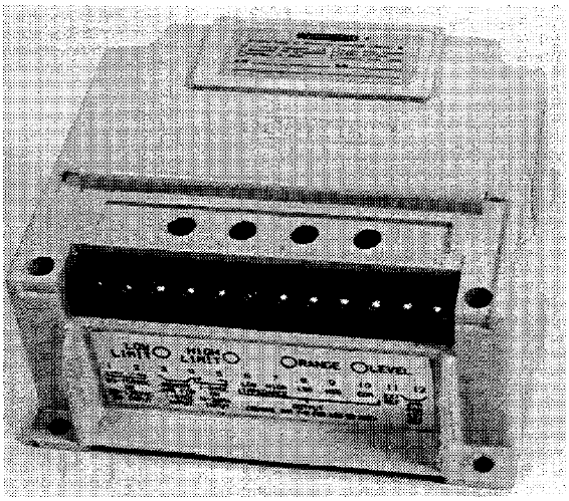
WOODWARD

Product Manual 82030
(Revision NEW)
Original Instructions



Isolated Signal Converter

8272-711, 8272-712

Installation and Operation Manual

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, on the *publications page* of the Woodward website:

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Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, to verify whether this translation is up to date. Out-of-date translations are marked with ⚠. Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

Revisions—Changes in this publication since the last revision are indicated by a black line alongside the text.

Warnings and Notices

Important Definitions

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING**—Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION**—Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

⚠WARNING

Overspeed / Overtemperature / Overpressure

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

Start-up

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

⚠WARNING

Automotive Applications

On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.

NOTICE

Battery Charging Device

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

Isolated Signal Converter

Description

Woodward Isolated Signal Converters are auxiliary devices used in prime-mover control to isolate and convert a control signal received from a process sensor, computer, or programmable device, changing that control signal into a signal compatible with Woodward electronic governor controls. The output of the Isolated Signal Converter is used to influence the speed or power reference of the prime mover control.

In most cases the control signals received will be 4–20 mA, although control signals such as 0–20 mA, 1–5 volts, 0–10 volts, or 0–15 volts can also be received. The unit will convert the control signal to a signal compatible with Woodward controls.

The signal converter can extend the range of the control signal by a 2:1 ratio. (A signal of 2 to 4 volts can be expanded to an output signal to the Woodward control of 1 to 5 volts.) This expansion of range allows full Woodward control over a more limited control-signal range. Working the other direction the signal converter is capable of compressing an input signal by a 50:1 ratio. This ratio makes the range adjustment in the reduced output direction much more critical than in the expanded output direction.

Although the range adjustment could accommodate a much larger signal the input control signal should not exceed 15 volts.

The signal converter provides adjustable high and low limits which can be used to limit the speed or load change controlled by the control signal input. The limits allow the connected Woodward control to lock at a low or high level should the control-signal input leave the band between the high- and low-limit settings.

An external reference feature on the signal converter lets the high and low limits follow the regulated power supplies from some controls. This feature is used on some full authority EPG and 2500 control systems which have fluctuating power supply voltages (see “Setting Up the Converter”).

High- and low-signal-select connections are available on the output of the signal converter. When a control circuit of the governor unit is connected to either the high or to the low output-select feature on the signal converter the output of the isolated signal converter will affect the governor control only when its signal is higher than the signal already on the control circuit for high select or lower than the signal already on the control circuit for the low select.

The Isolated Signal Converter is available in two models: 8272-712 which uses 90 to 150 Vdc or 88-132 Vac supply, or 8272-711 which uses 10 to 40 Vdc supply. Except for the supply voltage, the two units are identical.

The Signal Converter is enclosed in an aluminum housing. The assembly uses a Woodward conformal-coated printed circuit board with high-temperature, high-quality components.

Installation

Refer to Figure 3 for mounting information. The control is designed for switch gear mounting and may be mounted in any position. Ambient temperature must be between –40 and +160 °F (–40 and +71 °C). Provide adequate ventilation for cooling and space for installation and servicing.

Control Adjustments

Outputs are controlled by four potentiometers. These potentiometers are labeled:

- RANGE
- LEVEL
- LOW LIMIT
- HIGH LIMIT

RANGE determines the change in output signal for a given change in the input signal.

LEVEL sets the base output voltage that is affected by the input signal.

LOW LIMIT sets the low limit of the controlled parameter. (The signal converter will provide the minimum signal should the control-signal input drop below the limit setting.)

HIGH LIMIT sets the high limit of the controlled parameter. (The signal converter will provide the maximum signal should the control-signal input exceed the high limit setting.)

Control Selections

See “Setting Up the Converter” for connections required to various Woodward controls.

See Figure 4 for a block diagram of signal converter functions.

The signal converter can provide either a positive or negative output when required for applications that use a 0 to –5 or 0 to +5 voltage signal. (An example of this application is for Process Control functional mode. A voltage output of 0 to +5 will instruct the Differential-Process Import/Export Control to export power. A voltage output of 0 to –5 will instruct the Differential-Process Import/Export Control to import power. The polarity of the process or control signal input to the Signal Converter will affect the output polarity.)

Reversing polarity on the output terminals will provide inverse operating signals.

All wiring of the signal converter must be done in accordance with the plant wiring diagrams included in this manual.

Isolation

The switching power supply and the differential-input circuit provide isolation from circulating currents. Circulating currents normally arise when the control signal has a grounded common and a grounded power supply.

Setting Up The Converter

IMPORTANT

Maximum Signal Converter output does not necessarily result in maximum speed nor maximum power output. When connected to the speed-trim terminals of a 2301A control, zero output would result in maximum speed while maximum signal converter output would result in minimum speed.

Before starting to set up the converter determine if the control to which the converter will be connected is direct or inverse acting. A direct acting control will require an increase in voltage for an increase in controlled parameter. An inverse acting control will require a decrease in voltage for an increase in controlled parameter.

⚠WARNING

The following instructions require running the engine with unproven control abilities. DO NOT attempt any of the procedure unless the engine is equipped with an overspeed shutdown device and you are satisfied that the device is working properly and will shut down the engine should the governor call for excessive speed. Overspeed can cause extensive damage to the engine and driven appliance and can cause personal injury and even death.

The voltage levels required by the control must also be determined. To determine the voltage levels, set the control up according to the control plant wiring. Do not connect the Signal Converter, but use an external potentiometer or other manual means to control the desired parameter. (Usually this is an external speed trim or external reference potentiometer. Contact Woodward Technical Assistance if the method to do this is not clear. Place a voltmeter across the terminals to which the signal converter will be connected. (If the meter indicates a negative polarity, reverse the leads.) Manually adjust the external adjustment for the desired parameter.

Record the voltages required for minimum speed, load, or process and for the maximum speed, load or process.

For Direct Acting Control

1. Set HIGH LIMIT potentiometer fully clockwise.
2. Set LOW LIMIT potentiometer fully counterclockwise.
3. Set the RANGE potentiometer fully clockwise.
4. Set the LEVEL potentiometer fully counterclockwise.
5. Attach a voltmeter to terminal 10 (–) and to the designated (+) terminal according to the plant wiring for the control and purpose desired.
6. Attach a voltage or current source to terminal 4 (+) and 5 (–). Jumper terminal 3 to 4 if control signal is a current.
7. Attach the appropriate power source to terminal 1 (–) and 2 (+).
8. Set the control signal input for 4 mA or the lowest control signal.
9. Set the LEVEL to obtain the desired minimum output.
10. Increase the control signal to 20 mA or the highest control signal.

11. Set the range to obtain the desired maximum output.

12. Repeat steps 8 through 11 until set points do not require additional adjustment.

13. With 20 mA or the highest control signal applied, turn the high limit adjustment counterclockwise until the output just starts to drop. Return the high limit to the point where the desired output is just attained.

14. Turn the control input off and adjust the low limit clockwise until the minimum output is just attained.

For Inverse Acting Controls

Even though the converter action is inverse, the total system is direct acting (4 mA produces minimum speed, 20 mA produces maximum speed.)

1. Set the HIGH LIMIT potentiometer fully clockwise.

2. Set the LOW LIMIT potentiometer fully counterclockwise.

3. Set the RANGE potentiometers fully clockwise.

4. Set the LEVEL potentiometer fully counterclockwise. Note that the direction of setup is reversed from a direct acting output.

5. Attach a voltmeter to terminal 10 (+) and to the designated (–) terminal according to the plant wiring for the control and purpose desired.

6. Attach a voltage or current source to 4 (+) and 5 (–). Jumper terminal 3 to 4 if the control signal is a current.

7. Connect the appropriate power source to terminals 1 (–) and 2 (+).

8. Set the control signal to 4 mA or the lowest control signal (lowest speed).

9. Set the level to attain the desired maximum output voltage.

10. Increase the control signal input to 20 mA or the highest control signal (highest speed).

11. Set the Range to attain the desired minimum output voltage (highest speed)..

12. Repeat steps 8 through 11 until set points do not require additional adjustment.

13. With 4 mA or the lowest control signal applied, turn the LOW LIMIT ADJUST to the point where the desired output is just attained.

14. Turn the control input to 20 mA or the highest control signal applied. Turn the HIGH LIMIT clockwise until the output just starts to go above the minimum desired value. Reset the LOW LIMIT to obtain the minimum output desired.

High Signal Select

1. Set up for either direct or inverse acting, depending on the action (designation) of the control being used.

2. Connect a circuit across output terminals 9 and 10 as shown.

3. The signal converter should only be able to force the voltage across terminals 9 and 10 in the increase direction and to a voltage of about 8 Vdc.

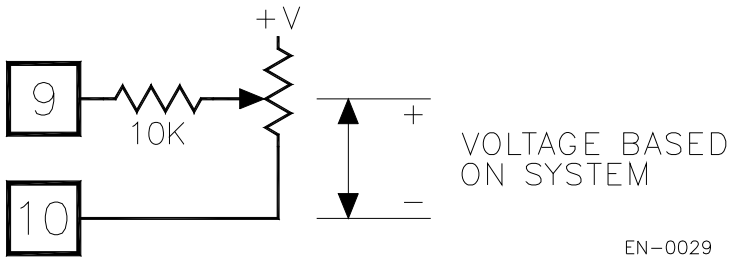


Figure 1. High Signal Select

Low Signal Select

1. Set up for direct acting controls only.

2. Connect a circuit across output terminals 8 and 10 and shown.

3. The signal converter should only be able to force the voltage across terminals 8 and 10 in the decrease direction.

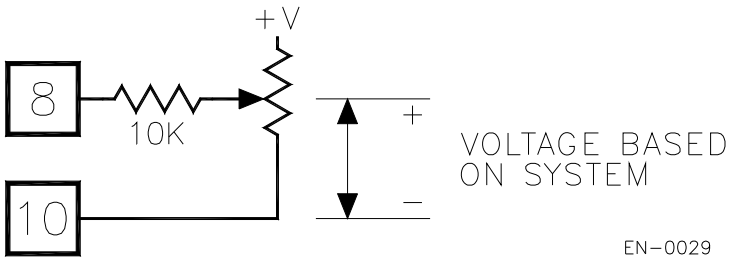


Figure 2. Low Signal Select

Woodward does not consider these units to be user serviceable.

If a unit does not calibrate to the appropriate values as specified in the tests, it should be returned to Woodward for repair or replacement.

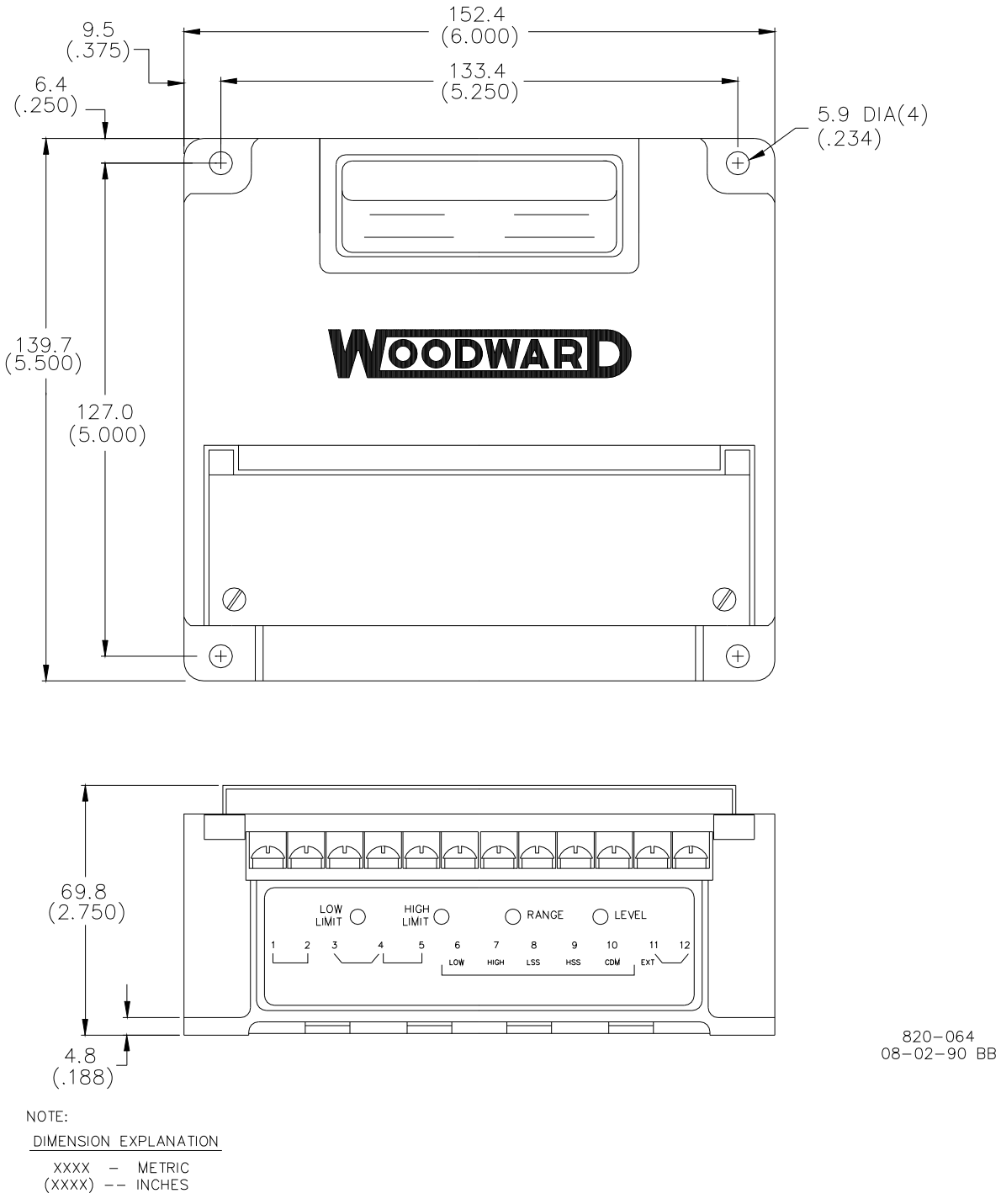
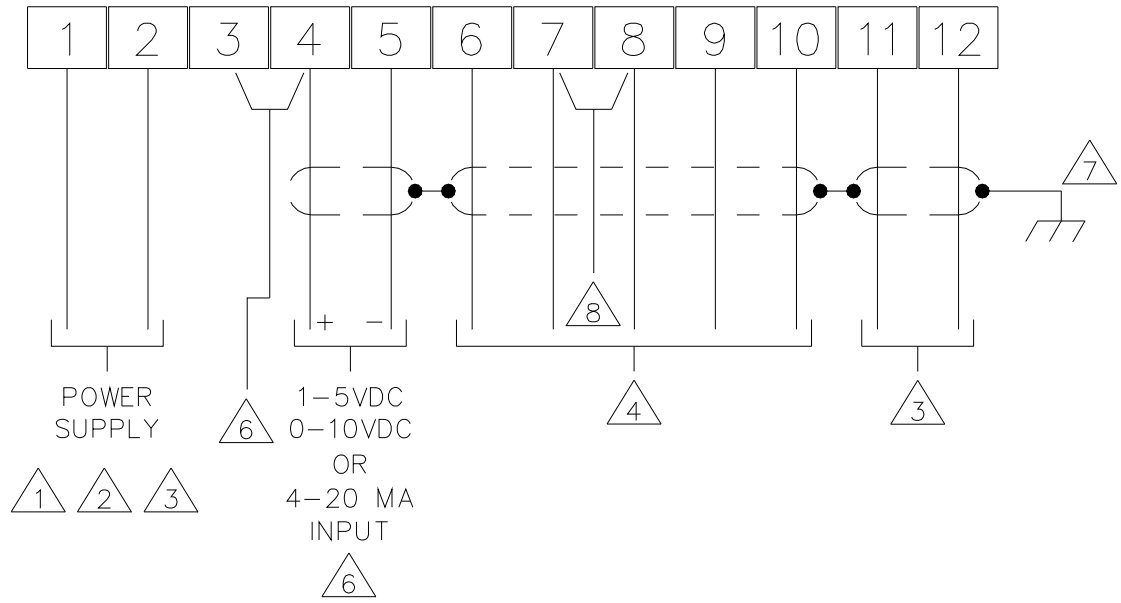


Figure 3. Outline Drawing of Isolated Signal Converter
(Do not use for construction.)



NOTES:

1. POWER REQUIREMENT LESS THAN 3 WATTS.
2. TERMINAL 1 TO BE NEGATIVE POLARITY FOR DC POWER SUPPLY, NEUTRAL FOR AC POWER SUPPLY; TERMINAL 2 TO BE POSITIVE POLARITY FOR DC POWER SOURCE, LINE FOR AC POWER SUPPLY.
3. EXTERNAL REFERENCE USED ONLY ON SPEED REFERENCE APPLICATIONS.
4. REFER TO FIGURES 4, 5 AND 6 FOR SPECIFIC OUTPUT CONNECTIONS.
6. REMOVE JUMPERS ACROSS TERMINALS 3 AND 4 FOR 1−5VDC AND 0−10VDC INPUTS.
7. WIRES TO BE SHIELDED TWISTED PAIRS, WITH SHIELD CONNECTED AT ONE END ONLY.
8. REMOVE JUMPER FROM TERMINALS 7 AND 8 WHEN USING TERMINALS 8 OR 9, LSS (LOW SIGNAL SELECT) OR HSS (HIGH SIGNAL SELECT).

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Figure 4. General Plant Wiring of Signal Converter

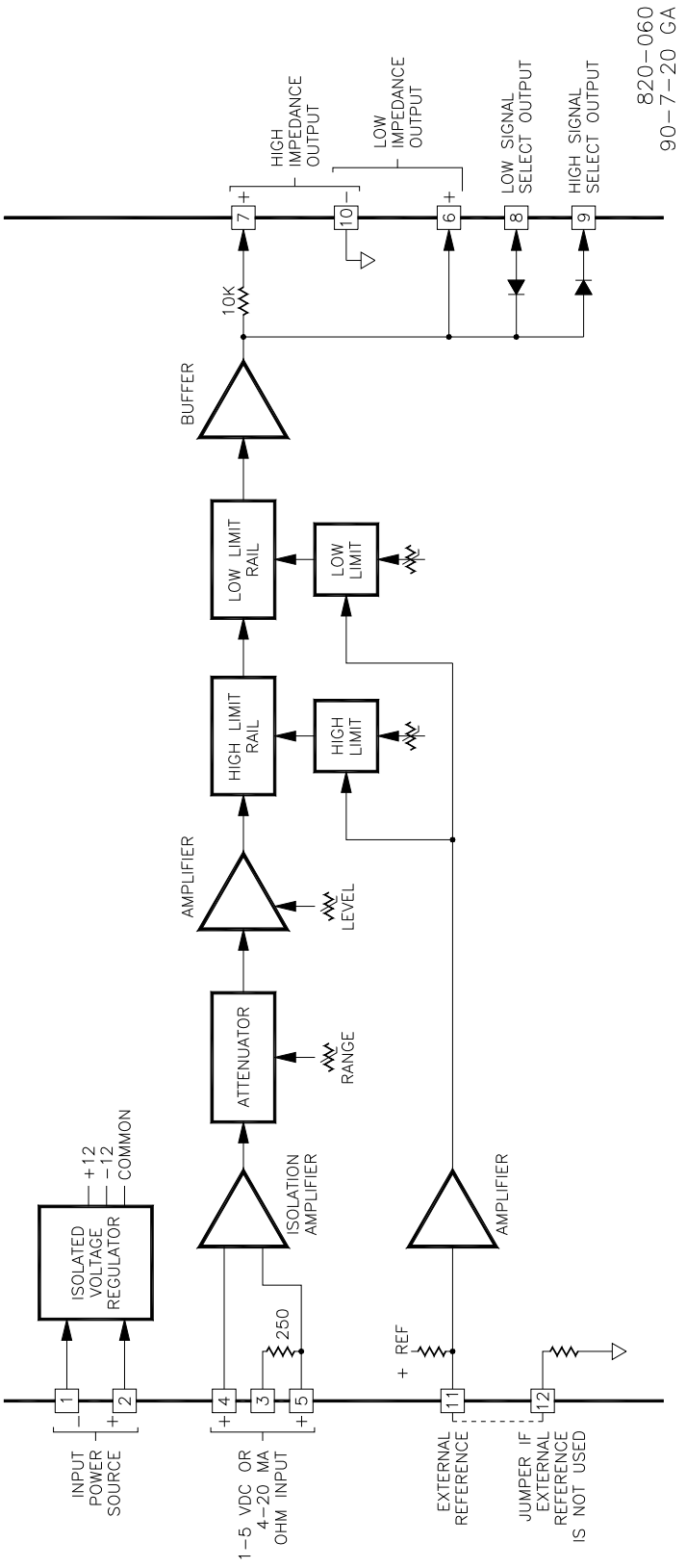


Figure 5. Block Diagram of the Isolated Signal Converter

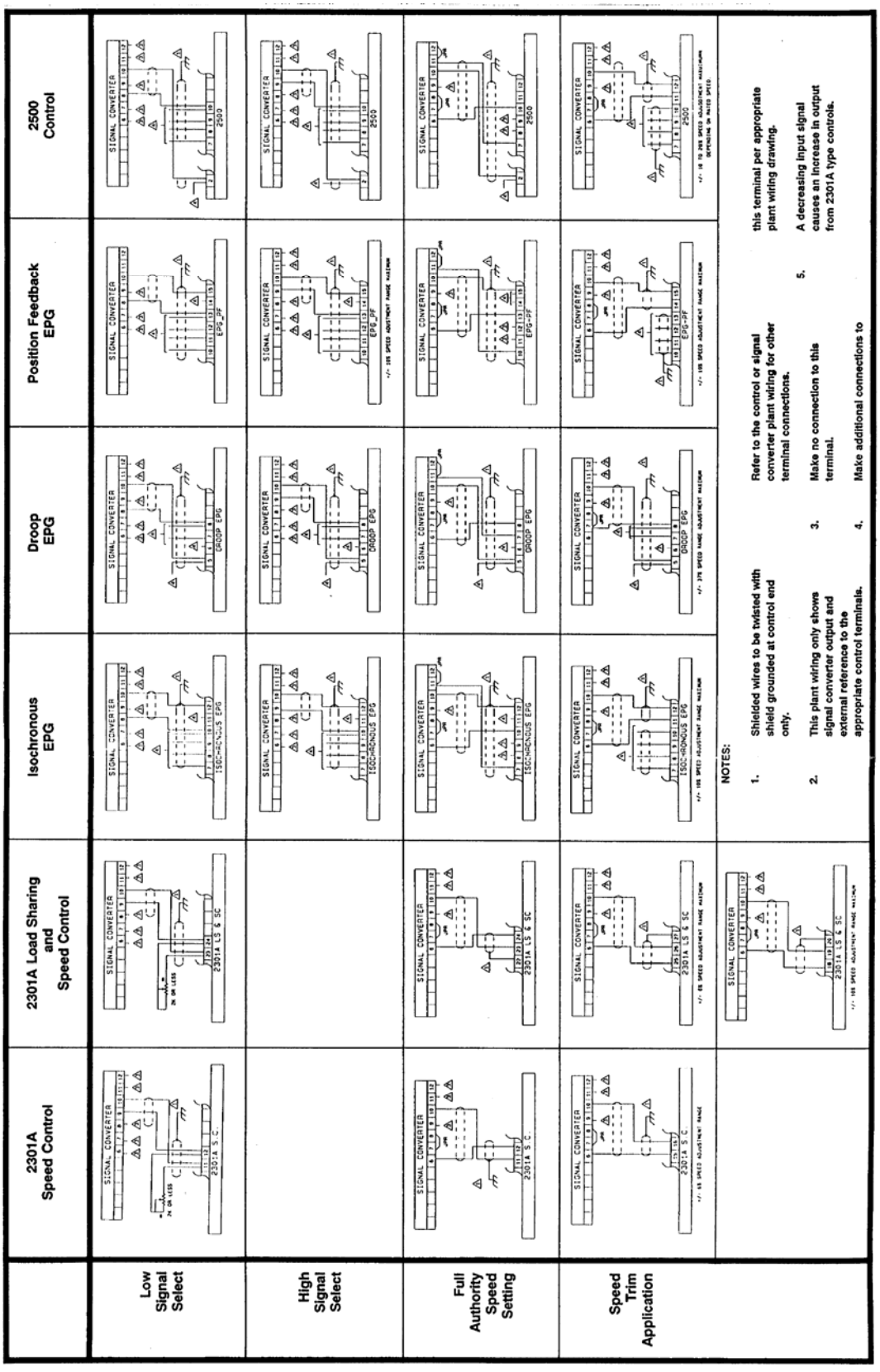


Figure 6. Plant Wiring for 2301A, EPG, and 2500 Controls

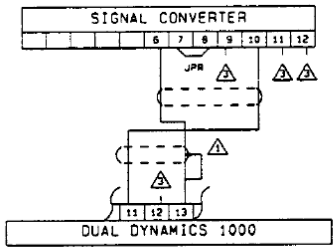
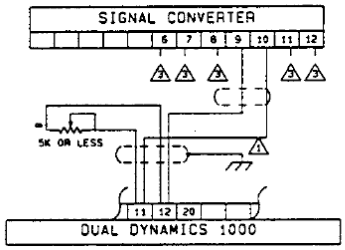
	Dual Dynamics Applications	
Full Authority Speed Setting		
High Signal Select Speed Setting		

Figure 7. Plant Wiring for Dual Dynamics 1000 Applications

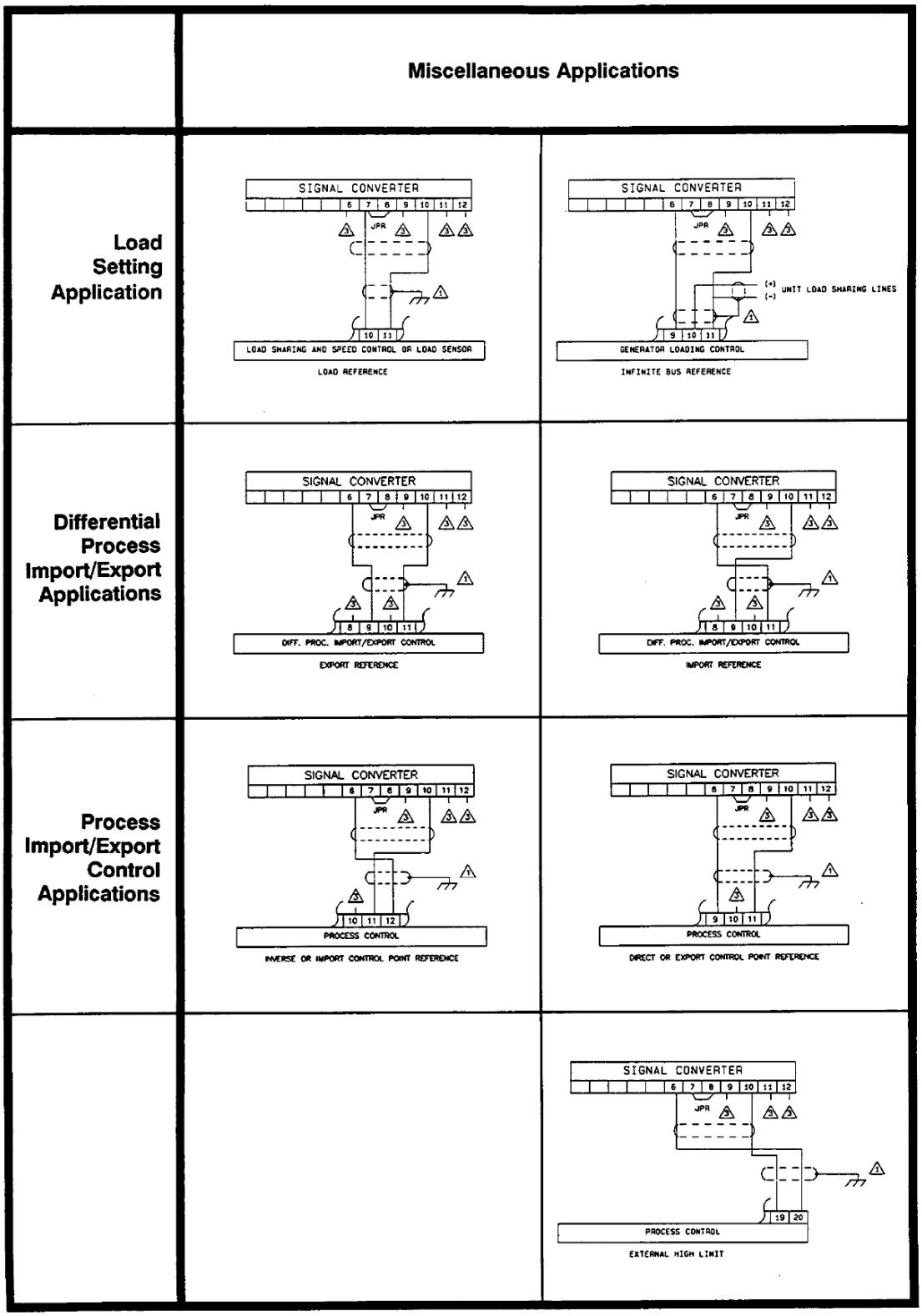


Figure 8. Plant Wiring for Miscellaneous Applications

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Send comments to: icinfo@woodward.com

Please reference publication 82030.

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2012/9/Colorado