WOODWARD

Application Note 51424
(Revision C)
Original Instructions

Application Solutions for Wear Mitigation of the 3103 EM-35MR Actuator

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:

www.woodward.com/publications

The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

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 Out-of-date translations are marked with ⚠.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.

Contents

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.

⚠WARNING

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

Chapter 1.
General Information

Introduction

This application note describes various means to extend the life of the Woodward 3103 gas valve with EM-35MR1 actuator, primarily related to protecting the actuator motor from gear tooth wear.

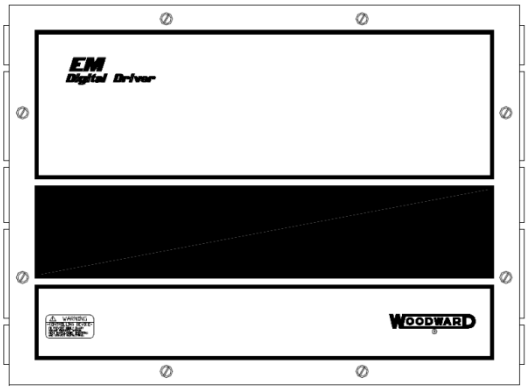
Essentially motor gear tooth lubrication will eventually recede from the gear contact points, causing high levels of friction which will lead to premature wear in those local areas. With the removal of movement using a motor power cutoff solution, motor wear can be eliminated.

The breakdown of the life extension plan covers these main areas of wear mitigation.

Solutions for Motor Gear Tooth Wear Reduction encompass:
- Limit Cycle Reduction
- Motor Power Cutoff
- Motor Gear Train Relubrication

This application note refers to the **EM-35MR1** actuator only. A list of key characteristics is shown below to aid in the identification of the driver types.

Identification of the 3103 EM-35MR1:
- A 3103 with the EM-35MR1 will utilize a motor feedback resolver rather than the field director and tachometer feedback device.
- The DIP program will only work with EM-35MR1 drivers.
- Old model EM-35 drivers and valves can also be identified if they use the position controller card in the NetCon, MicroNet, or MicroNet Plus chassis. If this is the case, this document does not apply.



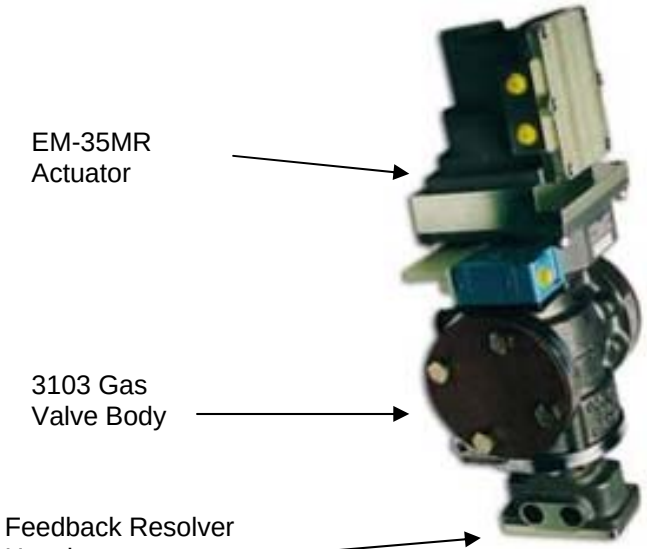
EM Digital Driver
for use with EM-35MR1 Actuators

EM-35 Digital Driver
for use with Old Model EM-35 Actuators

List of Terms

- CANopen Protocol—Digital protocol used for communications to the DVP.
- CPU—Central Processing Unit, specifically referring to the supervisory engine controller.
- DIP—Driver Interface Program. This program is used to interface the EM Digital Driver.
- DVP—Digital Valve Controller used to position the 3103 EM-35 Valve/Actuator.
- EM Digital Driver—Legacy Valve position controller for the 3103 EM-35 Valve/Actuator
- 3103 Gas Valve.
- EM-35MR1—3103 valve actuator. This sub-assembly houses the motor used for actuation.
- GAP—Graphical Application Programmer. Woodward proprietary programming tool used for source code creation on Woodward control products.
- IP56—IP refers to the ingress protection of the electrical enclosure. 56 corresponds to the level of protection provided.
- RS-485 Digital Protocol—Reference to the Woodward proprietary Digital protocol used to interface to the EM Digital Driver that resides on an RS-485 communications platform.
- RS-232 D9—Reference to the RS-232 communications platform that interfaces to the DIP.

3103 with EM Digital Driver and DVP Digital Driver

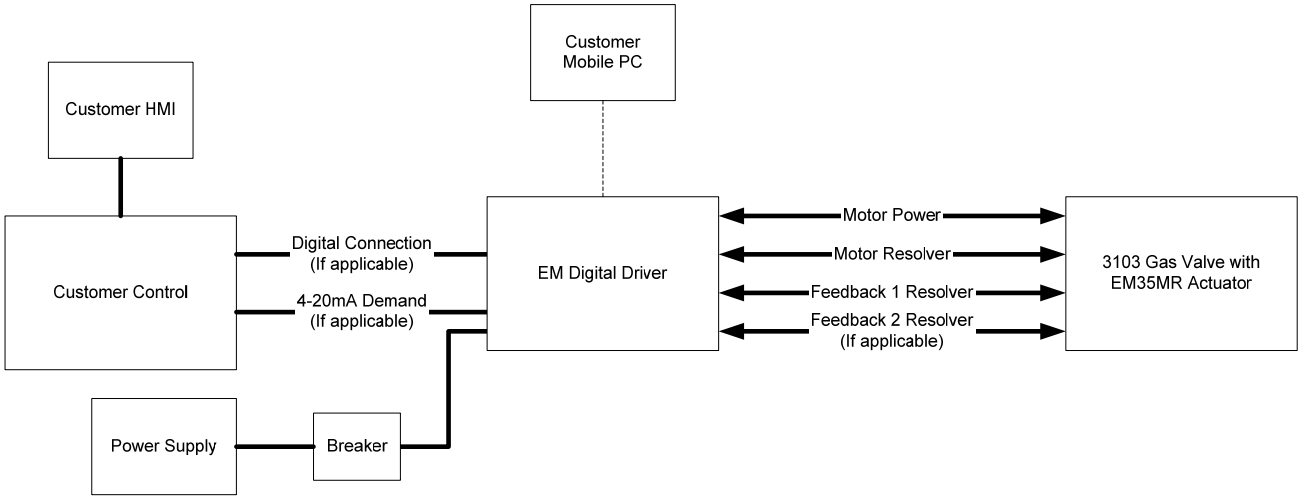


3103 EM-35MR Gas Valve

EM Digital Driver

DVP (IP56) Digital Driver

Simplified Interface Diagram



References

Title	Woodward No.
EM-24 Digital Driver Manual	26159
3103 with EM-35 Actuator Manual	40185
MicroNet Manual	26166
MicroNet Plus Manual	26166
DVP Driver Manual	26329
EM Driver Interface Program (DIP)	9927-700
DVP Driver Service Tool	9927-1736

Service and Support

All Woodward documents can be accessed from the Woodward website:
www.woodward.com/searchpublications.aspx

Questions and support relating to this document can be directed to:
TurbineHelpDesk@Woodward.com

Scope

All of the recommended solutions listed in application note are intended to extend the life of the 3103 valve/actuator product. Some solutions are more effective than others. We encourage the user to choose which application solution or solutions best suits their operational characteristics.

The solution types are categorized in the following manner. Some or all aspects of the descriptions may be entailed in any one particular solution.

Solution Type	Solution Description
Hardware	Change-out, alteration, or modification of physical hardware
Software	Changes to control application Changes driver service tool configuration
Manual Operation	Physical and manual operation by site personnel.

List of Solutions Addressed by this Application Note

A key is associated with every solution description that denotes the area of impact as seen below. A technical performance grading scale is assigned based on the overall Woodward recommended action.

- A Check box denotes the general areas of impact.

Hardware Replacement	Software Changes	Manual Operations
✓	✓	✓

- Performance Scoring
  - **Performance Score A:** Superior life extension through limit cycle reduction, relubrication and/or motor power cutoff solutions.
  - **Performance Score B**: Exceptional life extension through relubrication and/or motor power cutoff solutions.
  - **Performance Score C:** Some life extension through motor relubrication, but wear will persist at high rates as compared to motor power removal solutions.

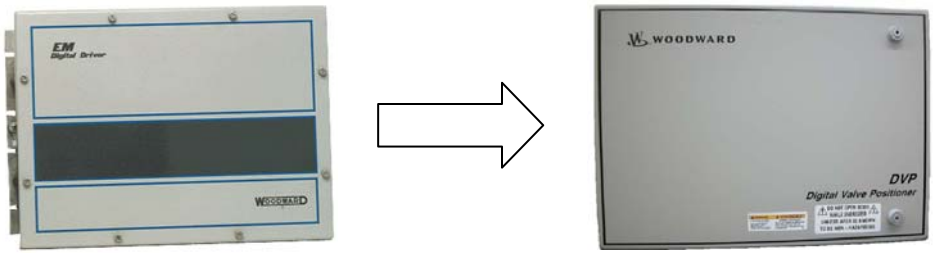
Application Solutions Matrix	Customer Interaction			
	Hardware	Software	Manual Operations	Technical Performance
Replace EM driver using analog/digital command with DVP	✓	✓		**A+**
Control Application Software Changes Issue RS-485 Shutdown to driver to remove current to motor (digital communications only).		✓		**A**
Driver Configuration for 3103 Motor Power Cutoff (Analog Demand)		✓		**A**
Manually Remove Power to EM Driver While in Standby			✓	**B**
Manual Periodic Relubrication by Cycling the Actuator Motor		✓	✓	**C**

Chapter 2.
Replace EM Driver with a 24 V DVP Driver

Hardware	Software	Manual Operations
✓	✓	

Application Description

Woodward's new driver platform, the DVP (Digital Valve Positioner), is fully compatible with the operation of the 3103 gas valve. This driver can directly replace the EM digital driver.



Replacement of the EM-24 Digital Driver will provide superior valve motor life extension as well as provides the user with the next generation of driver technology. The DVP driver has an advanced control model that significantly reduces limit cycle (noise) when the valve is at a controlled position. The DVP also offers a function called zero cutoff that allows the valve motor to remain inactive while keeping the valve available for service at a moment's notice. This solution is considered a highly effective solution for prolonged motor life.

⚠WARNING

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

⚠WARNING

All work should be carried out under safe conditions. Be sure gas is not present and the environment is safe to work on electrical components. Ensure all power is removed from the fuel system and surrounding equipment.

Customer Impacts

- The user will have to physically mount the 24 V DVP driver to where the EM driver was mounted. The DVP (IP56 version) footprint is identical to the EM driver footprint. No additional changes to the mounting screws are required.
- Signal wiring is similar and will not require any additional wiring. Terminal locations and types are different. Some forethought on how to utilize the existing wiring infrastructure should be considered.
- Power requirements will not change and existing power input wires will not need to change.
- The DVP will require configuration with a service tool. The service tool will require a software installation on a PC to establish communications to the DVP via an RS-232 D9 connection.
- Analog signals (4 mA to 20 mA) and discrete I/O are compatible with your current system.
- In zero cutoff mode the DVP will completely remove power from the valve motor. The 3103 spring force will close the valve below the 0 % position and drive it to the hard stop.
- Customer evaluation of control software applications that utilize “external to driver” position error monitoring should be considered.
- The DVP is not compatible with RS-485 digital communications. The DVP will require CANopen communications and may require a CANopen capable CPU among other control hardware modifications.
- Some control application software changes may be required.
- DVP Electrical plate punch-out’s will be necessary for cable interfaces.

Suggested Implementation

- Reference the 3103 Quick Start guide section in the DVP manual.
- Woodward recommends discussing this solution with a qualified Woodward customer service representative for implementation and compatibility with your system.
- Recommended DVP replacement part number is 8200-508 (IP56 DVP driver).

Chapter 3.
Woodward Control Application Software Changes

Hardware	Software	Manual Operations
	✓	

Application Description

The control application software solution is intended to alter the control software to perform some functions that will keep the engine status available for dispatch and prolong the motor life. The solution entails the use of multiple user enabled functions depending on the user preferences to provide superior wear mitigation.

The code will configure the driver to “Kill Power” to the valve’s actuator when a driver shutdown is initiated. Killing power disables the actuator and prevents unnecessary movement of the valve while the engine is shut down. The solution provided in this section covers instances where either digital control only or digital control with analog backup is used.

- This function operates using RS-485 digital communications with and without analog backup modes.

The code performs the following functions:

- Remove power from the valve motor while the engine is in standby upon initiation of a driver shutdown.
- Mask driver fault codes associated with the initiation of the “kill power” (shutdown) of the driver.
- Allows a reset of the driver to become “active” when in calibration or a ready to start command is issued.

⚠WARNING

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

⚠WARNING

All work should be carried out under safe conditions. Be sure gas is not present and the environment is safe to work on electrical components. Ensure all power is removed from the fuel system and surrounding equipment.

IMPORTANT

SOFTWARE DEVELOPMENT—This code is intended to be used as general guidelines for software design. This code may require specific alterations to customize the functionality to the developer's needs. Verification of the implementation is recommended.

Customer Impacts

- Application code changes will be required to implement this solution.
- When properly implemented, the turbine will remain in standby and available.
- The customer will need to request the documentation from Woodward, your OEM or your authorized service provider. Application of the changes will follow one of two paths depending on the control and application type:
  - Woodward Control with Woodward Application Software
    - Woodward will provide the application service to upgrade the software solution in Woodward generated code.
  - Woodward Control / Non-Woodward Application Software
    - Woodward will provide the software application GAP modules for customer application import and instructions for linking to the appropriate signals for operation.

Suggested Implementation

The following code recommendation documents support the application solution.

GAP Module for Application Implementation	5418-6048

Example Logic Diagram for Application Implementation	9987-3138

- This function is intended to be initiated after the engine has been shut down.
- When the driver is reset, the valve will position to the commanded position from the minimum stop.
- When a driver shutdown is initiated (SD=TRUE or discrete input = TRUE), the valve spring will drive the valve position to the minimum stop.
- The position error fault is internally masked within the driver when the driver is shut down.
- Programming may be needed to allow a calibration mode to disable the function.
- The motor power cutoff function requires the driver to receive a shutdown command to initiate. The configuration will mask the annunciation of the forced shutdown (code 512 or 513). It will however annunciate other internal driver faults.
- Woodward suggests using the discrete command from the “engine out of operation” status to initiate the driver shutdown.

IMPORTANT	**REQUIRED ACTION TO INITIATE THE CODE CHANGES—After application code is loaded to the CPU and tunables are uploaded, a driver power cycle is required to accept the new RS-485 digital configuration.**

IMPORTANT	**REQUIRED ACTION TO ACTIVATE THE KILL POWER MODE—The driver must receive a shutdown input command on the digital block (DIG_RVLV.SD = TRUE) to activate the “Kill Power” mode.**

Specific Digital Driver Fault Codes Mentioned (DIG_RVLV.DVR_F_STAT)

Fault Code (DVR_F_STAT)	Discrete Input Contact (Terminals 17,18,19)	Digital Shut Down Input (SD)
512	CLOSED	TRUE
513	OPEN	TRUE

Special Considerations

- This code can inhibit the turbine availability in the event of Digital RS-485 communications fault while the digital shutdown is initiated (SD=TRUE). Analog (4 mA to 20 mA) backup is not available for turbine start because the driver is in a SD state prior to communications being lost, forcing it into the shutdown lock state until RS-485 communications are re-established.
- If the driver discrete input is used exclusively (while in digital w/ analog backup mode), the digital block will still annunciate a "1" fault code that is not masked.

NOTICE

Woodward code recommendations assume the programmers' personal knowledge of their code operation. Woodward assumes no responsibility for testing and validation of the implementation of third-party code.

NOTICE

Woodward recommends closing the valve to 0% (min flow) to ensure proper engine shutdown prior to issuing the driver shutdown. This will drive the valve closed under powered conditions (not solely relying on the spring to close the valve).

Submit a request for the application solution through the following channels:

- End Users—Please contact your OEM provider.
- OEMs—Please contact Woodward Service Department:
  Turbinehelpdesk@woodward.com

Please submit the following information when requesting this solution.

- Engine Model
- GAP application part number if applicable.
- Request Logic drawing for implementation.
- Valve part number & serial number
- Hours of valve operation
- Hours of engine operation
- Refer to the GAP module or logic diagram listed above for RS-485 DIG_RVLV Hardware channel adjustments.

Chapter 4.
Driver Configuration for 3103 Motor Power Cutoff using Analog Demand

Hardware	Software	Manual Operations
	✔	

Application Description

This solution removes driver power to the 3103 EM actuator motor. The EM driver will remain operational, but in a shutdown state. The implementation of this solution is applicable to analog demand applications.

⚠WARNING

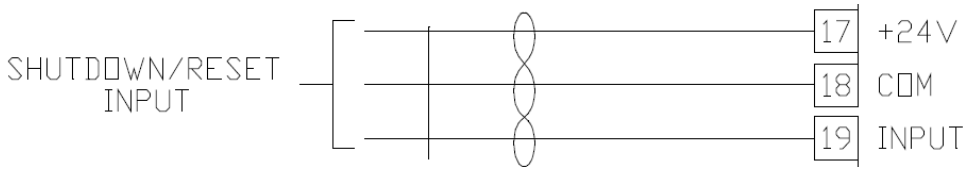
EXPLOSION HAZARD—Do not remove covers or connect/disconnect electrical connections unless power has been switched off and the area is known to be non-hazardous.

⚠WARNING

All work should be carried out under safe conditions. Be sure gas is not present and the environment is safe to work on electrical components. Ensure all power is removed from the fuel system and surrounding equipment.

Customer Impacts

- The solution will require customer interaction with the driver software using the DIP program to change the configuration settings.
- No position error SD will be annunciated while in this mode.
- Feedback when in the driver shutdown state will register approximately –3.5 % as the valve is driven by the spring to the minimum hard stop.
- Upon issuing a driver shutdown, the valve will close to the minimum stop via spring force only.
- The service tool will require a software installation on a PC to establish communications to the EM driver via an RS-232 D9 connection.
- For the activation of the motor power cutoff function, the EM driver must be issued a shutdown command.

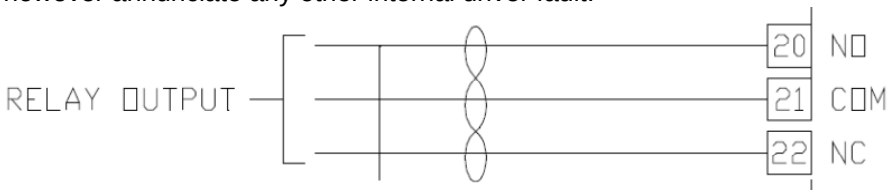


- Shutdown signal from the control must be maintained to remain in 'Kill Power' mode. Control logic changes may be necessary for proper implementation.
  - o A continuous shutdown signal must be present at the driver SD input to maintain the "kill power" state.
  - o If a calibration function is present in your logic, functionality in the software should be considered to allow the calibration function to activate.

NOTICE

Woodward recommends closing the valve to 0 % to ensure proper engine shutdown prior to issuing the driver shutdown. This will drive the valve closed under powered conditions.

- When properly configured, the driver will not annunciate the commanded shutdown through the discrete output (driver connections 20, 21, 22). It will however annunciate any other internal driver fault.



Suggested Implementation

The following procedure describes how to enable the 3103 EM motor power cutoff functionality in the EM Digital driver. Refer to the EM Digital driver manual for detailed connection and DIP information.

IMPORTANT

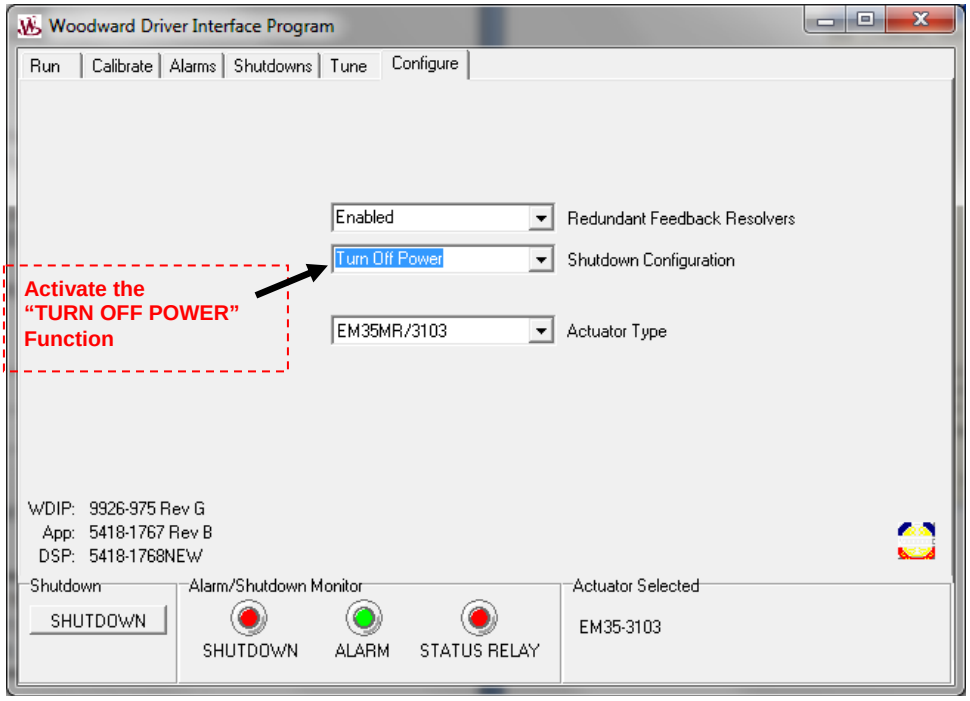
REQUIRED ACTION TO ACTIVATE THE KILL POWER MODE—The driver must receive a shutdown command (on the driver discrete input) to activate the "Kill Power" mode.

- Woodward suggests using the discrete command from the "engine out of operation" status to initiate the driver shutdown.

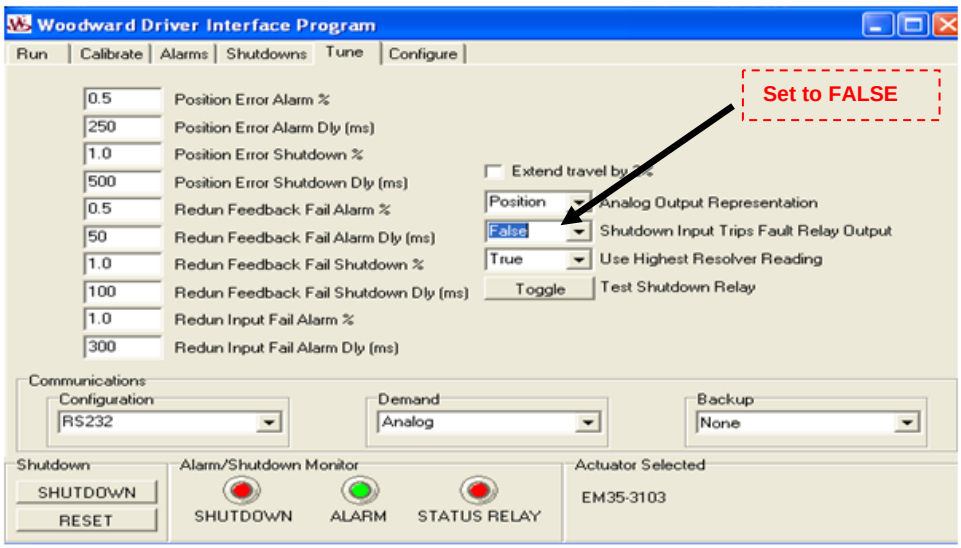
⚠WARNING

SAFETY HAZARD—The engine must be shut down and in a safe state prior to implementing this procedure.

1. Verify that the engine is shut down and in a safe state.
2. Connect to the EM Digital driver via the DIP service tool.
3. Enter the driver configuration tab. You may have to issue a driver shutdown to enter this page.
4. On the "Shutdown Configuration" list box, select "Turn Off Power".



5. Enter the "Tune" page and select the "Shutdown Input Trip Fault Relay Output".
6. Change this value to "False"



7. Exit the service tool.
8. Cycle driver power.
9. Reconnect the DIP service tool and verify the settings were correctly saved.

Chapter 5.
Manual Remove Power from the EM Driver while in Standby

Hardware	Software	Manual Operations
		✓

Application Description

Removal of power to the driver is intended to immobilize the valve motor while in extended periods of inactivity. This solution requires no hardware or software interaction.

With the motor immobilized, the life of the product can be extended substantially by reducing the wear of the motor gears when extended periods of inactivity are expected. This solution is considered a highly effective solution for prolonged motor life.

⚠WARNING

ELECTROCUTION HAZARD – Always disconnect power through proper switching devices such as breaker or fuse panels. Never disconnect live circuitry at terminals where exposing wire conductors are possible.

⚠WARNING

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

⚠WARNING

All work should be carried out under safe conditions. Be sure gas is not present and the environment is safe to work on electrical components. Ensure all power is removed from the fuel system and surrounding equipment.

Customer Impacts

- The turbine must be shut down for this application solution.
- The user will have to manually disconnect power from the EM driver.
- Both the valve and driver will be completely non-functional and unavailable for use while power is removed.
- The valve will close to the hard stop with spring force.
- Upon reapplication of power to the driver, the driver will enter the shutdown state and will require some interaction to reset any shutdowns generated at start up.

Suggested Implementation

- Woodward suggests using the input power breakers or fuses for removal and reapplication of power.

Chapter 6.
Manual Periodic Relubrication by Cycling the Actuator Motor

Hardware	Software	Manual Operations
	✓	✓

Application Description

When the valve position remains in one position for prolonged periods of time, the motor gear teeth engage at a single point of contact. This solution is effective at increasing life through relubrication of the motor gear teeth. Woodward recommends this implementation if the valve will be at on a single controlled position for extended periods of time (longer than about 20 days). If running the valve in this extended control mode is not absolutely necessary, Woodward highly recommends using the other motor power removal solutions.

Customer Impacts

- The turbine must be shut down for this application solution.
- The user will be required to actuate the driver manually through the control to the EM driver.

⚠WARNING

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

⚠WARNING

All work should be carried out under safe conditions. Be sure gas is not present and the environment is safe to work on electrical components. Ensure all power is removed from the fuel system and surrounding equipment.

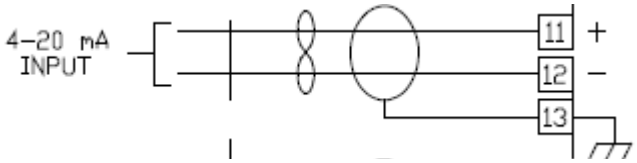
Suggested Implementation

With the turbine shut down and in a safe state, choose one option below.

Option 1: Control via the Turbine Control System

- Enable the supervisory control to manually control the metering valve demand.
- Clear shutdowns.

Option 2: Control via the (4 to 20) mA Input at the Driver



- Remove the (4 to 20) mA demand from the driver or control.
- Insert a (4 to 20) mA source on the driver analog demand terminals.
- Clear shutdowns.
- Manually stroke the metering valve from 0 % to 100 % 5 times.
- Return the control and driver to the normal run state.

Chapter 7.
Service Options

Product Service Options

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

- Consult the troubleshooting guide in the manual.
- Contact the manufacturer or packager of your system.
- Contact the Woodward Full Service Distributor serving your area.
- Contact Woodward technical assistance (see "How to Contact Woodward" later in this chapter) and discuss your problem. In many cases, your problem can be resolved over the phone. If not, you can select which course of action to pursue based on the available services listed in this chapter.

OEM and 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 **Recognized Turbine Retrofitter (RTR)** is an independent company that does both steam and gas turbine control retrofits and upgrades globally, and can provide the full line of Woodward systems and components for the retrofits and overhauls, long term service contracts, emergency repairs, etc.

You can locate your nearest Woodward distributor, AISF, RER, or RTR on our website at:

www.woodward.com/directory

Woodward Factory Servicing Options

The following factory options for servicing Woodward products are available through your local Full-Service Distributor or the OEM or Packager of the equipment system, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is originally shipped from Woodward or a service is performed:

- 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 is a flat-rate program and includes the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

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.

Charges for the Replacement/Exchange service are based on a flat rate plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned within 60 days, a credit for the core charge will be issued.

Flat Rate Repair: Flat Rate Repair is available for the majority of standard 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. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

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 and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205). 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 authorization 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 offers various Engineering Services for our products. For these services, you can contact us by telephone, by email, or through the Woodward website.

- 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. Emergency assistance is also available during non-business hours by phoning Woodward and stating the urgency of your problem.

Product Training is available as standard classes at many of our worldwide locations. We also offer customized classes, which can be tailored to your needs and can be held at one of our 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 many of our worldwide locations or 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 us via telephone, email us, or use our website: **www.woodward.com**.

How to Contact Woodward

For assistance, call one of the following Woodward facilities to obtain the address and phone number of the facility nearest your location where you will be able to get information and service.

Electrical Power Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany	+49 (0) 21 52 14 51
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

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

Turbine 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

You can also locate your nearest Woodward distributor or service facility on our website at:

www.woodward.com/directory

Technical Assistance

If you need to telephone for technical assistance, you will need to provide the following information. Please write it down here before phoning:

Your Name	
Site Location	
Phone Number	
Fax Number	
Engine/Turbine Model Number	
Manufacturer	
Number of Cylinders (if applicable)	
Type of Fuel (gas, gaseous, steam, etc)	
Rating	
Application	
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	

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.

Revision History

Changes in Revision C—

- Chapters 3 & 4—Added important placards to call out more detail with regard to activating the kill power mode
- Added detail about the suggested source of the driver shutdown

Changes in Revision B—

- Updated Chapter 3 throughout to reflect changes in code implementation

Changes in Revision A—

- Updated to describe differences between old and new EMs (bottom of page 1)

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

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Email and Website—www.woodward.com

**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.

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