CITY OF FORT WAYNE MASTER UPDATED: 7/8/2016

SECTION 40 61 93

PROCESS CONTROL SYSTEM – INPUT/OUTPUT LIST

1. – GENERAL
   1. SUMMARY
      1. Description of Process Control System (PCS) physical I/O requirements. Section to be used in conjunction with following sections.
         1. Section 40 61 13 – Process Control System (PCS) General Provisions
         2. Section 40 64 00 – Programmable Logic Controllers
         3. Section 40 70 00 – Instrumentation of Process Systems

NTS: Each PLC rack shall have their own I/O List. Include all applicable I/O Lists below.

* 1. SUBMITTALS
     1. For each I/O attribute listed in the I/O list that cannot be used exactly as listed, submit an explanation of the reason for the deviation and propose a method to modify the I/O list information. Do not proceed with any configuration until a method of resolving deviations is accepted by the ENGINEER.
     2. Include the control system I/O database information for PLC specific submittals in Section 40 64 00, Programmable Logic Controllers.

1. – SERVICES

NTS: When a project has multiple I/O lists, include separate sections for each list.

* 1. I/O LIST DEFINITIONS
     1. I/O LIST as shown in Schedule 1 of this Section contains information to configure I/O subsystem hardware and to indicate range conversion or signal function.
     2. TAG is the ISA instrument/equipment tag number.
     3. DWG is drawing number of Process and Instrumentation Diagram (P&ID) or InterConnect Diagram (ICD) relating to I/O point.
     4. LOCATION is tag number of Programmable Controller enclosure the I/O point is interfaced to.
     5. QTY identifies the number of I/O points associated with the particular record in the list
     6. EQUIPMENT describes associated equipment. Provide prewired I/O hardware for points described as SPARE.
     7. FUNCTION describes associated process parameter or programmable controller action.
     8. I/O TYPE is one of following:
        1. AI designates Analog Input.
        2. DI designates Discrete Input.
        3. AO designates Analog Output.
        4. RO designates Relay Output; momentary, maintained or latched relay contact output.
        5. DO designates Discrete Output; solid state output
        6. SPC designates Special; digital data stream, data highway or scanned I/O.
     9. SIGNAL TYPE Description:
        1. Analog Input (AI):
           1. RANGE

MIN: Process parameter range minimum value.

MAX: Process parameter range maximum value.

* + - * 1. ENGINEERING UNIT: Process parameter engineering units.
        2. POLL TIME: 0.25 second.
      1. Digital Input (DI):
         1. DATA 1: Condition existing when field contact open.
         2. DATA 2: Condition existing when field contact closed.
         3. POLL TIME: Change-of-State, exception-based.
      2. Analog Output (AO):
         1. RANGE

MIN: Process parameter range minimum value.

MAX: Process parameter range maximum value.

* + - * 1. ENGINEERING UNIT: Process parameter engineering units.
      1. Relay Output (RO):
         1. Relay outputs, using dry contact-closure type outputs, can be momentary or maintained.
         2. DATA 1: Contact closed function.
         3. DATA 2: Contact open function.
      2. Discrete Output (DO):
         1. Discrete outputs can be momentary or maintained.
         2. “DATA 1” is the contact closed function.
         3. “DATA 2” is the contact open function.
      3. Special (SPC):
         1. SPC modules allow passage of data parameters between tag bases of host processor and scanned I/O or data entry devices.
         2. DATA 1: Not Applicable.
         3. DATA 2: Not Applicable.
    1. DATA 1 and DATA 2 describe function or signal characteristics. These are further defined under each signal type.
    2. Range
       1. Min: Process parameter minimum data value.
       2. Max: Process parameter maximum data value.
    3. Engineering Units (EGU): Process parameter engineering unit of measure for associated data.
  1. I/O PROGRAMMING DEFINITIONS

NTS: Coordinate with owner’s programming standards.

* + 1. I/O Point Data Fields
       1. I/O point data fields are subject to review and modification by Engineer during Shop Drawing review phase. Incorporate modifications into entire system.
    2. I/O Point Spares Utilization
       1. Incorporate prewired spare points into active point data base. Include changing point names, descriptions, ranges, or statuses from spare to new point. Include related documentation changes. Spares utilization will be subject to following limitations:
          1. Incorporation shall not significantly alter control software functions. Minor change is addition of device alarm input. Significant change is addition of control device.
          2. Incorporation shall not significantly alter local area panels or field wiring to device. Minor alterations include additions of signals to terminations. Significant alterations include addition of major equipment.
          3. Additions shall not increase size of reports beyond that specified.
          4. Change will not be made subsequent to Submittal approval of given panel or process area loop drawings.
          5. Treat changing of active points to spare points in same manner as incorporation of spares.

NTS: Coordinate with owner’s programming standards.

* + 1. “P&ID ISA Tag Number” is an alphanumeric character string.
    2. “DESCRIPTION” is an alphanumeric character string up to 40 positions in length. Points described as “SPARE” denote pre-wired I/O.
    3. “ALARM DESCRIPTION” is an alphanumeric character string up to 40 positions in length. Points described as “SPARE” denote pre-wired I/O.
    4. “ALARM” is used only for discrete inputs to distinguish between status inputs and alarm inputs.

1. EXECUTION
   1. I/O CONFIGURATION
      1. Implement the control system database fields in a consistent manner by using the following procedures:
         1. Use abbreviations and acronyms already established in the Contract Documents. In particular, use the information in the I/O Point List.
         2. Use only abbreviation or acronym for a word or group of words, respectively.
         3. Use the same subject and word order within data fields.
         4. Use the same term (either phrase, word or acronym) to denote the same meaning. Do not use multiple terms for a single meaning.
         5. Use the point names, descriptions, logic state descriptions, ranges and units of measurement exactly the same wherever the point is referenced.
         6. Show point names and descriptions for all point references on documentation.
         7. Spell correctly.
         8. Maintain lists of acronyms and abbreviations used.
   2. I/O HARDWARE CONFIGURATION
      1. Partition the I/O among cards within an I/O enclosure to provide control loop integrity.
         1. Put all inputs of the same I/O type associated with a device (e.g. pump, blower, clarifier or other piece of equipment) on the same card.
         2. Put all inputs/outputs of the same type for devices arranged in process trains (e.g. a pump, its inlet valve and its outlet valve, or a pump and its associated appurtenances) on the same card or cards if more than one card is required to accommodate the points.
         3. Multiple process equipment of redundant process trains shall not all be on the same I/O card (e.g. multiple pumps on the same card)
         4. Where the preceding requirements specified in this paragraph would cause more than 20 percent spare points on a card, points for a process train may be split between two consecutive cards. Points for an individual device shall not be split between two consecutive cards.
         5. Make unused terminals resulting from partitioning the I/O into pre-wired spares. Provide pre-wired spare points with all cabling and termination internal to the PLC as done for other I/O points.
   3. POINT DATA FIELDS
      1. I/O point data fields shall be subject to review and modification by the ENGINEER during the Shop Drawing review phase. Incorporate changes directed by the ENGINEER completely into the entire system, at no additional cost to OWNER, subject to the following limitations:

NTS: Coordinate with Owner for INPUT/OUTPUT TAGGING.

* 1. INPUT/OUTPUT TAGGING

+ + END OF SECTION + +

(See following pages Schedules to this Section)