



**DEEP SEA ELECTRONICS PLC**

**Guide to Synchronising and Load Sharing**  
**PART 2 – AVR & GOVERNOR INTERFACING**

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# 1 INTRODUCTION

This manual (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 Synchronising / Load Sharing Controller 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 55x controller for use in synchronising and load sharing systems.

Connection 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.

## 2 INTERFACING TO GOVERNORS / ENGINE ECU'S

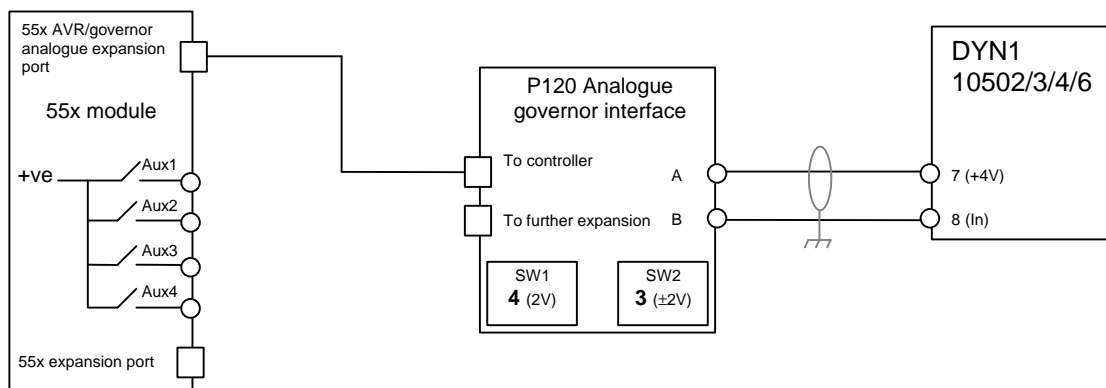
This section details the interface connections between the 55x controller and the most popular engine speed governors used with diesel generating sets.

If your particular type of Governor is not covered within this section, please contact our technical support department for advice.

### 2.1 BARBER COLMAN

#### 2.1.1 DYN1 10502, 10503, 10504, 10506

Using P120 Analogue governor interface module:

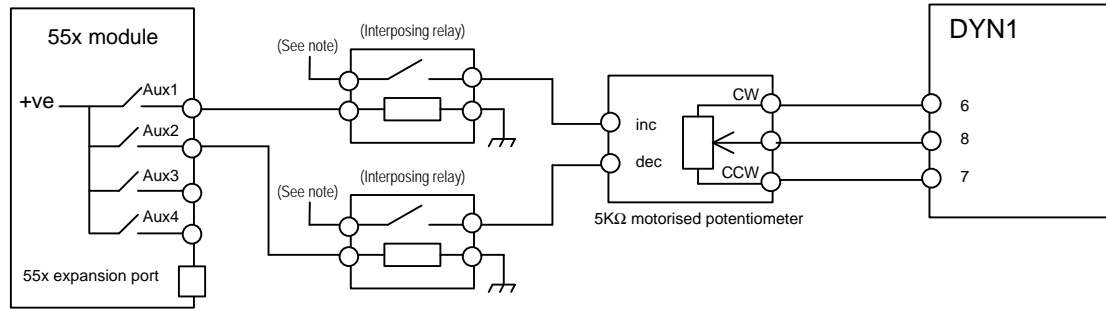


**NOTE:** - The AVR/Governor analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P120 interface module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

(DYN1 10502, 10503, 10504, 10506 continued)

Using external motorised potentiometer:



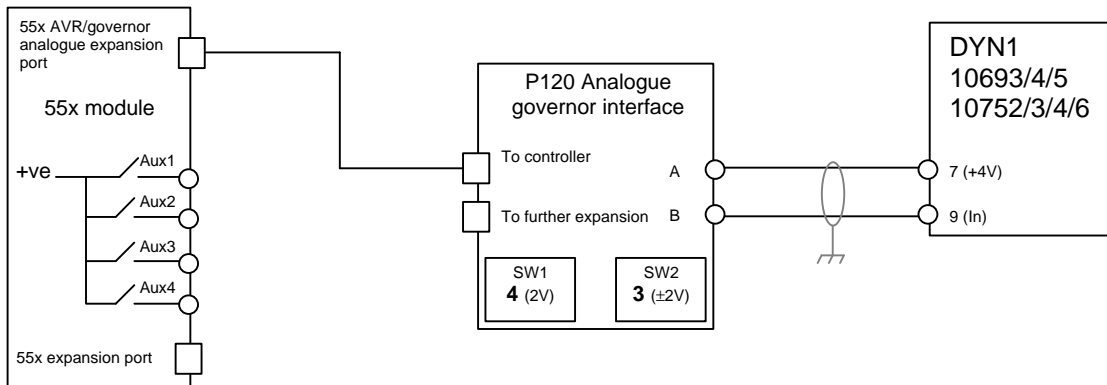
**NOTE:** - Interposing relay should connect to recommended polarity and voltage for potentiometer input. Refer to potentiometer manufacturer for details.

MODULE CONFIGURATION FOR 55X AUXILIARY RELAYS.

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

## 2.1.2 DYN1 10693, 10694, 10695, 10752, 10753, 10754, 10756

Using a P120 Analogue Governor Interface:



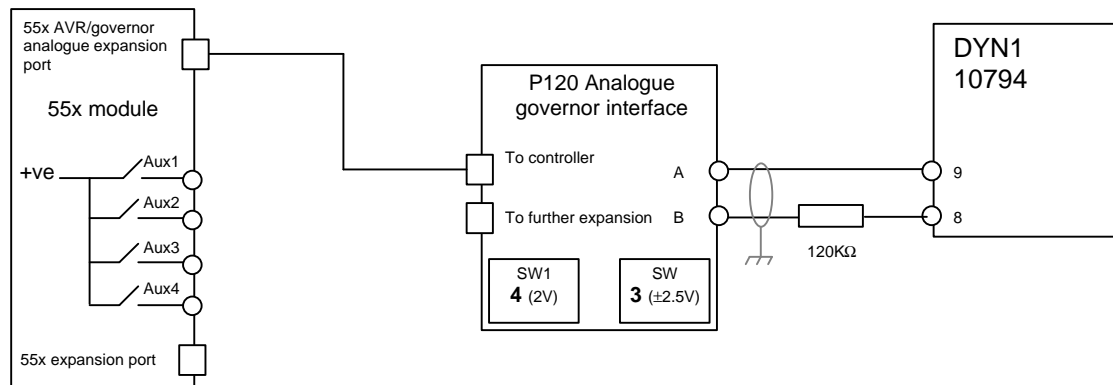
**NOTE:** - The AVR/Governor analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P120 interface module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.



### 2.1.3 DYN1 10794\*

Using P120 Analogue Interface Module:

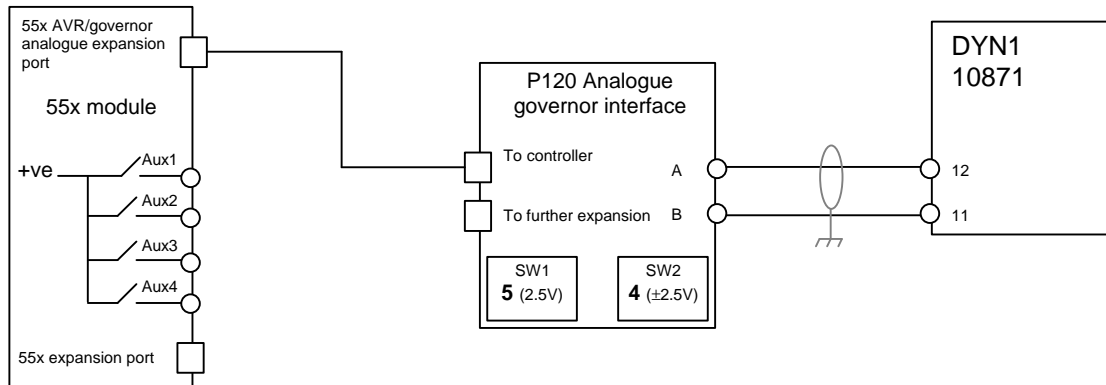


**NOTE:** - The AVR/Governor analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P120 interface module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

## 2.1.4 DYN1 10871

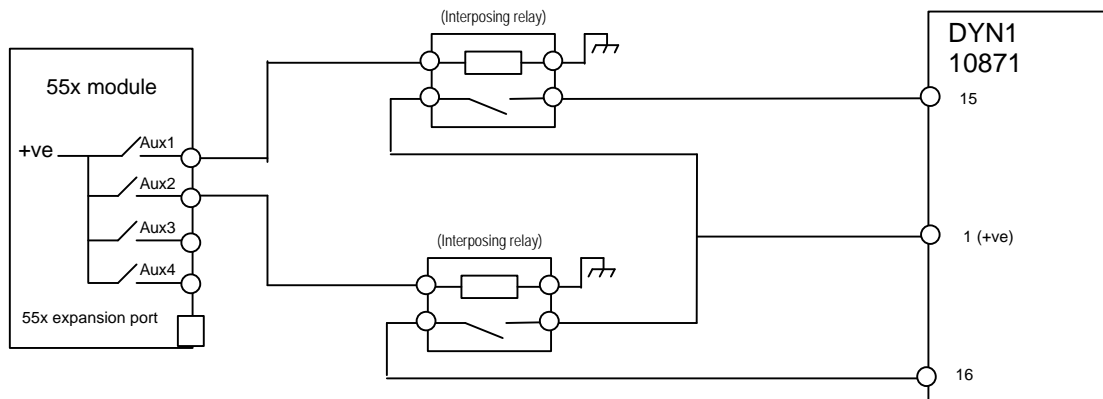
Using a P120 Analogue Governor Interface:



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the governor must be used.

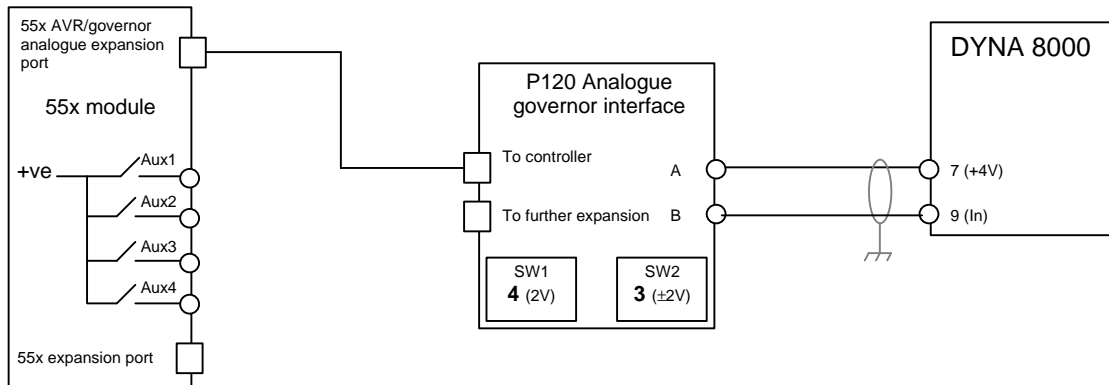
**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

Using discrete raise / lower inputs:



### 2.1.5 DYNA 8000\*

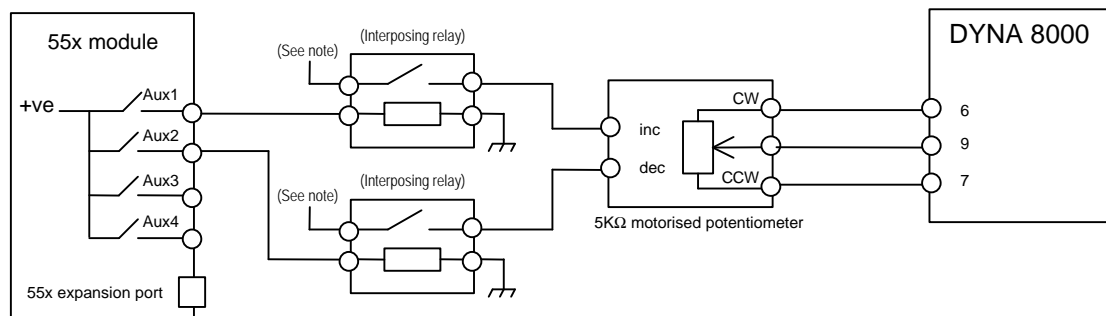
Using P120 Analogue governor interface module:



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

Using external motorised potentiometer:



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

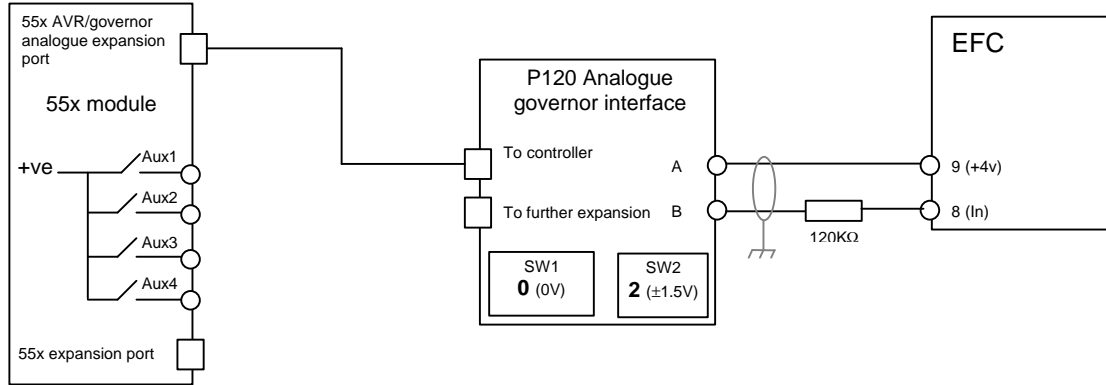
MODULE CONFIGURATION FOR 55X AUXILIARY RELAYS.

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

## 2.2 CUMMINS

### 2.2.1 EFC\*

Using P120 Analogue governor interface module:

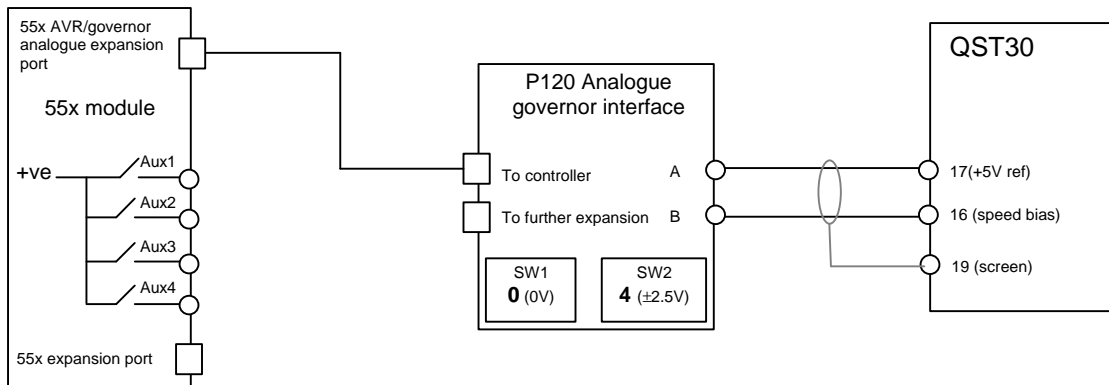


**NOTE:** - The AVR/Governor analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P120 interface module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

## 2.2.2 QST 30

Using P120 Analogue Governor Interface Module:



**NOTE:** - Ensure that the QST30 adjustable parameter Speed Bias Input Type is set to 'Woodward'.

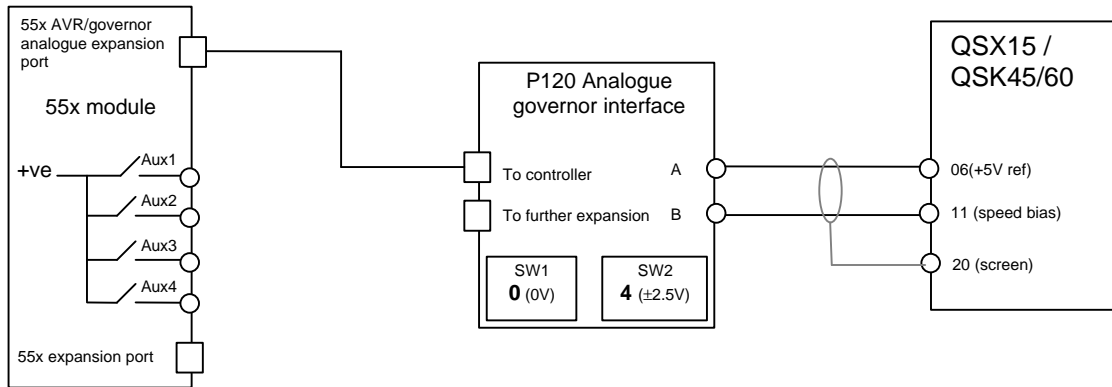
**NOTE:** - Setting the QST adjustable parameter Woodward scale factor to 60rpm/Volt gives a  $\pm 300$ RPM window of adjustment to engine speed.

**NOTE:** - The AVR/Governor 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 module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

2.2.3 QSX 15  
 2.2.4 QSK 45/60

Using P120 Analogue Governor Interface Module:



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

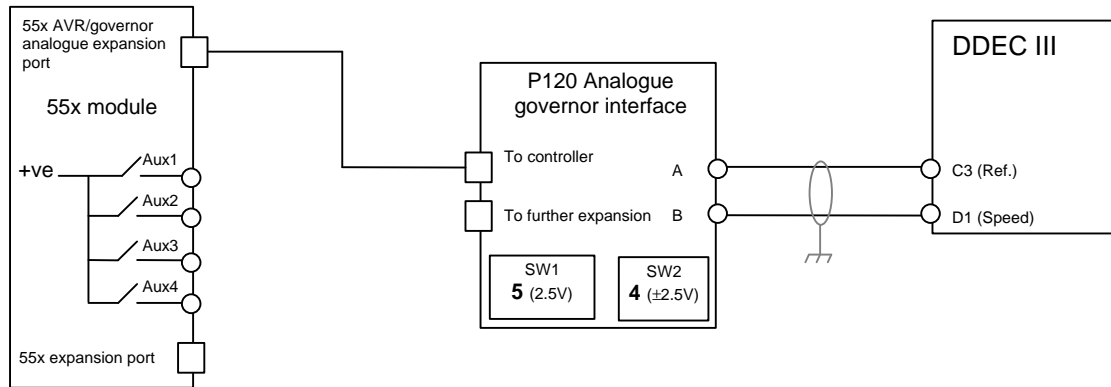
**NOTE:** - The AVR/Governor analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P120 interface module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

## 2.3 DETROIT DIESEL

### 2.3.1 DDEC III

USING P120 Analogue Governor Interface:



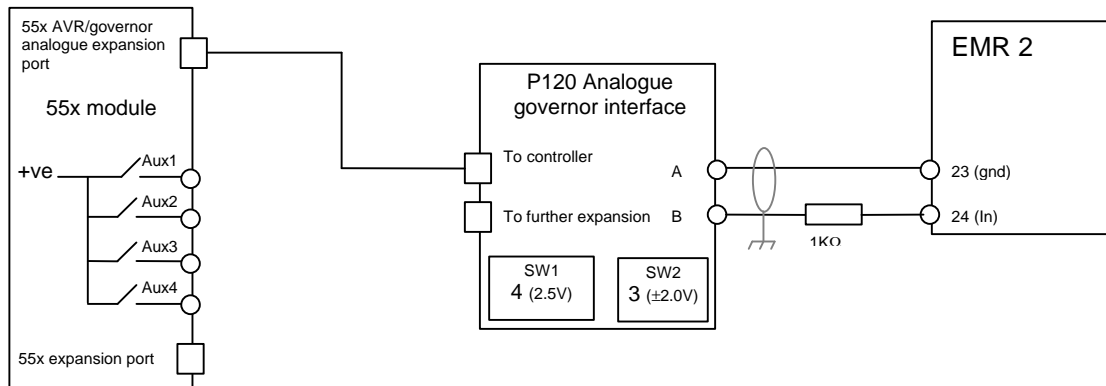
**NOTE:** - The AVR/Governor analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P120 interface module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

## 2.4 DEUTZ

### 2.4.1 EMR 2 ELECTRONIC ENGINE GOVERNOR\*

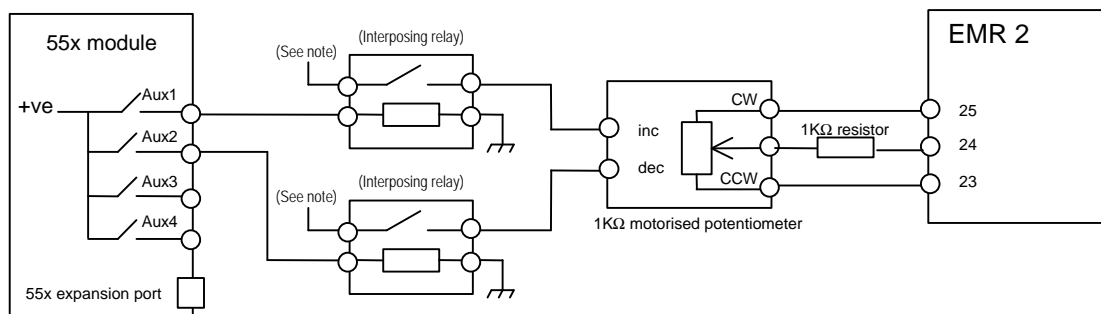
Using P120 Analogue governor interface module:



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

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 55X AUXILIARY RELAYS.

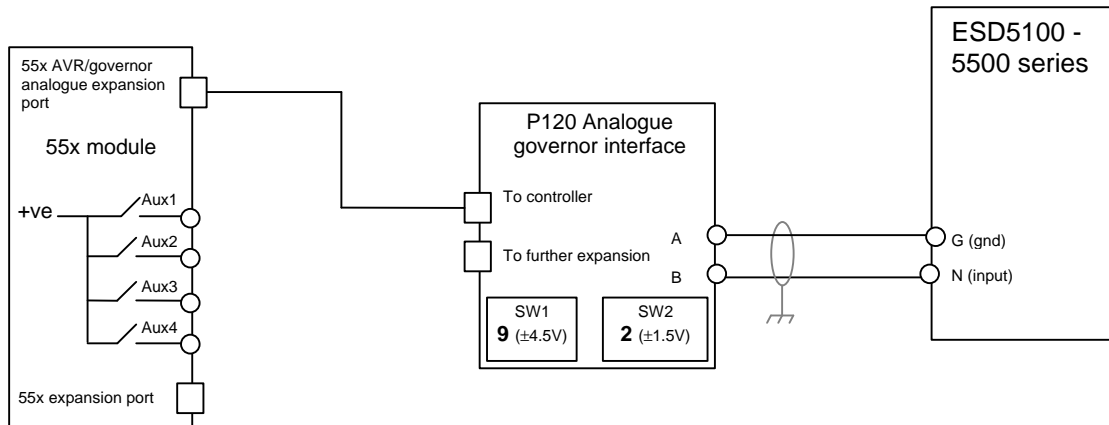
Module relay	Polarity	Output source
Aux. 1	Energise	Speed Raise Relay
Aux. 2	Energise	Speed Lower Relay



## 2.5 G.A.C. (GOVERNORS AMERICA CORP.)

### 2.5.1 5100 - 5500 SERIES\*

Using P120 Analogue Governor Interface Module:



#### MODULE CONFIGURATION FOR P120 INTERFACE

The 5100-5500 uses lower voltage on input N = higher speed. Therefore, we need to configure the 55x controller to 'reverse' the polarity of the P120's voltage output:

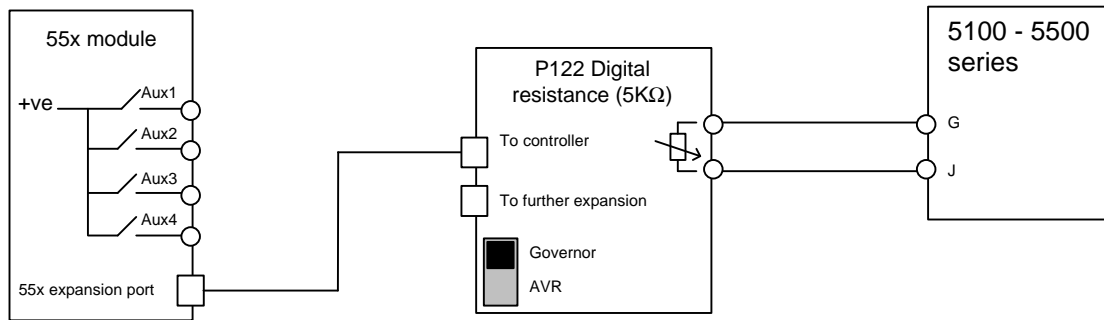
Configuration item	Selection
Reverse voltage output	<input checked="" type="checkbox"/>

**NOTE:** - The AVR/Governor 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 module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

(5100-5500 Series continued)

Using P122 Digital Resistance module:



#### MODULE CONFIGURATION FOR P122 INTERFACE

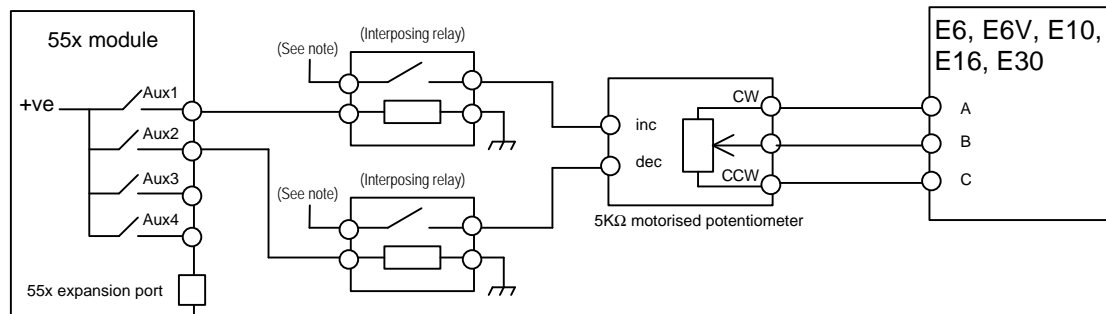
The 5100-5500 uses lower resistance on input N = higher speed. Therefore, we need to configure the 55x controller to 'reverse' the operation of the P122's resistance output:

Configuration item	Selection
Reverse governor output	<input checked="" type="checkbox"/>

**NOTE:** - If the 55x expansion port is already in use, the data connection to the P122 digital resistance module can be connected to the "To further expansion" socket of either an 81157xx relay board, 81548xx annunciator, or another P122 digital resistance module.

## 2.6 HEINZMANN

### 2.6.1 E6, E6V, E10, E16, E30



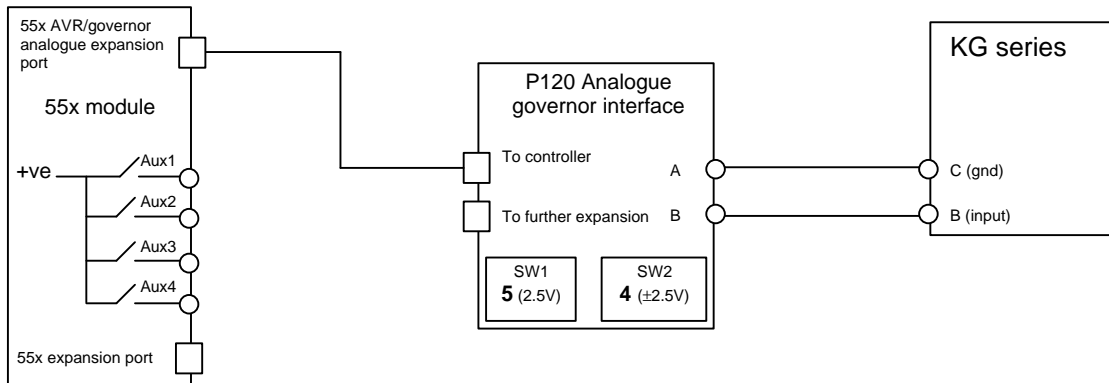
**NOTE:** - Interposing relay should connect to recommended polarity and voltage for potentiometer input. Refer to potentiometer manufacturer for details.

MODULE CONFIGURATION FOR 55X AUXILIARY RELAYS.

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

## 2.6.2 KG SERIES (6-04 TO 10-04)

Using P120 analogue governor interface:



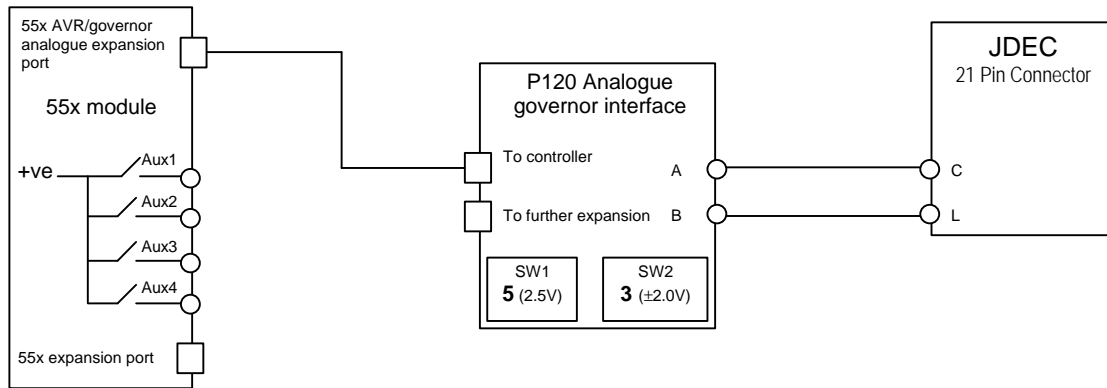
**NOTE:** - The AVR/Governor analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P120 interface module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

## 2.7 JOHN DEERE

### 2.7.1 JDEC

Using P120 analogue governor interface:



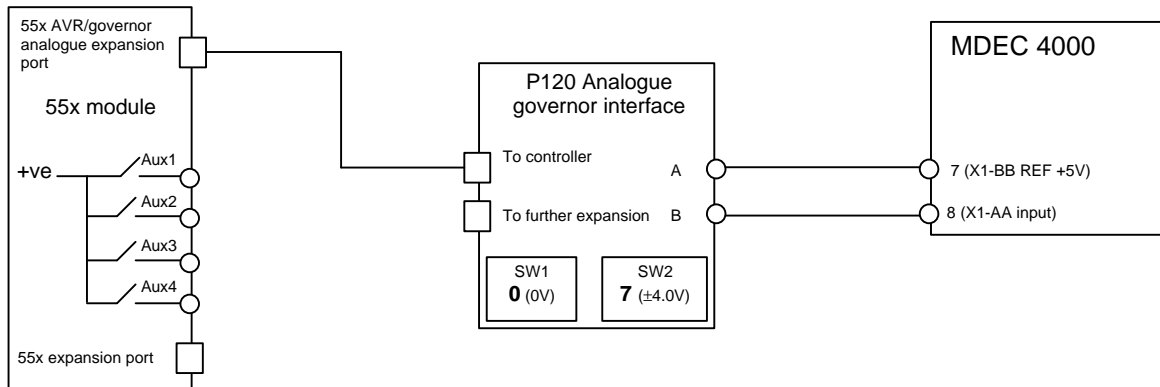
**NOTE:** - The AVR/Governor analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P120 interface module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

## 2.8 MTU

### 2.8.1 MDEC 4000

Using P120 analogue governor interface:



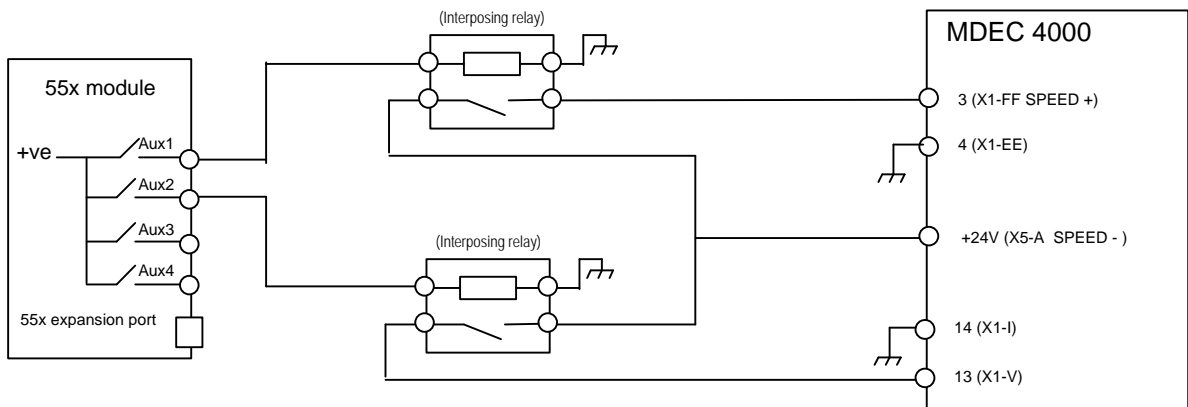
**NOTE:** - The range of speed adjustment possible is configurable within the MDEC 4000 controller. You are referred to the MDEC 4000 operating instructions for further details of this function.

**NOTE:** - The AVR/Governor 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 module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

(MDEC 4000 continued)

Using 55x internal raise/lower relays:



MODULE CONFIGURATION FOR 55X AUXILIARY RELAYS.

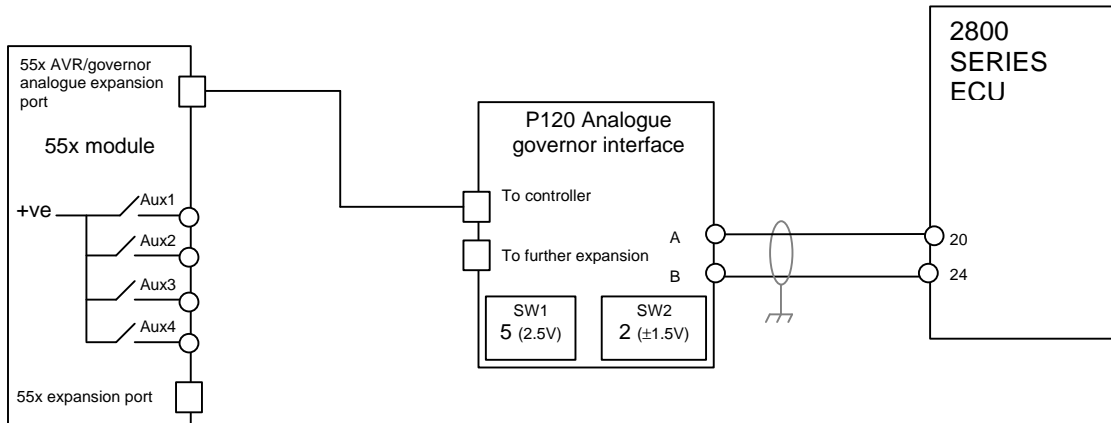
Module relay	Polarity	Output source
Aux. 1	Energise	Speed Raise Relay
Aux. 2	Energise	Speed Lower Relay

**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)

## 2.9 PERKINS

### 2.9.1 2800 SERIES ENGINE CONTROLLER

Using P120 Analogue Governor Interface Module:



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.



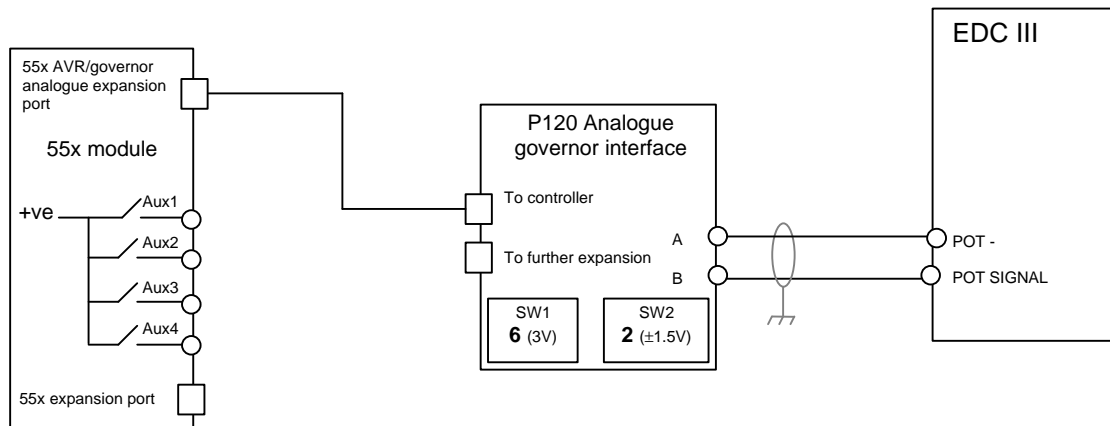
## 2.10 VOLVO

### 2.10.1 873979\*

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

### 2.10.2 EDC III

Using P120 Analogue Governor Interface Module:



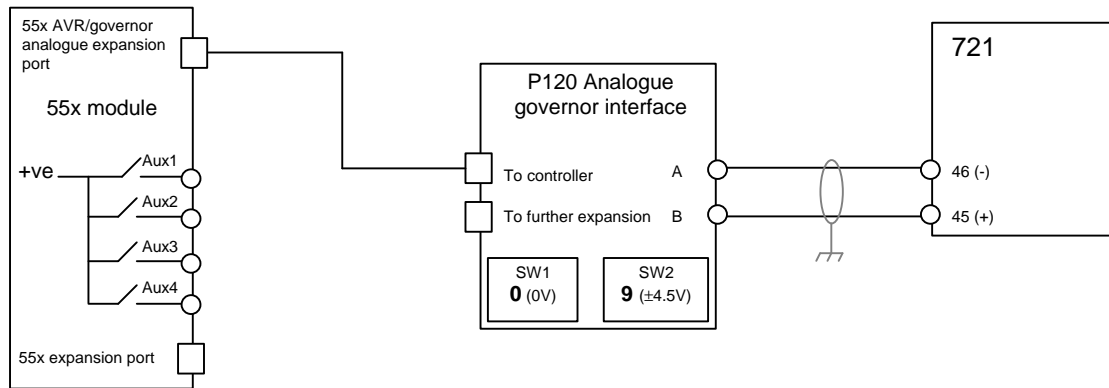
**NOTE:** - The AVR/Governor analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P120 interface module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

## 2.11 WOODWARD

### 2.11.1 721 DIGITAL SPEED CONTROL

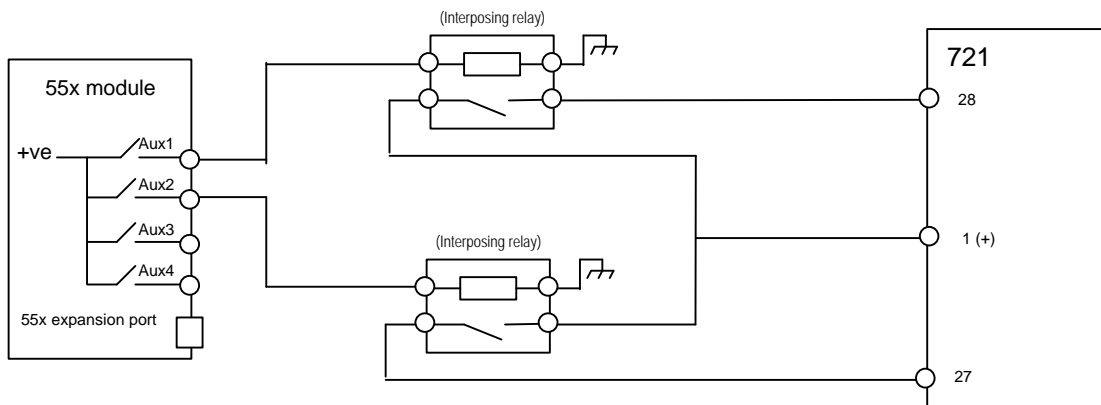
Using P120 analogue governor interface:



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

Using discrete raise/lower inputs:

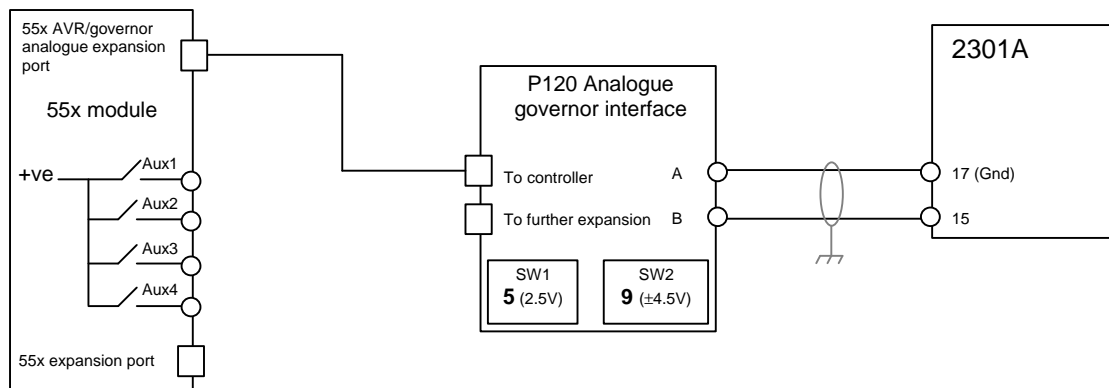


MODULE CONFIGURATION FOR 55X AUXILIARY RELAYS.

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

## 2.11.2 2301A SPEED CONTROL

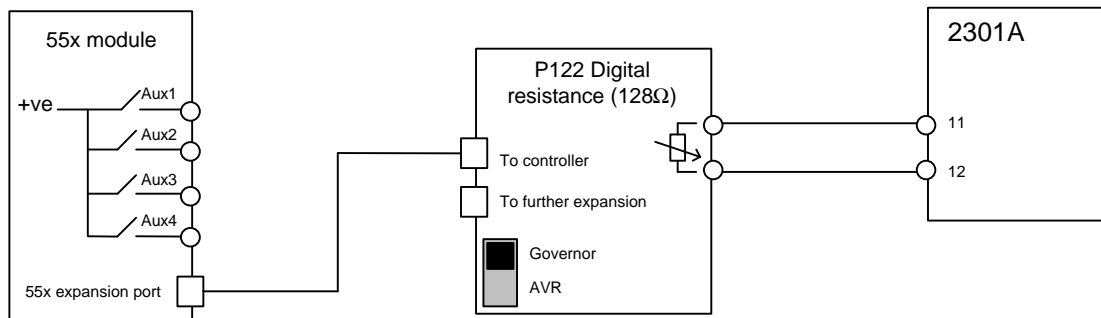
### Using P120 analogue governor interface



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the “To further expansion” socket of a P121 AVR interface module.

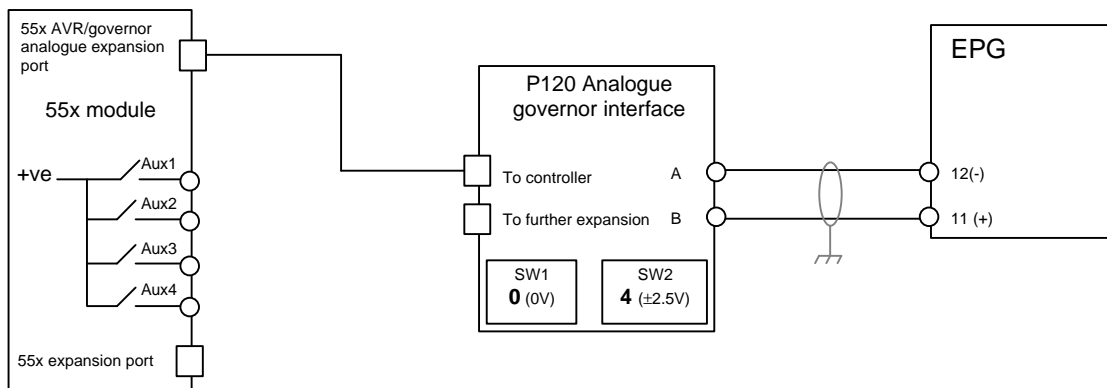
### Using P122 Digital resistance module



**NOTE:** - If the 55x expansion port is already in use, the data connection to the P122 digital resistance module can be connected to the “To further expansion” socket of either an 81157xx relay board, 81548xx annunciator, or another P122 digital resistance module.

### 2.11.3 EPG (ELECTRICALLY POWERED GOVERNORS)\*

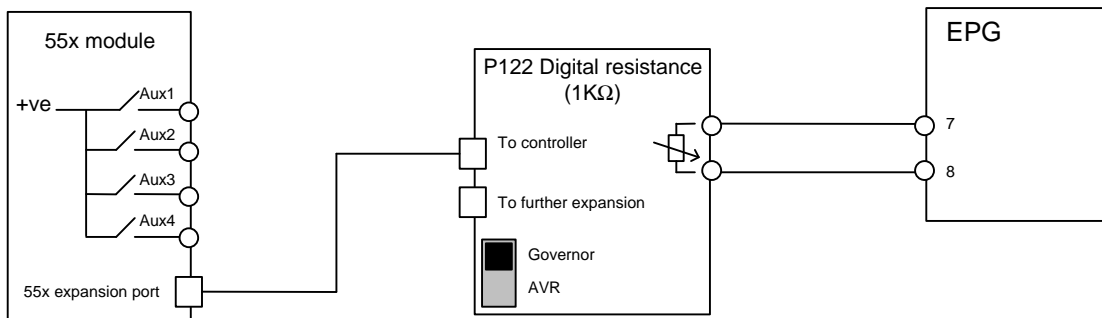
#### Using P120 analogue governor interface



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the governor must be used.

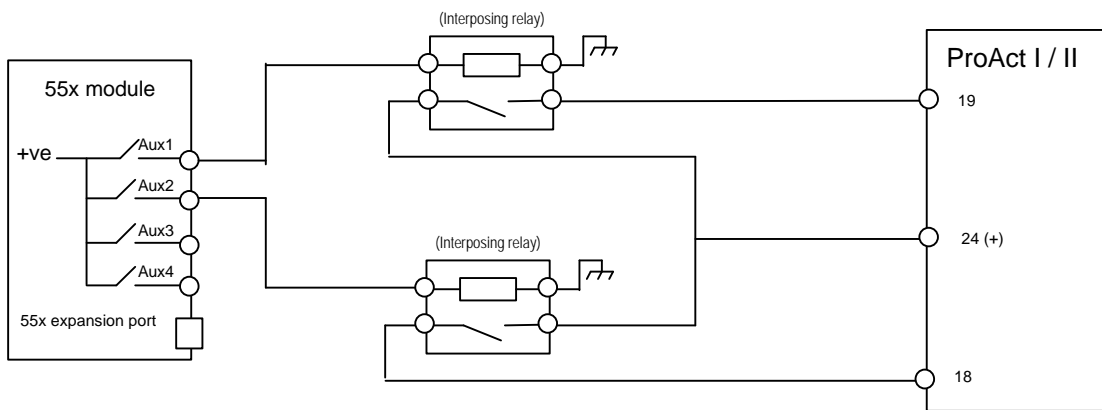
**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the “To further expansion” socket of a P121 AVR interface module.

#### Using P122 Digital Resistance Module:



**NOTE:** - If the 55x expansion port is already in use, the data connection to the P122 digital resistance module can be connected to the “To further expansion” socket of either an 81157xx relay board, 81548xx annunciator, or another P122 digital resistance module.

## 2.11.4 PROACT I / II



MODULE CONFIGURATION FOR 55X AUXILIARY RELAYS.

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

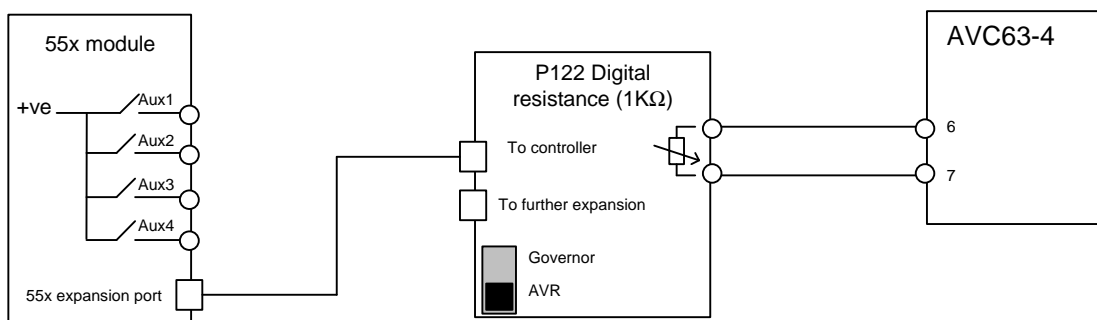
### 3 INTERFACING TO AUTOMATIC VOLTAGE REGULATORS

This section details the interface connections between the 55x controller and the most popular Automatic voltage regulators used with diesel generating sets.

If your particular type of A.V.R. is not covered within this section, please contact our technical support department for advice using the contact details provided in the section headed 'Introduction'.

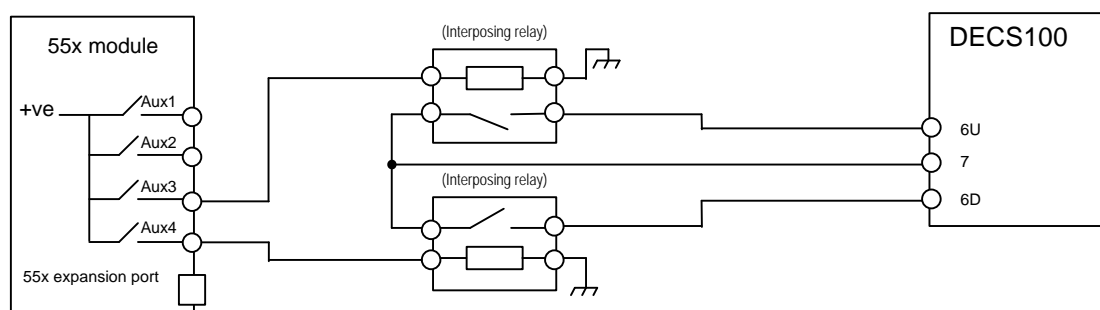
#### 3.1 BASLER

##### 3.1.1 AVC63-4



**NOTE:** - If the 55x expansion port is already in use, the data connection to the P122 digital resistance module can be connected to the "To further expansion" socket of either an 81157xx relay board, 81548xx annunciator, or another P122 digital resistance module.

##### 3.1.2 DECS 100 (DIGITAL EXCITATION CONTROL SYSTEM)

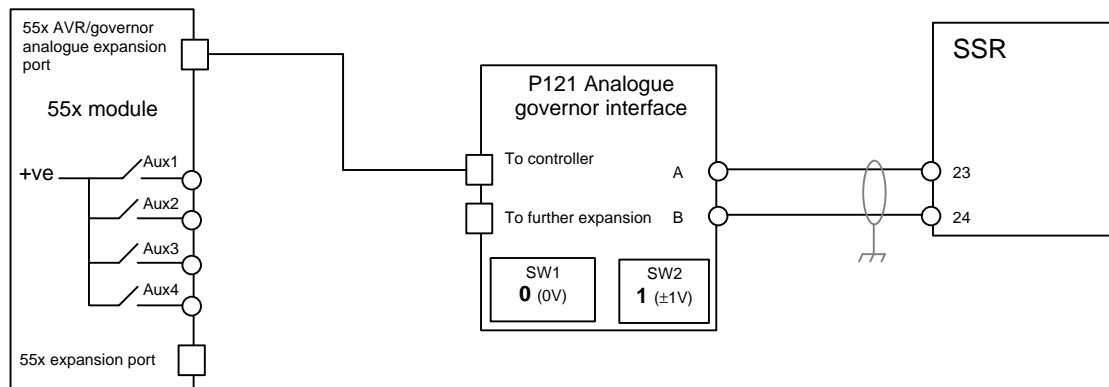


MODULE CONFIGURATION FOR 55X AUXILIARY RELAYS.

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

### 3.1.3 SSR

Using P121 Analogue AVR interface module:



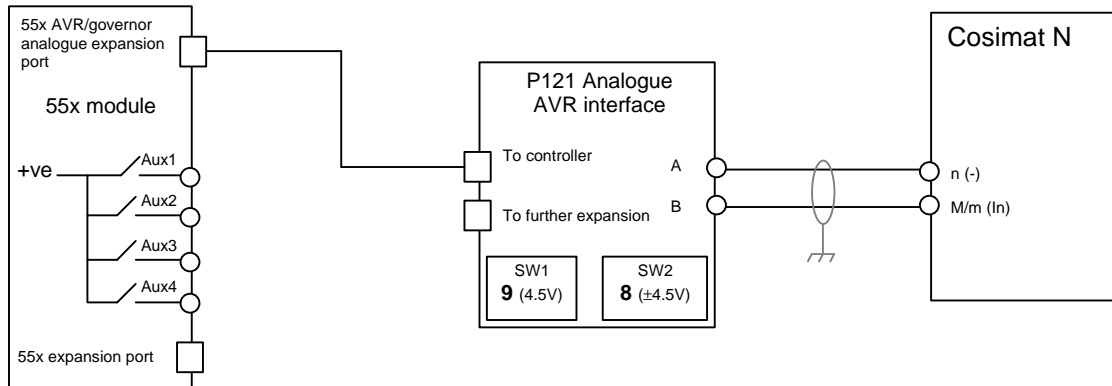
**NOTE:** - The AVR/Governor analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P121 interface module. A different method of interface to the governor must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

## 3.2 COSIMAT

### 3.2.1 COSIMAT N

Using P121 Analogue AVR Interface Module:



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the AVR must be used.

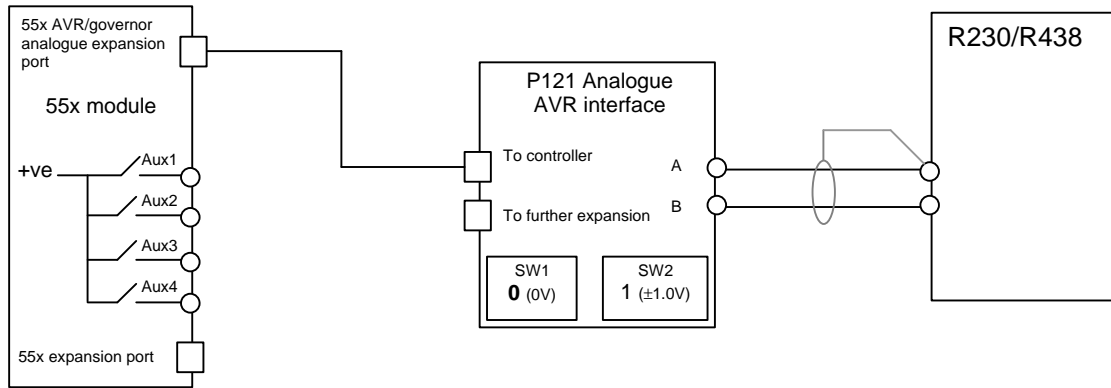
**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.



### 3.3 LEROY SOMER

#### 3.3.1 R230 / R438\*

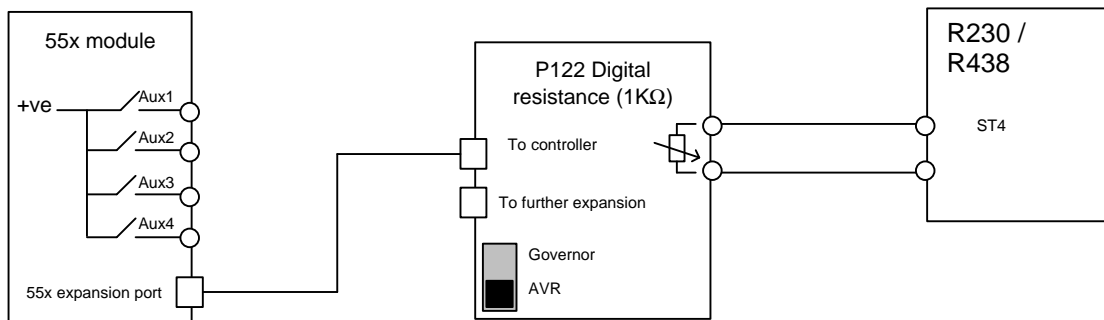
Using P121 Analogue AVR Interface Module:



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the AVR must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the “To further expansion” socket of a P121 AVR interface module.

Using P122 digital resistance module

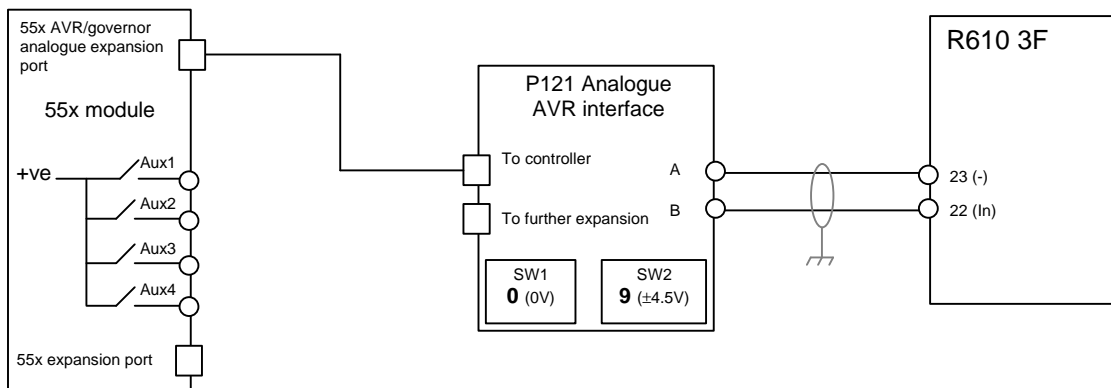


**NOTE:** - If the 55x expansion port is already in use, the data connection to the P122 digital resistance module can be connected to the “To further expansion” socket of either an 81157xx relay board, 81548xx annunciator, or another P122 digital resistance module.

**NOTE:** - The remote adjust input on the AVR are terminals ST4. Polarity of the connections between the terminals ST4 and the P122 is not important.

### 3.3.2 R610 3F

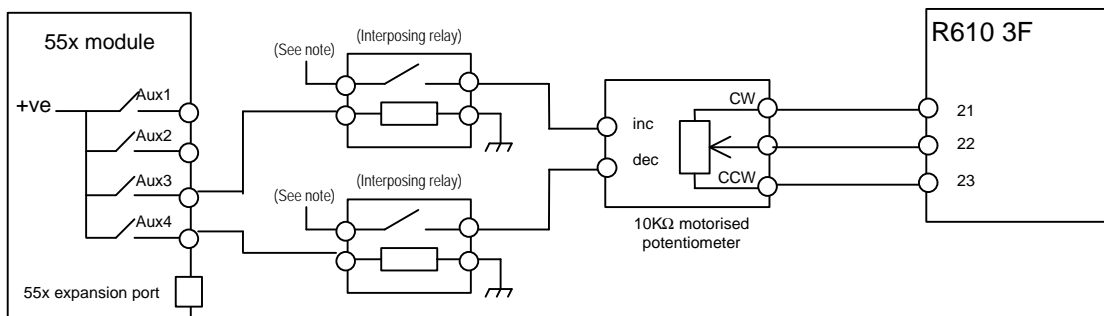
Using P121 Analogue AVR Interface Module:



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the AVR must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

Using external motorised potentiometer:



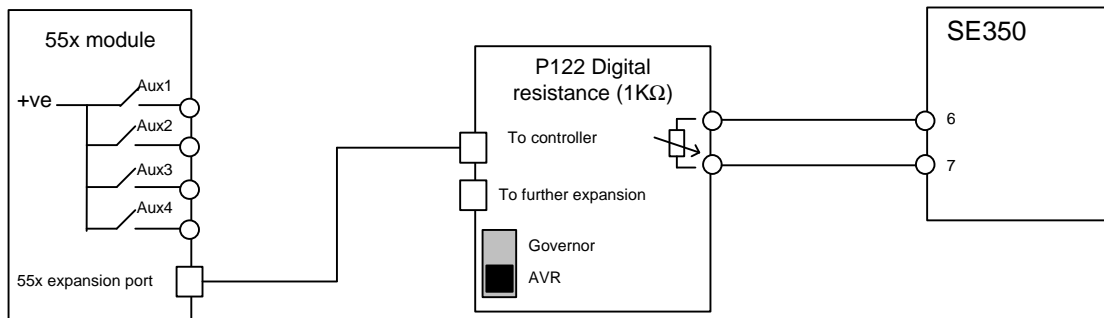
**NOTE:** - Interposing relay should connect to recommended polarity and voltage for potentiometer input. Refer to potentiometer manufacturer for details.

MODULE CONFIGURATION FOR 55X AUXILIARY RELAYS.

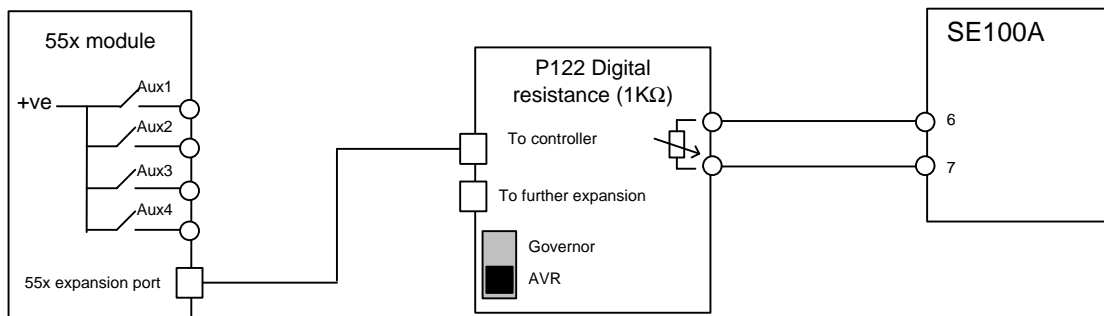
Module relay	Polarity	Output source
Aux. 1	Energise	Voltage Raise Relay
Aux. 2	Energise	Voltage Lower Relay

### 3.4 MARATHON

#### 3.4.1 SE350

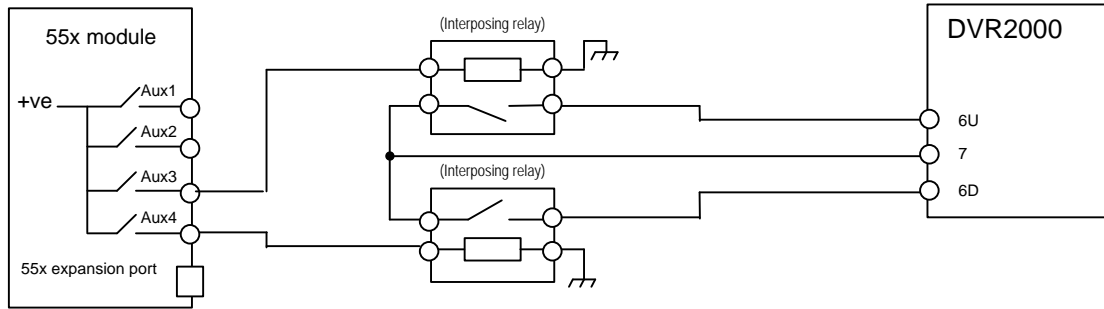


#### 3.4.2 SE100A



**NOTE:** - If the 55x expansion port is already in use, the data connection to the P122 digital resistance module can be connected to the "To further expansion" socket of either an 81157xx relay board, 81548xx annunciator, or another P122 digital resistance module.

### 3.4.3 MAGNAMAX DVR2000 / DVR2000C



MODULE CONFIGURATION FOR 55X AUXILIARY RELAYS.

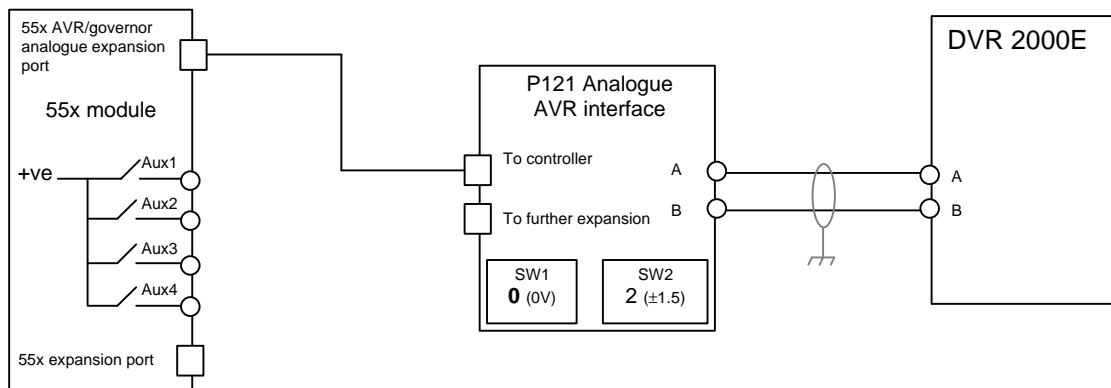
Module relay	Polarity	Output source
Aux. 3	Energise	Voltage Raise Relay
Aux. 4	Energise	Voltage Lower Relay

**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<sup>DVR™</sup> Technical Manual for Model DVR@ 2000)

**NOTE:** - The Magnamax<sup>DVR™</sup> 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<sup>DVR™</sup> AVR is in Select mode.

### 3.4.4 DVR2000E

Using P121 Analogue AVR Interface Module:



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the AVR must be used.

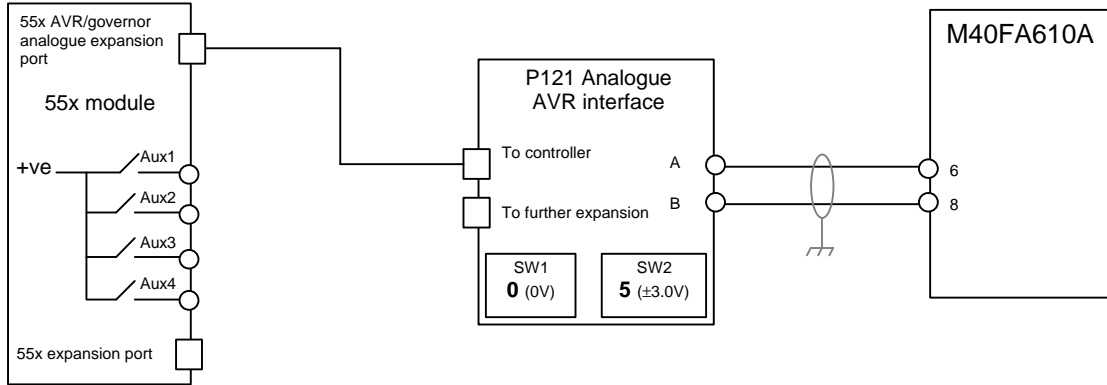
**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

**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)

# MARELLIMOTOR S.P.A.

## 3.4.5 M40FA610A

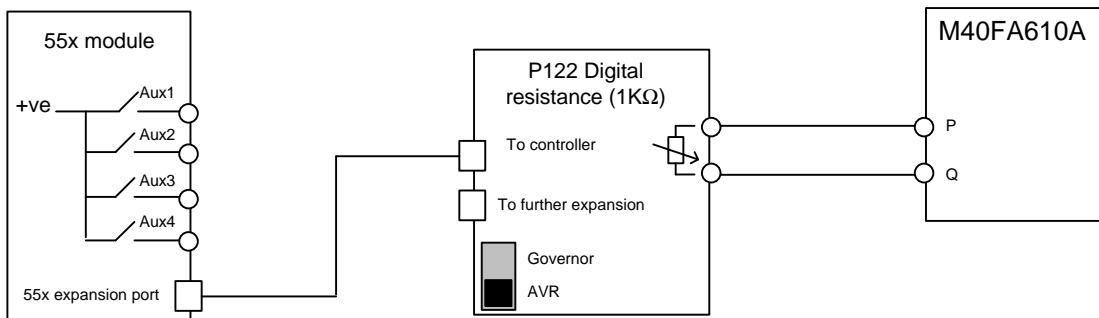
Using P121 analogue interface module:



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the AVR must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the “To further expansion” socket of a P121 AVR interface module.

Using P122 digital resistance module:

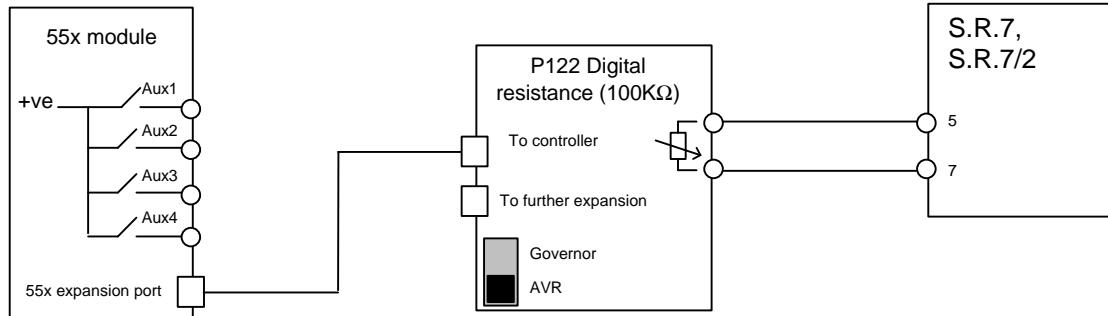


**NOTE:** - If the 55x expansion port is already in use, the data connection to the P122 digital resistance module can be connected to the “To further expansion” socket of either an 81157xx relay board, 81548xx annunciator, or another P122 digital resistance module.

### 3.5 MECC ALTE S.P.A.

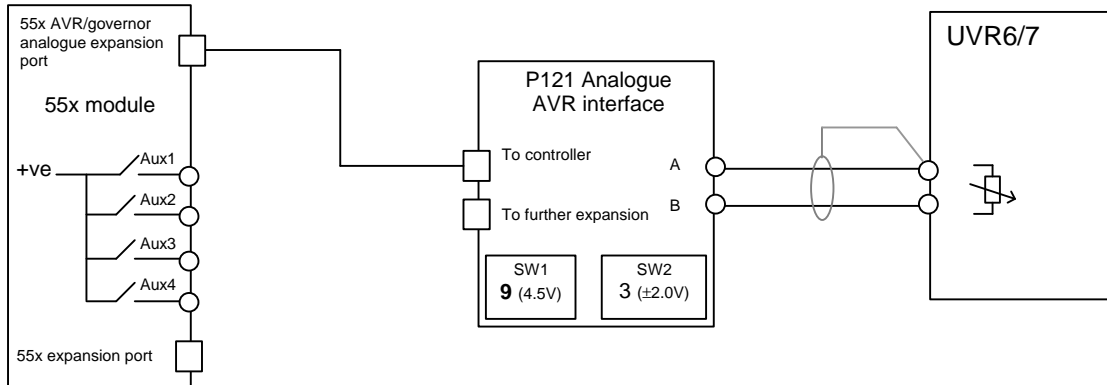
#### 3.5.1 S.R.7, S.R.7/2

Using P122 digital resistance module:



### 3.5.2 U.V.R.6, U.V.R.7\*

Using P121 analogue interface module:



#### MODULE CONFIGURATION FOR P120 INTERFACE

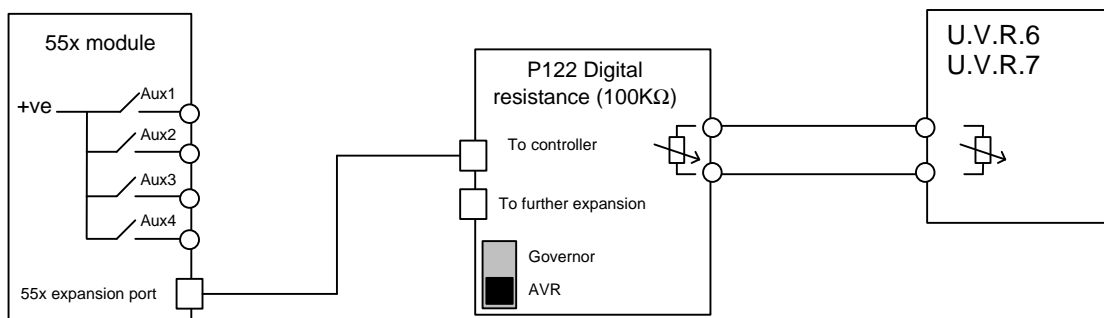
The UVR uses lower voltage on input N = higher generator output voltage. Therefore, we need to configure the 55x controller to 'reverse' the polarity of the P121's voltage output:

Configuration item	Selection
Reverse voltage output	<input checked="" type="checkbox"/>

**NOTE:** - The AVR/Governor 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 module. A different method of interface to the AVR must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

Using P122 digital resistance module:



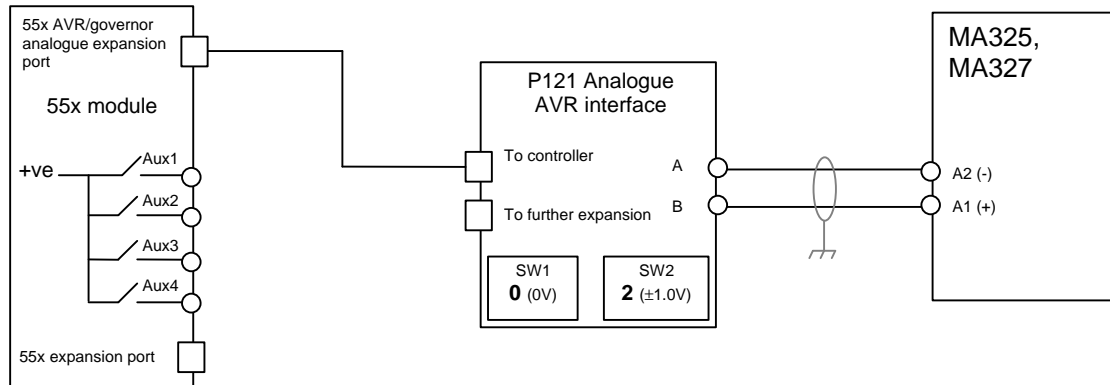
**NOTE:** - If the 55x expansion port is already in use, the data connection to the P122 digital resistance module can be connected to the "To further expansion" socket of either an 81157xx relay board, 81548xx annunciator, or another P122 digital resistance module.



## 3.6 NEWAGE INTERNATIONAL

### 3.6.1 MA325, MA327

Using P121 Analogue AVR Interface Module:

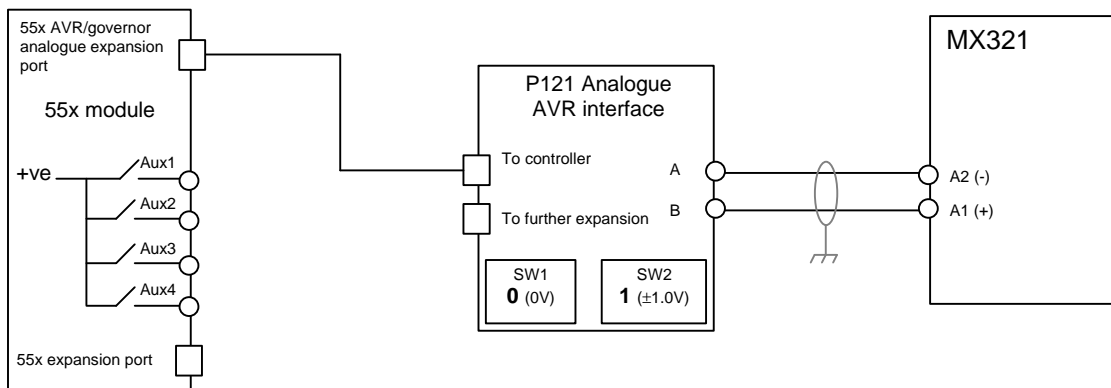


**NOTE:** - The AVR/Governor analogue expansion port is only fitted to load sharing enabled 55x controllers. Where this function is not fitted to the controller, it is not possible to use the P121 interface module. A different method of interface to the AVR must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

### 3.6.2 MX321\*

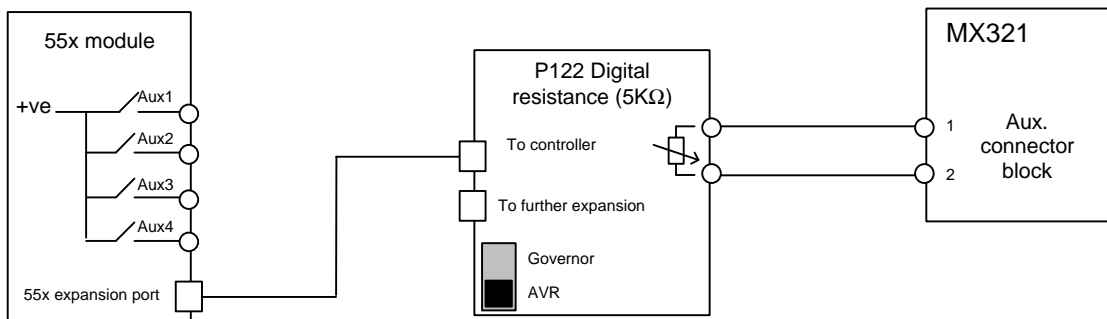
Using P121 Analogue AVR Interface Module:



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the AVR must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

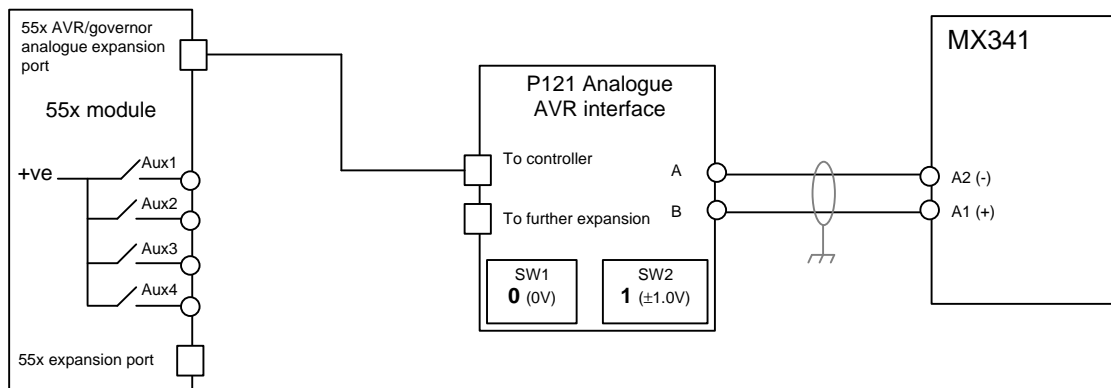
Using P122 Digital resistance Module:



**NOTE:** - If the 55x expansion port is already in use, the data connection to the P122 digital resistance module can be connected to the "To further expansion" socket of either an 81157xx relay board, 81548xx annunciator, or another P122 digital resistance module.

### 3.6.3 MX341

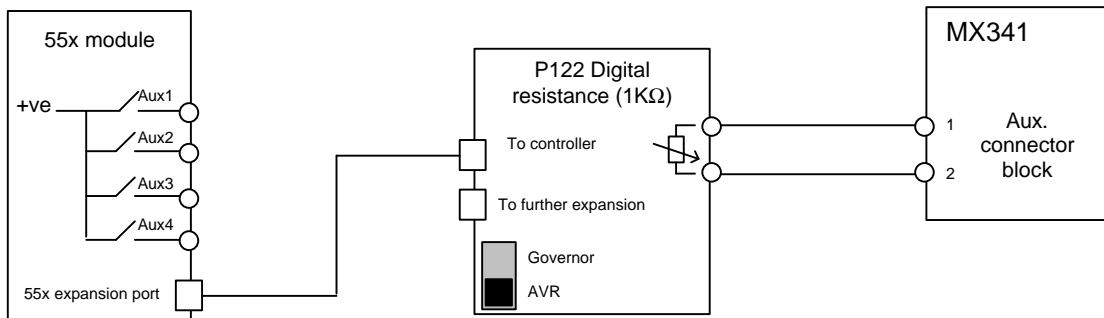
Using P121 Analogue AVR Interface Module:



**NOTE:** - The AVR/Governor 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 module. A different method of interface to the AVR must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the “To further expansion” socket of a P121 AVR interface module.

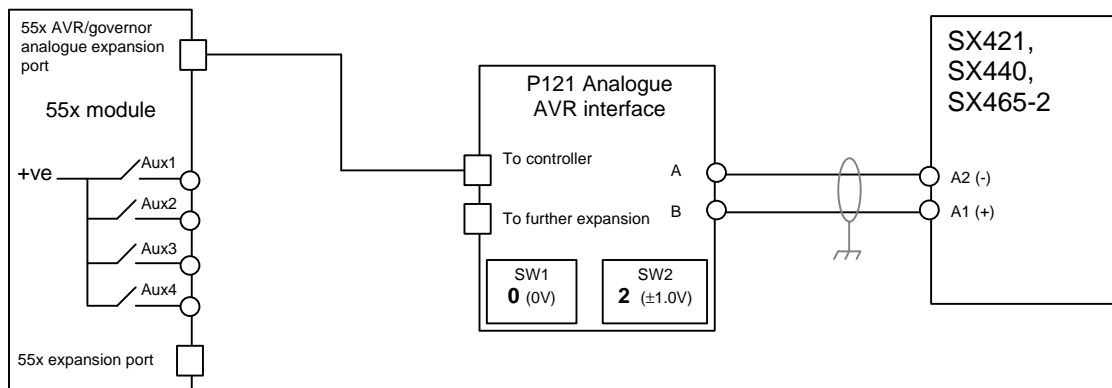
Using P122 Digital resistance module:



**NOTE:** - If the 55x expansion port is already in use, the data connection to the P122 digital resistance module can be connected to the “To further expansion” socket of either an 81157xx relay board, 81548xx annunciator, or another P122 digital resistance module.

### 3.6.4 SX421, SX440, SX465-2

Using P121 Analogue AVR Interface Module:



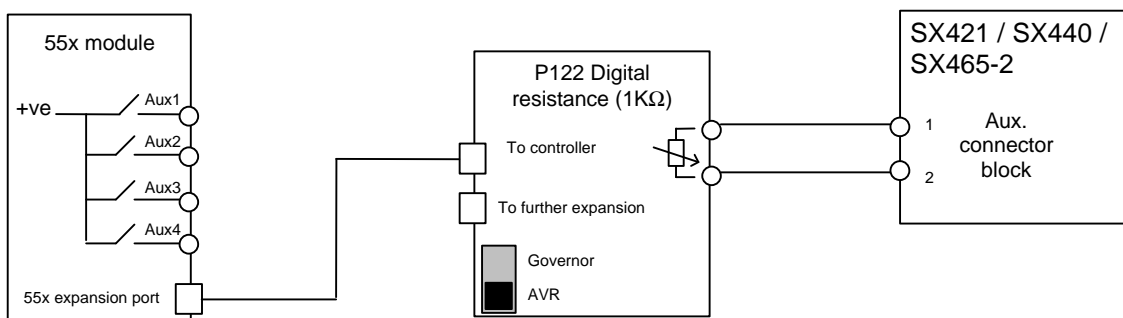
**NOTE:** - Ensure the “VTrim” adjustment for the SX440’s voltage adjustment input is set to accept a signal of  $\pm 1V$  DC.

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

**NOTE:** - The AVR/Governor 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 module. A different method of interface to the AVR must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the “To further expansion” socket of a P121 AVR interface module.

Using P122 Digital Resistance module:



**NOTE:** - If the 55x expansion port is already in use, the data connection to the P122 digital resistance module can be connected to the “To further expansion” socket of either an 8157xx relay board, 81548xx annunciator, or another P122 digital resistance module.

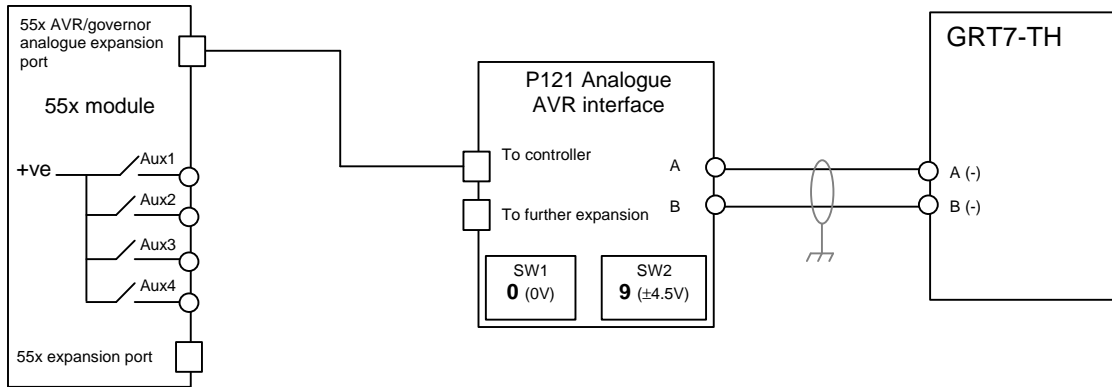
### **3.6.5 SX460**

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

### 3.7 WEG

#### 3.7.1 GRT7-TH

Using P121 Analogue AVR Interface Module:

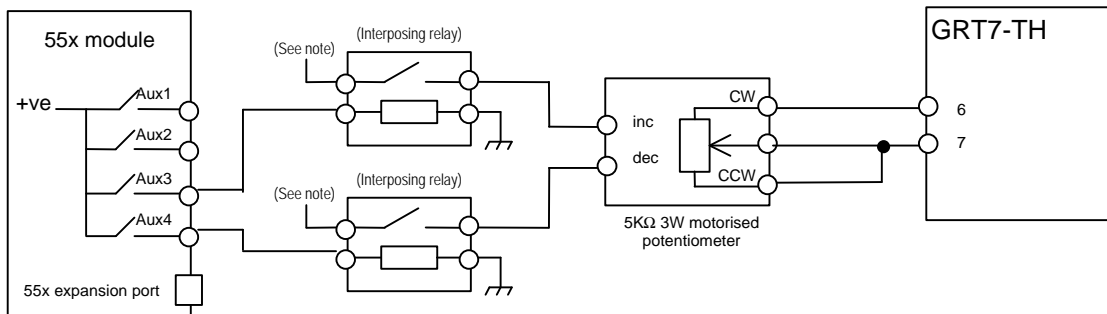


**NOTE:** - Using a P121 for AVR interface gives approximately +/- 5% adjustment of generator output voltage.

**NOTE:** - The AVR/Governor 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 module. A different method of interface to the AVR must be used.

**NOTE:** - If the 55x AVR/Governor expansion port is already in use, the data connection to the P120 governor interface can be connected to the "To further expansion" socket of a P121 AVR interface module.

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 55X AUXILIARY RELAYS.

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