



Document Reference: AN060020VS1

HOW TO USE A 4–20 mA OR A 0-20 mA SIGNAL ON ANALOG INPUT # 1

WARNING: This equipment contains high voltages and rotating parts of motors and driven machines. Read the VS1 instruction manual first and observe all safety precautions prior to working on this equipment!

Required Equipment:

VS1SP Inverter
VS1GV Vector
VS1SD Servo

Introduction:

Two analog inputs are available on VS1 drives: analog input #1 (J1-1 and J1-2) and analog input #2 (J1-4 and J1-5). Either analog input may be selected in Level 1 INPUT SETUP block, Command Source Parameter.

Analog input #1 is a 0-10VDC voltage input. Connect voltage signal to J1-1 (-) and J1-2 (+). When using a potentiometer as the speed command, process feedback or set point source, the potentiometer is connected to J1-1 (common), J1-2 (wiper) and J1-3 (10 VDC power supply).

Analog input #2 can be set for voltage or current mode operation and it will typically accept +/- 5VDC, +/- 10VDC, 0-20mA or 4-20mA commands based on the position of Jumper JP1 as shown in Figure 3-15 of the H2 instruction manual. How would one use a 4-20mA current signal on analog input #1?

Procedure:

Analog input #1 is a high impedance voltage input intended for a 0-10VDC voltage command signal. If it is desired to use analog input #1 as a 4-20mA (or 0-20mA) current command input it will be necessary to convert the 4-20mA (or 0-20mA) current command signal to a voltage command signal. While an external signal conditioner can be used to convert the current signal to a voltage signal, the simple conversion can be accomplished by installing a 500 ohm precision (1%) external resistor across terminals J1-1 and J1-2 and connecting the 4-20mA (or 0-20mA) signal to the same terminals J1-1 (-) and J1-2 (+). This external resistor is not provided by Baldor, but can easily be found

at electrical supply houses. This 500 ohm 1% precision resistor should have a power rating of ½ watt.

Per Ohm's Law: $E = I \times R$ therefore :

For 0 mA input, the voltage across the resistor will be $0 \text{ mA} \times 500 \text{ Ohms} = 0 \text{ Volts}$

For 4 mA input, the voltage across the resistor will be $4 \text{ mA} \times 500 \text{ Ohms} = 2 \text{ Volts}$

For 20 mA input, the voltage across the resistor will be $20 \text{ mA} \times 500 \text{ Ohms} = 10 \text{ Volts}$

With this connection, the controller will respond to a voltage command signal across terminals J1-1 and J1-2. The Level 1, INPUT SETUP BLOCK, ANALOG INPUT 1 TYPE Parameter 1403 should be left at the factory default setting 1 – Potentiometer!

When using a 4-20mA signal, the Level 1, INPUT SETUP BLOCK, ANA IN 1 INVERT Parameter 1404, ANA IN 1 GAIN Parameter 1405, ANA IN OFFSET Parameter 1406 and ANA IN 1 FILTER Parameter 1407 can be used as necessary to fine tune the drive for the application. Please refer to the H2 instruction manual for details.

The following parameters will need to be adjusted to compensate for the 20% offset in the 4-20ma analog input (2 – 10vdc):

ANA IN 1 OFFSET = -20%

ANA IN 1 GAIN = 125 (+/-5)

Note: When using a 0-20mA signal, on Analog Input # 1, you will not need to adjust the ANA IN 1 OFFSET or ANA IN 1 GAIN parameters because there is not a 20% offset.