WOODWARD

Product Manual 26147
(Revision H, 6/2016)
Original Instructions

ProAct™ Analog Electric Actuator with Integral Driver

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 *26455*, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, 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 *26455*, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, 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 Out-of-date translations are marked with ⚠.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.

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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.

Regulatory Compliance

European Compliance for CE Mark:
These listings are limited only to those units bearing the CE Marking.

EMC Directive: Declared to Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility (EMC)

Other European Compliance:

Machinery Directive: Compliant as partly completed machinery with Directive 2006/42/EC of the European Parliament and the Council of 17 May 2006 on machinery.

North American Compliance:

CSA: CSA Certified for Class I, Division 2, Groups A, B, C, & D, T3 at 74 °C Ambient. For use in Canada and the United States. This product is certified as a component for use in other equipment. The final combination is subject to acceptance by CSA International or local inspection.
Certificate 1167451

IMPORTANT **Jumpers should not be moved or changed unless power has been switched off.**

General Installation and Operation Notes and Requirements:
The ProAct Analog is suitable for use in Class I, Division 2, Groups A, B, C, and D per CSA for Canada and US or non-hazardous locations only.

Wiring must be in accordance with North American Class I, Division 2 or European Zone 2 wiring methods as applicable, and in accordance with the authority having jurisdiction.

Field Wiring must be suitable for at least 85 °C.

These listings are limited only to those units bearing the CSA agency identification.

Compliance with the Machinery Directive 2006/42/EC noise measurement and mitigation requirements is the responsibility of the manufacturer of the machinery into which this product is incorporated.

⚠WARNING

EXPLOSION HAZARD—Do not remove covers or connect/disconnect electrical connectors unless power has been switched off or the area is known to be non-hazardous.

Substitution of components may impair suitability for Class I, Division 2 or Zone 2

⚠AVERTISSEMENT

RISQUE D'EXPLOSION—Ne pas enlever les couvercles, ni raccorder / débrancher les prises électriques, sans vous en assurez auparavant que le système a bien été mis hors tension; ou que vous vous situez bien dans une zone non explosive.

La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe I, Division 2.

Chapter 1.
General Information

Introduction

This manual describes the Woodward ProAct™ Analog Actuator for engine applications. This manual provides installation instructions, describes the control, and explains the configuration (programming), adjustments (service mode), and hardware specifications. This manual does not contain instructions for the operation of the complete engine system. For engine or plant operating instructions, contact the plant-equipment manufacturer.

How to Use This Manual

The following summarizes how to install a ProAct actuator into a new or existing system.

- Unbox and inspect the hardware for any visible damage caused during shipping.
- Mount the actuator and linkages following the procedures and recommendations in Chapter 2.
- Wire the actuator—see Chapter 3.
- Refer to Chapter 4 for guidelines on calibration and setup.

⚠WARNING **The actuator must be properly set up using the CAL/CONFIG routine prior to starting the engine.**

Description

The ProAct Analog is a family of electric actuators with integral drivers intended to be mounted on-engine to control various functions including (but not limited to): fuel rack positioning, timing control, and throttle valve and wastegate positioning. The device is effectively a positioner which will accept a desired position signal from another device in the system, such as a speed control, and drive to that position. Each unit includes an analog driver interface capable of controlling the actuator, and provides a signal that represents throttle position.

The ProAct Analog actuator can be commanded to a position via 4–20 mA, 0–200 mA or PWM interfaces. In addition, given an on board position feedback device, the actual position is available to the system through a position output signal. This is a highly filtered signal and may not be suitable for closed loop operation.

Each member of the ProAct Analog family has a different input signal specification or bi-directional torque output capability as described in Chapter 9 (Specifications) and shown in Table 1-1. In addition, each actuator has a nominal rotation of 75° at the output shaft. It can be mounted in either a base mount or flange mount configuration. The units are designed to operate in an on-engine environment and can therefore withstand high levels of vibration and temperature extremes. The details of these environmental limits can be found in the Environmental Specifications section in Chapter 9.

Part Number	Model Number	Input Signal
8404-006	2	PWM
8404-005	1	PWM
8404-201	2	0–200 mA / 4–20 mA
8404-200	1	0–200 mA / 4–20 mA

Model 1—Low Torque Version
Model 2—High Torque Version

Table 1-1. Input Signal Specification

As described in Regulatory Compliance, the ProAct Analog family of actuators meets CE marking requirements.

Controller Overview

The position controller interface software is executed on a 16 MHz 6805 8-bit microcontroller onboard the ProAct Driver. Internal current and position sensors provide feedback for closed-loop position control. The driver interfaces with an external speed control via a position demand. The position demand can be an analog signal (4–20 mA or 0–200 mA) or PWM signal. The ProAct control monitors all available signals, internal and external, and provides actuator shutdown if any faults are detected. An analog output provides actual position indication. Figure 1-1 provides a functional overview of the ProAct Analog.

The ProAct control is field configurable, which allows a single basic design consisting of four part numbers to be used in many different applications. The driver must be configured and field calibrated to the specific engine. Figure 1-2 provides an overview of the ProAct Analog driver I/O (inputs/outputs).

Mechanical Setup

Mounting

The ProAct Analog platform is base mounted to tapped holes on the bottom of the actuator or flange mounted utilizing through-holes provided (see Figure 2-2). The unit can be mounted in any orientation. All exterior and mounting dimensions and exterior fasteners are metric. See Chapter 2 (Installation) for details on mounting and installation.

Output Shaft

The ProAct Analog family output shafts are standard US-customary sizes with toothed serrations.

Rotation

All ProAct Analog actuators have 73–77° of available travel. The max fuel direction of this travel is configurable in the clockwise or counterclockwise direction.

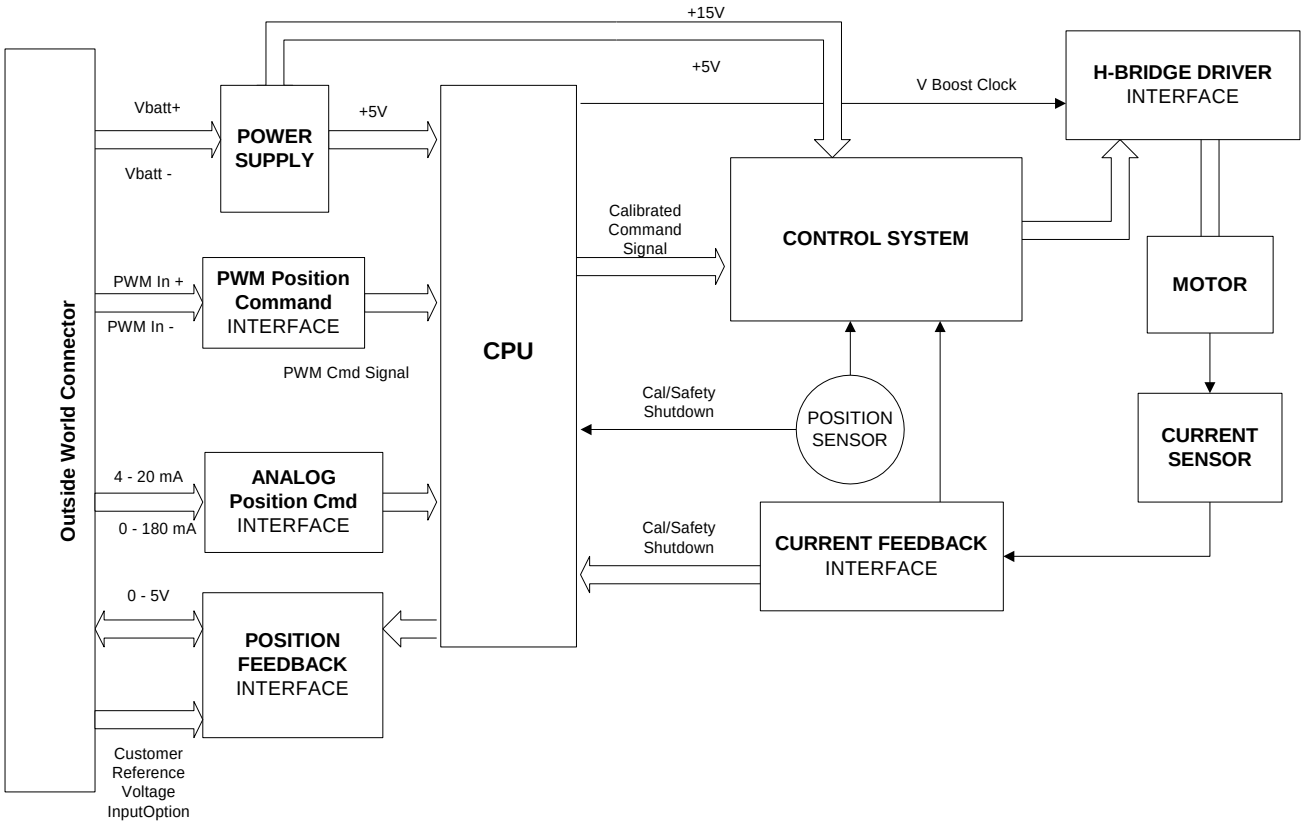


Figure 1-1. ProAct Analog Functional Overview

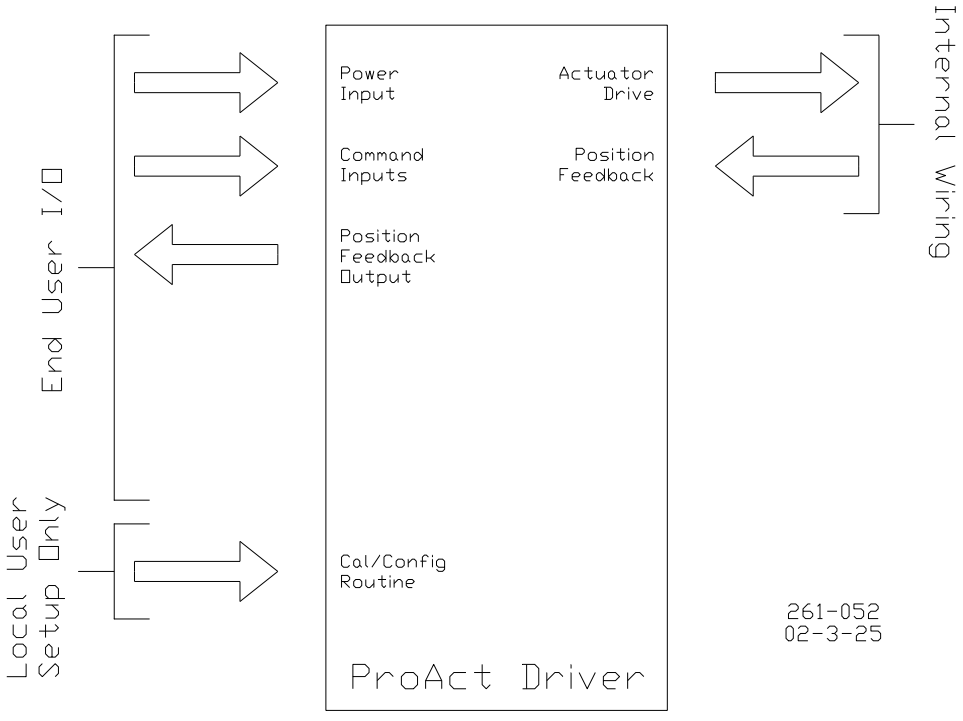


Figure 1-2. Driver Input/Output Overview

Mechanical Stops

Internal mechanical actuator stops will only survive a maximum kinetic energy of 0.011 J (0.097 in-lb). If the actuator internal stops are used, the load inertia should not exceed 3.76E-3 in-lb-s² (4.25E-4 kg-m²). See Chapter 2 (Linkage) for details on actuator inertia and internal stops. In service, electrical and engine stops should be set inside the actuator stops. Electrical stops are set via the CAL/CONFIG routine.

Electrical Connections

There is one interface on the circuit board. Refer to Figure 3-1 for details on ProAct actuator wiring.

Interface	Type	Use
7-pin connector	MS-3102R18-9P	customer interface
A		+24 Vdc power
B		4–20 mA / PWM signal input
C		current input signal common
D		–24 Vdc power GND
E		0–200 mA input signal
F		position output signal +5 V ref. opt.*
G		position output signal

*** NOTE**–If an external 5 volt source is used, the position output signal is ratiometric to that source. If no external supply is applied, the position signal is referenced to the internal 5 volt source.

Table 1-2. Board Connections

Position Command Input

There are three possible position command signals. See the table below for an overview of the signals and corresponding input signal to actuator position. All adjustments to the four different part numbers (Table 1-1) are done via the CAL/CONFIG routine. All circuits are protected against short circuit to battery negative. These short circuits will not cause damage to the control.

The response of the actuator when the input signal is outside the nominal range is model-dependent. PWM models will disable the coil drive until the PWM input signal returns to a nominal range value. At inputs less than 20 mA, the current model will drive into the min stop, and at inputs greater than 180 mA, it will drive into the max stop. Current models will continue to drive (to min stop) with no input signal applied.

Input Signal	Nominal Range	Adjustment Range	Actuator Output for Input Range
PWM: 7 to 32 V 100 to 3000 Hz	20% to 80% Duty Cycle	10% to 90% Duty Cycle	0% to 100% Actuator Position
Analog: 0 to 200 mA	20 to 180 mA	0.0 to 200 mA	0% to 100% Actuator Position
Analog: 4 to 20 mA	4 to 20 mA	0.0 to 25 mA	0% to 100% Actuator Position

Table 1-3. Positioning Command Input

Inputs/ Outputs (I/O)

The following Inputs/Outputs (I/O) are available in the ProAct Analog:

- power input
- 1 analog input
- 1 PWM input
- 1 analog output

Refer to the control wiring diagram (Figure 3-1) for wiring overview. Refer to Chapter 3 for wiring details.

Power Input

The input power has an operational range of 18–32 Vdc, nominal 24 Vdc. Please reference the electrical specification in Chapter 9 for input power and current requirements.

Analog Input for Position Demand

The analog input model has available both a 4–20 mA input and a 0–200 mA input. The input is selected using the appropriate input pin on the customer interface connector (Table 1-2)—pin B for 4–20 mA and pin E for 0–200 mA. The reference pin is C.

PWM Input for Position Demand

The PWM input model accepts a 100 to 3000 Hz input signal of 7 to 32 volts peak voltage (referenced to unit battery ground). The PWM input duty cycle minimum and maximum are field calibrated to match the controller sending the demand. This input is applied at pin B of the external connector with the reference at pin D (Power GND).

Low Power Standby Mode (PWM models only)

When the input is opened, the driver goes into a low power standby mode. The low power standby mode causes the motor driver to be de-activated to minimize the power consumption of the driver.

WARNING **The input must be connected to operate the unit. When open, the unit is forced into a non-operational shutdown state.**

Alternatively, if it is desired to completely reduce the power consumption of the driver to zero, power can be completely disengaged from the unit with a customer installed switch on the input power.

0.5–4.5 V Analog Output for Indication of Actual Position to an External Device

An analog output of 0.5 to 4.5 V corresponds to 0% and 100% actuator travel, respectively. Offset and gain adjustments are made automatically when the calibration routine is executed (see Chapter 7 for procedure).

Chapter 2
Hardware Installation

This chapter provides instructions on how to mount and connect the ProAct™ Analog actuator into a system. Hardware dimensions are provided for mounting the ProAct package to a specific application.

Unpacking

Be careful when unpacking the actuator. Check the unit for signs of damage, such as bent or dented panels, scratches, and loose or broken parts. Notify the carrier and Woodward if damage is found.

Mounting Location

The ProAct Analog actuator is designed to operate within an ambient temperature range of –40 to +74 °C (–40 to +165 °F). Mount the driver close enough to the battery to meet the wire-length requirements (see wiring instructions in Chapter 3).

The ProAct actuator is designed for installation on the engine. The ProAct actuator will generate heat, especially when stalled or during other conditions requiring maximum torque output. The installer must consider the heat conductivity of the installation bracket, and the operating temperature of the ultimate heat sink to which the bracket will be attached. Generally the heat transfer abilities of aluminum and low-carbon steel are better than those of high-carbon steel or stainless steel.

NOTICE

A minimum gap of 0.5 mm must be maintained between the support bracket and electronics enclosure (see Figure 2-2a). This is necessary because the enclosure is supported on vibration isolators to filter out high-frequency vibrations from reaching the electronics. If the enclosure contacts the bracket, the isolation is defeated and may reduce the electronics operating life.

If spacers are used to achieve the necessary gap, Woodward recommends maximizing the surface contact area of the spacers to maximize heat transfer between the ProAct and mounting bracket.

Actuator Application Guidelines

The following sections include environmental guidelines for applying the ProAct Analog. By adhering to the limitations and recommendations set forth in these sections, the customer will realize the full functionality of the actuator and improve its overall reliability.

Mounting

Models I and II actuators may be installed on a bracket in either base or flange mount configuration. The base mount configuration requires the use of four M8x1.25 screws with a minimum engagement of 16 mm. The flange mount configuration requires the use of four M8 screws through the flange. Whether base mounting or flange mounting the actuator, torque the four M8 screws to 22.6 N·m (200 lb-in). The actuator may be mounted in any attitude.

The ProAct Analog weighs approximately:

Model I	11 kg (25 lb)
Model II	11 kg (25 lb)

The bracket and attaching hardware must be designed to hold the weight and to withstand the vibration associated with engine mounting. Additionally, the bracket must be designed to provide a heat sink (heat transfer) from the actuator to the engine block as described in the Mounting Location section.

As shown in Chapter 9, ProAct Analog Specifications, the ProAct actuators have been designed for and verified to a given accelerated life vibration test level at the mounting surface of the actuator. The user should be aware that in any application, bracket design can significantly change the vibration levels at the actuator. Therefore, every effort should be made to make the bracket as stiff as possible so that engine vibrations are not amplified, creating an even more severe environment at the actuator. Additionally, when possible, orienting the actuator shaft parallel to the crankshaft of the engine will often reduce the vibration load on the actuator's rotor system in reciprocating engine applications.

Fuel Position Stops

Diesel Stops—Diesel installations will generally use the fuel system minimum and maximum position stops. Diesel engine racks are normally designed to provide the minimum and maximum stops without binding. The actuator's stops must not prevent the actuator from driving the fuel linkage to the minimum and maximum positions. The linkage should be designed to use as much actuator travel as possible, without preventing minimum and maximum fuel positions (see Figure 2-1).

Gas Engine Stops—Butterfly valves in carburetors will often bind if rotated too far toward minimum or maximum. For this reason, the stops in the actuator should be used at both minimum and maximum positions. Note that the actuator internal stops will allow up to 1.5 degrees of additional rotation in both directions during impact (see Figure 2-1).

The engine must always shut down when the actuator is at the minimum stop.

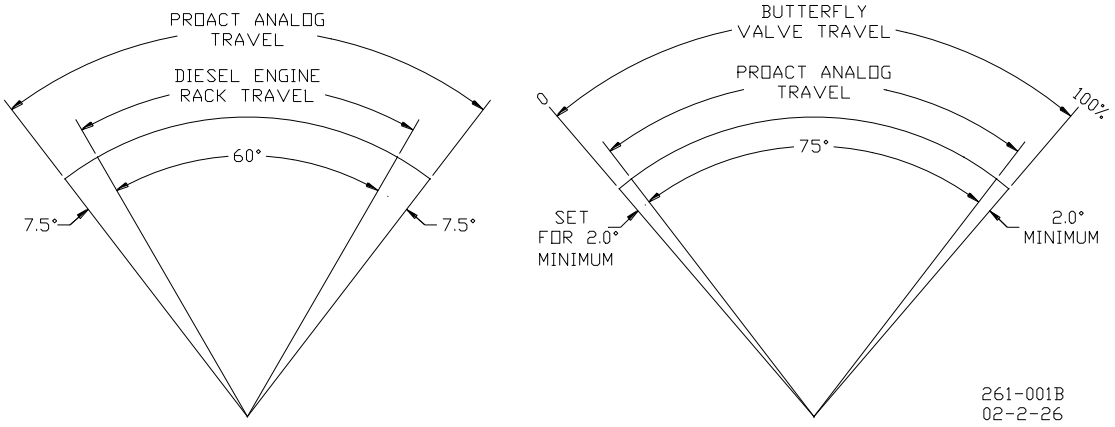


Figure 2-1. Fuel Stops

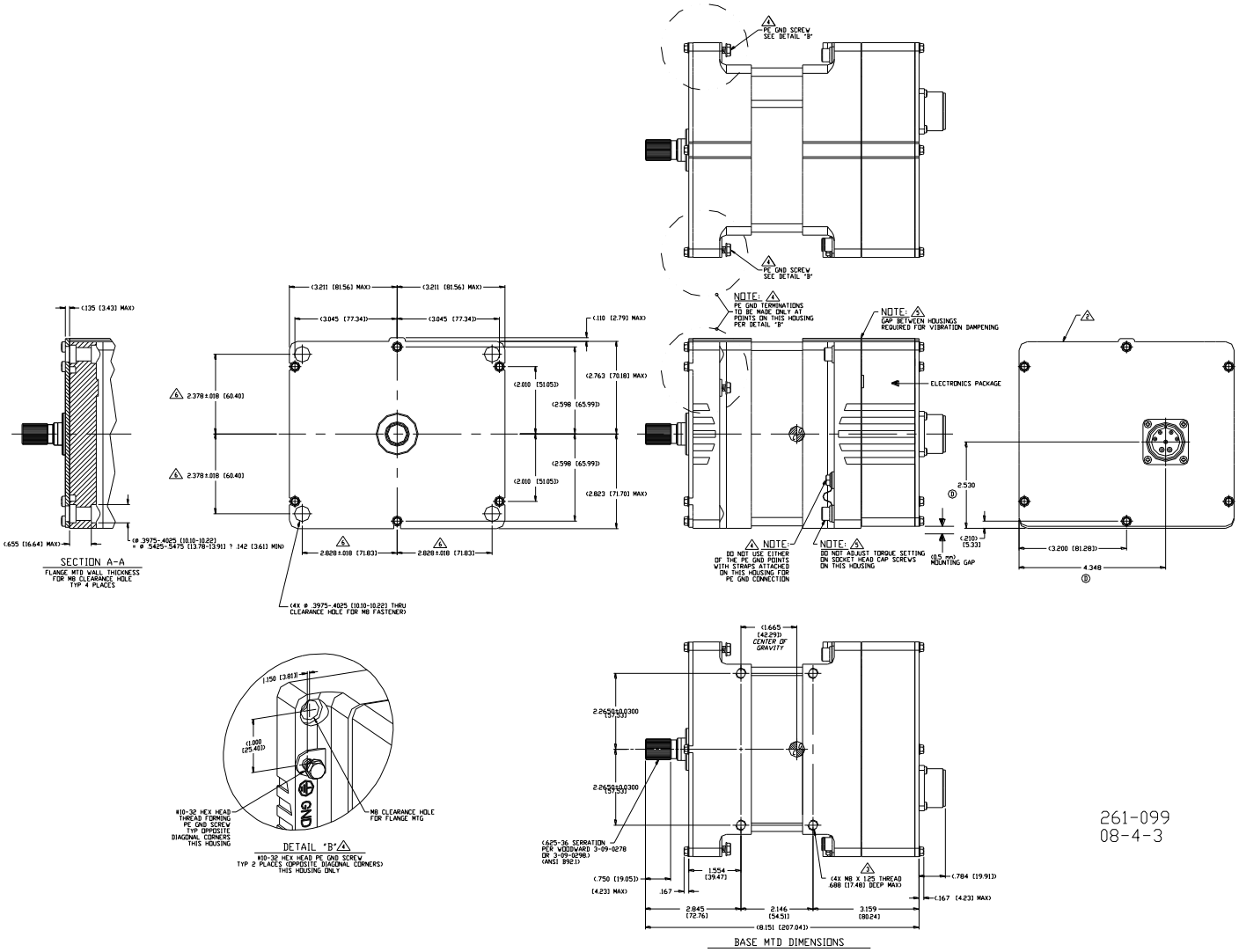


Figure 2-2a. ProAct Analog Actuator Outline Drawing

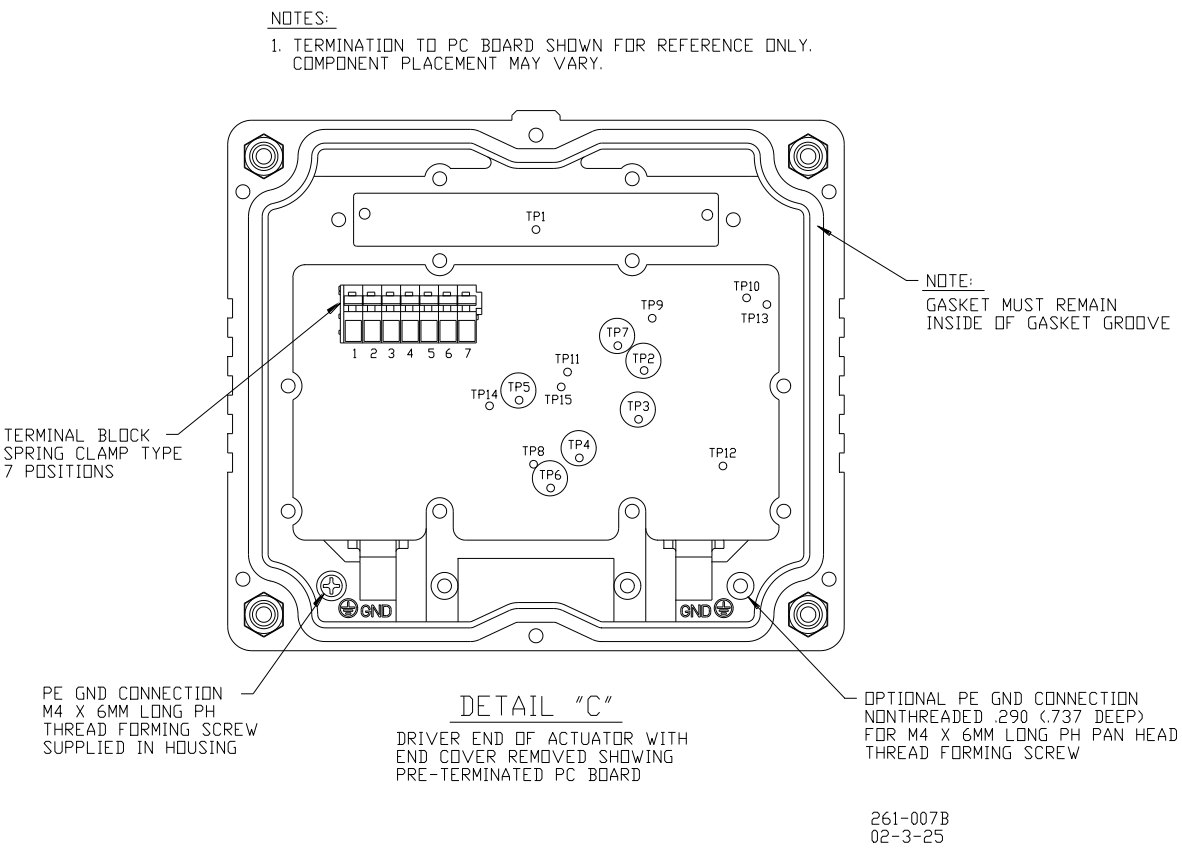


Figure 2-2b. ProAct Analog Actuator Outline Drawing

Linkage

Proper design and installation of the linkage from the actuator to the engine is necessary for the unit to provide the best control possible.

Certain applications with low inertia may be unstable with high impulse loads and may require additional system inertia. See troubleshooting guidelines or contact Woodward for more information.

Ensure that the actuator has ample work capacity to control the fuel supply under maximum load conditions.

Manually stroke the fuel-control linkage from stop to stop as if the actuator were moving it. The linkage must move freely, without friction and backlash. Lubricate or replace worn linkage or fuel control parts as required.

WARNING

The actuator contains no internal return spring, therefore an external positive shutdown is necessary in the event of a loss of power to the actuator.

NOTICE

The actuator's maximum slew rate can place stress on the fuel system stops and on the linkage between the actuator and the fuel system. The maximum actuator speed is 1000 degrees per second in both increase and decrease fuel directions.

The Mass Moment of Inertia (MMOI) for the ProAct Analog actuators are:
Model I, II 4.9E-3 lb-in-s² (5.5E-4 kg-m²)

The fuel system stops must be adequate to absorb the actuator MMOI in addition to the linkage inertia without damage.

ProAct actuator internal stops are designed to absorb 0.011 J (0.097 in-lb) of kinetic energy with 1.5 degrees of over travel. If the actuator stops are used, the load inertia must not exceed 3.76E-3 in-lb-s² (4.25E-4 kg-m²), and the linkage must be designed to allow the 1.5 degrees of over travel on each end.

Use of good rod-end connectors with as little free play as possible is essential. Select rod ends which will remain tight and wear well during the nearly constant movement associated with precise speed control. Low-friction, long-wearing rod ends are available from Woodward.

The linkage travel and offset should provide travel below steady state idle fuel and above steady state full load fuel. Woodward “standard” is for no load to full load actuator stroke (and control output) to provide approximately 2/3 of the stop-to-stop travel. As an example, 60° linkage travel should be 10° idle and 50° max load.

The link connecting the actuator lever to the fuel-control lever must be short and stiff enough to prevent flexing while the engine is running.

Typically, in a linkage system, there may be links and levers which are supported by customer-supplied bearings. Additionally, there will typically be a section of the linkage where the mass is supported fully by the actuator output shaft. Please note when designing these systems that each ProAct Analog actuator is designed to accept 1.2 kg (2.6 lb) of additional mass at a maximum vibration level of 10 Gs. Exceeding this mass or vibration level may damage the actuator's rotor system and shorten the life of the actuator.

Actuator levers are available from Woodward which allow adjustment of the rod end locations with respect to the center of the actuator shaft. The lever used must have a 0.625-36 serration.

Adjust the location of the rod end on the lever to achieve the desired actuator rotation between minimum and maximum positions. The linkage should be set to use as much of the 75 degrees as possible (at least 60 degrees minimum). To increase the amount of actuator rotation, move the rod end closer to the actuator shaft or farther away from the shaft controlling the fuel flow. To decrease the amount of actuator rotation, move the rod end farther from the actuator shaft or closer to the shaft controlling the fuel flow.

⚠WARNING **The actuator must be stroked using the CAL/CONFIG procedure any time the valve stops or linkage is adjusted.**

IMPORTANT **Follow the procedure in Chapter 7 on Adjusting User Stops and Dynamics.**

Chapter 3
Wiring

This chapter provides instructions on how to connect the ProAct™ actuator into a system. Ratings and jumper configurations are given to allow wiring and configuration of the ProAct package to a specific application.

Electrical ratings, wiring requirements, and options are provided to allow full installation the ProAct actuator into a new or existing application.

IMPORTANT **CAL/CONFIG jumpers should not be moved or changed unless power has been switched off.**

Electrical Connections

⚠WARNING **If you are replacing an earlier ProAct series actuator with the ProAct Analog model, be sure to remove the original driver, since the ProAct Analog actuator has an integrated driver.**

Refer to Table 1-2 for the customer interface wiring to the external connector, the representative interface schematic (Figure 2-2), and the Specification section of the manual for the hardware specifications.

When the ProAct is to be configured with a user-constructed external connector, all inputs and outputs to the ProAct actuator are accessed beneath the end cover which is fastened with 6 M4x10 mm, screws (see the outline drawing, Figure 2-2). The end configuration must use the cover with all screws and the seal in place.

Input power is connected to pin 1(+) and pin 2(–) of the terminal strip.

The terminal block is a screwless cage clamp style block. The spring clamp can be actuated by pressing down on the thumb levers integral to the block. The terminal block accepts wires from 0.20—3.3 mm² (24—12 AWG) wire. Two 0.82 mm² (18 AWG) or three 0.5 mm² (20 AWG) wires can easily be installed in each terminal. Wire for the terminals should be stripped 8–9 mm (0.3 inch).

Cable Shield Termination

The ProAct control is designed for operation with shielded cables. Shielding is required for the command signal lines and the sensor output and reference lines. Cable shield ground termination must be performed as shown in Figure 2-2. Command signal shield must be grounded as recommended on the command signal source, and the sensor signal shield must be grounded to the device's ground lead (pin D).

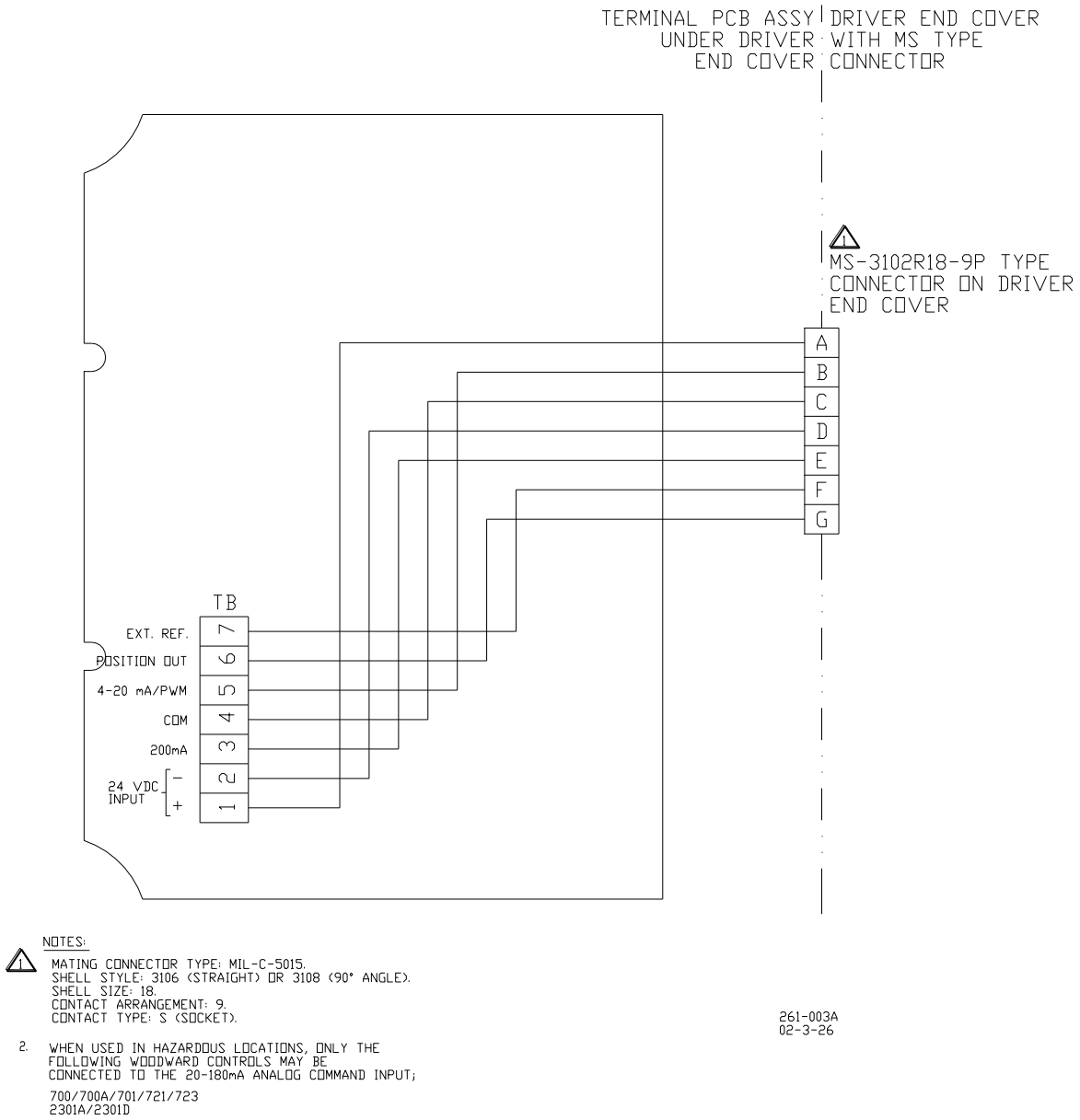


Figure 3-1. Control Wiring Diagram

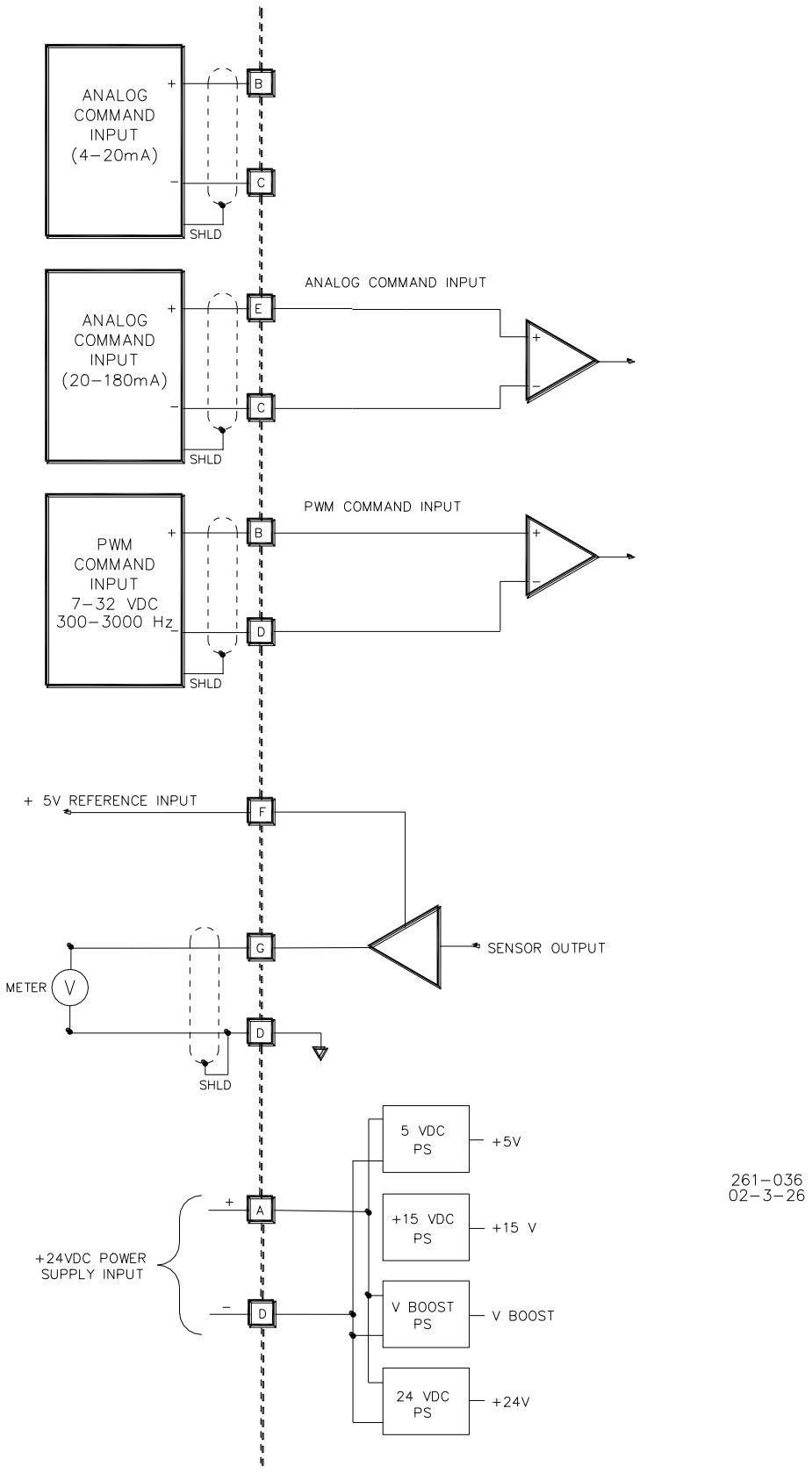


Figure 3-2. Representative I/O Schematic

Grounding and Ground Connections

The multiple ground connections are provided for variations in local wiring codes. An internal power ground connection (see Figure 3-1) and an external ground connection (other than the mounting) are both provided. Refer to the external PE Ground connection identified in Figure 2-2b.

IMPORTANT

Customers must use the grounding point that meets local authority approval requirements.

Power Source

Power source output must be low impedance (for example, directly from batteries).

Run an insulated wire directly from the positive (+) battery terminal to a fuse and on/off switch, then to the correct connection on the driver (see Figure 3-3). Run a second insulated wire directly from the negative (–) terminal of the battery to the driver. Neither of these connections needs to be shielded.

Run the power leads directly from the power source to the control. DO NOT POWER OTHER DEVICES WITH LEADS COMMON TO THE CONTROL (see Figures 3-3 & 3-4). If the power source is a battery, be sure the system includes an alternator or other battery-charging device.

When the engine is shut down, the driver powers the actuator into the minimum stop. If the battery charging system is off when the engine is shut down, this will cause the battery to be drained. In this case, the power to the ProAct must be turned off with a switch or relay. Any such switch or relay must be interlocking to prevent starting the engine when power to the actuator is shut off.

⚠WARNING

Do not remove power from the driver for normal shutdown procedures. All actuator position commands should come from the control unit, through the driver, to the actuator. Engine overspeed is possible if power is removed from the driver while the engine is running.

NOTICE

To prevent possible damage to the control, or poor control performance resulting from ground loop problems, follow these instructions.

ProAct Inputs/Outputs

Driver Input Power

The following table summarizes the driver power input requirements. The input voltage operational range is 18–32 Vdc, 24 Vdc nominal. The power input provides protection against reverse voltage connection. Refer to Table 3-2 for maximum cable lengths and wire sizes.

ProAct Analog Model	Transient Power–max (Watts)	Continuous Power–max (Watts)
I	67	19
II	251	65

Table 3-1. Driver Power Input

Input Power Fusing

NOTICE

The input power must be fused. Failure to fuse the ProAct could, under exceptional circumstances, lead to personal injury, damage to the control valve, and/or explosion.

Recommended fuse ratings are listed below.

Model I: 5 Amp Fast Acting Fuse
Model II: 15 Amp Fast Acting Fuse

All fuses should have a voltage rating of at least 100 V and an I^2t rating greater than 2 A for 2 seconds. A typical fast acting fuse will meet these ratings.

Input Power Wire Length Considerations

Input power wire lengths should be as short as possible. Maximum wire lengths are shown in Table 3-2.

⚠WARNING

If the recommended cable distances between battery and actuator are exceeded, torque output will be reduced and the unit may be damaged.

Recommended maximum wire length from power source to ProAct actuator based on a 24 V power source.

Input Power Wire Size	Max Wire Length (ProAct Model I)	Max Wire Length (ProAct Model II) Limited torque output*
16 AWG	12 m / 39 ft	8 m / 26 ft
1.5 mm^2	14 m / 46 ft	9 m / 30 ft

*** Note**—Rated transient torque is not achievable with an 18 V power source on the Model II. Listed maximum lengths will provide 75% of rated transient torque.

Table 3-2. Maximum Distance from 24 V Power Source to ProAct Actuator

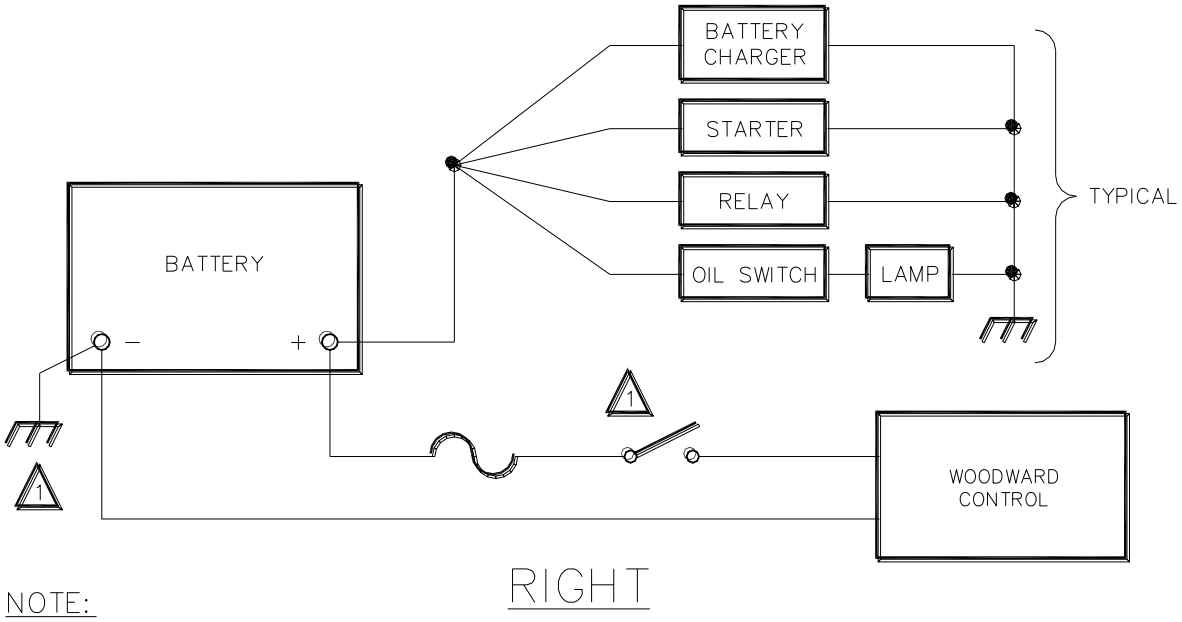


Figure 3-3. Correct Wiring to Power Supply

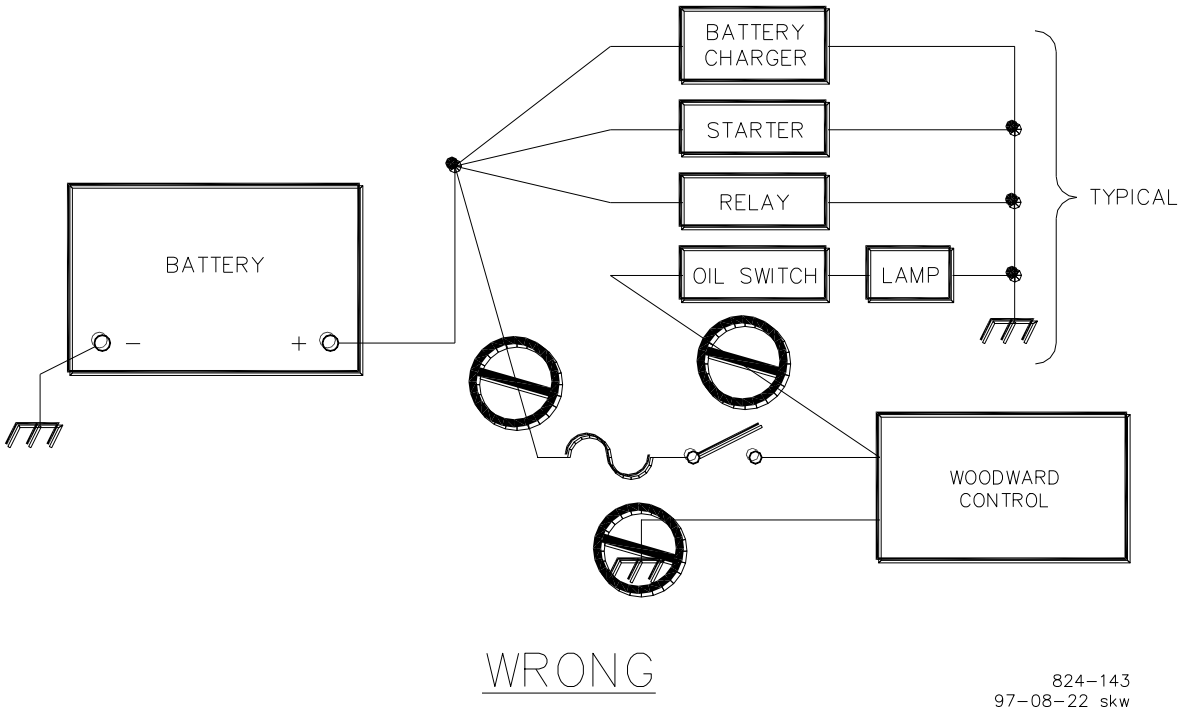


Figure 3-4. Incorrect Power Supply Wiring

Analog Position Command Signal

The analog input will accept a 0–25 mA or 0–200 mA input signal with a nominally configured operational range of 4–20 mA and 20–180 mA, respectively. The position command input will be capable of providing a common mode input voltage range (unit battery ground referenced) of 0–32 volts for all analog type inputs. The minimum wire size is 0.5 mm² or 20 AWG.

PWM Position Command Signal

The PWM input will accept a 100 to 3000 Hz PWM input signal of 7 to 32 volts peak voltage (referenced to unit battery ground). The position command input will be capable of providing a common mode input voltage range (unit battery ground referenced) of 0 to 4 volts for all PWM type inputs. The PWM circuit will accept a sourcing driver input. The driving circuit must be capable of providing 10 mA of sourcing current at all battery voltages. The minimum wire size is 0.5 mm² or 20 AWG, and must be shielded.

Position Feedback Output

The actuator position signal will be output from the driver as a 0.5–4.5 V signal corresponding to 0% to 100% actuator travel. The minimum wire size is 0.5 mm² or 20 AWG.

Chapter 4
Setup, Calibration, and Adjustments

General Description

Setup and calibration are provided through test points located on the printed circuit board (see Figure 4-1).

Setup

The basic setup consists of actuator configuration and stroking. Configuration is not required on most OEM-supplied units. Configuration is performed using the Config table in the Appendix.

Actuator stroking is required to ensure that 0–100% actuator travel provides an equivalent valve position.

The setup, configuration, and stroking adjustment must be performed when the engine is shut down.

Calibration

The ProAct™ control may be calibrated at any time, and calibration takes place whenever a configuration change is made.

To calibrate or make a configuration change, the engine must be shut down.

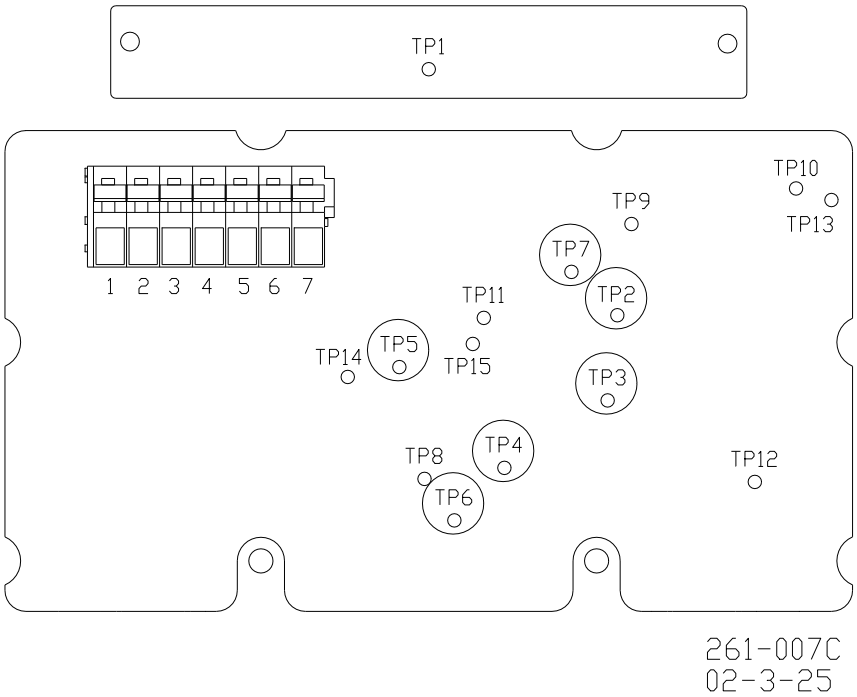


Figure 4-1. Printed Circuit Board

Chapter 5
Description of Operation

Position Control

The ProAct™ Analog provides closed-loop position control based on an internal position sensor and the desired position demand signal. Position and current controllers are utilized to position the output. Position control is provided using a customer's position demand and an internal driver output while using an internal position feedback sensor. The driver provides a 0.5–4.5 V analog output for indication of actual position. Field calibration is available at any time by utilizing the appropriate jumpers. Calibration must be done with the engine shut down.

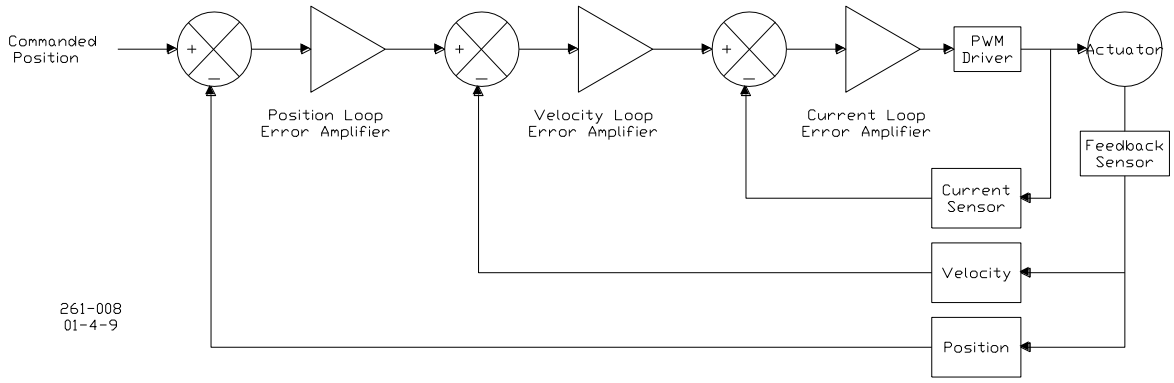


Figure 5-1. Controller Overview

Position Demand

The position demand is provided by a single input (factory set for either PWM or current [current is jumper selectable for either 4–20 mA or 0–200 mA]). The position demand can be provided by one of two signal sources: analog or PWM depending on which part number is in use (see Table 1-1). Failure of the position demand signal will cause the ProAct Analog to shut down and remain shut down until a valid signal is received.

Driver Output and Position Feedback

If the internal position or current sensor is out of range, the actuator is put into the shutdown state. Upon power-up, the unit will stay disabled until the problem is rectified and a position command signal and current signal have been received in the proper range.

Drive Current Limitations

The current to the coil is limited to prevent damage. A transient and a steady state limit are used. The transient current limitation is active during a transition in position output. After a short delay (about 0.25 seconds), the steady state limit is activated if desired position is not reached. The transient and steady state limits are not adjustable, but are based on the actuator type. The nominal transient and steady current limits for the ProAct actuators are:

	transient current limit	**steady-state current limit**
Models I, II	12 A	6 A

User Operating Modes

User-Calibration (Rigging)

The User Calibration mode provides the capability to calibrate the min and max position. This calibration must be done prior to operation of the unit. Once performed, this procedure stores the active min and max positions into non-volatile memory where it is retained until a new calibration is performed.

Configuration

The Calibration Routine provides the capability to alter the configuration of the output shaft (CW/CCW) and the polarity of the TPS output signal. The unit must be in a shutdown state to change the configuration.

Chapter 6
Diagnostics

Shutdowns Detection

A shutdown condition forces the actuator to the power down state regardless of the demanded position. When the shutdown condition no longer exists, the driver automatically returns to a non-shutdown state, following the Position Demand input command. The shutdown condition does not require a “reset” command.

WARNING

During shutdown, the actuator torque drops to minimum and an external spring is required to drive the position to minimum.

Chapter 7
Software Setup

Configure Mode Parameters

The Configure/Calibration Mode is used to set up the parameters for the specific application of the ProAct™ control. For example, the direction of shaft rotation, type of input, and TPS output polarity selections are set using the Configure/Calibration mode. See Table 7-1.

Adjusting User Stops

Introduction

The User Calibration mode provides the capability to set the min and max position to match the rigging of the actuator and valve. This calibration must be done prior to operation of the unit. If this procedure is not done, the actuator will be defaulted such that 0–100% position demand will correspond to 0–75 degrees rotation. Refer to Figure 7-1. Once the user calibration is performed, this procedure stores the active min and max positions into non-volatile memory where it is retained until a new calibration is performed. Be sure to remove all calibration/configuration jumpers before restarting the unit.

⚠WARNING

An improperly calibrated control could cause an overspeed or other damage to the prime mover. To prevent possible serious injury from an overspeeding prime mover, read this entire procedure before starting the prime mover.

⚠WARNING

An unsafe condition could occur with improper use of the calibration/configuration procedure. Only trained personnel should have access to this procedure.

ProAct Calibration Routine

To enter the User Calibration mode, the unit must be shut down and the appropriate jumpers must be connected. To set output shaft direction (CW/CCW) and throttle position sensor (TPS) output polarity, connect the test points in accordance with the following table. Refer to Figure 4-1 for test point (TP) locations.

Output Shaft	0–200 mA / PWM	4–20 mA
CW/TPS+	TP3-TP6	TP3–TP4
CW/TPS–	TP3-TP6 and TP2–TP5	TP3–TP4 and TP2–TP5
CCW/TPS+	TP3-TP6 and TP5–TP7	TP3–TP4 and TP5–TP7
CCW/TPS–	TP3-TP6, TP5–TP7, and TP5–TP2	TP3–TP4, TP5–TP7, and TP5–TP2

NOTE—PWM input and current input (0–200 mA/4–20 mA) are different part numbers. The input signal configuration cannot be field modified.

Table 7-1. Jumper Connections Used for Calibration

To enable the calibration routine, connect a jumper from TP3 to TP6 for 0–200 mA/PWM input or TP3–TP4 for 4–20 mA input. Connect additional test points as necessary to change the output shaft direction and TPS polarity—see Table 7-1. See Figure 4-1 for test point locations. When power is applied to the unit, the microprocessor will enter the calibration routine. The output shaft will sweep slowly from stop to stop in order to find the end points, and then return to the mid position. It is not necessary to apply an input signal during this time as the microprocessor assumes 0.5 to 4.5 V as its input. When the calibration is complete, turn off the power, disconnect all jumpers, and make sure that the input signal is applied. When power is reapplied the unit will be in the operate mode.

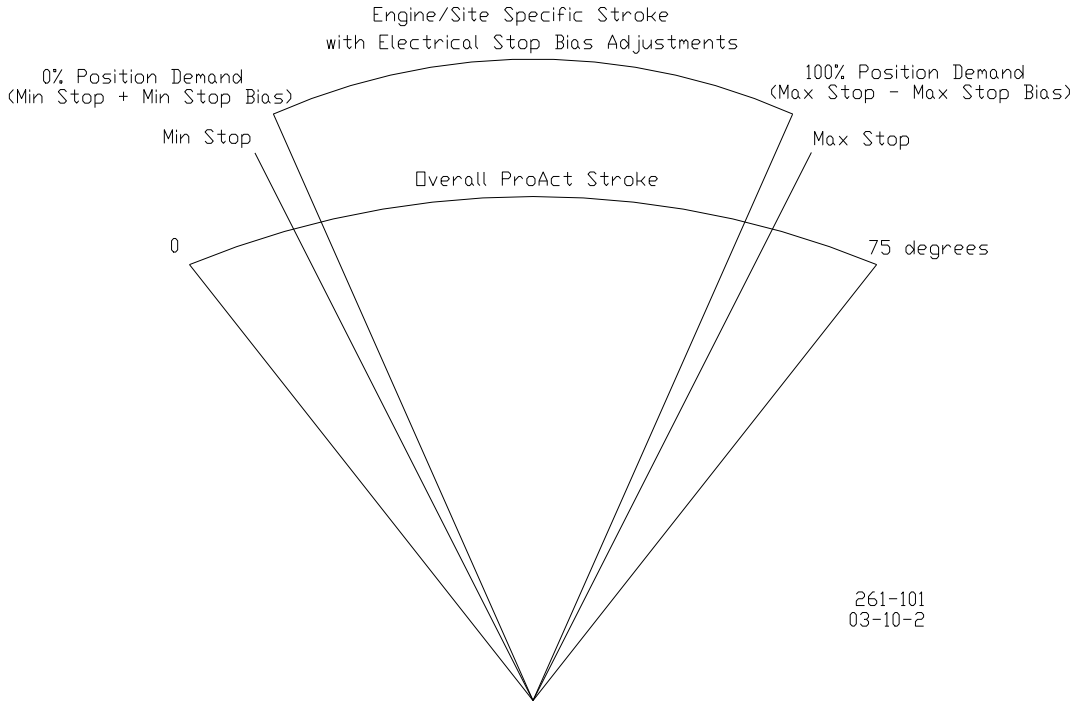


Figure 7-1. Electrical Stop Adjustments Relative to the Mechanical Min and Max Stops

Chapter 8
Troubleshooting

Introduction

Improper engine operation is often the result of factors other than governor operation. This chapter gives tips about engine problems which can resemble governor problems. Make sure the engine is operating correctly before making any changes in the governor. The following troubleshooting guide is an aid in isolating trouble to the control box, actuator, wiring, or elsewhere. Troubleshooting beyond this level is recommended ONLY when a complete facility for control testing is available.

Attempting to correct engine or load problems with untimely governor adjustment can make problems worse. If possible, isolate the governor from the engine to determine if the problem is with the governor and not with the engine or the load on the engine. Governor faults are usually caused by problems in the installation or the linkage between the actuator and the engine.

Carefully review all the wiring connections, the power supply, and the linkage before making any adjustments to the actuator or driver. Always check the fuel-control linkage from stop to stop as if the actuator were moving it. The linkage must move freely without friction and without backlash. Some fuel controls will present problems at particular fuel or rack positions because of a hesitation or binding in the linkage.

Fuel supply and injector conditions can also present problems which resemble governor problems. On spark-ignited engines, distributor, coil, points, and timing problems can all cause improper operations which may resemble faulty governor control.

IMPORTANT

The control can be damaged with the wrong voltage. When replacing a control, check the power supply, battery, etc., for the correct voltage.

Troubleshooting Procedure

This chapter is a general guide for isolating system problems. The guide assumes that the system wiring, soldering connections, switch and relay contacts, and input and output connections are correct and in good working order. Make the checks in the order indicated. Various system checks assume that the prior checks have been properly done.

General System Troubleshooting Guide

The following is a general troubleshooting guide for areas to check which may present potential difficulties. By making these checks appropriate to your engine/turbine before contacting Woodward for technical assistance, your system problems can be more quickly and accurately assessed.

Actuators

- Is the actuator wiring correct?
- Is the direction of the stroke correct? (This is configured using the CAL/CONFIG routine.)
- Has the feedback signal been calibrated? (This is calibrated at the factory.)

Linkage

- Is there slop or lost motion?
- Is there misalignment, binding, or side loading?
- Is there visible wear or scarring?
- Does the linkage move smoothly?

Valves

- Does the valve move through its proper stroke smoothly?
- Does the valve travel its full stroke?
- Can mid-stroke be obtained and held?
- Does the valve fully seat (close) before the governor reaches full minimum stroke?
- Does the valve fully open before the governor reaches maximum stroke?

Mechanical Troubleshooting Guide

Linkage and Actuator Stroke

Use as much of the 75 degrees of actuator stroke as possible. Carefully follow the guidelines in the Driver Adjustments section of Chapter 2 in making linkage arrangements. Using less than optimum actuator movement will make stability more difficult, and will make the actuator more sensitive to external loading forces and friction.

Actuator exhibits “hunt” or large limit cycle.

- Check for loose terminal lever.
- Check for loose or worn linkage.
- Verify correct mounting hardware.
- Verify mounting bolts are tightened to appropriate torque values.

Unable to rotate stand-alone actuator in unpowered condition

- Internal mechanical failure—replace actuator.

Electrical Troubleshooting Guide

Analog Input

If the Analog input is not functioning properly, verify the following:

- Measure the input voltage on the terminal block. It should be in the range of 0–5 V.
- Verify that there are no or minimal ac components to the Analog Input signal. AC components can be caused by improper shielding.
- Check the wiring. If the inputs are reading 0 or the engineering units that correspond to 0 mA, look for a loose connection at the terminal blocks and disconnected or misconnected cables. Check for proper wire installation on the terminal block, pin #3 for 0–200 mA or pin #5 for 4–20 mA.
- If all of the inputs are reading high, check that the power is not connected across the input directly.
- Check the configuration to ensure that the input is configured properly. This can be done by running the calibration/configuration routine.

Analog Output

If the Analog output is not functioning properly, verify the following:

- Check to ensure that voltage is between 0.5 and 4.5 V for full output stroke.
- Check the wiring, look for a loose connection at the terminal block pin#6 and disconnected or misconnected cables.

Performance Troubleshooting Guide

If the actuator buzzes, or has a fast limit cycle:

- Check for loose linkage.

If the actuator has a slow limit cycle:

- Free stuck linkage or load.

Actuator has steady state position error:

- Re-run stop position calibration.
- Supply voltage too low.
- Actuator load too large or actuator too small.
- Free stuck linkage.
- Actuator fault – replace actuator.

Chapter 9
ProAct™ Analog Specifications

Environmental Specifications

Specification Item	Acceptable Range or Qualification Condition	Comments
Operating Temperature	–40 to +74 °C	
Storage Temperature	–40 to 125 °C, unpowered.	
Vibration	Sine: 3.2 mm peak-to-peak for 2-39.4 Hz, 10 G for 39.4-300 Hz. Random: 0.01 G^2/Hz at 10 Hz, 0.10 at 100 Hz, 0.10 at 1000 Hz, 0.05 at 2000 Hz (12.79 Grms) 3 hours per axis	
Shock	MS1—40G 11ms sawtooth	
Ingress Protection	IP56 per IEC60529	
Humidity	60 °C, 95% RH for five days at one cycle per day	
Chemical Resistance	The ProAct™ Analog uses materials proven capable of withstanding normal engine environment chemicals per SAE J1455, such as diesel fuel, engine oil, and antifreeze.	

Hardware Specifications

Feature	Specification	Comments
Shaft	0.625-36 serrations	
Mass Moment of Inertia (lb-in-sec^2 / kg-m^2)	Model I,II—4.9E-3 / 5.50E-4	
Minimum Steady State Work Output	Model I—1.7 J (1.25 ft-lb) Model II—3.4 J (2.5 ft-lb)	
Minimum Transient Work Output	Model I—3.4 J (2.5 ft-lb) Model II—7 J (5 ft-lb)	
Rotation	73–77°	
Weight	Model I—11 kg (25 lb) Model II—11 kg (25 lb)	

Electrical Specifications

Feature	Specification
Input Power—max	Model I—67 W (transient) / 19 W (continuous) Model II—251 W (transient) / 65 W (continuous)
Input Current—Max @ +24 Vdc	Model I—2.8 A (transient) / 0.8 A (steady state) Model II—11 A (transient) / 2.7 A (steady state)

I/O Specifications

Analog Input

Input type:	4–20 mA or 0–200 mA, input selectable, balanced differential input
Max input current (full scale):	25 mA ± 2% (20 mA range) 225 mA ± 2% (200 mA range)
Common mode rejection:	–60 dB minimum
Input common mode range:	0–32 V minimum
Safe input common mode volt:	±200 V minimum
Input impedance:	225 Ω (±10%) (20 mA range) 25 Ω (±10%) (200 mA range)
Anti-aliasing filter:	1 anti-aliasing poles at 1 ms (159 Hz)
Resolution:	12 bits (using Gaussian Noise)
Accuracy:	±1.5% of full scale, @ 25 °C
Temp Drift:	±300 ppm/°C (FS), maximum

PWM Command Input

Input Magnitude:	7–32 V
Frequency Range:	100–3000 Hz
Isolation:	none
Input common mode range:	0–4 V minimum
Safe input common mode volt:	0–32 V minimum
Input Impedance:	5 kΩ
Input type:	Single ended, ground referenced input
Resolution:	12 bits
Accuracy:	±1.5% of full scale, @ 25 °C
Temperature drift:	300 ppm/°C
Fault Detection:	for Duty Cycle timer <5% or >95%

Analog Output

Output Type:	0–5 V
PWM frequency:	2 kHz
Resolution:	8 bit
Accuracy:	±1.5% of full scale at 25 °C
Temperature Drift:	250 ppm/°C, maximum

Position Feedback Sensing

Input:	~1–4 Vdc from Hall-Effect Sensor
Circuit Output:	~0.5–4.5 Vdc to analog-to-digital converter
Software Output:	0–75 degrees (1.31 radians) rotation (software assumes 75 degrees travel)
Positioning Repeatability:	<±1% of full stroke at 25 °C after calibration
Positioning Linearity:	<±1.5% of full stroke at 25 °C after calibration
Positioning Accuracy:	<±1.0% of full stroke at 25 °C after calibration and ±1.5% linearity
Temperature Drift:	<±350 ppm/°C, maximum after calibration

Software

Performance

Parameter	Specification
Bandwidth	(measured at -6 db) > second order, 40 rad/s –3 db at >8 Hz with low inertia. See ProAct Transfer Function
Max Slew Rate	> 1000 degrees/second >18.5 rad/s (10% to 90% travel)
Limit Cycle	< 0.35 degrees peak to peak with low friction loads
Steady State Error	< 3 degrees for loads up to 80% of steady state current limit. Integrating control drives steady state error to zero.
Min Load Inertia	0

Chapter 10
Product Support and Service Options

Product Support Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

1. Consult the troubleshooting guide in the manual.
2. Contact the **OE Manufacturer or Packager** of your system.
3. Contact the **Woodward Business Partner** serving your area.
4. Contact Woodward technical assistance via email (**EngineHelpDesk@Woodward.com**) with detailed information on the product, application, and symptoms. Your email will be forwarded to an appropriate expert on the product and application to respond by telephone or return email.
5. If the issue cannot be resolved, you can select a further course of action to pursue based on the available services listed in this chapter.

OEM or Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A **Full-Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.
- An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.
- A **Recognized Engine Retrofitter (RER)** is an independent company that does retrofits and upgrades on reciprocating gas engines and dual-fuel conversions, and can provide the full line of Woodward systems and components for the retrofits and overhauls, emission compliance upgrades, long term service contracts, emergency repairs, etc.

A current list of Woodward Business Partners is available at **www.woodward.com/directory**.

Product Service Options

Depending on the type of product, the following options for servicing Woodward products may be available through your local Full-Service Distributor or the OEM or Packager of the equipment system.

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime.

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Flat Rate Repair: Flat Rate Repair is available for many of the standard mechanical products and some of the electronic products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option, with the exception that the unit will be returned to you in "like-new" condition. This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:
- return number;
- name and location where the control is installed;
- name and phone number of contact person;
- complete Woodward part number(s) and serial number(s);
- description of the problem;
- instructions describing the desired type of repair.

Packing a Control

Use the following materials when returning a complete control:
- protective caps on any connectors;
- antistatic protective bags on all electronic modules;
- packing materials that will not damage the surface of the unit;
- at least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- a packing carton with double walls;
- a strong tape around the outside of the carton for increased strength.

NOTICE

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*.

Replacement Parts

When ordering replacement parts for controls, include the following information:
- the part number(s) (XXXX-XXXX) that is on the enclosure nameplate;
- the unit serial number, which is also on the nameplate.

Engineering Services

Woodward's Full-Service Distributors offer various Engineering Services for our products. For these services, you can contact the Distributor by telephone or by email.

- Technical Support
- Product Training
- Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact.

Product Training is available as standard classes at many Distributor locations. Customized classes are also available, which can be tailored to your needs and held at one of our Distributor locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact one of the Full-Service Distributors listed at **www.woodward.com/directory**.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory published at **www.woodward.com/directory**.

You can also contact the Woodward Customer Service Department at one of the following Woodward facilities to obtain the address and phone number of the nearest facility at which you can obtain information and service.

Products Used In Electrical Power Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany:	
Kempen	+49 (0) 21 52 14 51
Stuttgart	+49 (711) 78954-510
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

Products Used In Engine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany	+49 (711) 78954-510
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
United States	+1 (970) 482-5811

Products Used In Industrial Turbomachinery Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

For the most current product support and contact information, please visit our website directory at **www.woodward.com/directory**.

Technical Assistance

If you need to contact technical assistance, you will need to provide the following information. Please write it down here before contacting the Engine OEM, the Packager, a Woodward Business Partner, or the Woodward factory:

General

Your Name _____

Site Location _____

Phone Number _____

Fax Number

Prime Mover Information

Manufacturer _____

Engine Model Number _____

Number of Cylinders _____

Type of Fuel (gas, gaseous, diesel, dual-fuel, etc.) _____

Power Output Rating _____

Application (power generation, marine, etc.)

Control/Governor Information

Control/Governor #1

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Control/Governor #2

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Control/Governor #3

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Symptoms

Description _____

_____

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

Appendix
ProAct™ Program Summary

APPLICATION _____

ACTUATOR SERIAL NUMBER _____

For details on individual settings, refer to Chapter 7.

Configure Mode Settings

Unit Setup tab sheet
Actuator
Actuator Type .....= _____
Actuator CCW Direction? .....Yes ____ No ____
Shutdown
Shutdown Action.....= _____
Analog In
AnlgIn 20 Min Value (mA) .....= _____
AnlgIn 20 Max Value (mA) .....= _____
AnlgIn 200 Min Value (mA) .....= _____
AnlgIn 200 Max Value (mA) .....= _____
PwmIn
PwmIn Min Duty (%).....= _____
PwmIn Max Duty (%).....= _____
PwmIn Frequency (Hz) .....= _____
PwmIn Invert Input Signal? .....Yes ____ No ____

Revision History

Changes in Revision H—

- Updated Regulatory Compliance information

Changes in Revision G—

- Revision advanced to coordinate with new installation sheet, and to update manual to latest formats and safety warnings.

Changes in Revision F—

- Updated Regulatory Compliance information
- New Declaration of Conformity & Declaration of Incorporation

Declarations

DECLARATION OF CONFORMITY

EU DoC No.:	00130-04-CE-02-02
Manufacturer's Name:	WOODWARD, INC.
Manufacturer's Contact Address:	3800 Wilson Avenue Loveland, CO 80538 USA
Model Name(s)/Number(s):	ProAct Analog Actuator
The object of the declaration described above is in conformity with the following relevant Union harmonization legislation:	Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility (EMC)
Applicable Standards:	EN61000-6-4, 2011: EMC Part 6-4: Generic Standards - Emissions for Industrial Environments EN61000-6-2, 2005: EMC Part 6-2: Generic Standards - Immunity for Industrial Environments

This declaration of conformity is issued under the sole responsibility of the manufacturer.
We, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s).

MANUFACTURER

Signature

Christopher Perkins
Full Name

Engineering Manager
Position

Woodward, Fort Collins, CO, USA
Place

05-APR-2016
Date

5-09-1183 Rev 26

DECLARATION OF INCORPORATION
Of Partly Completed Machinery
2006/42/EC

File name:	00130-04-CE-MD-02-02
Manufacturer's Name:	WOODWARD INC.
Manufacturer's Address:	3800 Wilson Avenue Loveland, CO 80538 USA
Model Names:	ProAct Analog Actuator
This product complies, where applicable, with the following Essential Requirements of Annex I:	1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7

The relevant technical documentation is compiled in accordance with part B of Annex VII. Woodward shall transmit relevant information if required by a reasoned request by the national authorities. The method of transmittal shall be agreed upon by the applicable parties.

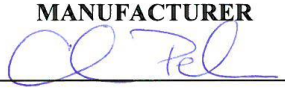
The person authorized to compile the technical documentation:

Name: Dominik Kania, Managing Director
Address: Woodward Poland Sp. z o.o., ul. Skarbowa 32, 32-005 Niepolomice, Poland

This product must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of this Directive, where appropriate.

The undersigned hereby declares, on behalf of Woodward Governor Company of Loveland and Fort Collins, Colorado that the above referenced product is in conformity with Directive 2006/42/EC as partly completed machinery:

MANUFACTURER



Signature

Christopher Perkins
Full Name

Engineering Manager
Position

Woodward Inc., Fort Collins, CO, USA
Place

16-MAY-2016
Date

Document: 5-09-1182 (rev. 16)

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We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 26147H.

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**Woodward has company-owned plants, subsidiaries, and branches,
as well as authorized distributors and other authorized service and sales facilities throughout the world.**

Complete address / phone / fax / email information for all locations is available on our website.