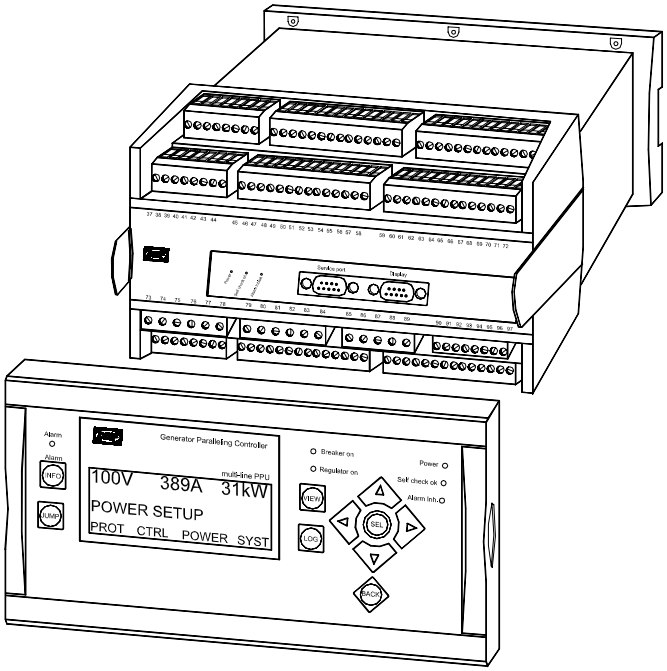
DEIF A/S

Description of options

Option EF3, EF4 and EF5
Combination outputs
Multi-line 2 – version 2

4189340271F
SW version 2.4X.X



- *Description of option*
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- *Functional description*
- *Parameter list*

DEIF A/S, *Frisenborgvej 33*
DK-7800 Skive, Denmark

Tel.: +45 9614 9614, Fax: +45 9614 9615
E-mail: deif@deif.com, URL: www.deif.com

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This manual is valid for standard multi-line 2 PPU/GPC units with firmware version 2.20.0 or later.

1. Warnings and legal information

Legal information and responsibility

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the generator set controlled by the unit, the company responsible for the installation or the operation of the set must be contacted.

The units are not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

Safety issues

Installing the unit implies work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.

Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.

Definitions

Throughout this document a number of notes and warnings will be presented. To ensure that these are noticed, they will be highlighted in order to separate them from the general text.

Notes

The notes provide general information which will be helpful for the reader to bear in mind.

Warning

The warnings indicate a potentially dangerous situation which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.

2. Description of option

This document describes the functionality of the mixed governor and AVR outputs contained in options EF3 and EF4.

EF3 option

Option EF3	ANSI no.
PWM speed control output for CAT® engines	77
Selectable +/-20mA or relay output for voltage control (AVR)	77
PWM output for speed droop	

EF4 option

Option EF4	ANSI no.
Selectable +/-20mA or relay output for speed control (governor)	77
Selectable +/-20mA or relay output for voltage control (AVR)	77

EF5 option

Option EF5	ANSI no.
PWM speed control output for CAT® engines	77
Selectable +/-20mA or relay output for voltage control (AVR)	77

Option EF4: If analogue output is chosen for the governor, then only relay outputs will be available for AVR, and vice versa.

AVR control is option D1.

Options EF3, EF4 and EF5 are available for the GPC and the PPU, not for the GPU.

3. Terminal description

Slot #4 (terminals 65-72) is used for governor and AVR outputs.

Slot #6 (terminals 90-97) is used for different options as well as the PWM droop output. Therefore, choosing option EF3, care must be taken not to choose two options that use the same slot. Options EF4 and EF5 only occupy slot #4.

The analogue governor output is intended to control a governor requiring an analogue speed setting signal. This can be DC current or, by mounting a resistor across the output, DC voltage. The maximum DC voltage available is 10V DC (500 Ω across the terminals).

The choice of resistor depends on the specific governor. Please refer to the DEIF document 'Interfacing DEIF Equipment with Governors and AVRs' for detailed information.

Terminals, option EF3 output

PWM for GOV without AVR control

The PWM output is designed for use with Caterpillar generator sets.

Term. Slot #4	Function	Description
65		
66		
67	PWM +	PWM speed governor signal
68	PWM -	
69		
70		
71		
72		

x

Term. Slot #6	Function	Description
90		
91		
92	PWM +	PWM droop signal
93	PWM -	
94		
95		
96		
97		

Connect PWM- to the engine battery negative and PWM+ to the engine control system S-SPD (speed) input (called RATED SPEED on the ADEM controller and PRIMARY THROTTLE on the PEEC controller).

Connect PWM- to the engine battery negative and PWM+ to the engine control system S-SPD (droop) input (called DROOP SPEED on the ADEM controller and DROOP on the PEEC controller).

PWM for GOV, analogue control for AVR (option D1)
The PWM output is designed for use with Caterpillar generator sets.

Term. Slot #4	Function	Description
65	+/- 20mA	AVR set point output
66	0	
67	PWM +	PWM speed governor signal
68	PWM -	
69		
70		
71		
72		

x

Term. Slot #6	Function	Description
90		
91		
92	PWM +	PWM droop signal
93	PWM -	
94		
95		
96		
97		

Connect PWM- to the engine battery negative and PWM+ to the engine control system S-SPD (speed) input (called RATED SPEED on the ADEM controller and PRIMARY THROTTLE on the PEEC controller).

Connect PWM- to the engine battery negative and PWM+ to the engine control system S-SPD (droop) input (called DROOP SPEED on the ADEM controller and DROOP on the PEEC controller).

PWM for GOV, relay control for AVR (option D1)
The PWM output is designed for use with Caterpillar generator sets.

Term. Slot #4	Function	Description
65		
66		
67	PWM +	PWM speed governor signal
68	PWM -	
69	NO	Relay output for AVR. Raise voltage
70	Com.	
71	NO	Relay output for AVR. Lower voltage
72	Com.	

x

Term. Slot #6	Function	Description
90		
91		
92	PWM +	PWM droop signal
93	PWM -	
94		
95		
96		
97		

Connect PWM- to the engine battery negative and PWM+ to the engine control system S-SPD (speed) input (called RATED SPEED on the ADEM controller and PRIMARY THROTTLE on the PEEC controller).

Connect PWM- to the engine battery negative and PWM+ to the engine control system S-SPD (droop) input (called DROOP SPEED on the ADEM controller and DROOP on the PEEC controller).

Terminals, option EF4 output

Slot #4 is used for governor/AVR outputs.

Analogue output for speed, relay output for voltage

Term. Slot #4	Function	Description
65	+/- 20mA	Analogue +/-20mA for GOV
66	0	
67	Not used	Not used
68	Not used	
69	Relay 13	Relay output for AVR. Raise voltage
70	Relay 13	
71	Relay 14	Relay output for AVR. Lower voltage
72	Relay 14	

Analogue output for voltage, relay output for speed

Term. Slot #4	Function	Description
65	+/- 20mA	Analogue +/-20mA for AVR
66	0	
67	Not used	Not used
68	Not used	
69	Relay 13	Relay output for GOV. Raise frequency
70	Relay 13	
71	Relay 14	Relay output for GOV. Lower frequency
72	Relay 14	

The two configuration combinations shown above in option EF4 are selected in menu 2260.

Terminals, option EF5 output

PWM for GOV without AVR control

The PWM output is designed for use with Caterpillar generator sets.

Term. Slot #4	Function	Description
65		
66		
67	PWM +	PWM speed governor signal
68	PWM -	
69		
70		
71		
72		

Connect PWM- to the engine battery negative and PWM+ to the engine control system S-SPD (speed) input (called RATED SPEED on the ADEM controller and PRIMARY THROTTLE on the PEEC controller).

PWM for GOV, analogue control for AVR (Option D1)
The PWM output is designed for use with Caterpillar generator sets.

Term. Slot #4	Function	Description
65	+/- 20mA	AVR set point output
66	0	
67	PWM +	PWM speed governor signal
68	PWM -	
69		
70		
71		
72		

Connect PWM- to the engine battery negative and PWM+ to the engine control system S-SPD (speed) input (called RATED SPEED on the ADEM controller and PRIMARY THROTTLE on the PEEC controller).

PWM for GOV, relay control for AVR (option D1)
The PWM output is designed for use with Caterpillar generator sets.

Term. Slot #4	Function	Description
65		
66		
67	PWM +	PWM speed governor signal
68	PWM -	
69	NO	Relay output for AVR. Raise voltage
70	Com.	
71	NO	Relay output for AVR. Lower voltage
72	Com.	

Connect PWM- to the engine battery negative and PWM+ to the engine control system S-SPD (speed) input (called RATED SPEED on the ADEM controller and PRIMARY THROTTLE on the PEEC controller).

4. Functional description

Analogue output

The +/- 20mA output can be converted to any voltage range from 0-1 to 0-10V DC by mounting resistors across the terminals.

Example: A 250 Ω resistor across the terminals will supply a range of +/- 5V DC.

The choice of resistor depends on the specific governor. Please refer to the DEIF documents 'Interfacing DEIF Equipment with Governors and AVRs' and 'General Guidelines for Commissioning' for detailed information.

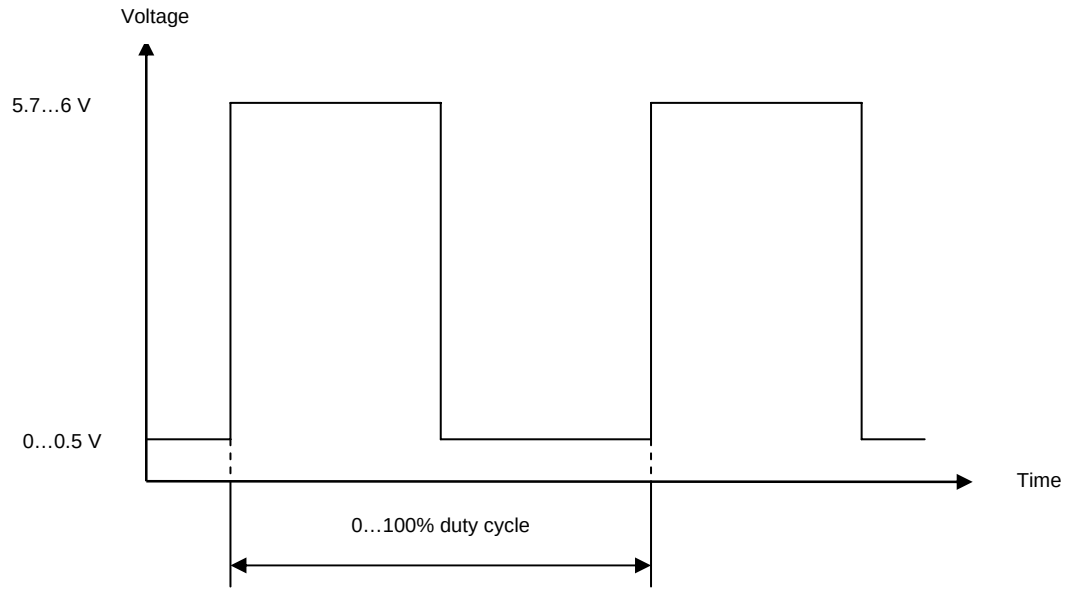
Place the resistor at the governor/AVR end to avoid the signal being disturbed by noise.

The outputs from the controller unit are active outputs, and no external supply can be connected.

Duty cycle

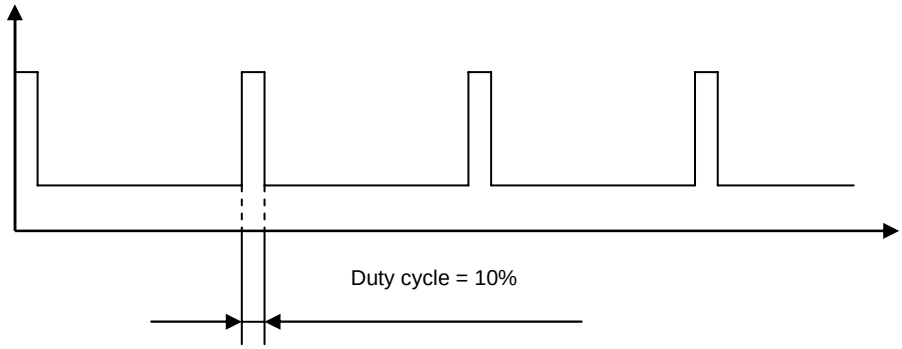
The PWM signal has a frequency of 500Hz +/- 50Hz. The resolution of the duty cycle is 12 bits, which gives output 4095 different levels. The output is an open collector output with a 1k-ohm pull-up resistor.

The low level of the signal is between 0 and 0.05 volt, whereas the high level is between 5.7 and 6 volt.

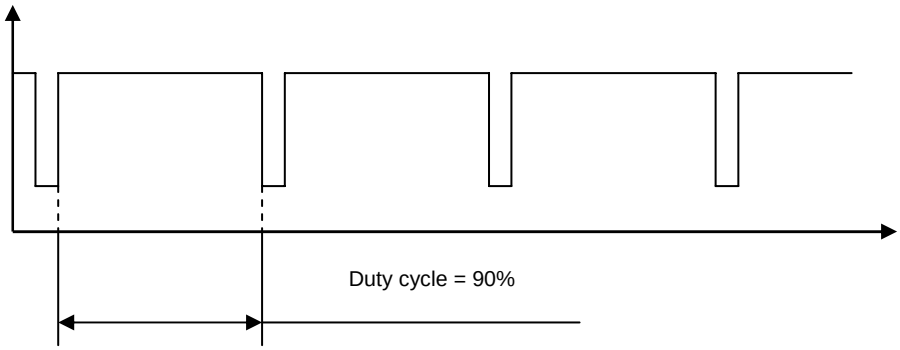


Principle of duty cycles

The drawing below shows an example of a 10% duty cycle:



The drawing below shows an example of a 90% duty cycle:



5. Parameter list

The setup of parameters is done via the display or the PC utility software (USW).

For further information about the structure of the parameter descriptions, please see the Designer's Reference Handbook.

2260 Governor/AVR setup

No.	Setting		Min. setting	Max. setting	Factory setting
2261	Type	Type	GOV = Ana AVR = Bin	GOV = Bin AVR = Ana	GOV = Ana AVR = Bin

Bin means binary (= relay).
Ana means analogue (= +/-20mA).

If PWM control is enabled in menu 2274, then only AVR selection can be made.

AVR control is option D1.

2270 Pulse width modulation

No.	Setting		Min. setting	Max. setting	Factory setting
2271	PWM control	Minimum value	0.0%	50.0%	10.0%
2272	PWM control	Init. value	0.0%	100.0%	35.0%
2273	PWM control	Maximum value	50.0%	100.0%	90.0%
2274	PWM control	Enable	OFF	ON	OFF
2275	PWM control	Droop duty cycle	0.0%	100.0%	50.0%

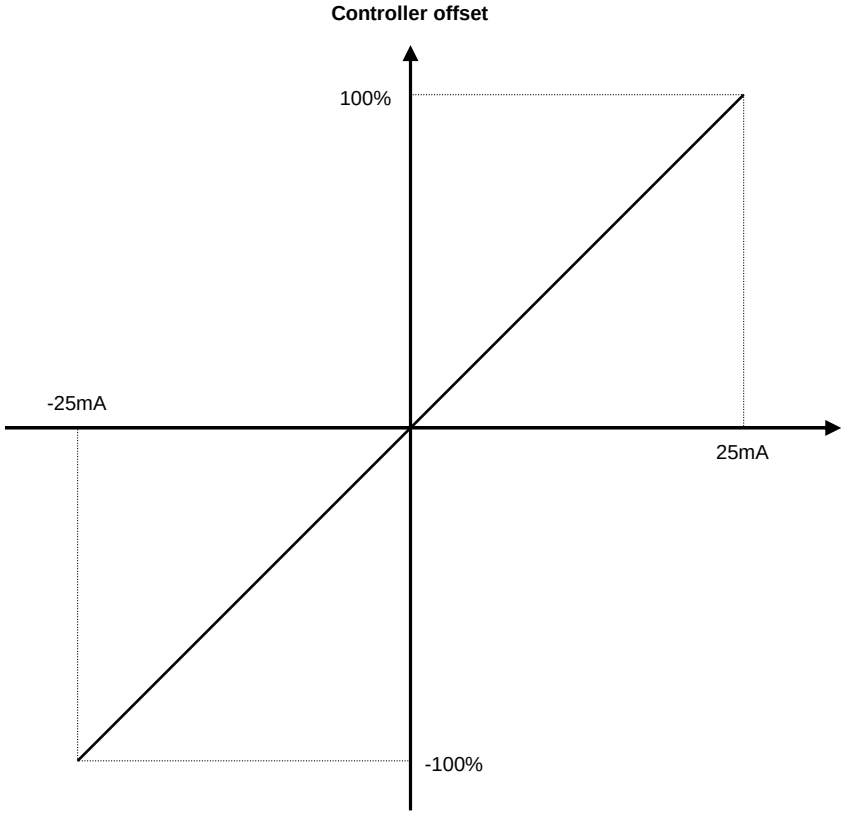
These are the settings for the PWM output:

No.	Setting	Comment
2271	Minimum value	This is the minimum output level of the PWM signal
2272	Init. Value	This is the initial output level, which is the level where the PWM signal will start the regulation. The init. value refers to the range obtained by maximum value – minimum value. That means that the above factory settings actually give a resulting init. value of ((90.0-10.0)*35.0)/100 = 28.0% PWM output.
2273	Maximum value	This is the maximum output level of the PWM signal
2274	Enable	Enables or disables the PWM control. If the PWM control is disabled, the menu group 2260 is displayed, and governor and AVR output must be selected
2275	Droop duty cycle	This is selection of the engine droop. The range is 2-95% equal to 10-0% droop, i.e. the signal is inversed. If the droop is not used (not connected) the result will be no droop/isochronous governor

Analogue controller offset

In addition to the controller parameters described above, the analogue offset setting can be used. The purpose is to give the analogue output an offset value when powering up the unit. Furthermore, a binary input can be used to reset the output to the offset value. The offset value must be adjusted, so the gen-set will start up at the correct speed and voltage.

Typically the speed/voltage adjustment is made on the speed governor/AVR itself.



2160 Analogue governor offset

No.	Setting		Min. setting	Max. setting	Factory setting
2161	Ana GOV offset	Offset	-100%	100%	0%

Menu 2160 analogue GOV offset only appears if option PWM control is deactivated and the analogue GOV control is selected.

2210 Analogue AVR offset

No.	Setting		Min. setting	Max. setting	Factory setting
2211	Ana AVR offset	Offset	-100%	100%	0%

Menu 2210 analogue AVR offset only appears if option D1 is chosen and analogue AVR control is selected.

After adjusting the analogue offset values, the controller unit must be reset (power off) in order to use the new adjustment.

DEIF A/S reserves the right to change any of the above