ENGINEERING SPECIFICATION

SYMCOM MODEL ISS-105 Intrinsically Safe Pump Control

PART 1 GENERAL

1.1 REFERENCES

A. UL 913 Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division I, Hazardous (Classified) locations, Sixth Edition – Underwriters Laboratories
B. CAN/CSA-C22.2 No. 157-1992, "Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations"
C. ANSI/IEEE C62.41 – American National Standards Institute/Institute of Electrical & Electronics Engineers

Relays shall be installed according to the latest version of the National Electrical code.

1.2 WARRANTY

A. Manufacturer Warranty: The manufacturer shall guarantee the pump control to be free from material and workmanship defects for a period of five years from the date of manufacture when installed and operated according to the manufacturer's requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

The equipment specified shall be the Model ISS-105, manufactured by SymCom, Inc.

2.2 DESCRIPTION

A. Regulatory Requirements:
   1. The equipment shall be UL Listed as type QUZW—Process Control Equipment for Use in Hazardous Locations, Sixth Edition.
   2. The equipment shall be cUL Listed as type QUZW7—Process Control Equipment for Use in Hazardous Locations Certified for Canada, Sixth Edition.

2.3 PERFORMANCE/DESIGN CRITERIA: DUPLEX, TRIPLEX, AND QUADPLEX PUMP CONTROL

A. General IO Capability

   1. Outputs:
      a. The equipment shall include 4 SPST output relay contacts pilot duty rated at 480VA at 240VAC.
      b. The equipment shall include 1 SPDT output relay contact pilot duty rated at 480VA at 240VAC.

   2. Inputs
      a. The equipment shall provide 5 inputs to the hazardous area.

   3. The equipment shall provide the following external inputs:
      a. Power Reset
      b. Alarm Silence/Alarm Reset
      c. Remote Control 2
      d. Remote Control 1

B. Functions

   1. The equipment shall have out-of-sequence detection.
      a. The equipment shall flash the LED of the out-of-sequence input.
      b. The equipment shall energize the audible alarm relay during an out-of-sequence fault.
      c. The equipment shall provide a 10 second trip delay on out-of-sequence faults.
      d. The equipment shall reset out-of-sequence faults with a power-cycle.
      e. The equipment shall indicate an out-of-sequence fault when a float does not close.
   2. The equipment shall provide an adjustable inrush delay that prevents pump 1 and pump 2 from starting simultaneously.
   3. The equipment shall provide a minimum fixed 2 second inrush delay on all pumps to prevent the pumps from starting simultaneously.
   4. The equipment shall provide jockey/duty pump configuration.
      a. The equipment shall have a separate input and relay to control the jockey/duty pump.
      b. The float input shall not be included in the out-of-sequence detection.
   5. The equipment shall provide emergency pump configuration:
      a. The equipment shall have a separate input and relay to control the emergency pump.
      b. The float input shall not be included in the out-of-sequence detection.
   6. The equipment shall provide external alternation control, to configure pump 1, 2, 3 or 4 as the dedicated lead pump.
   7. The equipment shall provide float out of sequence alarms, which indicates a float has not closed.

8. The equipment shall provide separate pump stop modes for pump-up and pump-down systems.
    a. The equipment shall start each pump with its corresponding on float.
    b. The equipment shall stop each pump with its corresponding off float.
    c. The equipment shall provide 2 on float inputs.
    d. The equipment shall provide 2 off float inputs.

9. The equipment shall provide intrinsically safe switch mode that includes the following functions and features:
    a. 2 latching inputs
    b. 1 SPDT delay-on-make or delay-on-break time delay relay
    c. Individual channel invert control which causes a relay to function as either normally open or normally closed.
    d. Adjustable time delay from 2-255 seconds
    e. 5 inputs
    f. 5 outputs

10. The equipment shall provide duplex pump-down mode that includes the following functions:
    a. High, Low level alarm relays
    b. Pump 1, Pump 2 relays
    c. Audible alarm relay
    d. Low, Stop, Lead, Lag, High inputs for normally open floats
    e. Alternates between Lead and Lag pump every cycle of the stop float
    f. Pumps shall turn off with a common stop float

11. The equipment shall provide triplex pump-down mode that includes the following functions:
    a. High or Low level alarm relays
    b. Pump 1, Pump 2, Pump 3 relays
    c. Audible alarm relay
    d. Low or High, Stop, Lead, Lag1, and Lag2 inputs for normally open floats
    e. Alternate between Pump 1, Pump 2, and Pump 3 every cycle of the stop float
    f. Pumps shall turn off with a common stop float

12. The equipment shall provide quadplex pump-down mode that includes the following functions:
    a. Pump 1, Pump 2, Pump 3, Pump 4 relays
    b. Audible alarm relay
    c. Stop, Lead, Lag1, Lag2, and Lag3 inputs for normally open floats
    d. Alternate between Pump 1, Pump 2, Pump 3, and Pump 4 every cycle of the stop float
    e. Pumps shall turn off with a common stop float

13. The equipment shall provide Duplex SPS (separate pump stop) pump-down mode that includes the following functions:
    a. Pump 1, Pump 2 relays
    b. Audible alarm relay
    c. High or Low level alarm relays
    d. Low or High, Lead Stop, Lead, Lag Stop, Lag inputs for normally open floats.
    e. Pumps shall turn off independently with Lead, Lag stop floats

14. The equipment shall provide duplex pump-up mode that includes the following functions:
    a. High, Low level alarm relays
    b. Pump 1, Pump 2 relays
    c. Audible alarm relay
    d. Low, Stop, Lead, Lag, High inputs for normally open floats
    e. Alternates between Pump 1 and Pump 2 every cycle of the stop float
    f. Pumps shall turn off with a common stop float

15. The equipment shall provide triplex pump-up mode that includes the following functions:
    a. High or Low level alarm relay
    b. Pump 1, Pump 2, Pump 3 relays
    c. Audible alarm relay
    d. Low or High, Stop, Lead, Lag1, and Lag2 inputs for normally open floats
    e. Alternate between Pump 1, Pump 2, and Pump 3 every cycle of the stop float
    f. Pumps shall turn off with a common stop float

16. The equipment shall provide quadplex pump-up mode that includes the following functions:
    a. Pump 1, Pump 2, Pump 3, Pump 4 relays
    b. Audible alarm relay
    c. Stop, Lead, Lag1, Lag2, and Lag3 inputs for normally open floats
    d. Alternate between Pump 1, Pump 2, Pump 3, and Pump 4 every cycle of the stop float
    e. Pumps shall turn off with a common stop float

17. The equipment shall provide duplex SPS (separate pump stop) pump-up mode that includes the following functions:
    a. Pump 1, Pump 2 relays
    b. Audible alarm relay
    c. High or Low level alarm relay
    d. Provide Low or High, Lead Stop, Lead, Lag Stop, Lag inputs for normally open floats
    e. Pumps shall turn off independently with Lead, Lag stop floats

C. Human Interface Features

1. The equipment shall provide the following functions controlled from a DIP switch:
   a. Low Alarm Enable
   b. High Alarm Enable
   c. Pump 1 Enable
   d. Pump 2 Enable
   e. Pump 3 Enable
   f. Pump 4 Enable
   g. Audible Alarm Fail Safe Enable
   h. Alternation Control
2. The equipment shall include the following mode settable by a BCD switch:
   a. Intrinsically safe switch mode
   b. Duplex pump-down mode
   c. Triplex pump-down mode
   d. Quadplex pump-down mode
   e. Duplex pump-down, separate pump stop
   f. Duplex pump-up mode
   g. Triplex pump-up mode
   h. Quadplex pump-up mode
   i. Duplex pump-up, separate pump stop
3. The equipment shall include a dial adjustment to set lag pump delay time from 2-255 seconds.
4. The equipment shall have 10 indicator LEDs. Each LED shall be capable of indicating the status of its corresponding input or output.

D. Intrinsically Safe Requirements

1. The equipment shall have the following entity parameters
   a. Voc=16.8V
   b. Isc=1.2mA
   c. La=100mH
   d. Ca=0.39µF
   e. $Po = \frac{Voc * Isc}{4}$
2. The equipment shall provide intrinsically safe circuit into the following locations:
   a. Class I, Divisions I & II, Groups A, B, C, & D
   b. Class II, Divisions I & II, Groups E, F & G
   c. Class III
3. The equipment shall provide 5 inputs to the hazardous area.

E. Electromagnetic Compatibility

1. The equipment shall be immune to electrostatic discharge per IEC 61000-4-2, Level 3, 6 kV contact discharge and 8 kV air discharge.
2. The equipment shall be immune to electrical fast transient bursts exceeding IEC 61000-4-4, Level 3. Specified limits shall be 4 kV input power 2kV inputs/outputs.
3. The equipment shall be immune to electrical surges per IEC 61000-4-5, Level 4. Specified limits shall be 4kV line-to-line and line-to-ground.
4. The equipment shall be immune to radiated radio frequency emissions. Specified limits shall be 10V/m at 150 MHz.

F. Dielectric Isolation: The equipment shall provide 2000VAC dielectric withstand between the AC mains and the relay contacts and between the AC mains and enclosure for 1 minute.

G. Enclosure Class of Protection: The equipment shall provide IEC IP20 (finger safe) protection.

H. Environmental Requirements

1. The equipment shall operate continuously without derating in ambient temperatures of -20° to 55°C (-4° to 133°F).
2. The equipment shall operate continuously without derating in relative humidity of up to 95% non-condensing per IEC 68-2-3.
3. The equipment shall operate properly after storage in ambient temperatures of -40° to 80°C (-40° to 176°F).

I. Dimensions: The equipment dimensions shall not exceed 3.703” in width X 5.025” in length X 2.35” in height.

J. Mounting:

1. The equipment shall be mountable on standard 35 mm DIN rail.
2. The equipment shall be surface mountable on a backplane using 2 screws, bolts or similar mounting hardware.

End of Section