

Analog Output Options for Syringe Pumps

Installation and Operation Instructions

Overview

Teledyne Isco offers several options for output signals to monitor flow rate and pressure. Voltage and current outputs transmit data for flow rate, pressure, and volume remaining in the cylinder.

The D-Series pump controller underwent design updates in November 2011, and the HL-Series pump controller underwent the same in October 2013. Some features and options are only compatible with either the legacy controller or the current controller. This bulletin is divided into a section for [~Legacy Controller Outputs~](#) and a section for [~Current Controller Outputs~](#).

If you are unsure which version you have, refer to Technical Bulletin [TB28 D-Series Syringe Pump Controller Versions](#) before selecting options for, servicing, or operating the controller.

Note
Output voltage for pressure is also located on the back panel of all pump modules via standard banana jacks.

Table 1: Optional Controller Outputs for Voltage & Current

Controller Version	Voltage: 0-10V (selectable ranges)	Current: 4-20mA
Legacy	Internal circuit board 4 Outputs Flow: Up to 3 pumps Volume: Up to 2 pumps Pressure: User-installed kit	3 Internal circuit boards (more can be added) Up to 3 pumps
Current	Internal circuit board 4 Outputs Up to 4 pumps Pressure included	3 Internal circuit boards (more can be added) Up to 4 pumps

Part Numbers for Analog Output Options

Part numbers are listed in the table below. Contact Teledyne Isco for additional details and ordering information.

Table 2: Parts Listing of Analog Options

Description	Part Number
Pump controller w/ analog voltage outputs	68-1240-046
Analog voltage output conversion package (flow & volume)	68-1247-070
Analog voltage output conversion package (flow, volume, & pressure)	60-5364-261
4-20mA analog output for one pump (3 outputs)	68-1247-120
Additional output cards	68-1247-121

~Legacy Controller Outputs~

With the exception of the legacy voltage output option that includes pressure, circuit boards are pre-installed in the controller at the factory. They can also be installed or removed by the user at a later time.

The analog output connection is the female 25-pin Sub-D connector located on the rear panel of the controller, under ANALOG OUTPUT.

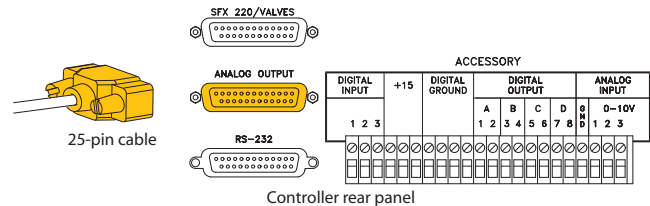


Figure 1: Analog output connection, rear panel

Voltage Analog Output

The voltage analog output board for flow and volume is pre-installed at the factory, but can also be purchased in an upgrade kit. The version that includes pressure is only available as an upgrade kit.

This option has a total of four outputs with selectable ranges from 0 to 5V, -5 to +5V, and 0 to 10V. The default range at installation is 0 to 10V. To adjust the range, remove the top cover of the controller (Figure 2), and move the jumper to a new range (Figure 3). Each output can be set to a different range.

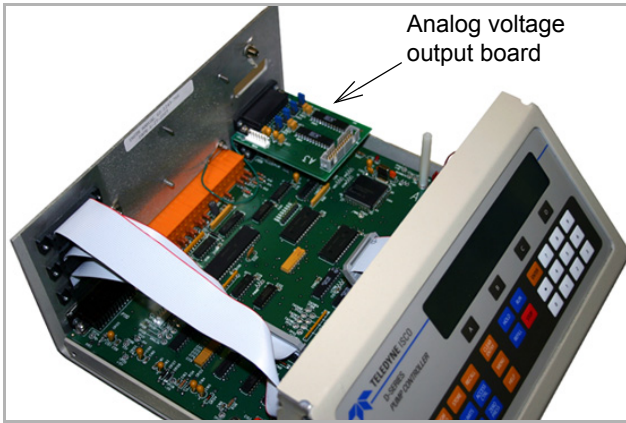


Figure 2: Accessing the analog voltage output board

The top of the selected range is the same maximum value entered for MAX FLOW when setting LIMITS, as described in your user manual. For example: if the output range is 5V and the preferred output scale is 1 volt per 10 ml/min, MAX FLOW is set at 50 ml/min. MAX FLOW cannot exceed the pump specification.

A controller running one or two pumps can also output cylinder volume on the remaining outputs. The volume output range is not adjustable. Full scale is equal to one pump stroke.

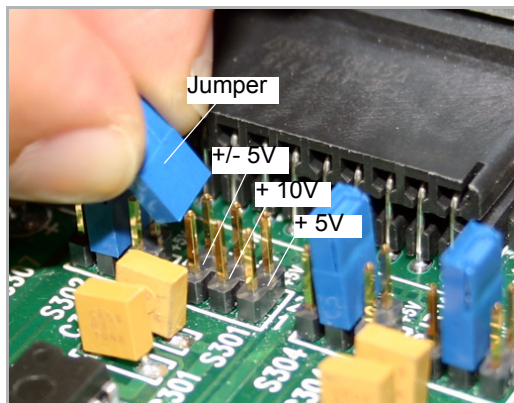
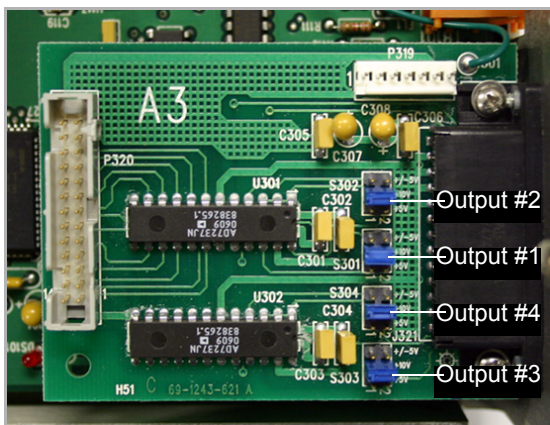


Figure 3: Adjusting the voltage output ranges

Table 3: Voltage Output Signal/Sub-D Pins

Pin #	Description	One/Two Pump Function	Three Pump Function
1	Chassis (earth)	—	—
2	Analog common	—	—
3	Analog common	—	—
4	Analog common	—	—
5	Analog common	—	—
14	Output #1	Flow Rate A	Flow Rate A
15	Output #2	Flow Rate B	Flow Rate B
16	Output #3	Volume A	Flow Rate C
17	Output #4	Volume B	Volume B

4-20mA Analog Output (Legacy Controller)

The 4-20mA analog output board is pre-installed at the factory, but can also be purchased in an upgrade kit. The board initially contains three output cards, for flow rate, pressure, and volume for Pump A. Additional cards can be purchased to output data for one or two more pumps.

Table 4: Analog Output Signal/Sub-D Pins for 4-20mA

Pin	Channel	Data Type/Pump
14		Pump A Flow Rate
1	1	Pump A Flow Rate (Signal Return)
15		Pump A Pressure
2	2	Pump A Pressure (Signal Return)
16		Pump A Volume Remaining
3	3	Pump A Volume Remaining (Signal Return)
17		Pump B Flow Rate
4	4	Pump B Flow Rate (Signal Return)
18		Pump B Pressure
5	5	Pump B Pressure (Signal Return)
19		Pump B Volume Remaining
6	6	Pump B Volume Remaining (Signal Return)
20		Pump C Flow Rate
7	7	Pump C Flow Rate (Signal Return)
21		Pump C Pressure
8	8	Pump C Pressure (Signal Return)
22		Pump C Volume Remaining
8	9	Pump C Volume Remaining (Signal Return)

~Current Controller Outputs~

Circuit boards are pre-installed in the controller at the factory. They can also be installed or removed by the user at a later time.

The analog output connection is the female 25-pin Sub-D connector located on the rear panel of the controller, under ANALOG OUTPUT.

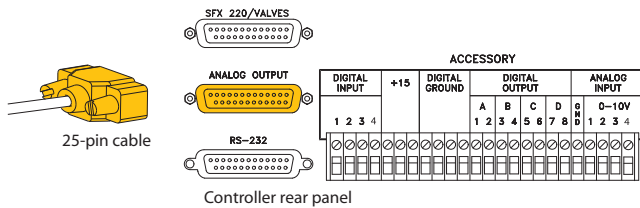


Figure 4: Analog output connection, rear panel

Voltage Analog Output

The voltage analog output board for flow and volume is pre-installed at the factory, but can also be purchased in an upgrade kit.

This option has a total of four outputs with selectable ranges from 0 to 5V, -5 to +5V, and 0 to 10V. The default range at installation is 0 to 10V. To adjust the range, remove the top cover of the controller (Figure 2), and move the jumper to a new range (Figure 3). Each output can be set to a different range.

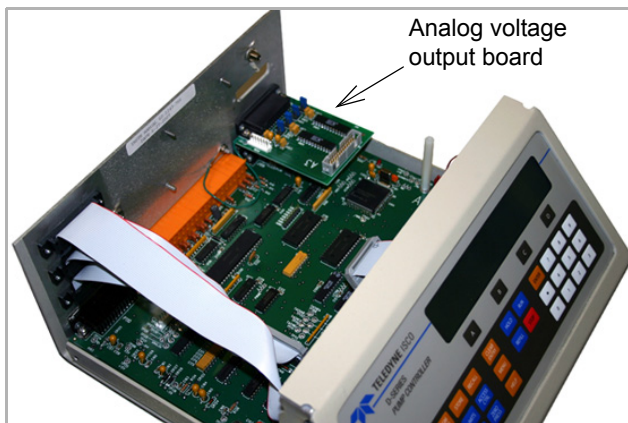


Figure 5: Accessing the analog voltage output board

The top of the selected range is the same maximum value entered for MAX FLOW when setting LIMITS, as described in your user manual. For example: if the output range is 5V and the preferred output scale is 1 volt per 10 ml/min, MAX FLOW is set at 50 ml/min. MAX FLOW cannot exceed the pump specification.

A controller running one or two pumps can also output cylinder volume on the remaining outputs. The volume output range is not adjustable. Full scale is equal to one pump stroke.

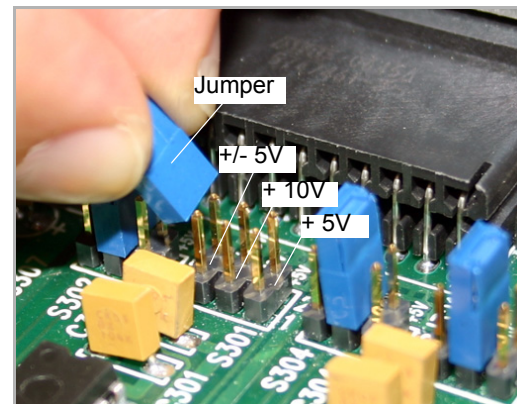
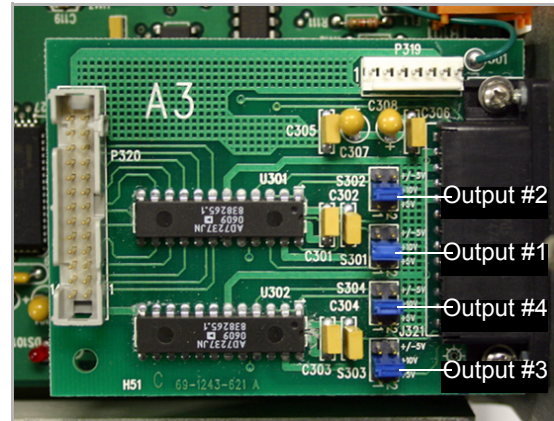


Figure 6: Adjusting the voltage output ranges

The top of the selected range is the same maximum value entered for MAX FLOW when setting LIMITS, as described in your user manual. For example: if the output range is 5V and the preferred output scale is 1 volt per 10 ml/min, MAX FLOW is set at 50 ml/min. MAX FLOW cannot exceed the pump specification.

A controller running one or two pumps can also output cylinder volume on the remaining outputs. The volume output range is not adjustable. Full scale is equal to one pump stroke.

Note

A larger voltage board is available, with 12 analog outputs and a fixed range of 0-10V. Pin-outs and descriptions are provided in Table 6.

Table 5: Voltage Output Signal/Sub-D Pins

Pin #	Description	One/Two Pump Function	Three Pump Function
1	Chassis (earth)	—	—
2	Analog common	—	—
3	Analog common	—	—
4	Analog common	—	—
5	Analog common	—	—
14	Output #1	Flow Rate A	Flow Rate A
15	Output #2	Flow Rate B	Flow Rate B
16	Output #3	Volume A	Flow Rate C
17	Output #4	Volume B	Volume B

4-20mA Analog Output (Current Controller)

The 4-20mA analog output board is pre-installed at the factory, but can also be purchased in an upgrade kit. The board initially contains three output cards, for flow rate, pressure, and volume for Pump A. Additional cards can be purchased to output data for one or two more pumps.

Table 6: Analog Output Signal/Sub-D Pins for 4-20mA and 0-10 VDC

Pin #	Channel	Data Type/Pump
14		Pump A Flow Rate
1	1	Pump A Flow Rate (Signal Return)
15		Pump A Pressure
2	2	Pump A Pressure (Signal Return)
16		Pump A Volume Remaining
3	3	Pump A Volume Remaining (Signal Return)
17		Pump B Flow Rate
4	4	Pump B Flow Rate (Signal Return)
18		Pump B Pressure
5	5	Pump B Pressure (Signal Return)
19		Pump B Volume Remaining
6	6	Pump B Volume Remaining (Signal Return)
20		Pump C Flow Rate
7	7	Pump C Flow Rate (Signal Return)
21		Pump C Pressure
8	8	Pump C Pressure (Signal Return)
22		Pump C Volume Remaining
8	9	Pump C Volume Remaining (Signal Return)
23		Pump D Flow Rate
10	10	Pump D Flow Rate (Signal Return)
24		Pump D Pressure
11	11	Pump D Pressure (Signal Return)
25		Pump D Volume Remaining
12	12	Pump D Volume Remaining (Signal Return)

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