



# BE2000E Digital Voltage Regulator

The BE2000E is an environmentally rugged product designed to control the output of brushless excited synchronous generators equipped with single phase PMG's. The BE2000E is the perfect replacement for Marathon Electric machines equipped with the popular DVR®2000E and DVR®2000EC voltage regulators. Enjoy the benefit of Basler Electric's years of experience and support of excitation control systems when choosing the BE2000E as your DVR® replacement voltage regulator.

## FEATURES

- Four control modes: automatic voltage regulation (AVR), manual or field current regulation (FCR), power factor (PF) regulation, and reactive power (var) regulation.
- Programmable stability settings.
- Soft start control with an adjustable time setting in AVR control mode.
- Overexcitation limiting (OEL) in AVR, var, and PF control modes.
- Underfrequency (volts/hertz) compensation or engine unloading feature.
- Crowbar circuitry protects the field.
- Overtemperature protection.
- Three-phase or single-phase generator voltage (RMS) sensing/regulation in AVR mode.
- Single-phase generator current sensing for metering and regulation purposes.
- Field current and field voltage sensing.
- Four contact sensing inputs for system interface.
- One common output relay for alarm indication and trip functions.
- Six protection functions: overexcitation shutdown, generator overvoltage shutdown, BE2000E overtemperature shutdown, loss of generator sensing shutdown, overexcitation limiting and crowbar shutdown.
- Generator paralleling with reactive droop compensation and reactive differential compensation.
- Front-panel human-machine interface (HMI) indicates system and BE2000E status and offers the ability to adjust settings at the front panel.
- Rear RS-232 communication port for personal computer communication using BESTCOMS™ - BE2000E Windows® based software for fast, user-friendly, setup and control.

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## ADDITIONAL INFORMATION

### INSTRUCTION MANUAL

Request Publication 9287500995

## SPECIFICATIONS

### OPERATING POWER

Single-Phase	180 to 240 Vac*
Frequency Range	120 to 300 Hz*
Burden	330 VA
Terminals	3, 4

\*The operating power input is designed to work with a Marathon Electric PMG with the 7.5 $\mu$ F, 370Vac rated capacitor installed across the terminals.

### GENERATOR VOLTAGE SENSING

Type	1-phase/3-phase, 4 ranges, 50/60 Hz
Terminals	E1, E2, E3
Burden	<1 VA per phase
Range 1	120 Vac (100 to 140 Vac)
Range 2	240 Vac (200 to 280 Vac)
Range 3	480 Vac (400 to 560 Vac)
Range 4	600 Vac

### GENERATOR CURRENT SENSING

Type	1-phase ( $\emptyset$ ), 50/60 Hz
Rating	5 Aac maximum continuous
Burden	<0.1 VA
Terminals	CT1, CT2

### CONTACT INPUT CIRCUITS

Type	Dry Contact
Interrogation Voltage	13 Vdc

#### Terminals

Unit/Parallel Control	52L, 52M
Raise	6U, 7
Lower	6D, 7
var/PF Enable	52J, 52K

### COMMON ALARM OUTPUT

Type	Form A
Rated Load	7 Aac/7 Adc continuous
Make	30 Aac/30 Adc, carry for 0.2 seconds
Break	7 Aac/0.1 Adc
Operating Voltage	240 Vac/250 Vdc maximum
Terminals	AL1, AL2

### FIELD OUTPUT

Continuous Rating:	75 Vdc, 3.0 Adc
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#### 10 Second Forcing Rating

200 Vac Power Input:	150 Vdc, 7.5 Adc
Field Resistance:	18 $\Omega$ minimum
Terminals:	F+, F-

### AVR OPERATING MODE

Adjustment Range	See generator voltage sensing
Voltage Regulation	$\pm$ 0.25% over load range at rated PF and constant generator frequency
Temperature Drift	$\pm$ 0.5% for a 40°C (104°F) change
Response Time	$\leq$ 1 cycle

#### Underfrequency (V/Hz)

Characteristic	Slope from 1 to 3 PU is adjust- able in 0.01 increments
Range	40 to 65 Hz
Increment	0.01 Hz

### FCR (MANUAL) OPERATING MODE

Adjustment Range	0 to 3 Adc
Increment	0.01 A

### VAR OPERATING MODE

Adjustment Range	100% to -100%
Increment	0.1%

### PF OPERATING MODE

Adjustment Range	0.6 lead to 0.6 lag
Increment	0.001

### PARALLEL COMPENSATION

Modes	Reactive Droop and Reactive Differential (cross-current)*
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#### Droop

Adjustment Range	0 to 10%
Increment	0.01%

\*Burden can exceed 1 VA if external resistors are added to the CT circuit.

### COMMUNICATION PORT

Interface	Full Duplex RS-232
Connection	DB-9 connector on rear panel
Baud	4800
Data Bits	8
Parity	None
Stop Bit	1

### FIELD OVERVOLTAGE PROTECTION

Pickup	0 to 250 Vdc
Time Delay	15 seconds (fixed)

### FIELD OVERCURRENT PROTECTION

<u>Pickup</u>	
Adjustment Range	0 to 7.5 Adc
Increment	0.001 Adc

#### Time Delay

Adjustment Range	0 to 10 seconds
Increment	1 second

### GENERATOR OVERVOLTAGE PROTECTION

<u>Pickup</u>	
Range	105 to 120% of set point
Increment	1.0%

#### Time Delay

Fixed Setting	0.75 seconds
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### SOFT-START FUNCTION

Time Adjust Range	1 to 120 seconds
Increment	1 second

### ANALOG (AUXILIARY) INPUT

Voltage Range	-3 Vdc to +3 Vdc
Set Point Range	-30% to +30% shift
Burden	1 k $\Omega$
Terminals	A, B

## SPECIFICATIONS, continued

**METERING**

Accuracy of all metering values assumes 25C, 50/60 Hz and less than 20% THD.

Generator Voltage

Range 10 V to 79 kV  
Accuracy 0.5%

Generator Current

Range 0.1 to 5,000 A (5 A CTs)  
Accuracy 0.5%

Frequency

Range 40 to 65 Hz  
Accuracy 0.2 Hz

Field Voltage

Range 0 to 200 Vdc  
Accuracy 5.0%

Field Current

Range 0 to 8.0 Adc  
Accuracy 0.5%

Power (Apparent, Real and Reactive)

Range 0 to 99 MVA, MW and Mvar  
Accuracy 3.0%

Power Factor

Range -1.0 to -0.6, +0.6 to +1.0  
Accuracy 0.02

Phase Angle

Range 0 to 360°  
Accuracy 2°

**ENVIRONMENT**

Operating Temp -40°C to +70°C (-40°F to +158°F)  
Storage Temp -40°C to +85°C (-40°F to +185°F)

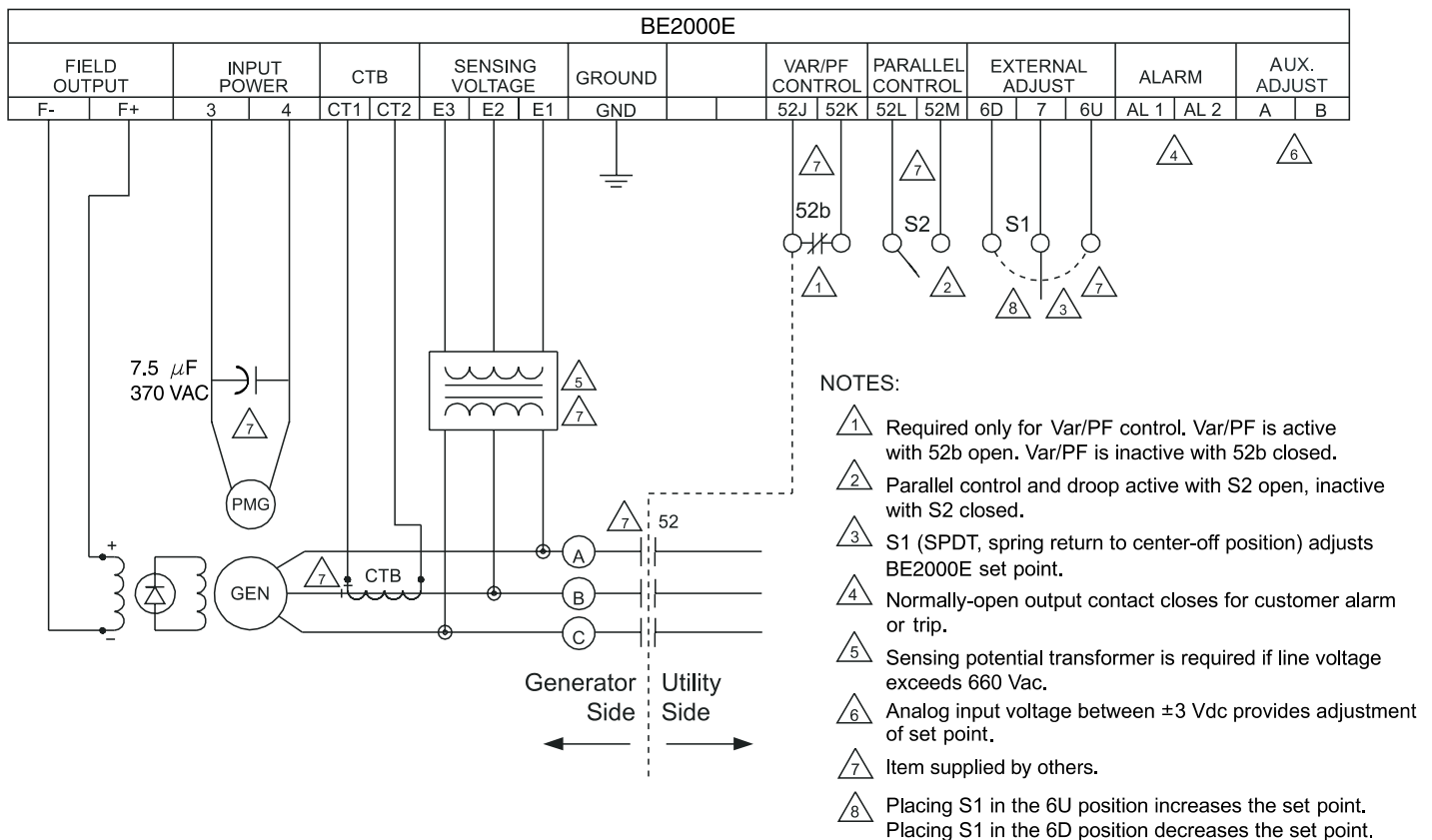
**TYPE TESTS**

Shock 20 G in 3 perpendicular planes  
Vibration 1 G at 5 to 26 Hz  
0.036" double amplitude (27 to 52 Hz)  
5 G at 53 to 500 Hz  
Salt Fog Tested per MIL-STD-810E

**PHYSICAL**

Weight 690 g (1.52 lb)

## CONNECTIONS



**Figure 1 - Typical Connection with ABC Rotation and Three-Phase Sensing**

## DIMENSIONS

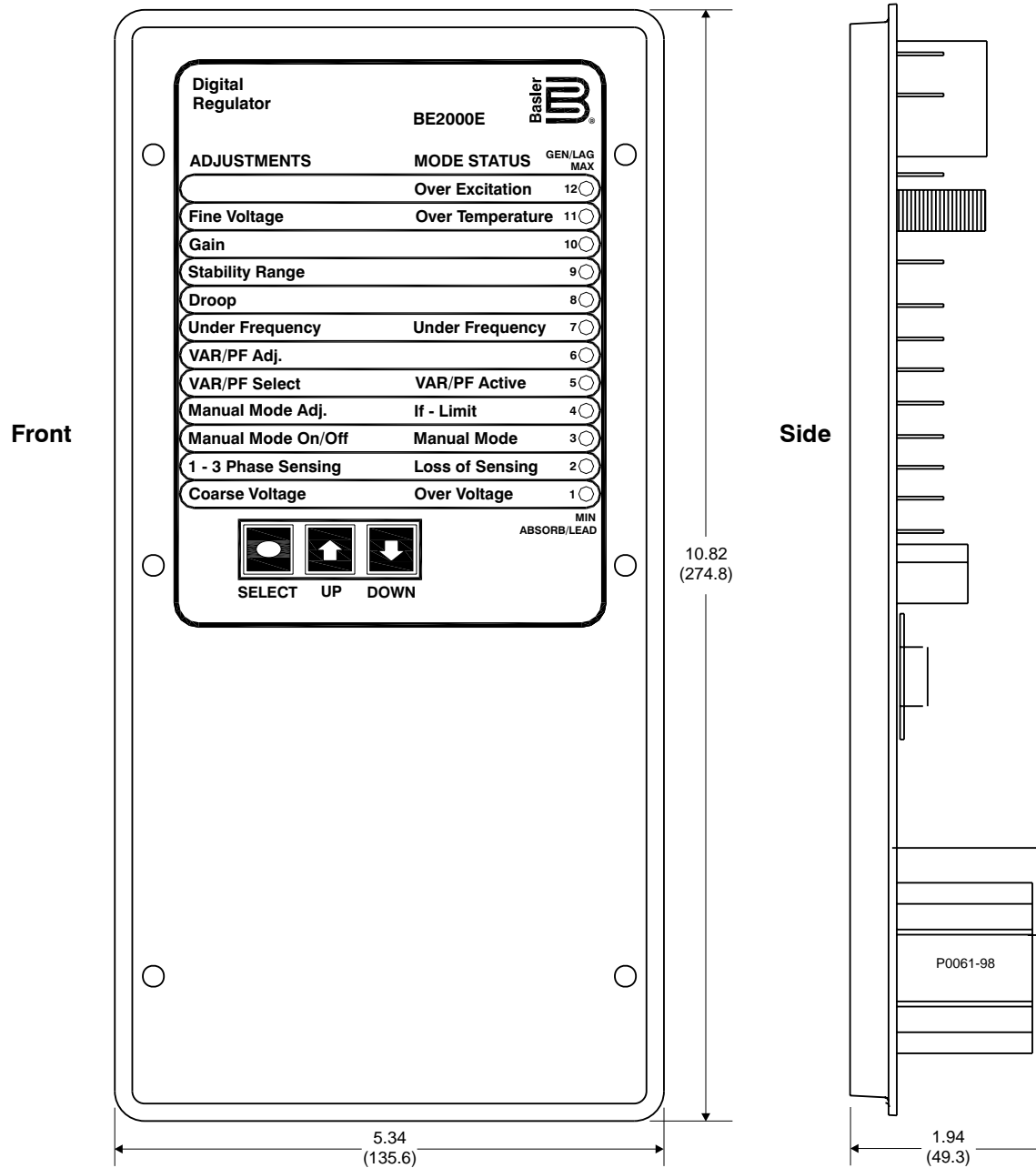


Figure 2 - Dimensions



ISO 9001-2008

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