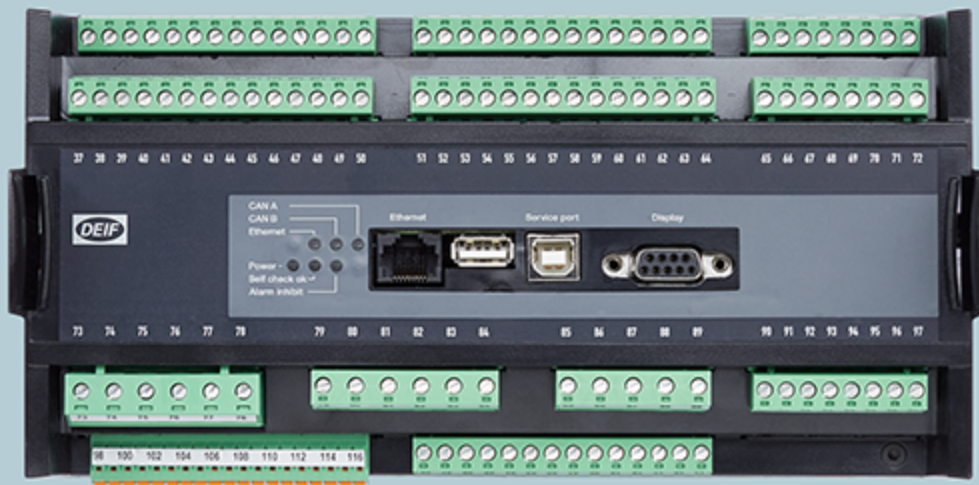




AGC-4



Options E and F Analogue controller and transducer outputs



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1. Description of options

1.1 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

1.2 Software version

This document is based on the AGC-4 software version 4.76.

1.3 Parameters

The relevant parameters are 2781, 2783, and 5690 to 5991. For more information, see the **Parameter list**.

1.4 Option E1

Option E1 is a hardware option: A PCB installed in slot #4. The option E1 PCB replaces the standard relay PCB in slot #4.

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	

1.5 Option E2

Option E2 is a hardware option: A PCB installed in slot #4. The option E2 PCB replaces the standard relay PCB in slot #4.

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	

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

1.6 Option F1

Option F1 is a hardware option: A PCB installed in slot #6, in addition to the standard hardware.

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	

1.7 Option EF2

Option EF2 is a hardware option: A PCB installed in slot #4. The option EF2 PCB replaces the standard relay PCB in slot #4.

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	

1.8 Option EF4

Option EF4 is a hardware option: A PCB installed in slot #4. The PCB replaces the standard relay PCB in slot #4.

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

Term.	Function	Description
69	Relay 69	Speed governor, AVR or configurable
70		
71	Relay 71	Speed governor, AVR or configurable
72		

1.9 Option EF5

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

Term.	Function	Description
65	+/- 25 mA	AVR set point 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.	



INFO

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).

1.10 Option EF6

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

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	



INFO

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).

1.11 Warnings, legal information and safety

1.11.1 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



DANGER!

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

Notes



INFO

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

1.11.2 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.



INFO

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.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

1.11.3 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.



DANGER!

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

1.11.4 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.

1.11.5 Factory settings

The Multi-line 2 unit is delivered from the factory with default settings. These are not necessarily correct for the engine/generator set. Check all the settings before running the engine/generator set.

2. Function description

2.1 Analogue outputs

2.1.1 Overview

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 +/-10 V DC by mounting a resistor across the terminals.



Resistor example

A 400 Ω resistor across the terminals of the +/-25 mA output supplies +/-10 V DC.



INFO

The choice of resistor depends on the governor. Place the resistor at the governor/AVR end to avoid the signal being disturbed by noise. For more information, see **Interfacing DEIF Equipment with Governors and AVRs** and **General Guidelines for Commissioning**.

2.1.2 Using an analogue output to regulate a GOV/AVR

You can use an analogue output to regulate a governor or AVR.



INFO

AVR regulation requires option D1.



Governor analogue output setup example

To set up transducer 66 of option E1 to transmit the governor set point as a 0 to 20 mA signal:

In *Reg. output GOV*, menu 2781, for *Set point*, select **Analogue**.

In *Governor output*, menu 5981, for *Transducer A*, select **Transducer 66**.

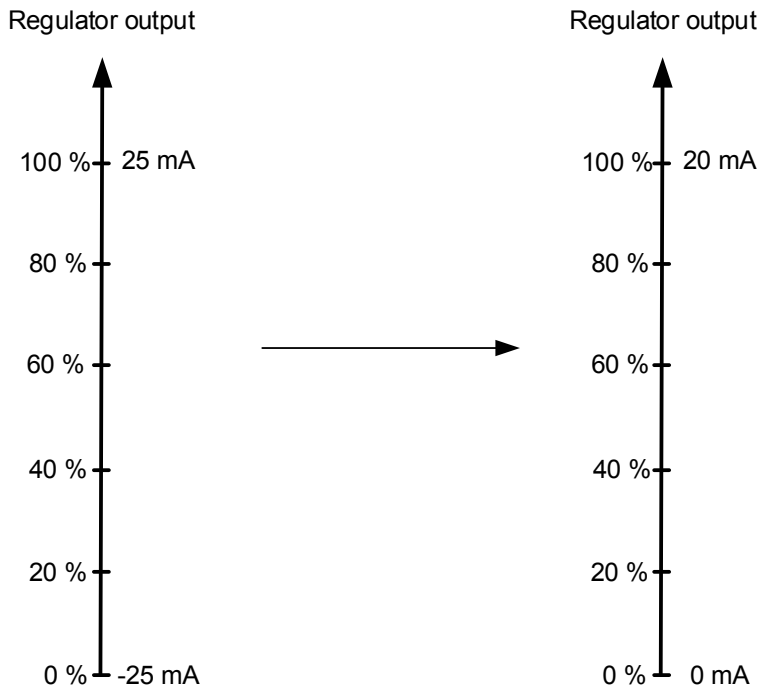
In *AOUT 66 Limits*, menu 5781, select the minimum limit, that is, **0 mA**.

In *AOUT 66 Limits*, menu 5782, select the maximum limit, that is, **20 mA**.

Output limits

You can limit the analogue output's maximum and minimum output if the full range is not needed. 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 to 20 mA to be used for governor control.



INFO

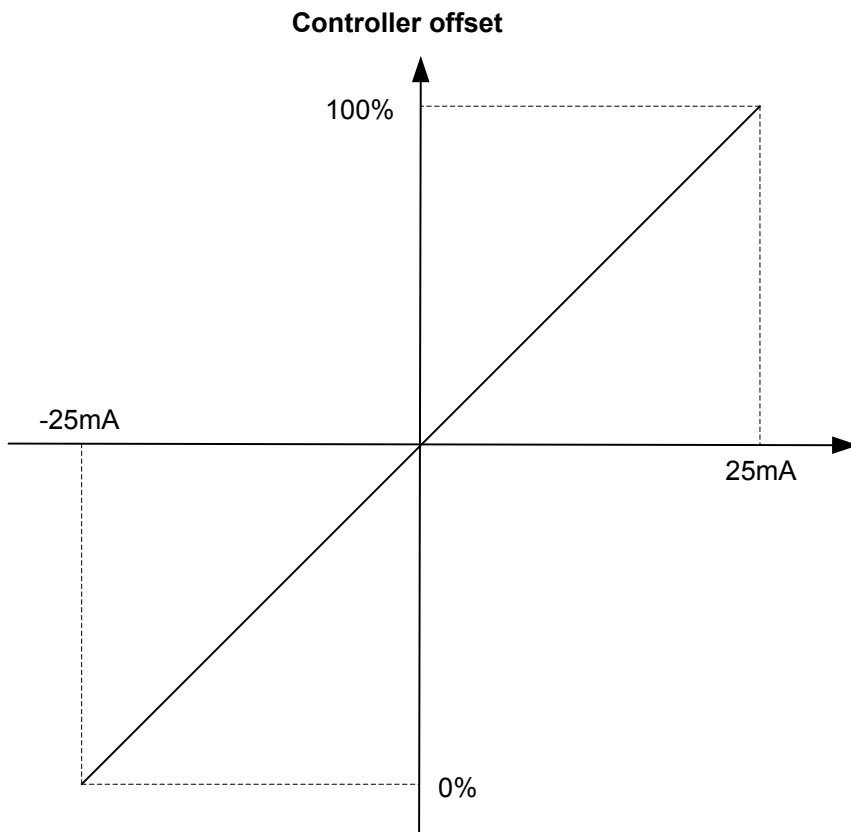
The menus used for setting up the regulation output limits are 5780 to 5810. The menus available are option-dependent.

2.1.3 GOV/AVR 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 offset always refers to the analogue output limits. When the engine is stopped the controller outputs are reset to the analogue offset value. The initial speed/voltage adjustment is typically made on the speed governor/AVR itself. The output for the GOV/AVR can be inverted by selecting *Inverse proportional* in parameters 2781/2783.

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



2.1.4 Using an analogue output as a transducer

You can use an analogue output as a transducer to transmit the controller's set point, AC measurements or power management information to an external system.

You can select the output range for the transducer. That is, 0-20mA, 4-20mA, 0-10V, or -10-0-10V.

You can also select the output range for the value. For example, for the genset apparent power (menu 5850), select the minimum in 5855, and select the maximum in 5844.

Table 2.1 Parameters for using an analogue output as a transducer

Menu	Value	Details
5690	P ref	The controller's power set point. For example, for MWM TEM controllers.
5700	Q ref	The controller's reactive power set point
5710	cos phi ref	The controller's cos phi set point
5820	P1*	Genset active power
5830	P2*	Genset active power
5840	P3*	Genset active power
5850	S	Genset apparent power
5860	Q	Genset reactive power
5870	cos phi	cos phi of the power from the genset
5880	f	Genset frequency
5890	U	Genset L1-L2 voltage

Menu	Value	Details
5900	I	Genset L1 current
5910	U	Busbar L1-L2 voltage
5920	f	Busbar frequency
5930	Input 102	The value received by analogue input 102.
5940	Input 105	The value received by analogue input 105.
5950	Input 108	The value received by analogue input 108.
5960	P total consumed	The total power produced in the power management system.
5970	P total available	The additional power that the power management system could supply without starting more gensets.

*Note: P1, P2 and P3 are identical. For example, P1 can be used as an input to a switchboard instrument, while P2 can be an input to a PLC.



Available power transducer setup example

To set up transducer 66 to transmit the available power (0 to 10 MW) as a 4 to 20 mA signal:

In menu 5973, for *Set point*, select **4-20mA**. For *Transducer A*, select **Transducer 66**.

In menu 5975, select the minimum value (this corresponds to 4 mA), that is, **0 kW**.

In menu 5974, select the maximum value (this corresponds to 20 mA), that is, **10000 kW**.



INFO

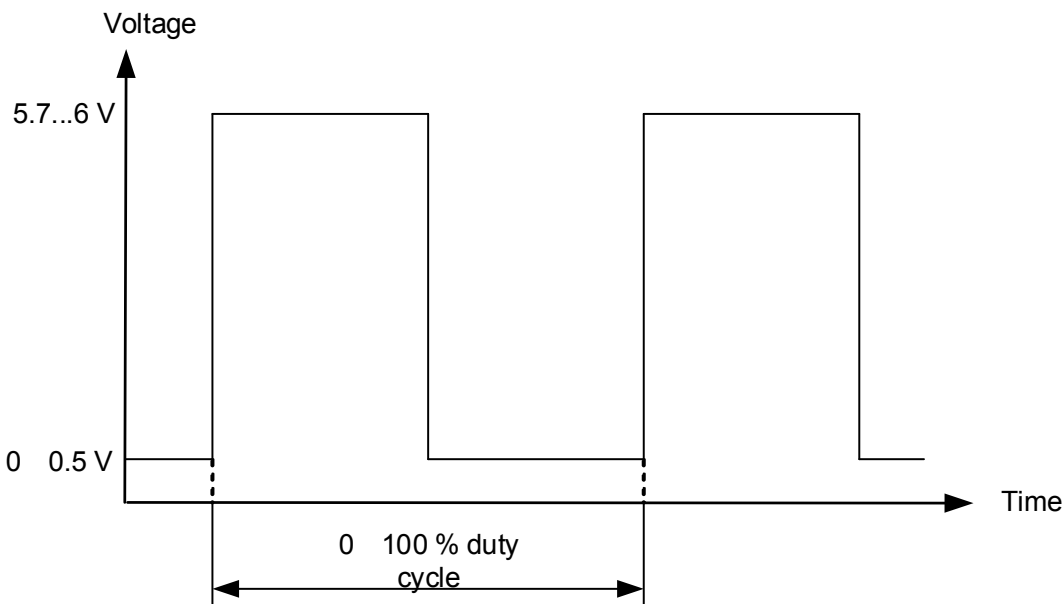
These values are also available through Modbus.

2.2 PWM duty cycle

2.2.1 Duty cycle

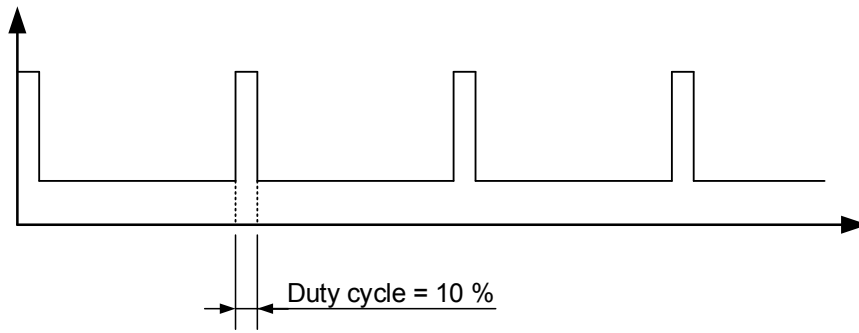
The PWM signal has a frequency of 500 Hz +/- 50 Hz. The resolution of the duty cycle is 12 bits, which gives output 4095 different levels. The output is an open collector output with a 1 k-ohm pull-up resistor.

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

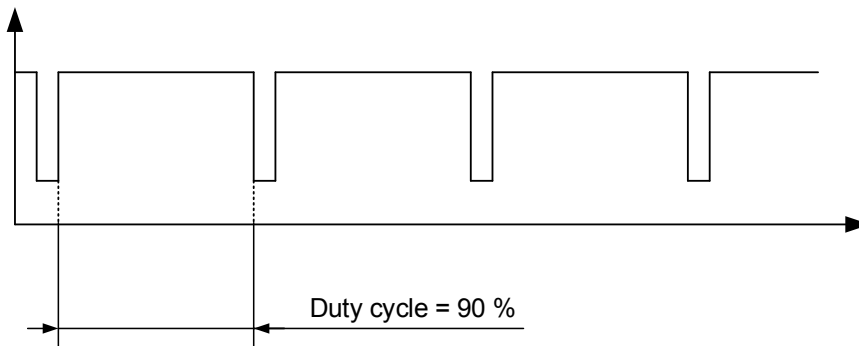


2.2.2 Principle of duty cycles

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



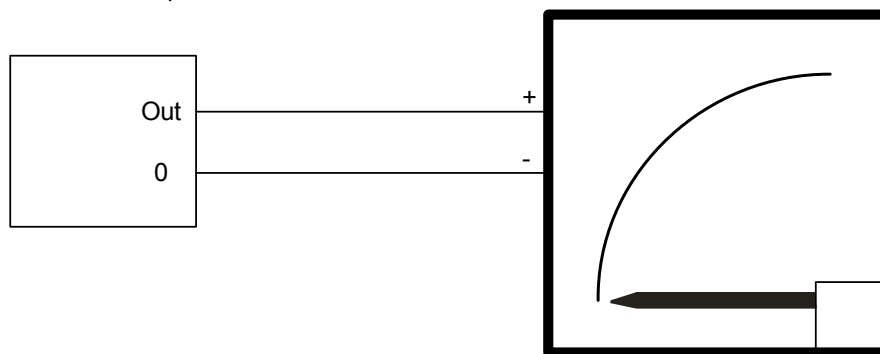
The drawing below shows an example of a 90% duty cycle:



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

Transducer output

4-20 mA instrument or similar



INFO

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