MULTI-LINE 2
DESCRIPTION OF OPTIONS



Options E and F
Analogue controller and transducer outputs

- Description of options
- Functional description

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1. Delimitation

1.1 Scope of options E and F

This description of options covers the following products:

AGC-3	SW version 3.6x.x or later
AGC-4	SW version 4.0x.x or later
PPM	SW version 3.0x.x or later
GPC/GPU Hydro	SW version 3.0x.x or later
GPU/PPU	SW version 3.0x.x or later

2. General information

2.1 Warnings, legal information and safety

2.1.1 Warnings and notes

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

Warnings

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

Notes

Notes provide general information, which will be helpful for the reader to bear in mind.

2.1.2 Legal information and disclaimer

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the engine/generator controlled by the Multi-line 2 unit, the company responsible for the installation or the operation of the set must be contacted.

The Multi-line 2 unit is not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

2.1.3 Safety issues

Installing and operating the Multi-line 2 unit may imply 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.

2.1.4 Electrostatic discharge awareness

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

2.1.5 Factory settings

The Multi-line 2 unit is delivered from factory with certain factory settings. These are based on average values and are not necessarily the correct settings for matching the engine/generator set in question. Precautions must be taken to check the settings before running the engine/generator set.

3. Description of options

3.1 ANSI numbers

Function	ANSI no.
Selectable +/-25 mA or relay output for speed control (governor)	77
Selectable +/-25 mA or relay output for voltage control (AVR)	77
PWM speed control output for CAT® engines	77
1 x 0(4)-20 mA outputs	77
2 x 0(4)-20 mA outputs	77

3.2 Option E1

Option E1 is a hardware option, and a separate PCB is installed in slot #4. The PCB will replace the standard-installed relay PCB in slot #4.

3.2.1 Terminal description

Term.	Function	Description
65	Not used	
66	+/-25 mA	Speed governor, AVR or transducer output 66
67	0	
68	Not used	
69	Not used	
70	+/-25 mA	Speed governor, AVR or transducer output 71
71	0	
72	Not used	

Transducer outputs are 0(4)-20 mA outputs.

AVR control requires option D1.

3.3 Option E2

Option E2 is a hardware option, and a separate PCB is installed in slot #4. The PCB will replace the standard-installed relay PCB in slot #4.

3.3.1 Terminal description

Term.	Function	Description
65	Not used	
66	0(4)-20 mA	Speed governor, AVR or transducer output 66
67	0	
68	Not used	
69	Not used	
70	0(4)-20 mA	Speed governor, AVR or transducer output 71
71	0	
72	Not used	

Transducer outputs are 0(4)-20 mA outputs.

AVR control requires option D1.

3.4 Option F1

Option F1 is a hardware option, and a separate PCB is installed in slot #6 in addition to the standard-installed hardware.

3.4.1 Terminal description

Term.	Function	Description
90	Not used	
91	0	Transducer output 91
92	0(4)-20 mA	
93	Not used	
94	Not used	
95	0	Transducer output 95
96	0(4)-20 mA	
97	Not used	

Transducer outputs are 0(4)-20 mA outputs.

3.5 Option EF2

Option EF2 is a hardware option, and a separate PCB is installed in the slot #4. The PCB will replace the standard-installed relay PCB in slot #4.

3.5.1 Terminal description

Term.	Function	Description
65	Not used	
66	+/-25 mA	Speed governor, AVR or transducer output 66
67	0	
68	Not used	
69	Not used	
70	0(4)-20 mA	Speed governor, AVR or transducer output 71
71	0	
72	Not used	

Transducer outputs are 0(4)-20 mA outputs.

AVR control requires option D1.

3.6 Option EF4

Option EF4 is a hardware option, and a separate PCB is installed in the slot #4. The PCB will replace the standard-installed relay PCB in slot #4.

3.6.1 Terminal description

Term.	Function	Description
65	+/-25 mA	Speed governor, AVR or transducer output 66
66	0	
67	Not used	
68	Not used	
69	Relay 69	Speed governor, AVR or configurable
70		
71	Relay 71	Speed governor, AVR or configurable
72		

Transducer outputs are 0(4)-20 mA outputs.

AVR control requires option D1.

3.7 Option EF5

Option EF5 is a hardware option, and a separate PCB is installed in slot #4. The PCB will replace the standard-installed relay PCB in slot #4. The PWM (Pulse Width Modulated) speed output is intended for Caterpillar® electronic engine control systems ADEM and PEEC.

3.7.1 Terminal description

Term.	Function	Description
65	+/- 25 mA	AVR setpoint output.
66	0	
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).

AVR control requires the D1 option.

Option EF5 is not available for GPU Hydro.

3.8 Option EF6

Option EF6 is a hardware option, and a separate PCB is installed in slot #4. The PCB will replace the standard-installed relay PCB in slot #4. The PWM (Pulse Width Modulated) speed output is intended for Caterpillar® electronic engine control systems ADEM and PEEC.

3.8.1 Terminal description

Term.	Function	Description
65	Not used	
66	Not used	
67	0	Speed governor, AVR or transducer output 68
68	+/-25 mA	
69	PWM -	PWM speed governor signal
70	PWM +	
71	0	Speed governor, AVR or transducer output 72
72	+/-25 mA	

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).

AVR control requires the D1 option.

4. Functional description

4.1 Analogue outputs

4.1.1 Outputs

The analogue outputs are active and galvanically separated. No external supply can be connected.

The current outputs can be converted to any voltage in the range inside +/-10V DC by mounting a resistor across the terminals.

Example: A 200 Ω resistor across the terminals of the +/-25 mA output 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.

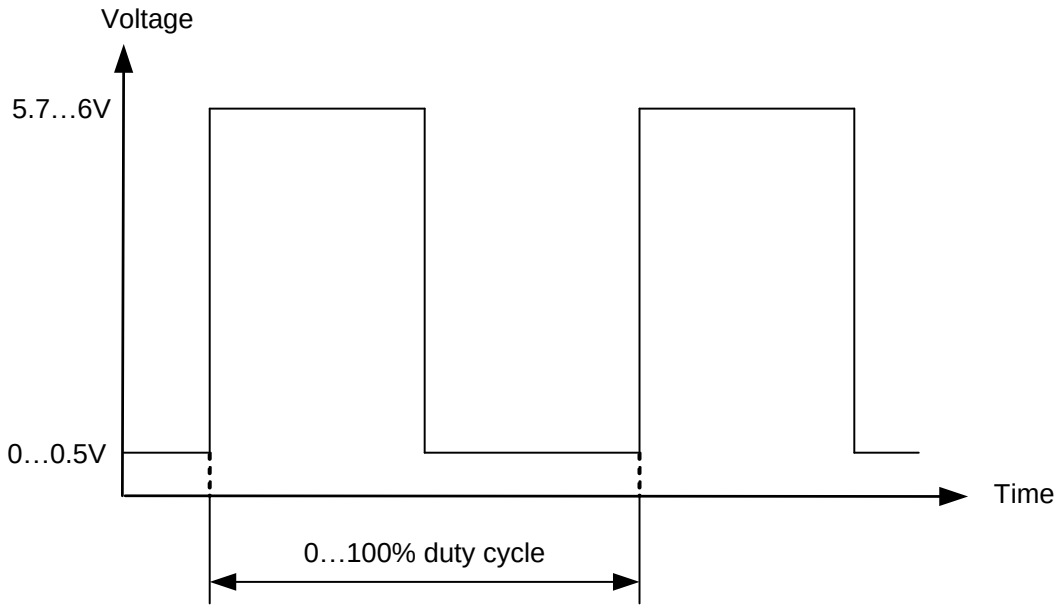
The outputs from the controller unit are active outputs, and no external supply can be connected.

4.2 Duty cycle

4.2.1 Duty cycle

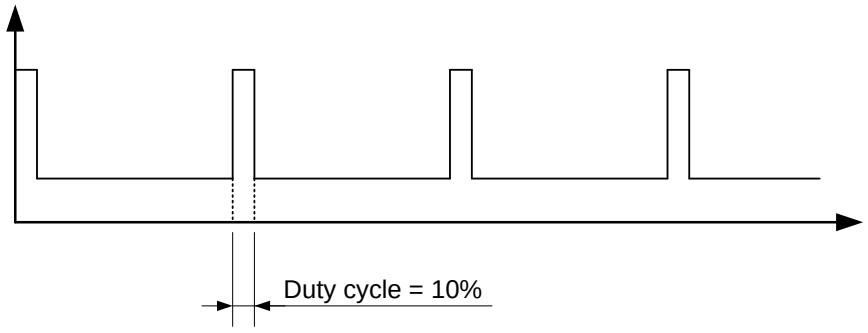
The PWM signal has a frequency of 500 Hz +/- 50 Hz. The resolution of the duty cycle is 12 bits, which gives output 4095 different levels. The output is an open collector output with a 1 k-ohm pull-up resistor.

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

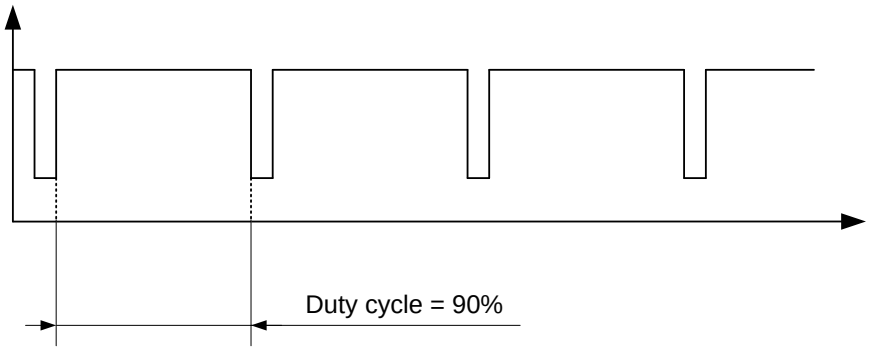


4.2.2 Principle of duty cycles

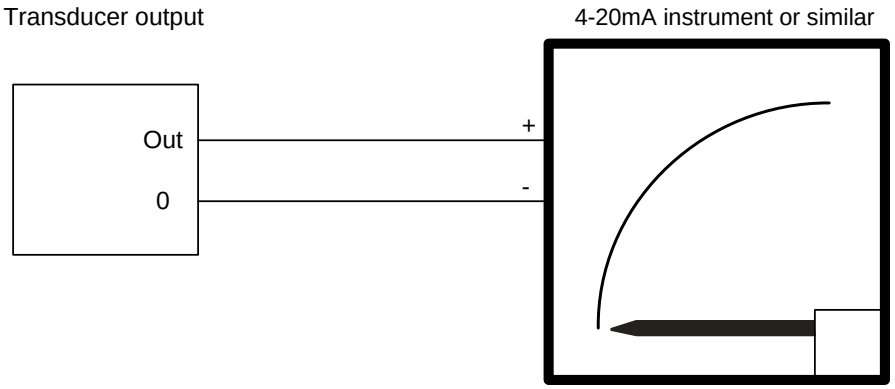
The drawing below shows an example of a 10% duty cycle:



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



When used as transducer outputs, the signal can be connected directly to 4-20 mA instruments as shown below.



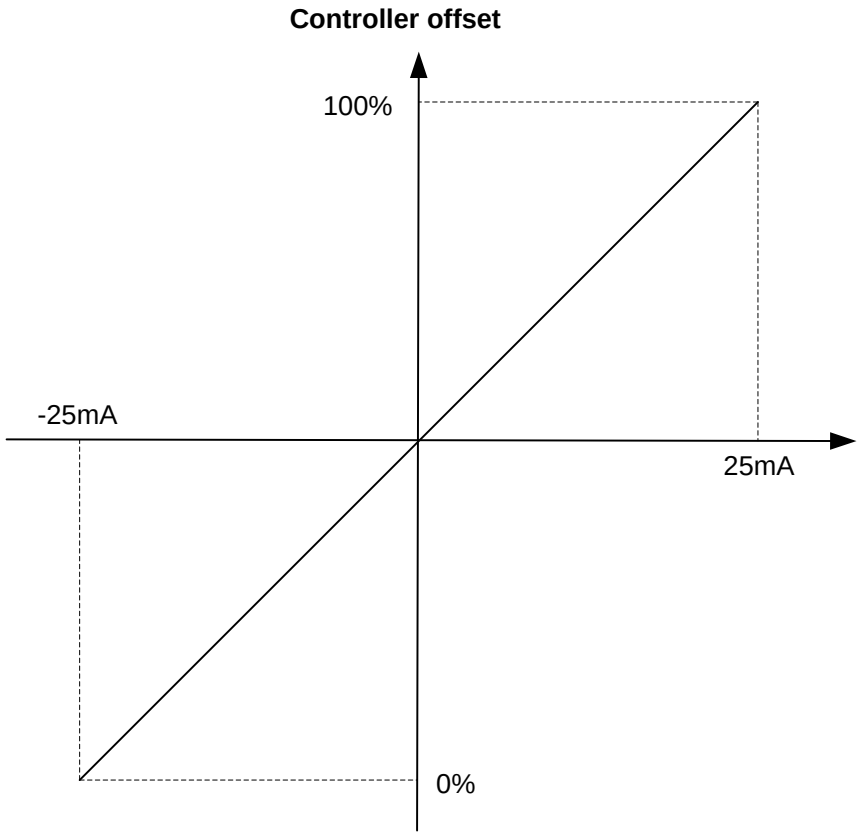
It is recommended to use instruments from the DQ series of DEIF instruments. Please refer to www.deif.com for more information.

4.3 Analogue controller offset

4.3.1 Analogue controller offset

In addition to the controller parameters, this additional setting can be used. The purpose of this setting is to give the analogue output an offset value when powering up the unit. Furthermore, a digital input can be used to reset the output to the offset value. The offset value must be adjusted so the genset will start up at the correct speed and voltage.

The following drawing is for the E1 option with the output limits set to +/-25 mA.



The offset always refers to the analogue output limits.

When the engine is stopped the controller outputs are reset to the analogue offset value.

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

Output for GOV/AVR can be inversed in parameters: 2181 + 2182.

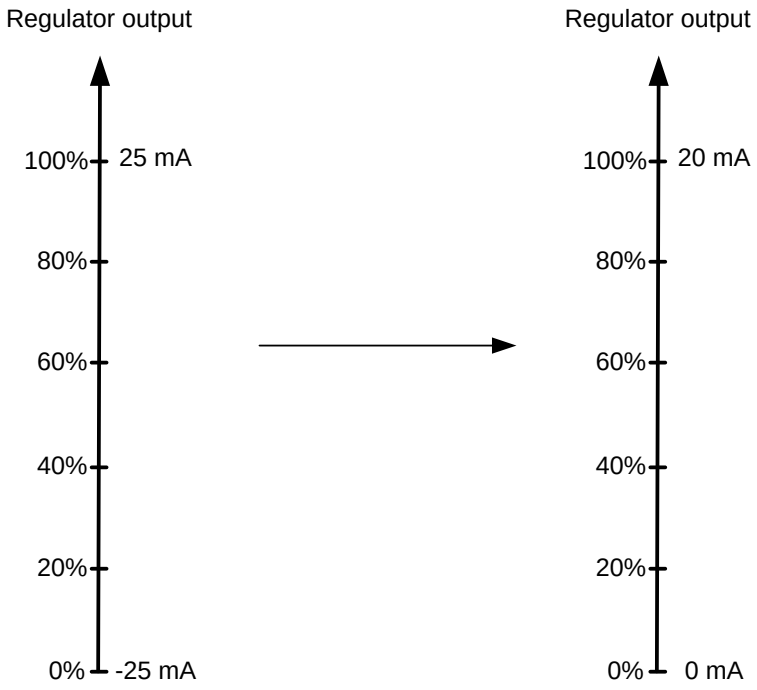
4.4 Output limits

4.4.1 Limits

If the full range of the analogue output is not needed it is possible to limit the maximum and minimum output values.

This can especially be useful when using the analogue output for governor control, since some governors only accept a specific voltage range.

In the following example, analogue output 66 with a standard output of +/- 25 mA (option E1) is limited to an output of 0-20 mA to be used for governor control.



The menus used for setting up the output limits are 5780 to 5810. The menus available are option-dependent.

5. Parameters

5.1 Further information

The options E and F relate to the parameters 5780-5990.

For further information, please see the separate parameter list for the Multi-line unit in question:

AGC-3	Document number 4189340705
AGC-4	Document number 4189340688
PPM	Document number 4189340672
GPC-3/GPU-3 Hydro	Document number 4189340580
PPU-3/GPU-3	Document number 4189340581