TULSA Water and Sewer Department
SCADA System Improvements
Module Add-On Instruction
FINAL

PRESENTED TO
Cindy Cantero
City of Tulsa
Water Pollution Control
175 E 2nd Street, Suite 1400, Tulsa, OK 74103

PREPARED BY
Tetra Tech
7645 E. 63rd St., Suite 301
Tulsa, Ok 74133

P: (918) 249-3909
www.tetratech.com

200-11383-19001
April 22, 2024
CONTENTS
1 INTRODUCTION ................................................................................................................................. 2
2 TEMPLATE ............................................................................................................................................... 2
3 FEATURES ........................................................................................................................................... 4
   3.1 Configuration Tags ........................................................................................................................ 4
   3.2 Input Tags ...................................................................................................................................... 4
   3.3 Output Tags................................................................................................................................... 4
   3.4 HMI Tags....................................................................................................................................... 4
   3.5 PLC Logic Tags ............................................................................................................................. 4

List of Tables
Table 1-1 Embedded AOIs........................................................................................................................ 2
Table 3-1 Configuration Tags........................................................................................................................ 4
Table 3-2 HMI Tags ...................................................................................................................................... 4
Table 3-3 PLC Logic Tags ............................................................................................................................ 4

List of Figures
Figure 1-1 Module AOI as it appears in ladder logic..................................................................................... 2
Figure 2-1 Unscheduled Standard Logic Templates .................................................................................... 2
Figure 2-2 Standard Template Logic for the Module AOI ............................................................................. 3
Figure 2-3 GSV Configuration for Module AOI Logic.................................................................................... 3

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.

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>July 9, 2021</td>
<td>AOI created in Studio 5000 Version 21.11, Draft submitted to client</td>
</tr>
<tr>
<td>1.0</td>
<td>April 4, 2022</td>
<td>Final submitted to client.</td>
</tr>
</tbody>
</table>
1 INTRODUCTION

The Module Add-On Instruction (AOI) monitors the status of a remote PLC rack. The AOI includes alarms that indicate if the rack is faulted or not running.

Table 1-1 Embedded AOIs

<table>
<thead>
<tr>
<th>Embedded AOIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete Alarm</td>
</tr>
</tbody>
</table>

![Module_AOI](image1)

Figure 1-1 Module AOI as it appears in ladder logic

2 TEMPLATE

Template logic can be found in the Unscheduled Programs/Phases task folder of the Tulsa ControlLogix Standard PLC file. Because the template task is unscheduled, the routines within it do not execute during runtime. The intention of the template routine is to provide a standard logic structure for the AOIs that can be copied into the executable tasks of the MainProgram.

![Controller Organizer](image2)

Figure 2-1 Unscheduled Standard Logic Templates
The MainRoutine template displays the standard logic for using the Module AOI. The first rung needs to be updated with the text from the rung comment. This will create three GSV instructions that look at the ethernet card to be monitored, as shown in Figure 2-3.

**Figure 2-2 Standard Template Logic for the Module AOI**

**Figure 2-3 GSV Configuration for Module AOI Logic**
3 FEATURES

3.1 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 3-1 Configuration Tags

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data Type</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C_EntrySts</td>
<td>DINT</td>
<td>Module status (hex) mapped into the AOI from the ethernet card of the remote rack.</td>
<td>0</td>
</tr>
<tr>
<td>C_FltCode</td>
<td>DINT</td>
<td>Module fault code mapped into the AOI from the ethernet card of the remote rack.</td>
<td>0</td>
</tr>
<tr>
<td>C_FltInto</td>
<td>DINT</td>
<td>Module fault code information mapped into the AOI from the ethernet card of the remote rack.</td>
<td>0</td>
</tr>
</tbody>
</table>

3.2 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. The PLC AOI does not contain any input tags.

3.3 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. The PLC AOI does not contain any output tags.

3.4 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 3-2 HMI Tags

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data Type</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>H_FltDlyTmSec</td>
<td>REAL</td>
<td>Faulted alarm delay time in seconds.</td>
<td>5</td>
</tr>
<tr>
<td>H_FltEn</td>
<td>BOOL</td>
<td>Faulted alarm enable.</td>
<td>False</td>
</tr>
<tr>
<td>H_NRunDlyTmSec</td>
<td>REAL</td>
<td>Not running alarm delay time in seconds.</td>
<td>5</td>
</tr>
<tr>
<td>H_NRunEn</td>
<td>BOOL</td>
<td>Not running alarm enable.</td>
<td>False</td>
</tr>
</tbody>
</table>

3.5 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 3-3 PLC Logic Tags

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data Type</th>
<th>Description</th>
<th>Alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>P_Flt</td>
<td>BOOL</td>
<td>Module faulted alarm.</td>
<td>Yes</td>
</tr>
<tr>
<td>P_NRun</td>
<td>BOOL</td>
<td>Module not running alarm.</td>
<td>Yes</td>
</tr>
</tbody>
</table>