



DEEP SEA ELECTRONICS PLC

Guide to Synchronising and Load Sharing

PART 2 – AVR & GOVERNOR INTERFACING

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TABLE OF CONTENTS

Section	Page
1 INTRODUCTION	5
2 INTERFACING TO GOVERNORS / ENGINE ECU'S	6
2.1 INTERFACING WITH 55XX CONTROLLERS	6
2.1.1 SPECIFICATIONS	6
2.1.2 CONNECTION DETAILS	6
2.1.3 ANALOGUE GOVERNOR OUTPUT SETTINGS	7
LOCATION OF SW1 AND SW2 SELECTORS.....	8
2.2 INTERFACING WITH 55X CONTROLLERS	9
2.2.1 SPECIFICATIONS	9
2.2.2 CASE DIMENSIONS.....	9
2.2.3 CONNECTION DETAILS	10
2.2.4 P120 SELECTOR SWITCH SETTINGS	11
2.2.5 LOCATION OF SW1 AND SW2 SELECTORS.....	12
2.3 DETERMINING CONNECTIONS AND SETTINGS FOR GOVERNORS NOT LISTED IN THIS PUBLICATION.....	13
2.4 AMBAC	14
2.4.1 EC5000* / EC5100* / EC5110*	14
2.4.2 CW673C	14
2.5 BARBER COLMAN	15
2.5.1 DYN1 10502, 10503, 10504, 10506.....	15
2.5.2 DYN1 10693, 10694, 10695, 10752, 10753, 10754, 10756	16
2.5.3 DYN1 10794*	17
2.5.4 DYN1 10871	18
2.5.5 DPG 2201*	19
2.5.6 DPG 2401.....	19
2.5.7 DYNA 8000*	20
2.6 CATERPILLAR	21
2.6.1 ADEM*	21
2.7 CUMMINS.....	22
2.7.1 EFC*	22
2.7.2 QST 30*	22
2.7.3 QSX 15	22
2.7.4 QSK 45/60	22
2.8 DETROIT DIESEL.....	23
2.8.1 DDEC III	23
2.8.2 DDEC IV*	24
2.9 DEUTZ.....	25
2.9.1 EMR 2 ELECTRONIC ENGINE GOVERNOR*	25
2.10 G.A.C. (GOVERNORS AMERICA CORP.).....	26
2.10.1 5100 - 5500 SERIES*	26
2.11 HEINZMANN.....	27
2.11.1 E6, E6V, E10, E16, E30	27
2.11.2 KG SERIES (6-04 TO 10-04)*	28
2.11.3 PANDAROS*	29
2.12 JOHN DEERE.....	30
2.12.1 JDEC	30
2.13 MITSUBISHI	31
2.13.1 XB400*	31
2.14 MTU	32
2.14.1 MDEC 2000* / 4000*	32
2.15 PERKINS	34
2.15.1 1300 SERIES ENGINE CONTROLLER*	34
2.15.2 2800 SERIES ENGINE CONTROLLER*	34
2.16 SCANIA	35
2.16.1 S6 ENGINE CONTROLLER*	35

2.17	VOLVO	36
2.17.1	873979*	36
2.17.2	EDC III*	36
2.17.3	EMS2*	36
2.18	WOODWARD	37
2.18.1	721 DIGITAL SPEED CONTROL	37
2.18.2	2301A SPEED CONTROL*	38
2.18.3	EPG (ELECTRICALLY POWERED GOVERNORS)*	38
2.18.4	PROACT I / II	39
3	INTERFACING TO AUTOMATIC VOLTAGE REGULATORS	40
3.1	INTERFACING WITH 55XX CONTROLLERS	40
3.1.1	SPECIFICATIONS	40
3.1.2	CONNECTION DETAILS	40
3.1.3	ANALOGUE AVR OUTPUT SETTING	42
3.1.4	SW1 / SW2 SOFTWARE SELECTOR SETTINGS.	42
3.2	INTERFACING WITH 55X CONTROLLERS	43
3.2.1	SPECIFICATIONS	43
3.2.2	CASE DIMENSIONS	43
3.2.3	CONNECTION DETAILS	44
3.2.4	P121 SELECTOR SWITCH SETTINGS	46
3.2.5	LOCATION OF SW1 AND SW2 SELECTORS	47
3.3	DETERMINING CONNECTIONS AND SETTINGS FOR AVRS NOT LISTED IN THIS PUBLICATION	48
3.4	BASLER	49
3.4.1	AVC 63-12	49
3.4.2	DECS 15, DECS 100	49
3.4.3	DECS 200	50
3.4.4	SSR	50
3.5	CATERPILLAR	51
3.5.1	CDVR	51
3.5.2	VR6	52
3.6	COSIMAT	53
3.6.1	COSIMAT N	53
3.7	GRAMAYER	54
3.7.1	GRT7-TH*	54
3.8	KATO	56
3.8.1	K65-12B, K125-10B	56
3.9	LEROY SOMER	57
3.9.1	R230 / R438* / R448 / R449	57
3.9.2	R610 3F	58
3.10	MARATHON	59
3.10.1	MAGNAMAX DVR2000 / DVR2000C	59
3.10.2	DVR2000E*	59
3.11	MARELLIMOTOR S.P.A.	60
3.11.1	M40FA610A	60
3.12	MECC ALTE S.P.A.	61
3.12.1	S.R.7*	61
3.12.2	U.V.R.*	62
3.13	NEWAGE INTERNATIONAL	63
3.13.1	MA325, MA327	63
3.13.2	MX321*	63
3.13.3	MX341*	64
3.13.4	SX421, SX440*, SX465-2	64
3.13.5	SX460	64
3.14	WEG	65
3.14.1	GRT7-TH*	65
4	APPENDIX	66

1 INTRODUCTION

This document (Part 2 of the DSE Guide to Synchronising and Load Sharing) is intended to provide a guide to panel designers for interfacing the 550 / 555 / 5510 / 5520 Synchronising / Load Sharing Controllers to many of the most popular engine speed governors and automatic voltage regulators.

Part 1 of this manual consists of the Guide to Synchronising and Load Sharing and how to use / configure the 5xxx controller for use in synchronising and load sharing systems.

Equipment designated with the asterisk (*) have been tested and witnessed working by DSE personnel. However, the diagrams included within this manual are intended as a guide only, Engineers must be familiar with the AVR / Governor being used, and should always refer to the respective manufacturers instructions.

If your AVR / Governor is not covered within this manual, please contact our technical support department for advice using the contact details below.

 **NOTE:** - Some of the examples contained within this manual refer to engine connectors and governor/ECU functions that may be optional. Ensure you check with your engine/governor supply that the terminals discussed here are included with your purchase. This may sometimes incur additional cost to have the function enabled or fitted to the engine/governor/ECU

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2 INTERFACING TO GOVERNORS / ENGINE ECU'S

This section details the interface connections between the 55x and 55xx controllers and the most popular engine speed governors used with diesel generating sets.

If your particular type of Governor is not covered within this section, you are referred to the section entitled *Determining connections and settings for governors/AVRs not listed in this publication* elsewhere in this document.

2.1 INTERFACING WITH 55XX CONTROLLERS

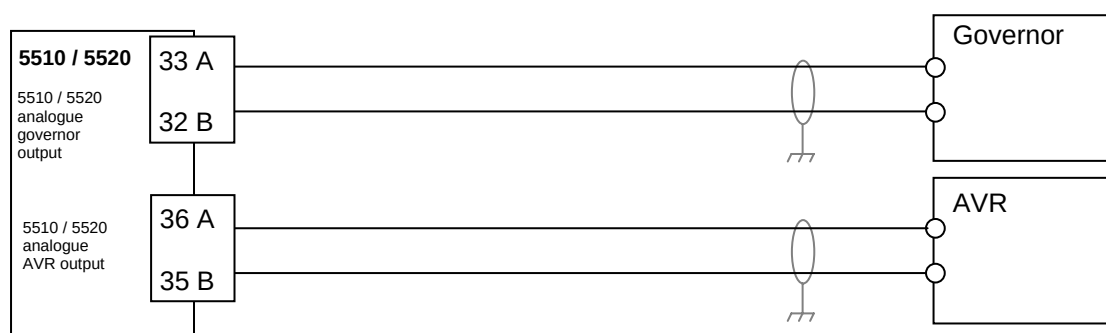
The analogue governor output provides an isolated, adjustable DC voltage level to connect into the control inputs of many governors. This replaces the manually operated or motorised potentiometers used in many synchronising and load sharing applications. The output is also suitable for connection to the load sharing inputs of many popular engine speed governors.

This enables the 5510 / 5520 to adjust the speed of the engine to match the mains / bus and hence get the supplies into synchronism and is especially suited for use in active power sharing systems.

2.1.1 SPECIFICATIONS

Item	Value
Output type	Optically isolated DC voltage level
Minimum output load	1000Ω

2.1.2 CONNECTION DETAILS



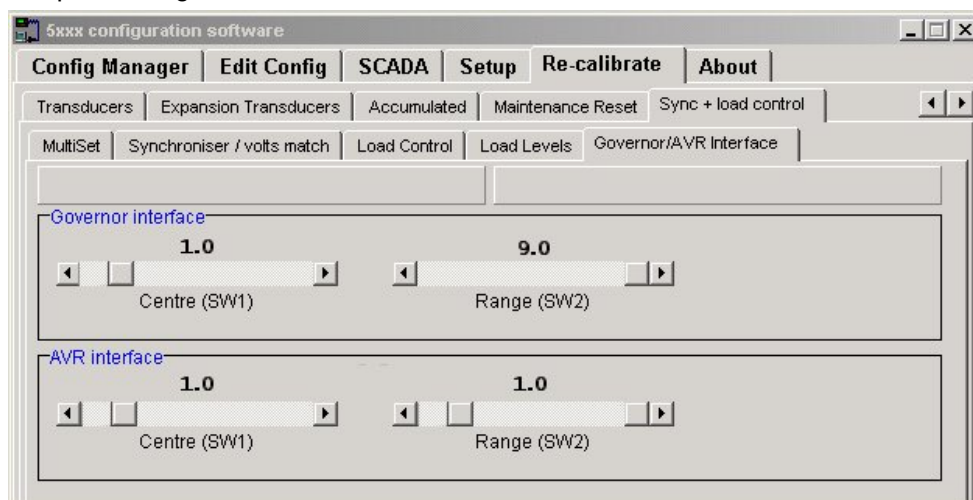
NOTE: - Further details on connections to various governors can be found elsewhere in this manual.

NOTE: - For details of the analogue AVR output see the relevant section elsewhere in this manual.

NOTE: - The length of cable between the 5510 / 5520 and the governor should be kept as short as possible. Foil screened cable is recommended for this purpose to ensure integrity of the control signal.

2.1.3 ANALOGUE GOVERNOR OUTPUT SETTINGS

To enable the analogue Governor output to interface with as many different types of governor as possible, settings for voltage range and nominal voltage are adjustable using the 5xxx for Windows™ configuration software. These allow the user to configure the output of the module to match the input of the governor.



The SW1 software selector sets the 'centre' point of the interface module's output. For example: if the output range required is 1V to 3V, with the 'centre' point being at 2V, then the position of the SW1 selector would be 4.0, giving a voltage offset of 2V.

The SW2 software selector sets the voltage output range of the interface module's output. For example: if the output range required is 1V to 3V, then the position of the SW2 selector would be 1.0, giving a voltage range of $\pm 1V$ from the 'centre' point of 2V

For reference purposes, the software settings perform the following functions:

SW1 setting	'centre' voltage of governor output
0	0V
1	0.5V
2	1.0V
3	1.5V
4	2.0V
5	2.5V
6	3.0V
7	3.5V
8	4.0V
9	4.5V

SW2 setting	Voltage range of governor output
0	$\pm 0.5V$
1	$\pm 1.0V$
2	$\pm 1.5V$
3	$\pm 2.0V$
4	$\pm 2.5V$
5	$\pm 3.0V$
6	$\pm 3.5V$
7	$\pm 4.0V$
8	$\pm 4.5V$
9	$\pm 5.0V$

Typical wiring diagrams and SW1/SW2 selector settings for many of the most popular governors are included within the DSE guide to synchronising and Load Sharing (Part2).

NOTE: - If the governor you are using is not listed within this manual, it may still be possible to interface to it using the analogue governor output. Contact your governor manufacturer to check if the product has a DC voltage input for connection to a synchroniser / load sharer, and if so, what the 'voltage range' and 'centre voltage' is. You can then use the tables above to determine settings for SW1 and SW2. Analogue governor output terminal A is the negative output terminal and B is the positive output terminal (providing governor output reversed is not selected in the 55xx controller's configuration). If the 'centre voltage' and 'voltage range' are not available from the governor manufacturer, providing the input is compatible with a DC voltage signal, it still may be possible to interface to it using the 5510/5520 modules. Contact our Technical Support Department for advice.

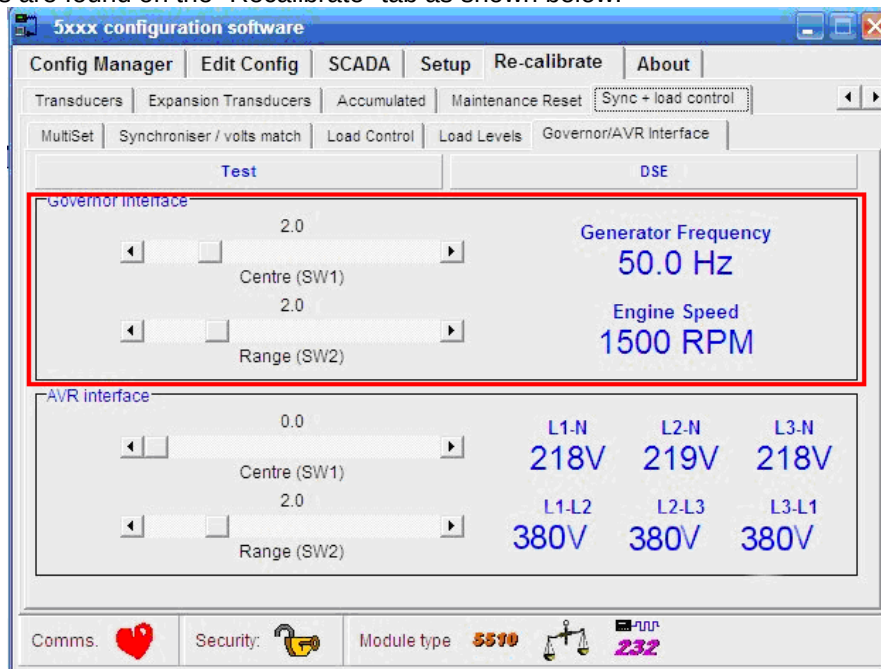
5510 / 5520 controllers contain an analogue output to interface to the governor / ECU. This output is PC configurable using the 5xxx configuration software to configure the centre voltage and voltage range to suit the governor / ECU in use.

Additionally, the 5510/5520 controller will send speed control signals via the electronic engine data link when used in conjunction with compatible engines.

LOCATION OF SW1 AND SW2 SELECTORS

Access to the software selectors is gained by using the 5xxx configuration software in conjunction with the P810 interface cable.

The settings are found on the “Recalibrate” tab as shown below:



Throughout this manual, SW1 and SW2 in the connection diagrams refer to these software “sliders”.

2.2 INTERFACING WITH 55X CONTROLLERS

550 / 555 / 557 controllers require model P120 to interface between the controller and the governor / ECU. This interface has two selector switches to configure the centre voltage and voltage range to suit the governor / ECU in use.

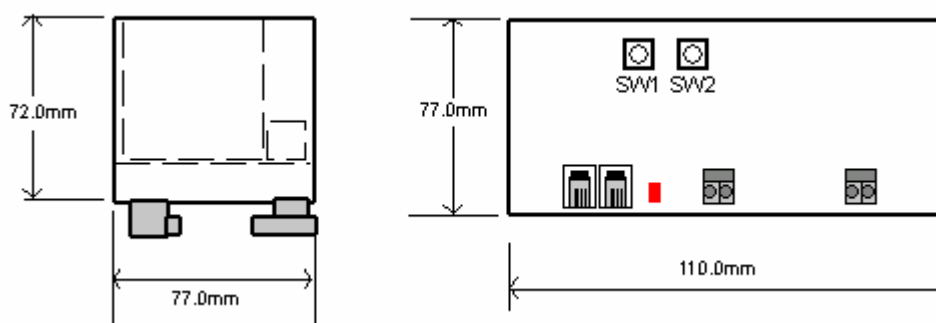
NOTE:- The P120 device is **NOT** required for 5510/5520 controllers. See section entitled “*5510/5520 analogue governor output*”.
The P120 analogue governor interface module is ONLY used to interface the 550/555/557 controllers with supported governors

Description	Photograph
The P120 analogue governor interface module provides an isolated, adjustable DC voltage level to connect into the control inputs of many governors. This replaces the manually operated or motorised potentiometers used in many synchronising and load sharing applications. The module is also suitable for connection to the load sharing inputs of many popular engine speed governors. The P120 interface is controlled directly by the 55x controller via its P120/P121 analogue expansion port. This enables the 55x to adjust the speed of the engine to match the mains / bus and hence get the supplies into synchronism. The P120 module is especially suited for use in active power sharing systems.	

2.2.1 SPECIFICATIONS

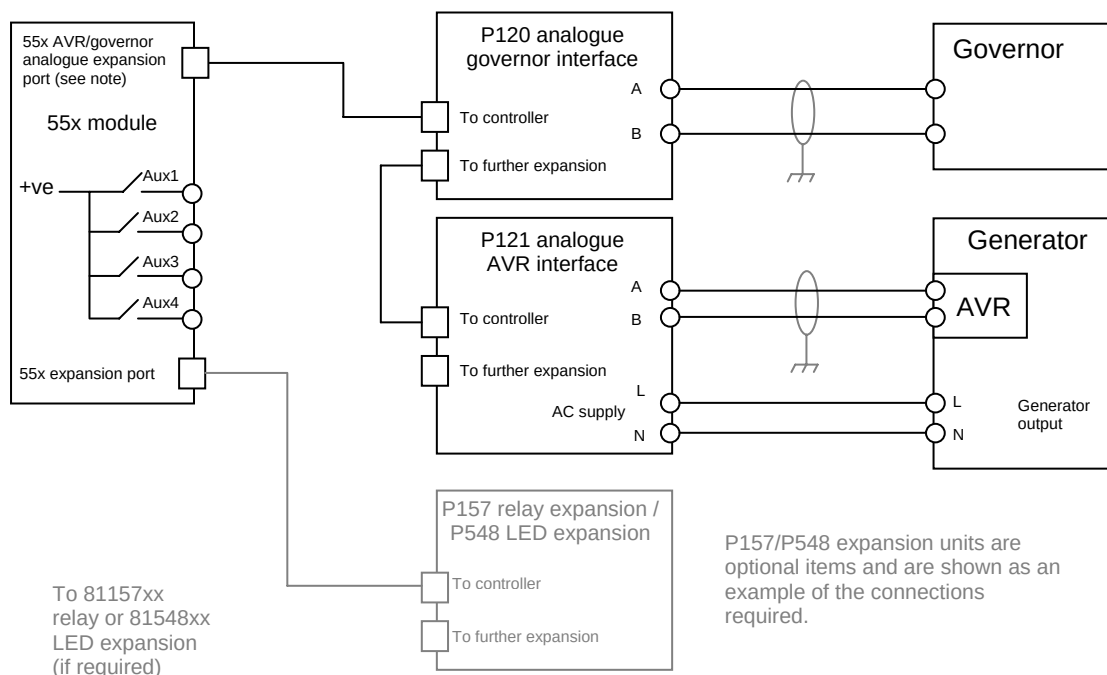
Item	Value
DC input Voltage range	8V – 35V DC continuous. Reverse polarity protected
Max operating current	75mA at 12V, 45mA at 24V.
Output type	Optically isolated DC voltage level
Minimum output load	1000Ω
Operating temperature range	-30°C to +70°C
Indications	Combined DC power on / Link lost LED
Fixing	TS32 32mm top hat din rail fixing (din rail not supplied)
IP protection	IP30
Appropriate standards	BS EN 60950, BS EN 50081-2, BS EN 50082-2

2.2.2 CASE DIMENSIONS



2.2.3 CONNECTION DETAILS

Connection to the controller is made by connecting the data cable supplied with the interface module to the P120/P121 analogue expansion socket of 55x load sharing enabled controllers. Where more than one analogue expansion module is required in the system, the modules can be 'daisy-chained' by connecting the "To further expansion" socket of one expansion module to the "To controller" socket of another, as shown below. The order of the modules in the 'daisy chain' is not important.



NOTE: - The P120 analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P120 interface modules. Where a different method of interface to the governor is used, load sharing will not be possible.

NOTE: - As the P120 module provides a DC voltage level to the governor, it is important that the DC supply to the module is the same supply as provided to the governor. It is equally important that the DC supply cable length between the governor and the P120 module is kept to an absolute minimum. It is recommended that where possible, the P120 module be fitted in close proximity to the governor control unit to facilitate this requirement.

NOTE: - The length of cable between the P120 interface unit and the governor should be kept as short as possible. Foil screened cable is recommended for this purpose to ensure integrity of the control signal.

NOTE: - The maximum total length of the cable between the module, P120 and P121 is 100 meters.

2.2.4 P120 SELECTOR SWITCH SETTINGS

To enable the P120 analogue Governor interface modules to interface with as many different types of governor as possible, rotary selectors for voltage range and nominal voltage are fitted. These allow the user to configure the output of the module to match the input of the governor.

The SW1 selector sets the 'centre' point of the interface module's output. For example: if the output range required is 1V to 3V, with the 'centre' point being at 2V, then the position of the SW1 selector would be 4, giving a voltage offset of 2V.

The SW2 selector sets the voltage output range of the interface module's output. For example: if the output range required is 1V to 3V, then the position of the SW2 selector would be 1, giving a voltage range of $\pm 1V$ from the 'centre' point of 2V

For reference purposes, the switch positions perform the following functions:

SW1 setting	'centre' voltage of P120
0	0V
1	0.5V
2	1.0V
3	1.5V
4	2.0V
5	2.5V
6	3.0V
7	3.5V
8	4.0V
9	4.5V

SW2 setting	Voltage range of P120
0	$\pm 0.5V$
1	$\pm 1.0V$
2	$\pm 1.5V$
3	$\pm 2.0V$
4	$\pm 2.5V$
5	$\pm 3.0V$
6	$\pm 3.5V$
7	$\pm 4.0V$
8	$\pm 4.5V$
9	$\pm 5.0V$

Typical wiring diagrams for many of the most popular governors are included within this manual (See sections entitled Interfacing to Governors).

Where these diagrams include the P120 interface module, the switch positions required for both SW1 and SW2 are given.

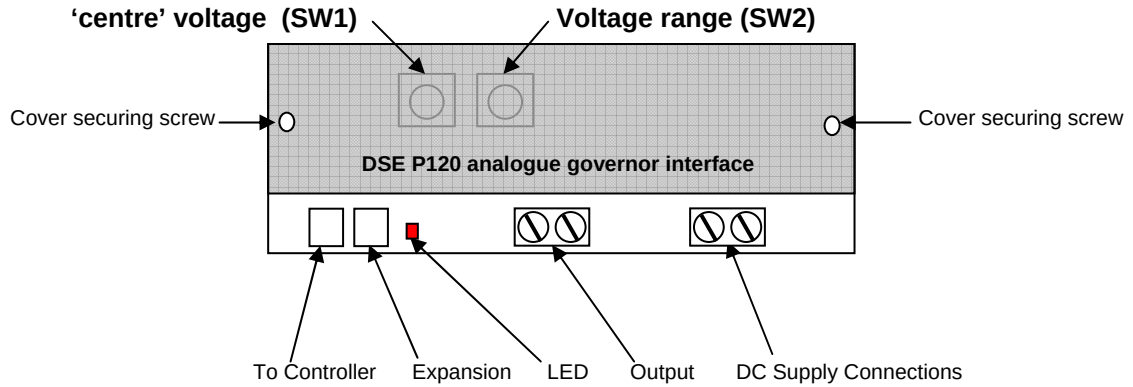
NOTE: - If the governor you are using is not listed within this manual, it may still be possible to interface to it using the P120 module. Contact your governor manufacturer to check if the product has a DC voltage input for connection to a synchroniser / load sharer, and if so, what the 'voltage range' and 'centre voltage' is. You can then use the tables above to determine settings for SW1 and SW2. P120 terminal A is the negative output terminal and B is the positive output terminal (providing governor output reversed is not selected in the 55x controller's configuration).

If the 'centre voltage' and 'voltage range' are not available from the governor manufacturer, providing the input is compatible with a DC voltage signal, it still may be possible to interface to it using the P120 modules. Contact our Technical Support Department for advice.

If the governor is not fitted with a DC voltage input for connection to synchroniser/load share modules, then a different interface method will be required. See section entitled Interfacing to governors.

2.2.5 LOCATION OF SW1 AND SW2 SELECTORS

Access to the selectors is gained by removing power to the interface module, then removing the two screws that are used to secure the transparent cover. The selectors are positioned as shown below:

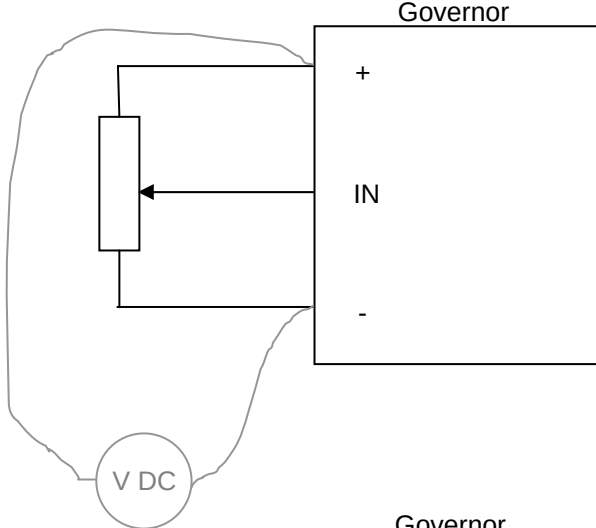


Throughout this manual, SW1 and SW2 in the connection diagrams refer to these switches.

2.3 DETERMINING CONNECTIONS AND SETTINGS FOR GOVERNORS NOT LISTED IN THIS PUBLICATION

The following guide is intended to assist the user to determine where to connect to governors not listed in this document.

Additionally it will assist you to find the correct settings for SW1 (centre) and SW2 (range).

This diagram shows how the remote adjust potentiometer is usually connected to the governor. The potentiometer adjusts the voltage into the IN terminal between the voltages supplied at '-' and '+'.


To find the 'centre' and 'range' voltages accepted by the device's input, measure the DC voltage of terminal '+' in relation to terminal '-' as shown.

Example. You measure 4V from '-' to '+'. Halving this voltage gives the centre voltage (2V).

The range voltage setting will have a maximum value of 2V above or below the centre voltage).

To determine the settings of SW1 and SW2, refer to the tables below.

The DSE controller (or DSE P120) connects only to the "-" and "IN" terminals and provides the varying DC voltage to simulate the turning of a potentiometer.

The Analogue output terminals of the DSE controller (or DSE P120) are connected as follows. Note that the "+" terminal of the governor/AVR is left unconnected.

DSE
Analogue
output B

DSE
Analogue
output A

SW1 and SW2 settings

SW1 setting	'centre' voltage
0	0V
1	0.5V
2	1.0V
3	1.5V
4	2.0V
5	2.5V
6	3.0V
7	3.5V
8	4.0V
9	4.5V

SW2 setting	Voltage range
0	±0.5V
1	±1.0V
2	±1.5V
3	±2.0V
4	±2.5V
5	±3.0V
6	±3.5V
7	±4.0V
8	±4.5V
9	±5.0V

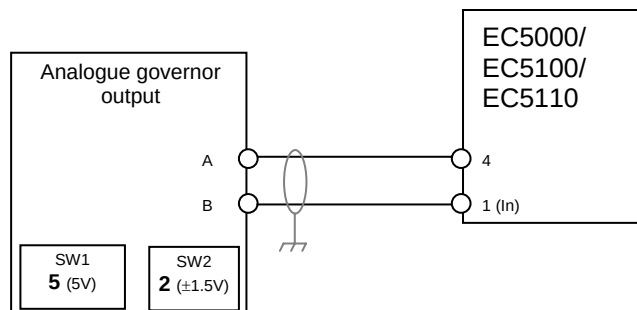
NOTE:- On DSE 5510/5520 controllers, SW1 and SW2 settings can be adjusted by a setting change of 0.1 which equates to 0.05V. ie setting 4.5 gives a centre (SW1) voltage of 2.25V.

When using P120/P121, SW1 and SW2 go up in steps of 1 which equates to 0.5V. You may have to compromise to find a switch setting close to the measured value if the measured value is not a multiple of 0.5V.

2.4 AMBAC

2.4.1 EC5000* / EC5100* / EC5110*

Using Analogue governor output module:



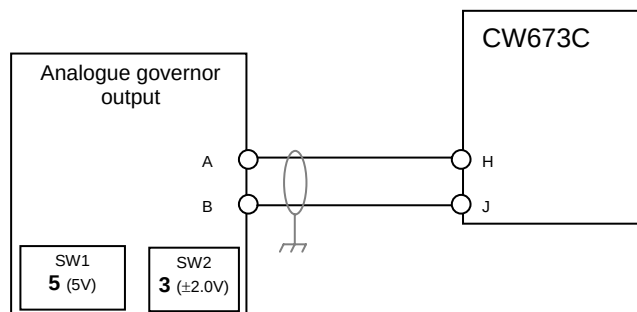
NOTE:

5510 / 5520 controllers: Analogue governor output is integral to the controller.

550 / 555 controllers: Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.4.2 CW673C

Using Analogue governor output module:



NOTE:

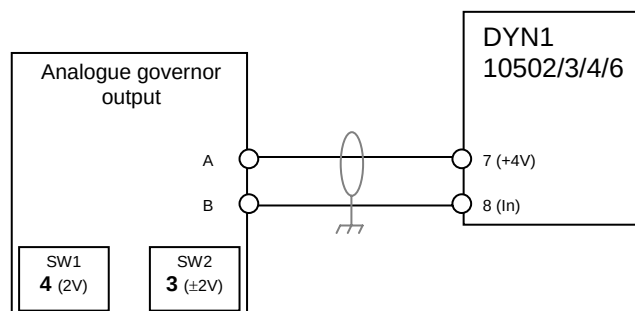
5510 / 5520 controllers: Analogue governor output is integral to the controller.

550 / 555 controllers: Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.5 BARBER COLMAN

2.5.1 DYN1 10502, 10503, 10504, 10506

Using Analogue governor output:

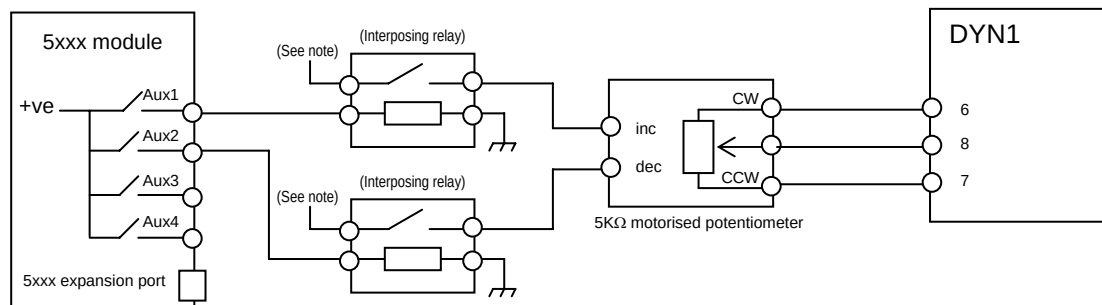


NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

Using external motorised potentiometer:



NOTE: - Interposing relay should connect to recommended polarity and voltage for potentiometer input. Refer to potentiometer manufacturer for details.

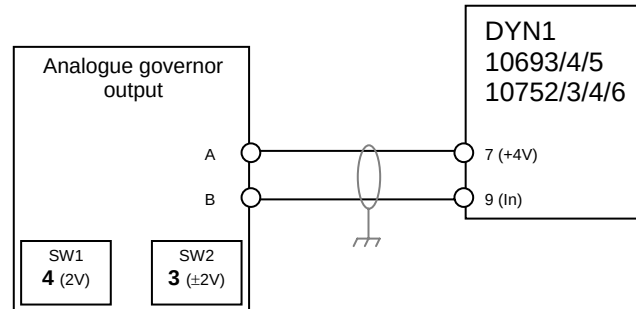
MODULE CONFIGURATION FOR 5xxx AUXILIARY RELAYS.

Module relay	Polarity	Output source
Aux. 1	Energise	Speed Raise Relay
Aux. 2	Energise	Speed Lower Relay

NOTE:- Applying a 'brake' to motorised potentiometers will help the response and stability of the potentiometer control. This brake is not necessary for digital potentiometers, only potentiometers with motor drives. For typical details on applying a 'brake' to potentiometer motors, please refer to the APPENDIX section of this manual.

2.5.2 DYN1 10693, 10694, 10695, 10752, 10753, 10754, 10756

Using Analogue governor output:



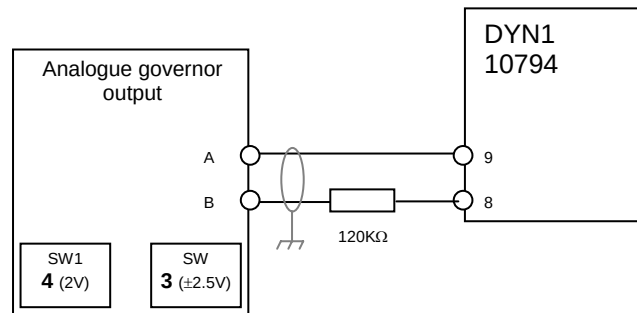
NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.5.3 DYN1 10794*

Using Analogue governor output:



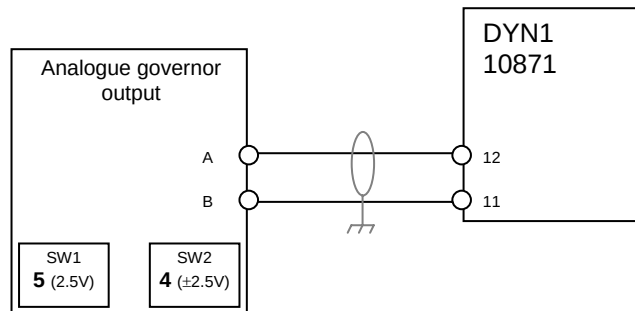
NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.5.4 DYN1 10871

Using Analogue governor output:

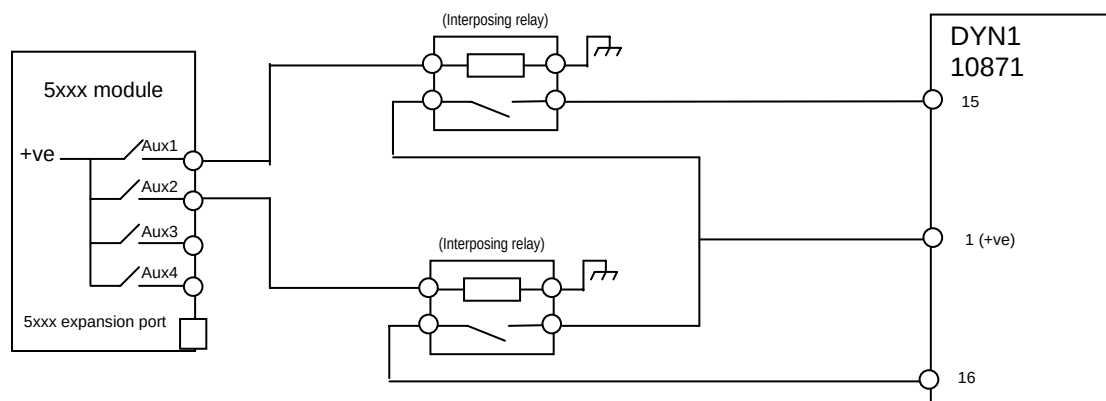


NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

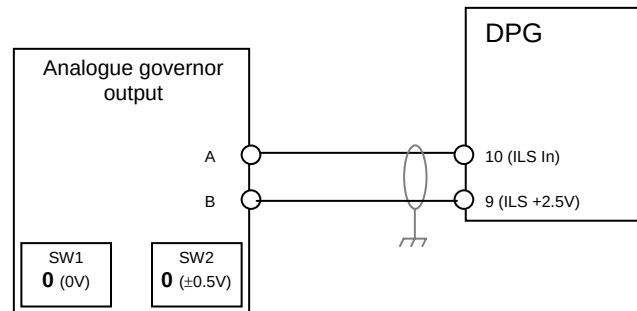
550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

Using discrete raise / lower inputs:



2.5.5 DPG 2201*

Using Analogue governor output module:



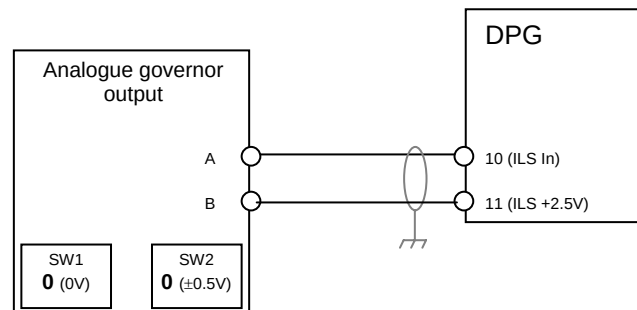
NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.5.6 DPG 2401

Using Analogue governor output module:



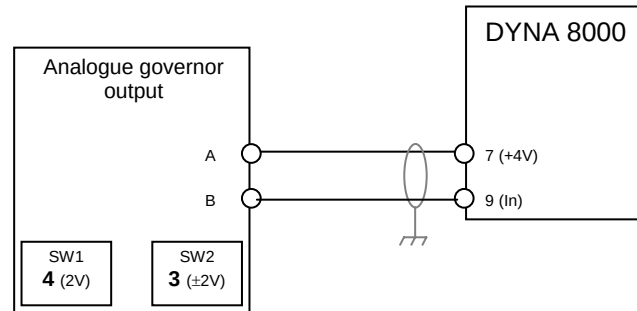
NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.5.7 DYNA 8000*

Using Analogue governor output module:

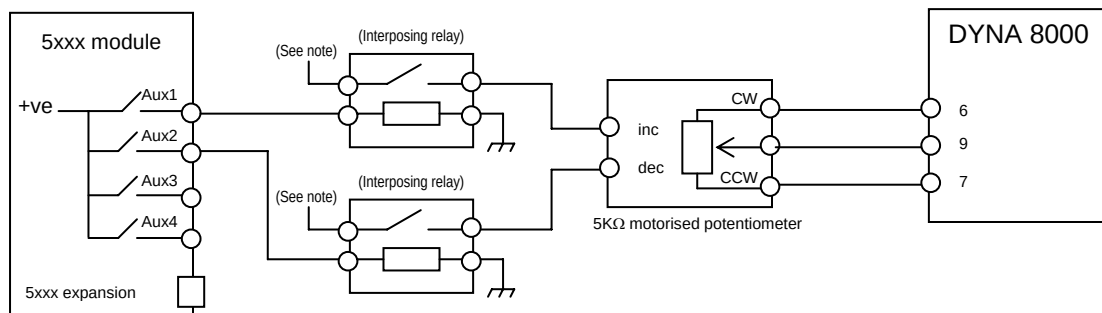


NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

Using external motorised potentiometer:



NOTE:

- Interposing relay should connect to recommended polarity and voltage for potentiometer input. Refer to potentiometer manufacturer for details.

MODULE CONFIGURATION FOR 5xxx AUXILIARY RELAYS.

Module relay	Polarity	Output source
Aux. 1	Energise	Speed Raise Relay
Aux. 2	Energise	Speed Lower Relay

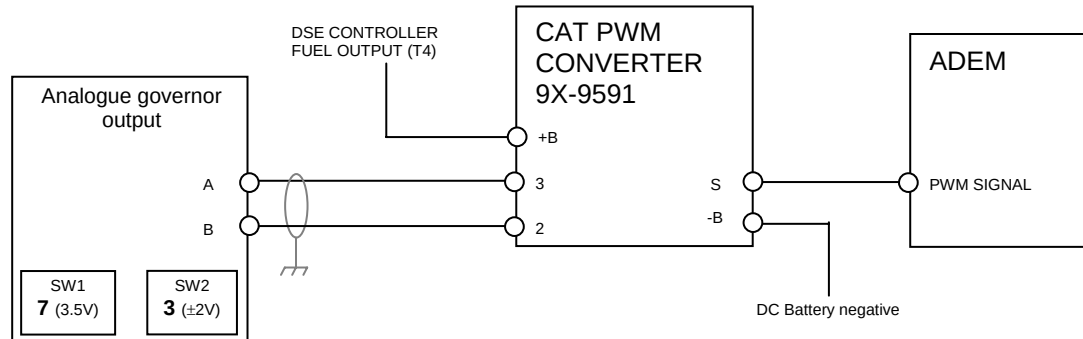
NOTE:-

Applying a 'brake' to motorised potentiometers will help the response and stability of the potentiometer control. This brake is not necessary for digital potentiometers, only potentiometers with motor drives. For typical details on applying a 'brake' to potentiometer motors, please refer to the APPENDIX section of this manual.

2.6 CATERPILLAR

2.6.1 ADEM*

Using Analogue governor output module:

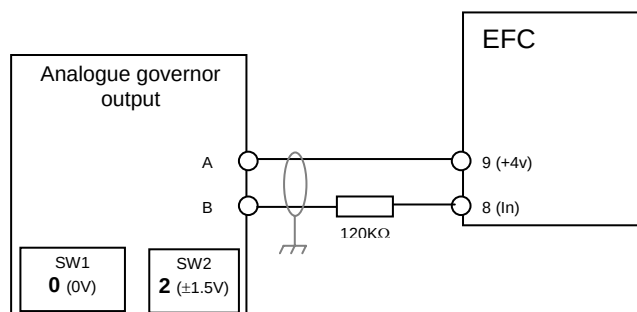


NOTE: CAT PWM CONVERTER 9X-9591 is available from your local CAT dealer and is used to allow the DSE 55xx series or P120 interface to interface with the CAT ADEM PWM controller.

2.7 CUMMINS

2.7.1 EFC*

Using Analogue governor output module:



NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

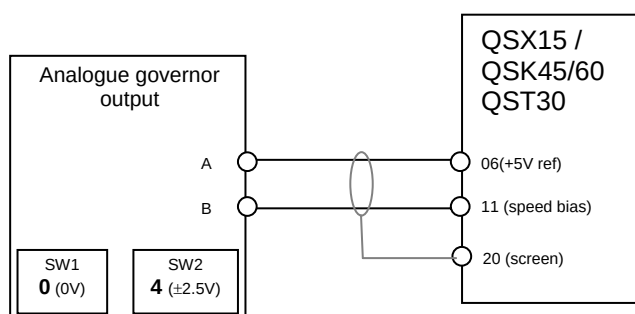
550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.7.2 QST 30*

2.7.3 QSX 15

2.7.4 QSK 45/60

Using Analogue governor output Module:



NOTE: - Ensure that the QSK45/60 adjustable parameter *Speed Bias Input Type* is set to 'Woodward'.

NOTE:

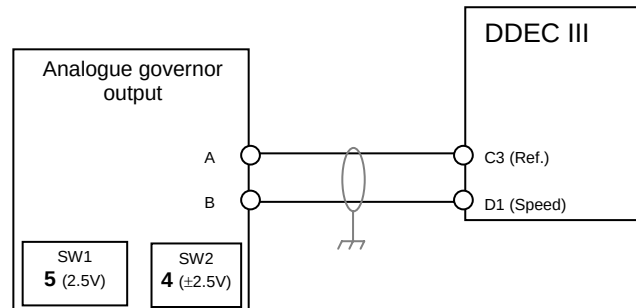
5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.8 DETROIT DIESEL

2.8.1 DDEC III

Using Analogue governor output:



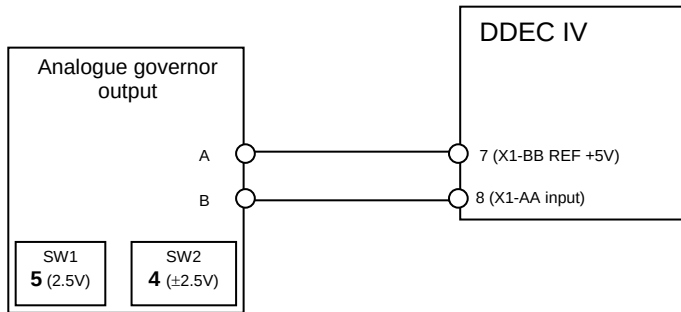
NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.8.2 DDEC IV*

Using Analogue governor output:



NOTE:

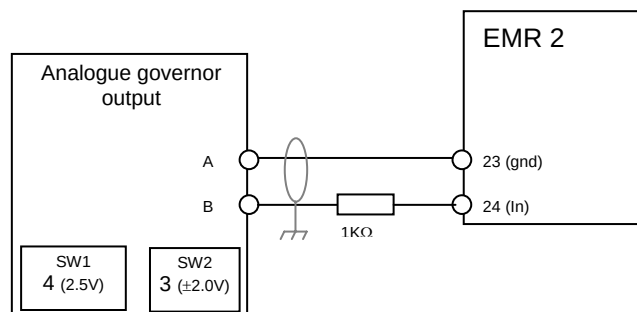
5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.9 DEUTZ

2.9.1 EMR 2 ELECTRONIC ENGINE GOVERNOR*

Using Analogue governor output module:

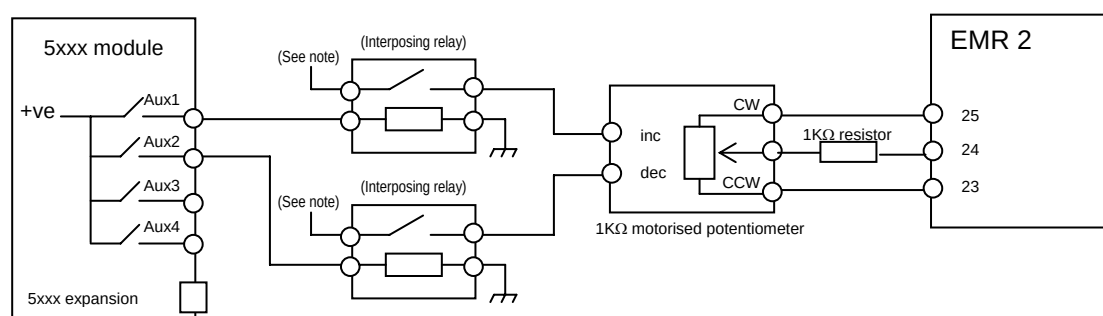


NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

Using external motorised potentiometer:



NOTE: - Interposing relay should connect to recommended polarity and voltage for potentiometer input. Refer to potentiometer manufacturer for details.

MODULE CONFIGURATION FOR 5xxx AUXILIARY RELAYS.

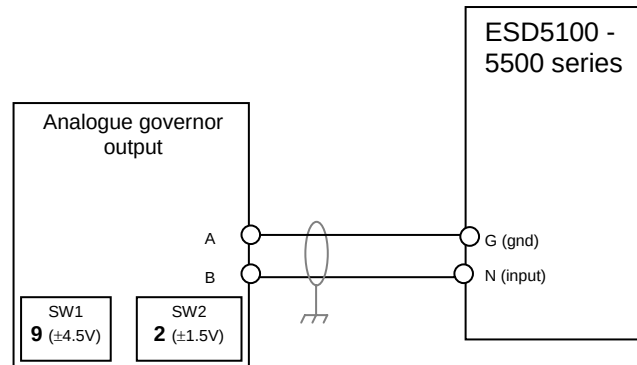
Module relay	Polarity	Output source
Aux. 1	Energise	Speed Raise Relay
Aux. 2	Energise	Speed Lower Relay

NOTE:- Applying a 'brake' to motorised potentiometers will help the response and stability of the potentiometer control. This brake is not necessary for digital potentiometers, only potentiometers with motor drives.
For typical details on applying a 'brake' to potentiometer motors, please refer to the APPENDIX section of this manual.

2.10 G.A.C. (GOVERNORS AMERICA CORP.)

2.10.1 5100 - 5500 SERIES*

Using Analogue governor output Module:



MODULE CONFIGURATION FOR ANALOGUE GOVERNOR INTERFACE

The 5100-5500 uses lower voltage on input N = higher speed. Therefore, we need to configure the 5xxx controller to 'reverse' the polarity of the P120's voltage output:

Configuration item	Selection
Reverse governor output	☒

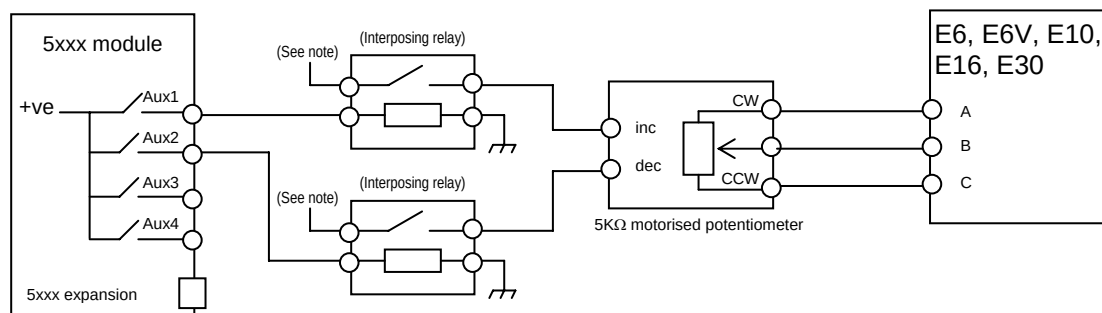
NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.11 HEINZMANN

2.11.1 E6, E6V, E10, E16, E30



NOTE: - Interposing relay should connect to recommended polarity and voltage for potentiometer input. Refer to potentiometer manufacturer for details.

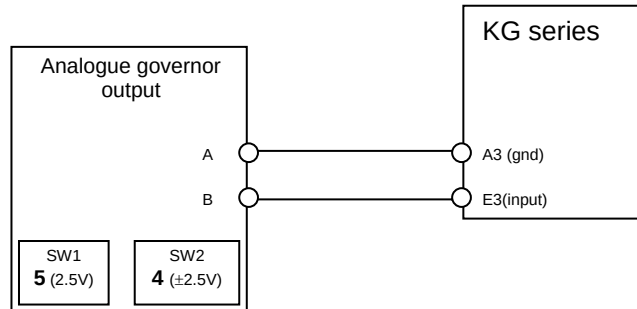
MODULE CONFIGURATION FOR 5xxx AUXILIARY RELAYS.

Module relay	Polarity	Output source
Aux. 1	Energise	Speed Raise Relay
Aux. 2	Energise	Speed Lower Relay

NOTE:- Applying a 'brake' to motorised potentiometers will help the response and stability of the potentiometer control. This brake is not necessary for digital potentiometers, only potentiometers with motor drives.
For typical details on applying a 'brake' to potentiometer motors, please refer to the APPENDIX section of this manual.

2.11.2 KG SERIES (6-04 TO 10-04)*

Using Analogue governor output:



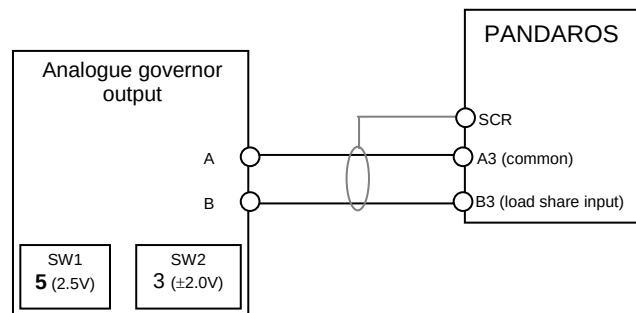
NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.11.3 PANDAROS*

Using Analogue governor output:



NOTE:

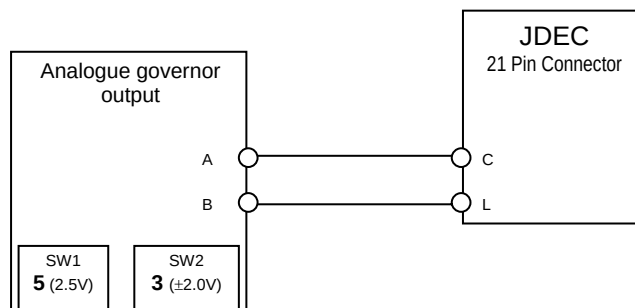
5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.12 JOHN DEERE

2.12.1 JDEC

Using Analogue governor output:



NOTE:

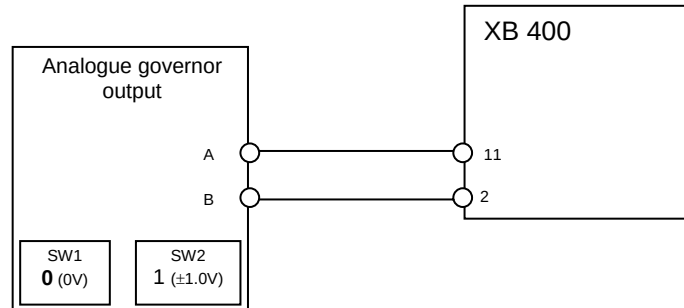
5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.13 MITSUBISHI

2.13.1 XB400*

Using Analogue governor output:



NOTE:

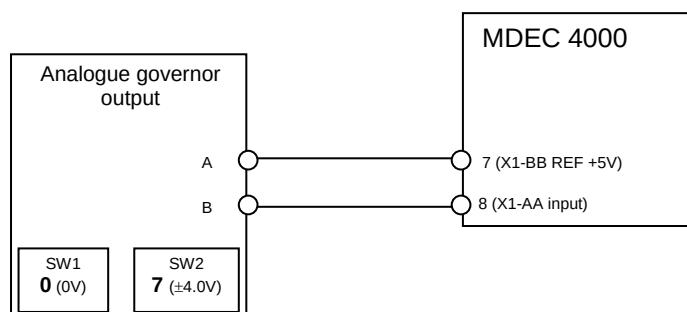
5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.14 MTU

2.14.1 MDEC 2000* / 4000*

Using Analogue governor output:



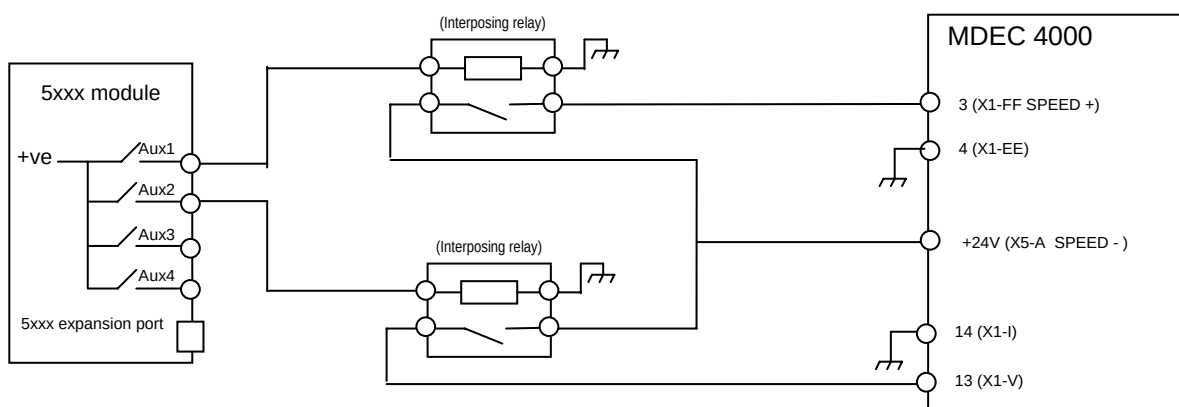
NOTE: - The range of speed adjustment possible is configurable within the MDEC 4000 controller. You are referred to the MDEC 4000 operating instructions for further details of this function.

NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

Using 5x internal raise/lower relays:



MODULE CONFIGURATION FOR 5xxx AUXILIARY RELAYS.

Module relay	Polarity	Output source
Aux. 1	Energise	Speed Raise Relay
Aux. 2	Energise	Speed Lower Relay

NOTE: - Briefly activating the input for less than 1s increases or decreases the nominal speed by 1 RPM. When the input is activated for more than 1s, the nominal speed is adjusted automatically at a configurable rate. Source mtu ELEKTRONIK ECU 4/G Documentation (Part 1)

Using CAN for speed control

MTU MDEC is the electronic management system fitted to the MTU 2000 and MTU 4000 series engines. Speed control of these engines can be 'automatic', taking place over the engine data link between the MDEC and the DSE 5510/5520 controller. Hence there is no requirement to connect the analogue governor output terminals (A/B).

When speed control is via the "CAN" link, SW1 and SW2 must still be set in the "Recalibrate" section of the 5xxx configuration software :

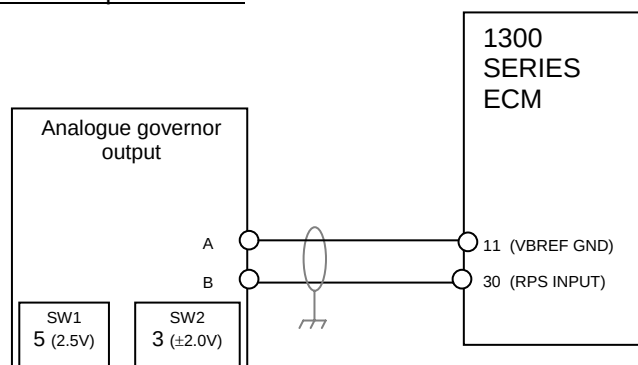
SW1 5 (2.5V)	SW2 2 ($\pm 1.5V$)
-----------------	-------------------------

 **NOTE: - Speed control over CAN is only possible when using the MDEC 304 version. MDEC 303 does not support speed control over the CAN link.**

2.15 PERKINS

2.15.1 1300 SERIES ENGINE CONTROLLER*

Using Analogue governor output Module:



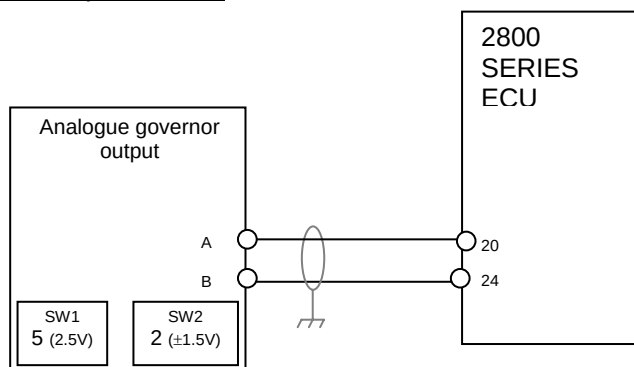
NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.15.2 2800 SERIES ENGINE CONTROLLER*

Using Analogue governor output Module:



NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

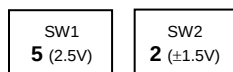
2.16 SCANIA

2.16.1 S6 ENGINE CONTROLLER*

S6 is the electronic management system fitted to the Scania electronic engines. Speed control of these engines is via two methods.

If taking advantage of the 5510/5520 controllers' CAN interface it is not necessary to fit the Scania Co-ordinator device. Engine instrumentation, diagnostics and speed controller is provided by the DSE 5510/5520 controllers CAN data link to the S6 ECU. Hence there is no requirement to connect the analogue governor output terminals (A/B).

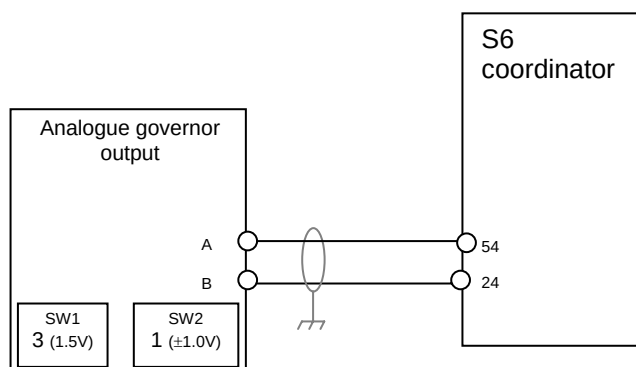
When speed control is via the "CAN" link, SW1 and SW2 must still be set in the "Recalibrate" section of the 5xxx configuration software :



NOTE:- It is not necessary to fit the Scania Co-ordinator device. Engine instrumentation and diagnostics is provided by the DSE 5510/5520 controller.

When using a Scania S6 engine in conjunction with a DSE controller not fitted with the CAN interface (ie DSE 550 / 555) you must fit the Scania Co-ordinator device and use analogue speed control signals as shown below :

Using Analogue governor output Module:



NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.17 VOLVO

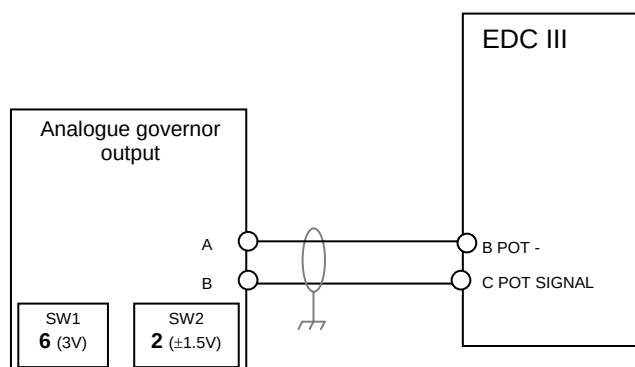
2.17.1 873979*

This governor is manufactured for Volvo by G.A.C. See section entitled *G.A.C. 5100-5500 Series for connection details*.

2.17.2 EDC III*

EDCIII is the electronic management system fitted to the Volvo TAD12 engine. Connections are the EDC III's standalone connector.

Using Analogue governor output Module:



NOTE:

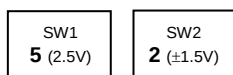
5510 / 5520 controllers: Analogue governor output is integral to the controller.

550 / 555 controllers: Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.17.3 EMS2*

EMS2 is the electronic management system fitted to the Volvo TAD9 and TAD16 electronic engines. Speed control of these engines is 'automatic', taking place over the engine data link between the EMS2 and the DSE 5510/5520 controller. Hence there is no requirement to connect the analogue governor output terminals (A/B).

When speed control is via the "CAN" link, SW1 and SW2 must still be set in the "Recalibrate" section of the 5xxx configuration software :



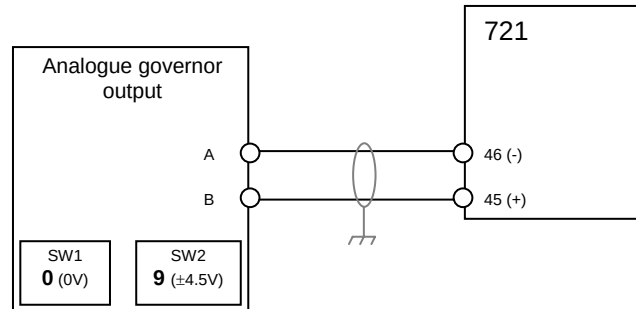
NOTE:- It is not necessary to fit the Volvo CIU device. Engine instrumentation and diagnostics is provided by the DSE 5510/5520 controller.

2.18 WOODWARD

For Woodward DYNA products please see 'Barber Colman' elsewhere in this manual.

2.18.1 721 DIGITAL SPEED CONTROL

Using Analogue governor output:

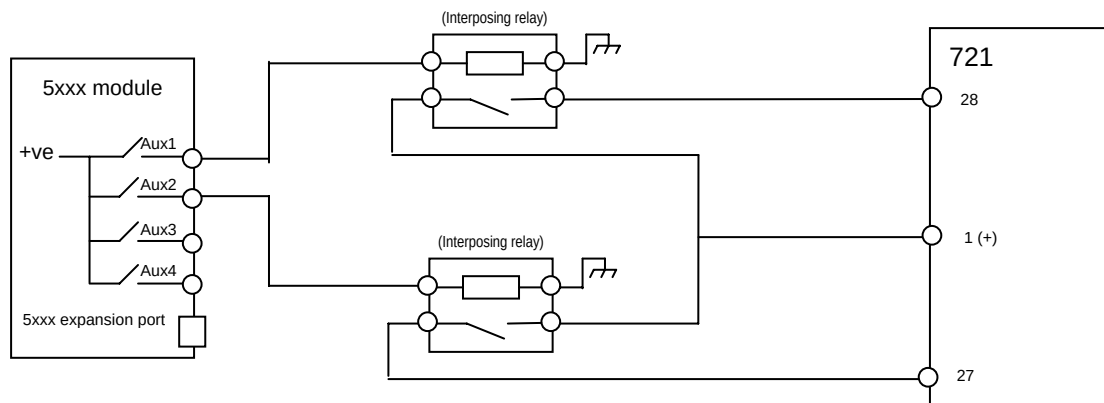


NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

Using discrete raise/lower inputs:

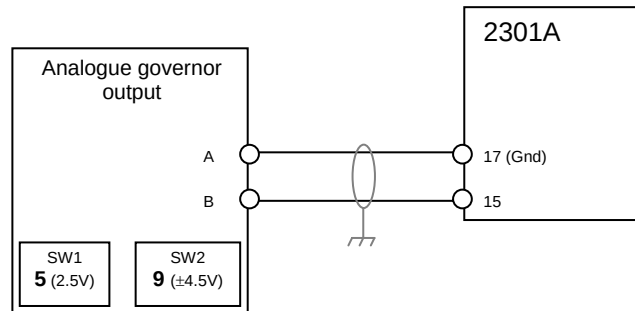


MODULE CONFIGURATION FOR 5xxx AUXILIARY RELAYS.

Module relay	Polarity	Output source
Aux. 1	Energise	Speed Raise Relay
Aux. 2	Energise	Speed Lower Relay

2.18.2 2301A SPEED CONTROL*

Using Analogue governor output



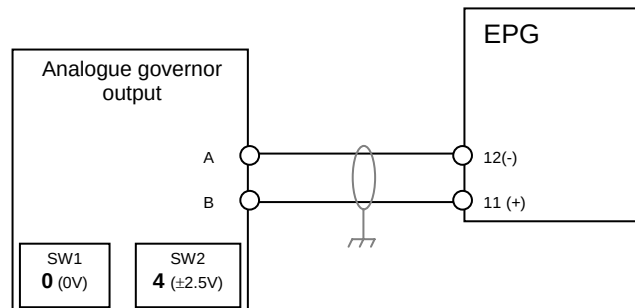
NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.18.3 EPG (ELECTRICALLY POWERED GOVERNORS)*

Using Analogue governor output

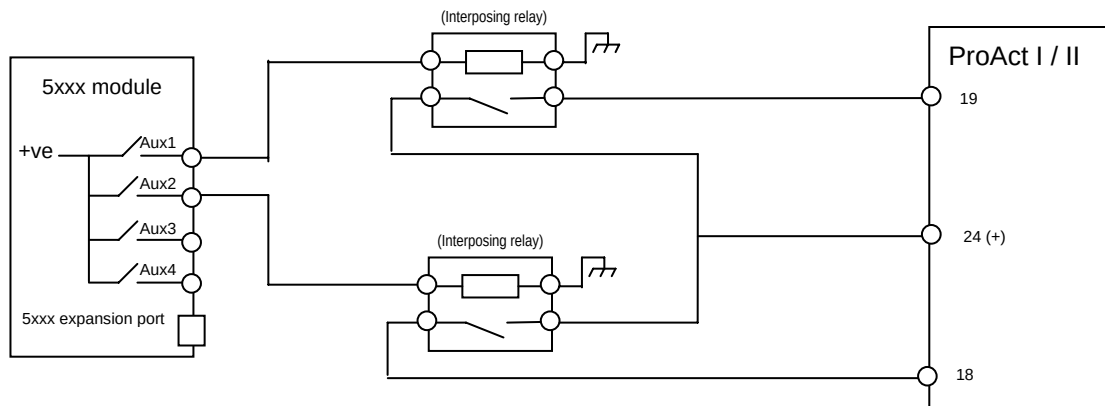


NOTE:

5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

2.18.4 PROACT I / II



MODULE CONFIGURATION FOR 5xxx AUXILIARY RELAYS.

Module relay	Polarity	Output source
Aux. 1	Energise	Speed Raise Relay
Aux. 2	Energise	Speed Lower Relay

3 INTERFACING TO AUTOMATIC VOLTAGE REGULATORS

This section details the interface connections between the 55x and 55xx controllers and the most popular Automatic Voltage Regulators (AVRs) used with diesel generating set alternators. If your particular type of AVR is not covered within this section, please contact our technical support department for advice.

3.1 INTERFACING WITH 55XX CONTROLLERS

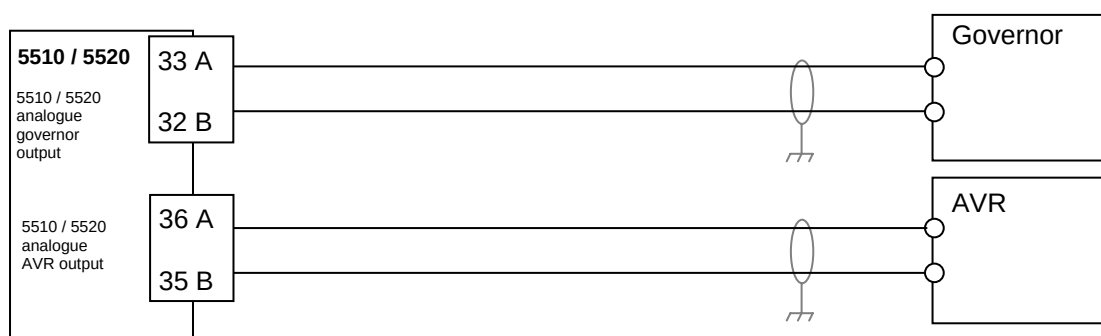
NOTE:- This section applies only to the analogue AVR output integral to the 5510 / 5520 controllers..
For details on the P121 analogue AVR interface module used to interface the 550/555/557 controllers with supported AVRs, see section entitled “*P121 analogue AVR interface*”.

The analogue AVR output provide an isolated, adjustable DC voltage level to connect into the control inputs of many automatic voltage regulators. This replaces the manually operated or motorised potentiometers used in many synchronising and load sharing applications. The module is also suitable for connection to the load sharing controller inputs of many popular AVRs. This enables the 55xx to adjust the alternator voltage output to match the mains / bus and hence get the supplies into synchronism. The 55xx module is especially suited for use in reactive power sharing systems.

3.1.1 SPECIFICATIONS

Item	Value
Output type	Optically isolated DC voltage level
Minimum output load	1000 Ω

3.1.2 CONNECTION DETAILS



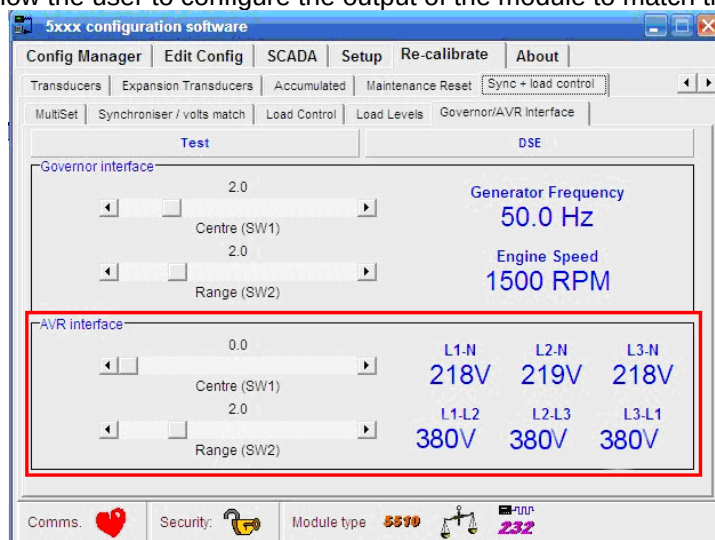
 **NOTE:-** Further details on connections to various AVRs can be found in the *DSE Guide to Synchronising and Load Sharing (Part2)*.

 **NOTE:-** For details of the analogue governor output see the relevant section elsewhere in this manual.

 **NOTE: -** The length of cable between the 5510 / 5520 and the AVR should be kept as short as possible. Foil screened cable is recommended for this purpose to ensure integrity of the control signal.

3.1.3 ANALOGUE AVR OUTPUT SETTING

To enable the 55xx module to interface with as many different types of AVR as possible, selectors for voltage range and nominal voltage are adjustable using the 5xxx for Windows™ configuration software. These allow the user to configure the output of the module to match the input of the AVR.



The SW1 software selector sets the 'centre' point of the interface module's output. For example: if the output range required is 1V to 3V, with the 'centre' point being at 2V, then the position of the SW1 selector would be 4.0, giving a voltage offset of 2V.

The SW2 software selector sets the voltage output range of the interface module's output. For example: if the output range required is 1V to 3V, then the position of the SW2 selector would be 1.0, giving a voltage range of $\pm 1V$ from the 'centre' point of 2V

3.1.4 SW1 / SW2 SOFTWARE SELECTOR SETTINGS.

For reference purposes, the software selectors perform the following functions:

SW1 setting	'centre' voltage of P121
0	0V
1	0.5V
2	1.0V
3	1.5V
4	2.0V
5	2.5V
6	3.0V
7	3.5V
8	4.0V
9	4.5V

SW2 setting	Voltage range of P121
0	$\pm 0.5V$
1	$\pm 1.0V$
2	$\pm 1.5V$
3	$\pm 2.0V$
4	$\pm 2.5V$
5	$\pm 3.0V$
6	$\pm 3.5V$
7	$\pm 4.0V$
8	$\pm 4.5V$
9	$\pm 5.0V$

Typical wiring diagrams and SW1/SW2 selector settings for many of the most popular AVRs are included within the DSE guide to synchronising and Load Sharing (Part2).

NOTE: - If the AVR you are using is not listed within this manual, it may still be possible to interface to it using the analogue AVR output. Contact your AVR manufacturer to check if the product has a DC voltage input for connection to a synchroniser / load sharer, and if so, what the 'voltage range' and 'centre voltage' is. You can then use the tables above to determine settings for SW1 and SW2. Analogue AVR output terminal A is the negative output terminal and B is the positive output terminal (providing AVR output reversed is not selected in the 55xx controller's configuration).

If the 'centre voltage' and 'voltage range' are not available from the AVR manufacturer, providing the input is compatible with a DC voltage signal, it still may be possible to interface to it using the 5510/5520 modules. Contact our Technical Support Department for advice.

3.2 INTERFACING WITH 55X CONTROLLERS

550 / 555 / 557 controllers require model P121 to interface between the controller and the AVR. This interface has two selector switches to configure the centre voltage and voltage range to suit the governor / ECU in use.

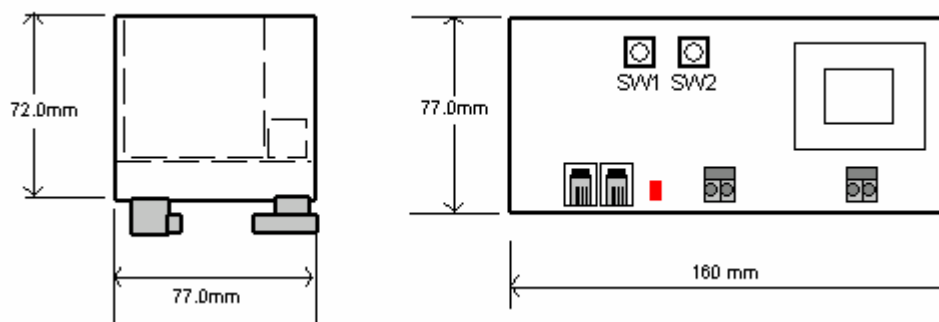
NOTE:- This device is **NOT** required for 5510/5520 controllers. These controllers have integral analogue AVR outputs. See section entitled “5510/5520 analogue AVR output”. The P121 analogue governor interface module is **ONLY** used to interface the 550/555/557 controllers with supported AVRs.

Description	Photograph
The P121 analogue AVR interface modules provide an isolated, adjustable DC voltage level to connect into the control inputs of many automatic voltage regulators. This replaces the manually operated or motorised potentiometers used in many synchronising and load sharing applications. The module is also suitable for connection to the load sharing controller inputs of many popular AVRs. The P121 interface is controlled directly by the 55x controller via its AVR analogue expansion port. This enables the 55x to adjust the alternator voltage output to match the mains / bus and hence get the supplies into synchronism. The P121 module is especially suited for use in reactive power sharing systems.	

3.2.1 SPECIFICATIONS

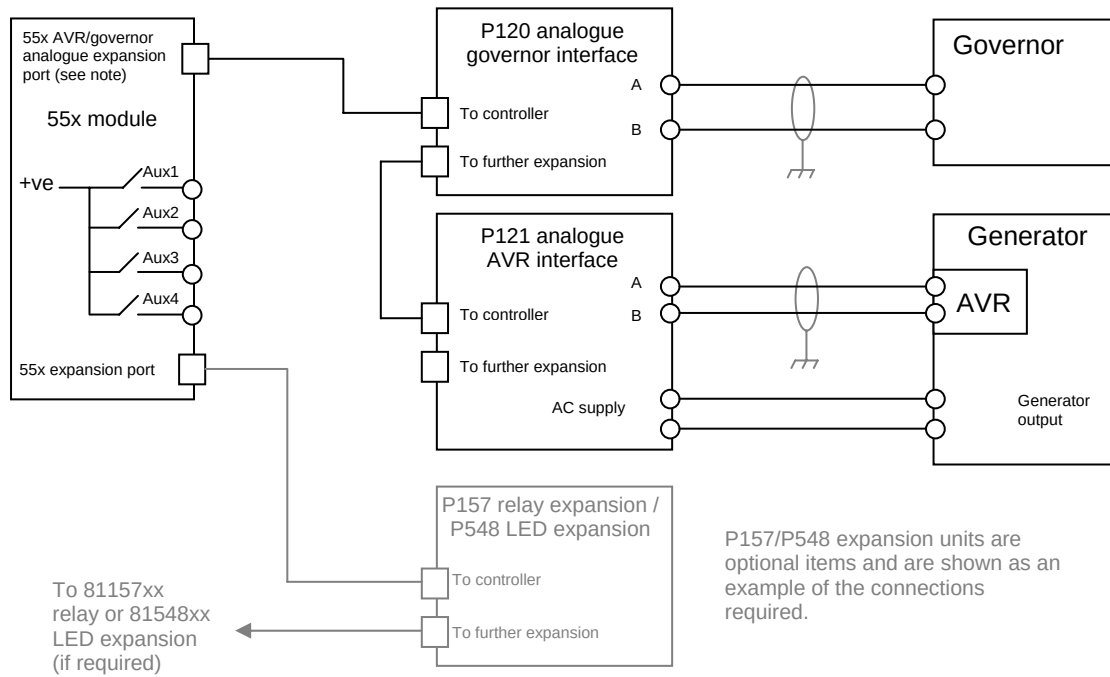
Item	Value
AC input Voltage range	152 V AC to 305 V AC (+20%)
AC input frequency	50Hz to 75Hz at rated engine speed
Maximum burden	2VA
AC input isolation	Double insulated transformer
Output type	Optically isolated DC voltage level
Minimum output load	1000Ω
Operating temperature range	-30°C to +70°C
Indications	Combined AC power on / Link lost LED
Fixing	TS32 32mm top hat din rail fixing (din rail not supplied)
IP protection	IP30
Appropriate standards	BS EN 60950, BS EN 50081-2, BS EN 50082-2

3.2.2 CASE DIMENSIONS



3.2.3 CONNECTION DETAILS

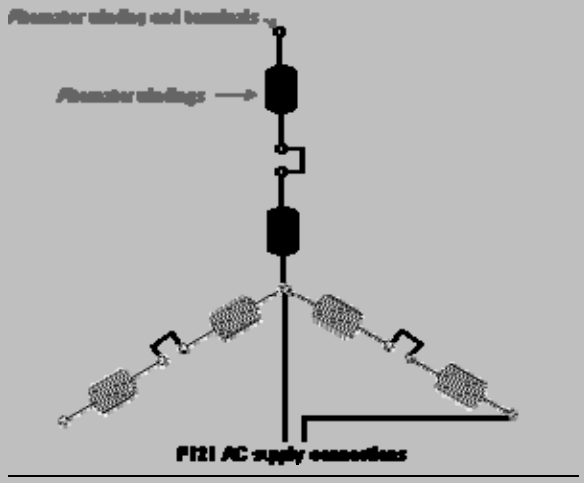
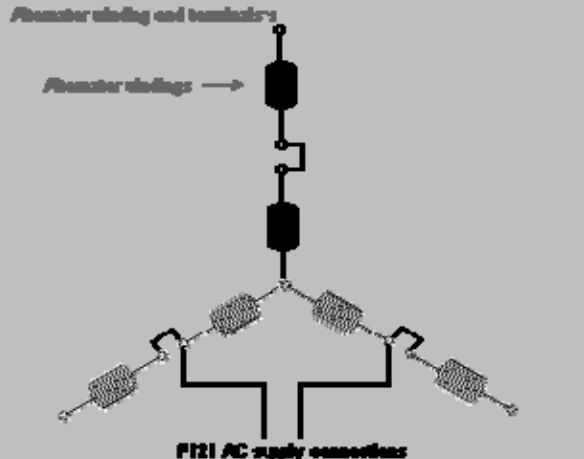
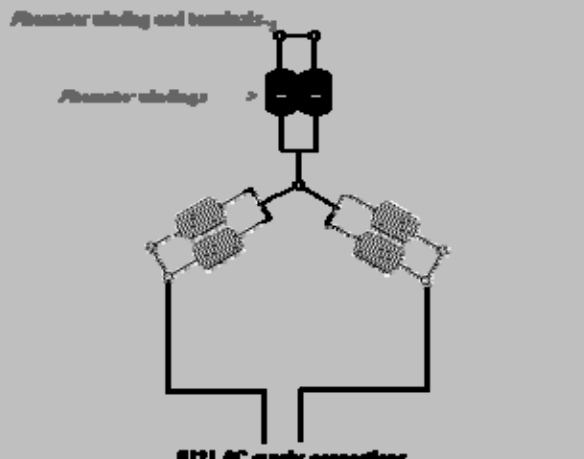
Connection to the controller is made by connecting the data cable supplied with the interface module to the P120/P121 analogue expansion socket of 55x load sharing enabled controllers. Where more than one analogue expansion module is required in the system, the modules can be 'daisy-chained' by connecting the "To further expansion" socket of one expansion module to the "To controller" socket of another, as shown below. The order of the modules in the 'daisy chain' is not important.



NOTE: - The AVR analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P121 interface modules. Where a different method of interface to the governor is used, load sharing will not be possible.

NOTE: - The length of cable between the P121 interface unit and the AVR should be kept as short as possible. Foil screened cable is recommended for this purpose to ensure integrity of the control signal.

NOTE: - The maximum total length of the cable between the module, P120 and P121 is 100 meters.

Diagram	Description
<u>P121 AC Supply connections (230V nominal voltage)</u> 	The P121 AVR interface module is normally sited within the generator control panel, along with the 55x controller. In this case, where the Ph-N voltage is between 170V and 277V, it's AC supply terminals can be connected to the alternator output L1 and N terminals within the panel.
<u>P121 AC Supply connections (230V nominal voltage) – Alternative connection</u> 	However, the P121 may also be fitted within the alternator box. In this instance, it's AC supply can be connected as shown in the example. This allows for a more straightforward conversion between 110V and 220V for instance, on hire sets. I.e. In the example shown the windings are connected in series to give 230V. If a switch were to alter the series links to parallel links to give 115V, the P121 supply connections would not need to be moved.
<u>P121 AC Supply connections (115V nominal voltage)</u> 	When used with a 115V nominal system (or a three phase system where the ph-ph voltage does not exceed 277V), the P121 AC supply connections must be wired as shown in this example (i.e. phase to phase).

3.2.4 P121 SELECTOR SWITCH SETTINGS

To enable the P121 analogue AVR interface module to interface with as many different types of AVR as possible, rotary selectors for voltage range and nominal voltage are fitted. These allow the user to configure the output of the module to match the input of the AVR.

The SW1 selector sets the 'centre' point of the interface module's output. For example: if the output range required is 1V to 3V, with the 'centre' point being at 2V, then the position of the SW1 selector would be 4, giving a voltage offset of 2V.

The SW2 selector sets the voltage output range of the interface module's output. For example: if the output range required is 1V to 3V, then the position of the SW2 selector would be 1, giving a voltage range of $\pm 1V$ from the 'centre' point of 2V

For reference purposes, the switch positions perform the following functions:

SW1 setting	'centre' voltage of P121
0	0V
1	0.5V
2	1.0V
3	1.5V
4	2.0V
5	2.5V
6	3.0V
7	3.5V
8	4.0V
9	4.5V

SW2 setting	Voltage range of P121
0	$\pm 0.5V$
1	$\pm 1.0V$
2	$\pm 1.5V$
3	$\pm 2.0V$
4	$\pm 2.5V$
5	$\pm 3.0V$
6	$\pm 3.5V$
7	$\pm 4.0V$
8	$\pm 4.5V$
9	$\pm 5.0V$

Typical wiring diagrams for many of the most popular AVRs are included within this manual (See section entitled Interfacing to AVRs).

Where these diagrams include the P121 interface modules, the switch positions required for both SW1 and SW2 are given.

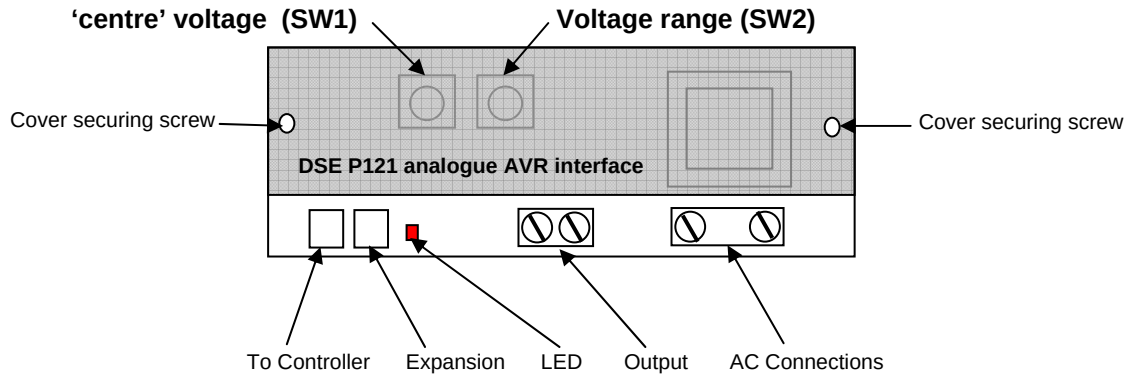
 **NOTE:** - If the AVR you are using is not listed within this manual, it may still be possible to interface to it using the P121 modules. Contact your AVR manufacturer to check if the product has a DC voltage input for connection to a synchroniser / load sharer, and if so, what the 'voltage range' and 'centre voltage' is. You can then use the tables above to determine settings for SW1 and SW2. P121 terminal A is the negative output terminal and B is the positive output terminal (providing governor output reversed is not selected in the 55x controller's configuration).

If the 'centre voltage' and 'voltage range' are not available from the AVR manufacturer, providing the input is compatible with a DC voltage signal, it still may be possible to interface to it using the P121 modules. Contact our Technical Support Department for advice.

If the AVR is not fitted with a DC voltage input for connection to synchroniser/load share modules, then a different interface method will be required. See section entitled Interfacing to AVRs.

3.2.5 LOCATION OF SW1 AND SW2 SELECTORS

Access to the selectors is gained by removing power to the interface module, then removing the two screws that are used to secure the transparent cover. The selectors are positioned as shown below:

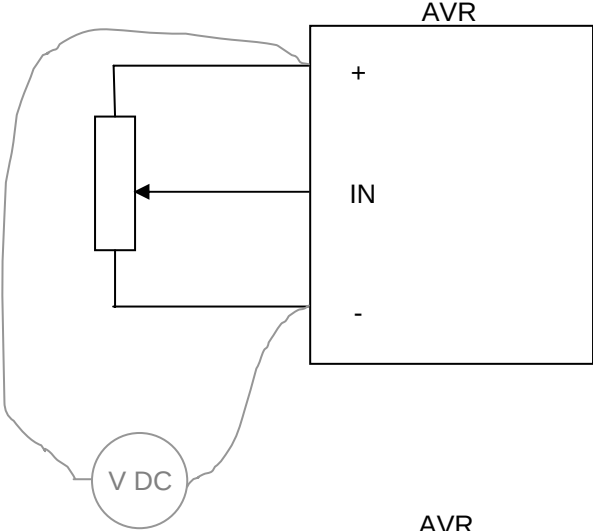


WARNING! Suitable steps should be taken to isolate the generator supply from the P121 AVR interface module before removing the cover. The cover must not be removed while the engine is running. Ensure the cover is correctly refitted before reconnecting the power and attempting to start the engine.

3.3 DETERMINING CONNECTIONS AND SETTINGS FOR AVRS NOT LISTED IN THIS PUBLICATION

The following guide is intended to assist the user to determine where to connect to AVRs not listed in this document.

Additionally it will assist you to find the correct settings for SW1 (centre) and SW2 (range).

This diagram shows how the remote adjust potentiometer is usually connected to the AVR. The potentiometer adjusts the voltage into the IN terminal between the voltages supplied at '-' and '+'.


To find the 'centre' and 'range' voltages accepted by the device's input, measure the DC voltage of terminal '+' in relation to terminal '-' as shown.

Example. You measure 4V from '-' to '+'. Halving this voltage gives the centre voltage (2V).

The range voltage setting will have a maximum value of 2V above or below the centre voltage).

To determine the settings of SW1 and SW2, refer to the tables below.

The DSE controller (or DSE P121) connects only to the "-" and "IN" terminals and provides the varying DC voltage to simulate the turning of a potentiometer.

The Analogue output terminals of the DSE controller (or DSE P121) are connected as follows. Note that the "+" terminal of the AVR is left unconnected.

DSE
Analogue
output B

DSE
Analogue
output A

SW1 and SW2 settings

SW1 setting	'centre' voltage
0	0V
1	0.5V
2	1.0V
3	1.5V
4	2.0V
5	2.5V
6	3.0V
7	3.5V
8	4.0V
9	4.5V

SW2 setting	Voltage range
0	±0.5V
1	±1.0V
2	±1.5V
3	±2.0V
4	±2.5V
5	±3.0V
6	±3.5V
7	±4.0V
8	±4.5V
9	±5.0V

NOTE:- On DSE 5510/5520 controllers, SW1 and SW2 settings can be adjusted by a setting change of 0.1 which equates to 0.05V. ie setting 4.5 gives a centre (SW1) voltage of 2.25V.

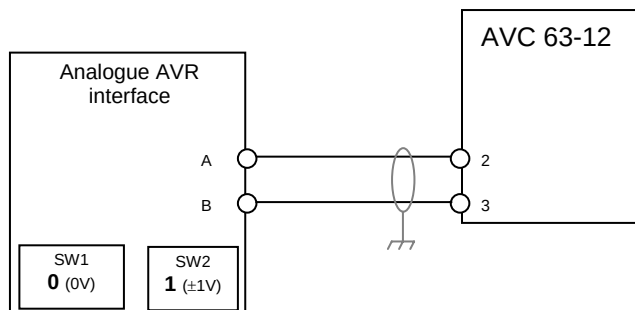
When using P121, SW1 and SW2 go up in steps of 1 which equates to 0.5V. You may have to compromise to find a switch setting close to the measured value if the measured value is not a multiple of 0.5V.

NOTE:- Some AVRs only have two terminals. If they are not listed within this document, please contact us for advice,

3.4 BASLER

3.4.1 AVC 63-12

Using Analogue AVR output module:



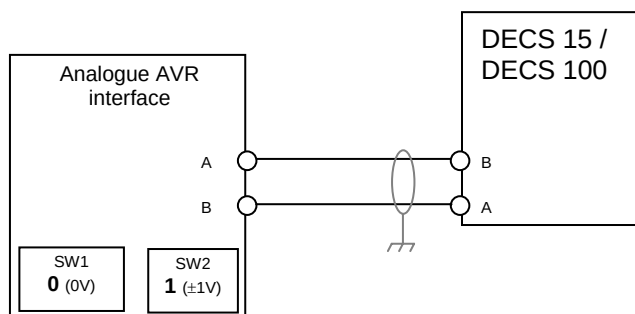
NOTE:

5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

3.4.2 DECS 15, DECS 100

Using Analogue AVR output module:



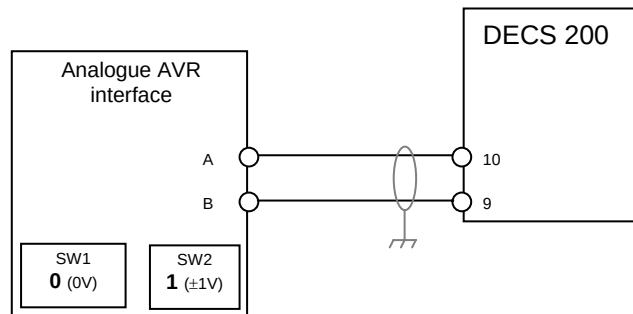
NOTE:

5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

3.4.3 DECS 200

Using Analogue AVR output module:



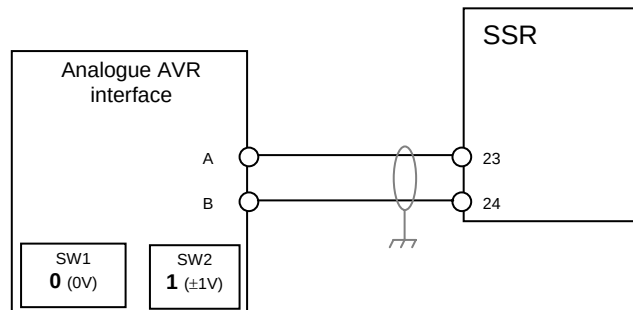
NOTE:

5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

3.4.4 SSR

Using Analogue AVR output module:



NOTE:

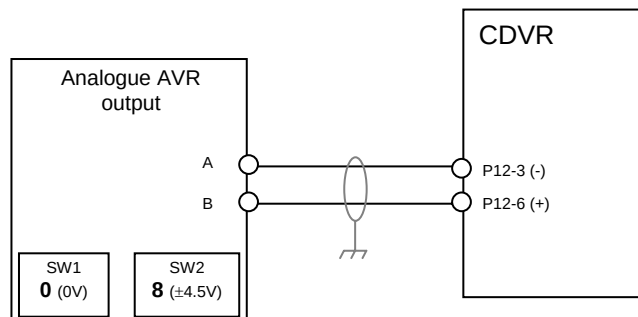
5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

3.5 CATERPILLAR

3.5.1 CDVR

Using Analogue AVR output Module:

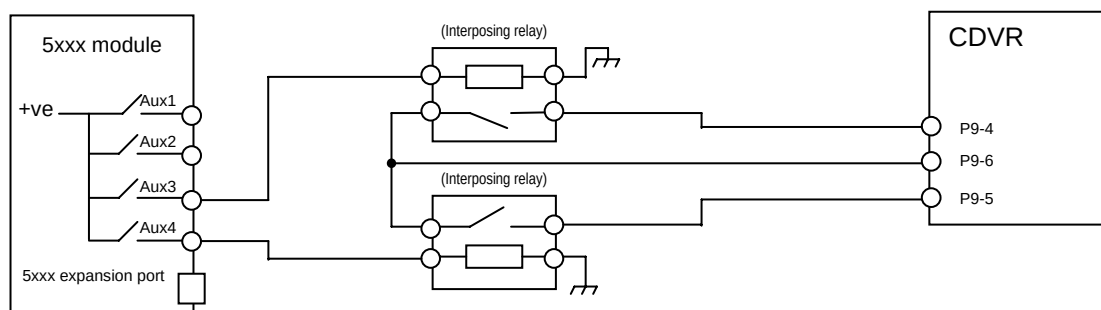


NOTE:

5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

Using module relays

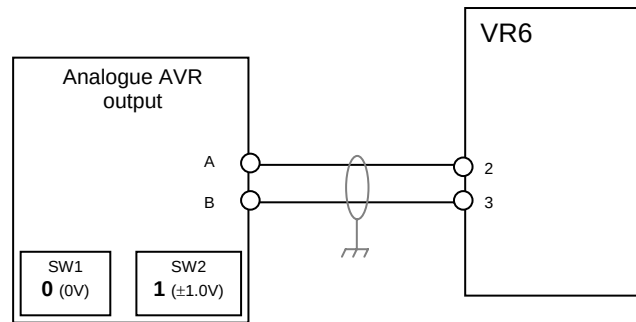


MODULE CONFIGURATION FOR 5xxx AUXILIARY RELAYS.

Module relay	Polarity	Output source
Aux. 3	Energise	Voltage Raise Relay
Aux. 4	Energise	Voltage Lower Relay

3.5.2 VR6

Using Analogue AVR output Module:



NOTE:

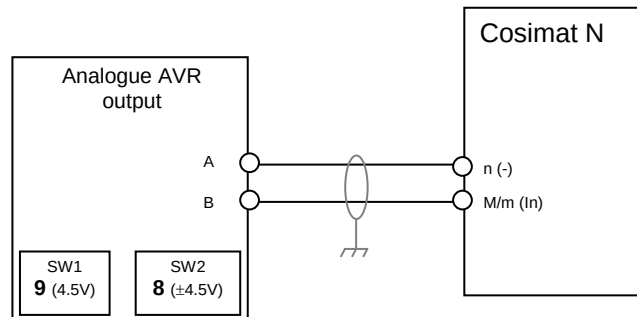
5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

3.6 COSIMAT

3.6.1 COSIMAT N

Using Analogue AVR output Module:



NOTE:

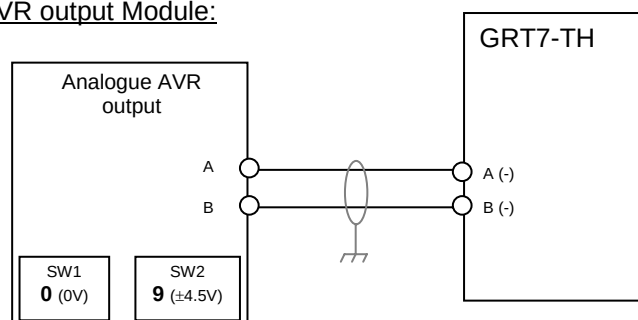
5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

3.7 GRAMEYER

3.7.1 GRT7-TH*

Using Analogue AVR output Module:



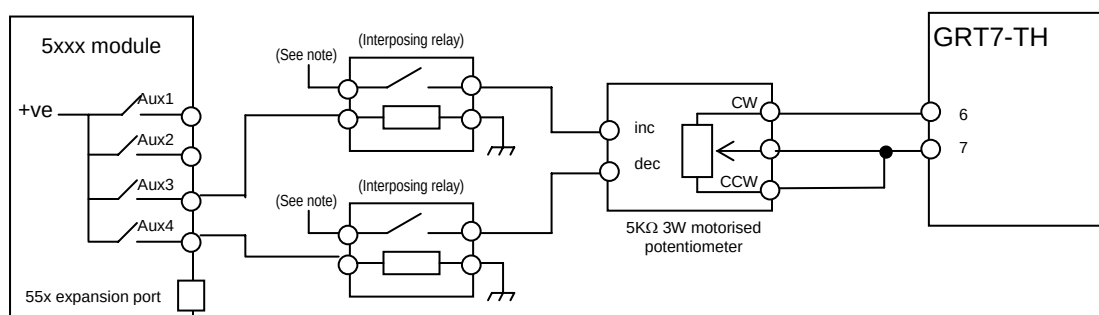
NOTE: - Using a P121 for AVR interface gives approximately +/- 5% adjustment of generator output voltage.

NOTE:

5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

Using external motorised potentiometer:



NOTE: - Interposing relay should connect to recommended polarity and voltage for potentiometer input. Refer to potentiometer manufacturer for details.

MODULE CONFIGURATION FOR 5xxx AUXILIARY RELAYS.

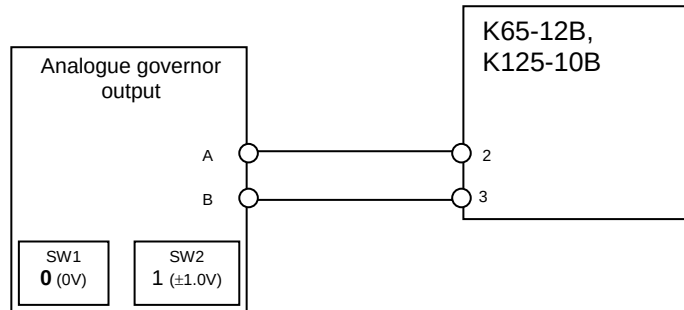
Module relay	Polarity	Output source
Aux. 3	Energise	Voltage Raise Relay
Aux. 4	Energise	Voltage Lower Relay

NOTE:- Applying a 'brake' to motorised potentiometers will help the response and stability of the potentiometer control. This brake is not necessary for digital potentiometers, only potentiometers with motor drives. For typical details on applying a 'brake' to potentiometer motors, please refer to the APPENDIX section of this manual.

3.8 KATO

3.8.1 K65-12B, K125-10B

Using Analogue governor output:



NOTE:

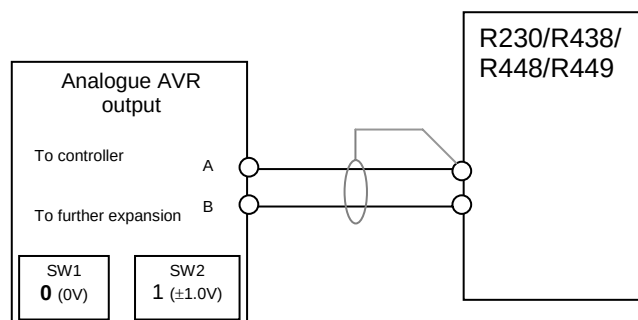
5510 / 5520 controllers : Analogue governor output is integral to the controller.

550 / 555 controllers : Analogue governor output is provided using the P120 governor interface module, compatible with load sharing enabled 550 / 555 controllers.

3.9 LEROY SOMER

3.9.1 R230 / R438* / R448 / R449

Using Analogue AVR output Module:



NOTE:

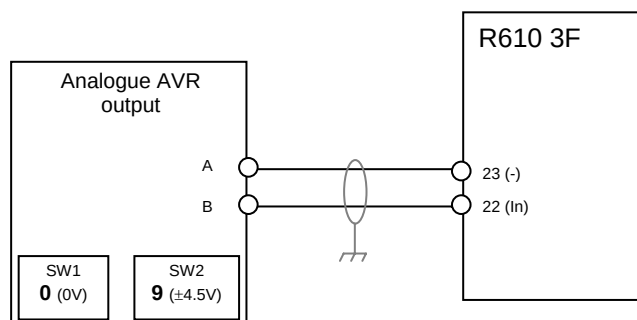
5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

NOTE: - The remote adjust input on the AVR are terminals ST4. Incorrect polarity will result in being unable to volts match or VAr share. You may need to reverse the connections if this occurs.

3.9.2 R610 3F

Using Analogue AVR output Module:

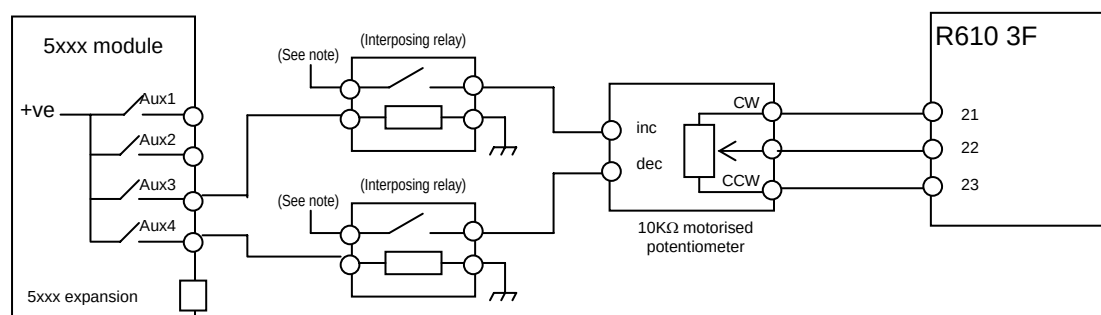


NOTE:

5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

Using external motorised potentiometer:



NOTE: - Interposing relay should connect to recommended polarity and voltage for potentiometer input. Refer to potentiometer manufacturer for details.

MODULE CONFIGURATION FOR 5xxx AUXILIARY RELAYS.

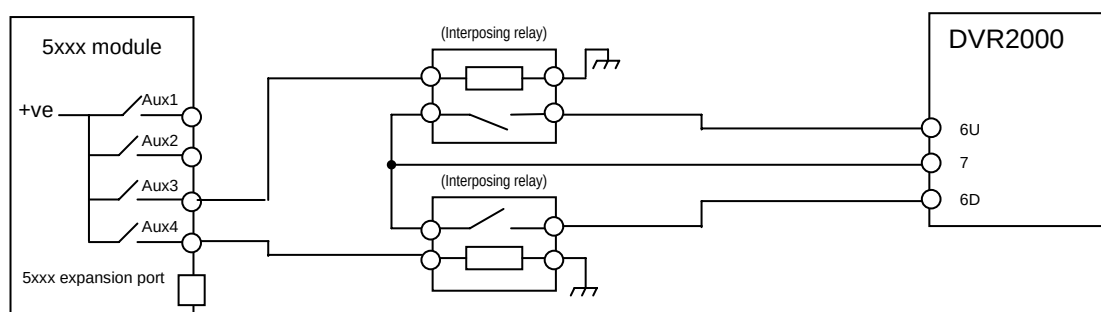
Module relay	Polarity	Output source
Aux. 3	Energise	Voltage Raise Relay
Aux. 4	Energise	Voltage Lower Relay



NOTE:- Applying a 'brake' to motorised potentiometers will help the response and stability of the potentiometer control. This brake is not necessary for digital potentiometers, only potentiometers with motor drives. For typical details on applying a 'brake' to potentiometer motors, please refer to the APPENDIX section of this manual.

3.10 MARATHON

3.10.1 MAGNAMAX DVR2000 / DVR2000C



MODULE CONFIGURATION FOR 5xxx AUXILIARY RELAYS.

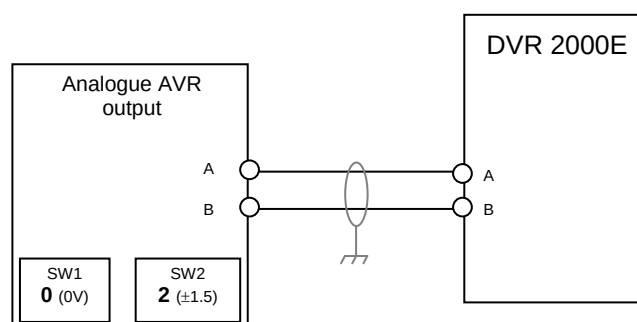
Module relay	Polarity	Output source
Aux. 3	Energise	Voltage Raise Relay
Aux. 4	Energise	Voltage Lower Relay

NOTE: - The Interposing relays must have contacts rated for 240V 1A AC. Care is required because “input power” voltages are present between 6U & 7 and 6D & 7. (Source: Marathon Electric Magnamax^{DVR™} Technical Manual for Model DVR® 2000)

NOTE: - The Magnamax^{DVR™} AVR disables the voltage raise/lower inputs when in the *select mode*. I.e. The 55x controller cannot ‘remotely adjust’ the generator’s output voltage while the Magnamax^{DVR™} AVR is in *Select mode*.

3.10.2 DVR2000E*

Using Analogue AVR output:



NOTE:

5510 / 5520 controllers : Analogue AVR output is integral to the controller.

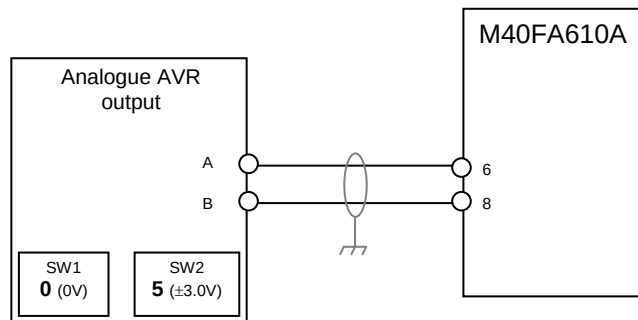
550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

NOTE:- Setting SW2 to position 1 (1.5V) gives the possibility of +/- 10% adjustment in voltage. This is normally considered enough for voltage matching. If more adjustment is required, increase SW2. The Marathon DVR2000E’s input can accept upto a maximum of +/-3V to give +/- 30% adjustment range. This can be achieved by setting P121 SW2 = 6 (3V)

3.11 MARELLIMOTOR S.P.A.

3.11.1 M40FA610A

Using analogue AVR output:



NOTE:

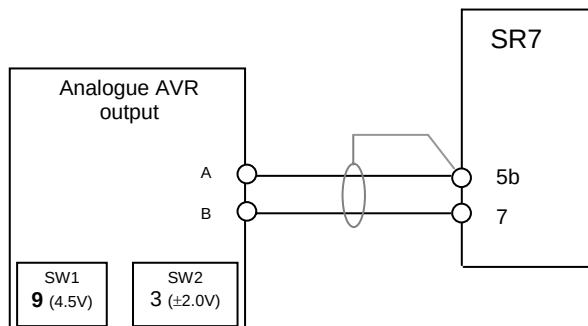
5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

3.12 MECC ALTE S.P.A.

3.12.1 S.R.7*

Using analogue AVR output:



MODULE CONFIGURATION FOR ANALOGUE AVR OUTPUT

The SR7 uses lower voltage on input N = higher generator output voltage. Therefore, we need to configure the 5xxx controller to 'reverse' the polarity of the voltage output:

Configuration item	Selection
Reverse AVR output	☒

NOTE:

5510 / 5520 controllers : Analogue AVR output is integral to the controller.

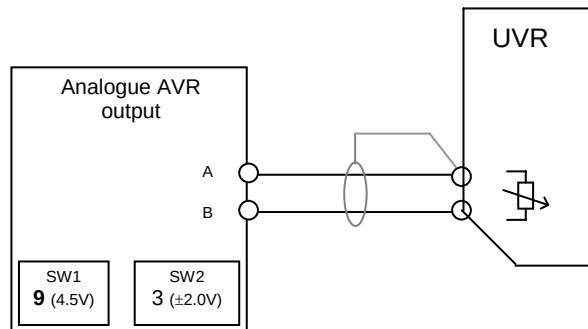
550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.



NOTE:- When the analogue AVR output is connected to the Mecc Alte AVR the alternators output voltage will rise. It is recommended to set the AVR voltage to minimum setting before connecting the analogue AVR output.

3.12.2 U.V.R.*

Using analogue AVR output:



MODULE CONFIGURATION FOR ANALOGUE AVR OUTPUT

The UVR uses lower voltage on input N = higher generator output voltage. Therefore, we need to configure the 5xxx controller to 'reverse' the polarity of the voltage output:

Configuration item	Selection
Reverse AVR output	☒

NOTE:

5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

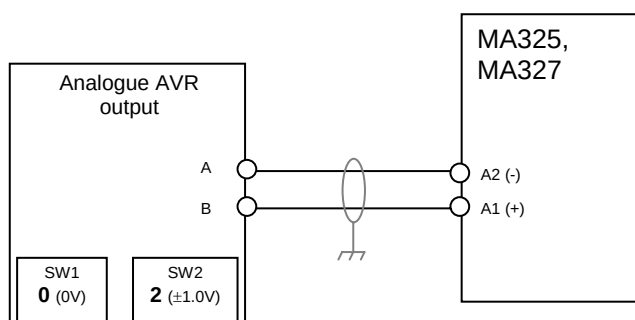
NOTE:-

When the analogue AVR output is connected to the Mecc Alte AVR the alternators output voltage will rise. It is recommended to set the AVR voltage to minimum setting before connecting the analogue AVR output.

3.13 NEWAGE INTERNATIONAL

3.13.1 MA325, MA327

Using Analogue AVR output Module:



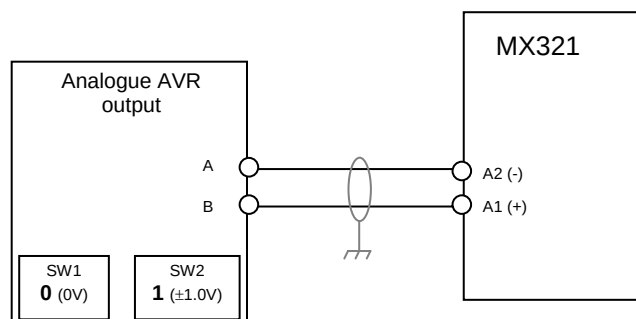
NOTE:

5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

3.13.2 MX321*

Using Analogue AVR output Module:



NOTE:

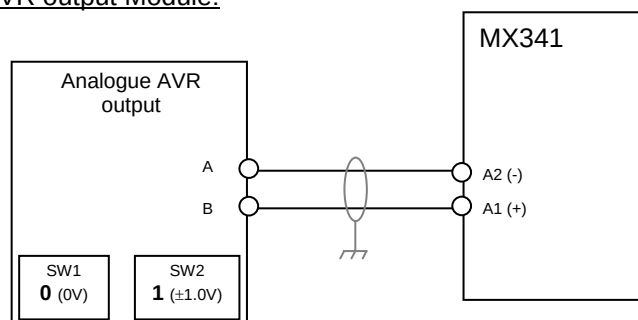
5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

NOTE:- MX341 inputs A1/A2 are “disabled” when the AVR’s voltage trim is wound fully anticlockwise!
The more “clockwise” the AVR’s voltage trim setting is, the more effect that the P121 will have upon the voltage adjustment.

3.13.3 MX341*

Using Analogue AVR output Module:



NOTE:

5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

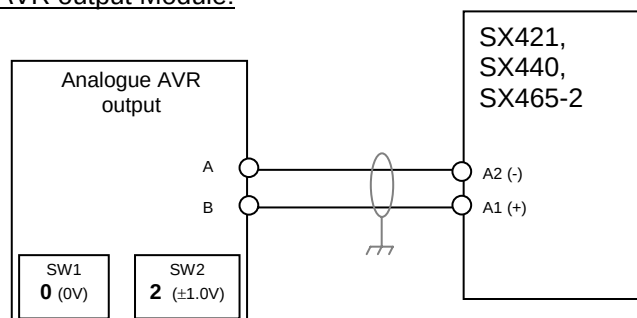
NOTE:-

MX341 inputs A1/A2 are “disabled” when the AVR’s voltage trim is wound fully anticlockwise!

The more “clockwise” the AVR’s voltage trim setting is, the more effect that the P121 will have upon the voltage adjustment.

3.13.4 SX421, SX440*, SX465-2

Using Analogue AVR output Module:



NOTE:

- Ensure the “VTrim” adjustment for the SX440’s voltage adjustment input is set to accept a signal of $\pm 1V$ DC.

NOTE:-

Ensure that some droop is configured using the AVR’s “Droop” adjustment. (typically 5%).

NOTE:

5510 / 5520 controllers : Analogue AVR output is integral to the controller.

550 / 555 controllers : Analogue AVR output is provided using the P121 governor AVR module, compatible with load sharing enabled 550 / 555 controllers.

3.13.5 SX460

As this AVR has no provision for the addition of a ‘droop kit’, it is not suitable for use in synchronising / load sharing applications.

3.14 WEG

3.14.1 GRT7-TH*

As this device is manufactured by Grameyer, please see the section entitled Grameyer elsewhere in this manual

4 APPENDIX

Applying a 'brake' to motorised potentiometers will help the response and stability of the potentiometer control. This brake is not necessary for digital potentiometers, only potentiometers with motor drives.

