**Algorithms**

**Input Terminals**
- A1 (W400W401) 4/20 mADC
- Input Analog Filter
- On/Off Delay 0.999 sec

**Input Terminals**
- A1 (W400W401) 4/20 mADC
- Low Level Alarm
- On/Off Delay 0.999 sec

**Input Terminals**
- A1 (W400W401) 4/20 mADC
- Loss of Signal Alarm

**Input Terminals**
- A1 (W400W401) 4/20 mADC
- Alarm Acknowledge

**Input Terminals**
- A1 (W400W401) 4/20 mADC
- Pump Runtime Accumulators

**Input Terminals**
- A1 (W400W401) 4/20 mADC
- Number of Starts

**Input Terminals**
- A1 (W400W401) 4/20 mADC
- Pump Run Timer Reset

**Input Terminals**
- D1, D2
- Pump Fail Delay

**Input Terminals**
- D7 (W112W113)
- Dry Contact

**Input Terminals**
- D8 (W114W115)
- Dry Contact

**Output Terminals**
- Loss of Signal Alarm
- Alarm Acknowledge
- Pump Runtime Accumulators
- Number of Starts
- Pump Run Timer Reset

**Output Terminals**
- Pump Fail Delay

**Output Terminals**
- Set Point Mode Enable
- Calibrate Mode Enable

**Digital Inputs**
- PUMP 1 F.B.
  - D1 (W100W101)
- PUMP 2 F.B.
  - D2 (W102W103)
  - D3 (W104W105)
- SPARE
  - D4 (W106W107)
  - D5 (W108W109)
  - D6 (W110W111)

**Field-Equipment**
- Tank
  - Level (4/20 MADC)
  - Pump On/Off Control
    - P1 R1 (W200W201)
    - P2 R2 (W206W207)
  - Pump Run Status
  - High Level Alarm R5 (W224W225)
  - Low Level Alarm R6 (W230W231)
  - Loss of Signal Alarm R7 (W236W237)

**Legend**
- Algorithm Number
- Begin Algorithm
- End Algorithm
- Interlock, when enabled, Algorithm is disabled.

**WARNING**

For SCADA overall system design must incorporate other safeguards in addition to the ICS for operating conditions hazardous to personnel, equipment, or property; such as the use of "deadman" or "suresafe interlocks" and red tag access etc.

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**AGM Electronics, Inc.**
Tucson, Arizona
Knowledge Map
2 PUMP CONTROL

<table>
<thead>
<tr>
<th>Signature</th>
<th>Date</th>
<th>PRO-991117A0000</th>
<th>Rev</th>
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<tr>
<td>JG</td>
<td>11/23/95</td>
<td>Ref ICS2</td>
<td>NC</td>
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<tr>
<td>RF</td>
<td>11/23/99</td>
<td>SO# XXXX</td>
<td>Sheet</td>
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Sheet | 1 of 3
DISPLAY MODE
THE DISPLAY MODE IS ENTERED UPON POWER UP, OR BY PRESSING SWITCH (S02P), AND THE TANK LEVEL WILL BE DISPLAYED IN ENGINEERING UNITS. TO EXIT THE DISPLAY MODE ENTER THE SETPOINT OR CALIBRATION MODE.

SETPOINT MODE
THE SETPOINT MODE IS ENTERED BY PRESSING SWITCH (S02P) WITH DIGITAL INPUT (D7) CLOSED, TO MOVE THROUGH THE SETPOINT MODE USE SWITCH (S08P). TO ENTER A SETPOINT SELECT THE CORRECT POINTER LIGHT USING THE SELECT SWITCH (S08P) AND USE SWITCH (S00) TO INCREMENT OR DECREMENT THE DISPLAYED VALUE. USE SWITCH (S01P) TO SAVE THE DISPLAYED VALUE, A FLASHING SETPOINT LIGHT INDICATES AN UNSAVED VALUE WHILE A CONSTANT LIGHT DENOTES A SAVED VALUE.

<table>
<thead>
<tr>
<th>STEP</th>
<th>LIGHT</th>
<th>DISPLAY</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>01</td>
<td>L11</td>
<td>on 999.9</td>
<td>PUMP 1 ON STPT (LEVEL)</td>
</tr>
<tr>
<td>02</td>
<td>L11</td>
<td>of 999.9</td>
<td>PUMP 1 OFF STPT (LEVEL)</td>
</tr>
<tr>
<td>03</td>
<td>L13</td>
<td>on 999.9</td>
<td>PUMP 2 ON STPT (LEVEL)</td>
</tr>
<tr>
<td>04</td>
<td>L13</td>
<td>of 999.9</td>
<td>PUMP 2 OFF STPT (LEVEL)</td>
</tr>
<tr>
<td>05</td>
<td>L18</td>
<td>D 9999</td>
<td>PUMP ON-OFF DELAY (SECONDS)</td>
</tr>
<tr>
<td>06</td>
<td>L20</td>
<td>D 9999</td>
<td>INPUT FILTER (SECONDS)</td>
</tr>
<tr>
<td>07</td>
<td>L51</td>
<td>on 999.9</td>
<td>HIGH ALARM ON STPT (LEVEL)</td>
</tr>
<tr>
<td>08</td>
<td>L51</td>
<td>of 999.9</td>
<td>HIGH ALARM OFF STPT (LEVEL)</td>
</tr>
<tr>
<td>09</td>
<td>L53</td>
<td>on 999.9</td>
<td>LOW ALARM ON STPT (LEVEL)</td>
</tr>
<tr>
<td>10</td>
<td>L53</td>
<td>of 999.9</td>
<td>LOW ALARM OFF STPT (LEVEL)</td>
</tr>
<tr>
<td>11</td>
<td>L32</td>
<td>D 9999</td>
<td>PUMP 1 FEEDBACK DELAY (SECONDS)</td>
</tr>
<tr>
<td>12</td>
<td>L34</td>
<td>D 9999</td>
<td>PUMP 2 FEEDBACK DELAY (SECONDS)</td>
</tr>
<tr>
<td>13</td>
<td>L60</td>
<td>999999</td>
<td>0% D/A ANALOG OUTPUT (650)</td>
</tr>
<tr>
<td>14</td>
<td>L62</td>
<td>999999</td>
<td>100% D/A ANALOG OUTPUT (3280)</td>
</tr>
<tr>
<td>15</td>
<td>L14</td>
<td>999999</td>
<td>CURRENT TIME (HR:MIN:SEC)</td>
</tr>
<tr>
<td>16</td>
<td>L15</td>
<td>999999</td>
<td>CURRENT DATE(MO/DAY/YR)</td>
</tr>
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</table>

ALARMS
ALARMS ARE CONTROLLED BY THE ENTERED SETPOINTS. WHEN THE SETPOINTS ARE EXCEEDED, THE ALARM WILL LIGHT. THE RELAY WILL DE-ENERGIZE WHEN THE CONDITION-clears BUT WILL ALLOW THE LIGHT TO STAY ON UNTIL THE ALARM RESETS (S57P) IS PRESSED WHICH WILL TURN OFF THE ALARM LIGHT IF THE CONDITION IS CLEARED.

CONTROL
THE HAND-OFF/AUTO SWITCHES (S39 – S41) ARE USED TO TURN THE PUMPS ON AND OFF, OR SELECT AUTOMATIC CONTROL OF EACH PUMP. THE STATUS LIGHTS (L18 – L20) WILL TURN ON WHENEVER A PUMP IS BEING CALLED FOR. ONLY THE AVAILABLE PUMPS IN (AUTO) WILL BE ROTATED. LIGHTS (L32 – L34) ARE USED AS PUMP FAIL STATUS LEDS.

CALIBRATION
TO ENTER THE CALIBRATION MODE FOR CALIBRATING THE INCOMING ANALOG SIGNAL TO ENGINEERING DISPLAY UNITS (FEET), PRESS THE CALIBRATION MODE SELECT SWITCH (S02P).

TO CALIBRATE:
1> USE THE SELECT SWITCH (S08P) TO SELECT THE 0% LIGHT (L60)
2> APPLY 0% ANALOG SIGNAL TO ANALOG INPUT.
3> USE THE INC/DEC SWITCH TO SET THE DISPLAY FOR DESIRED 0% UNITS.
4> PRESS THE ENTER SWITCH TO SAVE THE 0% CALIBRATION
5> USE THE SELECT SWITCH TO SELECT THE 100% LIGHT (L62).
6> APPLY 100% ANALOG SIGNAL TO ANALOG INPUT.
7> USE THE INC/DEC SWITCH TO SET THE DISPLAY FOR DESIRED 100% UNITS.
8> PRESS THE ENTER SWITCH TO SAVE THE 100% CALIBRATION
9> CALIBRATION COMPLETE, PRESS (S02P) TO RETURN TO NORMAL MODE.