MYRIAD 'DPC' DUPLEX PUMP CONTROLLER INSTRUCTION MANUAL
VERSION 4.99

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MYRIAD DPC MANUAL 031924

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INTRODUCTION:

The Sigma Myriad DPC (Duplex Pump Controller) is a state of the art microprocessor based, user configurable instrument for the monitoring and control of two (2) constant speed or (2) variable speed driven pumps.

The Myriad DPC performs all of the functions found in a full size control panel.

- Displays level in numeric and bargraph forms
- Displays pump run status
- Allows full user selection of all system variables
- Monitors critical alarms (motor overtemperature, etc.)
- Monitors non critical alarms (seal leak, etc.)
- Monitors hand off auto selection switch position
- Monitors pump (VFD) 'run' feedback
- Provides digital and relay outputs for pump control, level alarm, sensor fail, pump fault and seal leak
- Provides 4/20MA outputs for VFD speed setting with proportional control or P.I.D. setpoint control.
- Retransmits level signal
- Provides time and date 'stamped' alarm information
- Continuous sensor monitor with 'sensor fail' alarm output
- Audible and visual alarms
- Allows simulation of level to exercise pumps or verify operation
- Records "MAX" and "MIN" process values and a graphic trend chart for trouble shooting
- Available in ¼ DIN panel mount or Nema 4X enclosures

Additional Functions available with the Optional Auxiliary PCB

- Alternation selector hardwired 3 position 'Pump 1 – Auto – Pump 2 '
- Float Switch Control. 4 Float Control, Low Float Cutout, Single Emergency Float Control
- Horn Driver Output
- Reset Pushbutton Input
- Seal Leak Inputs for each pump

ORDERING INFORMATION:

- 1/4 DIN Case   Sigma Myriad-DPC-DIN
- Wall Mount Nema 4X   Sigma Myriad-DPC-N4X

<u>SPECIFICATIONS:</u>

- ANALOG INPUT (1 ea.) (A second AI is available when backup sensor is enabled)
  Analog, 4/20MA, 0-5V, 1-5V, 0-10VDC, isolated with common negative, +-0.1% accuracy.

- DIGITAL INPUTS (7 ea.) (7 additional DIs are available with the Aux PCB)
  Digital 10-30VDC

- ANALOG OUTPUT: (4 ea.)
  Analog, with common negative 0-20MA, 4/20MA, 0-5V, 0-10V (voltage output requires a resistor).

- DIGITAL OUTPUTS: (4 ea.) (Horn output available on Aux PCB)
   Opto isolated, solid state, open collector, 100MA 30VDC max.

- RELAY OUTPUTS: (4 ea.)
  SPDT, Form 'C' 5A Relay

- DISPLAY:
  LCD, 128 X 32 pixel bitmapped graphic display

- LOOP POWER:
  24VDC regulated output, 100MA max.

- 5 USER KEYS:
  Up, Down, Left, Right, Enter

- ACCURACY:
  0.1% of calibrated span

- LOCKOUT:
   User password, user configurable

- INPUT IMPEDANCE:
  Voltage 100K, current 100 OHMS

- POWER:
  120VAC (230VAC available)

- ENVIRONMENTAL:
  Operating, 0-65° C
  Storage, -40° -80° C
  R.H., 0-90% non-condensing

- ENCLOSURE:
  ¼ DIN, ABS plastic 96 X 96 X 124MM or Nema 4X wall mount 12 x 8 x 8 inches

- **FRONT PANEL:**
  Gasketed Nema 4X

- **ACCESS: (DIN CASE)**
  Chassis & boards remove from front of case.

- **TERMINAL STRIP:**
  (40) Removable for ease of wiring 28 – 16 AWG

- **CONNECTIONS:**
  Removable screw terminal blocks 28 – 16 AWG wire.

- **CONTROL OUTPUTS:**
  4 relay outputs, user programmable, SPDT Form 'C' relays 5 AMP.
  4 digital outputs, Opto isolated, open collector. (Horn output available on Aux PCB)
  Digital communication RS485 MODBUS® RTU protocol

- **OUTPUT ANNUNCIATION:**
  On board piezo buzzer

- **CPU Activity Monitor**

- **PROGRAMMING:**
  Menu based, all parameters and setpoints are user configurable via menu prompts and user keys. The preconfigured screens and 'pull down' sub menus with English prompts assure rapid setup and commissioning.

- **1 YEAR WARRANTY**

- **OPTIONS:**
  Auxiliary Digital I/O PCB with predefined functions.
  Miscellaneous Expansion cards, networking
  Auxiliary Analog I/O PCB with predefined functions

- **MODBUS® 485 RTU**
  Network allows multiple units to be connected together for distributed applications or remote monitoring SCADA applications.

- **NETWORKING:**
  Significant expansion is possible via additional control boards and MODBUS® networking. Up to 128 units may be interconnected, 4000 feet per node.

FEATURES:

- Microprocessor Based
- Graphic LCD Display
- 5 Function Keys
- Isolated 24VDC Sensor Power
- 4/20MA, 1-5V, 0-5V, 0-10VDC Programmable input
- 2 Analog Input (4 additional AI's are available with AUX PCB)
- 4 Analog Outputs (4 additional AO's are available with AUX PCB)
- 7 Digital Inputs (7 additional DI's are available with the Aux PCB)
- 4 Digital Outputs (Horn output available on Aux PCB)
- 4 Form 'C' Relay Outputs
- Fully User Programmable in English
- 2 Ea. RS485 Ports (Programming and SCADA)
- CPU Activity Monitor
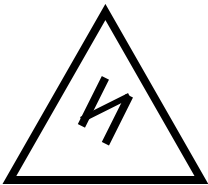- P.I.D. Control (optional selection)

WIRING DETAIL

- Inputs, see Dwg # 07-105

- Outputs, see Dwg # 07-105

⚠ CAUTION

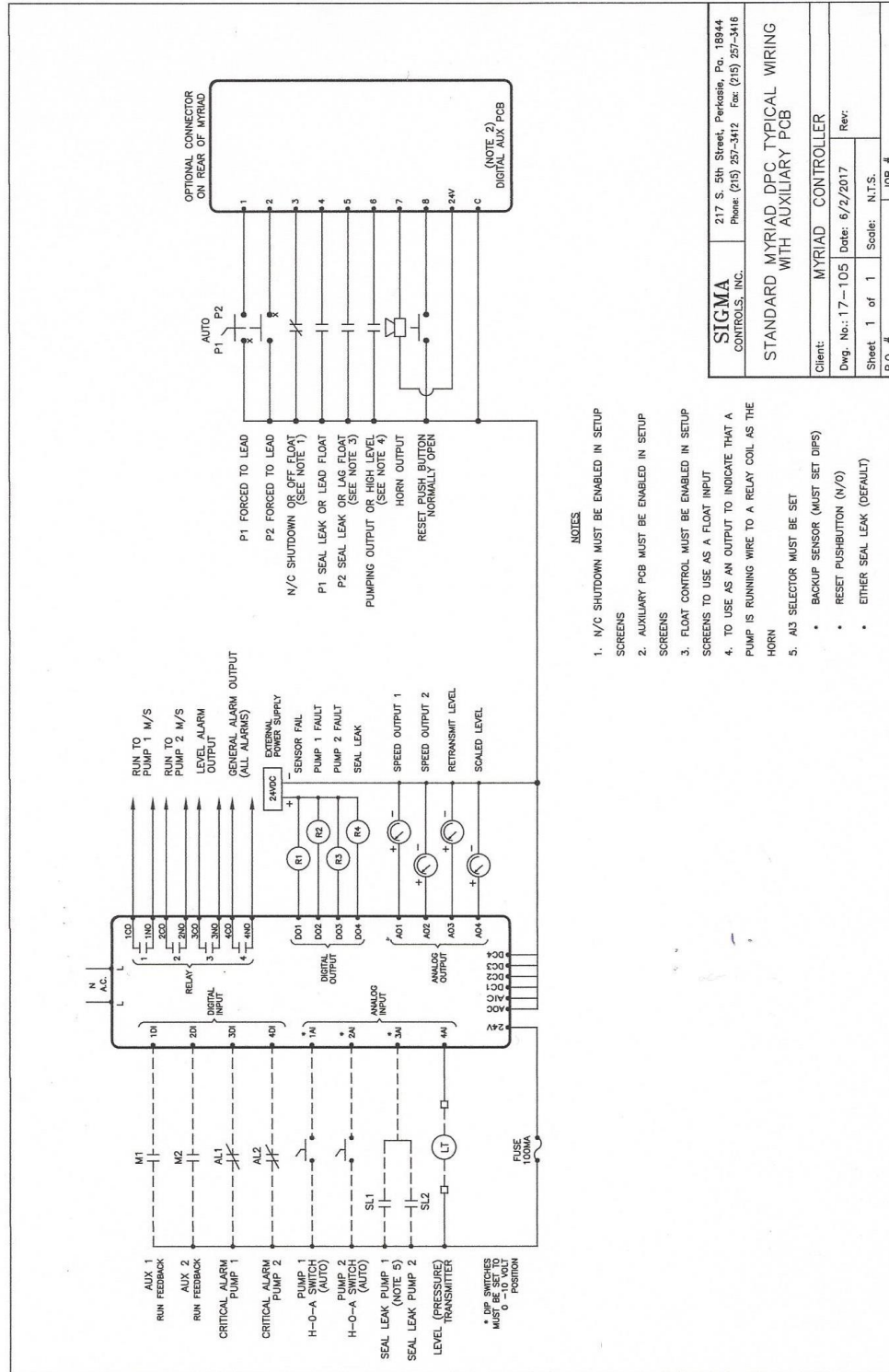**All electrical wiring must be in accordance with all local state and national codes that apply.**
Do not exceed the rated current of the D.C. power supply (100MA) or the form 'C' relay outputs (5A/240VAC resistive).

⚡ WARNING

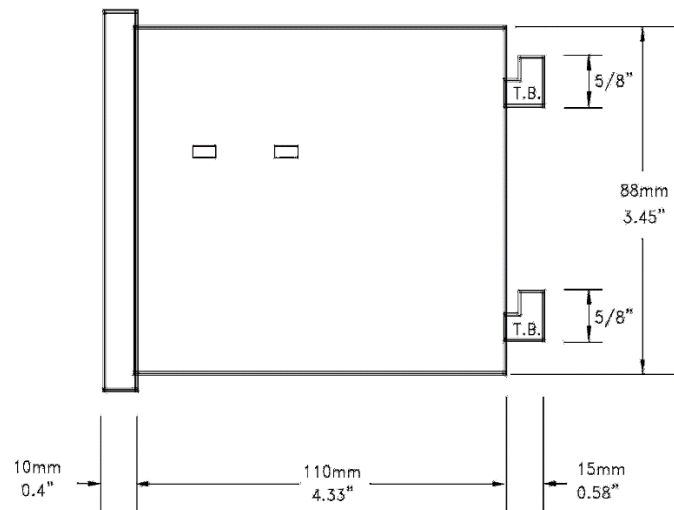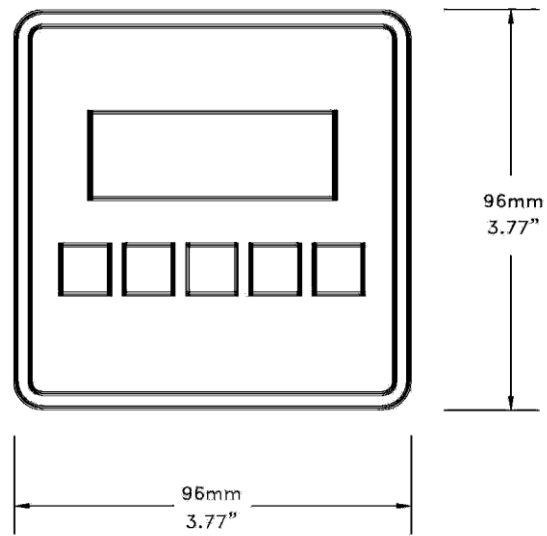**Hazardous voltages are present within the enclosure. Installation or service should only be carried out by trained personnel.**

⚠ CAUTION

The range selector switches located on the bottom of the circuit board are factory set. If a field change of input type is required see Appendix 'A'. Do not apply an input signal that is not coordinated with range switches or the unit may be damaged.

OPTIONAL CONNECTOR ON REAR OF MYRIAD

(NOTE 2) DIGITAL AUX PCB

AUTO P1 P2

P1 FORCED TO LEAD
P2 FORCED TO LEAD
N/C SHUTDOWN OR OFF FLOAT (SEE NOTE 1)
P1 SEAL LEAK OR LEAD FLOAT
P2 SEAL LEAK OR LAG FLOAT (SEE NOTE 3)
PUMPING OUTPUT OR HIGH LEVEL (SEE NOTE 4)
HORN OUTPUT
RESET PUSH BUTTON NORMALLY OPEN

AUX 1 RUN FEEDBACK
AUX 2 RUN FEEDBACK
CRITICAL ALARM PUMP 1
CRITICAL ALARM PUMP 2
PUMP 1 H-O-A SWITCH (AUTO)
PUMP 2 H-O-A SWITCH (AUTO)
SEAL LEAK PUMP 1 (NOTE 5)
SEAL LEAK PUMP 2
LEVEL (PRESSURE) TRANSMITTER

* DIP SWITCHES MUST BE SET TO 0 - 10 VOLT POSITION

FUSE 100MA

M1
M2
AL1
AL2
SL1
SL2
LT

N A.C. L
L

RELAY
DIGITAL INPUT
DIGITAL OUTPUT
ANALOG INPUT
ANALOG OUTPUT

1CO 1NO
2CO 2NO
3CO 3NO
4CO 4NO
1DI 2DI 3DI 4DI
1AI 2AI 3AI 4AI
DO1 DO2 DO3 DO4
AO1 AO2 AO3 AO4
DC4 DC3 DC2 DC1 AIC ADC 24V
24V

RUN TO PUMP 1 M/S
RUN TO PUMP 2 M/S
LEVEL ALARM OUTPUT
GENERAL ALARM OUTPUT (ALL ALARMS)
EXTERNAL POWER SUPPLY
24VDC
SENSOR FAIL
PUMP 1 FAULT
PUMP 2 FAULT
SEAL LEAK
SPEED OUTPUT 1
SPEED OUTPUT 2
RETRANSMIT LEVEL
SCALED LEVEL

R1 R2 R3 R4

NOTES

1. N/C SHUTDOWN MUST BE ENABLED IN SETUP SCREENS

2. AUXILIARY PCB MUST BE ENABLED IN SETUP SCREENS

3. FLOAT CONTROL MUST BE ENABLED IN SETUP SCREENS TO USE AS A FLOAT INPUT

4. TO USE AS AN OUTPUT TO INDICATE THAT A PUMP IS RUNNING WIRE TO A RELAY COIL AS THE HORN

5. AI3 SELECTOR MUST BE SET
   * BACKUP SENSOR (MUST SET DIPS)
   * RESET PUSHBUTTON (N/O)
   * EITHER SEAL LEAK (DEFAULT)

96mm
3.77"

96mm
3.77"

T.B.

5/8"

88mm
3.45"

T.B.

5/8"

10mm
0.4"

110mm
4.33"

15mm
0.58"

PROGRAMMING & SETUP

The Myriad DPC utilizes 'plain English' menu driven setup screens which are intuitive and easily understood.
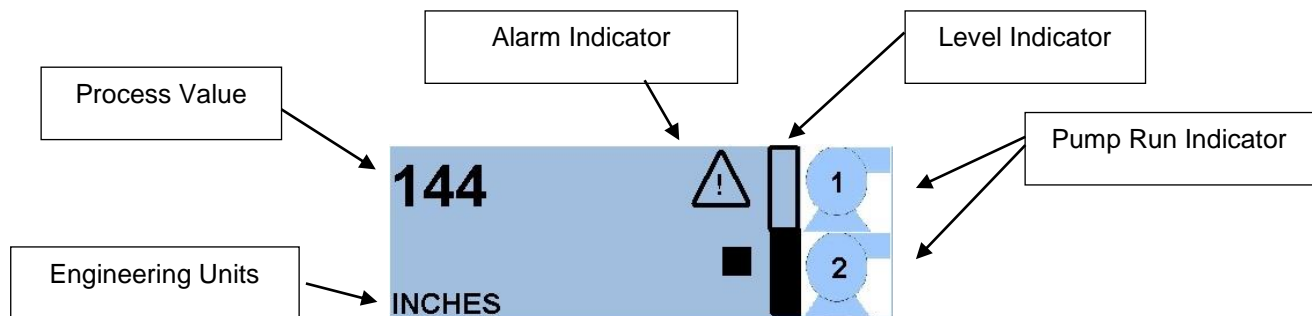
MAIN DISPLAY

NOTE: To 'RETURN' to the main display from any other screen, scroll to 'EXIT' and press 'ENTER'.

From the default screen (Fig. 1), push the 'ENTER' button to enter the password protected menus.

Enter the user selected password (factory default is zero) using the ↑↓ button and press 'ENTER' to access the first programming menu 'MENU 1'.

NOTE: Programming should begin at 'MENU 2'. 'SCALE' to set the instrument for the correct input signal from 'MENU 1'. Use the → ← buttons to highlight the 'NEXT' item and press enter to access 'MENU 2'.

MENU 2 SCALE

```
                    MENU 2
AOUT                           SETUP
SCALE                          DIAGS

BACK          NEXT        EXIT
```

Use the → ← buttons to highlight 'SCALE' and press 'ENTER'.

```
                 INPUT TYPE
                  4-20 MA

               # OF POINTS 2
BACK          NEXT        EXIT
```

This first screen shows what type of Analog input is being used. **NOTE: INPUT TYPE MUST BE COORDINATED WITH INPUT SELECTOR SWITCH LOCATED ON THE BOTTOM OF THE CIRCUIT BOARD** (See Appendix 'A')

The 'DPC' does not include linearization of the input signal. The display is linear over the 2 points selected.

NOTE: Highlight 'NEXT' and press 'ENTER' to advance to the next screen.

DECIMAL POINT SELECTOR SCREEN

```
      DECIMAL POINT                         DECIMAL POINT
ex.          ++.+                    ex.          +++
             2.1                                  3.0

BACK      NEXT      EXIT            BACK      NEXT      EXIT
```

The cursor will be positioned over the decimal count window. Use the ↑ ↓ arrow buttons to raise or lower the unit number to the left of the decimal point. (The example shown in this window will change with your selection.)

Use the → ←   buttons to move the cursor over the number behind the decimal point and use the ↑ ↓ buttons to change this selection. Once again, the example will change to confirm your selection.

Use the → ←   buttons to highlight the 'NEXT' selection and press 'ENTER' to access the Input Scale Screen.

INPUT SCALING TO ENGINEERING UNITS

```
              INPUT SCALE
4.00 MA        =                0
20.00 MA       =              144
BACK           NEXT           EXIT
```

NOTE: This screen sets what the Myriad DPC displays in the main display for the selected input. The example shown above will display 0.0 units when the input is 4.00 MA. Both the input and the display at that input can be changed for different requirements.
A) With the cursor selecting '4.00' (or the zero value of the selected input) use the ↑↓ buttons to change the input value for the required displayed value.

ENGINEERING UNITS SELECTION:

When 'Scale Menu' is complete the 'INPUT TEXT" menu is the last menu in the scaling process.

```
              INPUT TEXT
           FEET OF WATER


     BACK        NEXT        EXIT
```

This screen allows the selection of several engineering units. With the cursor on the default value as shown, press the ↑↓ buttons to select between:

FEET	NTU
INCHES	PPM
GPM	DEG. F
PSI	DEG C
LPM	FLOATS
ING HG	TONS/HR
MGD	PH

Use the ↑ ↓ buttons to select the desired engineering units then with the → ← buttons, highlight 'NEXT' and press 'ENTER' to access the "DISPLAY FILTER" screen.

DISPLAY FILTER SCREEN

```
DISPLAY FILTER
< 0 = FAST      10 = SLOW>
            0
BACK          NEXT          EXIT
```
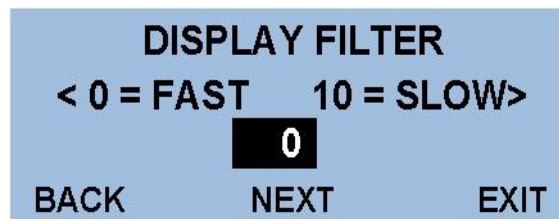
Use the ↑↓ buttons to change the amount of filtering applied to the input signal. '0' is no filter and '10' is high filter.

⚠ **Too much filtering will dampen process responses.**

Scroll to 'NEXT' and press 'ENTER' to return to the Menu 2.

SETUP

NOTE: The 'SETUP' menu allows access to the following items:

1) Pump elapsed timer 1
2) Pump elapsed timer 2
3) Trend screen time base
4) Password
5) Date
6) Alarm Horn on/off
7) Set MODBUS® ID
8) Backup Sensor
9) Alarm Outputs
10) PID Enable

ELAPSED TIMER 1 & 2

An elapsed timer is provided to allow the operator to monitor the run times of the two pumps.

```
SETUP
ELAPSED TIMER 1
            678345
BACK          NEXT          EXIT
```

To reset the #1 timer use the ↑↓ keys to change the saved value to zero. Select 'NEXT' and press 'ENTER' to access elapsed timer 2. Follow the procedure above to reset this timer to zero.

Use the →← keys to highlight 'NEXT' and press the 'ENTER' key to move to the trend screen speed screen.

TREND SPEED SCREEN

```
                  SETUP
              TREND SPEED
                  FULL
      BACK         NEXT         EXIT
```

NOTE: The trend screen is provided as a diagnostic tool. This trend graphic will display the process value over the time duration selected. The duration of the trend is selectable between 2 minutes, 2 hours, 12 hours and full speed. The trend is non-retentive and will overwrite previous data.

Use the ↑↓ keys to select the desired time base and scroll to 'NEXT' and press 'ENTER' to move to the 'Change Password' screen.

CHANGE PASSWORD SCREEN

```
                  SETUP
            CHANGE PASSWORD
                    0
      BACK         NEXT         EXIT
```

⚠ **Once the password has been changed make sure a record of the new password is retained. Access to the programming menus requires a correct password.**

Use the ↑↓ keys to enter a number up to 9999, select 'NEXT' and press 'ENTER' to enter the 'change clock' menu.

CHANGE CLOCK, MONTH, DATE AND DAY SCREENS

```
          SETUP
        SET MONTH
       3/27/13   16:56
   BACK        NEXT        EXIT
```

As described previously, use the ↑↓ keys to set the screen to the current time. Scroll to 'NEXT' and press 'ENTER' to move to the change month screen.

The 'CHANGE MONTH' screen, 'CHANGE DATE' screen and 'CHANGE DAY' screen are all adjusted as above. After changing the 'DAY' screen, scroll to 'NEXT' and press 'ENTER' to select the 'Alarm Horn' screen.

NOTE: DAYLIGHT SAVINGS CHANGES ARE NOT AUTOMATIC.

ALARM HORN SCREEN

```
          SETUP
        ALARM HORN
            ON
   BACK      NEXT      EXIT
```

NOTE: Selecting the alarm horn to 'OFF' will disable the internal piezo alarm from sounding when an alarm condition occurs.

Allows the MODBUS® comm port to be set to match network requirements. Exit to save, then cycle Power to adopt new node.

```
          SETUP
        SET MODBUS   ID
    5
   BACK        NEXT        EXIT
```

High and low level alarms are available on Relay 3. If desired this selection will provide high level alarm on RLY #3 and low level alarm on digital output #4. (24VDC relay required.)

```
          SETUP
       ALARM OUTPUTS
 DO4 = SF          RLY 3 = HILO
   BACK        NEXT        EXIT
```

When the desired selections are made, scroll to 'NEXT' and press 'ENTER' to return default screen.

Select 'EITHER SEAL LEAK' for the standard monitoring of the pumps' seal leak contact closures. [Default]

Select 'BACKUP SENSOR' if using a backup level transmitter in this mode. A primary sensor failure will change operation to a secondary sensor. (Do not use if using a single level sensor.) Set Dip switch 7 to up and 8 to down.

Select 'RESET PUSHBUTTON' To use AI3 for an external alarm reset pushbutton.

```
          SETUP
       AI3 SELECTION
      EITHER SEAL LEAK
   BACK        NEXT        EXIT
```

Select 'PID' (proportional, integral, derivative), control provides a setpoint for the controller to maintain. (Use for booster and similar applications.)

```
          SETUP
        PID ENABLE
            OFF
   BACK        NEXT        EXIT
```

Select 'REVERSE' to drive the output down when the process value exceeds the setpoint, as in pressure boosting applications.
Select 'FORWARD' to drive the output up when the process value exceeds the setpoint.

```
              SETUP
          PID DIRECTION
             REVERSE
  BACK         NEXT          EXIT
```

If PID is enabled. Go to Page 18 for setup.

Select 'DUPLEX' for two pump operation
Select 'SIMPLEX' when pump 2 is not installed.

```
              SETUP
             CONTROL
             DUPLEX
   BACK        NEXT          EXIT
```

The Auxiliary PCB is a factory installed option. When in use, this screen must be enabled, otherwise all of its functions will be disabled.

```
              SETUP
          AUXILIARY PCB
            DISABLED
   BACK        NEXT          EXIT
```

The Auxiliary PCB has inputs for float switches. This must be enabled to use those functions.

```
              SETUP
          FLOAT CONTROL
            DISABLED
   BACK        NEXT          EXIT
```

When float control is enabled it serves as a backup control to the analog level sensing. This setting controls at what point the floats assume control.

Select LEAD FLOAT to initiate backup control when the float above the low float is tipped. Used when the top 3 floats are hanging above the normal pumping range.
Select LAG FLOAT to initiate backup control when the 2nd float above the low float is tipped. Used when the top 2 floats are hanging above the normal pumping range.
Select HIGH FLOAT to initiate backup control when the high float is tipped.
Select SINGLE FLOAT to initiate emergency operation of both pumps. No other floats need to be installed for this mode.
Select NONE-FLOATS ONLY use the controller with only floats. The level sensor will be disabled.

```
              SETUP
          BACKUP UPON
           LEAD FLOAT
   BACK        NEXT         EXIT
```

ANALOG OUTPUT (AOUT)

Use the → ← keys to highlight the 'AOUT' item and press 'ENTER' to access the analog output signal settings.

NOTE: There are four analog outputs on the DPC: AOUTPUT 1 and AOUTPUT 2 are speed vs. level setpoints which are only utilized on variable speed drive applications. This screen allows the user to program the speed of the drive at a selected level. Both level and drive speed are selectable.

SPEED SCALE

```
          SPEED SCALING
      30      =        50.1%
      100     =        89.9%
   BACK      NEXT      EXIT
```

The 'level' value will be highlighted, use the ↑↓ buttons to change the level point at which the speed of the drive (selected in the next block) is requested. In the example above, the drive will be at 50% speed when the level is 30 inches.

Select a value of drive speed and level as described above and scroll to 'EXIT' to save the values selected and move to analog output 4 screen.

NOTE: When inverting the output direction (as in a pressure application), the speed on scale one must be lower than the speed on scale 2. For example, to invert the default values that are shown here, use the following settings:

Scale 1: Level = 100, Speed = 50%

<u>**ANALOG OUTPUT 4 (ANLOUT4)**</u>   **NOTE: Analog output <u>3</u> is a nonadjustable retransmitted signal which 'mirrors' the analog input signal.**

```
       AOUT  4 SCALING
          0  =  4.00Ma
        144  =  20.00Ma
    BACK        NEXT        EXIT
```

NOTE: Analog output 4 is retransmitted output which can be scaled to any value of the display. With the display value highlighted, use the ↑↓ buttons to select a display value at which a selectable output occurs. Use → ← buttons to move to the output value for the previously selected display value and adjust as described above.
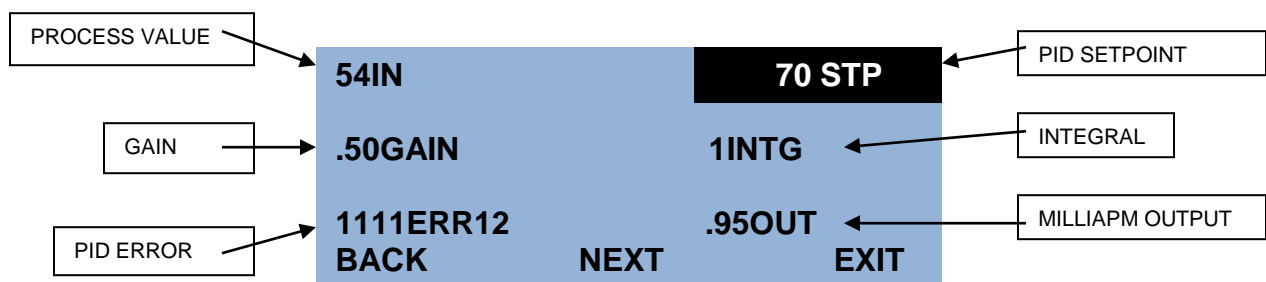
NOTE: In the example shown 4.00 MA will be output from analog output 4 when the display value is 0 inches.

From menu 2 use the → ← buttons to select 'SETUP' and press 'ENTER' to access the setup menu.

<u>**PID:**</u> **∗ IT IS STRONGLY RECOMMENDED THAT THE USER BE FAMILIER WITH THIS CONTROL METHOD PRIOR TO USING IT IN A LIVE APPLICATION**.

PID function provides proportional control of the output with a user selected setpoint. It is used for the modulation of a valve or VFD to maintain a constant process value, with process load charges.

To scroll PID Settings, use → ← buttons to change curser and ↑↓ to change values.

```
PROCESS VALUE →                                    ← PID SETPOINT
                54IN                70 STP
GAIN →          .50GAIN             1INTG          ← INTEGRAL
                1111ERR12           .95OUT          ← MILLIAPM OUTPUT
PID ERROR →     BACK        NEXT            EXIT
```

Gain – Speed of response. The higher the gain value, the slower the response.

Integral – Returns the process to the setpoint after a load change. The higher the value, the higher the change.

Setpoint – The value the controller will try to maintain the process variable at

```
              PID MIN/MAX
    MIN        .00%
    MAX       100.00%

    BACK          NEXT          EXIT
```

PID MIN/MAX – Sets the minimum and maximum the analog outputs can be ran at.

```
    54IN                        70 STP

    MANUAL CONTROL
    100.00% OUTPUT

    BACK          NEXT          EXIT
```

Use this screen to manually change the analog output to the VFD, Valve, etc.

MENU 1

```
              MENU 1
    SETTINGS                 SIM
    ALARMS                   ALT
      BACK        NEXT       EXIT
```

From Menu 1 select 'Settings' and press 'ENTER' to access the 'LEAD PUMP ON' setpoint.

LEAD PUMP ON

```
            SETTINGS
           LEAD ON AT
    80                    LEV
      BACK      NEXT      EXIT
```

NOTE: This parameter determines at what level the 'lead' pump turns on. Using the ↑↓ buttons select a level point to turn on the lead pump. Scroll to 'NEXT' and press 'ENTER' to access the:

LEAD PUMP OFF SCREEN

```
        SETTINGS
       LEAD OFF AT
  30                    LEV
  BACK      NEXT      EXIT
```

Following the procedure above, select a level value at which the lead pump turns off. Use 'NEXT' with the 'ENTER' button to access the:

LAG PUMP ON SCREEN

```
        SETTINGS
       LAG ON AT
  100                   LEV
  BACK      NEXT      EXIT
```

Select a value which turns on the lag pump. Use 'NEXT' and 'ENTER' to access the:

LAG PUMP OFF SCREEN

```
        SETTINGS
       LAG OFF AT
  40                    LEV
  BACK      NEXT      EXIT
```

Again, select a level value which turns off the lag pump. Select 'NEXT' and press 'ENTER' to advance to the:

PUMP ON DELAY SCREEN

```
        SETTINGS
      PUMP ON DELAY
  1                     SEC
  BACK      NEXT      EXIT
```

This screen allows an operator selected delay before a pump is operated after its 'ON' setpoint has been reached. Sometimes this delay is required to overcome process disturbances such as pressure or wave action.

Change the 'ON' delay as required and select 'NEXT' and press 'ENTER' to advance to the:

PUMP OFF DELAY SCREEN

```
              SETTINGS
           PUMP OFF DELAY
 1                          SEC
 BACK          NEXT         EXIT
```

Change pump off delay as described above and select 'NEXT' and press 'ENTER' to advance to the:

LEVEL ALARM SCREENS

The next screens are as follows:
> Low Level Alarm Set Point
> Low Level Alarm Reset Point
> High Level Alarm Set Point
> High Level Alarm Reset Point
> Alarm Timer (This function controls the timing for alarms to be detected)

Adjust and advance through the alarm settings as described previously. The 'alarm timer' provides an adjustable time delay for alarm notification after the alarm setpoint has been reached in order to prevent nuisance alarms.

After the 'alarm timer' has been set, exit settings and return to Menu 1, select 'ALT', press 'ENTER' to access the alternation menu.

'ALTERNATION'

```
            ALTERNATION
               DAILY
              02:23 A
  BACK          NEXT         EXIT
```

NOTE: Three options are available for alternating the pump lead position:

A) 'ALT OFF' no alternation of lead/lag pump.
B) 'WHEN PUMPS STOP' pumps alternate when a pump has completed a pump cycle.

C) 'DAILY' allows for alternation of the pumps in systems which run continuously. Selecting 'DAILY' brings up a new selection which is the time of day at which the pumps will alternate their position in the sequence even if they are operating.

Use the ↑↓ keys to select a time of day to alternate. Select 'NEXT' and press 'ENTER' to return to Menu 1.

From Menu 1 select 'ALARMS' and press 'ENTER' to view the current alarm status.

ALARMS

```
          CURRENT ALARMS
            LOW LEVEL

              ACTIVE
    BACK        RESET        EXIT
```

NOTE: In this menu item, all alarm screens will be shown in an automatically 'SCROLLING' fashion. The following alarm status will appear on the screen:

> P1 Failed to Run
> P2 Failed to Run
> P1 Critical Alarm
> P2 Critical Alarm
> Seal Leak Alarm
> High Level Alarm
> Low Level Alarm
> Sensor Failure
> Backup Control (Aux PCB Function)
> High Float Alarm (Aux PCB Function)

Any alarm that is currently active will be indicated on its screen by the lower display changing from 'NOT ACTIVE' to 'ACTIVE'. Any 'ACTIVE' alarm must be reset by selecting 'RESET' with the → ← arrows and pressing 'ENTER' **after the causal condition has been removed.**

NOTE: While in the main display any alarm condition which occurs during normal operation will cause a time and date 'stamped' message to pop-up over the main display screen. This indicates the specific alarm condition. The on board horn will sound. To clear the screen and stop the horn, press any key.

```
        SENSOR FAILURE
        9/02   02:23 A

      ! ! ! ! ! ALARM ! ! ! ! !

        PRESS ANY KEY
```

On the main display a ⚠ will flash indicating that an alarm condition still exists. This indicator will be removed after the alarm has been cleared as described above. The 'RESET' selection appears on the 'ALARMS' and the 'ENTER PASSWORD' screens.

OPERATIONAL INFORMATION

Several items of operational information are provided for operator review of system status. These items may be accessed from the 'VIEW' screen which appears at the bottom of the 'PASSWORD' entry screen.

```
       ENTER PASSWORD
              0

  VIEW       RESET      EXIT
```

From the main menu press 'ENTER' key to access the 'ENTER PASSWORD' screen. Use the → ← buttons to scroll to the 'VIEW' position and press 'ENTER'.

NOTE: IT IS NOT NECESSARY TO ENTER A PASSWORD TO ENTER THIS SCREEN.

VIEW MENU

```
          VIEW MENU
  TREND              PEAK
  ALARMS             ETMS
   VIEW       NEXT     EXIT
```
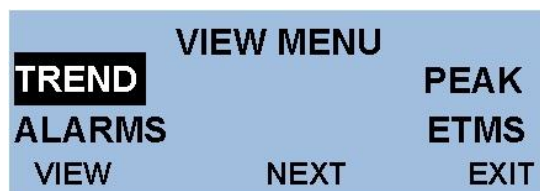
'TREND' will be highlighted, press 'ENTER' to view the recorded trend of the process value for the time selected previously during the setup procedure (2 min., 2 hrs., 12 hrs., or full speed).

12 HOURS

After viewing the process trend press 'ENTER' to return to the 'VIEW' menu. Select 'PEAK' with the → ← buttons and press 'ENTER'.

PEAK AND VALLEY
HI   100.0
LO -25.0
BACK   CLR   EXIT

This screen records the highest and lowest process values that have occurred since the last 'CLR' (clear). To reset these values to the current value of the process, scroll to 'CLR' and press 'ENTER'. The cursor will automatically move to the 'BACK' position, press 'ENTER' to return to the 'VIEW' menu. Select 'ALARMS' and press enter to view the current alarm status and use 'RESET' as described previously to clear any active alarms. Select 'BACK' and press 'ENTER' to return to the 'VIEW' menu. Select 'ETMS' and press 'ENTER' to view the recorded elapsed times for each pump.

ELAPSED TIMERS
P1   678345   HOURS
P2   234456   HOURS
BACK   NEXT   EXIT

NOTE: Elapsed times are resettable in the 'SETUP' mode and will 'ROLLOVER' to zero after 1,000,000 hours if not reset.

MAINTENANCE AND TROUBLE SHOOTING

MAINTENANCE:

The Myriad DPC is a digital solid state device which requires no periodic maintenance.

Occasional physical checks of the unit should be carried out for physical and mechanical security of mounting, terminal blocks, and electrical wiring.

TROUBLE SHOOTING:

- UNIT 'LOCKS UP' –   Recycle power to the unit by removing AC power, waiting 10 seconds and reconnecting power.
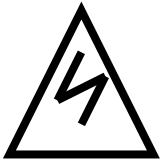
WARNING

NOTE: This should be done by using the user provided circuit breaker or fuse, not by removing the power wires at the terminal block. SERIOUS INJURY OR DEATH CAN OCCUR IF CONTACT IS MADE WITH THE INCOMING AC POWER.

- LCD display goes dim or contrast is poor. Remove power from the unit, release the 2 rear mounting screws and slide the unit forward in its case approximately 1 inch. On the left side of the circuit board is an adjustable potentiometer. With a small screwdriver adjust this "pot" to alter the contrast to the desired amount. Return the unit to its normal position and secure the rear screws.

- DISPLAY REMAINS AT ZERO OR SHOWS NO CHANGE -- If the display remains at zero or shows no change but the process is changing, check for D.C. voltage on the loop. With 2 wire (4/20MA) instruments check with a D.C. voltmeter at the level instrument, by disconnecting the level instrument from its 2 wires and measuring across these 2 wires with a D.C. voltmeter for the presence of 24VDC.

If D.C. voltage is present, reconnect the negative wire of the supply and insert a millimeter between the positive wires. The loop should provide a signal between 4 and 20 MA. If no current is present or the current exceeds 20MA consult the level instrument supplier.

If D.C. voltage is not present, check the user supplied power supply or if using the Myriad supply measure across terminals 24VDC and A/C. If no 24VDC is present consult factory. If 24VDC is present check field wiring between the Myriad and the field device and recheck 'SCALE' functions to insure correct setup.

▪ Unit appears to be functioning but does not bring on pumps or alarms. From 'MENU 2' scroll to 'DIAG' and press enter:

DIAGNOSTIC SCREEN
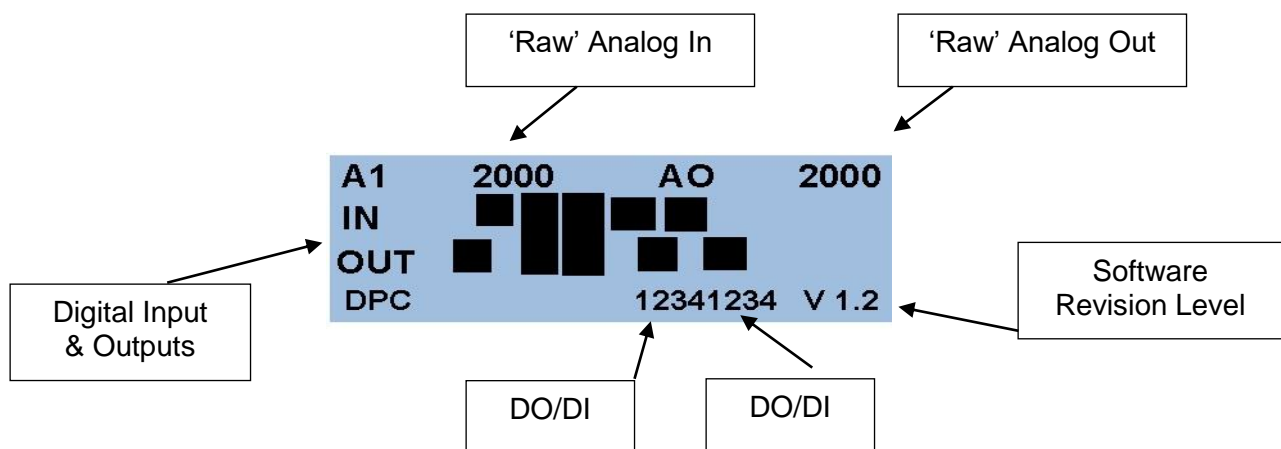
The diagnostic screen provides information about the current status of inputs and outputs and provides valuable information to aid in trouble shooting.

The screen shows the status of the 'RAW' analog input 1 and output 1 values. These raw values are approximately the input and output range in the selected input value; as shown, the input is 20.00 MA and the output is 20.00 MA. These values can provide help in determining if the Myriad DPC is receiving the correct analog input.

The next indicators are the digital input/output status. Any active (ON) DO/DI is indicated by an active, black, block above its respective number.

The input/outputs are as follows:

ANALOG

AI

Raw input from level sensor (4AI)

AO

Raw output at speed output #1 (AOI)

DIGITAL

DIGITAL INPUT

1	Pump 1 Run Feedback	1DI
2	Pump 2 Run Feedback	2DI
3	Critical Alarm Pump 1	3DI
4	Critical Alarm Pump 2	4DI
1	Pump 1 HOA in Auto	1AI
2	Pump 2 HOA in Auto	2AI
3	Seal Leak Pump 1 & 2	3AI (see SETUP for other options)

DIGITAL OUTPUT

1	Relay 1 Run to Pump 1	RLY1
2	Relay 2 Run to Pump 2	RLY2
3	Level Alarm	RLY3 (see SETUP for other options)
4	General Alarm	RLY4
1	Sensor Fail	DO1 (see SETUP for other options)
2	Pump 1 Fault	DO2
3	Pump 2 Fault	DO3
4	Seal Leak P1 or P2	DO4 (see SETUP for other options)

AUX DIAGNOSTIC SCREEN

Note; each point can be assigned as an input or an output. See drawing.
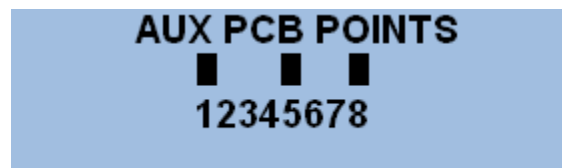
This screen will follow the original Diagnostic Screen when the aux PCB is enabled. It shows when a point is sinked to ground. This is either by the output sinking a relay or the common being applied as an input.
Press ENTER to exit to main menu.

NOTES ON ALARMS

General Alarm output is energized for any alarm in the system that becomes active.

PUMP ALARMS

(1) Pump fail, after a pump has been 'called' to run a digital input (normally from the auxiliary contact on the respective motor starter) is 'feedback' to the controller at 1DI and 2DI. If the controller fails to see this input it assumes the motor starter has failed to energize the starter and it energizes the 'Pump Failed to Run' alarm. This removes this pump from the sequence and brings on the next available pump.

(2) Critical alarm, the critical alarm inputs 3DI and 4DI, or normally closed inputs, usually from the pump motor thermostat. If the controller 'sees' either of these inputs go open, then the "critical alarm" is brought up on the screen and the respective pump is shut down. The next pump is brought on.
NOTE: If these inputs are not used they should be 'jumpered'.

(3) Seal leak, both seal leak inputs are connected to a single digital input 3AI. When either of these are closed the non-critical alarm is activated. The pumps are not shut down.

(4) H.O.A. selectors, are monitored for their position at 1AI and 2AI. If an HOA is not in the 'Auto' position that pump will not be permitted to run.

APPENDIX 'A'

SWITCH SELECTION OF ANALOG INPUT RANGES   (Factory default 4/20MA).

The range dip switches are located on the bottom of the main circuit board. Disconnect power, remove two rear screws, remove terminal strips, and slide the entire unit out of its case. Turn the unit upside down to locate the range dip switches.

SW1	SW2	INPUT 1	DESCRIPTION
0	0		Ain1 range = 5V
0	1		Ain1 range = 10V
1	0		Ain1 range = 20Ma
1	1		Not Used

SW3	SW4	DESCRIPTION
0	0	AIn2 range = 5V
0	1	AIn2 range = 10V
1	0	AIn2 range = 20mA
1	1	Not Used

SW5	SW6	DESCRIPTION
0	0	AIn3 range = 5V
0	1	AIn3 range = 10V
1	0	AIn3 range = 20mA
1	1	Not Used

SW7	SW8	DESCRIPTION
0	0	Ain4 range = 5V
0	1	Ain4 range = 10V
1	0	Ain4 range = 20mA
1	1	Not Used

ON

1	■
2	■
3	■
4	■
5	■
6	■
7	■
8	■

EXAMPLE ONLY

(TYPICAL FOR DPC, TPC, QPC)

⚠ **CAUTION, ENSURE THAT DIP SWITCHES ARE CORRECTLY SET FOR INPUT RANGE REQUIRED.**

APPENDIX 'C'

AUXILIARY PCB ADDENDUM

VERSION 4.0

The auxiliary PCB option adds standardized inputs and outputs to the DPC controller. These are some of the most commonly requested custom programming functions. This PCB is hard soldered at the factory. It is not user serviceable. Its existence is indicated by a 10 pin terminal on the back of the controller.

Terminals 1&2 are for a 3 position switch labeled 'PUMP 1-AUTO-PUMP 2'. When the #1 terminal is closed it assigns the lead to pump 1 and lag to pump 2. When the #2 terminal is closed it assigns the lead to pump 2 and lag to pump 1. When both inputs are open, alternation is controlled by the selected alternation mode.

Terminal #3 can be used as a normally closed shutdown or a low float cutoff to stop the pumps on a low water condition. Disable this when not in use to avoid the need for a jumper.

Terminals #4&5, when Float Control is disabled, can be used as separate seal leak alarm inputs. The standard DPC has one input that is shared by both pumps to indicate a seal failure. This option allows pump 1 seal leak to be connected to #4 and pump 2 seal leak to be connected to #5

Terminal #6, when Float Control is disabled, can be used to sink a 24VDC relay. This relay will engage when either pump is on. This is commonly used for chemical pumps that need to dose when a pump is running.

Terminal #7 can be used to sink a 24VDC relay. This relay will engage when any alarm occurs. It will disengage when silenced by touching any key or a reset pushbutton. This is not disabled by the Alarm Horn setting in the Setup menu. That is for the internal horn only.

Terminal #8 can be used for a momentary normally open reset pushbutton.

Float Control;

Terminal #4 is for a normally open 'low' or 'off' float. It can be used to unlatch the lead and lag pumps or as a low water cutoff to redundantly protect a pump from running dry.
Terminal #5 is for a normally open lead float.
Terminal #6 is for a normally open lag float.
Terminal #7 is for a normally open high float alarm. It can also be used as a single emergency float that will call for both pumps if the level rises.

APPENDIX 'D'

MYRIAD DPC RS485 MODBUS CONNECTIONS
06/06/17
NOTE: MYRIAD MUST BE ORDERED WITH RJ45 MODBUS CONNECTOR
VARIABLES

ADDRESS	DESCRIPTION	RANGE	DISPLAY AS	READ ONLY
40001	PROCESS [MAIN DISPLAY]	0-999	XXX - XX.X - X.XX - .XXX	READ ONLY
40002	SPEED OUTPUT	0-1000	XXX.X%	READ ONLY
40003	HMI BAR	0-31	COARSE BAR GRAPH	READ ONLY
40004	ALARM CODE	0-8	SEE ALARM CODE	READ ONLY
40005	MILLIAMP OUTPUT 1	0-2000	XX.XX ma	READ ONLY
40006	MILLIAMP OUTPUT 2	0-2000	XX.XX ma	READ ONLY
40007	MILLIAMP OUTPUT 3	0-2000	XX.XX ma	READ ONLY
40008	MILLIAMP OUTPUT 4	0-2000	XX.XX ma	READ ONLY
40009	MILLIAMP INPUT 1	0-2000	XX.XX ma	READ ONLY
40010	MILLIAMP INPUT 2	0-2000	XX.XX ma	READ ONLY
40011	MILLIAMP INPUT 3	0-2000	XX.XX ma	READ ONLY
40012	MILLIAMP INPUT 4	0-2000	XX.XX ma	READ ONLY
40013	N/A			READ ONLY
40014	N/A			READ ONLY
40015	N/A			READ ONLY
40016	N/A			READ ONLY
40017	HIGH ALARM SETPOINT	0-999	XXX - XX.X - X.XX - .XXX	READ WRITE
40018	HIGH ALARM RE-SETPOINT	0-999	XXX - XX.X - X.XX - .XXX	READ WRITE
40019	LOW ALARM SETPOINT	0-999	XXX - XX.X - X.XX - .XXX	READ WRITE
40020	LOW ALARM RE-SETPOINT	0-999	XXX - XX.X - X.XX - .XXX	READ WRITE
40021	LEAD ON SETPOINT	0-999	XXX - XX.X - X.XX - .XXX	READ WRITE
40022	LEAD OFF SETPOINT	0-999	XXX - XX.X - X.XX - .XXX	READ WRITE
40023	LAG ON SETPOINT	0-999	XXX - XX.X - X.XX - .XXX	READ WRITE
40024	LAG OFF SETPOINT	0-999	XXX - XX.X - X.XX - .XXX	READ WRITE
40025	MIN SPEED OUTPUT	0-1000	XXX.X%	READ WRITE
40026	MAX SPEED OUTPUT	0-1000	XXX.X%	READ WRITE
40027	MIN SPEED AT PROCESS VALUE	0-999	XXX - XX.X - X.XX - .XXX	READ WRITE
40028	MAX SPEED AT PROCESS VALUE	0-999	XXX - XX.X - X.XX - .XXX	READ WRITE

40029	ALTERNATON MODE	0-2	0=OFF, 1=PUMPS OFF, 2-TIMED	READ WRITE
40030	LEAD PUMP IS	1 OR 2	X	READ WRITE
40031	LAG PUMP IS	1 OR 2	X	READ WRITE
40032	PID SETPOINT			READ WRITE
40033	PUMP 1 VIRTUAL HOA	0-2	0=OFF, 1=HAND, 2-AUTO	READ WRITE
40034	PUMP 2 VIRTUAL HOA	0-2	0=OFF, 1=HAND, 2-AUTO	READ WRITE

BITS

ADDRESS	DESCRIPTION	RANGE	TYPE	READ ONLY
00001	HIGH ALARM	0 = OFF, 1= ON	ALARM	READ ONLY
00002	LOW ALARM	0 = OFF, 1= ON	ALARM	READ ONLY
00003	PUMP 1 FAILED TO RUN	0 = OFF, 1= ON	ALARM	READ ONLY
00004	PUMP 2 FAILED TO RUN	0 = OFF, 1= ON	ALARM	READ ONLY
00005	PUMP 1 CRITICAL	0 = OFF, 1= ON	ALARM	READ ONLY
00006	PUMP 2 CRITICAL	0 = OFF, 1= ON	ALARM	READ ONLY
00007	SEAL LEAK	0 = OFF, 1= ON	ALARM	READ ONLY
00008	SENSOR FAIL	0 = OFF, 1= ON	ALARM	READ ONLY
00009	PUMP 1 FEEDBACK	0 = OFF, 1= ON	STATUS	READ ONLY
00010	PUMP 2 FEEDBACK	0 = OFF, 1= ON	STATUS	READ ONLY
00011	ALLOCATED BUT UNUSED	0 = OFF, 1= ON		READ ONLY
00012	ALLOCATED BUT UNUSED	0 = OFF, 1= ON		READ ONLY
00013	ALLOCATED BUT UNUSED	0 = OFF, 1= ON		READ ONLY
00014	ALLOCATED BUT UNUSED	0 = OFF, 1= ON		READ ONLY
00015	ALLOCATED BUT UNUSED	0 = OFF, 1= ON		READ ONLY
00016	ALLOCATED BUT UNUSED	0 = OFF, 1= ON		READ ONLY
00017	SAVE TO EEPROM	0 = OFF, 1= ON	MOMENTARY	READ WRITE
00018	ACKNOWLEDGE	0 = OFF, 1= ON	MOMENTARY	READ WRITE
00019	RESET	0 = OFF, 1= ON	MOMENTARY	READ WRITE
00020	ALLOCATED BUT UNUSED	0 = OFF, 1= ON		READ WRITE
00021	ALLOCATED BUT UNUSED	0 = OFF, 1= ON		READ WRITE
00022	ALLOCATED BUT UNUSED	0 = OFF, 1= ON		READ WRITE
00023	ALLOCATED BUT UNUSED	0 = OFF, 1= ON		READ WRITE
00024	ALLOCATED BUT UNUSED	0 = OFF, 1= ON		READ WRITE

WARNING: SETTING VALUES OUT OF LIMITS OR WRITING TO ADDRESSES NOT MENTIONED HERE CAN CAUSE ERRATIC OPERATION. WRITING TO THESE VALUES SHOULD ONLY BE DONE BY QUALIFIED PERSONNEL, WITH CAUTION. IT IS RECOMMENDED TO POLL THESE PARAMETERS IN READ ONLY MODE.

COMPATIBILITY

THE SIGMA RS485 MODBUS NETWORK USES A 4 WIRE CABLE BASED ON A STANDARD TELEPHONE CABLE. THE PINOUT HAS BEEN SELECTED SO THAT IT CLOSELY MATCHES THE COLORING ON THE SIGMA SUBMERSIBLE CABLE. THIS NETWORK IS NOT COMPATIBLE, NOR SHOULD IT BE CONNECTED TO SIGMA MVNET RS485 CONNECTIONS OR LEGACY MP SENSORS. MUST BE USED WITH MYRIAD FIRMWARE VERSION 3.0 AND UP

ALARM CODE
0 – ALARMS CLEARED
1 – HIGH
2 – LOW
3 – FAIL TO RUN #1
4 – FAIL TO RUN #2
5 – CRITICAL ALM #1
6 – CRITICAL ALM #2
7 – SEAL LEAK
8 – SENSOR FAIL
9 – BACKUP ACTIVATED
10– SEAL LEAK P1 ALARM
11 – SEAL LEAK P2 ALARM
12 – HIGH FLOAT ALARM

COMMUNICATION SETTINGS
19200 BAUD [FIXED]
8 DATA BITS [FIXED]
1 STOP BIT [FIXED]
NO PARITY [FIXED]
MODBUS ID (NODE) IS SET TO 5 AT THE FACTORY. IT IS SELECTABLE FROM THE SETUP MENU
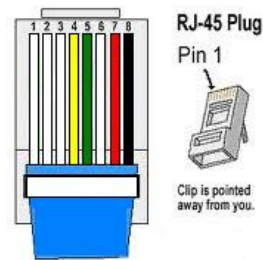
NOTE: MYRIAD MUST BE ORDERED WITH RJ45 MODBUS CONNECTOR

CABLING

RED = +24VDC (OPTIONAL), BLACK = -24VDC / COMMON, GREEN = + RS485, YELLOW = -RS485

PIN 4 = (-) RS485
PIN 5 = (+) RS485
PIN 7 = (+) 24VDC (NOT USED)
PIN 4 = (-) 24VDC

DUPLEX PUMP CONTROLLER

MYRIAD CONTROLLER SETTINGS

PASSWORD: _____ S/N: _____

VERS: _____

MENU 1	ENTER "NEXT" TO GO TO MENU 2	ACTUAL	SIM	LEAD/LAG ORDER	ALARMS
	SETTINGS				
	PUMP CONTROL SCREENS				Current Alarms
	LEAD ON AT			LEAD ☐	P1 Failed to Run/Critical
	LEAD OFF AT			LAG ☐	P2 Failed to Run/Critical
	LAG ON AT				
	LAG OFF AT			ALTERNATION	
				Off ☐	Seal Leak Alarm
				Pumps Off ☐	High Level Alarm
	PUMP ON DELAY			Timed ☐	Low Level Alarm
	PUMP OFF DELAY				Sensor Failure
	LEVEL ALARM SCREENS				
	Low Level Alarm Set Point				
	Low Level Alarm Reset Point				
	High Level Alarm Set Point				
	High Level Alarm Reset Point				
	Alarm Timer				

Bottom Line Screen Commands: Select and press 'ENTER'

VIEW	BACK	NEXT	SAVE	DONE	EXIT
View Screen	Move to previous item in list	Move to next item in list	Save value indicted	Move to next item for value input	Return to Main Display

KEYPAD INPUT KEYS

↑	↓	→	←	ENTER
Increase Screen Value	Decrease Screen Value	Move right one screen menu item	Move left one screen menu item	Enters selection or executes command

MENU 2	ACTUAL
Select "NEXT" and press "ENTER" to return to Menu 1	

AOUT		ACTUAL
Lead Scale		
	Display =	
	Speed =	
Lag Scale 1		
	Display =	
	Speed =	
Anlout 4 Scale 1		
	Display =	
	Output =	
Anlout 4 Scale 2		
	Display =	
	Output =	

SCALE		ACTUAL (4-20MA)
Input Type		
# of Points		
Decimal Point		
Input Scale 1		
	Input =	
	Display =	
Input Scale 2		
	Input =	
	Display =	
Input Text		
(Select one)	☐ Ft of Water	
	☐ PSI	
	☐ Gallons	
	☐ Liters	
	☐ Units	
	☐ Inches	
Display Filters	(2)	

SETUP	ACTUAL	DIAGS
Pump Elapsed Timer 1		
Pump Elapsed Timer 2		
Trend Speed Time Base	☐ FULL	
	☐ 2 MIN	
	☐ 2 HR	
	☐ 12 HR	
Change Password		
Set Month		
Set Day		
Set Year		
Set Hour		
Set Minute		
Set Day of Week		
Alarm Horn		
Set MODBUS ID		

VIEW MENU	(Accessible without Password)	
TREND		Indicates trend of monitored input
PEAK		Shows Minimum and Maximum since values were last reset
	CLR	Resets Min and Max Values
ALARMS		Produces alarm history of programmed alarms
ETMS (Elapsed Time Meter)		Indicates Hours of opertion for Pump 1 and Pump 2

DUPLEX PUMP CONTROLLER MYRSETTINGS 030712

Sigma Controls, Inc.
PROCESS CONTROLS AND INSTRUMENTATION

WARRANTY

All Sigma Controls, Inc. products are warranted to be free from defective materials and workmanship for one (1) year from date of shipment. Sigma reserves the right to repair or replace at its option any product found to be defective. In no event shall Sigma Controls, Inc. be liable for any consequential, incidental, or special damages and the limit of its liability shall not exceed the purchase price of the supplied equipment.

*****IMPORTANT*****

SENSORS AND CABLE THAT HAVE BEEN USED IN WASTE WATER OR HAZARDOUS LIQUIDS <u>MUST BE THOROUGHLY CLEANED</u> BEFORE RETURNING. UNITS RETURNED UNCLEANED WILL BE CONSIDERED UNREPAIRABLE AND RETURNED TO SENDER OR DISCARDED. <u>NOTE:</u> DO NOT SUBMERGE UNITS FOR CLEANING WITH CABLE CUT OR REMOVED. THIS WILL ALLOW CLEANING FLUID TO ENTER HOUSING, DAMAGING ELECTRONICS AND VOIDING THE WARRANTY.

<u>RETURN FOR REPAIR POLICY (WARRANTY/NON-WARRANTY REPAIR)</u>

Return status can be determined upon factory inspection of returned equipment.

A completed Return Authorization form must accompany all items returned for repair.

Repairs will be evaluated as quickly as possible. Cost for non-warranty repairs will be provided before repairs are initiated and repairs will be completed only after approval by customer.

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