

## Application Note - W900 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

W A L C H E M

IWAKI America Inc.

W900 Controller

WIN900

Home

Alarms

Inputs

ORP (S11)

Unassigned (S12)

Unassigned (S13)

Unassigned (S14)

Not Used (S21)

FM-1 (S22)

Unassigned (S31)

Unassigned (S32)

Unassigned (S33)

Unassigned (S34)

T-1 LL (D1)

T-1 HL (D2)

DAF LL (D3)

DAF HL (D4)

T-2 LL (D5)

T-2 HL (D6)

CBST-1 LL (D7)

CBST-1 HL (D8)

PS-1 (D9)

P-1 Ctrl (D10)

P-6 Ctrl (D11)

Selector (D12)

Unassigned (V1)

Unassigned (V2)

Unassigned (V3)

Unassigned (V4)

Unassigned (V5)

Unassigned (V6)

ORP (S11)

Value

0.0 mV

Alarms

None

Status

Normal

Raw Value

0.0 mV

Last Calibration

None

Calibration Gain

1.000

Calibration Offset

0.0

Type

ORP

Sensor Board

Universal

Date

2018-Nov-20

Time

12:08:46

LoLo Alarm [ mV ]

-1500.0

Low Alarm [ mV ]

-1500.0

High Alarm [ mV ]

1500.0

HiHi Alarm [ mV ]

1500.0

Deadband [ mV ]

5.0

Reset Calibration Values

Confirm

Cal Required Alarm [ days ]

0

Cable Length [ ft ]

3.00

Gauge

22 awg/0.35 mm2

Soothing Factor [ % ]

0

Name

ORP

Alarm Suppression

D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R1	R2	R3	R4	R5	R6	R7	R8				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
C1	C2	C3	C4	C5	C6	C7	C8				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

Type

ORP

Edit

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

WALCHEM

IWAKI America Inc.

W900 Controller

WIN900

Home

Alarms

Inputs

CRP (S11)

Unassigned (S12)

Unassigned (S13)

Unassigned (S14)

Not Used (S21)

FM-1 (S22)

Unassigned (S31)

Unassigned (S32)

Unassigned (S33)

Unassigned (S34)

T-1 LL (D1)

T-1 HL (D2)

DAF LL (D3)

DAF HL (D4)

T-2 LL (D5)

T-2 HL (D6)

CBST-1 LL (D7)

CBST-1 HL (D8)

PS-1 (D9)

P-1 Cntrl (D10)

P-6 Cntrl (D11)

Selector (D12)

Unassigned (V1)

Unassigned (V2)

Unassigned (V3)

Unassigned (V4)

Unassigned (V5)

Unassigned (V6)

Disturbance (V7)

Calc (V8)

Outputs

Config

Graphs

Instruction Manual

VTouch

Walchem.com

FM-1 (S22)

Flowrate

64.90 g/m

Total

1.318e06 gal

Alarms

None

Status

Normal

Raw Value

14.38 mA

Calibration Gain

1.000

Calibration Offset

0.00

Last Calibration

None

Last Reset

Nov-06 10:28

Type

Flowmeter

Sensor Board

Analog Input

Date

2018-Nov-20

Time

12:10:08

LoLo Alarm [ g/m ]

0.00

Low Alarm [ g/m ]

0.00

High Alarm [ g/m ]

100.00

HiHi Alarm [ g/m ]

100.00

Deadband [ g/m ]

0.50

Totalizer Alarm [ gal ]

0

Reset Flow Total

Confirm

Set Flow Total [ gal ]

0

Scheduled Reset

Disabled

Reset Calibration Values

Confirm

Cal Required Alarm [ days ]

0

Smoothing Factor [ % ]

50

Transmitter

2 Wire Powered

Flow Units

gal

Rate Units

min

Flowmeter Max [ g/m ]

100.00

Input Filter [ mA ]

4.00

Name

FM-1

Alarm Suppression

D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
R1	R2	R3	R4	R5	R6	R7	R8				
C1	C2	C3	C4	C5	C6	C7	C8				

Type

Flowmeter

Edit

V7 = Disturbance Input; In this case it is ORP (S11). For the programming shown below, when ORP= -50mV 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 = 0.0mV which creates a 1.22 disturbance value based on our settings.

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

**WALCHEM**  
IWAKI America Inc.  
**W900 Controller**  
**WIN900**

Home

Alarms

Inputs

ORP (S11)

Unassigned (S12)

Unassigned (S13)

Unassigned (S14)

Not Used (S21)

FM-1 (S22)

Unassigned (S31)

Unassigned (S32)

Unassigned (S33)

Unassigned (S34)

T-1 LL (D1)

T-1 HL (D2)

DAF LL (D3)

DAF HL (D4)

T-2 LL (D5)

T-2 HL (D6)

CBST-1 LL (D7)

CBST-1 HL (D8)

PS-1 (D9)

P-1 Ctrl1 (D10)

P-6 Ctrl1 (D11)

Selector (D12)

Unassigned (V1)

Unassigned (V2)

Unassigned (V3)

Unassigned (V4)

Unassigned (V5)

Unassigned (V6)

Disturbance (V7)

Calc (V8)

**Disturbance (V7)**

KUB

Value <b>1.22</b>	Input <b>0.0 mV</b>	Alarms <b>None</b>
Status <b>Normal</b>	Type <b>Disturbance Input</b>	Date <b>2018-Nov-20</b>
Time <b>12:11:19</b>		

Min Disturbance [ mV ]  

-50.0

Max Disturbance [ mV ]  

180.0

Value At Min Disturbance  

1.00

Value At Max Disturbance  

2.00

Smoothing Factor [ % ]  

0

Disturbance Input  

ORP (S11) ▼

Name  

Disturbance

Disable Disturbance Channels

D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R1	R2	R3	R4	R5	R6	R7	R8				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
C1	C2	C3	C4	C5	C6	C7	C8				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

Type  

Disturbance Input ▼

Edit

## Outputs:

A23 = 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.

**WALCHEM**  
IWAKI America Inc.  
**W900 Controller**  
**WIN900**

[Home](#)  
[Alarms](#)  
[Inputs](#)  
[Outputs](#)  
    ▶ P-1 (R1)  
    ▶ P-2 (R2)  
    ▶ P-4 (R3)  
    ▶ P-6 (R4)  
    ▶ CV-6 (R5)  
    ▶ pH EFF (R6)  
    ▶ PPM Volume (R7)  
    ▶ On/Off (R8)  
    ▶ Retrans (A21)  
    ▶ Disturbance (A22)  
    ▶ Prop (A23)  
    ▶ Manual (A24)  
    ▶ Unassigned (C1)  
    ▶ Unassigned (C2)  
    ▶ Unassigned (C3)  
    ▶ Unassigned (C4)  
    ▶ Unassigned (C5)  
    ▶ Unassigned (C6)  
    ▶ Unassigned (C7)  
    ▶ Unassigned (C8)  
[Config](#)  
[Graphs](#)  
[Instruction Manual](#)  
[VTouch](#)  
[Walchem.com](#)  
[Admin Log Out](#)

**Prop (A23)**

Output  
64.6 %

Status  
Auto Mode

Input Value  
64.91 g/m

Time On  
35:44

Total Time  
10:19:39:22

Alarms  
None

Raw Output  
14.33 mA

Mode  
Proportional

Date  
2018-Nov-20

Time  
12:18:33

HOA Setting  
☒ Hand ☐ Off ☒ Auto

Setpoint [ g/m ]  
1.00

Proportional Band [ g/m ]  
99.00

Min Output [ % ]  
0.0

Max Output [ % ]  
100.0

Output Time Limit [ HH:MM:SS ]  
00 : 00 : 00

Reset Output Timeout  
Confirm

Hand Output [ % ]  
50.0

Hand Time Limit [ HH:MM:SS ]  
00 : 10 : 00

Off Mode Output [ mA ]  
4.00

Error Output [ mA ]  
3.00

Reset Time Total  
Confirm

Input  
FM-1 (S22)

Direction  
Force Lower

Name  
Prop

Interlock Channels

D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
R1	R2	R3	R4	R5	R6	R7	R8				
C1	C2	C3	C4	C5	C6	C7	C8				

Activate With Channels

D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
R1	R2	R3	R4	R5	R6	R7	R8				
C1	C2	C3	C4	C5	C6	C7	C8				

Mode  
Proportional

Edit

A22 = Disturbance Control; Primary Output = A23 (Proportional control based only on flow rate),  
Disturbance Input = V7 (ORP)

You can see the primary output = 64.6% (A23), and the disturbance input = 1.22, which is then multiplied by the 64.6% to generate an increased output of 78.6%. 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.

**WALCHEM**  
IWAIR America Inc.  
**W900 Controller**  
**WIN900**

Home

Alarms

Inputs

Outputs

P-1 (R1)

P-2 (R2)

P-4 (R3)

P-6 (R4)

CV-6 (R5)

pH EFF (R6)

PPM Volume (R7)

On/Off (R8)

Retrans (A21)

Disturbance (A22)

Prop (A23)

Manual (A24)

Unassigned (C1)

Unassigned (C2)

Unassigned (C3)

Unassigned (C4)

Unassigned (C5)

Unassigned (C6)

Unassigned (C7)

Unassigned (C8)

Config

Graphs

Instruction Manual

VTouch

Walchem.com

Admin Log Out

**Disturbance (A22)**

Output  
78.6 %

Status  
Auto Mode

Alarms  
None

Primary Output  
64.6 %

Disturbance Input  
1.22

Time On  
10:19:46:37

Total Time  
10:19:49:15

Raw Output  
16.58 mA

Mode  
Disturbance

Date  
2018-Nov-20

Time  
12:22:43

HOA Setting  
☐ Hand ☐ Off ☒ Auto

Reset Time Total  
Confirm

Output Time Limit [ HH:MM:SS ]  
00 : 00 : 00

Reset Output Timeout  
Confirm

Min Output [ % ]  
0.0

Max Output [ % ]  
100.0

Hand Output [ % ]  
50.0

Hand Time Limit [ HH:MM:SS ]  
00 : 10 : 00

Off Mode Output [ mA ]  
4.00

Error Output [ mA ]  
3.00

Primary Output  
Prop (A23)

Disturbance Input  
Disturbance (V7)

Trigger Input  
None

Name  
Disturbance

Interlock Channels

D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
R1	R2	R3	R4	R5	R6	R7	R8				
C1	C2	C3	C4	C5	C6	C7	C8				

Activate With Channels

D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
R1	R2	R3	R4	R5	R6	R7	R8				
C1	C2	C3	C4	C5	C6	C7	C8				

Mode  
Disturbance

Edit