



## DECS-100 Digital Excitation Control System

Basler Electric offers a high powered, low-cost digital excitation control system, the DECS-100. This environmentally rugged product is ideally suited for controlling the output of brushless excited synchronous generators up to 5MW. The DECS-100 has a very impressive 7A<sub>dc</sub> output from a pulse width modulated power stage. The DECS-100 is perfect for machines that will be paralleled to other generators and/or to the utility system. It is ideal for distributed generation, co-generation and peak shaving applications. The DECS-100 is easy to use, and it has communications capability with a PC. The DECS-100 utilizes microprocessor technology and control algorithms pioneered by Basler Electric for longer than a decade. It shares many features and functions of our larger excitation control systems. The DECS-100 is Basler Electric's fifth generation of microprocessor-based excitation system.

### FEATURES

- Microprocessor based
- 0.25% Voltage Regulation Accuracy
- 0.5% accuracy up to 40% THD (harmonics associated with 6 SCR load)
- 63V<sub>dc</sub> @ 7A<sub>dc</sub> PWM output
- 0-3X V/Hz limiting
- Soft Start capability
- 20 standard stability selections and one customizable selection
- VAR/PF control
- Overexcitation limiting
- Underexcitation limiting
- Voltage Matching
- Manual Mode (Field current regulation)
- Paralleling input from 1 or 5A CT secondaries
- Nominal sensing inputs of 120, 240, 480 and 600Vac
- Power Input from 50/60Hz shunt connections or PMGs operating at 50 to 400Hz
- Five generator protection functions including Loss of Sensing transfer to manual
- Alarm Contact Output
- Accessory input
- LED Annunciation of operating conditions
- Setup via PC using BESTCOMS software (included)
- cURus recognition per UL 508 and CSA Standard C22.2 No. 14
- DNV Standard for Certification 2.4
- CE compliant

### WINDOWS® SOFTWARE

Interface for setting and communicating with Basler products  
Request DECS-100-CD

### ADDITIONAL INFORMATION

#### INSTRUCTION MANUAL

Request Publication 9287500991

**DESCRIPTION and  
SPECIFICATIONS**  
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## DESCRIPTION

The DECS-100 is a microprocessor-based regulation system designed to control the output of a brushless excited synchronous generator. The DECS-100 is perfect for paralleling applications where generator to generator and/or generator to utility paralleling occurs with VAR/PF control and Over- and Underexcitation

Limiting. The DECS-100 offers high functionality, communications, and performance at an extremely affordable price. The DECS-100 is very rugged and offers an extremely robust mechanical design that is cURus recognized, CE compliant, and DNV certified.

## SPECIFICATIONS

### INPUTS

#### Power Input\*

|                           |                        |
|---------------------------|------------------------|
| Voltage:                  | 88-250Vac              |
| Phase:                    | Single- or three-phase |
| Burden:                   | 650VA                  |
| Frequency:                | 50 to 400Hz            |
| Minimum Build-up Voltage: | 6.0Vac                 |

\* NOTE: For Station Power application, refer to Accessories (page 8) regarding ICRM-7.

#### Sensing Input

|                        |   |
|------------------------|---|
| Nominal Voltage Input: | 100/120, 200/240, 400/480, 600Vac, Single- or three-phase |
| Burden:                | <1VA  |
| Current Input:         | 1 or 5 Amp (two models)                                   |
| Burden:                | <1 VA   |
| Frequency:             | 50/60Hz   |

#### Accessory Input

$\pm 1\text{Vdc}$  creates a  $\pm 10\%$  adjustment (respectively) for AVR, FCR and VAR set point.  
 $\pm 1\text{Vdc}$  creates a  $\pm 0.1\text{PF}$  adjustment (respectively) in the PF mode set point.  
(adjusts only the active regulation mode)

### OUTPUTS

#### DC Output

|                            |                                     |
|----------------------------|-------------------------------------|
| Continuous voltage:        | 63Vdc                               |
| Continuous current:        | 7.0Adc                              |
| 10 second Forcing Voltage: | 135Vdc (with nominal input applied) |
| 10 second Forcing Current: | 15.0Adc                             |
| Minimum Field Resistance:  | 9 Ohms                              |

#### Alarm Contact Output

Dry Contact Rated: 120/240Vac - make 30A for 0.2S, carry 7A continuously, break 0.1A inductive

#### REGULATION ACCURACY

|                      |  |
|----------------------|--|
| Regulation accuracy: | $\pm 0.25\%$ no load to full load  |
| Temperature drift:   | $\pm 0.5\%$ for a $40^\circ\text{C}$ change in one hour  |
| Response time:       | <1 cycle to the limit of the A/D converter   |
| THD:                 | $\pm 0.25\%$ for 20% THD and $\pm 0.5\%$ for 40% THD<br>(distortion as seen with a 6 SCR load) |

## SPECIFICATIONS, continued

### AGENCY APPROVALS

|       |                                      |
|-------|--------------------------------------|
| cURus | UL 508 and CSA Standard C22.2 No. 14 |
| CE    | EMC and LVD                          |
| DNV   | Standard for Certification 2.4       |

### MECHANICAL SPECIFICATIONS

|                        |   |
|------------------------|---|
| Operating temperature: | -40°C to +70°C  |
| Storage temperature:   | -40°C to +80°C  |
| Shock:                 | 20 Gs in three mutually perpendicular planes                            |
| Vibration:             | 5-26Hz, 1.2Gs<br>27-52Hz, 0.036 inch double amplitude<br>53-500Hz, 5.0G |
| Salt Fog:              | Per MIL-STD-810E, Method 509.3, 48 hours of testing                     |
| Weight:                | 2.42 lbs. (1.10 kg)   |
| Shipping weight:       | 2.88 lbs. (1.31 kg)   |
| Dimensions:            | 5.34" (135.6mm) wide x 10.82" (274.8mm) high x 2.84" (72.1mm) deep      |

### ADJUSTMENTS

#### Adjustment Ranges

|                          |   |
|--------------------------|---|
| AVR Mode:                | 100/120, 200/240, 400/480, 600Vac   |
| Fine Voltage Adjustment: | 0-15% of nominal in 0.1% steps  |
| Manual (FCR) Mode:       | 0-7Adc in 0.01Adc steps   |
| VAR Mode:                | -100 lead VAR to +100 lag VAR in 0.1% steps   |
| Power Factor Mode:       | -0.6PF lead to +0.6PF lag in 0.001PF steps  |
| Overexcitation Limiter:  | Instantaneous limit: 15A in 0.001Adc steps<br>Time Delay to shutdown: 0-10 seconds in integer steps |
| Underexcitation Limiter: | 0-100% of rated VARs  |
| Volts per Hertz:         | Slope, 0-3V/Hz in 0.1V/Hz increments (See Figure 1)<br>UF kneepoint, 40-65Hz in 0.1Hz increments    |
| Parallel Droop:          | 0-10% in 0.01% increments   |
| Softstart:               | Generator Bias (beginning generator voltage)<br>Time: 0-7200 seconds in 1 second steps              |
| Voltage Matching Speed:  | 0-300 seconds in 0.01 second steps  |

#### Adjustment Methods

- Contact inputs (one for raise and one for lower)
- Auxiliary input  $\pm 3\text{Vdc}$
- PC via BESTCOMS

## FEATURES/FUNCTIONS

### PWM Power Stage

A 7.0A<sub>dc</sub> power stage provides fast response and great immunity to noise and sinewave distortion created by non-linear loads and makes the DECS-100 tolerant to many applications previously considered uncontrollable.

### Sensing Input

The sensing input takes nominal voltage up to 600V<sub>ac</sub> without requiring expensive potential transformers. The adjustment range is capable of being controlled in 0.1V<sub>ac</sub> steps. This means that circulating current on paralleled generators, due to overly coarse adjustment steps, is no longer an issue.

### Stability

20 standard stability ranges are provided, as well as one customizable stability range for customized performance. The PC BESTCOMS software provides PID selection software and a sophisticated response time program to facilitate verification of stability performance.

### Front Panel Annunciation

The DECS-100 provides seven LEDs to indicate generator system and DECS-100 conditions without requiring connection to the communications device.

### Protection

Five protection functions have the ability to be user-programmed to shut down the DECS-100 and close the alarm contact. They are:

- Generator Overvoltage
- Loss of Generator Voltage\*
- Field Overvoltage
- Overexcitation Limiting
- Underexcitation Limiting

\* Loss of sensing transfer is also selectable by the user in lieu of shutdown due to Loss of Sensing.

### Overexcitation Limiting

This feature limits the output current of the DECS-100 to predetermined levels that are safe for the exciter/generator. There are adjustments for current threshold and time delays to customize the performance of the DECS-100 to meet the system's needs. The DECS-100 also provides two types of overexcitation limiting characteristics: Summing Point and Takeover.

*Summing Point OEL.* The summing point type of OEL will provide a smooth transition into and out of the limit condition. This is because it is controlled through the voltage regulator's main control algorithm. However, this type may be influenced by terminal voltage.

*Takeover OEL.* The takeover type provides direct control of the field current without being conditioned by the voltage regulator's main control algorithm. However, transitioning into and out of an actual limit condition may result in a more responsive characteristic.

### Underexcitation Limiting

The minimum excitation limiter will adjust the amount of excitation supplied to the exciter field of the generator from dropping below an unsafe operating level. This prevents the machine from possibly slipping poles and from damaging the machine. This is accomplished by monitoring the Vars being absorbed by the generator based on user-defined settings.

### Voltage Matching

This function allows the DECS-100 to match the generator voltage. This feature replaces the same function in the automatic synchronizer, thereby saving money by allowing the use of a less expensive synchronizing device.

### Softstart

Softstart functions as a voltage limiter during generator build-up. It limits the generator voltage overshoot typically present when machines are initially started.

### VAR/PF Control

Integrated VAR/PF controls save the user the cost of purchasing and installing remote devices that perform the same functions. This function is typically used on utility-paralleled generators that cannot control the grid voltage. Once set, the VAR or PF of the generator output will be regulated.

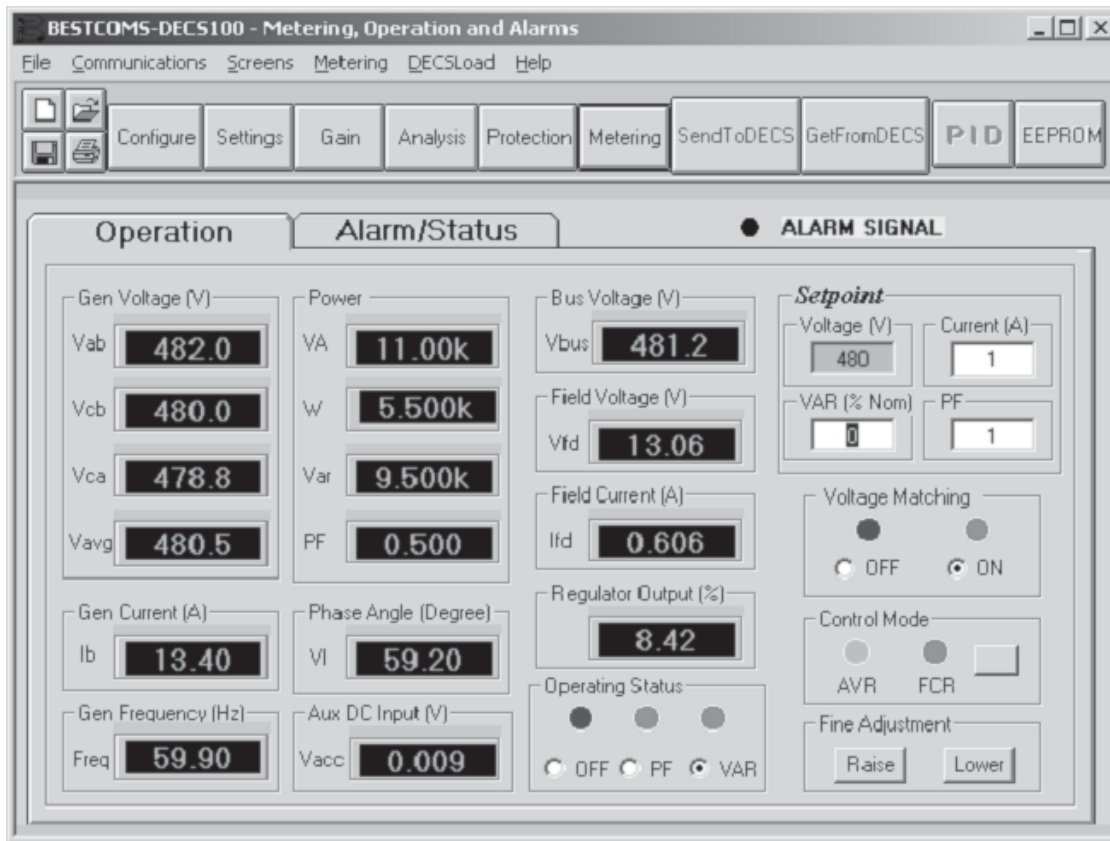
### External Adjustments

The DECS-100 allows for multiple points and methods of external adjustment of the active regulation mode. There are four methods for adjustment: contact input, auxiliary voltage input or PC adjustment. The PC communication also allows operating modes and set points changes.

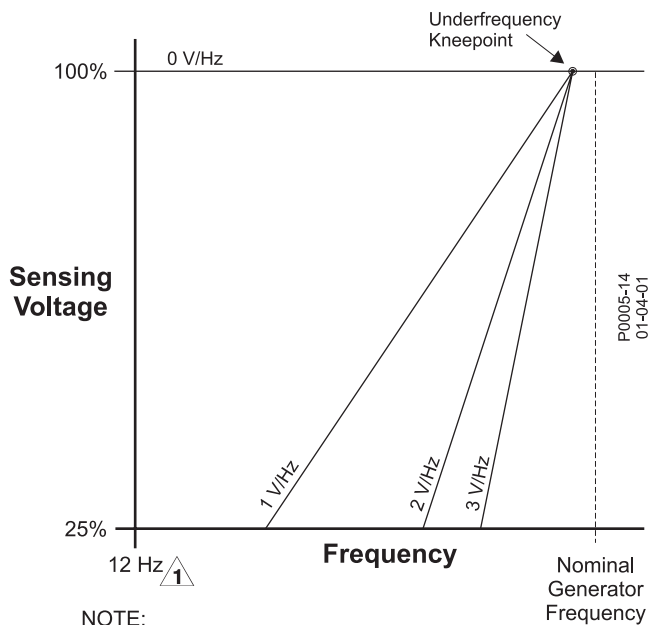
### Communications

PC (Windows® compatible) communications software is provided by Basler Electric with the DECS-100. The PC BESTCOMS allows for total setup, control, and monitoring of all parameters of the DECS-100. The PC BESTCOMS allows for custom PID selection and has a monitoring screen for viewing all of the generator parameters in actual machine levels. The communication interface uses the RS-232 DB9 connector located on the DECS-100. The software package is provided with every DECS-100 on a single CD-ROM along with the instruction manual and product bulletin.

## FEATURES/FUNCTIONS, continued



Typical BESTCOMS PC Software Screen



NOTE:

1 DECS operation is not specified below 12Hz.  
Power must be removed below this frequency.

Figure 1 - Typical Volts per Hertz Curve

# CONNECTIONS

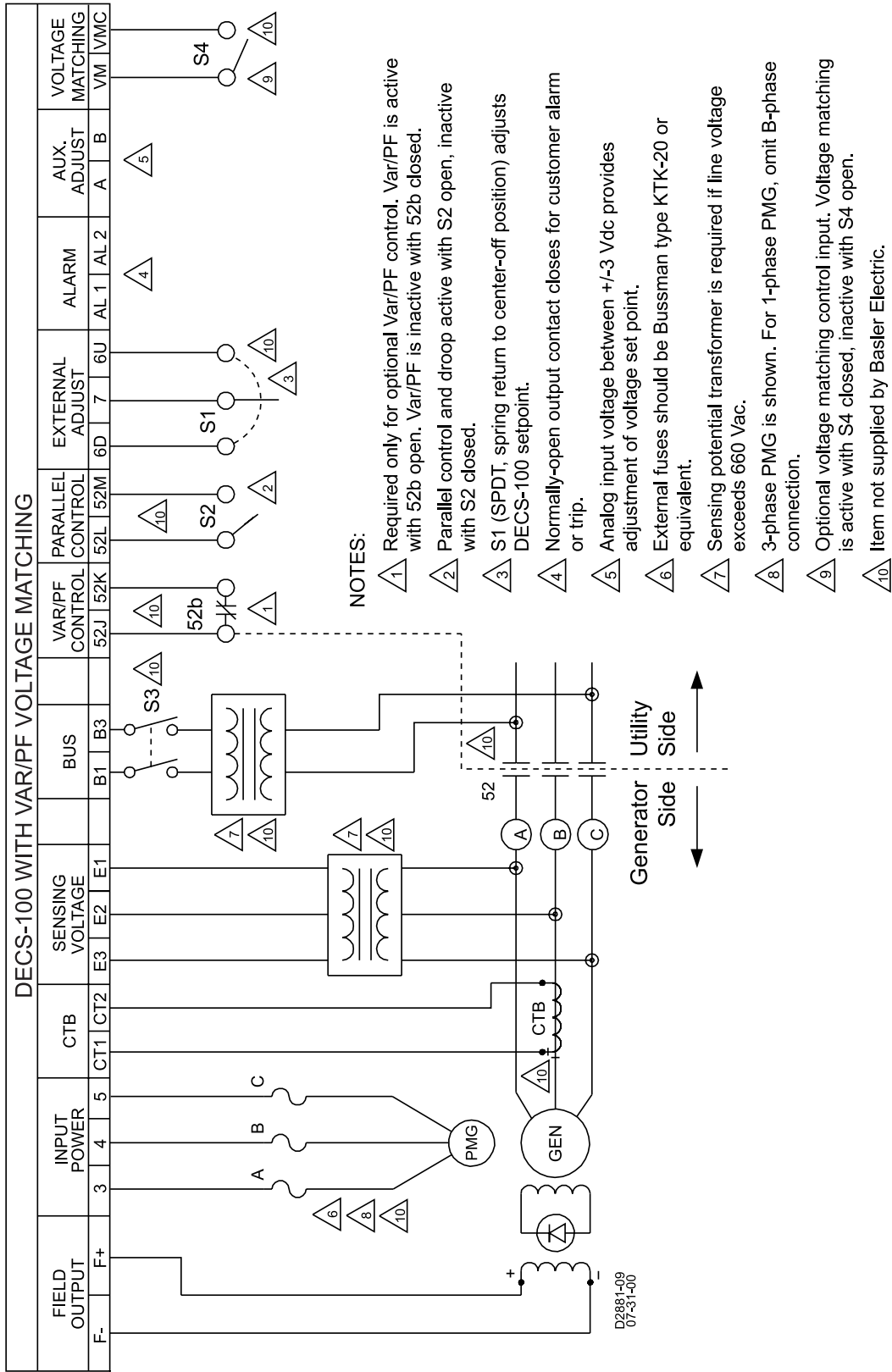


Figure 2 - Typical Connections for PMG Application with ABC Rotation and Three-Phase Sensing

# DIMENSIONS

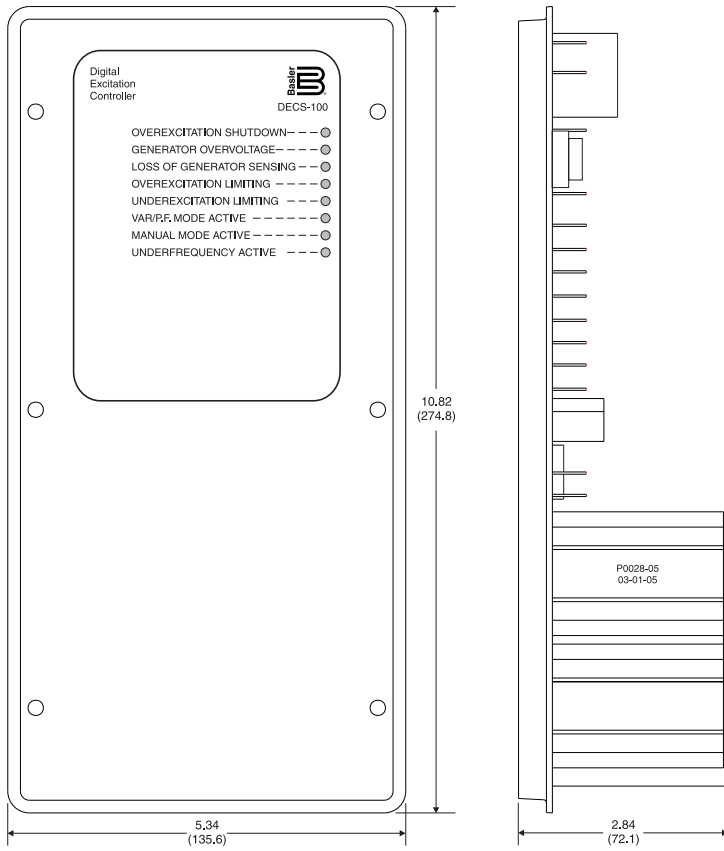


Figure 3 - DECS-100 Dimensions

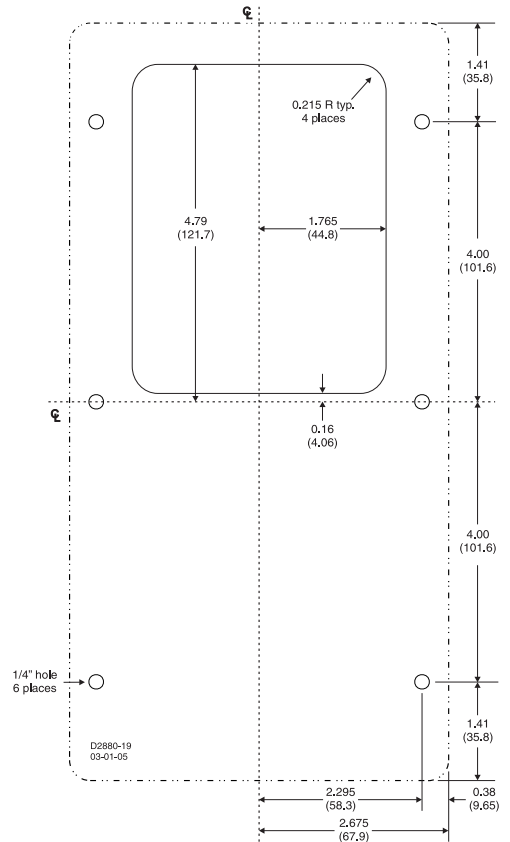
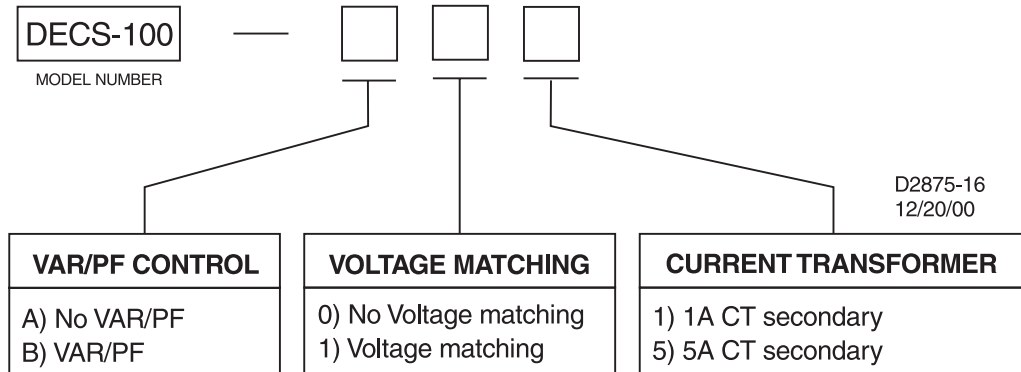


Figure 4 - Cutout and Drilling Dimensions

## HOW TO ORDER

The DECS-100 is selected by the style chart below. For example, if a DECS-100 is required with VAR/PF control, voltage matching, and a 5 Amp CT, the complete model number would be DECS-100-B15.



### Additional information:

- The DECS-100 is available in bulk-packaged shipments of 50 pieces. If this is desired, please inform your customer service representative.
- The DECS-100 is shipped with a CD-ROM that contains the Instruction Manual, Product Bulletin, and BESTCOMS for PC Windows®-based operating systems. Printed manuals and bulletins are available at an additional cost.

## ACCESSORIES

DECS-100 is designed to operate with the following accessories. For additional product compatibility, please contact your application specialist at Basler Electric or your sales representative.

- MVC300 Manual Voltage Controller
- EDM200 Exciter Diode Monitor
- EL200 Min/Max Excitation Limiter
- SCP250 VAR/PF controller
- ICRM-7 Inrush Current Reduction Module is required when energizing the DECS-100 from a source that is already at the regulator's input power ratings. This module minimizes the amount of inrush current that could be seen when power is applied.



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