TULSA Water and Sewer Department

SCADA System Improvements

Analog Output Add-On Instruction

FINAL

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Revision History

After the Add-On Instruction has been modified or updated, this document should be revised to reflect the changes. The version is broken into two parts: major (**X**.0) and minor (1.**X**). A major version is reserved for adding or removing sections of this document. A minor version is reserved for modifications to existing sections.

Version	Date	Description
1.0	July 9, 2021	AOI created in Studio 5000 Version 21.11, Draft submitted to client
1.0	April 4, 2022	Final submitted to client.

1 INTRODUCTION

The Analog Output Add-On Instruction (AOI) reads a scaled analog value and converts it to raw data to be written to field instrumentation. It includes a value fault alarm that monitors the quality of the I/O. This AOI is used inside the Motor VFD AOI to control the speed command. Similarly, it is used inside the Valve Position AOI to control the position command.

Table 1-1 Embedded AOIs

Embedded AOIs
Linear Scale

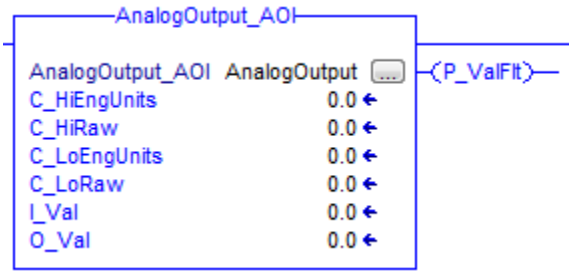

Figure 1-1 Analog Output AOI as it appears in ladder logic

2 FEATURES

2.1 Configuration Tags

Configuration tags are inputs to the AOI that are set by the engineer during programming and equipment start-up. A “C_” prefix is used to indicate that the tag modifies the configuration of an equipment or instrument.

Table 2-1 Configuration Tags

Parameter	Data Type	Description	Default Value
C_HiEngUnits	REAL	The maximum value of the scaled analog signal.	100
C_HiRaw	REAL	The maximum value of the raw analog output signal.	20
C_InvOut	BOOL	When true, the value is inverted when scaling, i.e. the max. raw value would correspond to the min. engineering value.	False
C_LoEngUnits	REAL	The minimum value of the scaled analog signal.	0
C_LoRaw	REAL	The minimum value of the raw analog output signal.	4
C_ValClmpEn	BOOL	When true, the scaled value is clamped between C_LoEngUnits and C_HiEngUnits.	False
C_ValFltPermsv	BOOL	External signal mapped into the AOI to allow the value fault alarm to become active.	False

2.2 Input Tags

Input tags are inputs to the AOI that are set by the I/O and indicate equipment status. The “I_” prefix is used to indicated that the tag is displaying an equipment or instrument status.

Table 2-2 Input Tags

Parameter	Data Type	Description
I_Val	REAL	Value in engineering units mapped into the AOI.
I_ValFlt	BOOL	External signal mapped into the AOI for determining if output value is good.

2.3 Output Tags

Output tags are outputs from the AOI that are used to control equipment. The “O_” prefix is used to indicate that the tag controls a real-world output within the PLC.

Table 2-3 Output Tags

Parameter	Data Type	Description
O_Val	REAL	Raw output value.

2.4 HMI Tags

HMI tags are inputs to the AOI that are set by the operator. The “H_” prefix is used to indicate that the tag modifies a PLC register from the operator interface.

Table 2-4 HMI Tags

Parameter	Data Type	Description	Default Value
H_ValFltDlyTm	REAL	Delay time for the value fault alarm.	0
H_ValFltEn	BOOL	Enables the value fault alarm.	False

2.5 PLC Logic Tags

PLC Logic tags are attributes internal to the AOI. The “P_” prefix is used to indicate that the tag is modified or calculated within the PLC.

Table 2-5 PLC Logic Tags

Parameter	Data Type	Description	Alarm
P_ValFlt	BOOL	Value fault alarm activated if external I_ValFlt is true.	Yes
P_ValFltLgc	BOOL	Value fault condition for use within the logic.	No