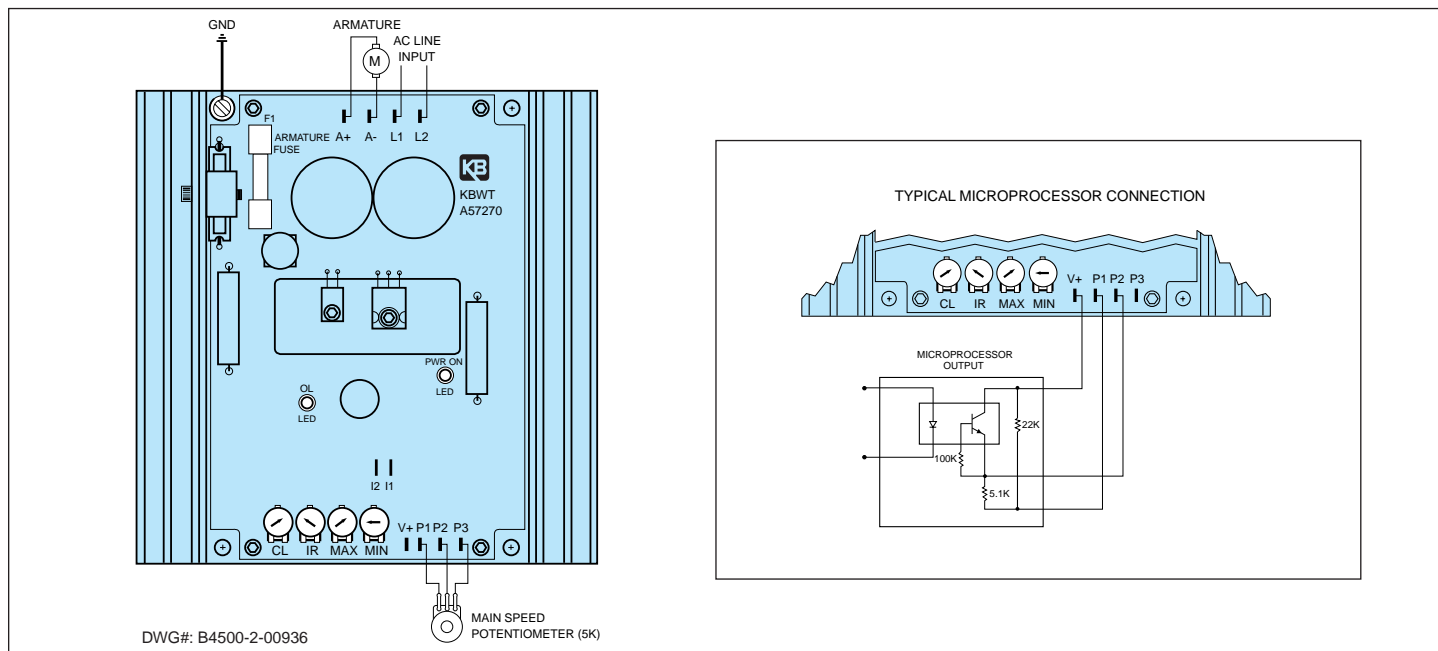
## ELECTRICAL RATINGS

Model No.	KB Part No.	AC Line Voltage (VAC) - 10%, +15% (50/60 Hz)	Maximum AC Line Current (RMS Amps)	Maximum DC Output Current					Maximum Motor Horsepower (KW)		Armature Fuse Rating (Amps) (Optional)
				Continuous Duty Rating				Current Limit Max. Setting (Amps DC)	Continuous Duty	Intermittent Duty (1 min)	
				Amps DC	@ Output Voltage	Amps DC	@ Output Voltage				
KBWT-16	8614	115	10.0	6.0	90	6.0	130	10.0	.75 (.5)	1.5 (1.1)	15
KBWT-26	8615	230	10.0	6.0	180	6.0	260	10.0	1.5 (1.1)	3.0 (2.0)	15
KBWT-110	8603	115	15.0	10.0	90	8.5	130	17.0	1.2 (.9)	2.0 (1.5)	20
KBWT-112	8612	115	18.0	12.0	90	10.5	130	25.0	1.5 (1.1)	2.5 (1.9)	25
KBWT-210	8610	230	15.0	10.0	180	8.5	260	17.0	2.2 (1.7)	4.0 (3.0)	20

## MECHANICAL SPECIFICATIONS INCHES [mm]



## CONNECTION DIAGRAM



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