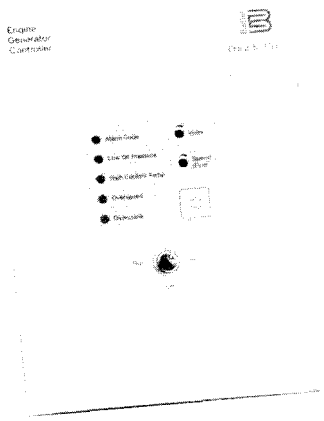


ENGEN®-100/ENGEN®-200 ENGINE GENERATOR CONTROLLER

The ENGEN® engine/generator controller is an integrated genset controller contained in a single, easy to install package. The controller contains a microprocessor-based digital speed governor for the engine, engine start/stop control, engine protection and voltage regulation for controlling the voltage output of a brushless synchronous generator. Just add metering and the ENGEN® system has everything else for the complete control of your emergency stand-by generator system.

FEATURES:

- 12 or 24 VDC systems
- Integrated package for reduced installation costs
- Small size, reliable, low cost
- CSA certified, File #LR23131-137

ENGINE CONTROL

- Auto/Off/Run switch
- Selectable start delay
- Adjustable number of crank cycles
- Adjustable crank/rest time
- Auto start will accept a remote run signal
- Run will allow manual starting of the engine
- LED test switch
- Fuel solenoid control relay
- Glow plug control

GENERATOR VOLTAGE REGULATION

- 1/4% voltage regulation
- 50/60 Hz operation
- 63 V dc at 4 A dc continuous output
- Underfrequency compensation
- Overexcitation shutdown
- Sensing input 240 or 480 V ac
- Solid state buildup
- Coarse and fine voltage adjust
- Adjustable stability
- Remote voltage adjust (ENGEN®-200)

ENGINE SPEED CONTROL

- Mag Pickup input for speed sensing
- 1/4% isochronous speed control
- Up to 10 A dc rated output (actuator stall current)
- Coarse and fine speed adjust
- Adjustable PID stability network
- Proportional actuator supplied
  - Push or pull type
  - 4, 6 or 15 pounds of force
  - 0.3, 0.7 and 1.3 footpounds torque
- Remote speed adjust (ENGEN®-200)

ENGINE PROTECTION

- Shutdowns
  - Low oil pressure
  - High coolant temperature
  - Overspeed
  - Overcrank
  - Loss of Speed signal
  - Actuator failure
  - Internal microprocessor fault
- Local LED annunciation
  - Low oil pressure
  - High coolant temperature
  - Overspeed
  - Overcrank
  - Diagnostic problem
- Common alarm output contact
- Common alarm input

INSTRUCTION MANUAL

Request publication 9329600990

Basler Electric

P. O. BOX 269 HIGHLAND, ILLINOIS, U.S.A. 62249 PHONE 618-654-2341 FAX 618-654-2351

SND-3
6-99

DESCRIPTION

ELECTRONIC GOVERNOR

The electronic governor consists of a powerful microprocessor-based controller driving a precision proportional actuator, connected to the engine's fuel control lever. The governor provides isochronous engine governing through a wide speed range.

The controller processes the speed signal received from the speed sensor and compares it to the desired speed setting. The output of the controller is a pulse width modulated signal to the actuator. The actuator converts the signal to an output shaft position, proportional to the amount of current in the coil.

For remote speed adjustment, order ENGEN®-200.

VOLTAGE REGULATOR

The voltage regulator is entirely solid state and uses an electromagnetic interference (EMI) suppression circuit to reduce EMI generated by the regulator. Voltage is internally adjustable. The regulator has a switch selectable, frequency compensated operating characteristic as shown in Figure 1. During start-up, the solid state voltage buildup circuit operates from generator output residual voltages as low as 6Vac. The built-in overexcitation limiting removes the output power if the exciter field voltage exceeds a predetermined level (See Figure 2.). After removing power, the regulator monitors the generator output and resets when the voltage has decreased below 6Vac.

For remote voltage adjustment, order ENGEN®-200.

ENGINE CONTROL

The engine control portion of the ENGEN® unit allows the user to either manually start the genset by putting the RUN/OFF/AUTO switch in the "RUN" position or by selecting "AUTO" and allowing the transfer switch to start a preprogrammed crank/rest routine. After the machine reaches a predetermined speed, cranking will be discontinued. The number of crank/rest cycles and the duration of the crank/rest cycle are adjustable.

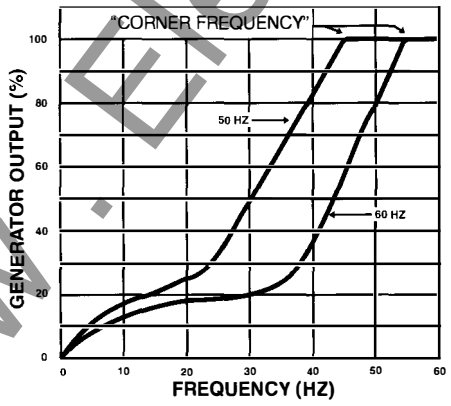


Figure 1 - Frequency Compensation

Generator shutdown occurs when the RUN/OFF/AUTO switch is placed in the "OFF" position or in the "AUTO" position when the ATS contact is opened.

ENGINE PROTECTION

The ENGEN® unit also provides for engine protection. The engine shuts down when a contact is received from the oil pressure sending unit (Low Oil Pressure), coolant temperature sending unit (High Coolant Temperature), or when the speed signal from the magnetic pickup is lost (Loss of Speed Signal) or when a signal is received that indicates engine speed is above 105-125% of desired setspeed (Engine Overspeed). The ENGEN® unit also provides for overcrank protection. Once the predetermined number of crank/rest cycles has expired, the ENGEN® unit ceases cranking and locks out the ENGEN® controller. If the engine needs to be shut down from a remote location, then connect a normally open contact to the **Common Alarm In** terminals. The contact closing from either a common alarm or a remote switch shuts down the engine and lights the "Alarm" LED on the ENGEN®-100 front panel. If remote annunciation is desired, the **Common Alarm Output** contact may be used to indicate engine shutdown. This contact, normally open, closes when the engine is shut down due to an alarm condition.

For systems using glow plugs, the **Glow Plug** terminals should be connected such that they control a user-supplied interposing relay that applies power to the glow plugs of the diesel engine. The glow plug contacts, normally open, close at the beginning of the crank delay period. They open once the crank disconnect speed is reached.

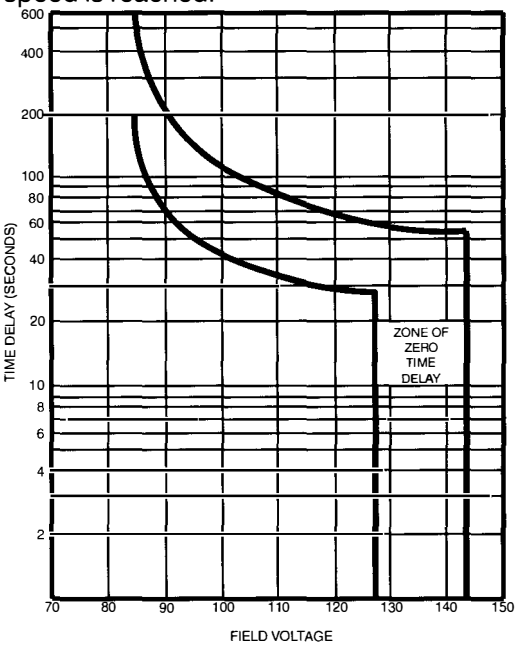


Figure 2 - Overexcitation Shutdown

SPECIFICATIONS

Refer to Tables 1, 2 and 3 for the electrical specifications and to Table 4 for the physical specifications of ENGEN®. Table 5 lists the specifications for the linear actuators.

Output Power (with a 240 Vac Input):	4 Adc @ 63 Vdc (252 W) maximum continuous. 6.66 Adc @ 105 Vdc (700 W) forcing for one minute.
Exciter Field DC Resistance:	15.8 Ω minimum to 100 Ω maximum.
AC Input Power:	190 to 264 Vac ±10%, single-phase, 50/60 Hz.
Input Burden:	650 VA maximum.
AC Sensing Voltage: 240 Vac Tap: 480 Vac Tap:	 190-240 Vac ±10%, single-phase, 50/60 Hz. 380-480 Vac ±10%, single-phase, 50/60 Hz.
Sensing Burden:	1 VA maximum.
Voltage Adjust Range:	170 to 264 Vac @ 240 Vac Tap, 340 to 528 Vac @ 480 Vac Tap.
Regulation:	Better than 0.25% no load to full load, average sensing.
Voltage Drift:	Less than 1% for 40°C (72°F) change.
Response Time:	Less than 1 electrical cycle.
Frequency Compensation:	Refer to Figure 1.
EMI Suppression:	Internal filtering provided.
Voltage Buildup:	Buildup occurs from generator residual voltage as low as 6 Vac.
Overexcitation Shutdown:	Refer to Figure 2.
Power Dissipation:	9 Watts maximum continuous.

Table 1 - Electrical Specifications - Voltage Regulator Functions

Output Current:	10 Adc @ 24 Vdc (192 W) maximum continuous.
Actuator Resistance:	Refer to Table 5.
DC Input Power:	9-30 Vdc. (Battery dip ride through to 6Vdc for 0.5 sec.)
Speed Signal Input:	250 Hz to 10,000 Hz (16 selectable ranges) from magnetic pickup.
Speed Adjust Range:	0 to 110% of rated speed.
Speed Regulation:	±0.25% (isochronous governing).
Speed Signal Voltage:	40 V rms maximum continuous, for 15 kohm load. 2 V pk-pk minimum during cranking.
Actuator Failure or Loss of Output Signal:	Engine shutdown occurs if actuator fails or if output signal is lost.
Power Dissipation:	6 W maximum continuous.

Table 2 - Electrical Specifications - Governor Functions

SPECIFICATIONS, continued

Overspeed Shutdown:	Engine shutdown occurs if speed exceeds 125% of setpoint.
Overcrank:	Cranking terminates once the selected number of cranking cycles (1-5) is completed and engine fails to start.
Loss of Speed Signal:	Engine shutdown occurs if speed signal from mag pickup is lost.
Low Oil Pressure Signal:	Engine shutdown occurs if low oil pressure is detected.
High Coolant Temp Signal:	Engine shutdown occurs if high coolant temperature is detected.
Common Alarm Input	Engine shutdown occurs if a contact closure is detected across these terminals.
Common Alarm Output	A closure of this contact indicates that the engine shutdown has occurred. This contact is rated at 10A (10Vdc or 227Vac.)
Crank/Rest Time:	Adjustable to give the desired cranking/rest times from 2 to 30 sec. ±20%.
Engine Crank Time Delay:	0 to 60 seconds.
Crank relay and Fuel Solenoid Contact Ratings:	10A @ 30Vdc.

Table 3 - Electrical Specifications - Engine Control

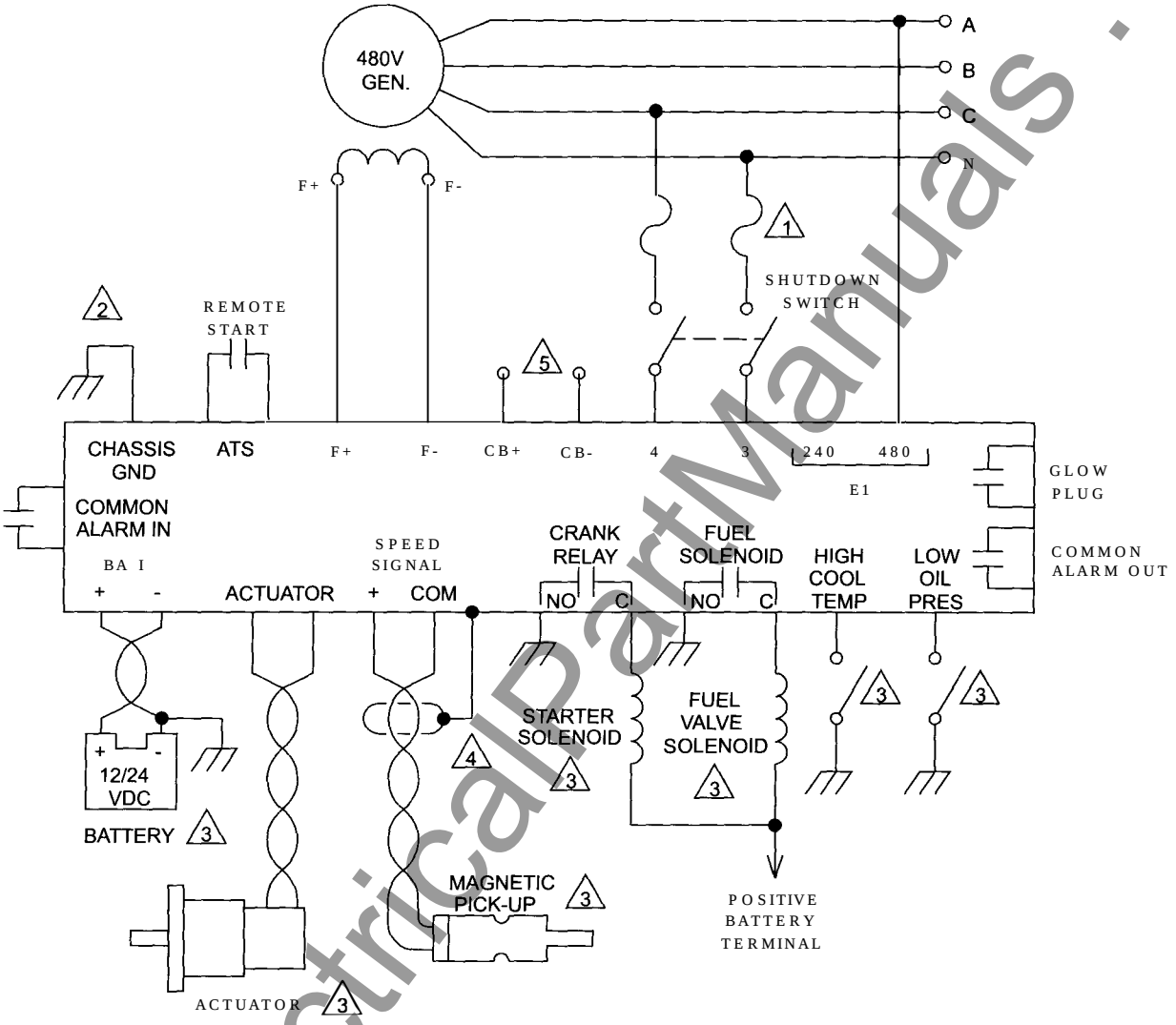
Operating Temperature:	-40°C (-40°F) to +60°C (+140°F).
Storage Temperature:	-40°C (-40°F) to +85°C (+185°F).
Shock:	Withstands up to 15 Gs in each of three mutually perpendicular axes.
Vibration:	Withstands the following accelerations at the stated frequency: 1.2 Gs at 5 to 26 Hz, 0.036 inches double amplitude at 27 to 52 Hz, 5.0 Gs at 53 to 500 Hz.
Weight:	3 pounds (1.4 kg.)

Table 4 - Environmental and Physical Specifications

PARAMETER	MODEL 0175*	MODEL 0250*	MODEL 0300*
Stroke	0.8 inches (max.)	1.0 inches (max.)	1.0 inches (max.)
Net Force	4.0 pounds	6.0 pounds	15.0 pounds
Spring Shutdown Force @ Full Stroke	0.5 pounds	1.7 pounds	4.5 pounds
Work Ratings	0.3 ft-lbs.	0.7 ft-lbs.	1.3 ft-lbs.
Voltage	12 or 24 Vdc ±20% (differential actuators required)		
Current	4.5 amps (12 Vdc), 2.0 amps (24 Vdc)	6.8 amps (12 Vdc), 3.5 amps (24 Vdc)	7.1 amps (12 Vdc), 3.4 amps (24 Vdc)
Response Time	30 msec for 10-90% of stroke	65 msec for 10-90% of stroke	80 msec for 10-90% of stroke
Shipping Weight	1.5 pounds (0.7 kg.)	3.0 pounds (1.4 kg.)	6.5 pounds (3.0 kg.)
Temperature Range	-40°C (-40°F) to +121°C (+250°F)		
Vibration	15 Gs		
Shock	200 Gs		

*Available in push and pull, base or flange type mount actuators.

Table 5 - Linear Actuator Specifications



1. 300V, 5A, FAST BLOWING, HIGH INTERRUPTING CAPACITY FUSES.
2. GROUND THE UNIT TO THE ENGINE FRAME.
3. THIS ITEM LOCATED ON THE ENGINE-GENERATOR SET.
4. CONNECT SHIELD WIRE TO FASTON ON UNIT'S END PLATE.
5. REFER TO ENGEN AND CBS 305 INSTRUCTION MANUAL FOR PROPER INTERCONNECTION (IF USED).

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Figure 3 - 480 Vac Interconnection Diagram

ACCESSORIES

POWER ISOLATION TRANSFORMER

Low voltage power isolation transformers can be used to provide electrical isolation and to match voltages from the generator to the regulator. Basler part number BE 18674 provides isolation and matches voltages.

MVC 300 MANUAL VOLTAGE CONTROL

With an electronically regulated output, this control offers backup excitation for the regulator in critical applications.

CBS 305 SERIES CURRENT BOOST SYSTEM

Using electronics built into the ENGEN® and a current transformer to tap the generator line current, the CBS boosts the field current during short circuit or large motor starting.

LED FAULT INDICATORS

LOW OIL PRESSURE LED

ENGEN® shuts down the engine after one second when low oil pressure is detected; the Low Oil Pressure LED is illuminated. On start-up, this function is inhibited for 10 seconds after Crank disconnect.

HIGH COOLANT TEMPERATURE LED

ENGEN® shuts down the engine after one second when high coolant temperature is detected; the High Coolant Temperature LED is illuminated. On start-up, this function is inhibited for 60 seconds after Crank disconnect.

OVERSPEED SHUTDOWN LED

ENGEN® shuts down the engine immediately when speed in excess of 105-125% of set speed is detected; the Overspeed LED is illuminated.

OVERCRANK LED

If the engine fails to start after the preset number of start attempts, the cranking is terminated and the Overcrank LED illuminated.

ALARM CODE LED

This LED flashes a specific number of times, or remains continuously illuminated, to indicate the following conditions:

# of Flashes	Alarm Condition
1, 2, or 3	Microprocessor-related faults
5	Actuator or governor-related faults
7	Loss of Speed Signal
Continuous	Common Alarm Input contact

NOTE: Flashing codes 4 and 6 are not used.

NOTE: Any one of the above functions is latched as the “first-up” fault and subsequent faults are ignored. The indicated fault can only be reset by removal of power to the ENGEN® unit by switching the main front panel switch to the center “OFF” position. It should be noted that if the engine should stall or stop for any other reason (such as running out of fuel or other mechanical reason), ENGEN® will detect a loss of speed and latch this as a fault.

NOTE: The “LAMP TEST” pushbutton enables all front panel LEDs to be tested simultaneously.

FRONT PANEL CONTROLS

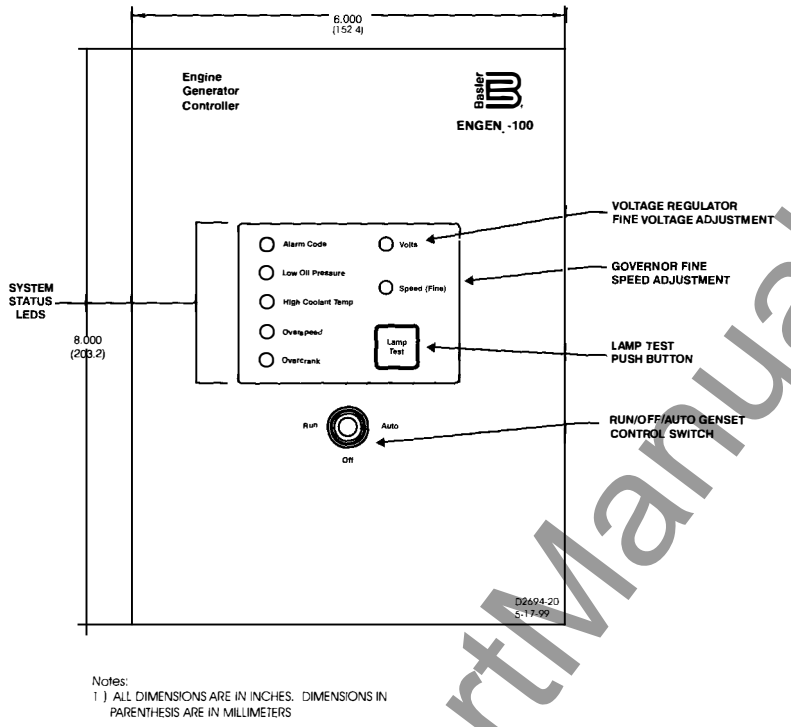


Figure 4 - Engine/Generator Controller Adjustments (Front View)

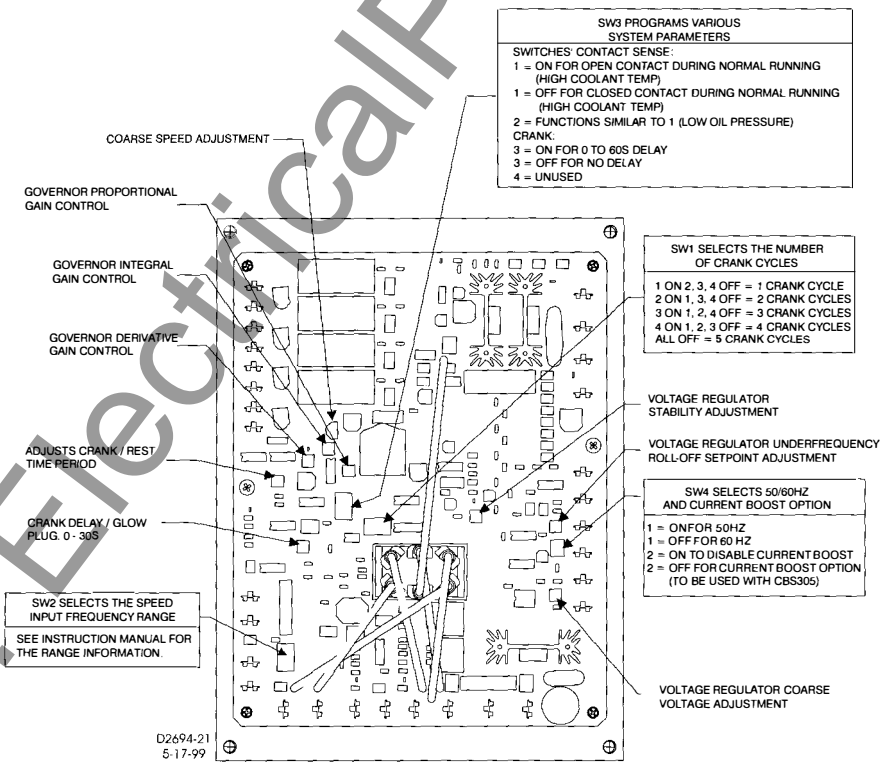
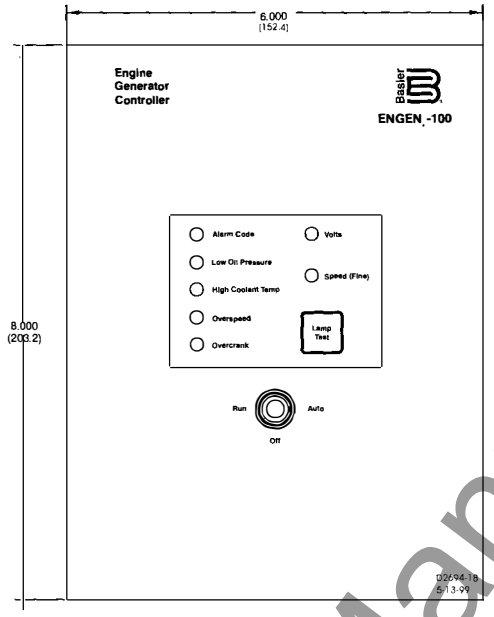


Figure 5 - Engine/Generator Controller Adjustments (Rear View)



Notes:
1.) ALL DIMENSIONS ARE IN INCHES. DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Figure 6 - Physical Outline

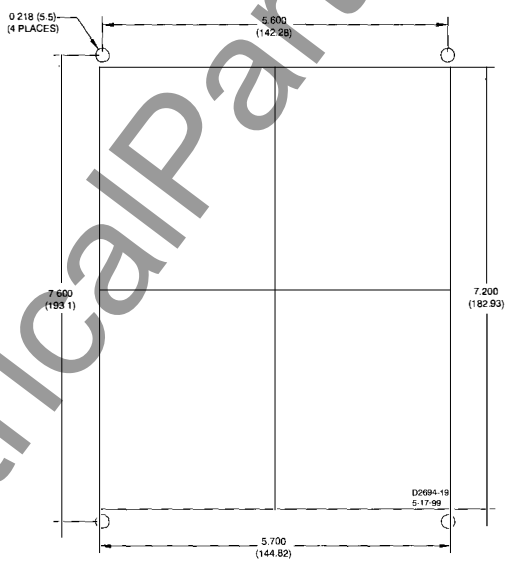


Figure 7 - Recommended Mounting Hole Pattern

ORDERING INFORMATION

ENGEN®-100 has internal coarse and fine adjustments. ENGEN®-200 has all the same great features as ENGEN®-100 and it adds Remote Fine Speed and Voltage adjustments.

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