SIGMA S6100 S/LS Module

Governor & AVR Interfacing

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Table of Contents

1 Preface

The SELCO SIGMA S6100 S/LS module will control the speed governor and automatic voltage regulator (AVR) of the generator set. Control of the speed governor is necessary in order for the S6100 module to do frequency stabilization, automatic synchronization and active load sharing. Control of the automatic voltage regulator is necessary in order to do voltage stabilization, voltage matching and reactive load sharing.

The S6100 module can control the speed governor and automatic voltage regulator by increase/decrease relay signals (contact pulses), or by an electronic signal (voltage, current or pulse-width-modulated signal).

This document explains how to interface various brands and types of speed governors and automatic voltage regulators to the speed and voltage control signals of the S6100 module.

2 Speed Governors

2.1 Barber-Colman Company

2.1.1 Dyn1 (Part no. 10794-000-0-24)

2.1.1.1 Pre-adjustment

To be written!

2.1.1.2 Electronic Control

Connection:

S6100 analogue output 1 terminal 1 (VDC) connected to governors terminal 8.
S6100 analogue output 1 terminal 4 (REF) connected to governors terminal 11.

Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *ANAOUT1*
WRITE SYS SPEEDCTRL ANAOUT SIGNAL *VOLT*
WRITE SYS SPEEDCTRL ANAOUT VOLTMIN *0.000*
WRITE SYS SPEEDCTRL ANAOUT VOLTMAX *8.000*

2.1.1.3 Potentiometer Control

To be written!

2.2 Cummins

2.2.1 Remote EFC Control (Part no. 3037359)

2.2.1.1 Pre-adjustment

The auxiliary speed trim of the Cummins Remote EFC Control (Part no. 3037359) has obviously been designed to operate with an external potentiometer. The potentiometer attaches to terminal 7, 8 and 9. Terminal 7 is at +7.2 VDC, while terminal 9 is at +3.6 VDC (measured according to terminal 11). Thus the sweeper moves between +3.6 and +7.2 VDC (compared terminal 11).

It seems that the best option is to use terminal 11 as reference (as opposed to terminal 2). Using terminal 2 as reference can cause the speed to fluctuate with the supply voltage of the EFC.

2.2.1.2 Electronic Control

Connection:

S6100 analogue output 1 terminal 1 (VDC) connected to governors terminal 8.
S6100 analogue output 1 terminal 4 (REF) connected to governors terminal 11.

Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *ANAOUT1*
WRITE SYS SPEEDCTRL ANAOUT SIGNAL *VOLT*
WRITE SYS SPEEDCTRL ANAOUT VOLTMIN *3.600*
WRITE SYS SPEEDCTRL ANAOUT VOLTMAX 7.*200*

2.2.1.3 Potentiometer Control

Motor Potentiometer:

5 kOhm / 10 turn

S6100 Relay Contacts terminal 1 (Speed +) to E7800 terminal 1 (INCR).
S6100 Relay Contacts terminal 2 to Control Voltage +
S6100 Relay Contacts terminal 3 (Speed -) to E7800 terminal 3 (DECR).
Control Voltage – to E7800 terminal 2.

E7800 terminal 4 to governors terminal 7
E7800 terminal 5 to governors terminal 8
E7800 terminal 6 to governors terminal 9

Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *SPEEDRELAY*

2.3 Governors America Corporation

2.3.1 ESD 5100

2.3.1.1 Pre-adjusment

To be written!

2.3.1.2 Electronic Control

Connection:

S6100 analogue output 1 terminal 1 (VDC) connected to governors terminal N (AUX).
S6100 analogue output 1 terminal 4 (REF) connected to governors terminal E (- BATTERY).

Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *ANAOUT1*
WRITE SYS SPEEDCTRL ANAOUT SIGNAL *VOLT*
WRITE SYS SPEEDCTRL ANAOUT VOLTMIN *10.000*
WRITE SYS SPEEDCTRL ANAOUT VOLTMAX *0.000*

2.3.1.3 Potentimeter Control

Motor Potentiometer:

5 kOhm / 5 turn

Connection:

S6100 Relay Contacts terminal 1 (Speed +) to E7800 terminal 1 (INCR).
S6100 Relay Contacts terminal 2 to Control Voltage +
S6100 Relay Contacts terminal 3 (Speed -) to E7800 terminal 3 (DECR).
Control Voltage – to E7800 terminal 2.

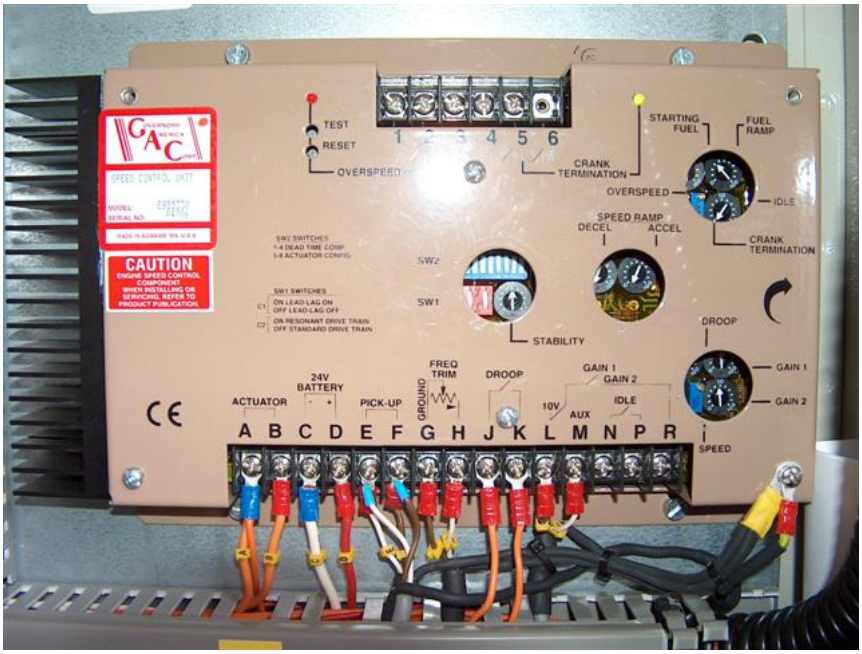
E7800 terminal 4 to governors terminal G
E7800 terminal 5 to governors terminal G
E7800 terminal 6 to governors terminal J

Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *SPEEDRELAY*

2.3.2 ESD 5300

2.3.2.1 Photo



2.3.2.2 Pre-adjustment

First, read through the datasheet of the governor. The datasheet provides the complete procedure for adjusting the governor. The procedure described below is summery.

Connect the external speed signal to terminal M (AUX) and ensure that the external controller is in manual mode (external speed signal is at nominal level). Also set the external FREQ. TRIM to middle position (if attached). Start the engine and adjust the SPEED trimmer so that revolutions match nominal speed (e.g. 1500 or 1800 RPM). Set the STABILITY and GAIN 1 (R-L Open) or GAIN 2 (R-L Closed) to middle position. Turn Stability CW until instability occurs, then turn

Stability CCW until stability is re-established. If the engine remains unstable, turn GAIN 1 or GAIN 2 CCW until stability is obtained. Stop the engine. Leave the remaining trimmers at the factory settings.

The governor can operate with external control in droop as well as isynchronous mode.

Connection:

S6100 analogue output 1 terminal 1 (VDC) connected to governors terminal M (AUX).
S6100 analogue output 1 terminal 4 (REF) connected to governors terminal C (24V BATTERY -).

Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *ANAOUT1*
WRITE SYS SPEEDCTRL ANAOUT SIGNAL *VOLT*
WRITE SYS SPEEDCTRL ANAOUT VOLTMIN *10.000*
WRITE SYS SPEEDCTRL ANAOUT VOLTMAX *0.000*

2.3.2.3 Potentiometer Control

Motor Potentiometer:

5 kOhm / 5 turn

Connection:

S6100 Relay Contacts terminal 1 (Speed +) to E7800 terminal 1 (INCR).
S6100 Relay Contacts terminal 2 to Control Voltage +
S6100 Relay Contacts terminal 3 (Speed -) to E7800 terminal 3 (DECR).
Control Voltage – to E7800 terminal 2.

E7800 terminal 4 to governors terminal H
E7800 terminal 5 to governors terminal H
E7800 terminal 6 to governors terminal G (GROUND)

Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *SPEEDRELAY*

2.3.3 ESD 5500

2.3.3.1 Photo

2.3.3.2 Pre-adjustment

First, read through the datasheet of the governor. The datasheet provides the complete procedure for adjusting the governor. The procedure described below is summery.

Connect the external speed signal to terminal N (AUX) and ensure that the external controller is in manual mode (external speed signal is at nominal level). Also set the external FREQ. TRIM to middle position (if attached). Start the engine and adjust the SPEED trimmer so that revolutions match nominal speed (e.g. 1500 or 1800 RPM). Set the STABILITY and GAIN to middle position. Turn Stability CW until instability occurs, then turn Stability CCW until stability is re-established. If the engine remains unstable, turn GAIN CCW until stability is obtained. Stop the engine. Leave the remaining trimmers at the factory settings.

The governor can operate with external control in droop as well as isynchronous mode.

2.3.3.3 Electronic Control

Connection:

S6100 analogue output 1 terminal 1 (VDC) connected to governors terminal N (AUX).
S6100 analogue output 1 terminal 4 (REF) connected to governors terminal E (- BATTERY).

Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *ANAOUT1*
WRITE SYS SPEEDCTRL ANAOUT SIGNAL *VOLT*
WRITE SYS SPEEDCTRL ANAOUT VOLTMIN *10.000*
WRITE SYS SPEEDCTRL ANAOUT VOLTMAX *0.000*

2.3.3.4 Potentiometer Control

Motor Potentiometer:

5 kOhm / 5 turn

Connection:

S6100 Relay Contacts terminal 1 (Speed +) to E7800 terminal 1 (INCR).
S6100 Relay Contacts terminal 2 to Control Voltage +
S6100 Relay Contacts terminal 3 (Speed -) to E7800 terminal 3 (DECR).
Control Voltage – to E7800 terminal 2.

E7800 terminal 4 to governors terminal J
E7800 terminal 5 to governors terminal J
E7800 terminal 6 to governors terminal G (GROUND)

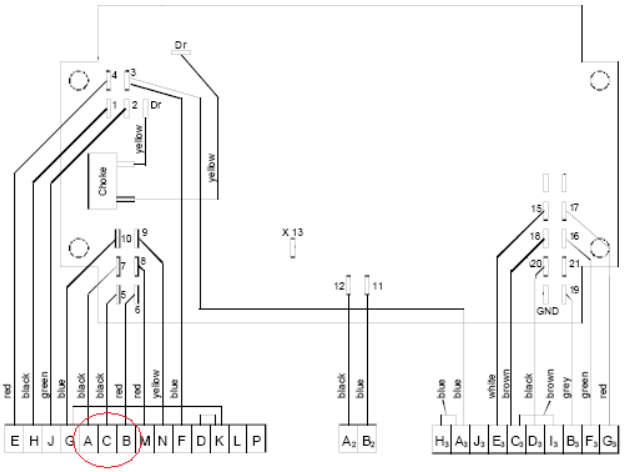
Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *SPEEDRELAY*

2.4 Heinzmann

2.4.1 E-series

2.4.1.1 Schematics



2.4.1.2 Pre-adjustment

External speed control of the Heinzmann E-series is intended to be done using a 5 kOhm potentiometer. Thus the easiest solution is to do potentiometer control using a SELCO E7800. Electronic control can be done but it requires a bit of tweaking. For electronic control to operate it is necessary to disconnect the potentiometer wiper from the governors terminal B and connected it to the reference of the S6100 speed output (terminal 4). The speed output of the S6100 (terminal 1) must then be connected to terminal B on the governor. In this setup the potentiometer can be used for offset adjustment of the frequency but should be left alone during normal operation.

2.4.1.3 Electronic Control

Connection:

S6100 analogue output 1 terminal 1 (VDC) connected to governors terminal B.
S6100 analogue output 1 terminal 4 (REF) connected to governors speed trim potentiometer wiper.

Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *ANAOUT1*
WRITE SYS SPEEDCTRL ANAOUT SIGNAL *VOLT*
WRITE SYS SPEEDCTRL ANAOUT VOLTMIN *-5.000*
WRITE SYS SPEEDCTRL ANAOUT VOLTMAX *5.000*

2.4.1.4 Potentiometer Control

Motor Potentiometer:

5 kOhm / 10 turn

Connection:

S6100 Relay Contacts terminal 1 (Speed +) to E7800 terminal 1 (INCR).
S6100 Relay Contacts terminal 2 to Control Voltage +
S6100 Relay Contacts terminal 3 (Speed -) to E7800 terminal 3 (DECR).
Control Voltage – to E7800 terminal 2.

E7800 terminal 4 to governors terminal C
E7800 terminal 5 to governors terminal B
E7800 terminal 6 to governors terminal A

Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *SPEEDRELAY*

2.4.2 KG-series

2.4.2.1 Pre-adjustment

To be written!

2.4.2.2 Electronic Control

Connection:

S6100 analogue output 1 terminal 1 (VDC) connected to governors terminal C3.
S6100 analogue output 1 terminal 4 (REF) connected to governors terminal A3.

Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *ANAOUT1*
WRITE SYS SPEEDCTRL ANAOUT SIGNAL *VOLT*
WRITE SYS SPEEDCTRL ANAOUT VOLTMIN *1.000*
WRITE SYS SPEEDCTRL ANAOUT VOLTMAX *5.000*

2.4.2.3 Potentiometer Control

Motor Potentiometer:

5 kOhm / 10 turn

Connection:

S6100 Relay Contacts terminal 1 (Speed +) to E7800 terminal 1 (INCR).
S6100 Relay Contacts terminal 2 to Control Voltage +
S6100 Relay Contacts terminal 3 (Speed -) to E7800 terminal 3 (DECR).
Control Voltage – to E7800 terminal 2.

E7800 terminal 4 to governors terminal C
E7800 terminal 5 to governors terminal B
E7800 terminal 6 to governors terminal A

Configuration:

WRITE SYS SPEEDCTRL MODE *GOVCTRL*
WRITE SYS SPEEDCTRL OUT *SPEEDRELAY*

3 Automatic Voltage Regulators

3.1 Newage AVK SEG

3.1.1 MX321

3.1.1.1 Pre-adjustment

Set the TRIM trimmer to middle position to allow for remote control of the excitation.

3.1.1.2 Electronic Control

Connection:

S6100 analogue output 2 terminal 5 (VDC) connected to voltage regulators terminal A2.
S6100 analogue output 2 terminal 8 (REF) connected to voltage regulators terminal A1.

Configuration:

WRITE SYS VOLTCTRL MODE *AVRCTRL*
WRITE SYS VOLTCTRL OUT *ANAOUT2*
WRITE SYS VOLTCTRL ANAOUT SIGNAL *VOLT*
WRITE SYS VOLTCTRL ANAOUT VOLTMIN *-5.000*
WRITE SYS VOLTCTRL ANAOUT VOLTMAX *5.000*

3.1.1.3 Potentiometer Control

Motor Potentiometer:

1 kOhm / 10 turn

Connection:

S6100 Relay Contacts terminal 4 (Volt +) to E7800 terminal 1 (INCR).
S6100 Relay Contacts terminal 5 to Control Voltage +
S6100 Relay Contacts terminal 6 (Volt -) to E7800 terminal 3 (DECR).
Control Voltage – to E7800 terminal 2.

E7800 terminal 4 to voltage regulators terminal 1 (External Hand Trim Connection)
E7800 terminal 5 to voltage regulators terminal 1 (External Hand Trim Connection)
E7800 terminal 6 to voltage regulators terminal 2 (External Hand Trim Connection)

Configuration:

WRITE SYS VOLTCTRL MODE *AVRCTRL*
WRITE SYS VOLTCTRL OUT *VOLTRELAY*

3.1.2 MX341

3.1.2.1 Pre-adjustment

Set the TRIM trimmer to middle position to allow for remote control of the excitation.

3.1.2.2 Electronic Control

Connection:

S6100 analogue output 2 terminal 5 (VDC) connected to voltage regulators terminal A2.
S6100 analogue output 2 terminal 8 (REF) connected to voltage regulators terminal A1.

Configuration:

WRITE SYS VOLTCTRL MODE *AVRCTRL*
WRITE SYS VOLTCTRL OUT *ANAOUT2*
WRITE SYS VOLTCTRL ANAOUT SIGNAL *VOLT*
WRITE SYS VOLTCTRL ANAOUT VOLTMIN *-5.000*
WRITE SYS VOLTCTRL ANAOUT VOLTMAX *5.000*

3.1.2.3 Potentiometer Control

Motor Potentiometer:

1 kOhm / 10 turn

Connection:

S6100 Relay Contacts terminal 4 (Volt +) to E7800 terminal 1 (INCR).
S6100 Relay Contacts terminal 5 to Control Voltage +
S6100 Relay Contacts terminal 6 (Volt -) to E7800 terminal 3 (DECR).
Control Voltage – to E7800 terminal 2.

E7800 terminal 4 to voltage regulators terminal 1 (External Hand Trim Connection)
E7800 terminal 5 to voltage regulators terminal 1 (External Hand Trim Connection)
E7800 terminal 6 to voltage regulators terminal 2 (External Hand Trim Connection)

Configuration:

WRITE SYS VOLTCTRL MODE *AVRCTRL*
WRITE SYS VOLTCTRL OUT *VOLTRELAY*