

## Process and Import/Export Control

### Applications

The Woodward Process and Import/Export Control, with Woodward Load Sharing or Speed controls, provides control of a prime mover system or process.

Process controls will control any process where the controlled parameter is determined by the load or speed of a prime mover, and where the control parameter can be monitored at a 1 to 5 Vdc or a 4 to 20 mAdc input signal.

Input of 0 to 10 Vdc may be used if an external control-point potentiometer is used.

#### Types of Controls

The Process Import/Export Control is available in Low-Signal Select or Differential Process configuration.

### Description

The Woodward Process Control has built-in, adjustable high and low limits to restrict the Process Control output range in case of excessive input. An external high-limit potentiometer can be used to supplement the internal high limit. This allows the operator to limit output without changing set points and to externally manipulate the rate of loading. The external high limit can be used to set load. This allows setting the gain adjustment for best transient response.

The output amplifier of the Process Control tracks the voltage present on the leads connected to the output terminals. This voltage represents system speed or load condition at the time the Process Control is activated. When the control is activated, the output starts at the current system speed or load and integrates to obtain a system speed or load which matches the Process Control set point. This minimizes speed or load transient upon activation of the control.

The Woodward Process Control features an isolated internal power supply to reduce ground-loop or other interference problems. All models feature adjustable Gain and Droop circuits. The gain function governs Process or Import/Export Control response time, and sets process loop stability.

Droop is available, if required, to achieve proper controlling action. Droop may be used when several controls are controlling the same pressure on a common header pipe, when paralleling mechanical loads, or when the prime mover cannot be stabilized through normal gain adjustments.



- Choice of operating modes:
  - ✓ Inverse process control
  - ✓ Direct process control
  - ✓ Inverse and direct process control
  - ✓ Differential process control
- Import, export or import/export control
- High and low supply voltage
- Adjustable high and low limits
- Isolated power supply

## Operation of the Low Signal Select (Inverse/Direct) Process Import/Export Control

The Process Import/Export control compares the input signals to operator-set references. The difference between each input and the reference setting is sent to a circuit which selects the lower speed or power from the prime mover. The output of this circuit is sent, as an operating voltage, to a load or speed control. The load or speed control then changes or maintains the prime mover load or speed and, in turn, the input to the Process Import/Export Control.

The Low Signal Select control offers a choice of three different modes of action:

- **Inverse Process Control:**

Controls a process where the sensed input signal decreases as the load or speed increases. (Example: where the sensed input is inlet pressure. Also used for import power control.)

- **Direct Process Control:**

Controls a process where the sensed input signal increases as the load or speed increases. (Example: where the sensed input is exhaust pressure. Also used for export power control. May be used for Import/Export control with a 4–20 mA transducer.)

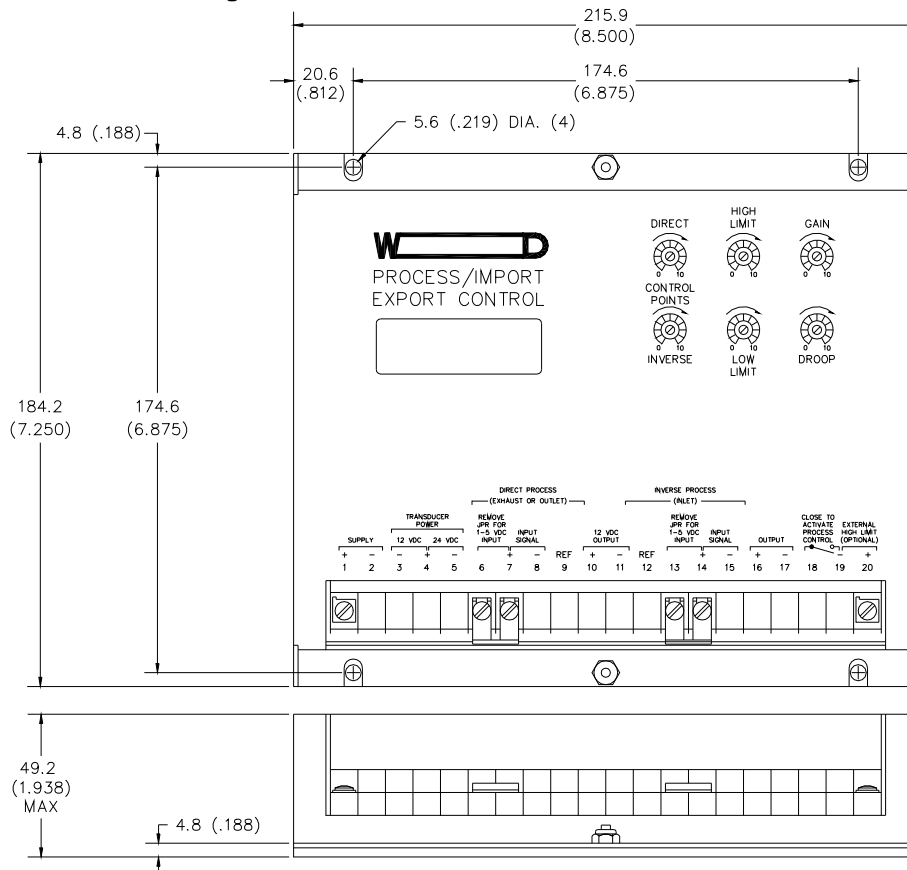
- **Inverse and Direct Process Control:**

Uses both inverse and direct process inputs to control a process. The controlling action of the Process Control is determined by the sensed-input signal which requires the lowest prime-mover load or speed. (Examples: The Process Control acts as an Inverse Process Control when the controlling input is inlet pressure. The Process Control acts as a Direct Process Control when the controlling input is outlet pressure.)

## Differential Process Control

The Differential Process Control subtracts the inverse process input from the direct process input and compares the difference to an operator-set reference. The Process Control output voltage is then sent to a load or speed control which changes or maintains the load or speed of the prime mover to maintain the required differential input to the Process Control.

The Differential Process Control is capable of differential process control only. A differential control is required for Import/Export control of electrical generation when a –5 to +5 Volt or –20 to +20 mA transducer is used.



NOTE : DIMENSIONS ARE MILLIMETERS (INCHES)

**Process Import/Export Control Outline Drawing**  
(Do not use for construction)

## Specifications

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### Inputs from Controlled Parameter

1–5 Vdc or 4–20 mA dc signal (0–10 Vdc may be used when using an external control point potentiometer.)  
 $\pm 5$  Vdc or  $\pm 20$  mA dc transducer is used with differential unit for import/export control.

### Outputs:

Compatible with most Woodward electronic speed controls and load-sharing controls.  
 Output impedance determined by setting an internal switch.

Selections include: High impedance  
 Low impedance  
 Low signal select  
 High signal select

### Ambient Temperature Range

–40 to +71 °C (–40 to +160 °F)

### Power Supply

Low Voltage Model Compatible with 12, 24, or 32 Vdc power systems (10 Vdc minimum, 40 Vdc maximum)  
 High Voltage Model Compatible with 100 to 120 Vac, 45 to 440 Hz, or 125 Vdc (88 to 132 Vac or 90 to 150 Vdc)

### Adjustments

High Limit	0 to 8 Vdc (range)
Low Limit	–0.6 to high limit setting
Optional External High Limit	0 to internal high limit setting
Inverse Control Point	0 to 5.5 Vdc or 0 to 22 mA dc
Direct Control Point	0 to 5.5 Vdc or 0 to 22 mA dc
Differential Units Direct Control Point	–5.5 Vdc to 5.5 Vdc (with inverse control point fully clockwise and 0 to 11 Vdc external direct control point)
Droop	0 to 7.5% with 1 to 5 Vdc or 4 to 20 mA dc input and 0 to 3 Vdc output
Gain	For setting process control system stability and response time

### Construction

Weight: 1.0 kg (2.2 lb)—steel case with durable epoxy-based paint finish

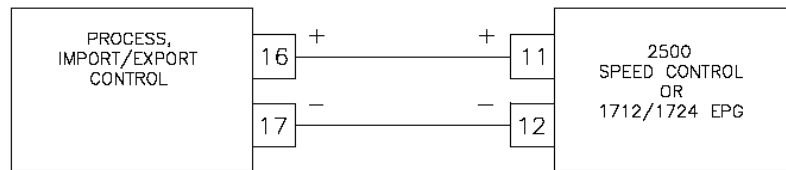
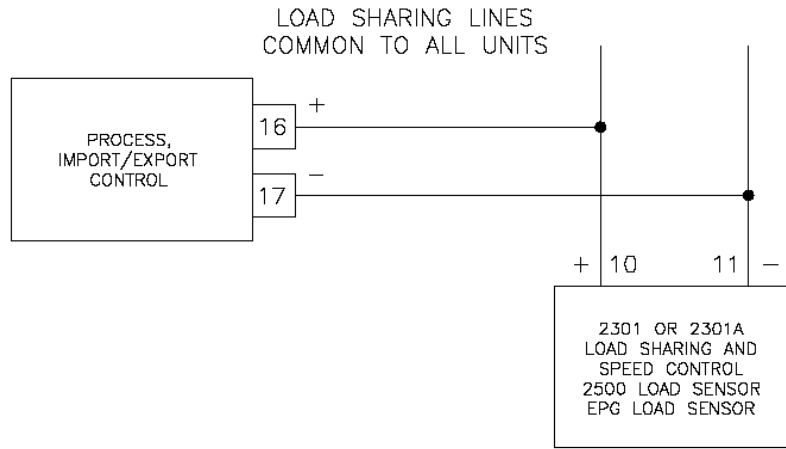
Technical Manual: 82010

## To Specify an Import/Export Control

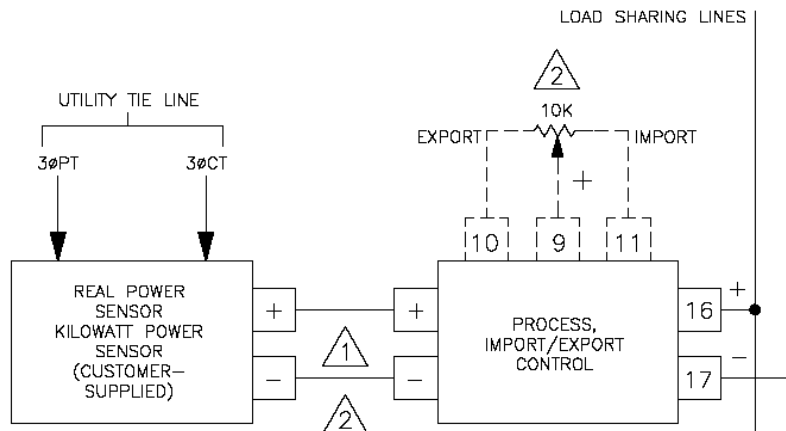
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The following text is suggested to describe a Process Import/Export control in a system specification:

The Process Import/Export control will provide inverse and/or direct process control functions based on watt transducer or process transducer inputs. The Process Import/Export control will be available with either high voltage (88–132 Vac or 90–150 Vdc) or low voltage (10–45 Vdc) power supply inputs. The Process Import/Export control will be available with either Low Signal Select or Differential Process functions. The Process Import/Export control will have on board high limit, low limit, gain, and process set point adjustments. An external high limit potentiometer input will be standard on the Process Import/Export control. The Process Import/Export control will provide 12 or 24 Vdc isolated power supplies for use in providing power for the watt or process transducers. This power supply shall have a current output capacity of 50 mA dc for both 12 and 24 volt power supply outputs. The Process Import/Export control must be UL Listed and CSA Certified (Woodward Process Import/Export control or equivalent).



HIGH OR LOW SIGNAL SELECT OUTPUT CONFIGURATION. SET TO ADJUST SPEED UP OR DOWN FROM A GIVEN SET SPEED.



82D-010  
98-03-17 skw

Typical System Block Diagrams



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