

Application Note – Intuition-9 Controller - Analog Output, Disturbance Variable Control Mode

In this example, we are controlling bisulfite chemical feed to dechlorinate the water using an analog output based on an incoming analog water meter flow rate. We are monitoring ORP, and when ORP increases to a user defined value, this disturbance creates a numeric multiplier that is applied to the analog output that is controlling chemical feed. So chemical feed is increased based on the increase in the disturbance (which is the change in ORP).

Programming the controller

Inputs:

S11 = ORP sensor

The screenshot shows the 'ORP (S11)' sensor status. The interface includes the Walchem logo and navigation menu on the left. The main content area displays three key metrics: Value (0.1 mV), Alarms (None), and Status (Normal).

Value	Alarms	Status
0.1 mV	None	Normal

S22 = Analog flow meter, 0-100 gpm (4-20mA)

The screenshot shows the 'Flowmeter (S22)' status. The interface includes the Walchem logo and navigation menu on the left. The main content area displays three key metrics: Flowrate (64.6 g/m), Total (159 gal), and Alarms (None).

Flowrate	Total	Alarms
64.6 g/m	159 gal	None

V7 = Disturbance Input; In this case it is ORP (S11). For the programming shown below, when ORP= -50 mV the disturbance value = 1.00, and when the ORP = 180mV the disturbance value = 2.0. So as the ORP value goes from -50mV to 180mV, the disturbance value will go from 1.00 to 2.00. The screen shot below shows the ORP = 0.1mV which creates a 1.22 disturbance value based on our settings.

This disturbance value, 1.22, will be the multiplier applied to the analog output signal going to the chemical feed pump.

The screenshot shows the 'Disturbance (V7)' configuration page. The interface includes the Walchem logo and navigation menu on the left. The main content area displays various configuration parameters for the disturbance input.

Value	Input	24-Hour Minimum
1.22	0.1 mV	1.22

24-Hour Maximum	24-Hour Average	Alarms
2.00	1.45	None

Status	Type	Date
Normal	Disturbance Input	2021-Dec-29

Time
08:14:37

Min Disturbance [mV]	Max Disturbance [mV]	Value At Min Disturbance
-50.0	180.0	1.00

Value At Max Disturbance	Smoothing Factor [%]	Disturbance Input
2.00	0	ORP (S11)

Name
Disturbance

Outputs:

A31 = Proportional Control, analog output to chemical feed based on an incoming analog water meter flow rate, 0-100gpm. In this case, based on the settings shown in the screen shot below, at 1 gpm flow rate, the controller is sending 4mA to the feed pump, and at 100gpm the controller is sending 20mA to the feed pump.

Under normal conditions, this is how chemical feed is done. The ORP disturbance has not yet been factored in. See next pages for this.



A32 = Disturbance Control; Primary Output = A31 (Proportional control based only on flow rate), Disturbance Input = V7 (ORP)

You can see the primary output = 64.2% (A31), and the disturbance input = 1.22, which is then multiplied by the 64.2% to generate an increased output of 78.2%. So, the ORP value has caused a disturbance (or multiplier) of 1.22 thus causing the output to the chemical feed pump to increase until the ORP value decreases to a point where the disturbance (or multiplier) returns to 1.0.

