

# SECTION D

## ANALOG OUTPUTS

Revision Date: 3-14-24

### DESCRIPTION OF OPERATION

#### Introduction

Analog Outputs AOX1 and AO1-AO4 are 4-20mA outputs that may be assigned the task of sending the Speed Reference data to Variable Frequency Drives or Level Input data to a Telemetry device.

Analog Output AOX1 is Standard on all Station Controllers. Analog Outputs AO1 - AO4 are Optional.

The Analog Outputs are Isolated, Transient Protected and use a 12-bit Digital to Analog Converter to produce the reference signal for the 4-20 mA Analog Output.

For Terminal Block numbers see page D-3.

#### Functions

Using Parameters F.50 - F.54, each Analog Output must be assigned a Function that determines what data is sent to the Analog Output to control the value of its output. See page D-2.

See "ANALOG OUTPUT FUNCTIONS" below for a description of each of the Functions.

#### Status

The status of the Analog Outputs is made available to be read by SCADA and is available in the menu from Parameters A.200 - A.204. See page D-2.

### ANALOG OUTPUT FUNCTIONS

#### No Function - Function 0

Analog Outputs that are assigned the Function of "No Function" (Function 0), will not perform any Function and will have their output turned off.

#### Pump 1 - 4 Speed Reference - Functions 1 - 4

Analog Outputs assigned the Functions of "Pump 1-4 Speed Reference" (Functions 1-4) provide the Speed Reference to Pumps 1 - 4 Variable Frequency Drives.

With these Functions, the Analog Outputs are only active providing the speed reference when the respective pump is called to run. When a pump is not called to run the respective Analog Output sends out 4 mA.

With these Functions, a 4mA output represents a speed reference of 0 percent (0Hz) and a 20mA output represents a speed reference of 100 percent (60Hz).

The "Pump 1-4 Speed Reference" (Functions 1-4) uses Parameters P.61, P.62 & P.63 to establish the Level versus Speed Curve. See VFD SPEED CONTROL in Section H.

#### Pump X Speed Reference - Function 5

An Analog Output assigned the Function of "Pump X Speed Reference" (Function 5) provides a Speed Reference to any of the pump's Variable Frequency Drives.

With this Function, the Analog Output is always active even if no pumps are called to run.

With this Function, a 4mA output represents a speed reference of 0 percent (0 Hz) and a 20mA output represents a speed reference of 100 percent (60 Hz).

The "Pump X Speed Reference" (Function 5) uses Parameters P.61, P.62 & P.63 to establish the Level versus Speed Curve. See Section H.

#### Copy of Wet Well Level - Function 6

The Analog Output from the "Copy of Wet Well Level" (Function 6) is a copy of the "Wet Well Level" (Parameter Ld.11). It represents the Level currently being used by the Controller to perform Level Control. The Analog Output also increases and decreases while in the Level Simulation Mode.

With the "Level Input Select" (Parameter P.22) set for the "Analog Level Meter - ALM1" the Analog Output will be a copy of the Analog Input AIX1. See Section M.

With the "Level Input Select" (Parameter P.22) set for the "Level Probe Meter - LPM1" the Analog Output will be scaled to match the span of the Level Probe using the "Level Probe Meter Electrode Spacing" (Parameter P.27). The Analog Output starts at 4.0mA with no Electrodes covered and increases in 1.6 mA steps to 20mA with all Electrodes covered. See Section L.

## ANALOG OUTPUTS

User / Operator Info.		SCADA		Description of Parameters and SCADA Notes	
Parameter	Default Value	Current Value	Register Address		
<b>Analog Output Setup</b>					
Analog Output Function				Analog Output	
F.50	6		40350	Analog Output - AOX1	
F.51	1		40351	Analog Output - AO1	
F.52	2		40352	Analog Output - AO2	
F.53	3		40353	Analog Output - AO3	
F.54	4		40354	Analog Output - AO4	
				<p><b>Function of Analog Output:</b></p> <p>0 = No Function            1 = Pump 1 Speed Reference            2 = Pump 2 Speed Reference            3 = Pump 3 Speed Reference            4 = Pump 4 Speed Reference            5 = Pump X Speed Reference            6 = Copy of Wet Well Level</p> <p>Notes:</p> <ol style="list-style-type: none"> <li>Function 0 - "No Function", turns off the Analog Output.</li> <li>Functions 1-4 - "Pump 1-4 Speed Reference" Analog Outputs are active only when the respective pump is called to run.</li> <li>Function 5 - "Pump X Speed Reference" Analog Output is always active, even when no pumps are called to run.</li> <li>Function 6 - This Function makes the Analog Output send out a 4-20mA signal that is proportional to the Wet Well Level.                If the Level input Select (Parameter P.22) is set for the "Analog Level Meter - ALM1", then the Analog Output will be a copy of Analog Input AIX1.                If the Level input Select (Parameter P.22) is set for the "Level Probe Meter - LPM1", then the Analog Output will be scaled to be at 4.0mA with no Electrodes covered and increases in 1.6mA steps to 20mA with all Electrodes covered.</li> </ol>	

User / Operator Info.		SCADA		Description of Parameters and SCADA Notes	
Parameter	Register Address				
<b>Analog Output Status - 12-bit</b>					
A.200	40066	Analog Output - AOX1		<p>Note:</p> <p>Parameters A.200 - A.204 are 12-bit Digital to Analog Converter output control values that are factory calibrated to the following:</p> <p style="text-align: center;">819 @ 4.0mA      4095 @ 20mA</p>	
A.201	40067	Analog Output - AO1			
A.202	40068	Analog Output - AO2			
A.203	40069	Analog Output - AO3			
A.204	40070	Analog Output - AO4			
<b>Analog Output Status - 12-bit (Legacy)</b>					
—	40075	Analog Output - AO1		<p>Note:</p> <p>These are the Legacy 12-bit Digital to Analog Converter output control values that are factory calibrated to the following:</p> <p style="text-align: center;">0 @ 4.0mA      4095 @ 20mA</p>	
—	40076	Analog Output - AO2			
—	40077	Analog Output - AO3			
—	40078	Analog Output - AO4			

# ANALOG OUTPUTS

## Connection Diagram

