4-20 mA Sampler Input Interface

Installation and Operation Instructions

TELEDYNE ISCO
A Teledyne Technologies Company

Instruction Sheet
60-3703-070, Revision J

Overview

The Isco 4-20 mA Sampler Input Interface is designed to convert a 4-20 mA output signal proportional to flow from a non-Isco flow meter into a signal which may be used to pace an Isco sampler.

For the 3700 and 6100 Series Samplers, use Interface #60-3704-037. For all other Isco Samplers, use Interface #60-3704-075. The only difference between the two devices is their mechanical design; function and operation are the same for both.

Function and Operation

The Interface converts the analog signal from the flow meter into a flow pulse occurring at constant flow volumes (for example, every 1,000 gallons), which can then be accepted by the Isco sampler. An Isco sampler can receive and totalize a selectable number of flow pulses from the interface before collecting a sample. This allows samples to be collected at equal increments of flow volume, resulting in flow-paced sampling.

The Interface is calibrated at the factory so that at a full-scale flow rate (20 mA) its output is five flow pulses per minute (1 pulse every 12 seconds).

GALLONS PER MINUTE

$$\frac{\text{Full-scale flow rate (GPM)}}{\text{5 Flow pulses per minute}} = \text{Volume in Gal (Gal/Pulse)}$$

GALLONS PER HOUR

$$\frac{\text{Full-scale flow rate (GPH)}}{\text{300 Flow pulses per hour}} = \text{Volume in Gal (Gal/Pulse)}$$

CUBIC FEET PER SECOND

$$\text{Full-scale flow rate (CFS)} \times \text{12 Sec/Pulse} = \text{Volume in Feet}^3\text{ (Feet}^3\text{/Pulse)}$$

MILLION GALLONS PER DAY

$$\text{Full-scale flow rate (MGD)} \times \text{138.89 Days/million pulses} = \text{Volume in Gal (Gal/Pulse)}$$

For example, assume that the full-scale flow rate of the flow meter is **8 MGD**. The flow volume of each flow pulse can be calculated:

$$8\text{ MGD} \times 138.89\text{ Days/million pulses} = 1{,}111.1\text{ Gal/Pulse}$$

Thus, each flow pulse to the sampler represents **1,111.1 gallons** of flow.

The time interval between flow pulses for a flow rate which is less than the full-scale flow rate can be calculated as follows:

$$\frac{\text{Full-scale flow rate}}{\text{Actual flow rate}} \div 5\text{ Pulses/minute} = \text{Interval in minutes between pulses}$$

Note that both the full-scale and actual flow rates must be expressed in the same units. For example, assume that the full-scale flow rate of the flow meter is **800 GPM** and that the current actual flow rate in the stream is **117 GPM**. The time interval between flow pulses for a flow rate of 117 GPM can be calculated:

$$\frac{800\text{ GPM}}{117\text{ GPM}} \div 5\text{ pulses/minute} = 1.367\text{ minutes between pulses}$$

Thus, at a flow rate of 117 GPM, a flow pulse will be sent to the sampler every 1.367 minutes. This information may be helpful in establishing the desired sampling program.

Table 1 shows the pulse rates at various input currents.

Table 1: Pulse Rates at Various Input Currents

Current	Time in Seconds	Current	Time in Seconds
4mA	No Output	13mA	21.3
5mA	192	14mA	19.2
6mA	96	15mA	17.4
7mA	64	16mA	16
8mA	48	17mA	14.8
9mA	38.4	18mA	13.7
10mA	32	19mA	12.7
11mA	27.4	20mA	12
12mA	24		

The following are conversion factors you can use to calculate volumetric units per pulse.

If units are “xxx” per day: divide by 24 to get units per hour,
then divide by 60 to get units per minute,
then divide by 5 to get units per pulse.
If units are “xxx” per minute: divide by 5 to get units per pulse.
If units are “xxx” per second: multiply by 12 to get units per minute.

Installation Instructions

The 4-20 mA Input Interface is a current loop device. The Interface should be wired in series with any other equipment on the loop; for example, a chlorinator, a circular chart recorder, or another sampler. Connect the output of the non-Isco flow meter to the input connect cable of the Interface. The red wire on the Interface's pig-tail cable should be connected to the positive output of the flow meter, and the black wire to the negative output. The voltage drop across the input of the Interface should be approximately 5 VDC. If the voltage drop is approximately 1 VDC, reverse the connections of the red and black wires.

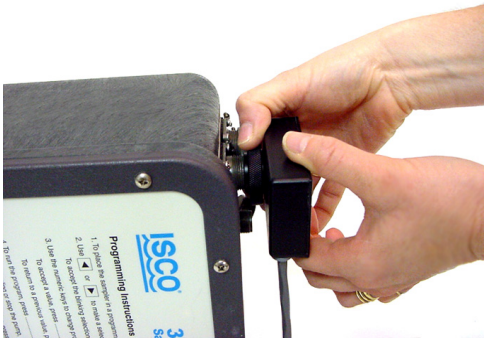
Attaching the Interface to a Sampler

- To attach the Interface to an Isco **3700** or **6100** Series Sampler, screw the output connector on the Interface directly onto the FLOW METER connector on the sampler by tightening the plastic knurled nut (Figure 1).
- To attach the Interface to **any other** model Isco Sampler, clean the end of the sampler control box and the back of the Interface with ethyl alcohol. Apply the **dual lock 400** fastener (the piece with the closely-spaced pins) to the sampler control box and the **dual lock 170** (the piece with the widely-spaced pins) to the back of the Interface housing.
  Press the Interface into place (Figure 1).
  Then, screw the Interface connector's knurled nut onto the FLOW METER connector on the Isco sampler (Figure 1).

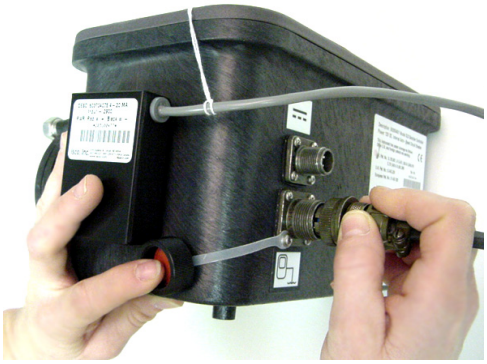
To order additional dual lock fasteners, request Isco part number **60-3703-114** for **dual lock 400** and **60-3703-123** for **dual lock 170**.

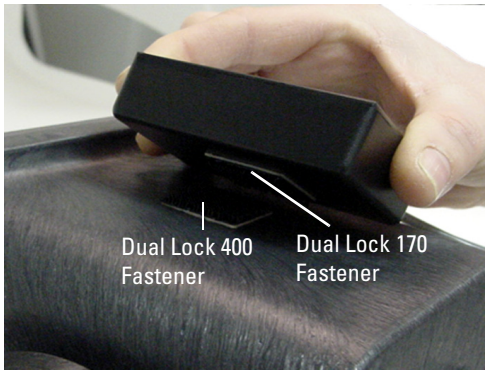
☑ *Note*

If the 4-20 mA Sampler Input Interface fails to operate, first try reversing the connections of the red and black wires. If this does not result in successful operation, contact the Isco Customer Service Department.



Installing the Interface on a 3700 Series Sampler


Installing the Interface on a GLS Sampler



Attaching the Interface to the Control Box (GLS pictured)


Installing the Interface on a 6712 Sampler

Figure 1: Installation on Various Samplers

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