

IMPORTANT		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.
	DAN or se	IGER —Indicates a hazardous situation which, if not avoided, will result in death erious injury.
DEFINITIONS	WAI deat	RNING —Indicates a hazardous situation which, if not avoided, could result in h or serious injury.
	CAL mino	ITION —Indicates a hazardous situation which, if not avoided, could result in or or moderate injury.
	• NOT dam	ICE —Indicates a hazard that could result in property damage only (including age to the control).
	• IMP	DRTANT —Designates an operating tip or maintenance suggestion.

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.



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.

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, be sure to check the Woodward website: www.woodward.com/pubs/current.pdf

The revision level is shown at the bottom of the front cover after the publication number. The latest version of most publications is available at:

www.woodward.com/publications

If your publication is not there, please contact your customer service representative to get the latest copy.



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.

NOTICE

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.

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.*

Revisions—Text changes are indicated by a black line alongside the text.

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Contents

Electrostatic Discharge Awareness	ii
CHAPTER 1 INTRODUCTION Power Flow Throttle Replacement Selection Guide	1 2
CHAPTER 2. MOUNTING Power Flow Bolt Patterns Mounting Adapter Components	3
CHAPTER 3. PROGRAMMING TOOL/COMMUNICATION KITS	9
CHAPTER 4. SERVICE OPTIONS Product Service Options Woodward Factory Servicing Options Returning Equipment for Repair Replacement Parts Engineering Services How to Contact Woodward	10 10 11 12 12 13 13
	14

List of Figures

Figure 1. Mounting Flanges for PF31, PF38, and PF42 Actuators	3 ⊿
Figure 3. L-Series Mounting Flange for 25 mm, 30 mm, and 36 mm ITBs	5
Figure 4. L-Series Mounting Flange for 43 mm and 50 mm ITBs	5
Figure 5. Mounting Flange for F-Series 60 mm ITBs	6
Figure 6(a). Gasket Between L-Series ITB and Adapter Plate	7
Figure 6(b). Adapter Plate	7
Figure 6(c). Gasket Between Adapter Plate and Intake Manifold	8
Figure 7. L-Series Communication Kit Setup	9
Figure 8. F-Series Communication Kit Setup	9

Electrostatic Discharge Awareness

All electronic equipment is static-sensitive, some components more than others. To protect these components from static damage, you must take special precautions to minimize or eliminate electrostatic discharges.

Follow these precautions when working with or near the control.

- 1. Before doing maintenance on the electronic control, discharge the static electricity on your body to ground by touching and holding a grounded metal object (pipes, cabinets, equipment, etc.).
- 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.
- 3. Keep plastic, vinyl, and Styrofoam materials (such as plastic or Styrofoam cups, cup holders, cigarette packages, cellophane wrappers, vinyl books or folders, plastic bottles, and plastic ash trays) away from the control, the modules, and the work area as much as possible.
- 4. 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.



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..*

Chapter 1 Introduction

Woodward has replaced the Power Flow throttle product line with integrated throttle body models of its L-Series and F-Series controllers. These ITB models have different electrical connections, programming tools, and mounting flange patterns. This manual will help you select appropriate replacements for your current Power Flow throttles.

Woodward's *L-Series ITB position controller* or the *L-Series ITB speed controller* can be used as a functional replacement for Power Flow throttle models PF31, PF38, PF42, and PF50.

The L-Series ITB speed controller combines an L-Series electronic actuator with integrated speed control software to control the engine speed. The L-Series speed controller incorporates a microprocessor-based control into the actuator, creating a single, integrated package. This eliminates the need for an additional driver box and speed control box.

Woodward's *F-Series ITB position controller* can be used as a functional replacement for Power Flow throttle model PF60.

Use the chart on the facing page to help in the selection of your replacement throttles.



Electrical Installation



Power Flow Throttle F	Replacement	Selection	Guide
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POWER FLOW P/N	REPLAC L-SERI Position Controller P/N	EMENT ES ITB Speed Controller P/N	REPLACE- MENT F-SERIES ITB P/N	THROTTLE DIAMETER	PWM CONTROLLER	CONNECTOR KIT	CRIMP TOOL	CALIBRATION SOFTWARE	SERVICE MANUAL
DE21 0 0 12	8404- 2020	-		20	Required *	8928-396	HDT- 48-00	Optional †	26237
PF31-0-0-12	_	8404- 2006	_	30 mm	-			8923-1061	26250
	8404- 2011	_		26 mm	Required *	- 8928-396 HDT- 48-00	Optional †	26237	
PF38-0-0-12	Ι	8404- 2007	_	36 mm			48-00	8923-1061	26250
	8404- 2021	-	-	43 mm	Required *	8928-396	HDT- 48-00	Optional †	26237
PF42-0-0-12		8404- 2008						8923-1061	26250
PF50-0-0-12	8404- 2022	_	_	50 mm	Required *	8928-396	HDT- 48-00	Optional †	26237
	-	8404- 2009			-			8923-1061	26250
PF60-0-0-12	_	_	**	60 mm	Required *	1635-1517 (connector) 1608-1044 (gold sockets)	HDT- 48-00	Optional ‡	26355

(*) Please consult your Woodward customer service representative for the controller best suited to your application.

(**) P/Ns vary depending on electrical connection orientation. Please consult Woodward to determine appropriate model for your application.

(†) L-Series Service Tool (p/n 8923-1061) may be used to configure and adjust the controller.

(‡) F-Series Service Tool (p/n 8923-1254) may be used to configure and adjust the controller.



An adapter plate and gaskets may be required to mount ITB to the mixer and intake manifold (see Chapter 2). Please contact your Woodward customer representative for your requirements.

Chapter 2. Mounting

The mounting flanges for both L-Series and F-Series ITBs are different from the Power Flow mounting flanges. The following schematics should be used to either source or develop mounting flanges and spacers for the replacement throttles.

Power Flow Bolt Patterns

PF31, PF38, and PF42 ITBs mixer and intake manifold bolting patterns are shown below in **Figure 1.**



Dimensions are in millimeters (inches in brackets).

Figure 1. Mounting Flanges for PF31, PF38, and PF42 Actuators



PF50 and PF60 ITBs mixer and intake manifold bolting patterns are shown below in **Figure 2.**



Dimensions are in millimeters (inches in brackets).

Figure 2. Mounting Flanges for PF50 and PF60 Actuators

The L-Series 25 mm, 30 mm, and 36 mm ITBs have the same mounting flange, as shown in **Figure 3**. The L-Series 43 mm and 50 mm have the same mounting flange, as shown in **Figure 4**.

Dimensions are in millimeters (inches in brackets).







Dimensions are in millimeters (inches in brackets).



Replacement of Power Flow Throttles

The F-Series ITB, which is the recommended replacement for the PF60, has a different mounting flange than the L-Series as shown in **Figure 5**.



Dimensions are in millimeters (inches in brackets).

Figure 5. Mounting Flange for F-Series 60 mm ITBs

Mounting Adapter Components

An adapter plate and gaskets may be required to mount the ITB to the mixer and intake manifold.

Mounting components are available through Woodward for the L-Series 50mm ITB *only*. **Figures 6a**, **8b**, and **8c** show dimensions for the two gaskets and adapter plate for the 50mm ITB.

For guidance on gaskets and adapter plates for bore sizes other than 50mm, please contact your Woodward customer representative.



Dimensions are in millimeters.





Dimensions are in millimeters.





Figure 6(c). Gasket Between Adapter Plate and Intake Manifold

Chapter 3. Programming Tool/Communication Kits

The L-Series speed controller requires parameters such as Speed Input, Rated Set Point, and Overspeed Threshold to be configured before starting the engine. Refer to the L-Series speed control manual 26250 for a complete description of all L-Series features and programming examples.



Figure 7. L-Series Communication Kit Setup



Figure 8. F-Series Communication Kit Setup

Chapter 4. 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.

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

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 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.



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: <u>www.woodward.com/support</u>.

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	Engine Systems	Turbine Systems		
FACILITY PHONE NUMBER Brazil	FACILITY PHONE NUMBER Brazil+55 (19) 3708 4800 0 China 186 (512) 6762 6727	FACILITY PHONE NUMBER Brazil		
Germany: Kempen	Germany:	Gillia+00 (512) 07 02 07 27		
Stuttgart+49 (711) 78954-0 India+91 (129) 4097100	Stuttgart +49 (711) 78954-0 India+91 (129) 4097100	India+91 (129) 4097100		
Korea	Korea	Korea		
Poland +48 12 618 92 00 United States +1 (970) 482-5811	United States +1 (970) 482-5811	United States +1 (970) 482-5811		

You can also contact the Woodward Customer Service Department or consult our worldwide directory (<u>www.woodward.com/support/directory.cfm</u>) for the name of your nearest Woodward distributor or service facility.

For the most current product support and contact information, please refer to the latest version of publication **51337** at <u>www.woodward.com/publications</u>.

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:

General

Your Name	
Site Location	
Phone Number	
Fax Number	

Prime Mover Information

Engine/Turbine Model Number	
Manufacturer	
Number of Cylinders (if applicable)	
Type of Fuel (gas, gaseous, steam, etc)	
Rating	
Application	

Control/Governor Information

Please list all Woodward governors, actuators, and electronic controls in your system:

Woodward Part Number and Revision Letter
Control Description or Governor Type
Serial Number
Woodward Part Number and Revision Letter
Control Description or Governor Type
Serial Number
Woodward Part Number and Revision 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. We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication **36728**.



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

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