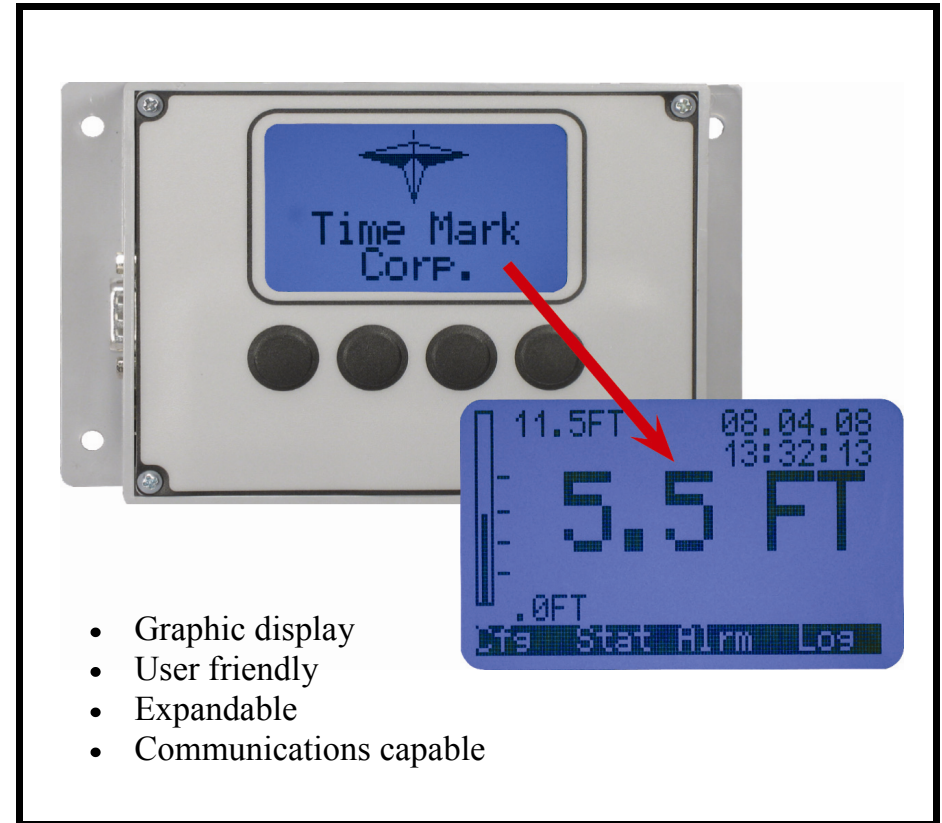


Time Mark Corporation Model 42A Pump Controller User's Guide



TIME MARK
CORPORATION

Time Mark Corporation ∞ 11440 E. Pine Street ∞ Tulsa, OK 74116
Sales: (800) 862-2875 ∞ Fax: (918) 437-7584

www.Time-Mark.com ∞ Email: Sales@Time-Mark.com

© 2009 Time Mark Corporation. All rights reserved.
Made in the U.S.A.

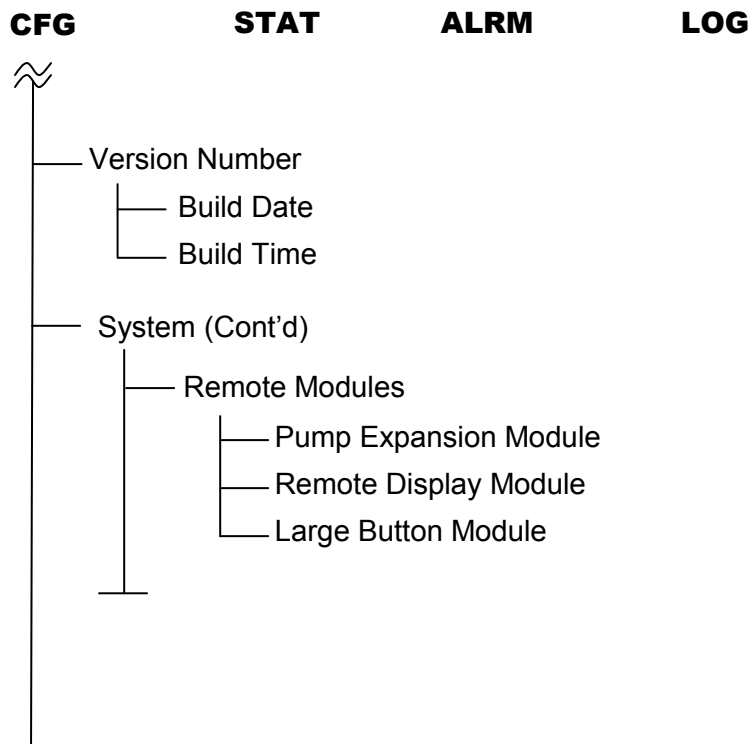
Time Mark Corporation ∞ 11440 E. Pine Street ∞ Tulsa, OK 74116
Sales: (800) 862-2875 ∞ Fax: (918) 437-7584
www.Time-Mark.com ∞ Email: Sales@Time-Mark.com

10.2 Cleaning

1. Use a non-abrasive cloth with alcohol to clean the unit.

Notes

MENU TREE



10.0 Glossary

10.1 Terminology and Definitions

1. **“Pump U/D”** – Pump Up/Down
 - (a) Pump Up – Operation to keep level high (e.g. water tower)
 - (b) Pump Down – Operation to keep level low (e.g. sump pit)
2. **“Auto Reset”** – Pump alarm. When alarm clears, pump is available for use.
3. **“Flt Err Corr”** – Float Error Correction
 - (a) Method to detect stuck floats (e.g. float will get stuck when level is below it).
4. **“On Demand”** – refers to pump operation (e.g. if level requires two pumps operating and one faults out, next pump available will start).

Table of Contents

1.0 PACKAGE CONTENTS	
1.1 Package Contents	4
1.2 Missing/Broken Parts	4
2.0 INTRODUCTION	
2.1 Description and Overview	4-5
3.0 MODEL 42A CONNECTIONS	
3.0 Model 42A Connections	5-7
4.0 MOUNTING HARDWARE	
4.1 Panel Mount	7
4.2 Din Rail Mount, 35mm	8
4.3 Flush Mount	8
5.0 GETTING STARTED	
5.1 Power Supply Connection	9
5.2 HOME Screen Menu Description	9
6.0 SETUP INSTRUCTIONS	
6.1 Time Setup	9
6.2 Date Setup	10
6.3 Level Input Setup	11
6.4 Pump Control Setup	11
6.5 Analog I/O Functions Setup	13
6.6 Float Backup Setup	13
6.7 Communication	14
6.8 Password Protection	14
6.9 Resetting Factory Defaults	15
7.0 SPECIFICATIONS	
7.1 Unit Specifications	16
8.0 INDEX	
8.1 Communications Instructions	17
8.2 Modbus Register Map (for Communications)	17-21
9.0 MENU TREE	
9.0 Menu Tree	23-26
10.0 GLOSSARY	
10.1 Glossary	26
10.2 Cleaning	27

MENU TREE

1.0 Package Contents

1.1 Package Contents

Box Contents :

- (1) – Model 42A Pump Controller
- (1) – 5.08mm, 2 Pin Power Supply Connector
- (2) – 5.08mm, 6 Pin Output (Contact) Connectors
- (1) – 3.81mm, 2 Pin RS485 Comm Port Connector
- (3) – 3.81mm, 5 Pin Pump Connectors
- (1) – 3.81mm, 3 Pin Analog In Connector
- (1) – 3.81mm, 2 Pin Analog Out Connector
- (1) – Installation and Operation Manual
- 24VDC Power Supply

35mm Din Rail Mounting Kit

In Door/Panel mounting hardware Kit

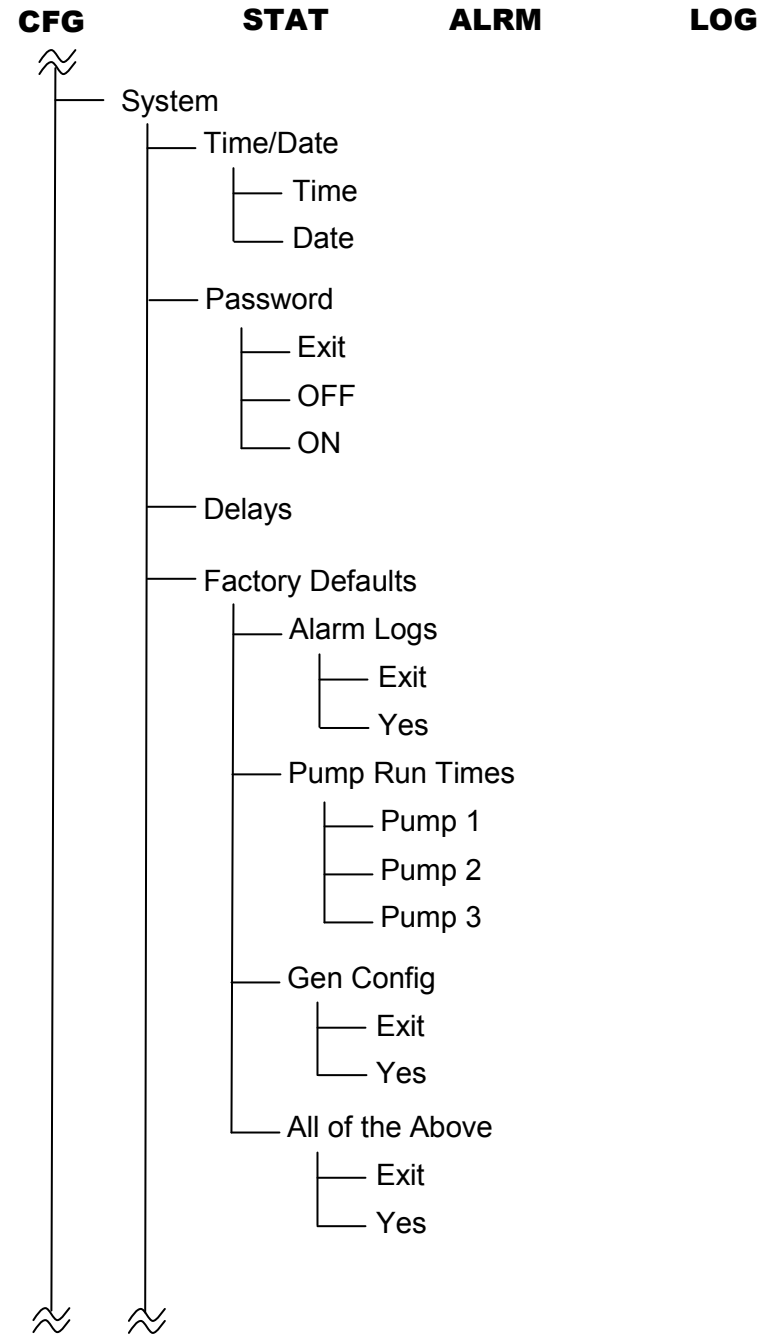
1.2 Missing/Broken Parts

If a part(s) is missing or broken, please contact a Time Mark Representative at (800) 862-2875 between 8am-5pm CT Monday through Friday.

2.0 Introduction

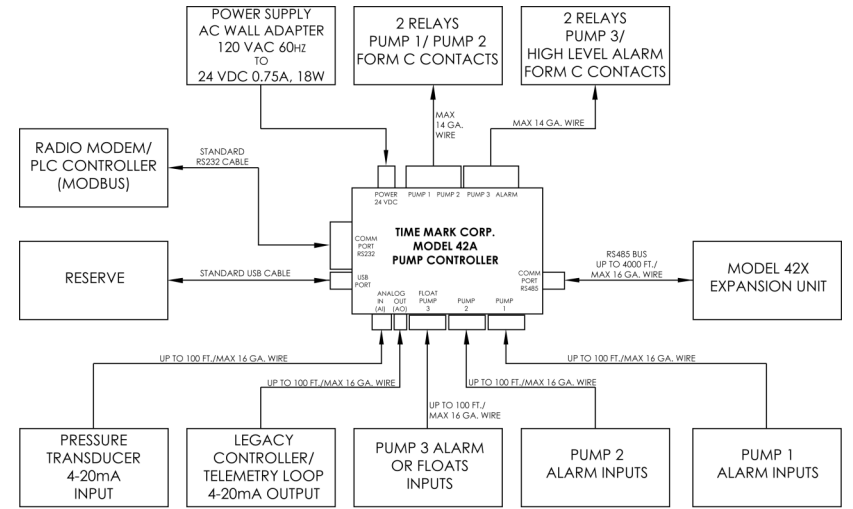
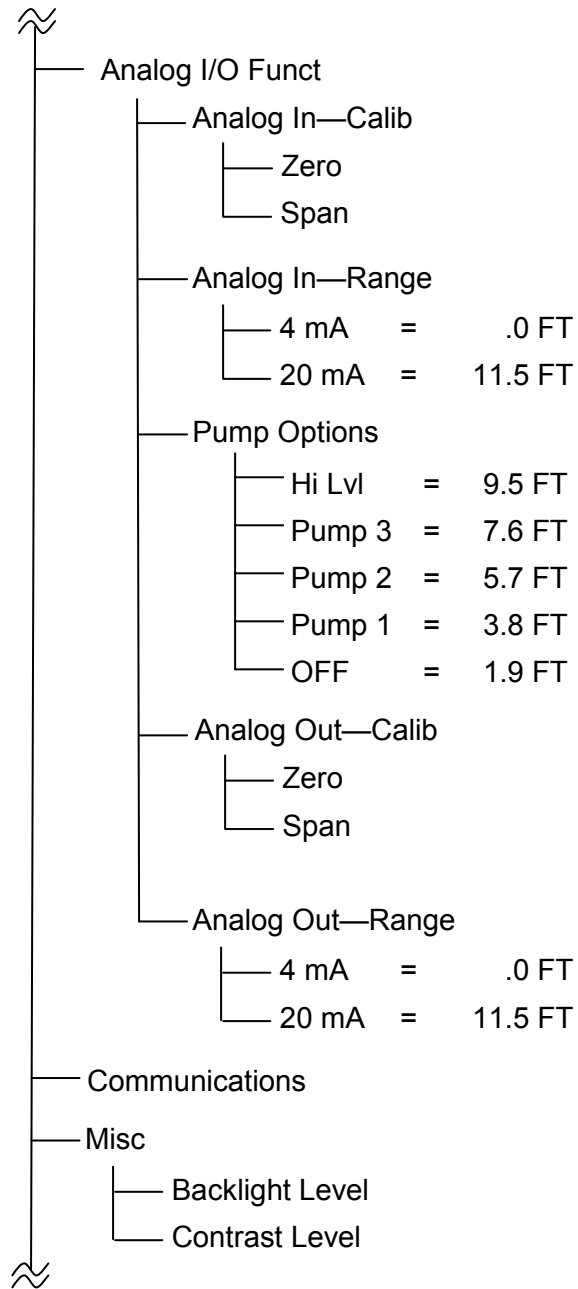
2.1 Description

1. An advanced pump management and control system with powerful features, easy setup, and customization.
2. All pump alarms are logged to the Model 42A with the pump identification number, alarm type (seal fail, over temperature, or contactor fail), date and time.
3. The 42A is equipped with (3) sets of pump alarm inputs and a full range of pump and sensor configurable menu options.



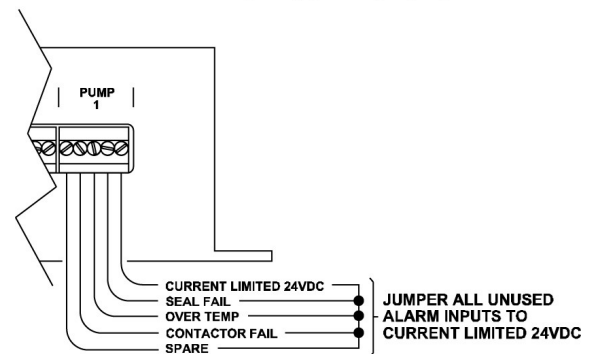
MENU TREE

CFG STAT ALRM LOG

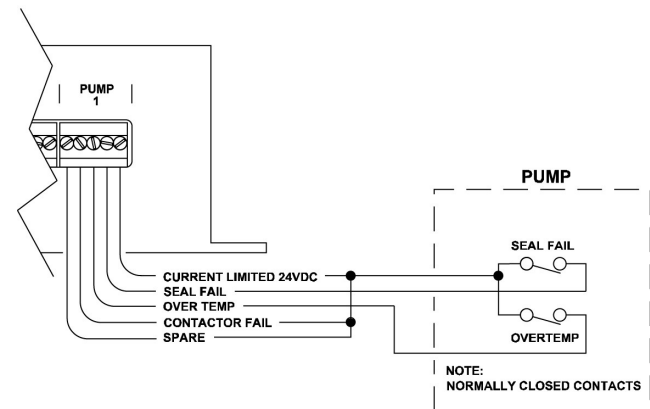


3.0 Model 42A Connections

ALARM INPUT - CONNECTIONS



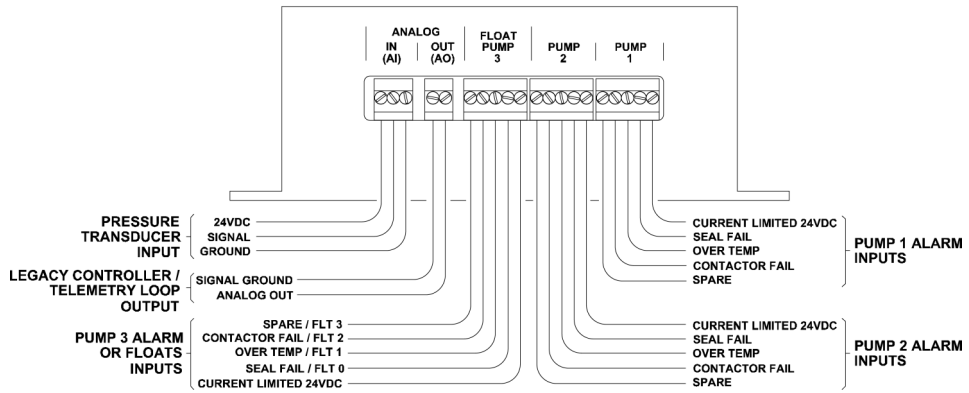
NORMAL USAGE - CONNECTIONS



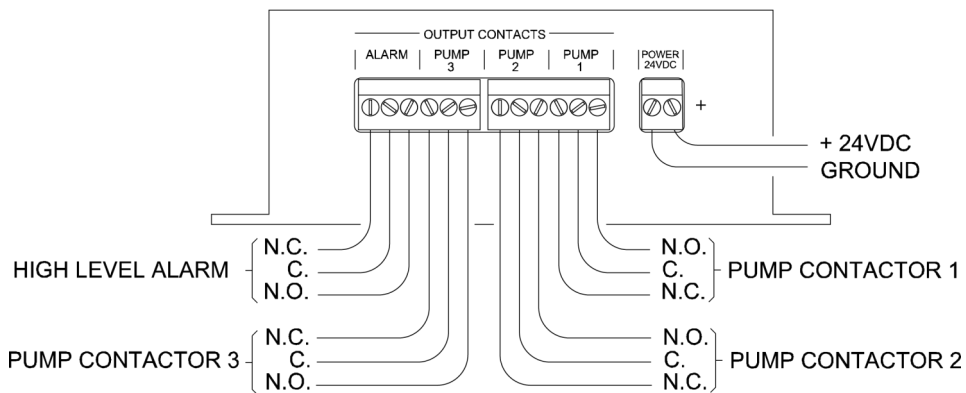
MENU TREE

***WARNING:** Do **NOT** power on the Model 42A before completing wire connections.

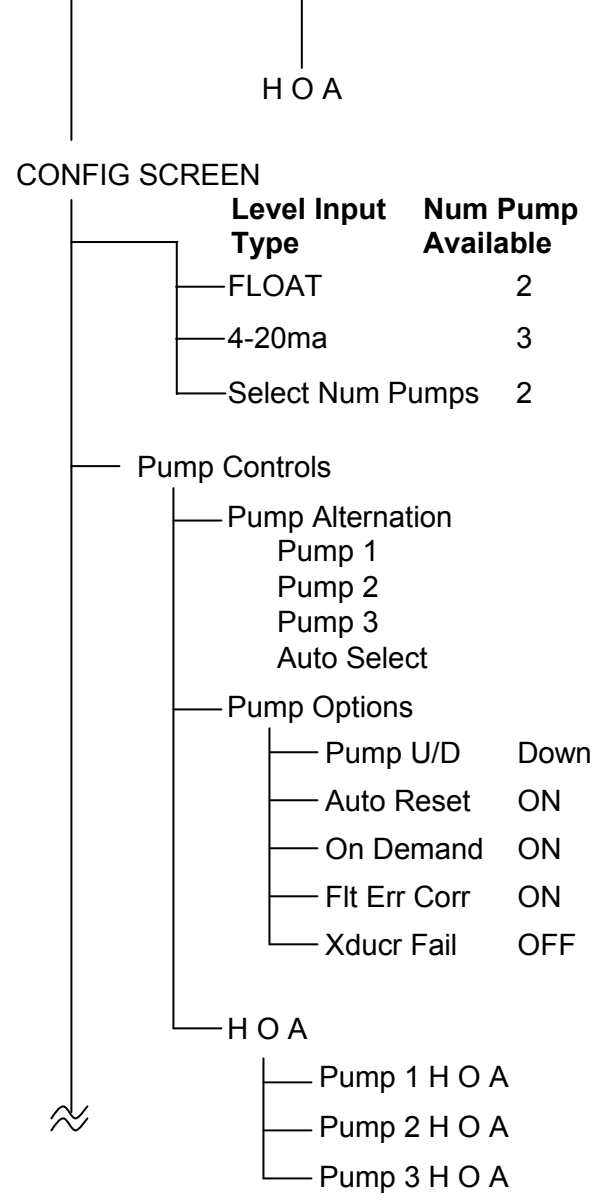
BOTTOM SIDE VIEW - CONNECTIONS



TOP SIDE VIEW - CONNECTIONS



CFG **STAT** **ALRM** **LOG**



**Menu Tree continued through pages 20—22.*

8.2 Modbus Register Map (CONTINUED)

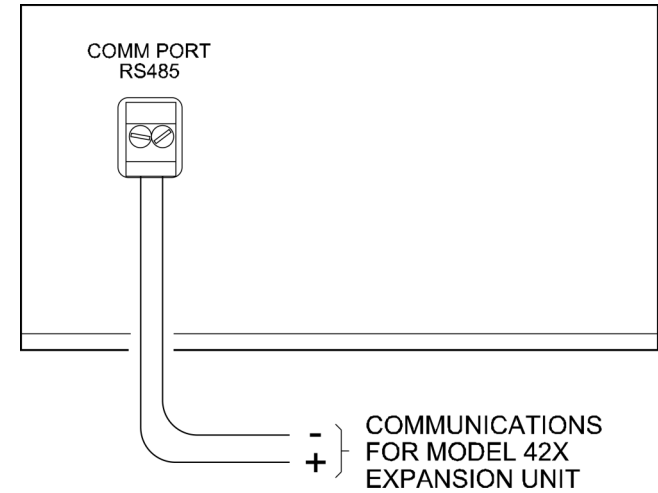
Addr	Description	Notes	Address
1-8	Local Pump 1 SealFail	Bit 3	4
	Local Pump 2 Spare	Bit 4	5
	Local Pump 2 AuxCont	Bit 5	6
	Local Pump 2 OverTemp	Bit 6	7
	Local Pump 2 SealFail	Bit 7	8
9 – 16	Pump 3 4 – 1 bits	Low nibble	
	Exp Pump 4 16 – 13	High nibble	
	Local Pump 3 Spare	Bit 0	9
	Local Pump 3 AuxCont	Bit 1	10
	Local Pump 3 OverTemp	Bit 2	11
	Local Pump 3 SealFail	Bit 3	12
	Remote Pump 1 Spare	Bit 4	13
	Remote Pump 1 AuxCont	Bit 5	14
	Remote Pump 1 OverTemp	Bit 6	15
	Remote Pump 1 SealFail	Bit 7	16
17-24	Exp Pump 5 20 – 17	Low nibble	
	Exp Pump 6 24 – 21	High nibble	
	Remote Pump 2 Spare	Bit 0	17
	Remote Pump 2 AuxCont	Bit 1	18
	Remote Pump 2 OverTemp	Bit 2	19
	Remote Pump 2 SealFail	Bit 3	20
	Remote Pump 3 Spare	Bit 4	21
	Remote Pump 3 AuxCont	Bit 5	22
	Remote Pump 3 OverTemp	Bit 6	23
Remote Pump 3 SealFail	Bit 7	24	

Read Discrete Inputs – 0x02

*Note: These are **READ-ONLY**.

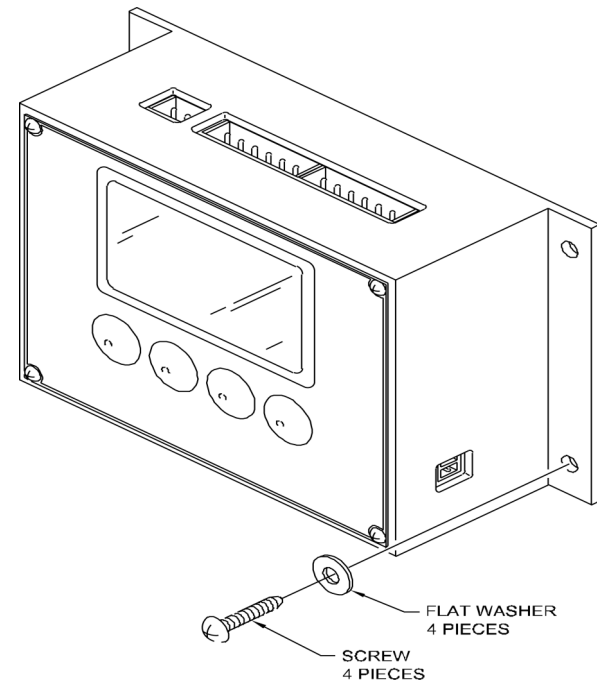
Format: 1xxxx

Address	Description
1	Fluid Level – implied decimal place
2	Raw A/D counts

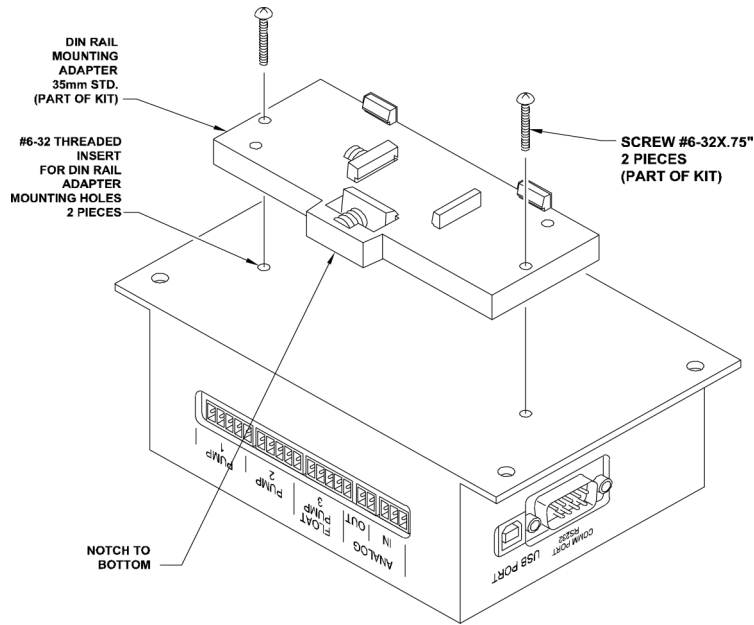


4.0 Mounting Hardware

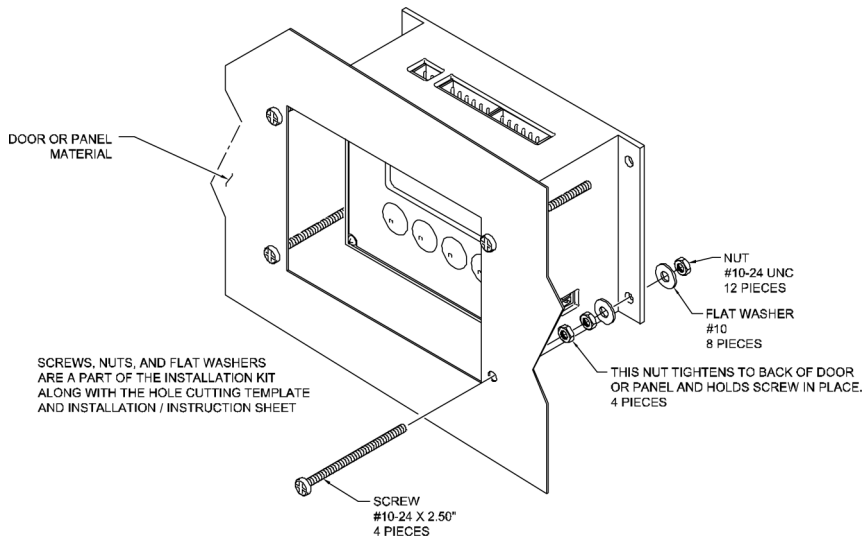
4.1 Panel Mount



4.2 Din Rail Mount, 35mm



4.3 Flush Mount



8.2 Modbus Register Map (CONTINUED)

Addr Rnge	Notes	Bit	R/W	Address (P=Pumps)								
				P1	P2	P3	P4	P5	P6	P7		
17-72	PumpStatus [MAX_NUM_PMPS]											
	PmpOn	Bit 0	R/O	17	25	33	41	49	57			
	Avail	Bit 1	R/O									
	ErrBit	Bit 2	R/O									
	ErrLatch	Bit 3	R/O									
	SwPmpOff	Bit 4	R/W	21	29	37	45	53	61	70		
	SwPmpHand	Bit 5	R/W	22	30	38	46	54	62	71		
	Unused	Bit 6										
Unused	Bit 7											
73-128	PumpAlarm [MAX_NUM_PMPS]											
	Spare	Bit 0	R/O	73	81	89	97	105	113	121		
	AuxCont	Bit 1	R/O									
	OverTemp	Bit 2	R/O									
	SealFail	Bit 3	R/O									
	PrevSpare	Bit 4	R/O									
	PrevAuxCont	Bit 5	R/O									
	PrevOverTemp	Bit 6	R/O									
PrevSealFail	Bit 7	R/O	80	88	96	104	112	120	128			

Read Discrete Inputs – 0x02

*Note: These are **READ-ONLY**.

Format: lxxxx

Addr	Description	Notes	Address
1-8	Pump 1	4 – 8 bits	Low nibble
	Pump 2	8 – 5 bits	High nibble
	Local Pump 1 Spare	Bit 0	1
	Local Pump 1 AuxCont	Bit 1	2
	Local Pump 1 OverTemp	Bit 2	3

8.2 Modbus Register Map (CONTINUED)

Formats for Addresses:

0xxxx	Read/Write Discrete Outputs or Coils
1xxxx	Read Discrete Inputs
3xxxx	Read Input Registers (16 bit)
4xxxx	Read/Write Output or Holding Reg (16 bit)

Read:

0x01
0x02
0x04
0x03

Write:

0x05
0x06

Function:	Code:
Read Coils	0x01

Addr Range	Notes	Bit	R/W	Addr
1-8	Local Pump 1 Relay	Bit 0	R/O	1
	Local Pump 2 Relay	Bit 1	R/O	2
	Local Pump 3 Relay	Bit 2	R/O	3
	Local Hi Level Relay	Bit 3	R/O	4
	Remote Pump 1 Relay	Bit 4	R/O	5
	Remote Pump 2 Relay	Bit 5	R/O	6
	Remote Pump 3 Relay	Bit 6	R/O	7
	Remote HiLevel Relay	Bit 7	R/O	8
9-16	Modes – from Flags Unused	Bit 0		9
	Expansion Module	Bit 1	R/W	10
	OnDemand Option	Bit 2	R/W	11
	AutoReset Option	Bit 3	R/W	12
	PumpUp/Down Option	Bit 4	R/W	13
	Float Err Check Opt	Bit 5	R/W	14
	Xdcr Fail to Floats	Bit 6	R/W	15
	Level Mode Flts/Pr	Bit 7	R/W	16

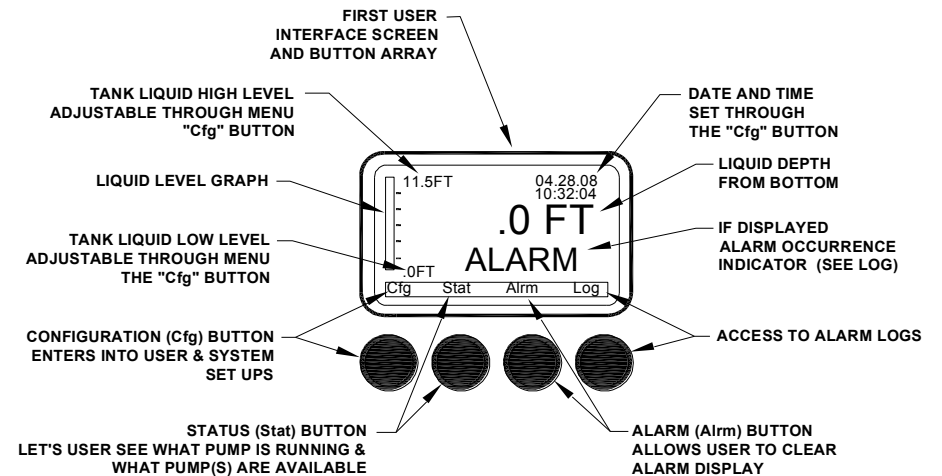
5.0 Getting Started

5.1 Power Supply Connection

STEP 1: Locate the 5.08mm, 2 Pin connector in your installation kit. Install the 5.08mm 2 Pin connector (see page 5).

STEP 2: Plug the 24VDC connector into the Model 42A. The 42A hardware display will illuminate showing the Time Mark logo and then the **HOME** screen.

5.2 HOME Screen Menu Description



6.0 Setup Instructions

6.1 Time Setup

1. Press **CFG** button to go to the "CONFIG" screen.

8.2 Modbus Register Map (CONTINUED)

Addr	Description	R/W	Notes:
0037	PumpStatus [0]	R/O	--bit 0 Pump On
0038	PumpStatus [1]	R/O	--bit 1 Available
0039	PumpStatus [2]	R/O	--bit 2 Error Bit
0040	PumpStatus [3]	R/O	--bit 3 Error Latch for Alarm
0041	PumpStatus [4]	R/O	--bit 4 Hand/Off/Auto – Off
0042	PumpStatus [5]	R/O	--bit 5 Hand/Off/Auto – Hand
0043	PumpStatus [6]	R/O	
0044	PumpAlarm [0]	R/O	--bit 0 Spare
0045	PumpAlarm [1]	R/O	--bit 1 Contractor Failure
0046	PumpAlarm [2]	R/O	--bit 2 Over Temp
0047	PumpAlarm [3]	R/O	--bit 3 Seal Failure
0048	PumpAlarm [4]	R/O	--bit 4 Prev Spare Condition
0049	PumpAlarm [5]	R/O	--bit 5 Prev Over Temp Condition
0050	PumpAlarm [6]	R/O	--bit 6 is prev Seal Fail condition

*NOTES on RTC. Values expressed as BCD. Example is month – high nibble.

RTC Date Year/Month

Month	Year
High nibble – 10's	High nibble – 10's
Low nibble – 1's	Low nibble – 1's

RTC Date Time

Day	Hours
High nibble – 10's	High nibble – unused
Low nibble – 1's	Low nibble – 24 hour

- “CONFIG SCREEN” selections are:
 - Level Input Select
 - Pump Controls
 - Analog I/O Funct
 - Communications
 - Misc
 - System
- Press **CFG** button then use the **↓** until “System” is highlighted. Then press **SELECT**. The following options will be displayed:
 - Time/Date
 - Password
 - Delays
 - Factory Defaults
 - Version Number
 - Remote Modules
- Press **↓** until “Time/Date” is highlighted, then press **SELECT**. The following options will be displayed in military time:
 - Time
 - Date
- Menu item “Time” is highlighted then press **SELECT**. Toggle between Hours/Minutes/Seconds (e.g. 09 05 19) by using the **↑** and **↓** to make changes to the highlighted areas.
- Press **EXIT** to save changes and return to CONFIG SCREEN.
- Press **EXIT** once more to return HOME.

**Note: All time is set to Central Standard Time (CST) by default.*

6.2 Date Setup

- Please follow Time Setup steps 1 through 4 for date setup.
- Press **↓** until “Date” is highlighted, then press **SELECT**. Then make changes using the **SELECT**, **↑** and **↓** buttons.

Press **EXIT** to save changes and return to CONFIG SCREEN.

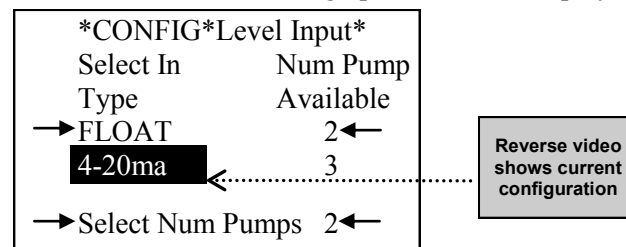
Press **EXIT** once more to return HOME. The date and time will be displayed in the upper right corner of the HOME screen.

8.2 Modbus Register Map (CONTINUED)

Addr	Description	R/W	Notes:
0008	SetPoint [7]	R/W	Implied decimal place (ex. 20 is 2.0)
0009	SetPoint [8]	R/W	Implied decimal place (ex. 20 is 2.0)
0010	AIZeroFt	R/W	Implied decimal place (ex. 20 is 2.0)
0011	AIRangeFt	R/W	Implied decimal place (ex. 20 is 2.0)
0012	AOZeroFt	R/W	Implied decimal place (ex. 20 is 2.0)
0013	AORangeFt	R/W	Implied decimal place (ex. 20 is 2.0)
0014	AIZeroCnts	R/W	Implied decimal place (ex. 20 is 2.0)
0015	AIRangeCnts	R/W	Implied decimal place (ex. 20 is 2.0)
0016	AOZeroCnts	R/W	Implied decimal place (ex. 20 is 2.0)
0017	AORangeCnts	R/W	Implied decimal place (ex. 20 is 2.0)
0018	RTC-Date -Mon/Year	R/W	--Month Year in BCD
0019	RTC-Date/Time	R/W	--Day Hours in BCD
0020	RTC-Time -Min/Sec	R/W	--Minute Second in BCD
0021	RunTimeMeter [0] Hi	R/O	
0022	RunTimeMeter [0] Low	R/O	--Run times are the number of sec run
0023	RunTimeMeter [1] Hi	R/O	--High holds bytes 4 and 3
0024	RunTimeMeter [1] Low	R/O	--Low holds bytes 2 and 1
0025	RunTimeMeter [2] Hi	R/O	--32 bit holds 4.294967296 Giga sec
0026	RunTimeMeter [2] Low	R/O	--or 71.58278827 Million minutes
0027	RunTimeMeter [3] Hi	R/O	--or 1.193046471 Million hours
0028	RunTimeMeter [3] Low	R/O	--or 49.71026963 Thousand days
0029	RunTimeMeter [4] Hi	R/O	--or 136.1925195 years
0030	RunTimeMeter [4] Low	R/O	
0031	RunTimeMeter [5] Hi	R/O	
0032	RunTimeMeter [5] Low	R/O	
0033	RunTimeMeter [6] Hi	R/O	
0034	RunTimeMeter [6] Low	R/O	
0035	Number of Cur Pumps	R/O	
0036	Number of Pumps On	R/O	

6.3 Level Input Setup

1. Press **CFG** once to go to the CONFIG SCREEN.
2. Press **↓** until “Level Input Select” is highlighted. Then press **SELECT**. The following options will be displayed:



3. Press **↓** until the type of level device that is being used is indicated with arrows on each side then press **SELECT**.
4. Press **↓** until “Select Num Pumps” is indicated by arrows on each side.
5. Press **SELECT** again, then use **↑** and **↓** to change number of pumps.
6. Press **EXIT** to save your selection.

6.4 Pump Control Setup

1. Press the **CFG** once to go to the CONFIG SCREEN.
2. Press **↓** until “Pump Controls” is highlighted. Then press **SELECT**. The following options will be displayed:
 - A) “Pump Alternation” Setup
 - Pump 1
 - Pump 2
 - Pump 3
 - AUTO SELECT (at bottom of screen)

*After making selection, press **EXIT** to save changes.
 - B) “Pump Options” Setup
 - Pump U/D (Select “Up” or “Down”)
 - Auto Reset (Select “ON” or “OFF”)
 - On Demand (Select “ON” or “OFF”)

- Flt Err Corr (Select “ON” or “OFF)
- Xducer Fail (Set 0 to 10 times by using **↑** and **↓**).

*After making selection, press **EXIT** to save changes.

C) “Pump H O A Controls” Setup (Press **SELECT** to change defaults)

- “Pump 1 H O **A**”
- “Pump 2 H O **A**”
- “Pump 3 H O **A**”

Reverse video shows current configuration

⇒ Press **SELECT** multiple times for each selection to highlight H (Hand), O (Off), or A (Auto).

⇒ Use **↑** and **↓** to highlight selections.

*After making selection, press **EXIT** to save changes.

**Note: If selecting “H” (Hand), pump runs until it reaches the low liquid level (OFF=1.9 FT). See Section 6.5 Analog In – Set Pts.*

6.5 Analog I/O Functions Setup

**Caution: This is a 4-20mA loop. Incorrect calibration could cause erratic operation.*

1. Press **CFG** once to go to the CONFIG SCREEN.
2. Press **↓** until “Analog I/O Funct” is highlighted. Then press **SELECT**. The following options will be displayed:

A) Analog In – Calib (Press **SELECT** to change defaults)

- Zero
 - ◇ Press **SELECT** to select “Zero”. Using the **↑** and **↓** buttons, toggle between “Exit” and “Zero” depending on your selection.
 - ◇ After choosing “Zero”, press **SELECT** make changes and save.
- Span
 - ◇ Press **↓** and **SELECT** to select “Span”. Using the **↑** and **↓** buttons, toggle between “Exit” and “Zero” depending on your selection.
 - ◇ After choosing “Zero”, press **SELECT** to make changes and save.

8.0 Index

8.1 Communications Instructions

- 1) Press **CFG** one time and the CONFIG SCREEN will appear.
- 2) Press **↓** until “Communications” is highlighted with arrows on both sides of the selection then press **SELECT**.
- 3) Press **↑** or **↓** until the item is highlighted with arrows on both sides of the selection then press **SELECT**.
- 4) “Option” will highlight in Reverse Video.
- 5) Use **↑** or **↓** to change the default settings.

OPTIONAL SETTINGS:

Items	Range
Modbus Address	1 to 240
Baud rate	19200, 9600, 4800, 2400, 1200
Parity	NONE, EVEN, ODD

DEFAULT SETTINGS:

Items	Range
Modbus Address	16
Baud rate	19200
Parity	EVEN

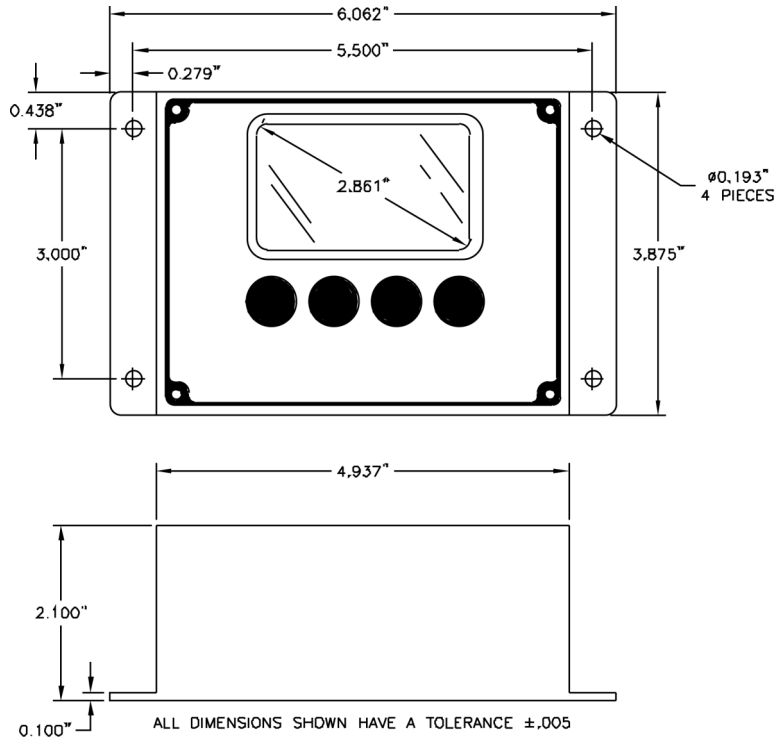
8.2 Modbus Register Map (for Communications)

Read Holding Registers – 0x03
 Write Holding Registers – 0x06
 Format: 4xxxx

Addr	Description	R/W	Notes:
0001	SetPoint [0]	R/W	Implied decimal place (ex. 20 is 2.0)
0002	SetPoint [1]	R/W	Implied decimal place (ex. 20 is 2.0)
0003	SetPoint [2]	R/W	Implied decimal place (ex. 20 is 2.0)
0004	SetPoint [3]	R/W	Implied decimal place (ex. 20 is 2.0)
0005	SetPoint [4]	R/W	Implied decimal place (ex. 20 is 2.0)
0006	SetPoint [5]	R/W	Implied decimal place (ex. 20 is 2.0)
0007	SetPoint [6]	R/W	Implied decimal place (ex. 20 is 2.0)

7.0 Specifications

7.1 Unit Specifications



- Unit weight: 15 oz. (with 35mm din kit installed)
- Installation environment: Cabinet (indoors, protected)
- Voltage requirement: 24VDC@200mA
- Operating temperature: -20C to 70C
- Power consumption: 164mA @ 24VDC
- Contact rating: 10A at 240VAC resistive
- Floating switch potential: 24VDC at 9.6mA
- Transient protection: PTC resettable Fuse
- Display: 128 x 64 pixels
- Expected relay life:
 - ⇒ Mechanical: 10 million operations (no load)
 - ⇒ Electrical: 100,000 operations at rated load
- Case Material: ABS plastic
- Termination: Removable terminal plugs
- 5 second delay time

B) Analog In – Range (Press SELECT to change defaults)

- “4mA = X.X FT”
 - ⇒ Press SELECT to highlight.
 - ⇒ Use ↑ and ↓ to change FT.
- “20mA = X.X FT”
 - ⇒ Press SELECT to highlight.
 - ⇒ Use ↑ and ↓ to change FT.

*After making selection, press EXIT to save changes.

C) Analog In – Set Pts (Press SELECT to change defaults)






- “Hi Lvl = X.X”
 - ⇒ Press SELECT to highlight.
 - ⇒ Use ↑ and ↓ to change amount.
- “Lag2 = X.X”
 - ⇒ Press SELECT to highlight.
 - ⇒ Use ↑ and ↓ to change amount.
- “Lag1 = X.X”
 - ⇒ Press SELECT to highlight.
 - ⇒ Use ↑ and ↓ to change amount.
- “Lead = X.X”
 - ⇒ Press SELECT to highlight.
 - ⇒ Use ↑ and ↓ to change amount.
- “OFF = X.X”
 - ⇒ Press SELECT to highlight.
 - ⇒ Use ↑ and ↓ to change amount.

*After making selection, press EXIT to save changes.

6.6 Float Backup Setup (when Transducer has failed)





- Unit requires setup as Analog Input (4-20mA) duplex. (Refer to Section 6.3)
 - ⇒ Under “Pump Option” turn “Xducer Fail” to ON
 - ⇒ Floats are connected to Pump 3/Floats connector (See Drawing 3.2 on page 3).
 - ⇒ Four floats are used: off, lead, lag, High Alarm
 - ⇒ When out of range (<2mA and/or >21mA) the controller will use the floats as an input sensor.

D) Analog Out – Calib (Press SELCT to change defaults)

- Zero
 - ◇ Press **SELCT** to select “Zero”. Using the  and  buttons, toggle between “Exit” and “Zero” depending on your selection.
 - ◇ After choosing “Zero”, press **SELCT** to make changes and save.
- Span
 - ◇ Press  and **SELCT** to select “Span”. Using the  and  buttons, toggle between “Exit” and “Zero” depending on your selection.
 - ◇ After choosing “Zero”, press **EXIT** to make changes and save.

*After making selection, press EXIT to save changes.

E) Analog Out – Range (Press SELCT to change defaults)

- “4mA = X.X FT”
 - ⇒ Press **SELCT** to highlight.
 - ⇒ Use  and  to change amount.
- “20mA = X.X FT”
 - ⇒ Press **SELCT** to highlight.
 - ⇒ Use  and  to change amount.




*After making selection, press **EXIT** to save changes.

***Caution:** This is a 4-20mA loop. Incorrect calibration could cause erratic operation. For professional use only.


6.7 Communications

⇒ Please see **Index 8.1 (pg. 17)** for more information on communications.

6.8 Password Protection

1. To set a password, press **CFG** to go to the “CONFIG” screen.
2. Using the  key, scroll down to “System” then press **SELCT**. The “CONFIG-SYSTEM” screen will appear. Select “Password” from the menu.
3. Using the  key, select “On”. Then press the  key to select a 4-digit numerical password. After each number is entered, press **SELCT**.
4. Press **EXIT** to save and return to the previous menu.

6.9 Restoring Factory Defaults

1. Press **CFG** to go to the “CONFIG” screen.
2. Using the  key, scroll down to “System” then press **SELCT**. The “CONFIG-SYSTEM” screen will appear. Select “Factory Defaults” from the following menu items:
 - Time/Date
 - Password
 - Delays
 - Factory Defaults
 - Version Number
 - Remote Modules
3. The following menu will be displayed:
 - Alarm Log
 - Pump Run Times
 - Gen Config
 - All of the above

**Selecting any of these items will take you to another screen.*
4. When “Alarm Log” is selected, the following menu items will be displayed:
 - Exit
 - Yes

**Selecting “Yes” will clear all the alarm logs.*
5. When “Pump Run Times” is selected, the following menu items will be displayed:
 - Pump 1.0
 - Pump 2.0
 - Pump 3.0

**Caution: Selecting a pump will zero the run time.*
6. When “Pump Run Times” is selected, the following menu items will be displayed:
 - Exit
 - Yes
7. When “All of the above” is selected, the following menu items will be displayed:
 - Exit
 - Yes

Press **EXIT to cancel and **SELCT** to save then return to the previous menu.*