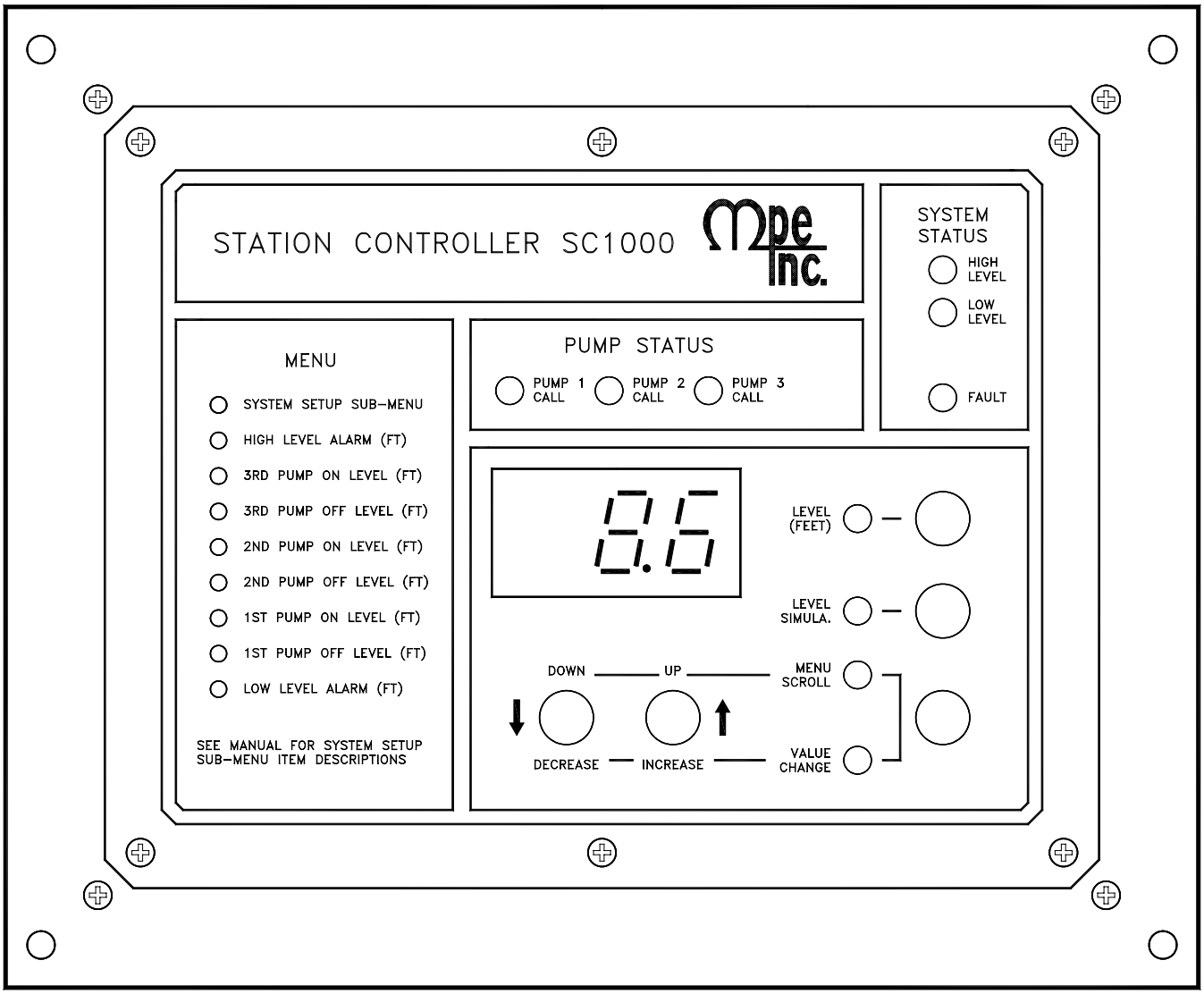
INSTRUCTION MANUAL

STATION CONTROLLER SC1000



MOTOR PROTECTION ELECTRONICS, INC.

2464 Vulcan Road, Apopka, Florida 32703
Phone: (407) 299-3825 Fax: (407) 294-9435

Revision Date: 9-11-08

STATION CONTROLLER SC1000

Applications:

- Simplex, Duplex, or Triplex
- Pump Down (Empty a Tank) or Pump Up (Fill a Tank)

Standard Features:

- All Setup Parameters Values may be viewed or changed from the front of the unit
- Level Input Source – Menu Selectable:
  - Analog Level Input [4-20mA from Pressure Transducer]
  - Level Probe [Conductance Probe with 10 Electrodes]
- 20VDC power for analog Level Input
- Phoenix style connectors used
- 6 Amp Pump Call Relay outputs
- RS-232 Serial Port with Modbus RTU Protocol
- Wet Well Level Analog Input Zero and Span Adjustments
- High and Low Level Alarm Relays and Alarm Indication
- Adjustable Lag Pump(s) Delay
- Alternation Schemes – Menu Selectable:
  - Standard Alternation
  - Pump 1 Always Lead – Stays On with other Pumps
  - Pump 1 Always Lead – Turns Off with other Pumps On
  - Pumps 1 & 2 Alternate, and Pump 3 Always Last
  - Fixed Sequence – Pump 1 Always Lead
  - Stepped On/Off – Only One Pump Runs at a Time

  Alternator Logic Skips Disabled Pumps
  Remembers Lead Pump Position during Power Outage
- First On - **First** Off or First On - **Last** Off Alternation
- Timed [1 minute] Level Simulation
- 12 Discrete Inputs that can be programmed for the following functions:
  - Pump disable with HOA in OFF, or pump fault
  - External Lead Pump Selector Switch
  - All pump disable – for connection to Phase Monitor
  - Limit number of pumps called while on emergency power
  - Alternation by External Time Clock
  - Low Level Pump Cutoff
  - Freeze wet well level during a bubbler tube purge
  - Bubbler System fault
  - Float switch backup
  - A variety of telemetry functions
- Status of Discrete Inputs may be viewed from front of controller
- Backup Pump Control, High & Low Alarms using Level Probe Inputs

Specifications:

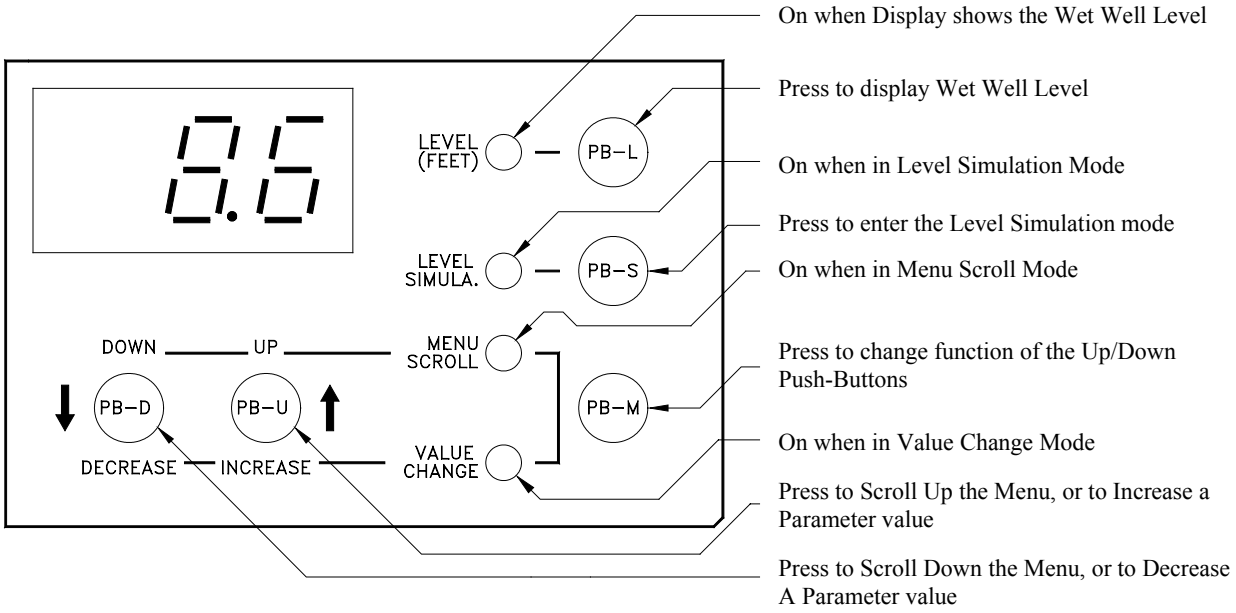
- Input Power: 120 VAC ±10%, 13 VA max
- External Dimensions: 6.9" x 8.5" x 4.1"
- Agency Approvals: UL 508, CAN/CSA
- Ambient Operating Temperature: –20°C to +65°C (–4°F to +149°F)
- Level Display: 3 Digit, 7 Segment LED
- Level Display Range: 0 – 347 feet (Decimal Point Position is Selectable)
- Indicators: LED
- Color: White with Blue Lettering
- Relays: 6A @ 250VAC
- Level Analog Input: 4 – 20mA, 250Ω Load, Transient Protected
- Level Probe Inputs: Provide ±12V Square Wave at 60Hz, Transient Protected
- Discrete Inputs: 24VDC, Transient Protected
- Power for Discrete Inputs: Unregulated 24VDC, Transient Protected
- Power for Analog Input: Regulated 20VDC ±1V, Transient Protected

Ordering Information:

Part Number: SC1000

To Make the 4-20mA Analog Level Input an Isolated Input add S to end of Part Number.

OPERATOR INTERFACE FUNCTIONS:



Note: There is a 4 second delay on changing parameter values.

How to <u>View</u> a Setup Parameter Value:

1. Press push-button PB-M until the Menu Scroll Mode indicator comes on.
2. Press push-button PB-D and PB-U as needed to arrive at the parameter you wish to view.

<u>Parameters in the Main Menu:</u>
The value of a parameter in the Main Menu is displayed whenever the indicator next to the parameter label is on.

<u>Parameters in the System Setup Sub-Menu:</u>
The value of a parameter in the System Setup Sub-Menu may be viewed by using the push-button PB-M to toggle from the parameter number (P.13, for example) to the parameter value.

How to <u>Change</u> a Setup Parameter Value:

1. Press push-button PB-M until the Menu Scroll mode indicator comes on.
2. Press push-button PB-D and PB-U as needed to arrive at the parameter you wish to change.

<u>Parameters in the Main Menu:</u>
Press push-button PB-M until the Value Change indicator comes on.

<u>Parameters in the System Setup Sub-Menu:</u>
Press push-button PB-M until the Value Change indicator comes on. The current value of the parameter will then be displayed.

3. Press and hold for 4 seconds, either push-button PB-D or PB-U, to change the parameter to the desired new value.
4. Press push-button PB-M or PB-L to exit the Value Change mode.

How to do Level Simulation:

1. Press push-button PB-S. (The Simulation starts from the actual level displayed prior to entering the Level Simulation mode.)
2. Press push-button PB-D or PB-U as needed to change the simulated level.
3. To end the level simulation press push-button PB-L. (If you do not exit the Level Simulation mode, normal operation will resume automatically 60 seconds after the last time the Up/Down push-buttons were pressed.)

MENU - SYSTEM SETUP

oPr – Operating Program Revision Number

Parameter Number	Default Value	Current Value	Description of Parameter
-	2.0 feet		Low Level Alarm
-	3.0 feet		1ST Pump Off Level
-	6.0 feet		1ST Pump On Level
-	4.0 feet		2ND Pump Off Level
-	7.0 feet		2ND Pump On Level
-	4.5 feet		3RD Pump Off Level
-	8.0 feet		3RD Pump On Level
-	10.0 feet		High Level Alarm
P.12	5 sec		Lag Pump Delay
P.13	3		Number of Pumps Present 1 = 1 Pump 2 = 2 Pumps 3 = 3 Pumps
P.14	3		Number of Pumps Allowed to Run At the Same Time 1 = 1 Pump 2 = 2 Pumps 3 = 3 Pumps
P.15	3		Number of Pumps Allowed to Run On Generator 1 = 1 Pump 2 = 2 Pumps 3 = 3 Pumps Must Connect Auto Transfer Switch to Discrete Input Programmed for this Function.
P.16	1		Alternator Sequence Mode 1 = Standard Alternation 2 = Pump 1 Always Lead – Stays On With Other Pumps 3 = Pump 1 Always Lead – Turns Off With Other Pumps 4 = Pumps 1 & 2 Alternate, and Pump 3 Always Last 5 = Fixed Sequence – Pump 1 Always Lead 6 = Stepped On/Off – Only One Pump Runs at a Time
P.17	2		Pump Stop Mode 1 = First On Last Off 2 = First On First Off
P.18	1		Automatic Alternation 1 = Enabled 2 = Disabled (Also see Parameter P.39)
P.19	1		Pump Up or Down Mode 1 = Pump Down – Empty a Tank 2 = Pump Up – Fill a Tank (When Parameter P.19 is Changed New Default Level Parameter Values will be Loaded.)
P.24	11.5 feet		Level Input Span (Display Value with 20.0mA Input), (Range: 0.25 feet – 347 feet)
P.25	0.0 feet		Level Input Zero (Display Value with 4.0mA Input)
P.27	1		Serial Port - Protocol 1 = Modbus RTU Mode
P.28	1		Serial Port - Slave Address (Range: 1 – 247)
P.29	4		Serial Port - Baud Rate 1 = 1200 bps 2 = 2400 bps 3 = 4800 bps 4 = 9600 bps
P.30	0		Serial Port - Parity Mode 0 = No Parity 1 = Odd Parity 2 = Even Parity
P.31	2		Serial Port - Stop Bits 1 = 1 Stop Bit 2 = 2 Stop Bits (The 2nd Stop Bit is only available when No Parity is selected on Parameter P.30)
P.32	3 ms		Serial Port - Delay Transmitting Response (Range: 1 - 100 ms) (oPr = 5 and Above)
P.33	1		Serial Port - Remote Telemetry Register Access Mode (oPr = 5 and Above) 1 = Read & Write 2 = Read Only
P.34	-		Spare Parameter
P.35	1 sec		Stop Pump Delay - Time period that the wet well level must remain at or below (at or above for Pump Up P.19 = 2) the respective OFF level setting in order to turn off a pump.
P.36	1		Display Decimal Point Position From Right Side (Where 0 = No Decimal Point)
P.37	1 min		Pump Re-enable Delay after Low/High Level Float Opens For Pump Down Applications (P.19 = 1) use Discrete Input Function = 24 (Low Float). For Pump Up Applications (P.19 = 2) use Discrete Input Function = 29 (High Float).
P.38	1 min		Delay Canceling Remote Pump Control Commands, After Loss of Serial Communication (To Allow Remote Commands to Remain (Until Power Loss) - Set P.38 = 255)
P.39	0		Forced Lead Pump Position 1(2,3) = Pump 1(2,3) as Lead, 0 = Normal Alternation
FLC	-	-	Fault Code Display (See Fault Code Table for Fault Description.) (See Parameter d.99.)

MENU - I / O SETUP

Parameter Number	Default Value	Current Value	Description of Parameter
F.01	1		Discrete Input 1 Function
F.02	2		Discrete Input 2 Function
F.03	3		Discrete Input 3 Function
F.04	4		Discrete Input 4 Function
F.05	5		Discrete Input 5 Function
F.06	6		Discrete Input 6 Function
F.07	7		Discrete Input 7 Function
F.08	8		Discrete Input 8 Function
F.09	9		Discrete Input 9 Function
F.10	10		Discrete Input 10 Function
F.11	11		Discrete Input 11 Function
F.12	12		Discrete Input 12 Function

Function of Input: — **Connect To:**

0 = General Purpose Telemetry …… Any Telemetry Contact
1 = Pump 1 Disable …… HOA and Fault Conditions
2 = Pump 2 Disable …… HOA and Fault Conditions
3 = Pump 3 Disable …… HOA and Fault Conditions
4 = Level Freeze …… Bubbler Tube Purge Logic
5 = External Alternation …… External Time Clock
6 = On Generator (see Parameter P.15) …… Automatic Transfer Switch
7 = All Pump Disable …… Phase Monitor
8 = Sequence Input 1 …… Lead Select Switch - 1 as Lead
9 = Sequence Input 2 …… Lead Select Switch - 2 as Lead
10 = Sequence Input 3 …… Lead Select Switch - 3 as Lead
11 = Low Float Telemetry & Alarm Only …… Low Float Switch (NC)
12 = High Float Telemetry & Alarm Only …… High Float Switch
13 = Pump 1 Running Telemetry Only …… Starter Auxiliary Contact
14 = Pump 2 Running Telemetry Only …… Starter Auxiliary Contact
15 = Pump 3 Running Telemetry Only …… Starter Auxiliary Contact
16 = Pump 1 Fault Telemetry Only …… Pump Fault Logic
17 = Pump 2 Fault Telemetry Only …… Pump Fault Logic
18 = Pump 3 Fault Telemetry Only …… Pump Fault Logic
19 = Telemetry A …… Telemetry Contact
20 = Telemetry B …… Telemetry Contact
21 = Telemetry C …… Telemetry Contact
22 = Telemetry D …… Telemetry Contact
23 = Bubbler System Failure …… Bubbler System Fault Contact
(Disables normal pump operation. Do not use without backup system.)
24 = Float Backup - Low Level …… Low Float Switch (NC)
25 = Float Backup – Off Level …… Off Level Float Switch
26 = Float Backup – 1ST On Level …… 1ST On Level Float Switch
27 = Float Backup – 2ND On Level …… 2ND On Level Float Switch
28 = Float Backup – 3RD On Level …… 3RD On Level Float Switch
29 = Float Backup – High Level …… High Level Float Switch

See Float Backup and Remote Telemetry Notes for more details.

F.19	1		Level Input Source 1 = Analog Level Input (4-20mA) on J21 2 = Level Probe on J25
F.20	12		Spacing Between Level Probe Electrodes (inches)
F.21	0.0		Level Offset (feet) – Adds to level from Analog Input or Level Probe Input, so that the Transducer or Level Probe can be placed off the bottom of the wet well and have the distance added to the Level Display. (Adjustment Range 0.0 - 5.0 feet)
F.22	100		Level Probe Sensitivity – The Controller Compares the value read from each of the ten Level Probe Electrodes with the value set on Parameter F.22. When one of the Level Probe Electrode Status values drops below the value set on Parameter F.22, that Electrode is considered covered by liquid. (See Parameters d.88-d.97 on page 5.) In order to set Parameter F.22, first ensure that the bottom Electrode (Number 10) is covered by liquid. Then go to Parameter d.97 and read the value. Set Parameter F.22 to a value that is approximately 40 higher that what is read from Parameter d.97. For Sewage, F.22 should be set between 90 and 120. For Clean Water, F.22 should be set between 135 and 200. More sludge build up on the probe can be tolerated with a lower value set on F.22.

MENU - INPUT STATUS DISPLAY

Parameter Number	Description of Parameter	
n.01	Discrete Input 1 Status	0 = Input Open 1 = Input Closed Note: Discrete Input Status is used when troubleshooting the wiring and logic connected to the various controller discrete inputs.
n.02	Discrete Input 2 Status	
n.03	Discrete Input 3 Status	
n.04	Discrete Input 4 Status	
n.05	Discrete Input 5 Status	
n.06	Discrete Input 6 Status	
n.07	Discrete Input 7 Status	
n.08	Discrete Input 8 Status	
n.09	Discrete Input 9 Status	
n.10	Discrete Input 10 Status	
n.11	Discrete Input 11 Status	
n.12	Discrete Input 12 Status	

MENU - DATA DISPLAY

Parameter Number	Description of Parameter	
d.01	Voltage of +5 Volt Power Supply (Measured Ahead of Voltage Regulator) Normal Range: 8.5V to 11.3V	
d.02	Voltage of +24 Volt Power Supply Normal Range: 21.1V to 26.1V	
d.07	Serial Communication Activity Indicator – Shows a "1" When the Master Polls One of the Slaves, or When One of the Slaves Respond. Only Indicates Activity, Not Valid Communication.	
d.08	Serial Communication – Shows the Address of the Last Slave Polled by the Master	
d.09	Serial Communication – Shows the Last Modbus Function Code Received	
d.10 - d.85	Serial Communication – Shows the Entire Rest of the Last Modbus Message Received	
d.88	Level Probe Electrode 1 Status	Parameters d.88 – d.97 are used to determine what should be set on Parameter F.22. (See setup procedure on page 4 next to Parameter F.22.) The Controller compares the status value of the ten Level Probe Electrodes (d.88 – d.97) with what is set on Parameter F.22. When the value drops below the setting on Parameter F.22, the Electrode is considered covered by liquid.
d.89	Level Probe Electrode 2 Status	
d.90	Level Probe Electrode 3 Status	
d.91	Level Probe Electrode 4 Status	
d.92	Level Probe Electrode 5 Status	
d.93	Level Probe Electrode 6 Status	
d.94	Level Probe Electrode 7 Status	
d.95	Level Probe Electrode 8 Status	
d.96	Level Probe Electrode 9 Status	
d.97	Level Probe Electrode 10 Status	
d.98	Level Probe Test Signal Status – This is a Measure of the ±12V Square Wave Sent Out to Each Electrode. Normal Range of this Parameter: 230 – 254	
d.99	Last Fault Code – This is the Last Fault Code that Appeared in Parameter FLC. (The contents of this parameter are cleared when power is cycled.)	
oPr	Operating Program Revision Number	

MENU - Setup of Backup Pump Control and Level Alarms
Using Selected Level Probe Inputs

Used When the Primary Level Input Source is set for the Analog Input (4-20mA), Parameter F.19 = 1.

			Description of Parameter	
Parameter Number	**Default Value**	**Current Value**	**Function:**	**Setting Description:**
b.01	0		Backup Low Level Alarm	0 = Function Not Used 1 = Electrode Input 1 on Connector J25-1 2 = Electrode Input 2 on Connector J25-2 3 = Electrode Input 3 on Connector J25-3 4 = Electrode Input 4 on Connector J25-4 5 = Electrode Input 5 on Connector J25-5 6 = Electrode Input 6 on Connector J25-6 7 = Electrode Input 7 on Connector J25-7 8 = Electrode Input 8 on Connector J25-8 9 = Electrode Input 9 on Connector J25-9 10 = Electrode Input 10 on Connector J25-10
b.02	0		Backup Pump Control – Off Level	
b.03	0		Backup Pump Control – 1ST On Level	
b.04	0		Backup Pump Control – 2ND On Level	
b.05	0		Backup Pump Control – 3RD On Level	
b.06	0		Backup High Level Alarm	

Notes:

- When the controller is set up to follow a 10 Electrode Conductance Level Probe as the primary level input source (Parameter F.19 = 2), the backup functions described here are not needed and will not operate.
- If a Function is not desired set the respective parameter equal to zero. For example if the Backup Low Level Alarm is not needed set Parameter b.01 = 0.
- An effective Backup Pump Control would involve having a 3 point Level Probe placed high in the wet well. The Level Probe would be connected to Connector J25 terminals 1, 2, and 3. The Off Level should be made to operate from the bottom Electrode by setting Parameter b.02 = 3. The 1ST On Level should be set to operate from Electrode 2 by setting Parameter b.03 = 2. The 2ND On Level should be set to operate from Electrode 1 by setting Parameter b.04 = 1. If pump 3 is present set the 3RD On, to operated from Electrode 1 by setting Parameter b.05 = 1.
- If a Backup High Level Alarm is desired set Parameter b.06 to the number of the Electrode Input that the High Level Probe is connected to. This feature is for alarm and telemetry only and will not function as a redundant pump call.
- If a Backup Low Level Alarm is desired set Parameter b.01 to the number of the Electrode Input that the Low Level Probe is connected to. This feature is for alarm and telemetry only and will not function as a redundant pump cut off.
- Whenever the Backup Pump Control is active the Fault indicator on the front of the Controller will be on and a fault code of 30 will be present in Parameter FLC. Also, the Fault Code of 30 will be present in the Last Fault Code register and may be viewed at Parameter d.99.

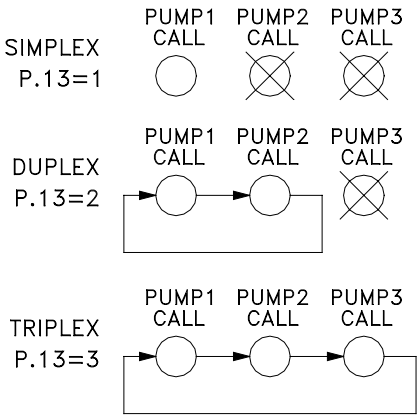
ALTERNATION SEQUENCE SETUP

STANDARD ALTERNATION P.16 = 1

Notes:

- Unless there is some special circumstance that requires a more complicated pump call sequence, this is the sequence that should be used.
- **Parameter P.17** must be used to select either **First On Last Off** or **First On First Off**.
- Discrete Inputs programmed as **Pump 1-3 Disable** inputs may be used to disable pumps.
- Discrete Inputs programmed as **Sequence Inputs** may be used to set the lead pump.
- **Parameter P.39** may be used to set the lead pump.
- A Discrete Input programmed for **External Alternation** may be used to force alternation. When this feature is used, Automatic Alternation would normally be disabled by setting **Parameter P.18** to **Disabled.**
- If connected to a SCADA system, alternation may be initiated by momentarily setting Coil 136 high, or by forcing the lead pump by writing to Register 40022 (Same as Parameter P.39).

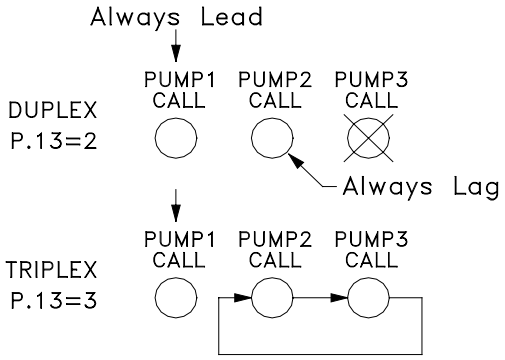
Movement of Lead Pump Upon Alternation



PUMP 1 ALWAYS LEAD P.16 = 2
Stays On With Other Pumps

Notes:

- This sequence is used when it is required that pump 1 always be lead pump. This sequence keeps pump 1 on, when the other pumps are called to run. For a triplex system pumps 2 and 3 will alternate among themselves.
- **Parameter P.17** must be used to select either **First On Last Off** or **First On First Off**.
- Discrete Inputs programmed as **Pump 1-3 Disable** inputs may be used to disable pumps.
- Discrete Inputs programmed as **Sequence Inputs** may be used to fix the sequence of pumps 2 and 3.
- **Parameter P.39** may be used to set the lead pump for Triplex, but has no effect on Duplex.
- If one pump is required to run, but pump 1 is disabled another pump will be called in its place.
- A Discrete Input programmed for **External Alternation** may be used to force alternation. When this feature is used, Automatic Alternation would normally be disabled by setting **Parameter P.18** to **Disabled.**
- If connected to a SCADA system, alternation may be initiated by momentarily setting Coil 136 high. The sequence of pumps 2 and 3 may be fixed by writing either 2 or 3 to Register 40022 (Same as Parameter P.39).

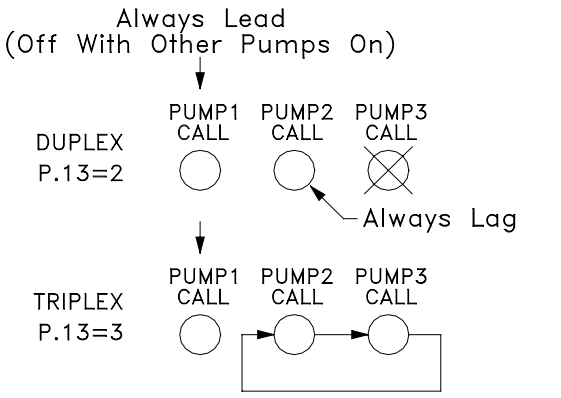


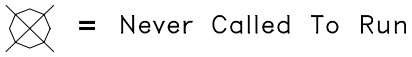
PUMP 1 ALWAYS LEAD P.16 = 3
Turns Off With Other Pumps On

Notes:

- This sequence is used when it is required that pump 1 always be lead, and when it must be turned off when another pump(s) comes on. When a pump from the second group is required, pump 1 is first turned off, then after the Lag Pump Delay, the other pump is turned on.
- **Parameter P.17** must be used to select either **First On Last Off** or **First On First Off**.
- Discrete Inputs programmed as **Pump #1-3 Disable** inputs may be used to disable pumps.
- Discrete Inputs programmed as **Sequence Inputs** may be used to fix the sequence of pumps 2 and 3.
- **Parameter P.39** may be used to set the lead pump for Triplex, but has no effect on Duplex.
- If pump 1 is disabled, another pump will **Not** be called in its place. The 1ST Pump On/Off Level parameters are dedicated to pump 1 and will not call another pump.
- A Discrete Input programmed for **External Alternation** may be used to force alternation. When this feature is used, Automatic Alternation would normally be disabled by setting **Parameter P.18** to **Disabled.**
- If connected to a SCADA system, alternation may be initiated by momentarily setting Coil 136 high, The sequence of pumps 2 and 3 may be fixed by writing either 2 or 3 to Register 40022 (Same as Parameter P.39).

Movement of Lead Pump Upon Alternation

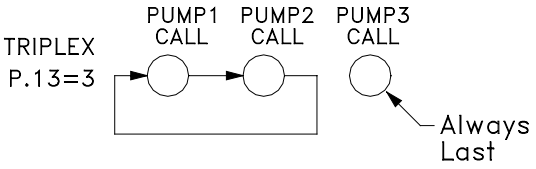




PUMPS 1 & 2 ALTERNATE P.16 = 4
PUMP 3 ALWAYS LAST

Notes:

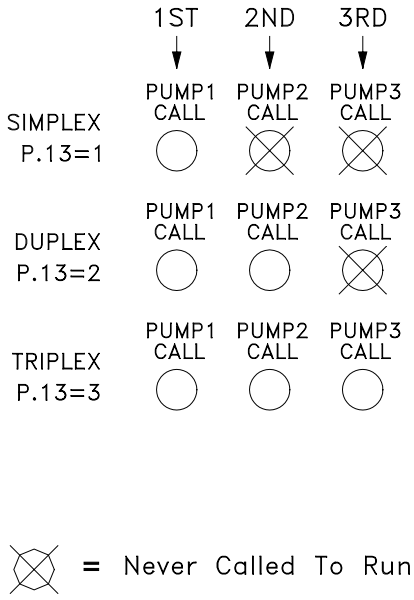
- This sequence is used when it is required that pumps 1 and 2 alternate among themselves and pump 3 must always be called last.
- **Parameter P.17** must be used to select either **First On Last Off** or **First On First Off**.
- Discrete Inputs programmed as **Pump 1-3 Disable** inputs may be used to disable pumps.
- Discrete Inputs programmed as **Sequence Inputs** may be used to set the lead pump among pumps 1 and 2.
- **Parameter P.39** may be used to set the lead pump. Setting P.39 on 3 has no effect.
- A Discrete Input programmed for **External Alternation** may be used to force alternation. When this feature is used, Automatic Alternation would normally be disabled by setting **Parameter P.18** to **Disabled.**
- If connected to a SCADA system, alternation of pump 1 and 2 may be initiated by momentarily setting Coil 136 high, or by forcing the lead pump position by writing to Register 40022 (Same as Parameter P.39).



FIXED SEQUENCE P.16 = 5

Notes:

- This sequence is used when no alternation is required and when pump 1 should always be lead pump. Other pumps may be set as lead by setting parameter P.39.
- Discrete Inputs programmed as **Pump 1-3 Disable** inputs may be used to disable pumps.
- Discrete Inputs programmed as **Sequence Inputs** may be used to set the lead pump.
- **Parameter P.39** may be used to set the lead pump.
- **The Pump Stop Mode** (Parameter P.17) has no effect on this sequence.
- **Automatic Alternation Enable/Disable** (Parameter P.18) has no effect on this sequence.
- The **External Alternation** feature will not function when using this sequence.
- If connected to a SCADA system, the lead pump position may be set by writing to Register 40022 (Same as Parameter P.39).



STEPPED ON/OFF SEQUENCE P.16 = 6
Only One Pump Runs at a Time

Notes:

- This sequence is used in stations where there is a significant difference in the size of the pumps, and when only one pump is to be allowed to run at a time. When there is a need for more pumping, the smaller pump is turned off and the next larger pump is called to run. As the need for pumping decreases, the larger pump is turned off and a smaller pump is called to run in its place (provided the Off Levels are staggered).
- The **Lag Pump Delay** operates to give the check valve of the pump being turned off time to close before another pump is called to run.
- Discrete Inputs programmed as **Pump 1-3 Disable** inputs should be used to disable pumps. It is critical that the largest pump in the group has some type of pump fault logic connected to the respective Pump Disable discrete input. This is needed so that the next smaller pump will be called to run if the largest pump fails to run.
- Discrete Inputs programmed as **Sequence Inputs** will not function, when using this sequence.
- **Parameter P.39** has no effect on this sequence.
- **The Pump Stop Mode** (Parameter P.17) has no effect on this sequence.
- **Automatic Alternation Enable/Disable** (Parameter P.18) has no effect on this sequence.
- The **External Alternation** feature will not function when using this sequence.
- The **On Generator** (Parameter P.15) has no effect on this sequence.

SYSTEM STATUS

High Level Alarm:

- Upon a High Level Alarm, the indicator will come on and the relay contacts will close.
- A High Level Alarm is delayed for ten seconds after power is applied.
- The High Level Alarm relay contacts will be closed when there is no power on the controller.
- The moment electrical power is applied to the controller, the High Level Alarm relay contacts open.
- The High Level Alarm relay contacts will close if there is a complete failure of the controller.
- A High Level float may also be used to activate alarm. The discrete input used must be assigned function 12 or 29.
- The Backup High Level Alarm using a Level Probe Input will activate the alarm. See Parameter b.06.
- With the Level Probe set as the Level Input Source – The High Level Alarm will be activated when Electrode 1 is covered with liquid regardless of what level the High Level Alarm Parameter is set on.

Low Level Alarm:

- Upon a Low Level Alarm, the indicator will come on and the relay contacts will close.
- A Low Level Alarm is delayed for 90 seconds after power is applied.
- The Low Level Alarm relay contacts will be open when there is no power on the controller.
- A Low Level float may also be used to activate alarm. The discrete input used must be assigned function 11 or 24.
- The Backup Low Level Alarm using a Level Probe Input will activate the alarm. See Parameter b.01.
- With the Level Probe set as the Level Input Source – The Low Level Alarm will be activated when Electrode 10 is uncovered regardless of what level the Low Level Alarm Parameter is set on.

Fault Indication - The Fault indicator shows when there is something wrong with the system.

Fault Codes – To view Fault Codes go to the System Setup Menu and scroll past parameters P.12 – P.39 to parameter FLC where the Fault Code may be read. Please see the Fault Code Table below.

Last Fault Code – The last Fault Code that was present in parameter FLC may be viewed from Parameter d.99. The contents of Parameter d.99 are cleared when power is cycled.

FLC FAULT CODE TABLE

FAULT CODE	DESCRIPTION OF CONDITION
0	Normal
1	Serial Communication Fault – Overrun Error reading incoming message.
2	Serial Communication Fault – Time out error reading incoming message.
3	Serial Communication Fault – Time out error responding to message.
4	Serial Communication Fault – Incoming message failed Checksum test.
5	Serial Communication Fault – Invalid Modbus Function Code.
6	Serial Communication Fault – Trying to preset more than 35 registers using Modbus Function Code No. 16.
7	Serial Communication Fault – Trying to force more than 100 Coils using Modbus Function Code No. 15.
8	Parameter Setup Fault – More than one Discrete Input is assigned to the same Function.
9	Parameter Setup Fault – Pump On & Pump Off parameters are set too close together. (They must be at least 0.2 feet apart with P.36 = 1, or 2 feet apart with P.36 = 0, or 0.02 feet apart with P.36 = 2.)
10	Parameter Setup Fault – Pump On & Pump Off parameters are upside down. (Pump Off Level must be lower than the Pump On Level, for a pump down application.)
13	Serial Communication Fault – The UART detected a Framing Error reading the incoming message. It did not find Stop Bit where expected.
14	Serial Communication Fault – Noise Detected on incoming message.
15	Bubbler System Fault Discrete Input Closed – Pump operation from transducer input will be disabled. Pump Operation will be allowed on Float Backup or on Backup Pump Control using Level Probe Inputs.
16	Pump Operation on Float Backup
17	Backup Float Switch Out of Sequence. (Fault will clear when normal operation is verified or when power is cycled.)
18	This indicates that the ALL PUMP DISABLE (Phase Monitor) discrete input is closed. All the pumps will be turned off.

19	One of the Pump On or Pump Off level control Parameters is set too low. One of them is set in the part of the display range that is artificially created by the Level Offset Parameter F.21. See page 4 for a description of Parameter F.21. All level control Parameters must be set higher than what is set on Parameter F.21.	
20	Level Probe Fault – Test Signal Status Below Normal Range See Parameter d.98 on page 5 of manual for more information	Level Probe Fault Codes 20 – 29 must be present for at least 60 seconds for the fault to be latched into memory. To reset the fault, scroll to and view parameter FLC. Record the fault code, then press the Down push-button while viewing the fault code. Cycling power to the controller will also reset the fault code. The most likely cause of fault codes 21 – 29 is sludge on the Level Probe. The analog value associated with each of the Level Probe Electrodes may be viewed from Parameters d.88 – d.97. See page 5 of manual for more information.
21	Level Probe Fault – Electrodes Covered Out of Sequence Electrode 1 Covered before Electrode 2	
22	Level Probe Fault – Electrodes Covered Out of Sequence Electrode 2 Covered before Electrode 3	
23	Level Probe Fault – Electrodes Covered Out of Sequence Electrode 3 Covered before Electrode 4	
24	Level Probe Fault – Electrodes Covered Out of Sequence Electrode 4 Covered before Electrode 5	
25	Level Probe Fault – Electrodes Covered Out of Sequence Electrode 5 Covered before Electrode 6	
26	Level Probe Fault – Electrodes Covered Out of Sequence Electrode 6 Covered before Electrode 7	
27	Level Probe Fault – Electrodes Covered Out of Sequence Electrode 7 Covered before Electrode 8	
28	Level Probe Fault – Electrodes Covered Out of Sequence Electrode 8 Covered before Electrode 9	
29	Level Probe Fault – Electrodes Covered Out of Sequence Electrode 9 Covered before Electrode 10	
30	Pump(s) are Called to Operate by the Level Probe Backup Pump Control	
31	Serial Communication Fault – Write Attempt to Register Not Marked for “Write” using Function Code No. 05	
32	Serial Communication Fault – Write Attempt to Register Not Marked for “Write” using Function Code No. 06	
33	Serial Communication Fault – Write Attempt to Register Not Marked for “Write” using Function Code No. 15	
34	Serial Communication Fault – Write Attempt to Register Not Marked for “Write” using Function Code No. 16	
35	Serial Communication Fault – Write Attempt made with Remote Telemetry Register Access Mode Parameter (P.33) set for Read Only.	

ANALOG LEVEL INPUT (4-20mA Input) – CALIBRATION PROCEDURE

The following calibration is for the 4-20mA Analog Input, and does not apply when the 10 Electrode Conductance Level Probe is used. To calibrate the level display when using the Level Probe, the distance between the electrodes must be set on parameter F.20.

LEVEL INPUT ZERO – P.25

This parameter is used to make the display read zero feet of water with a wet well level input of 4.0mA.

Calibration Procedure:

1. Apply a 4.0mA signal to the Wet Well Level Analog Input.
   (Alternate Procedure – Pull the pressure transducer or bubbler tube out of the water.)
2. Scroll to the place in the System Setup Sub-Menu where parameter P.25 is displayed.
3. Press the Scroll / Change mode push-button. (The Wet Well Level will be displayed.)
4. Use the Up / Down push-buttons to make the display read zero feet.
5. Perform the procedure below to calibrate the "LEVEL INPUT SPAN" parameter.

LEVEL INPUT SPAN – P.24

This parameter is used to establish the wet well level (in feet of water) that corresponds to an analog input of 20mA.

Calibration Procedure:

1. Apply a 20mA signal to the Wet Well Level Analog Input.
   (Alternate Procedure – Subject the pressure transducer or bubbler tube to a known depth of water.)
2. Scroll to the place in the System Setup Sub-Menu where parameter P.24 is displayed.
3. Press the Scroll / Change mode push-button. (The Wet Well Level will be displayed.)
4. Use the Up / Down push-buttons to make the display read the level (in feet of water) that your 20mA signal represents.
   (Alternate Procedure – Use the Up / Down push-buttons to make the display read the number of feet of water that the pressure transducer or the end of the bubbler tube is submerged under water.)
5. Repeat the procedure above for the "LEVEL INPUT ZERO" parameter.

LEVEL DISPLAY SPAN VERSUS TRANSDUCER CALIBRATION

		Transducer Calibration					
		1.10psi @ 20mA	2.17psi @ 20mA	5.0psi @ 20mA	10.0psi @ 20mA	15.0psi @ 20mA	100psi @ 20mA
Level Display Span	P.36 = 0	-	-	-	-	-	231 feet
	P.36 = 1	-	5.0 feet	11.5 feet	23.1 feet	34.6 feet	-
	P.36 = 2	2.55 feet	-	-	-	-	-

Level Display Span is what should be displayed with a 20mA Level Input.
Parameter **P.36** is used to set the decimal point position.
To find the Level Input Span Setting for other transducers use the following equation: Pressure (psi) x 2.309 = Level (feet of water)

REMOTE TELEMETRY REGISTERS

REGISTER ADDRESS	READ	WRITE	DESCRIPTION OF REGISTER CONTENTS (Where a Coil is represented by a Bit in a Register)															
40001	✓		16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1 COIL
				Pump Called On Probe Backup	Telemetry D	On Generator	Phase Monitor	Telemetry C	Telemetry B	Pump Called On Float Backup	Telemetry A	Bubbler System Fault		Pump 3 Fault	Pump 2 Fault	Pump 1 Fault	Low Level	High Level
40002	✓	✓	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
												Clear ETM 3	Clear ETM 2	Clear ETM 1		Force Pump 3 On	Force Pump 2 On	Force Pump 1 On
40003	✓		Pump 1 Elapsed Time Meter (hours and 1/10 hours)															
40004	✓		Pump 2 Elapsed Time Meter (hours and 1/10 hours)															
40005	✓		Pump 3 Elapsed Time Meter (hours and 1/10 hours)															
40006	✓		Spare Register															
40007	✓		Spare Register															
40008	✓		128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113
			Low Float	1st On Float	2nd On Float	3rd On Float			Probe Backup High Level	Probe Backup Low Level	High Float	Off Float	On Generator	Phase Monitor		Pump 3 Running	Pump 2 Running	Pump 1 Running
40009	✓	✓	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129
											Force Alt			Pump 3 Fault	Pump 2 Fault	Pump 1 Fault	Low Level	High Level
40010	✓	✓	160	159	158	157	156	155	154	153	152	151	150	149	148	147	146	145
												Pump 3 Disable	Pump 2 Disable	Pump 1 Disable		Pump 3 Called	Pump 2 Called	Pump 1 Called

40011	✓		Wet Well Level (feet and 1/10 feet)
40012	✓	✓	1ST Pump On Level (feet and 1/10 feet)
40013	✓	✓	1ST Pump Off Level (feet and 1/10 feet)
40014	✓	✓	2ND Pump On Level (feet and 1/10 feet)
40015	✓	✓	2ND Pump Off Level (feet and 1/10 feet)
40016	✓	✓	3RD Pump On Level (feet and 1/10 feet)
40017	✓	✓	3RD Pump Off Level (feet and 1/10 feet)
40018	✓	✓	Spare Register
40019	✓	✓	Spare Register
40020	✓	✓	High Level Alarm (feet and 1/10 feet)
40021	✓	✓	Low Level Alarm (feet and 1/10 feet)
40022	✓	✓	Forced Lead Pump Position 1(2,3) = Pump 1(2,3) as Lead, 0 = Normal Alternation (Same as Parameter P.39)
40023	✓		Actual Lead Pump Position
40024-4034	✓		Spare Registers

			560	559	558	557	556	555	554	553	552	551	550	549	548	547	546	545
40035	✓										Discrete Input 8	Discrete Input 7	Discrete Input 6	Discrete Input 5	Discrete Input 4	Discrete Input 3	Discrete Input 2	Discrete Input 1

			576	575	574	573	572	571	570	569	568	567	566	565	564	563	562	561
40036	✓														Discrete Input 12	Discrete Input 11	Discrete Input 10	Discrete Input 9

			592	591	590	589	588	587	586	585	584	583	582	581	580	579	578	577
40037	✓		Level Probe Electrode 10	Level Probe Electrode 9	Level Probe Electrode 8	Level Probe Electrode 7	Level Probe Electrode 6	Level Probe Electrode 5	Level Probe Electrode 4	Level Probe Electrode 3	Level Probe Electrode 2	Level Probe Electrode 1						

40047	✓		Fault Code (Same as Parameter FLC)
40048	✓		Last Fault Code (Same as Parameter d.99)
40049	✓		Factory Test Parameter - Voltage of +5V Power Supply (Same as Parameter d.01)
40050	✓		Factory Test Parameter - Voltage of +24V Power Supply (Same as Parameter d.02)

MODBUS FUNCTIONS SUPPORTED		
FUNCTION CODE	**FUNCTION DESCRIPTION**	**NOTES**
01	Read Coil Status	
02	Read Input Status	
03	Read Holding Registers	
04	Read Input Registers	
05	Force Single Coil	
06	Preset Single Register	
08	Diagnostics - Sub-function 00 (Return Query Data)	
15	Force Multiple Coils	Limited to 100 Coils
16	Preset Multiple Registers	Limited to 35 Registers

REMOTE TELEMETRY NOTES:

- An attempt to write to registers or coils not marked for "Write" will generate Fault Code 31, 32, 33, or 34. An attempt to write to a register or coil with the Remote Telemetry Register Access Mode Parameter (P.33) set for Read Only, will generate Fault Code 35. See the Fault Code Table.

- Regardless of what function might be assigned to a discrete input, its status may always be read from registers 40035-40037. If no control function is desired for a particular discrete input and only its status is desired, then the input may be assigned function "0" (General Purpose Telemetry), and its status may be read from registers 40035-40036.

- The **Serial Communication Activity Indicator** (Data display Parameter d.07) may be used to help troubleshoot the serial communication. It typically pulses from "0" to "1" momentarily to indicate that the master or one of the slaves is sending a message. It may stay "1" if there is very little time between messages. It does not indicate that a valid communication has occurred, only that there is activity on the serial port.

- The **Address of Last Slave Polled by Master** (Data display Parameter d.08) may be used to help troubleshoot the serial communication. It shows the address of the last slave that was polled by the master.

- Setup problems such as having selected the wrong Protocol, Baud Rate, Parity, or RTS Control Delays may not cause a **Fault Indication** or **Fault Code (FLC)** to be generated. This is because the controller does not always read the entire message and run the error checking routines. It reads the first part of a message to determine the address of the slave being polled. If the slave address does not match that set on Parameter P.28 (Slave Address), then the rest of the message is ignored and the error checking routines are not performed. The above mentioned setup problems usually result in the slave address not matching P.28, so the rest of the message is ignored and no fault indication given. Sometimes these setup errors cause the generation a Fault Code that may not reflect the root of the problem.

- The register 40001 is intended to be a **Common Alarm register**. If, for example, it is desired that a Control Panel Intrusion activate a common alarm, then a Discrete Input must be programmed for use as Telemetry A, B, C, or D, and the door switch connected to that Discrete Input. Then register 40001 should be monitored. A value of zero in register 40001 means no alarm, and a non-zero value means there is an alarm.

- To **Disable a Pump** set coil 149, 150, or 151 in register 40010. To return a pump to normal operation, clear the respective coil. Upon a loss of serial communication, the Pump Disable Logic will be automatically reset, and any pump that had been remotely disabled will be re-enabled after the delay set on Parameter P.38. For this feature to work properly, the master must poll the controller at intervals shorter than the time set on Parameter P.38.

- To **Force a Pump On** set coil 17, 18, or 19 in register 40002. To return the pump to normal operation, clear the respective coil. Upon a loss of serial communication, the Force Pump On Logic will be automatically reset, and any pump that had been remotely forced on will be turned off after the delay set on Parameter P.38. For this feature to work properly, the master must poll the controller at intervals shorter than the time set on Parameter P.38.

- The **Pump 1, 2, 3 Fault** alarm telemetry on register 40001 coil 3, 4, & 5 (and on register 40009 coil 131, 132, & 133) are generated by the closure of Discrete Inputs programmed for those functions. The inputs programmed for this function perform no control function inside the controller; they only provide telemetry. Even though they are labeled Pump 1, 2, 3 Fault alarms they may be used as general-purpose telemetry.

- The **Pump 1, 2, 3 Called** telemetry on register 40010 coil 145, 146, & 147 are generated inside the controller when it calls a pump to run. Whereas the **Pump 1, 2, 3 Running** telemetry on register 40008 coil 113, 114, & 115 require the closure of Discrete Inputs programmed for those functions. Discrete Inputs programmed for Pump 1, 2, 3 Running perform no control function inside the controller; they only provide telemetry.

- **High Level Telemetry:**

  The **High Level Alarm** is generated from a comparison of the displayed Level with the High Level alarm setting. This alarm works when Parameter F.19 is set on either 1 or 2. The status of this alarm may be read from coil 129 in register 40009. This alarm will also make coil 1 in register 40001 equal 1.

  The **High Float Alarm** is generated by the closure a float switch connected to a discrete input programmed for either function 12 or 29. The status of this alarm may be read from coil 120 in register 40008. This alarm will also make coil 1 in register 40001 equal 1.

  The **Probe Backup High Level Alarm** is generated when liquid covers the High Level Electrode of a Level Probe Input. Parameter b.06 must be setup with the number of the Level Probe Input used to read the High Level. This alarm is only used when the primary level input is a 4-20mA input from a transducer (Parameter F.19 = 1), and a Level Probe is used for backup. This alarm will also make coil 1 in register 40001 equal 1.

- **Low Level Telemetry:**

  The **Low Level Alarm** is generated from a comparison of the displayed Level with the Low Level alarm setting. This alarm works when Parameter F.19 is set on either 1 or 2. The status of this alarm may be read from coil 130 in register 40009. This alarm will also make coil 2 in register 40001 equal 1.

  The **Low Float Alarm** is generated by the closure a float switch connected to a discrete input programmed for either function 11 or 24. The status of this alarm may be read from coil 128 in register 40008. This alarm will also make coil 2 in register 40001 equal 1.

  The **Probe Backup Low Level Alarm** is generated when liquid uncovers the Low Level Electrode of a Level Probe Input. Parameter b.01 must be setup with the number of the Level Probe Input used to read the Low Level. This alarm is only used when the primary level input is a 4-20mA input from a transducer (Parameter F.19 = 1), and a Level Probe is used for backup. This alarm will also make coil 2 in register 40001 equal 1.

- To force **Pump Alternation,** momentarily set coil 136 in register 40009. When alternation is to be regularly performed through the SCADA system, automatic alternation should be disabled. This is done by setting Parameter P.18 to equal 2.

- The **Forcing of the Lead Pump Position** may be accomplished by writing a 1,2 or 3 to register 40022. To return the alternation to normal, write a zero to register 40022. Setting register 40022 does not guarantee that the pump selected will be lead. If the pump selected as lead is disabled (by a pump disable discrete input), then the next available pump will be made lead. A lead pump selector switch connected to discrete inputs, programmed as sequence inputs, will also override what is written to register 40022. The contents of register 40022 may be viewed and changed from the front of the unit on parameter P.39. The content of register 40022 is saved during a power outage in the non-volatile memory. The actual lead pump position may be read from register 40023.

- **Fault Codes** from parameter FLC may be read from register 40047. The **Last Fault Code** (Data Parameter d.99) may be read from register 40048.

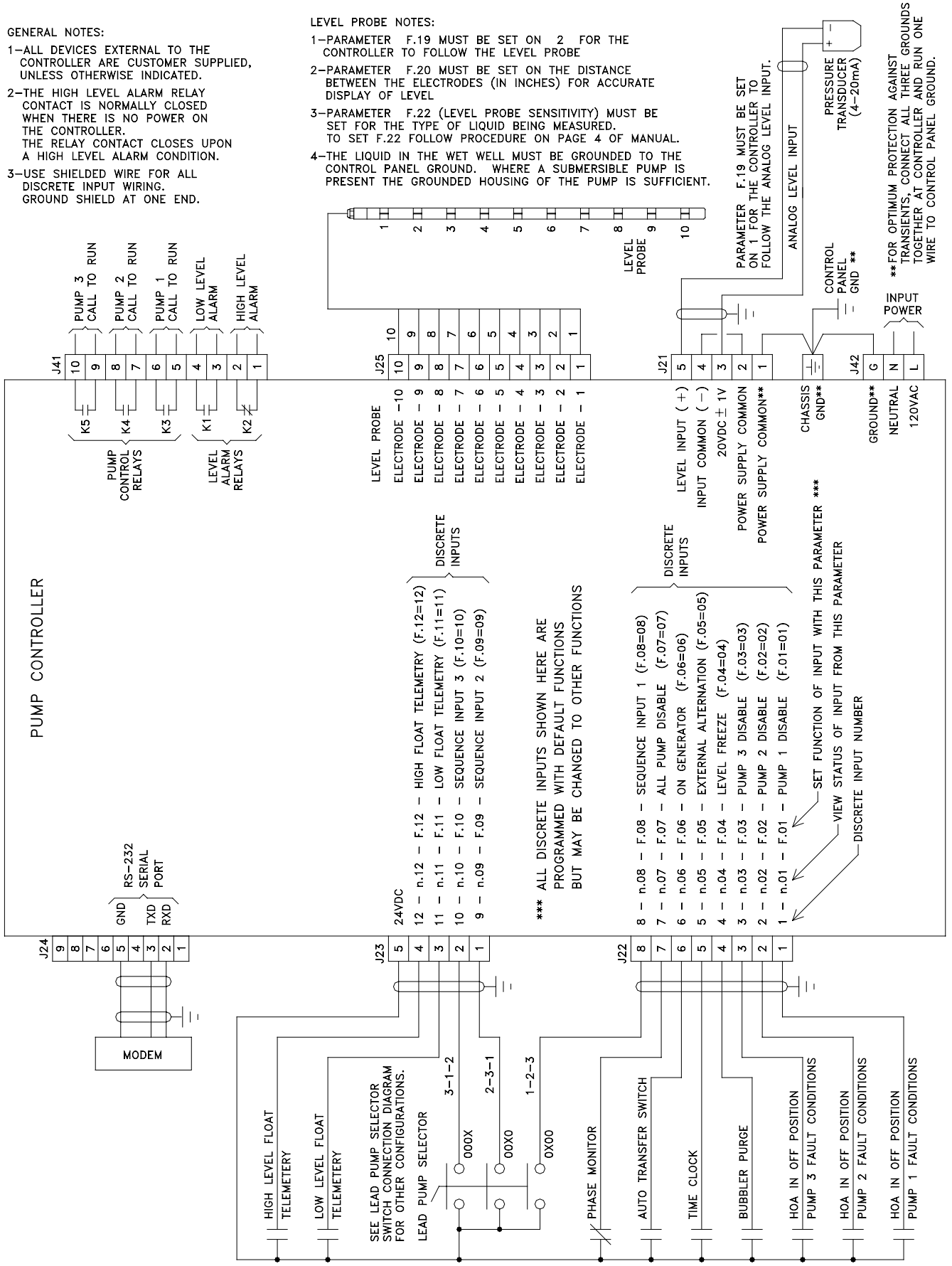
- **Wet Well Level** may be monitored by reading register 40011. The value will be just what is displayed on the front of the controller but with no decimal point.

- Individual **Level Probe Electrode Input Status** may be read from coils 583 – 592 in register 40037.

- **Pump On/Off Levels and High & Low Level Alarm** Parameter values may be viewed or changed through the SCADA system. See registers 40012 through 40021. The values will have no decimal point.

- **Pump 1-3 Elapsed Time Meters** may be read from registers 40003 – 40005. The values read from these registers are intended for use in comparing the pump run time of one pump with the run time of the other pumps at the station, for the purpose of checking for uneven run times. (Uneven run times is an indication of a maintenance problem with one of the pumps.) Periodically the comparison of run times should be made and the registers should reset to zero. The ETM data is stored in non-volatile memory just prior to a total loss of internal 5V power, so the data is not lost during a power outage. (However, if the serial port is being polled as a power outage occurs, the most recent data may occasionally be lost.) To reset one of the ETMs to zero, momentarily set the respective coil (21 – 23) in register 40002.

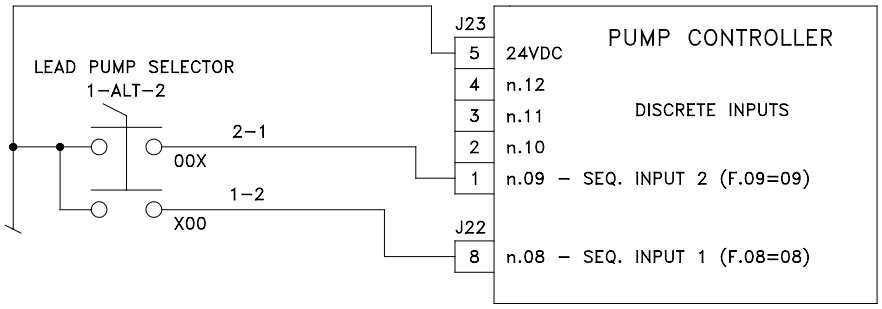
CONNECTION DIAGRAM



LEAD PUMP SELECTOR SWITCH - CONNECTION DIAGRAM

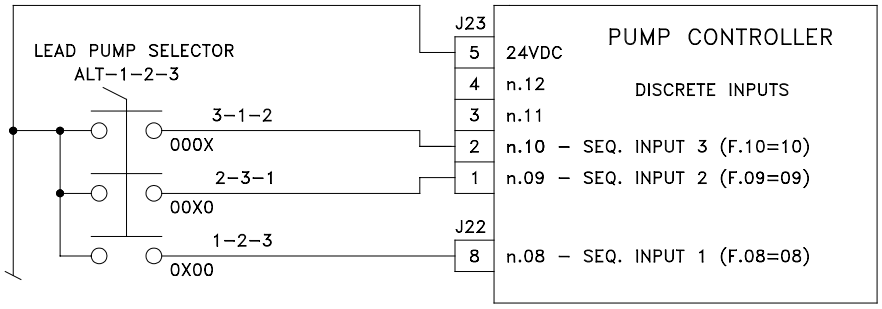
DUPLEX – STANDARD ALTERNATION

NUMBER OF PUMPS PRESENT: P.13 = 2
ALTERNATION SEQUENCE MODE: P.16 = 1



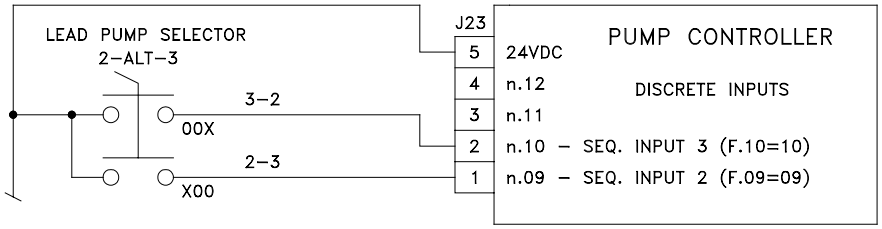
TRIPLEX – STANDARD ALTERNATION

NUMBER OF PUMPS PRESENT: P.13 = 3
ALTERNATION SEQUENCE MODE: P.16 = 1



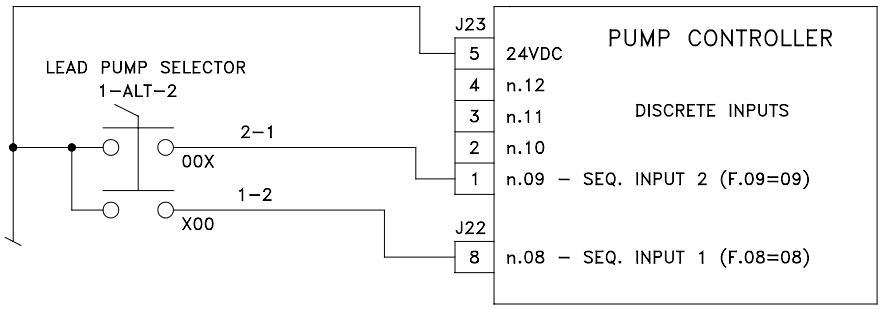
TRIPLEX – PUMP 1 ALWAYS LEAD – PUMPS 2 & 3 ALTERNATE

NUMBER OF PUMPS PRESENT: P.13 = 3
ALTERNATION SEQUENCE MODE: P.16 = 2 OR 3



TRIPLEX – PUMPS 1 & 2 ALTERNATE – PUMP 3 ALWAYS LAST

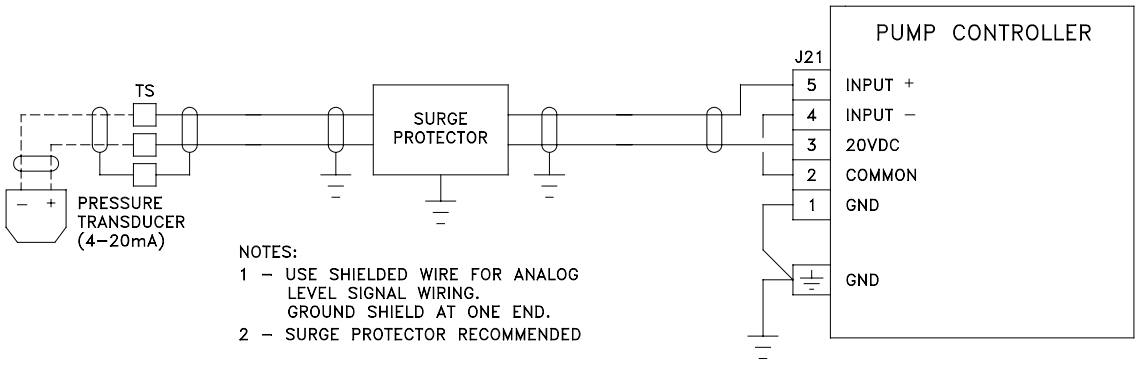
NUMBER OF PUMPS PRESENT: P.13 = 3
ALTERNATION SEQUENCE MODE: P.16 = 4



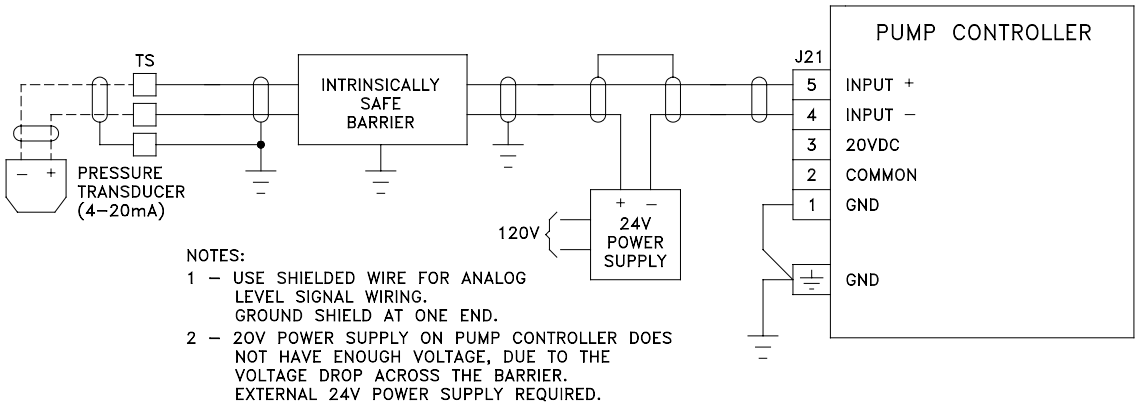
ANALOG LEVEL INPUT (4-20mA Input) - CONNECTION DIAGRAM

The Level Input Source (Parameter F.19) must be set on 1 for Controller to follow the Analog Level Input.

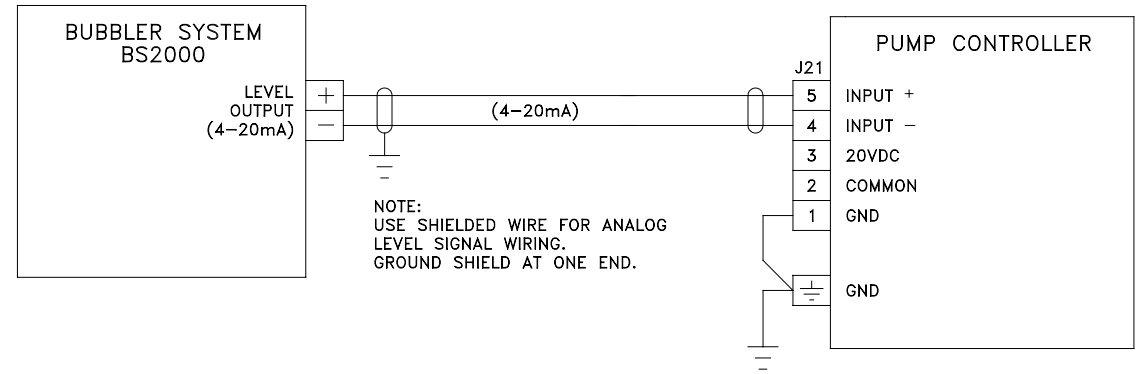
SUBMERSIBLE PRESSURE TRANSDUCER CONNECTION



SUBMERSIBLE PRESSURE TRANSDUCER CONNECTION WITH INTRINSICALLY SAFE BARRIER



BUBBLER SYSTEM BS2000 CONNECTION



LEVEL PROBE - CONNECTION DIAGRAM

NOTES:

1–INTRINSICALLY SAFE BARRIER IS OPTIONAL.

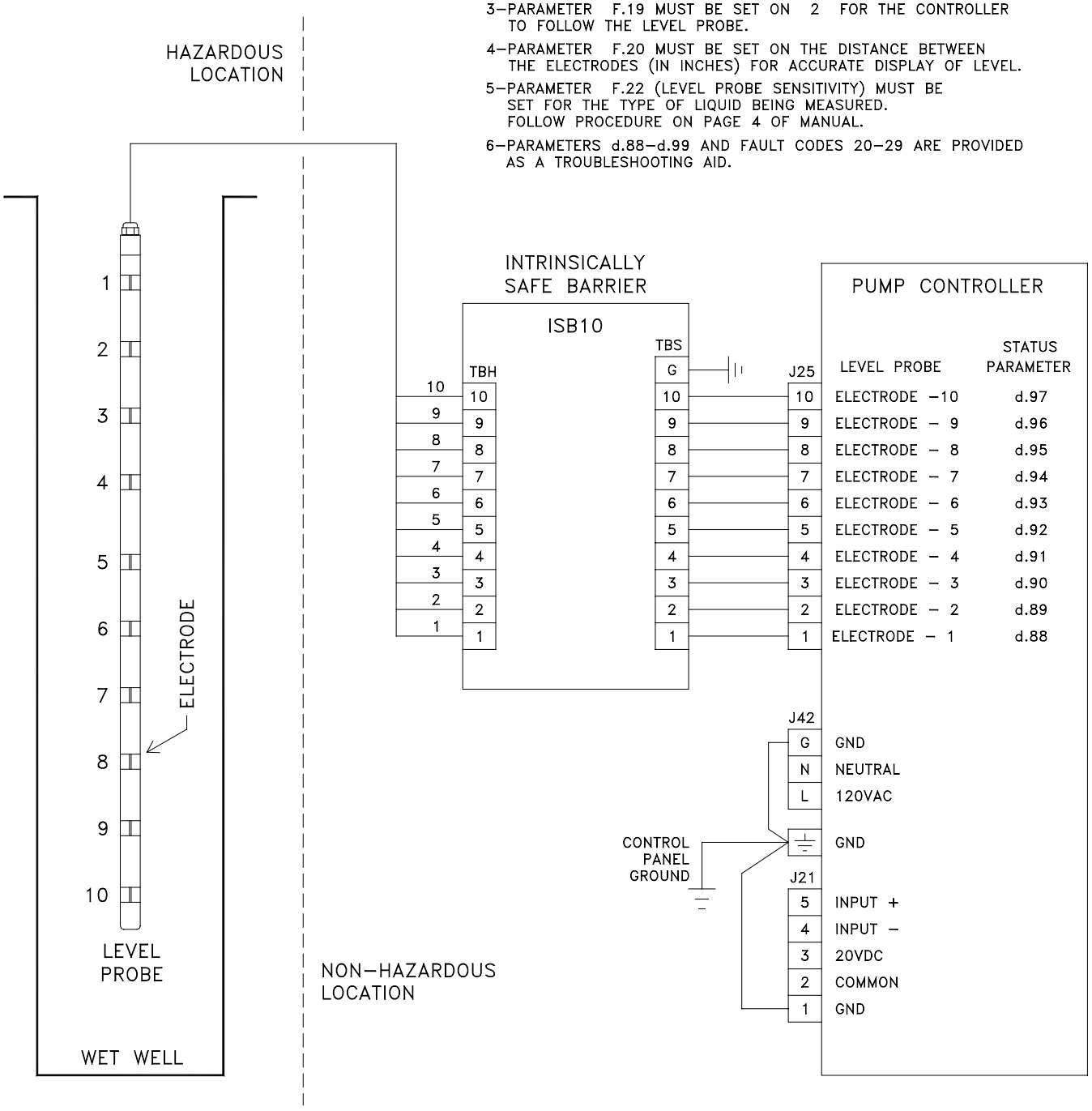
2–THE LIQUID IN THE WET WELL MUST BE GROUNDED TO THE CONTROL PANEL GROUND. WHERE A SUBMERSIBLE PUMP IS PRESENT THE GROUNDED HOUSING OF THE PUMP IS SUFFICIENT.

3–PARAMETER F.19 MUST BE SET ON 2 FOR THE CONTROLLER TO FOLLOW THE LEVEL PROBE.

4–PARAMETER F.20 MUST BE SET ON THE DISTANCE BETWEEN THE ELECTRODES (IN INCHES) FOR ACCURATE DISPLAY OF LEVEL.

5–PARAMETER F.22 (LEVEL PROBE SENSITIVITY) MUST BE SET FOR THE TYPE OF LIQUID BEING MEASURED. FOLLOW PROCEDURE ON PAGE 4 OF MANUAL.

6–PARAMETERS d.88–d.99 AND FAULT CODES 20–29 ARE PROVIDED AS A TROUBLESHOOTING AID.



LEVEL PROBE - PLACEMENT AND SETUP

LEVEL PROBE NOTES:

1–PARAMETER F.19 MUST BE SET ON 2 FOR THE CONTROLLER TO FOLLOW THE LEVEL PROBE.

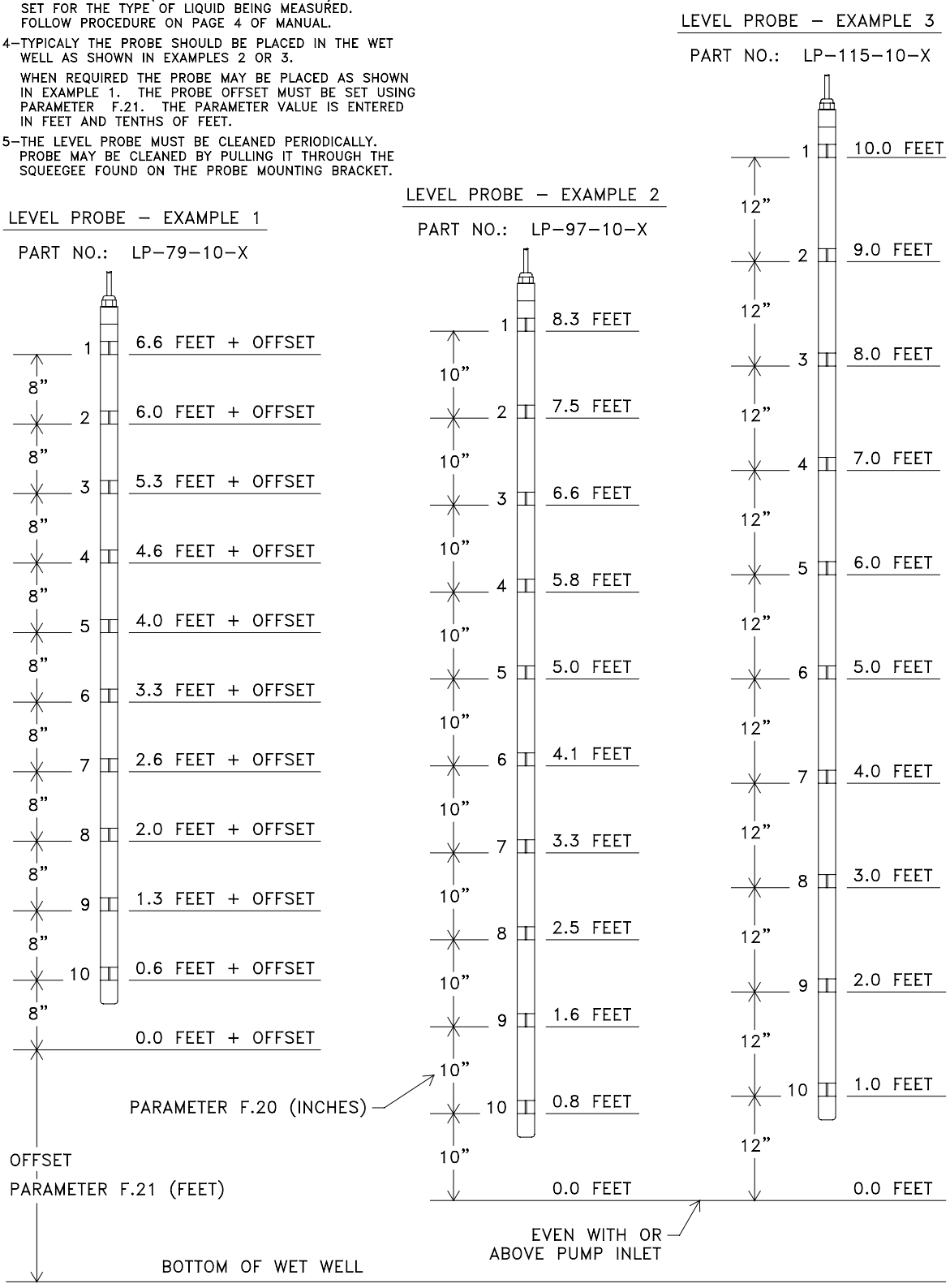
2–PARAMETER F.20 MUST BE SET ON THE DISTANCE BETWEEN THE ELECTRODES, IN INCHES, FOR ACCURATE DISPLAY OF LEVEL.

3–PARAMETER F.22 (LEVEL PROBE SENSITIVITY) MUST BE SET FOR THE TYPE OF LIQUID BEING MEASURED. FOLLOW PROCEDURE ON PAGE 4 OF MANUAL.

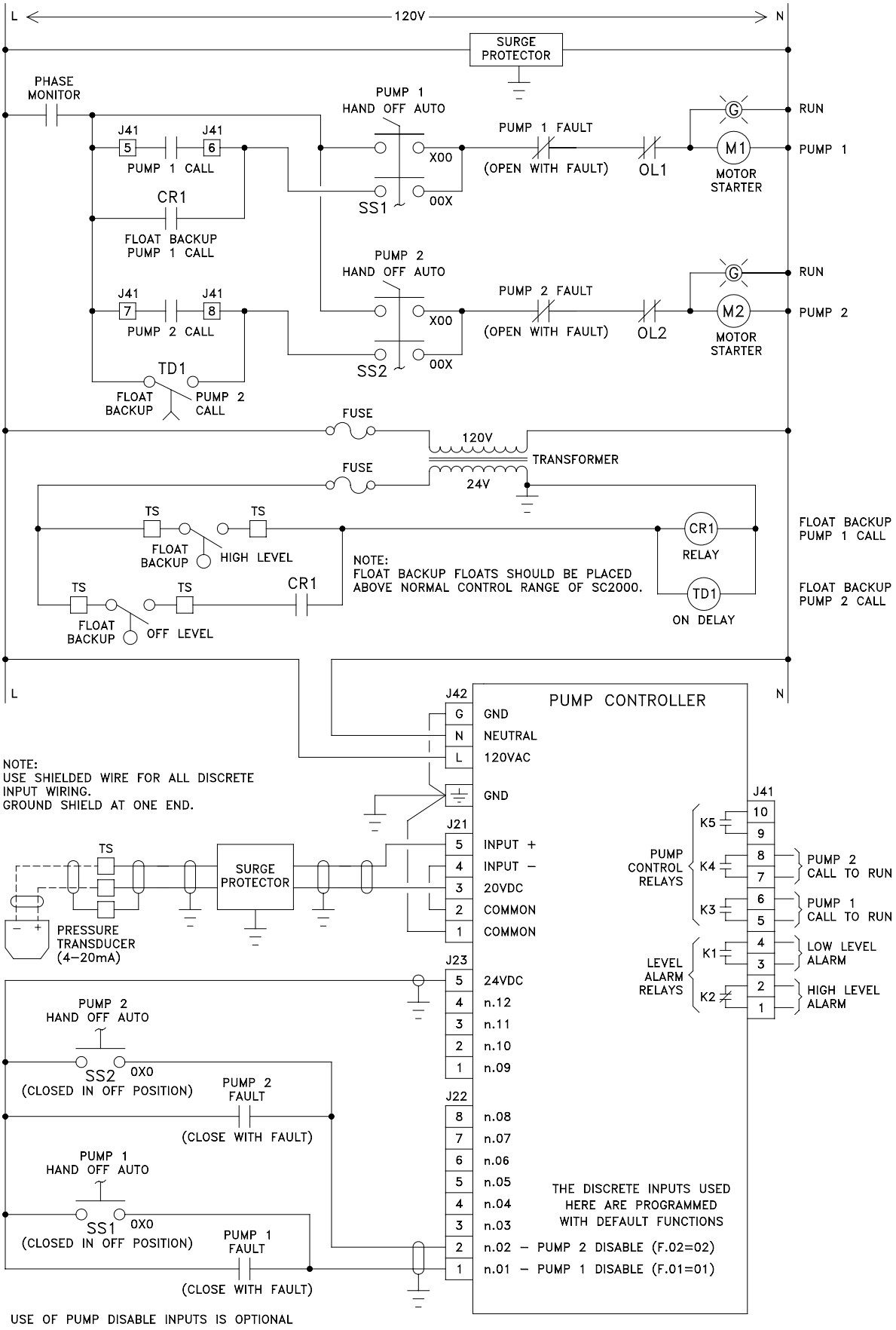
4–TYPICALY THE PROBE SHOULD BE PLACED IN THE WET WELL AS SHOWN IN EXAMPLES 2 OR 3.

WHEN REQUIRED THE PROBE MAY BE PLACED AS SHOWN IN EXAMPLE 1. THE PROBE OFFSET MUST BE SET USING PARAMETER F.21. THE PARAMETER VALUE IS ENTERED IN FEET AND TENTHS OF FEET.

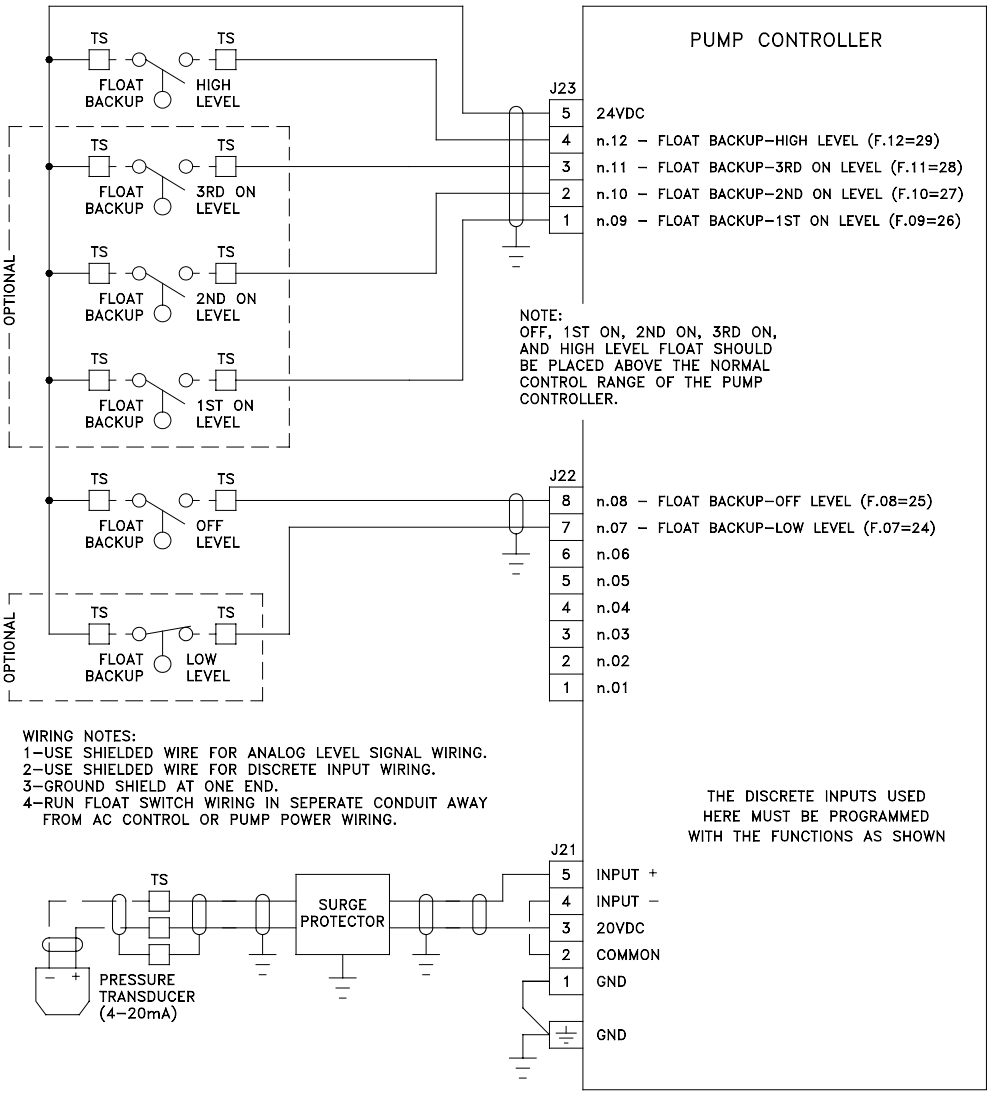
5–THE LEVEL PROBE MUST BE CLEANED PERIODICALLY. PROBE MAY BE CLEANED BY PULLING IT THROUGH THE SQUEEGEE FOUND ON THE PROBE MOUNTING BRACKET.



CONTROL SCHEMATIC EXAMPLE
DUPLEX – WITH 24V FLOAT BACKUP



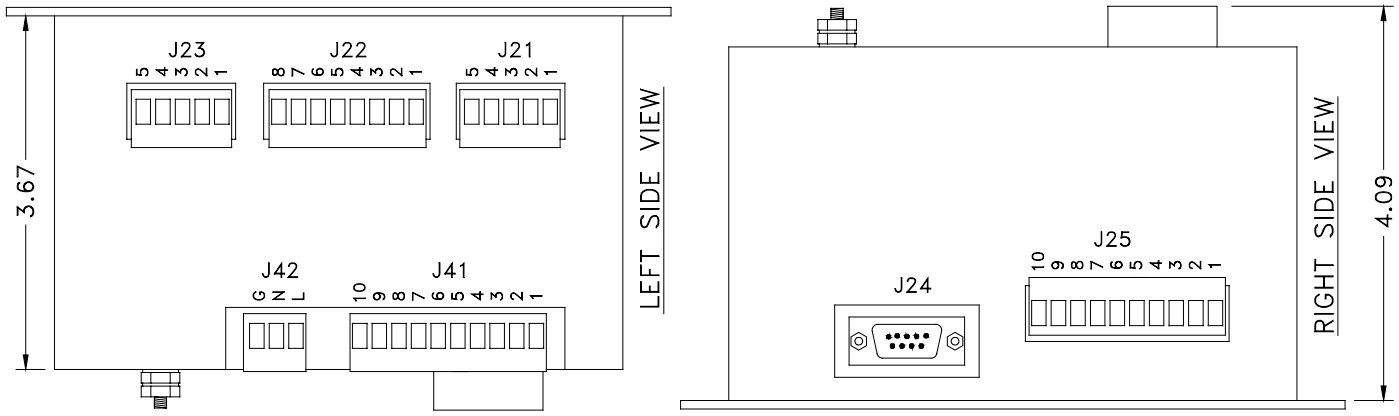
FLOAT BACKUP SYSTEM EXAMPLE - Pump Down



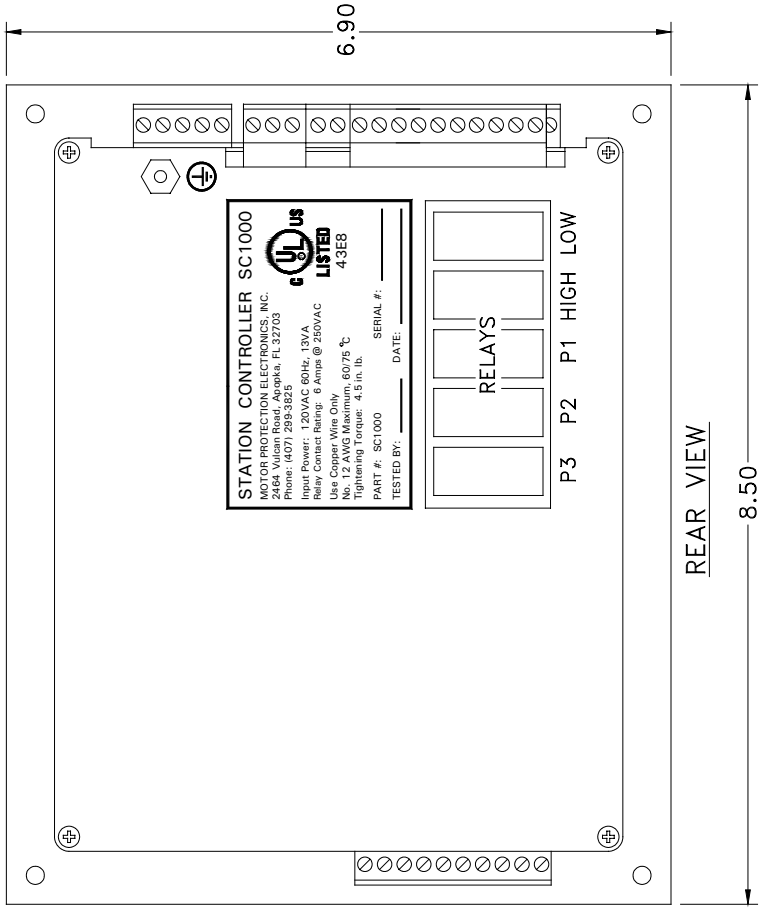
FLOAT BACKUP NOTES:

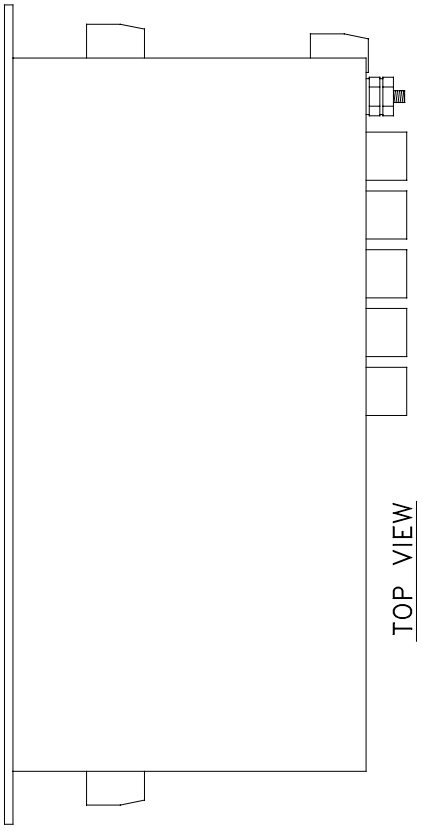
- **Pump Down Applications** (Parameter P.19 = 1)
  Two Float Backup - A simple two float backup system can be made using an Off float and a High float.
  High Level Input - Closure of the Float Backup High Level input will cause all pumps to be called to run, provided the Off float input is closed. The Discrete Input used for the High Level must be set on Function 29.
  Low Level input - Closure of the Low Level input will disable all pump operation. When the Low Float input opens, a delay prevents the immediate calling of the pumps. This delay is set on Parameter P37.
  Float Type - For Pump Down applications the Off, 1st , 2nd , 3rd On, and High floats must be normally open float switches that close as the level rises above the float. The Low Level float must close as the level drops below the float.
- **Pump Up Applications** (Parameter P.19 = 2)
  Two Float Backup - A simple two float backup system can be made using an Off float and a Low float.
  Low Level Input - Closure of the Float Backup Low Level input will cause all pumps to be called to run, provided the Off float input is closed. The Discrete Input used for the Low Level must be set on Function 24.
  High Level Input - Closure of the High Level Float Switch will disable all pump operation. When the High Float input opens, a delay prevents the immediate calling of the pumps. This delay is set on Parameter P37.
  Float Type - For Pump Up applications the Low, Off, 1st , 2nd , and 3rd On floats must be normally closed float switches that close as the level drops below the float. The High Level float must close as the level rises above the float.
- **The FAULT light** comes on and **Fault Code 16** is generated, when a pump is called to run by the Float Backup system.
- **Bubbler System Failure Input** - If a contact is provided that indicates that the analog level input is unreliable, then the contact may be used to disable normal pump operation. The contact must be connected to a Discrete Input programmed for Function 23. When the Discrete Input is closed the Float Backup will be in full control of the pumps. However, the analog level input can still cause High Level and Low Level alarms. Also, closure of this input will cause the FAULT light to come on and Fault Code 15 to be generated.

ENCLOSURE MECHANICAL LAYOUT



NOTE:
ALL DIMENSIONS ARE IN INCHES.





PANEL CUTOUT