ES-2600RG
REGENERATIVE DC DRIVE CONTROL 1/4 HP to 10 HP

High performance 1/4 to 10 HP in three models programmable for:

- Input Voltage and Frequency
- Torque or Speed Regulation
- Tach or Armature Voltage Feedback
- Horsepower (Maximum Current)
**ES-2600RG**

**REGENERATIVE DC DRIVE CONTROL 1/4 to 10 HP**

**GENERAL DESCRIPTION**

The ES-2600RG is a high performance, regenerative motor control. It includes many standard features that are available only as options on other single phase regenerative drives. Terminals are provided on the controller to access all important internal regulator points. This allows the ES-2600RG to be used in custom engineered applications as well as standard speed regulated applications.

The ES-2600RG was designed to handle most single phase regenerative drive applications without the addition of external hardware and the need for costly, time-consuming engineering. Three control models handle the entire 1/4 to 10 HP range of applications. Drive current limit and inverse time overload protective circuits for rating within this range are calibrated by means of a jumper change on the main printed circuit board.

The ES-2600RG controls a DC motor's speed or torque by varying the DC voltage applied to the motor's armature. Because the control is regenerative, it can provide power to the load and return that power to the AC power line. Rectilinear phase control assures stable operation at low speeds and smooth transitions between motoring and regenerative modes (zero deadband).

Simple jumper programming allows the ES-2600RG to operate from either 120 or 240 Volt AC input power at 50 or 60 Hz. Additional jumpers program the controller to operate as either a speed regulator or a torque regulator with armature current feedback.

Single phase AC input power is converted to variable voltage DC output power by the ES-2600RG controller. In speed regulated applications, the DC output voltage varies as a function of an input reference voltage (typically the input reference voltage is provided by an operator-adjustable potentiometer). Changing the potentiometer setting (reference) results in a motor speed change. In torque regulated applications, the DC output current varies as a function of an input reference voltage. Changing the torque reference changes the current supplied to the motor and results in a change in motor torque output.

The basic ES-2600RG controller is a chassis-mounted controller, which includes AC line fuses and a double break DC loop contactor for complete fault protection. LED indicators provide complete fault monitoring and status indication, and a digital test meter with multiposition selector switch is available as an option.

The ES-2600RG control includes many built-in features not available on competitive units. Field economy and separately adjustable rates of acceleration and deceleration are included as standard. If desired, the built-in accel/decel control ramps can be bypassed completely without any change to the controller, and current compounding can be added to the speed regulator by changing the position of another jumper. Current limit is normally set by a potentiometer located on the main printed circuit board, but if desired, it can be adjusted using a remote mounted potentiometer and a customer supplied voltage signal.

The ES-2600RG also includes an ammeter output available for use with one of the ES-2600RG ammeter kits. No additional ammeter shunt is required.

**CUSTOMER PROGRAMMABLE**

- Input voltage 120 or 240 VAC
- Current range
- Armature voltage feedback (90 or 180 VDC)
- Tach feedback
- IR Compensation (negative or positive)
- Two quadrant operation (forward or reverse)
- 10% reverse operation
- 50 or 60 Hz
- Accel/decel time range .2 to 4 / 2 to 30 seconds
- Ammeter full scale reading (150% or 200%)
STANDARD FEATURES

- **Solid State Full Wave Power Bridge** — Uses generously rated power semiconductors for maximum reliability and long life.
- **Full Four Quadrant Operation** — Allows operation of the drive motor in both the forward and reverse directions while producing torque in either clockwise or counterclockwise direction.
- **Quadrant Lockout** — May be selected by jumper programming to prevent forward or reverse motoring in certain applications.
- **Inner Current Loop Regulator** — Inherent high band width capability for fast response.
- **Rectilinear Phase Control** — Improves performance at low speed and near zero load.
- **Separately Adjustable Linear Accel/Decel Control** — Two ranges: 0.2 to 4 seconds and 2 to 30 seconds.
- **Speed Regulator** — 2% (two percent) accuracy using armature voltage feedback with IR compensation or 1% accuracy with tachometer feedback. Regulation may be improved by selecting the proper motor mounted tachometer.
- **Current (Torque) Regulator** — 1% (one percent) accuracy armature current regulator allows the operator to control motor torque instead of speed.
- **Negative IR Compensation** — Available by jumper connection. Allows use of control in jumper applications.
- **Remote Current Limit** — Available by the simple addition of a potentiometer or DC voltage input.
- **Double Break DC Armature Loop Contactor** — Full rated and fully sequenced contactor assures positive disconnect of DC motor when the stop pushbutton is pushed or whenever an undervoltage condition occurs.
- **Field Economy** — Insures longer life for wound field DC motors. May be easily bypassed or time delayed to meet specific application requirements.
- **Ammeter Output** — Motor current can be indicated with the simple addition of a remote meter.
- **Circuit Board Indicators** — Light emitting diodes (LEDs) of the main circuit board indicate: DC Overload, Field Loss, Instantaneous Overcurrent Trip, Run Mode, Jog Mode, SCRs Being Gated.
- **Fault Trip Circuit** — Protective circuits are designed to quickly shut the drive down and provide a visual indication whenever a DC overload, field loss, or instantaneous overcurrent condition occurs. This fault trip circuit prevents restart. It must be reset before the drive can run again.
- **Isolated Control Circuitry** — Provides complete isolation of the control and regulator circuitry from the AC power bus for protection in the event of a ground fault. The ammeter, speed potentiometer, and tachometer are not at line potential. Complete system capability is also possible without additional isolation accessories.
- **Instantaneous Overcurrent Protection** — Senses armature fault currents quickly to protect both semiconductors and motors against damaging current levels.
- **High Speed Current Limiting SCR Semiconductor Fuses** — Provide the utmost in fuse coordination and protection of the SCRs and motor with positive circuit clearing on both AC and DC faults.
- **Field Loss Protection** — Provides protection against runaway due to loss of motor field by shutting down the drive.
- **DC Overload (Armature)** — Senses overcurrent condition with inverse time shutdown.
- **Common Control Circuit Boards** — All ES-2600RG controls utilize the same PC board regardless of HP, voltage, frequency, or control mode.
- **Exclusive Static Adjustable Current Limit** — Allows static setting of the desired current limit value without applying DC power and without a connected output load whenever the optional test meter is connected.
- **Dual Frequency Operation** — Controls may be operated from 50 to 60 Hz power supplies by simple jumper change.
- **Jog at Preset Speed** — Separately adjustable from zero to plus or minus 30% of base speed.
- **Standard Adjustments** — Maximum speed, zero bias, acceleration time, deceleration time, IR compensation, current limit, jog speed, velocity stability, speed rate, and current stability.
- **SCR Trigger Circuits** — Pulse transformer isolated, hard firing, high frequency "burst" type pulse train output from individual gated oscillators insures SCR conduction regardless of the effects of line notching or incoming AC power line.
- **Reactors, Snubber Networks** — Prevent SCR DVT failures due to line spikes and transients. Provide DVT protection during SCR turn on and aids in SCR turn off during SCR commutation, minimizing the effects of AC power notching.
- **AC Line Filter and Transient Voltage Suppressor Network** — Eliminates interaction between other drives or AC equipment.
- **Power Supplies** — Each ES-2600RG contains an internal 115 VAC power supply to power the DC loop contactor and drive logic relays. Internal ±24 VDC, ±15 VDC, and a regulated ±10 VDC power supply are also included.
- **UL/CSA** — All ES-2600RG are UL listed and CSA approved.

OPTIONS

TEST METER
This modification consists of a digital panel meter and multiposition selector switch. It provides the capability to monitor nine critical drive parameters. The test meter kit plugs into the regulator PC board on the ES-2600RG. It is an ideal addition to the control as an aid in troubleshooting and start-up.

AMMETER KIT
The ES-2600RG control includes circuitry to drive an external ammeter without the addition of an ammeter shunt. This external meter can be calibrated in either percent load or in amperes.

ENCLOSURES
The basic ES-2600RG control is a chassis-mount unit. Walled-mounted enclosures are available to protect the ES-2600RG control from a wide variety of industrial environments.

ADDITIONAL OPTIONS
Many additional options are available to meet specific drive application requirements including:

- Reversing
- Process Signal Follower
- Auxiliary Control
- Isolation Transformers
- Dynamic Braking
- Specific Logic
- Field Weakening
- Many Others
SPECIFICATIONS

Service Conditions:
- Rated Voltage Input: 120 or 240 VAC (±10%) 1 Ø
- Rated Voltage Output: 90 or 180 VDC
- Frequency: 50/60 Hz (±2 Hz)
- Ambient Temperature: 0 to 40°C (32°F to 140°F)
- Altitude: Sea Level to 3300 Feet
- Efficiency: Power unit 98% or better depending on selected rating. Drive system 82% or better depending on selected rating.
- Load Inertia: Not more than motor inertia when referred to motor shaft.
- Power factor Corrected AC Line: Drive installation on power factor corrected AC lines should be avoided where possible.

Adjustments:
- Maximum Speed: 70 to 130% rated speed
- Acceleration Time: 0.2 to 30 sec.
- Deceleration Time: 0.2 to 30 sec.
- Jog Speed: 0 to 30% rated speed
- IR Compensation: 0 to 10% rated voltage
- Current Limit: 0 to 150% of selected range

Control Power
- Voltage (Relay Logic): 115 VAC
- Spare Capacity: 5 VAC

Input Signal Requirements
- ±10 VDC at 1 mA (nominal) for maximum output.

Speed Potentiometer
- 5000 Ohms, 2 Watt

Field Data
- Voltage: 100 VDC with 120 VAC input
  200 VDC with 240 VAC input
  240 VDC with 277 VAC input
- Current: 3 amperes maximum

RATINGS

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Optional Dead Front and Test Meter
0.272" DIA
4 MOUNTING HOLES FOR 1/4" STUD

CONTROL TECHNOLOGIES
WORLDWIDE

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