

**WARNING**

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.

The engine, turbine, or other type of prime mover should be equipped with an overspeed (overtemperature, or overpressure, where applicable) shutdown device(s), that operates totally independently of the prime mover control device(s) to protect against runaway or damage to the engine, turbine, or other type of prime mover with possible personal injury or loss of life should the mechanical-hydraulic governor(s) or electric control(s), the actuator(s), fuel control(s), the driving mechanism(s), the linkage(s), or the controlled device(s) fail.

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.

**CAUTION**

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.

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.

Important Definitions**WARNING**

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

**CAUTION**

Indicates a potentially hazardous situation that, if not avoided, could result in damage to equipment.

**NOTE**

Provides other helpful information that does not fall under the warning or caution categories.

Woodward reserves the right to update any portion of this publication at any time. Information provided by Woodward is believed to be correct and reliable. However, Woodward assumes no responsibility unless otherwise expressly undertaken.

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Revision History

Rev.	Date	Editor	Changes
NEW	2014-02-27	GG	Release



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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.

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:

<http://www.woodward.com/publications>

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

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Parts of Delivery

Please check delivery before starting installation.

This product comes with:

Piece(s)	Name	Remarks
1	EPU-100	Remanence Voltage Converter
1	Mini CD-ROM	Containing the EPU-100 Technical Manual (this manual), the Product Specification and further information
1	Packaging	-/-
The DIN rail is not(!) part of delivery		

Table 1. Parts of delivery

General Information



CAUTION

Only qualified workers should install this equipment. Such work should be performed only after reading this entire set of instructions.

Apply appropriate personal protective equipment and follow safe electrical practices.

The successful operation of this equipment depends upon proper handling, installation, and operation. Neglecting fundamental installation requirements may lead to personal injury as well as damage to electrical equipment or other property.

Failure to follow these instructions will result in death or serious injury!

Introduction



EPU means **Electronic Pickup Unit**. It converts the Remanence Voltage of the connected **Asynchronous Generator** into a digital signal with a rotational frequency according to the number of revolutions.

No adjustment needed.

In combination with Woodward's easYgen devices installation and configuration becomes very easy. EPU-100 input and supply power is already available. Configuration is just one parameter setting away. EPU-100 is preferred especially for small gensets.



NOTE

The present manual has been prepared to enable the installation and commissioning of the unit.

Due to the large variety of applications, it is not possible to cover every combination. The manual is therefore only a guide.

Safety Precautions



- Don't use EPU-100 in hazardous area.
- Don't use EPU-100 for medical devices.
- Installation by trained personnel only.

Intended Use



The unit must only be operated in the manner described by this manual. The prerequisite for a proper and safe operation of the product is correct transportation, storage and installation as well as careful operation and maintenance with respect to its technical data.

EPU-100 ...

- is prepared for DIN rail mounting.
- converts even the low Remanence Voltage output of an asynchronous generator without load into a rectangle speed/frequency related input for synchronization of closing breaker(s).
- is intended to be used with gensets only.

Woodward offers kits for asynchronous genset control that cover both EPU-100 together and easYgen-2000 or easYgen-3000. An Application Note describes the best practice implementation and use of this kit.



NOTE

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: constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage and invalidate product certifications or listings.

Don't use EPU-100 for speed regulation.

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.).
2. 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 easily as synthetics.
3. Keep plastic, vinyl and Styrofoam materials (such as plastic or Styrofoam cups, cigarette packages, cellophane wrappers, vinyl books or folders, plastic bottles, etc.) away from the control, modules and work area as much as possible.
4. **Opening the control cover may void the unit warranty!**
Do not remove the printed circuit board (PCB) from the housing unless absolutely necessary. If you must remove the PCB from the housing, follow these precautions:
 - Ensure that the device is completely voltage-free (all connectors have to be disconnected).
 - Do not touch any part of the PCB except the edges.
 - Do not touch the electrical conductors, connectors or components with conductive devices or with bare 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.



CAUTION

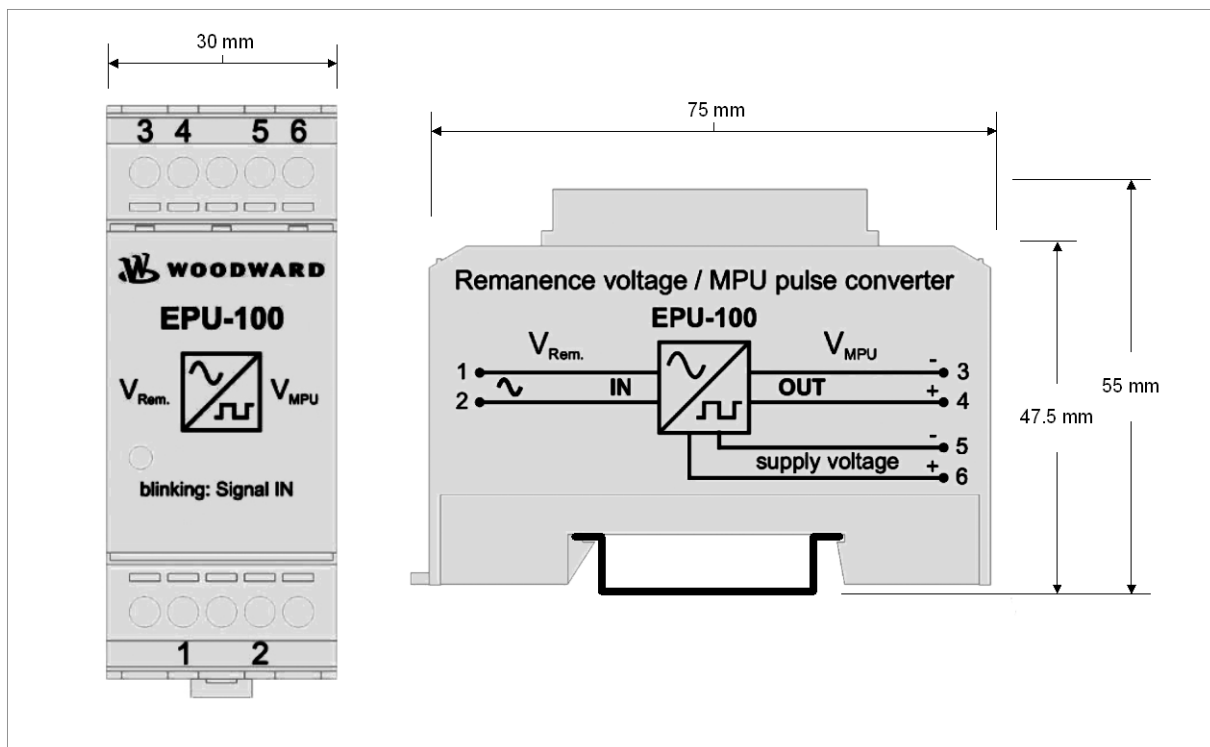
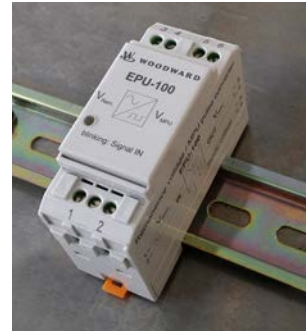
To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards and Modules*.

Installation

Mounting and Removal

EPU-100 is prepared for DIN rail mounting:

- Attach the upper snap-on guide to the DIN rail
- Press the EPU-100 down onto the DIN rail until it locks into position

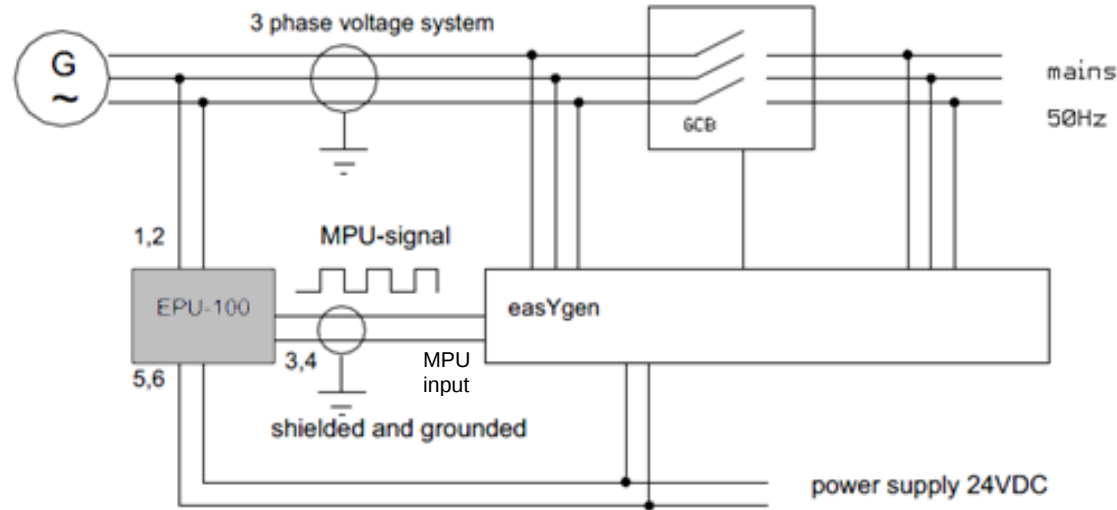


Drawing 1: Housing with circuit diagram and terminals

Wiring



EPU installation



Drawing 2: Connection Diagram



NOTE

Inductances must be provided with a suitable interference suppressor.

Terminal and Interface



WARNING

Danger For Life! Connection only at generator standstill!
Take care for safety instructions!

Contact	Signal	Name	Wire size Amax	
			„inflexible“	„flexible“
1	Remanence voltage IN L1 – L2	Phase, V _{Rem.} IN	0.2 .. 4 mm ²	0.2 .. 2.5 mm ²
2		Phase, V _{Rem.} IN	0.2 .. 4 mm ²	0.2 .. 2.5 mm ²
3	EPU OUT “MPU-signal”	-V _{MPU} OUT	0.2 .. 4 mm ²	0.2 .. 2.5 mm ²
4		+V _{MPU} OUT	0.2 .. 4 mm ²	0.2 .. 2.5 mm ²
5	(Power supply)	-U _{Batt.} ; 0 V reference	0.2 .. 4 mm ²	0.2 .. 2.5 mm ²
6		+U _{Batt.}	0.2 .. 4 mm ²	0.2 .. 2.5 mm ²

Table 2. Terminal wiring

For use with Woodward easYgen please connect MPU OUT of the EPU-100 with easYgen terminal for MPU input.

Functional Description



Display



LED function: LED is ...

- illuminated if supply voltage is in range,
and
- toggling with incoming Remanence Voltage signal.
The LED's blinking frequency is 4 times lower than the genset rotation frequency to be visible.

Signal Conversion



The output frequency V_{MPU} of the EPU-100 is 8 times higher than the frequency of the input voltage V_{Rem} .

Configuration



CAUTION

Configuration only if system is off.

No configuration for EPU-100. Configuration has to be done at genset controller side!



NOTE

There is no standard for the MPU signal defined.

EPU-100 working together with easYgen series genset controllers just needs configuration as described below.

Using EPU-100 with other genset controllers like Woodward's easYgen this genset controllers need specific setup.

Configure easYgen series genset controller for EPU-100 input

EPU input will be configured like MPU input with the

- number of teeth of the Pickup sensor or the
- number of impulses of the sensor

per one turn.

easYgen series Technical Manuals contain conversion tables for speed measurement related to the number of teeth (easYgen parameter ID 1602) and nominal speed in rpm (easYgen parameter ID 1601).

easYgen settings at 50 Hz mains frequency:

rpm Parameter ID 1601	500	750	1000	1500	3000
Number of teeth Parameter ID 1602 Terminal 79/80	48	32	24	16	8

Table 3. Overview rpm / number of teeth

Operation



WARNING – HIGH VOLTAGE

Please follow the safety regulation – especially for working with high voltage! Take care to be well instructed for first aid caused by electrical accidents. Don't contact hazardous parts:

DANGER TO LIFE



CAUTION

Commissioning by qualified personnel only.



CAUTION

Check phase correct connections before commissioning.

Missing or wrong connected (measuring) wiring can lead to malfunctions, which in turn can lead to damaged equipment or even accidents!

Application



This application describes the setup of an easYgen-2000/-3000 series to run an asynchronous generator in combination with an EPU-100.

Setup of the easYgen controller

1. Set parameter 235 (Generator Type) to "Asynchron". The parameter can be found in "Configure measurement" menu:

235 Generator type Asynchron ▼

2. To be able to measure the rpm of the engine, when the generator is in island mode the settings for the MPU need to be adjusted:
 1. Parameter 1600 (MPU input) need to be configured to "On"
 2. Parameter 15155 (Engine speed source) need to be configured to "Internal"
 3. Parameter 1601 (Engine rated speed) according to the engine value
 4. Parameter 1602 (Fly wheel teeth) need to be set to the value corresponding to the matching value listed on page 11 e.g.,:

MPU

1600 MPU input	On ▼
15155 Engine speed source	Internal ▼
1602 Fly wheel teeth	16

After this software setup the easYgen can interpret the MPU signal coming from the EPU-100.

Application Setup of EPU and easYgen

1. Connect EPU-100 as described with chapter Installation on page 8.
2. Check polarity of MPU-signal at easYgen terminal!
3. Connect 12/24 V_{DC} power supply

The application setup is complete.

EPU-100 LED is ...

- Illuminated: supply power in range
- Toggling: Remanence voltage input signal V_{REM} is valid

Trouble-Shooting

Problem	Reason Why	Solution
LED off	No supply voltage or supply voltage polarity mismatch	Check supply voltage
LED toggling all the time (with mains frequency)	Input with open connection works like antenna for mains	Check shielding or connect inputs 1 and 2 separately and both together to ground
No MPU-signal	No input signal detected	Check EPU outputs 3 and 4 with a multimeter V_{DC} : 2 .. 3 V = output is valid
EPU input is OK, but easYgen is detecting no MPU-signal	Wrong polarity at easYgen MPU input	Check polarity at easYgen MPU input

Table 4. Trouble-Shooting

Appendix 1. Technical Data

Attribute	Unit	Value	Remarks
Remanence Voltage input	V _{AC}	0.5 .. 600	L1 – L2
Input impedance	kΩ	> 240	
Input frequency range	Hz	16 .. 85	
Output frequency range	Hz	128 .. 680	8 times higher than input frequency
accuracy	%	5	For 40 .. 60 Hz
MPU Output Signal "MPU-signal"	V _{DC}	4.5 .. 5.5	
Reaction time	ms	< 400	Tracking time
LED frequency	Hz	ca. 4 .. 21	4 times lower than input frequency
Supply voltage	V ^{DC}	8 .. 42	V _{nom} = 24 V
Supply current	A _{DC}	< 0.02	
Wire size	mm ²	0.2 .. 4	"inflexible"
	mm ²	0.2 .. 2.5	"flexible"
Cable length to MPU-signal receiving end	m	< 10	shielded
Cable length to power supply	m	< 30	
Cable mains/load	-	-	shielded
Absolute altitude	m	up to 4,000	
Ambient temperature "operation"	°C	-40 .. +70	
Storage temperature	°C	-40 .. +100	
Dimensions	mm	30 x 75 x 55	W x D x H
Standards, approvals, approbations	DIN EN 61010-1, CE (UL on request)		CAT II 300-600 V acc. to DIN EN 61010-1

Table 5. Technical data

Service

Product Service Options



The following factory options are available for servicing Woodward equipment, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is purchased from Woodward or the service is performed. If you are experiencing problems with installation or unsatisfactory performance of an installed system, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact Woodward technical assistance (see "How to Contact Woodward" later in this chapter) and discuss your problem. In most cases, your problem can be resolved over the phone. If not, you can select which course of action you wish to pursue based on the available services listed in this section.

Returning Equipment for Repair



If a control (or any part of an electronic control) is to be returned to Woodward for repair, please contact Woodward in advance to obtain a Return Authorization Number. When shipping the unit(s), attach a tag with the following information:

- Name and location where the control is installed
- Name and phone number of contact person
- Complete Woodward part numbers (P/N) and serial number (S/N)
- Description of the problem
- Instructions describing the desired type of repair



CAUTION

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*.

Due to the fact that the EPU-100 is a low cost one PCB solution, replacement will be prioritized before repair. Warranty conditions are not affected. Anyway please send the repair candidate back for analysis reasons.

Packing A Control

Use the following materials when returning a complete control:

- Antistatic protective bags on all electronic modules
- Packing materials that will not damage the surface of the unit
- A packing carton with double walls

Return Authorization Number RAN

When returning equipment to Woodward, please telephone and ask for the Customer Service Department in Stuttgart [+49 (0) 711 789 54-510]. They will help expedite the processing of your order through our distributors or local service facility. To expedite the repair process, contact Woodward in advance to obtain a Return Authorization Number and arrange for issue of a purchase order for the unit(s) to be repaired. No work can be started until a purchase order is received.



NOTE

We highly recommend that you make arrangement in advance for return shipments. Contact a Woodward customer service representative at +49 (0) 711 789 54-510 for instructions and for a Return Authorization Number.

Replacement Parts



When ordering replacement parts for controls, include the following information:

- The part numbers P/N (XXXX-XXXX) that is on the enclosure nameplate.
- The unit serial number S/N, which is also on the nameplate.

Further Information



Woodward device	Product Specification #	Technical Manual #
Asynchronous Kit with EPU-100 and easYgen-2500	37568	37535 and 37561
Asynchronous Kit with EPU-100 and easYgen-3500		37528 and 37561
easYgen-1000 series	37180	37476 .. 37480
easYgen-2000 series	37548	37535
easYgen-3100/3200	37258	37532
easYgen-3400/3500	37523	37528
easYgen-3400/3500 Marine	37533	37531
DSL-2	37493	37443

Table 6. Further Information

How to contact Woodward



Please contact following address if you have questions or if you want to send a product for repair:

Woodward GmbH
Handwerkstrasse 29
70565 Stuttgart - Germany

Phone: +49 (0) 711 789 54-510 (8.00 - 16.30 German time)
Fax: +49 (0) 711 789 54-101
eMail: stgt-info@woodward.com

For assistance outside Germany, call one of the international 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.

You can also contact the Woodward Customer Service Department or consult our worldwide directory on Woodward's website (**www.woodward.com**) for the name of your nearest Woodward distributor or service facility.

For worldwide directory information, go to

www.woodward.com/ic/locations.

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:

Contact

Your company _____

Your name _____

Phone number _____

Fax number _____

Product (see name plate)

Unit no. and revision: P/N: _____ REV: _____

Unit type EPU-100 _____

Serial number S/N: _____

Description of your problem

If applicable, please have a list of all parameters available. You can print this e.g., using ToolKit. Additionally you can save the complete set of parameters (standard values) and send them to our Service department.

We appreciate your comments about the content of our publications.

Please send comments to: stgt-documentation@woodward.com

Please include the manual number from the front cover of this publication.



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Homepage

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