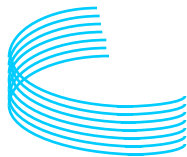


**PSM-660
PUMP STATION
FLOW MONITOR
CONTROLLER**

INSTRUCTION MANUAL



Ship To:



Via UPS

CONTROL ELECTRONICS, INC.

148 Brandamore Road
Brandamore, PA 19316

Mail To:



CONTROL ELECTRONICS, INC.

P.O. Box 330
Brandamore, PA 19316

Tel: (610) 942-3190

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<http://www.controlelectronics.com> e-mail: cei@controlelectronics.com

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... Please read first before installing flow meter.

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PSM-660 Specifications

Electronics

Power Requirements:	120/220 VAC, $\pm 15\%$, 50/60 Hz 12-24 VDC @ 15W max.
Temperature:	30°F to 120°F (-5°F with opt. heater)
Display:	2 line x 20 character, Alphanumeric, LCD with LED backlighting
Totalizer:	8 digit accumulative with programmable multiplier. x1, x10, x100, x1000 31 daily, 8 digit totalizers
Outputs:	0-10 VDC adjustable, 4-20 mA isolated into 1000 ohms, RS-232, Modem opt, 4 relay outputs - 1 Alarm and 3 Control, SPDT 7A/250 VAC form C
Flow Range:	0 - 100,000 GPM
Resolution:	0.1 GAL/MIN
Accuracy:	± 1.0 second run time, $\pm 0.1\%$ Calculation error
Memory:	Non-volatile RAM, Flash
Data Log:	31 Day Summary, 10 Day Detailed Summary.

Enclosure

Material:	Fiberglass with clear hinged Polycarbonate cover.
Rating:	NEMA 4X, IP65, Water-Tight, Dust-Tight Corrosion-Resistant: CSA, UL listed
Dimensions:	7.2"x11.8"x6.8": mounting 4.92"x12.3" with stainless steel mounting feet

Inputs

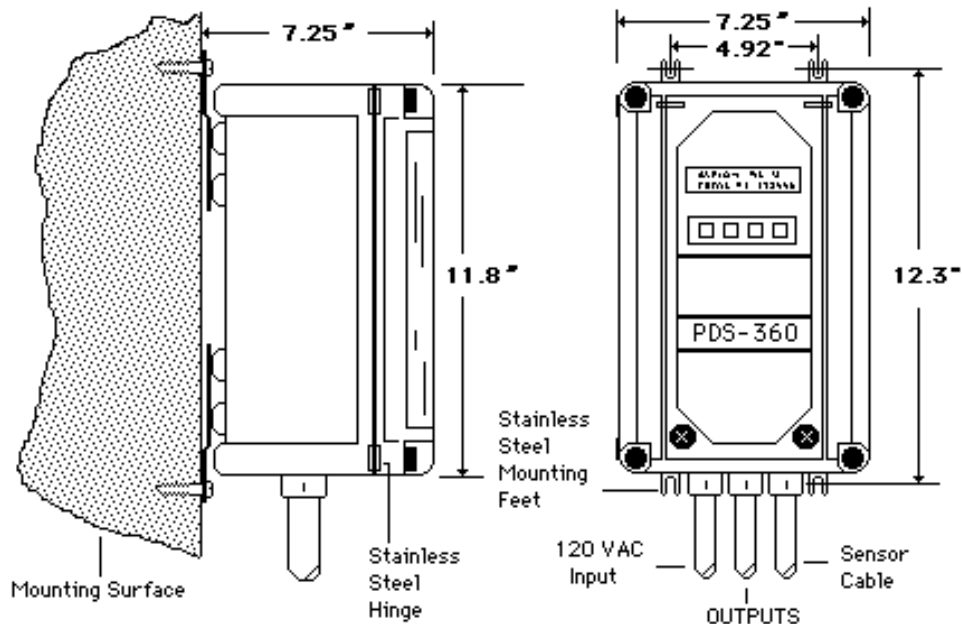
Floats, Contact Closures (optically coupled)
4-20 mA, 0-5/0-10 VDC continuous

Options

FLT-3W floats (NO/NC contacts), External Modem,
Heater/Thermostat

Warranty: The PSM-660 system is pretested and quality
control inspected before shipping. Warranty is against defec
in parts and workmanship for a period of 1(one) year.

Specifications and design subject to change without notice.
Made in USA



Enclosure Dimensions

Repair Policy: All repairs are performed on our premises. Repairs must be sent to Control Electronics by UPS prepaid. Customer must enclose a description of problem, who to contact, phone number, return ship-to address and **purchase order number** to cover repairs. Delay of repair may occur if information is not provided. No ARM number is required.

Repair Cost: Most repairs are processed within 48 hours unless major repair is required. Minimal repair charge is \$ 150.00 plus shipping. This covers most repairs. If repair exceeds \$ 150.00, we will notify the customer before we proceed. Payment is COD or Credit Card only unless other arrangements are made.



Warranty repairs are made at our discretion and returned UPS GROUND at our expense.

Return Policy: Control Electronics will accept 'return of product' for credit within 6 months of shipping date if it is determined that the product is not performing to specification as described in Product Performance statement in this manual (provided application is not the cause of problem). We do not accept returns for credit when the application is the source of the problem (i.e. poorly installed flumes, poor piping arrangements, interference from other equipment etc.) , product is misapplied or not used properly and/or if product is out of warranty (12 months from ship date).

(within 6 months) A **35% restocking charge** will be applied if product is returned for credit after 6 months from ship date. (7 to 12th month from shipping date).

Control Electronics does not accept returns of options such as circular recorders and other products not manufactured by Control electronics, Inc.

Control Electronics will not accept returns of used Sensors, cables, or spare parts unless shown to be defective under warranty or not performing as specified.

Any credit issued will be at the discretion of Control Electronics, Inc. Warranty of product is limited only to the repair or replacement (with same model) of defective product.

Any product or part of product returned damaged will not be considered for any credit.

Customer must call for authorization before returning product for credit. Products returned for credit will not be considered without prior authorization.

A description of how it was determined that the product was not performing to specification must accompany the return of the product for our evaluation before Control Electronics will consider any credit. The name of who to contact along with phone number should also be included with the return.

Ship To Adress: All repairs or returns must be shipped prepaid via UPS or equal to: Control Electronics, Inc., 148 Brandamore Rd., Brandamore, PA 19316

CONTROL ELECTRONICS, INC.

PSM-660 Product Performance

Control Electronics PSM-660 Series will perform as specified when tested under known, simulated conditions. All PSM-660's are tested for full functionality and performance before shipping.

The *accuracy* of the product is determined by inputting known elevation points and monitoring its ability to process the information accurately. Specifications for the product are determined by this method.

The *accuracy* of the product is not determined by wet-well draw-down test, pump curve charts etc. Such test indicate the accuracy of the over-all application/installation of floats, elevation measurements, displaced liquid by hardware etc., not just that of the product. Such tests are not acceptable as an indication of 'product(s) accuracy'. However, draw-down test etc. can be used to determine if the calibration of the product should be changed to compensate for application and installation conditions. This should only be done if no other application or installation corrections can be initiated to correct the problem.

Some equipment such as variable speed drives, nearby radio transmitters (i.e.: radio dispatch or hand held transmitters) etc. located next to the product or even at times in adjacent rooms may interfere with the products performance. The worst of these is usually the variable speed drive controllers. This type of equipment generates large amounts of electrical and RF (radio frequency) noise that can interfere with the products processing of data and may cause a software crash. Relocation of the product or different electrical grounding attempts may minimize or eliminate the interference. Ultimately, it is up to the user to make the corrections necessary and require that the product that is causing the interference be corrected.

If you have any questions in regards to product performance, please contact Control Electronics at (610) 942-3190 or fax us with application conditions and questions at (610) 942-3672. You may also e-mail us at: cei@controlelectronics.com .

CONTROL ELECTRONICS, INC.

PRODUCT WARRANTY

WARRANTY:

Control Electronics, Inc. warrants to the buyer that its products are free from defects in materials and workmanship at the time of shipment and during the WARRANTY PERIOD. Control Electronics, Inc. obligation under this warranty is limited to the replacement of the product(s) by same product(s) manufactured by Control Electronics, Inc. or repair of the product(s) at the Control Electronics, Inc. facility. Control Electronics, Inc. products are sold with the understanding that the buyer has determined the applicability of the product(s) to its intended use. It is the responsibility of the buyer to verify acceptability of performance to the actual conditions of use. Performance may vary depending upon these actual conditions.

This Warranty is in lieu of any other warranty, expressed or implied. This includes, but is not limited to, any implied warranty of fitness for a particular purpose, or other obligations or liabilities on the part of Control Electronics, Inc. Under no circumstances will Control Electronics, Inc. be liable for any loss, damage, expense, or consequential damages of any kind arising in connection with the use, or inability for use, of Control Electronics, Inc. products.

WARRANTY PERIOD:

This warranty is in effect for twelve (12) months from the date of shipment from Control Electronics, Inc. place of business. Any extension of warranty period must be requested at time of purchase and made part of purchase order.

LIMITATIONS:

Control Electronics, Inc. products must be installed and maintained in accordance with Control Electronics, Inc. published instructions. Users are responsible for the suitability of the product(s) to their application. There is no warranty against damage resulting from corrosion, misapplication, improper specification, improper installation or any conditions beyond the control of Control Electronics, Inc. Claims against carriers for damage in transit must be filed by the buyer. Control Electronics, Inc. is not liable for labor costs incurred in removal, reinstallation, or unauthorized repair of its product(s). Control Electronics, Inc. warranty does not cover travel time or expenses for job site service. Requests for field service must be accompanied by a signed purchase order. Travel time and expenses will be charged to this purchase order, along with service time if the cause of the failure is not covered by the warranty. No service will be performed on any product(s) unless full payment has been made for product(s).

WARRANTY CLAIM:

If Control Electronics, Inc. products are found to be defective in materials or workmanship within twelve (12) months of the date of shipment, they will be repaired or replaced with same product at the discretion of Control Electronics, Inc. at its place of business at no charge to the buyer. The defective product(s) must be sent, freight prepaid, to the ship-to address on the front page of this manual for warranty claim. All claims must be made in writing. Enclose a brief description of problem, person to contact, phone number and return ship-to address. Product(s) received without this information may not be processed on a timely basis.

If warranty and/or product(s) is not acceptable to buyer, please contact Control Electronics, Inc. and/or return product(s) unused for credit. This action must be made within 60 days from ship date from Control Electronics, Inc. Installation of product(s) or non-response within 60 day period indicates the buyers acceptance of product(s) and above warranty.

INTRODUCTION

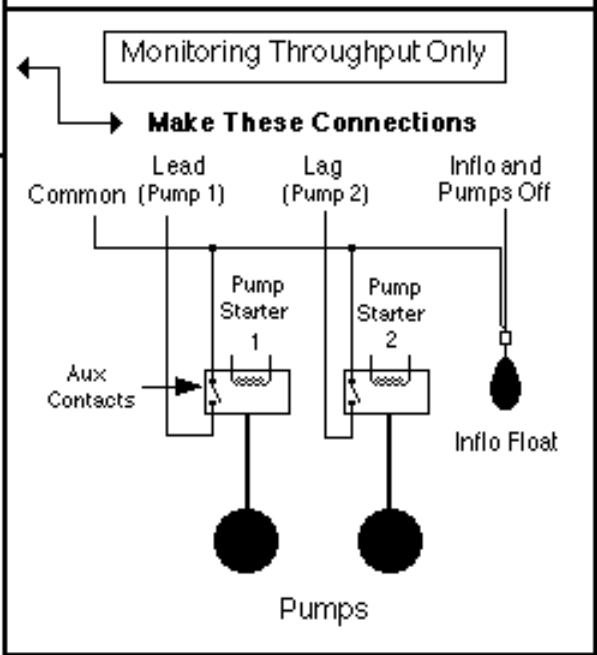
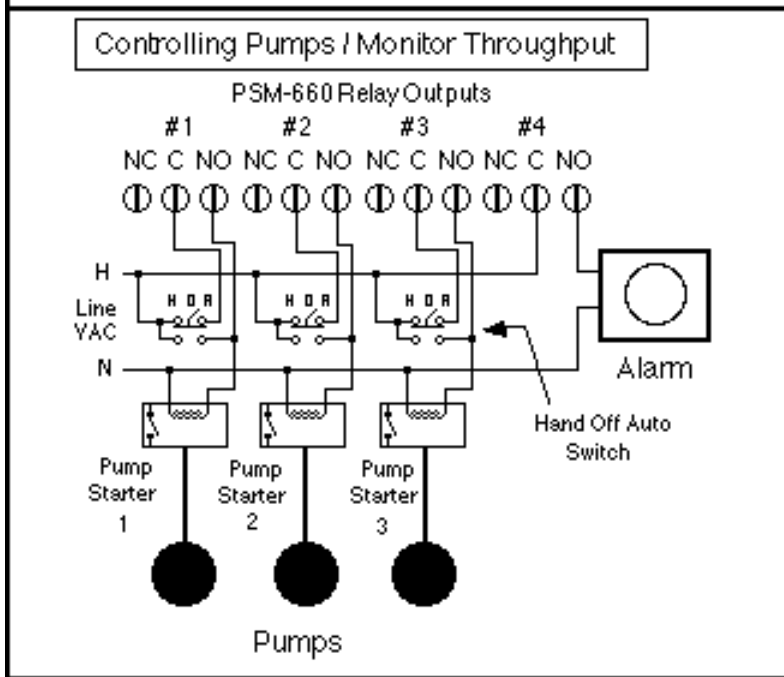
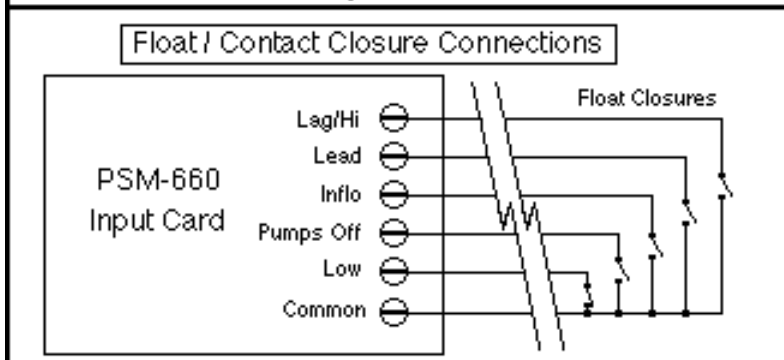
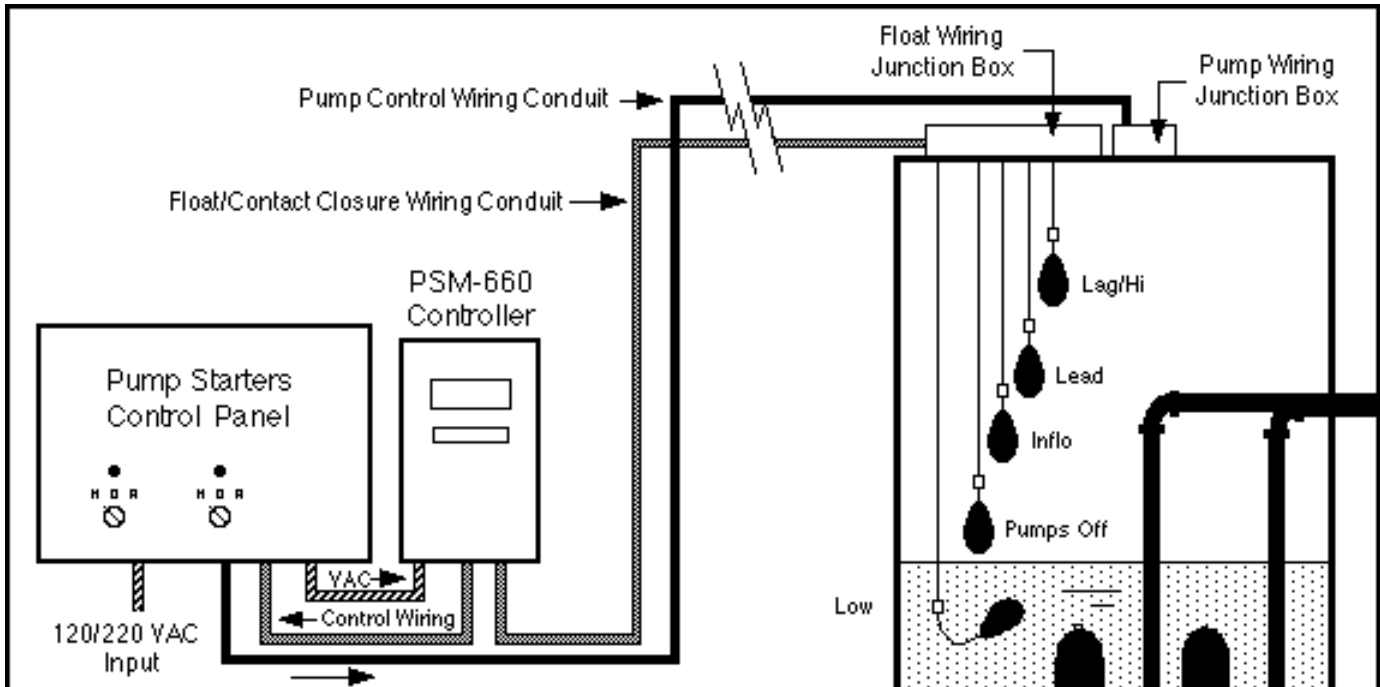
Control Electronics model PSM-660 Pump Station Monitor Controller is a microprocessor based system, designed to control up to 3 pumps with sequence and alternating capabilities and also to accurately measure liquid flow throughput in a wet well/lift station application. The system monitors floats or auxiliary control contacts to control the pumps and calculate the volume throughput.

The PSM-660 Monitor has been designed with the user in mind, allowing for simple, intuitive set-up through a menu driven programming interface. The operator enters dimensions of the wet well and pump ON/OFF elevation points to calculate a known volume to be pumped from the wet well. With the addition of an intermediate float switch/elevation point, the flow monitor will calculate the inflow GPM, using its accurate time base, just prior to the start of the pump cycle. The inflow value is then applied to the known volume pumped in calculating the total volume throughput for the pump cycle. The final accuracy of the PSM-660 is equal to a precise 'draw-down' test performed on each pump cycle. The Monitor may also be programmed to compensate for displaced liquid volume caused by piping and other hardware in the wet well.

All PSM-660 circuits are protected in a NEMA 4 X, IP65 corrosion resistant fiberglass enclosure with a clear polycarbonate hinged cover for easy viewing of flow and programmed data.

After installing the Pump Station Monitor, the operator will find the PSM-660 Flowchart in the back of this manual extremely helpful in navigating through the many options and features of the system.

With proper understanding of how the Pump Monitor works and its' successful installation, the PSM-660 will provide the user with many years of continuous, reliable operation.



PSM-660 General Overview

INSTALLATION

The PSM-660 Pump Monitoring system is easy to install. Adherence to all installation instructions will result in successful operation of your system. If any deviation must be made from the prescribed installation procedures, please call our service department for change approval. Failure to install your system properly could lead to operational problems and become costly if a service technician is required on-site to remedy. We suggest you read the entire manual to familiarize yourself with the equipment before installing.

1. Enclosure Location

The PSM-660 electronic controller is housed in a NEMA 4X, IP65 fiberglass enclosure. This enclosure is rated as being water-tight, dust-tight and corrosion resistant. However, care should be taken in selecting a location that will offer protection from rain, chemical spills, extreme temperatures etc.

The electronics enclosure is suitable for outdoor installation, but it is recommended that the enclosure be mounted indoors or in a fiberglass shed located next to the measuring site. If the instrument has to be located outdoors, provisions must be made to maintain a temperature range between 30°F and 120°F within the enclosure. For cold locations, our optional Heater and Thermostat should be purchased. This option can be installed at any time by the user. The enclosure should also be mounted away from direct sunlight or a sun shade should be provided.

Important

On a hot day, direct sun light could damage the LCD display and raise the internal temperature of the enclosure well above ambient temperature causing malfunction and/or possible damage to the unit. Use a sun shade if direct sun light can not be avoided.

The PSM-660 Electronics requires a 120/220 VAC power source. Though the PSM-660 Monitor is designed to tolerate external electrical interference you should avoid installation in locations near equipment that may be electrically noisy or instruments that generate R.F. (radio frequency) noise such as SCR controlled equipment (i.e. variable speed controllers).

The enclosure must be located so float wiring or auxiliary contact closure connecting points are accessible to the PSM-660. The inputs to the PSM-660 are low voltage, opto-isolated inputs. Float and contact closures must be non-powered and used only by the PSM-660.

Optional Floats

The Float locations in the wet well is the most important consideration for proper operation of your Pump Monitor. The Floats (either existing or new) should be located in the wet well away from the fill pipe and its drop splash and hardware that may entangle them. The floats should be suspended from or attached to supports securely. Different methods of supporting the floats are possible and it is up to the user to choose the best method for their application.

The elevations of the floats should be known as precisely as possible. It is best to know the elevation at which they activate, not necessarily their 'free-hanging' elevations. Calibration inaccuracies may arise from incorrect measurement of float elevations. Elevation points will be needed for programming the PSM-660 Monitor later.

Hard to reach areas should be avoided. A water-tight junction box should be provided at the top of the wet well that is easily accessible for wire connections to the floats.

When Monitoring Throughput ONLY



The PSM-660 may be connected to the pump starter(s) auxiliary contact closures or auxiliary contact closure that addresses the alternator if the system is only to monitor 'volume throughput' in the wet well, i.e. the PSM-660 is not controlling the pumps. This allows the PSM-660 to monitor the volume pumped from the wet well while another system controls the operation of the pumps.

2. Mounting



Once a suitable location has been selected for the controller, carefully screw mount the enclosure as shown in figure 2. Be sure to leave room for conduit entrance to the enclosure as shown. All conduits and wiring must enter through the bottom of the enclosure. Do not enter through the top. This could cause possible water damage if the enclosure is rained on or hosed down. When punching holes in the enclosure for conduit entrance, protect the electronics circuit card from damage. Hole punches, not drill bits, are recommended for making holes.

IMPORTANT



AC power is required and should enter through its own conduit (not required if supplied with optional AC power cord). Output control wires should exit the enclosure through a separate conduit. All conduit entrances must be made water-tight to maintain the NEMA 4X rating. This may include plugging the conduit with electrician's putty to prevent gas and condensation migration. Failure to make water-tight entrances may void warranty.

FLOATS

Proper mounting of the floats (if installing new floats) is important in achieving satisfactory performance from your Pump Monitor. It is necessary that the floats are securely mounted so they will not unknowingly slip, changing the floats active elevation point. Avoid crowded areas in the wet well so the floats do not tangle up with other floats or hardware. Do not allow the fill pipe to the wet well empty onto the floats. This will cause serious problems in performance.

Measure the floats active elevation points accurately. You will need this information for programming the Pump Monitor.

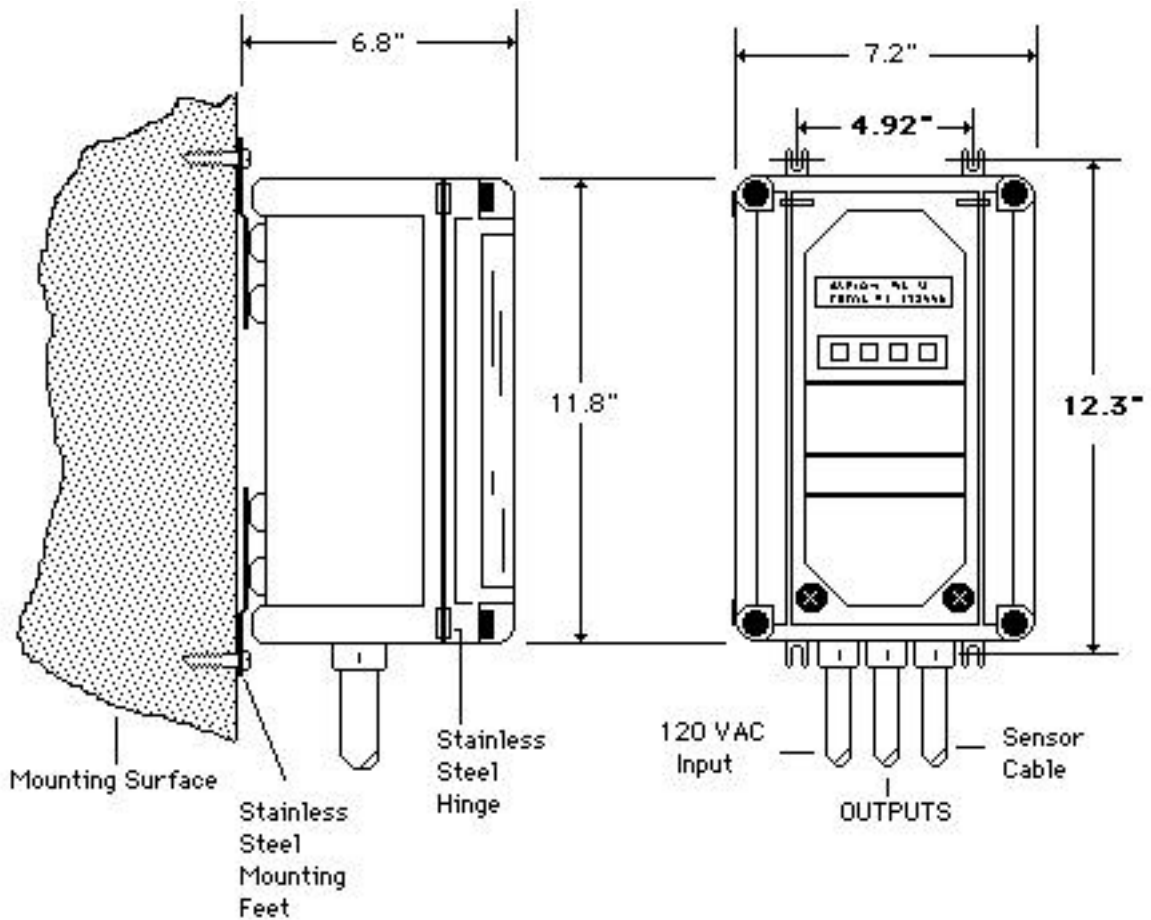


Figure 2.

3. ELECTRICAL CONNECTIONS

FLOATS

All float electrical connections should be made with wire nuts and electrical tape. All splices should be in a clean, dry junction box that is easily accessible at the top of the wet well. Wiring should be pulled through a conduit back to the PSM-660 controller. Wire size need be only 16 gauge or smaller. The input card operates with low voltage and current. Connections of the floats should be made to the input card as per type of control you are expecting the PSM-660 to do. Refer to PSM-660 Input Card wiring diagrams.

When Monitoring Throughput ONLY



NOTE: if you are using the PSM-660 to monitor volume throughput only, you will need only to install one float or use an existing spare float. Remaining connections will be made to a spare pump starter auxiliary contact closure or auxiliary contact closure for alternator input. If no auxiliary closure is available, it may be necessary to provide a relay in parallel with the pump starter or alternator input to provide the extra contact closure.

AC INPUT

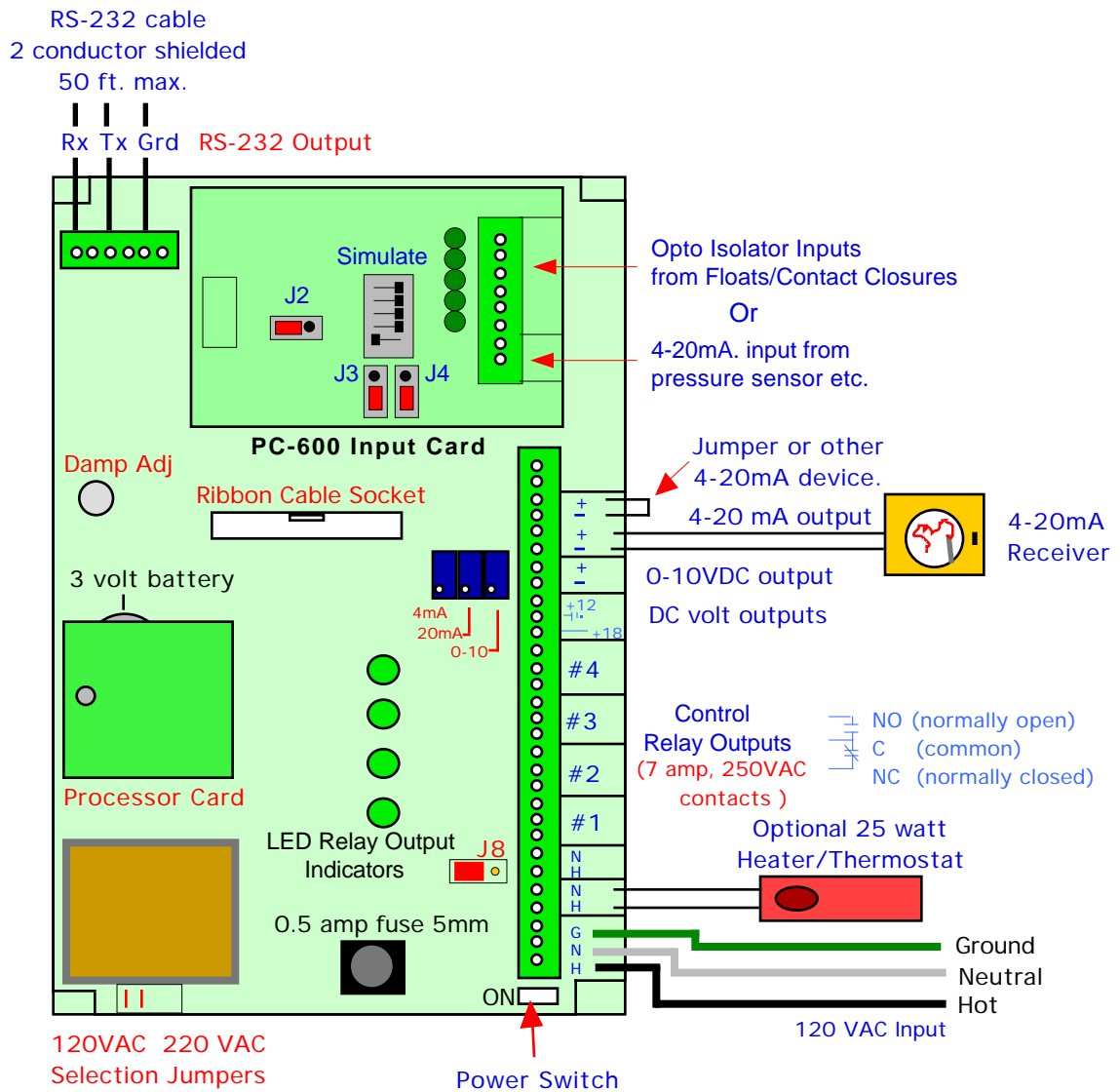
120 VAC power (220 VAC if jumper selection is made for 220 VAC operation. See circuit board diagram for jumper location) must enter through the bottom side of the enclosure in its own conduit. Connect AC

power to the terminal barrier strip at the bottom right of the electronics card marked 120 VAC INPUT. **DO NOT** allow the AC wires to lay all about in the enclosure. 14 gauge wire is preferred over a heavier wire that may place unnecessary stress on the terminal barrier strip

HEATER This output provides a switched 120 VAC power to the optional heater/thermostat for cold climates. Note: 220 VAC heater is not available. Do not connect optional heater if 220 VAC operation is used.

AC OUT This output provides a switched VAC power to control an external recorder or other device that operates in conjunction with the meter.

Note: the PSM-660 uses a .5 amp fuse. It may be necessary to increase fuse rating to 1 amp to accommodate external devices. Max rating should not exceed 3 amps.



PSM-660 Wiring

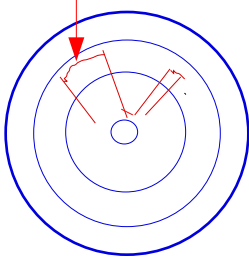
0-10VDC OUTPUT

The 0-10VDC output is used to drive Voltage Meters, Setpoint Controls, etc. Connection is made on the terminal barrier marked '-' and '+' on the right hand edge of the circuit board (terminal barrier TB1). There should never be less than 200 ohms between the '+' and '-' terminal or the output may be damaged. Use the 0-10VDC adjustment for output scaling such as 0-5 VDC or 0-1mA out etc.

4-20mA. OUTPUT

The 4-20mA. analog output signal is a FLOATING output (both the '+' and '-' terminals have their potential above system ground) and is DC isolated.

This cycles RUN TIME
Previous cycles GPM



Circular Chart

Polarity must be observed through the entire control loop for proper operation. Maximum load (loop resistance) is 1000 ohms with J8 jumper connected to 24 volt supply (600 ohms loop resistance otherwise).

Note: the Analog outputs (i.e. 4-20 mA output) indicates the previous pump cycles avg. GPM pump rate and the present (this cycles) RUN TIME. Reason is, the pump monitor does not know the pumping rate until the pump cycle is complete. So remember, when you analyze a circular chart recording, the information recorded is showing the GPM rate for the previous cycle but the 'pump run time' for this cycle.

Alarm# 1,2,3 Pump Control

Alarm 1, 2 and 3 are used to control pumps or other external devices. Alarm 1 is considered the LEAD pump control, Alarm 2 is LAG 1 and Alarm 3 is LAG 2/HI. The sequence order can be modified in the programming so Alarm 2 is made the LEAD pump control etc. The assigned LEAD and LAG 1 outputs may also be programmed to alternate. LAG 2 is used to control a third pump and/or HIGH level alarm. The LAG 2 control will activate after the LEAD and LAG 1 are activated and remain activated for a duration programmed by the user. The system assumes a problem or HIGH level if the LEAD/LAG 1 pump cannot lower the liquid level.

Example: if the LEAD pump is ON and LAG 1 also turns ON because the level continues rising, the LAG 2 control will activate if the LEAD and LAG 1 pumps cannot lower the level within the programmed delay time. The third Alarm control is assuming that the LEAD and LAG 1 pumps cannot handle the rising level in the wet well or one or both pumps have failed. Alarm #3 control is typically used as HIGH alarm and /or LAG 2 pump control or both.

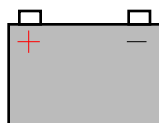
Alarm #4

Alarm #4 control output is used for alarm purposes. If any of the selected alarm conditions exist (HIGH Inflow Rate, Reduced Pumping Rate, Excessive Pump Run Time, LOW level), the alarm #4 control will activate and remain so until the alarm condition is corrected.

SHUT OFF

Not Used on the PSM-660 unless otherwise noted.

+12, ⏏ , UNREG DC Battery Operation



+12 VDC

These outputs/inputs provide DC power for optional accessories or allow for Battery operation of the monitor. A standard 12 volt car battery or gel cell battery (preferred) can be connected between the +12VDC and GROUND (⏏). Note: the power switch on the circuit board does not switch the battery supply nor is it fused. Power is applied as soon as the battery is connected. A 3 amp in-line fuse should be used between the plus (+) terminal of the battery and +12 VDC connection on the circuit board. The power supply on the circuit board should maintain a charge on the battery when AC power is also used.

ADJUSTMENTS AND CONTROLS

There are very few adjustments that can be made on the PSM-660 system. Do not attempt to make any if you do not understand their purpose. To do so may void your warranty and result in a costly service charge. See pages 6 and 10 for adjustment locations.

1. INPUT CARD

JUMPERS

The input card to the PSM-660 Monitor will accept FLOAT switches, relay contacts closures or analog 4-20 mA./0-10VDC type inputs. The user must configure the input card to the type inputs he/she will be using. Jumpers J2, 3 and 4 are used to configure the input. Place the jumper blocks for the following (see PSM-660 PC Card Input Connections, page 9, for reference):

1] FLOAT/CONTACT CLOSURE INPUT

- a] J2 to FLOAT
- b] J3 don't care
- c] J4 V-in10

2] 4-20 mA. INPUT

- a] J2 to Vin
- b] J3 to V-in5
- c] J4 4-20

3] 0-10 VDC INPUT

- a] J2 to Vin
- b] J3 to V-in10
- c] J4 to V-in10

4] 0-5 VDC INPUT

- a] J2 to Vin
- b] J3 to V-in5
- c] J4 to V-in10

When Programming the PSM-660 Pump Monitor, you will be asked 'what type of input'. Select one of the 4 types listed, to match above configuring, by pressing the UP/DOWN button.

SIMULATE DIP SW

The SIMULATE FLOAT input dip switch is used only when monitoring floats or contact closures. The operator may simulate the float inputs to verify correct operation of the Pump Monitor. The LOW input alarms when the switch is turned OFF or when the float/contact closure is OPEN.

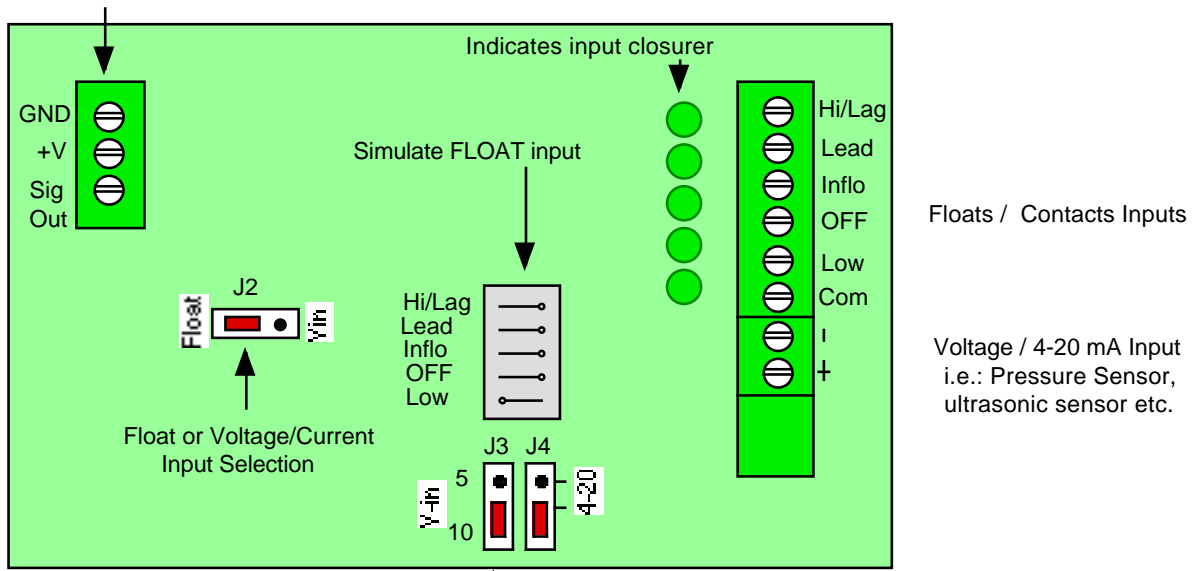
IMPORTANT



Note: if you are not using the LOW alarm input, you must slide the LOW simulate switch to its ON position.

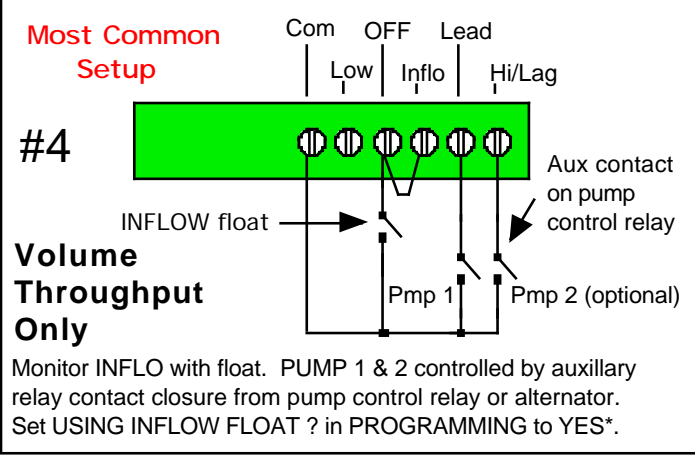
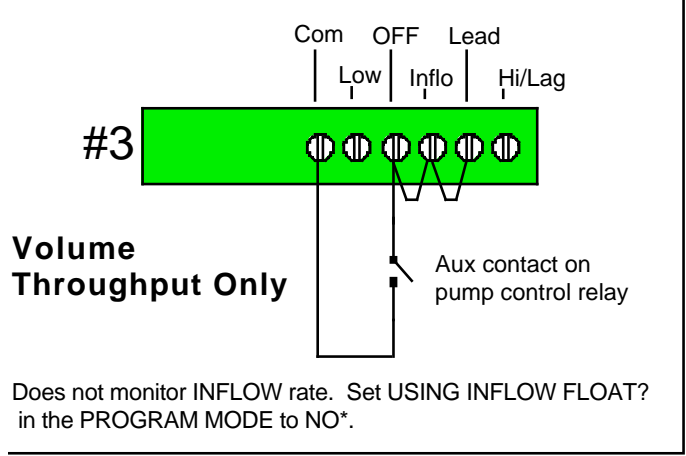
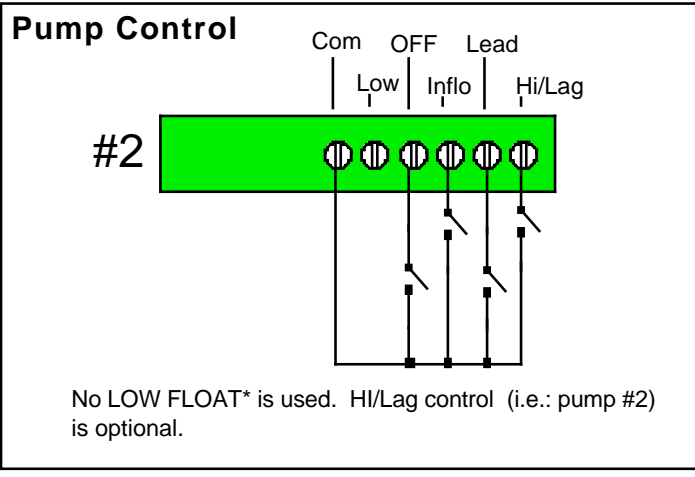
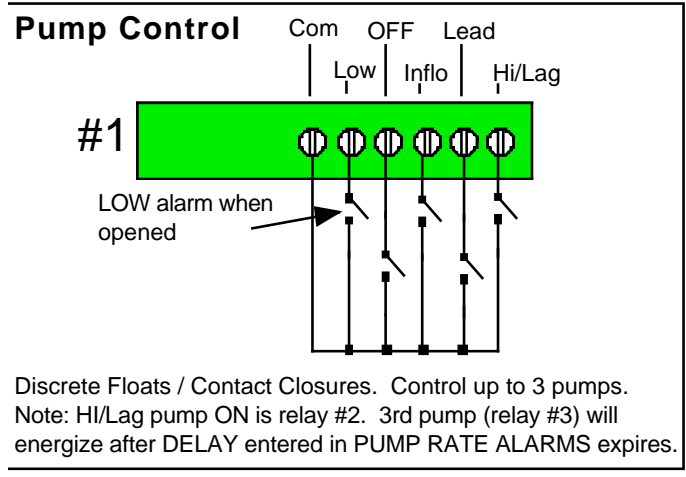
PSM-660 PC Card and Input Connections

Optional Remote Interconnect



J3 - select voltage level input of 5 or 10 VDC
 J4 - Select Voltage or 4-20 mA input

Selections shown for FLOAT / Contact closure input with no LOW FLOAT input.



*Note: SIMULATE FLOAT input LOW must be switched to ON if no LOW float is used.

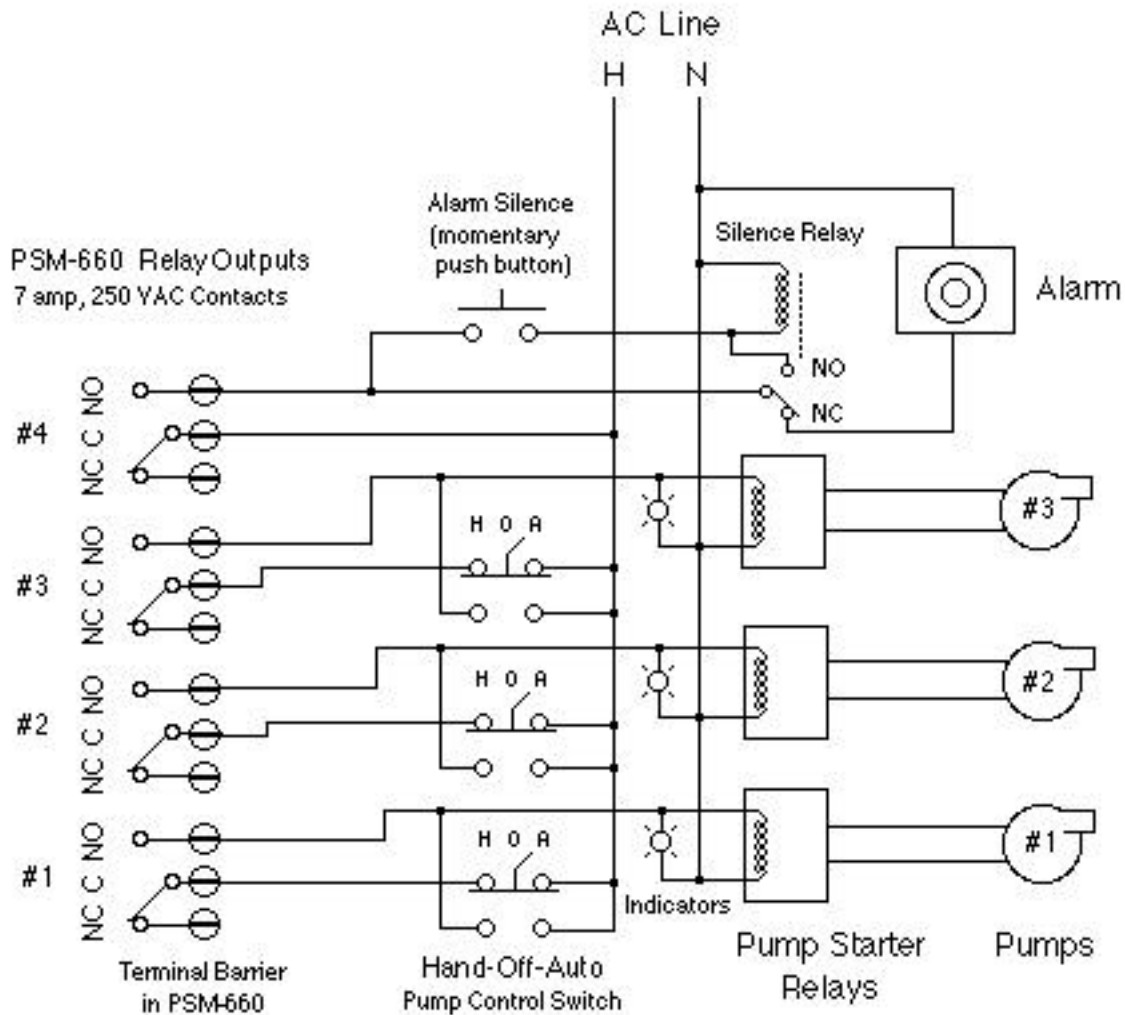
4 Common Float / Contact Closure input connections.

LED's

There are 5 LED indicators on the INPUT card. The LED will light indicating a float or contact closure for that input. If the appropriate LED does not light, check your wiring and switches.

REMOTE INTERCONNECT

As an option, the Input Card may be located remotely at the wet well to minimize the amount of wiring back to the controller. The 3 wire interconnect should be shielded. It would terminate at a terminal barrier on the controller circuit board. System must be ordered with this option.



Typical Wiring to Control Panel with HAND - OFF - AUTO switch for controlling pumps, Pump ON indicators and ALARM SILENCE button

2. MAIN CIRCUIT CARD PC-533

- 4 mA.** Adjust the 4 mA. control for 4 mA output on the 4-20 mA. current loop. This should be set before the 20 mA. adjustment. This will prevent any apparent interaction of the 4 and 20 mA. adjustments. You can Simulate 0% output using the TEST ANALOG OUTPUT feature under MISC SETUP mode in the programming to set the 4 mA. output.
- 20 mA.** Adjust the 20 mA. control for 20 mA. output on the 4-20 mA. current output loop. Simulate 100% output using the TEST ANALOG OUTPUT feature under MISC SETUP mode.
- 0-10VDC** Adjust the 0-10VDC potentiometer for a scaled voltage output or 0-1 mA. output.
- ON/OFF** Applies AC power to the circuit board and to the AC out and HEATER connections on the terminal barrier.
Note: this switch does not control battery power.
- 120/220 VAC** Install or remove appropriate J9 jumper(s) to change operating voltage. J9 jumper located at bottom left of circuit board.
- LED's** The MAIN circuit board has 6 LEDs. Four (4) LEDs indicate which relay is energized and two (2) LEDs under the INPUT card indicate POWER ON (continuous light) and system RUNNING (flashing).
- DAMP ADJ** Adjust clockwise to increase the Analog Output dampening.
- 3V Battery** This battery is for retaining programmed information and keeping the clock running when power is turned OFF. This battery should last for approximately 8 to 10 years under normal operation. Replace the battery if the system fails to start-up after attempting the start-up resets as described in the PSM-660 flowchart in this manual. It will be necessary to remove the processor card above the battery. Install new battery and reinstall processor card. Start-up system setting the system to factory defaults first, then proceed to reenter the program information and setting the clock. Refer to PROGRAM FLOWCHART in this manual.

3. FRONT PANEL

The keypad on the front panel is used for selecting the RUN MODE indications and for programming the flowmeter. When in the RUN MODE, one of five displays may be selected by pressing the SELECT button. The systems operation is not affected by changing any of the RUN MODE windows. Refer to the PROGRAM FLOWCHART.

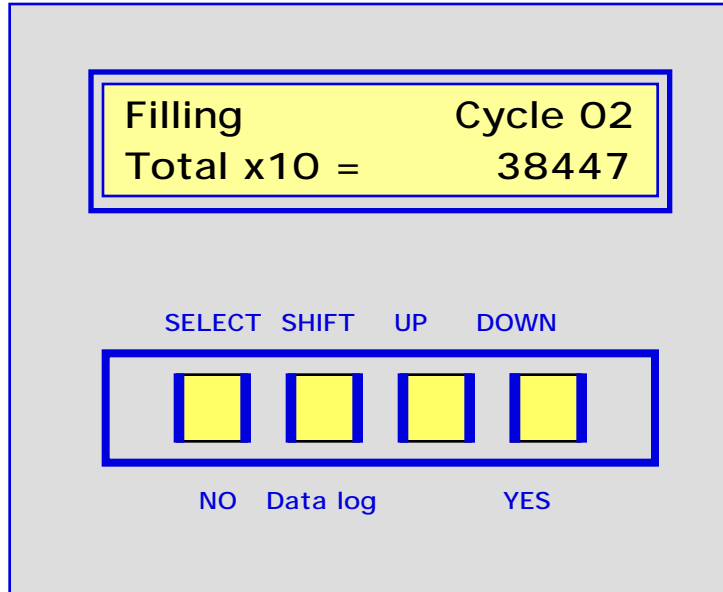
The programming of the flowmeter is accomplished by pressing the SELECT button until you are asked to go to the PROGRAM mode.

Answer YES and enter the PASS CODE. Enter the PASS CODE using the SHIFT, UP and DOWN buttons. If the wrong PASS CODE is entered, the system will return to the RUN MODES.

Note: The flowmeter leaves the factory with pass code 0000.

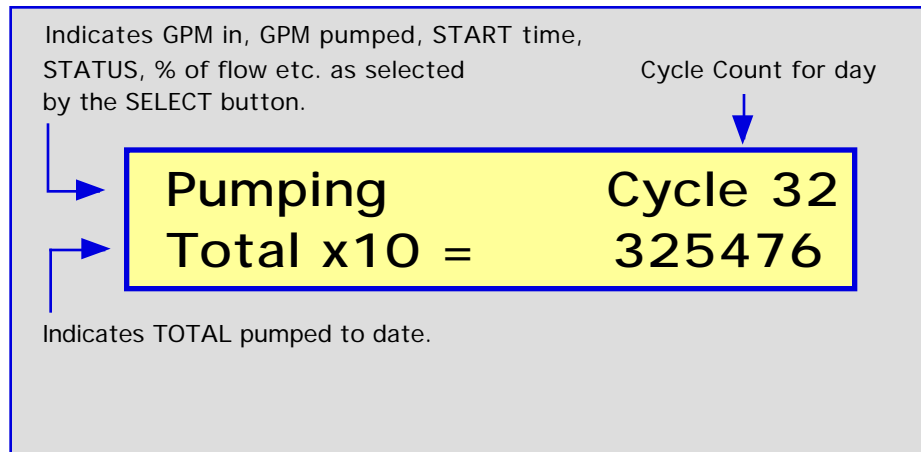
Once in the PROGRAM MODES, use the SELECT button to scroll through the MODE selected. To change any value, use the SHIFT, UP and DOWN buttons. Refer to the PROGRAM FLOWCHART.

TYPICAL DISPLAY AND KEYPAD LAYOUT



LCD DISPLAY

The PSM-660 display is a 2 line, 20 character alpha-numeric display with LED backlighting. All flow information and programming data is indicated by this display.



RUN MODE WINDOWS

- Window #1** The first window displays inflow GPM and GPM Pumped.
- a] **GPM in** indicates average GPM into wet well from time of 'pump off' to the pump starting.
 - b] **GPM Pump** indicates the calculated Pumping Rate at the end of the pump cycle.
- Window #2** Window #2 indicates
- a] **GPM pumped for pump cycle** indicated.
 - b] **Total pumped for cycle** indicated.
- Window #3** Window #3 indicates
- a] **Start time of cycle** indicated
 - b] **Pump RUN time for cycle** indicated.
- Window #4** Window #4 indicates
- a] **Flow %** (pump rate) for previous cycle. Flow % equals percent of analog output programmed.
 - b] **DAYS Total** equals Total Pumped for day.
- Window #5** This window indicates
- a] The status of the wet well i.e: **filling , pumping** etc. and **cycle** count for day.
 - b] An 8 digit totalizer indicates the **total** gallons pumped to date. The total equals the count showing times the multiplier .

4. CALIBRATION PROGRAMMING

PROGRAMMING All PSM-660 systems are calibrated through the PROGRAM and MISC SETUP modes. The operator first installs the System as described in the manual. You then Enter the PROGRAM MODE by pressing the SELECT button until you are asked "GO TO PROGRAM MODE?". Select YES and enter the PASS CODE . Press SELECT to move to the PROGRAM MODEs. You will need to enter the INPUT TYPE, SCALE ANALOG OUTPUT, PUMP ON/OFF elevations etc. for your application. The operator uses the SHIFT, UP and DOWN buttons to enter program data and make selections. The SHIFT button selects the digit you need to change. UP/DOWN changes the digits value. It is important to enter correct float/contact closure elevations for volume calculations. Also verify the TIME and DATE for DATA LOG time stamping. Refer to the PROGRAM FLOWCHART starting on page 16 for detailed information.

ANALOG OUTPUTS The 0-10VDC may be adjusted at any time for any scaled voltage output desired. Example: if full scale output required is 0-5 VDC adjust the 0-10VDC trim pot for correct voltage out.

0-1 mA. This output is available at the 0-10VDC output also. Adjust the 0-10VDC adjustment for the correct current output at any time. Example: this output may be used to drive a strip chart recorder etc.

4-20mA. This output can be set by using the TEST OUTPUT? function under the MISC SETUP MODE. Enter the TEST OUTPUT feature and press SHIFT to simulate 0%, UP for 50% and DOWN for 100%. Simulate 0% and adjust the "4 mA." adjustment for 4 mA. output. Simulate 100% and adjust the "20 mA." for 20 mA. output. Note: perform the 4 mA. adjustment first to eliminate any interaction between the 4 and 20 mA. adjustments.

ALARM #1 -4 The PSM-660 has four independently programmed contact closure outputs. The programming uses the elevation points and PUMP RATE ALARMS settings to control the relay output status.

The operator must enter the wet well dimensions and the LEAD pump ON/OFF and START INFLOW elevation points. The 'number of pumps' and their 'sequence order' should also be entered. The LEAD pump or relay output number is the first number in the sequence order programmed.

Example: if the sequence order is 2 1 3 x , the LEAD pump is number 2, the LAG 1 pump is number 1 and LAG 2/Hi alarm is number 3. 'x' means not used. Selecting YES to 'alternate' will alternate the first two numbers in the sequence order, pump # 2 and #1 in this example..

Use the PROGRAMMING FLOWCHART, beginning on page 16, to navigate through the various program parameters and features of the PSM-660. The PROGRAM FLOWCHART gives explanations next to each program parameter even though most are self explanatory. It is important that the elevation points be as accurate as possible for maximum performance.

- NOTICE -

It is strongly recommended that the user install back up floats or other methods for LOW and HIGH level sensing as overrides in the event there is a failure of the PSM-660 electronics or 'crash' of the operating software when controlling pumps. Control Electronics, Inc. does not assume any responsibility or liability of problems or damages resulting from a failed system. It is the responsibility of the user to provide backups in critical applications.

Using The PSM-660 FLOWCHART

OPERATING INSTRUCTIONS

When power is first applied, the PSM-660 monitor will run through its POWER-UP windows. It should display a greeting informing the user that the settings have not been changed; a request that the user should read the instruction manual; the software revision number, copyright notice and manufacturers name. The process takes a few seconds and will then enter the RUN MODE. The controller will display the window that was ON prior to turning power 'OFF'. To select or scroll through the RUN MODES, use the SELECT button. Each press of the SELECT button takes you to the next window. Selecting any of the RUN MODES will not affect the 4-20 mA. output or any of the programmed settings.

To enter the **PROGRAM MODE** , press the SELECT button until asked **GO TO PROGRAM MODE?** . Press 'YES'. You will be asked for the **PASS CODE** before you can enter into the **PROGRAM MODES** . The pass code is 0000 when it leaves the factory and will remain this until you change it. Press SELECT. If you like to change the code at this time, use the SHIFT, UP and DOWN buttons to enter your new pass code then press SELECT. This stores your new code. You now have access to the program section. If the incorrect pass code is entered, you will be returned to the RUN MODE.

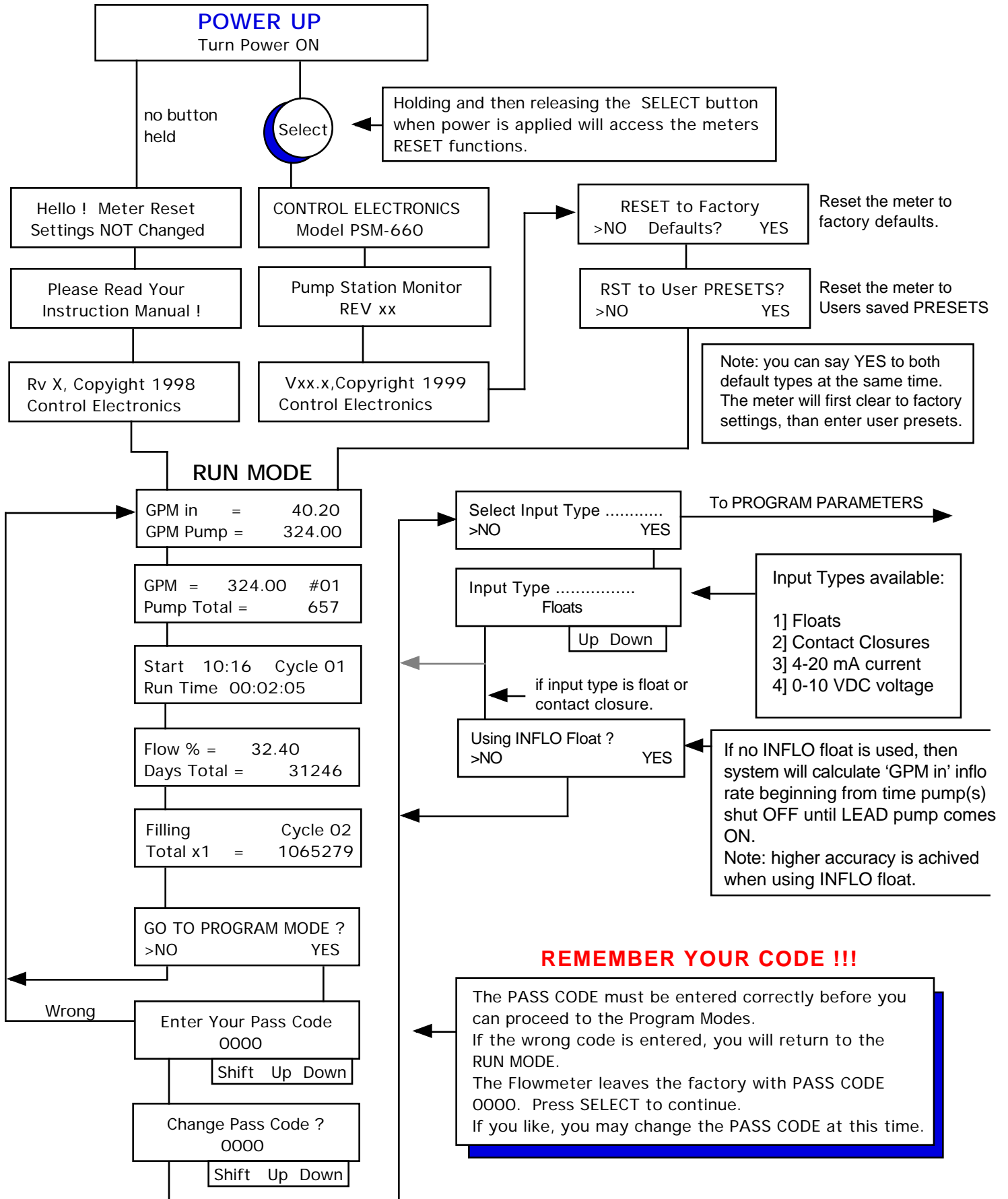
Once you entered the **PROGRAM MODE** you can scroll through it by pressing the SELECT button. The SELECT button performs three functions: 1] NO, 2] ENTER and 3] NEXT WINDOW. Use the SHIFT, UP and DOWN buttons to change the values in each window as needed. The DOWN button is used to select YES when data values are not displayed.

RESETTING THE CONTROLLER

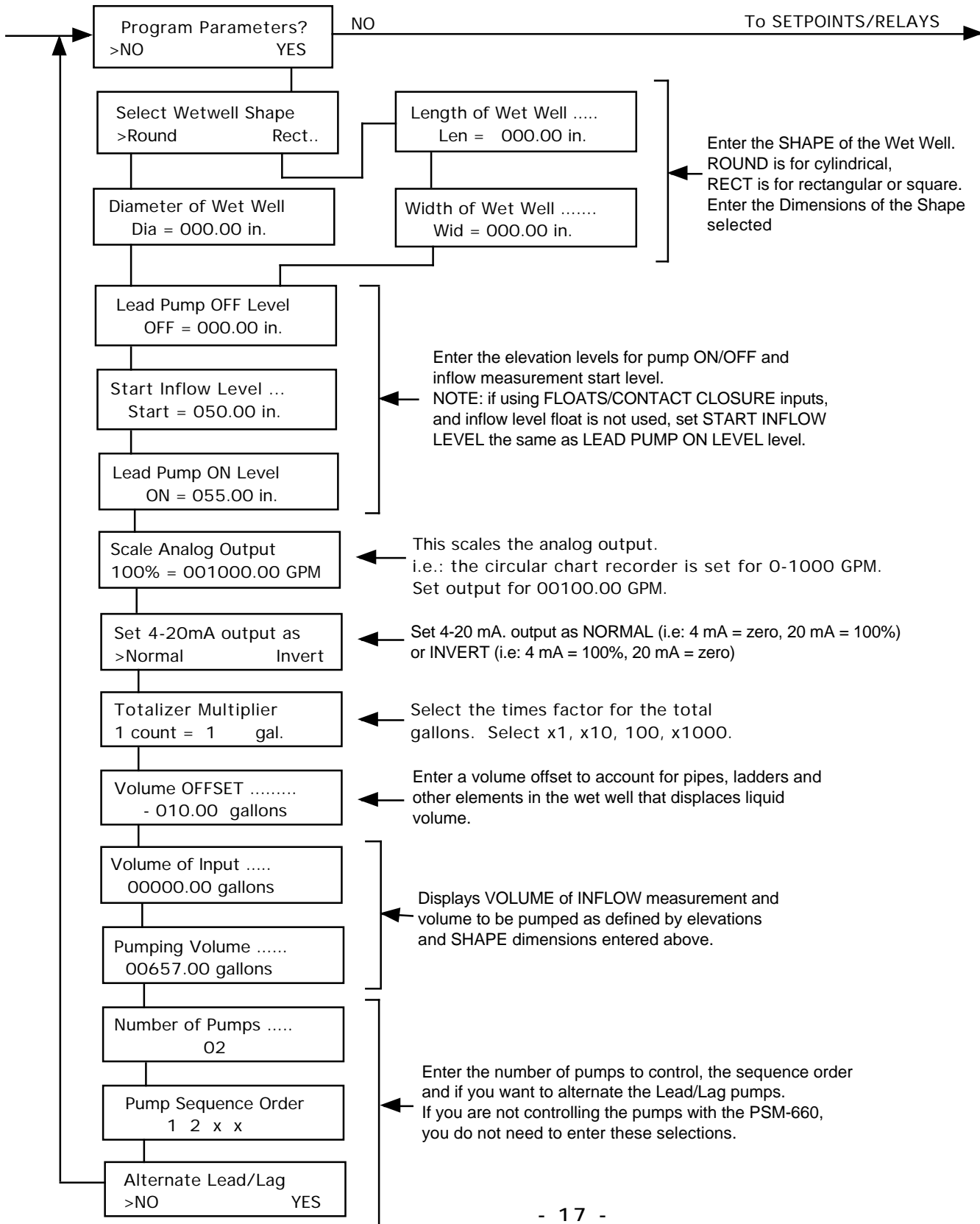
If the SELECT button is held when power is applied, then released, the user will have access to the controllers reset functions. The user may reset the controller to factory defaults. This reset will set the pass code to '0000'. The user may also reload the saved **USER PRESETS** for quick resetting/programming of the controller (provided the user SAVED the settings when prompted to in the programming). This function can help recover from a processor crash or lock-up. Both of these resets do not affect the totalizer or data log. The user may proceed to resetting the totalizer and /or data log in the PROGRAMMING section.

IF THE CONTROLLER SHOULD LOCK-UP or CRASH

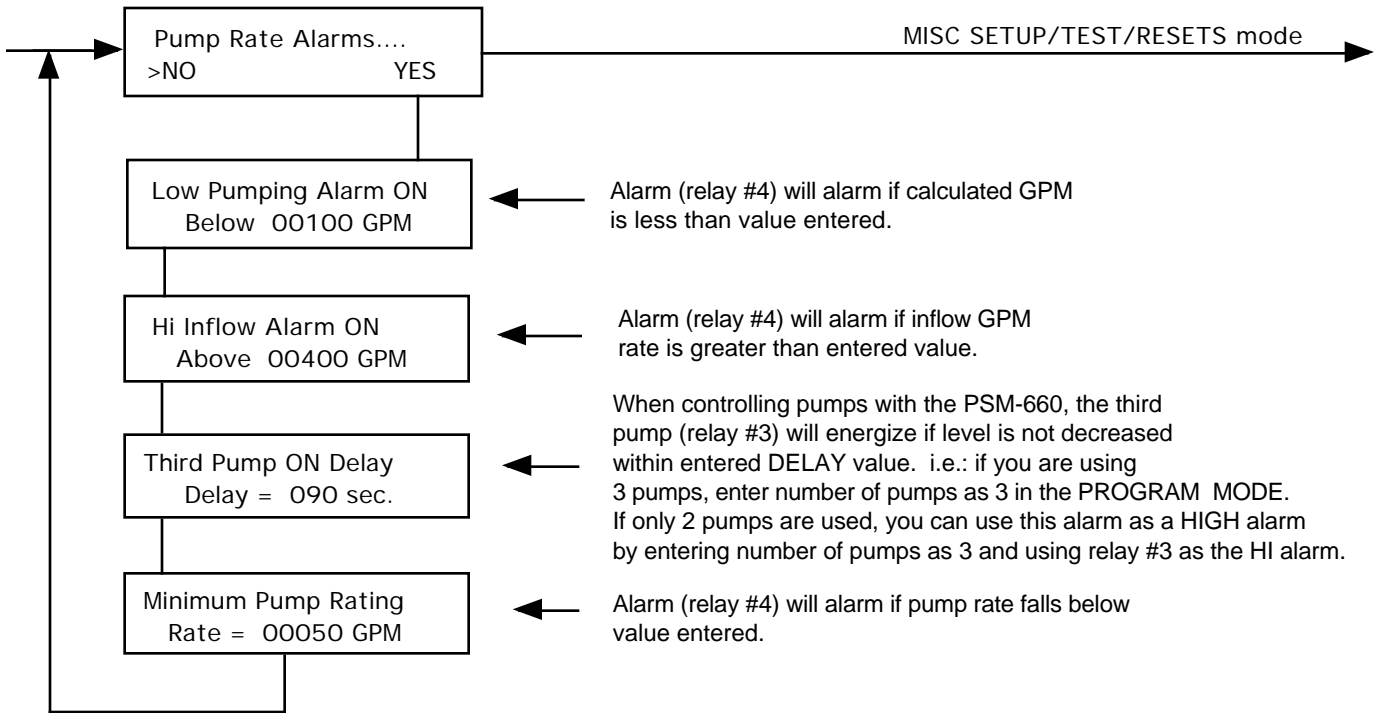
It is possible that the flow of the program may be interrupted by some external event such as lightning, testing back-up generators or some other anomaly on the AC or Sensor input that may cause the controller to crash or lock-up. Turning power OFF and waiting approximately 10 seconds before turning the meter back ON may correct/unlock the meter. If not, it may be necessary to perform a RESET using the SELECT button mentioned above. Resetting to factory defaults is considered a hard reset and it will be necessary to reprogram the meter after this reset. Resetting to USER PRESETS is preferred. You can first do a FACTORY DEFAULT reset and then a USER PRESETS if you like. You should not need to reset the totalizer or data log.

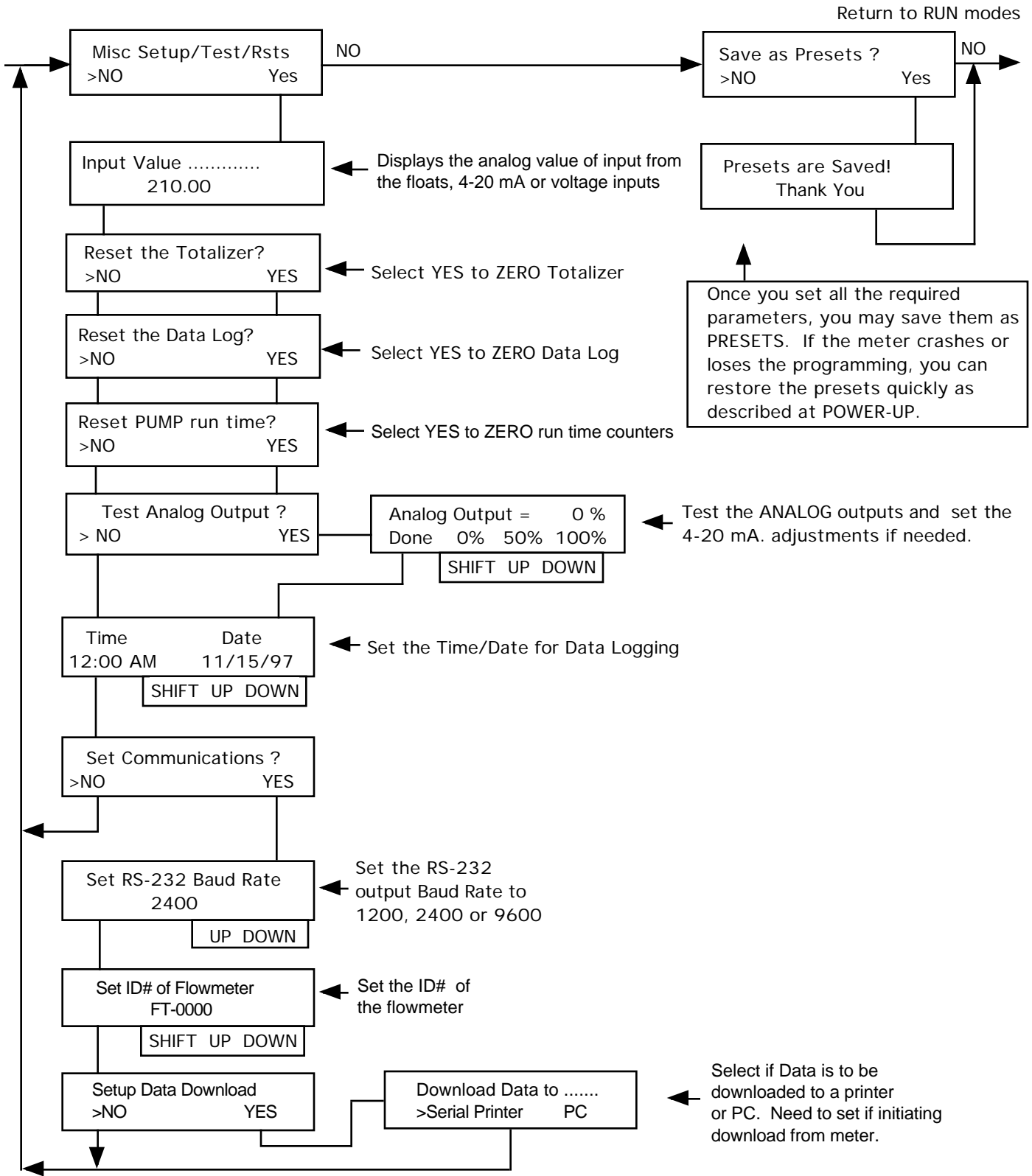


PROGRAM MODE



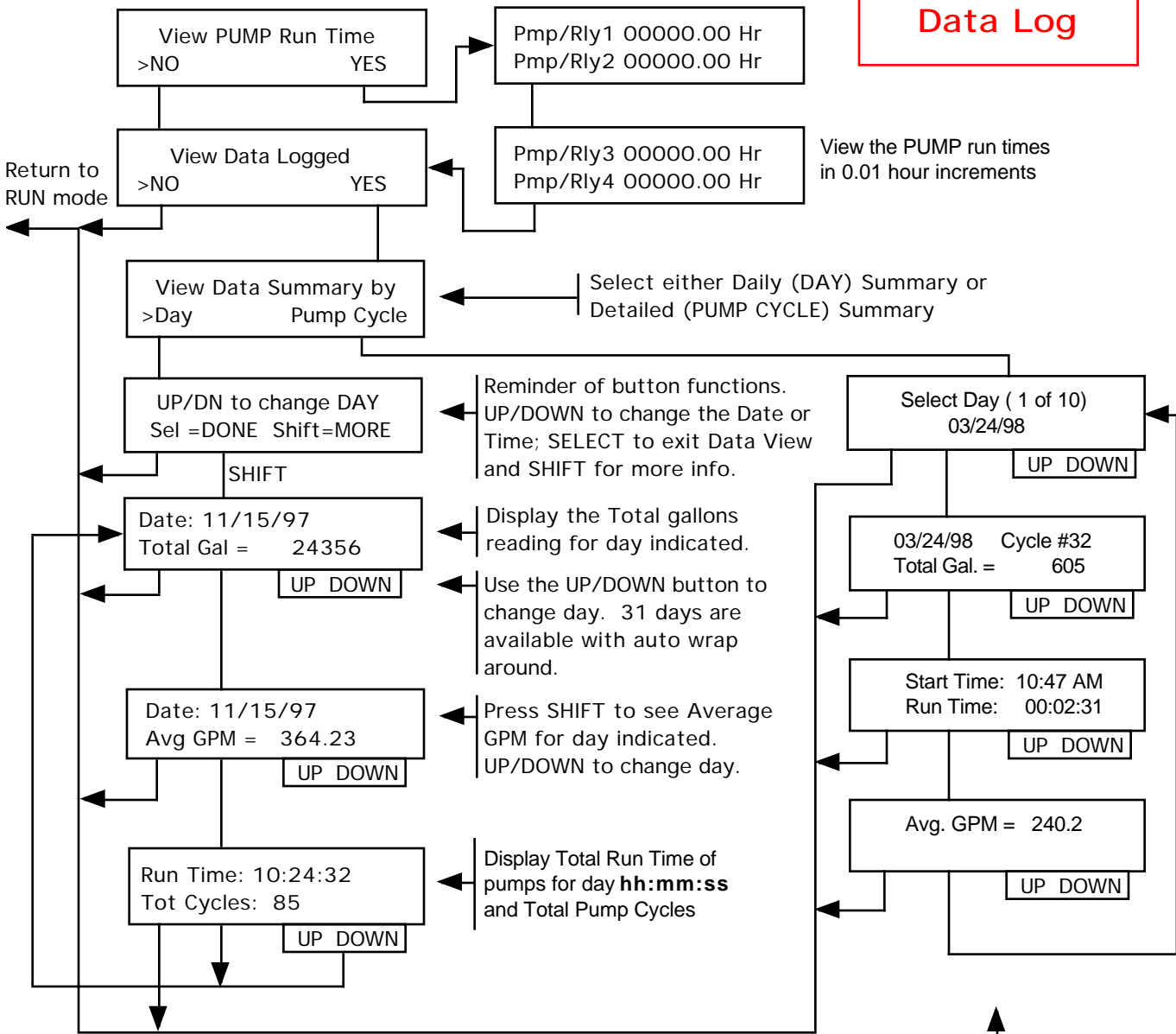
SET POINT MODE





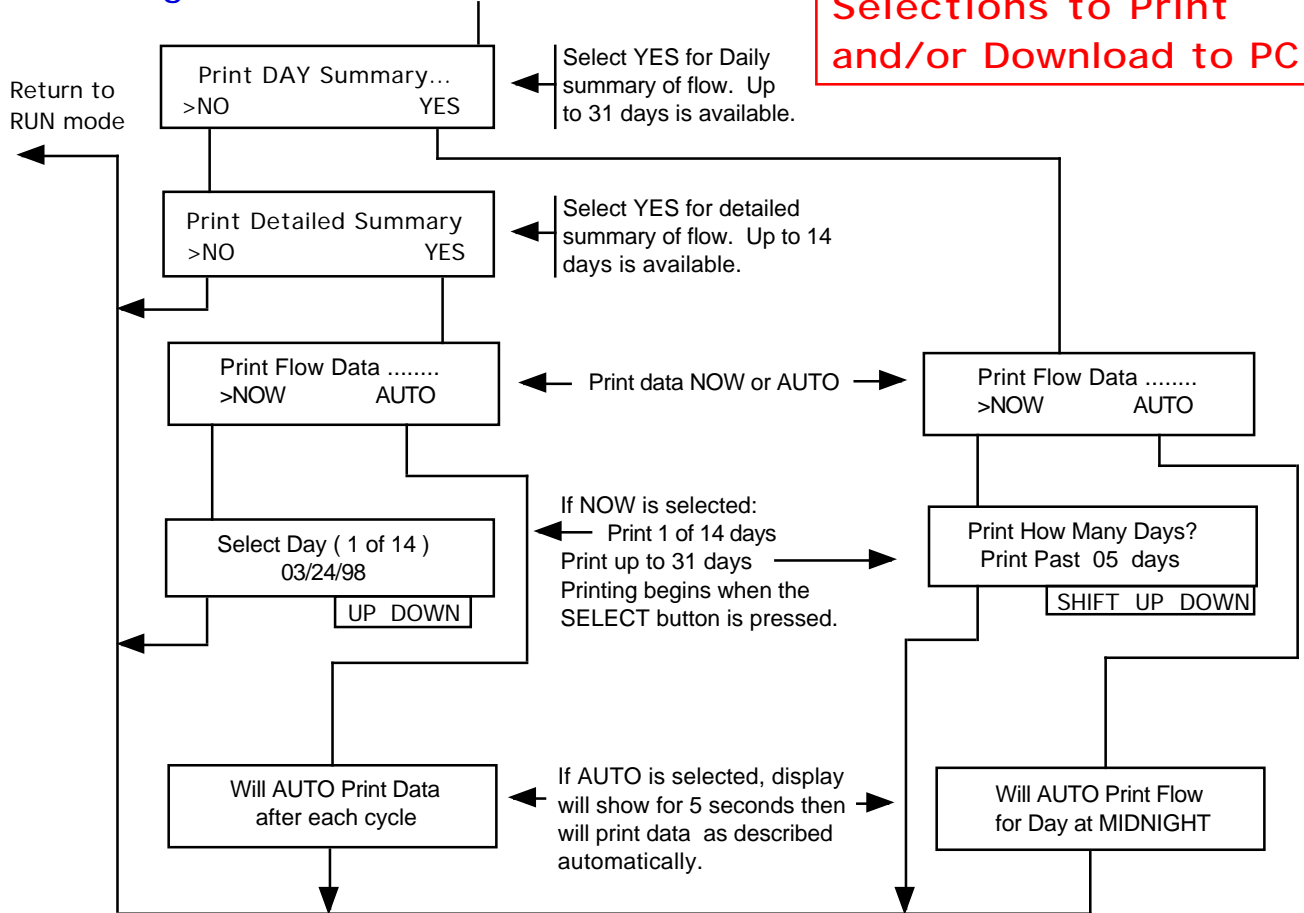
Pressing SHIFT (Data Log) while in RUN mode

Viewing the Data Log



Selecting PUMP CYCLE allows a more detailed viewing of the day selected. Use the UP/DOWN buttons to select the day and to select the pump cycle for that day. As shown, the day selected is March 24, Pump Cycle #32; Total gallons pumped was 605; Pumping began at 10:47 in the morning; Duration of pump cycle was 2 minutes and 31 seconds; Average GPM pump rate was 240.2 GPM.

Pressing UP button while in RUN mode

**NOTE**

- 1] You must first set-up communication parameters under MISC SETUP / TEST / RST section of program before printing data.
- 2] keypad is disabled when printing starts. Hold the DOWN button for 5 seconds to interrupt printing.

Making your selections then pressing the SELECT button will begin the printing or downloading to a PC.
Connect your PC to COM 1 and the RS-232 output on the flowmeter for downloading. See RS-232 wiring connections.
The PSM-660 will download data in ASCII format to any standard communication package such as found in WINDOWS HYPER-TERMINAL, PROCOM etc. Data may be saved to file, printed out or imported into a spread sheet for graphing and analysis.

Using the RS-232 Communication Output Port

The Operator may choose to communicate with the Pump Monitor using their PC or Laptop computer in order to download the logged data for further viewing and analysis. This may be accomplished by using any standard communication software package such as Microsofts WINDOWS 95/98 HYPER-TERMINAL, PROCOM etc. All data downloaded is in ASCII format. Each line of data is terminated by a CR (carrage return) and a line feed. Downloading of flow data may be initiated from the controller using the PRINT functions (see PROGRAM FLOWCHART) or by the PC /Laptop computer. Connect your communication cable to the RS-232 terminal barrier as indicated in RS-232 wiring.

In order to successfully download data by either method, you must first match the communication settings in both the Pump Monitor and the PC. The Monitor sends data in one of three baud rates - 1200, 2400 or 9600 baud. The baud rate is set in the system by the user under the MISC program section. Typical setting is 2400 baud. You may set the Monitors ID# at this time and whether data will be sent in SERIAL or PC format (required if you are going to initiate downloading from the Pump Monitor).

If you like to save the data to a file, you must first set your communication software in the PC to 'begin capture'. (See your PC/software owners manual for assistance). It is not necessary to 'capture' the data if you only want to view it on the PC/Lap top. You may set the 'begin capture' after the initial 'MENU' has been downloaded.

PC's Communication Settings

You should set the PC parameters to match the Monitors baud rate, no parity, 8 bit, 1 stop bit, XON/XOFF disabled. (i.e. 2400,N,8,1)

SERIAL OUTPUT (printer only)

This mode is used to send data to a serial printer and is fairly slow, because a 3 second delay is performed by the Monitor for each line sent to allow the printer time to print the line. Be sure to set the serial printers baud rate to match the Monitors. Use the Tx connection on the RS-232 terminal barrier, not the 'serial' output.

NOTE: The 'serial out' on the terminal barrier is for factory use only. Do not use for communications.

PC OUTPUT

This mode is used to send data to a PC/Lap top computer or a Parallel printer with a serial to parallel converter.

To Initiate Downloading from the Monitor: _____

Use this method if your PC software does not support 2 way communication.

Select the PRINT function on the Monitor (press the UP button while in the RUN modes) and select data type to send. i.e. 30 day summary or detailed summary. See PROGRAM FLOWCHART for assistance.

Once download begins, it will continue until completed or interrupted by holding the DOWN button for 2 seconds.

Once data has been downloaded and saved to file, you may import it into a spread sheet for graphing and analysis or reformat the data in a word processor for printing etc.

To Initiate Download from a PC or Laptop: _____

Communication is kept simple. Connect the communication cable to the RS-232 connector on the PC board. Open you PC communication software (i.e. HYPER-TERMINAL) then:

- 1] type an upper case 'A' to get the Monitors attention .
- 2] The Monitor should respond with a greeting, model number and a short menu

```
Hello!
PSM-660 Pump Monitor
Enter Download Selection Type....

      1] 30 Day Daily Summary
      2] 10 Day Detailed Summary
      3] Events [Alarms]
      4] Auto Detailed Data Entry
      5] Terminate Auto Data Entry [#3 above]
      6] Terminate Communication
      7] Reset the Data Log
Hit ENTER to interrupt Download Selection number 2.

Your Choice .....
>
```

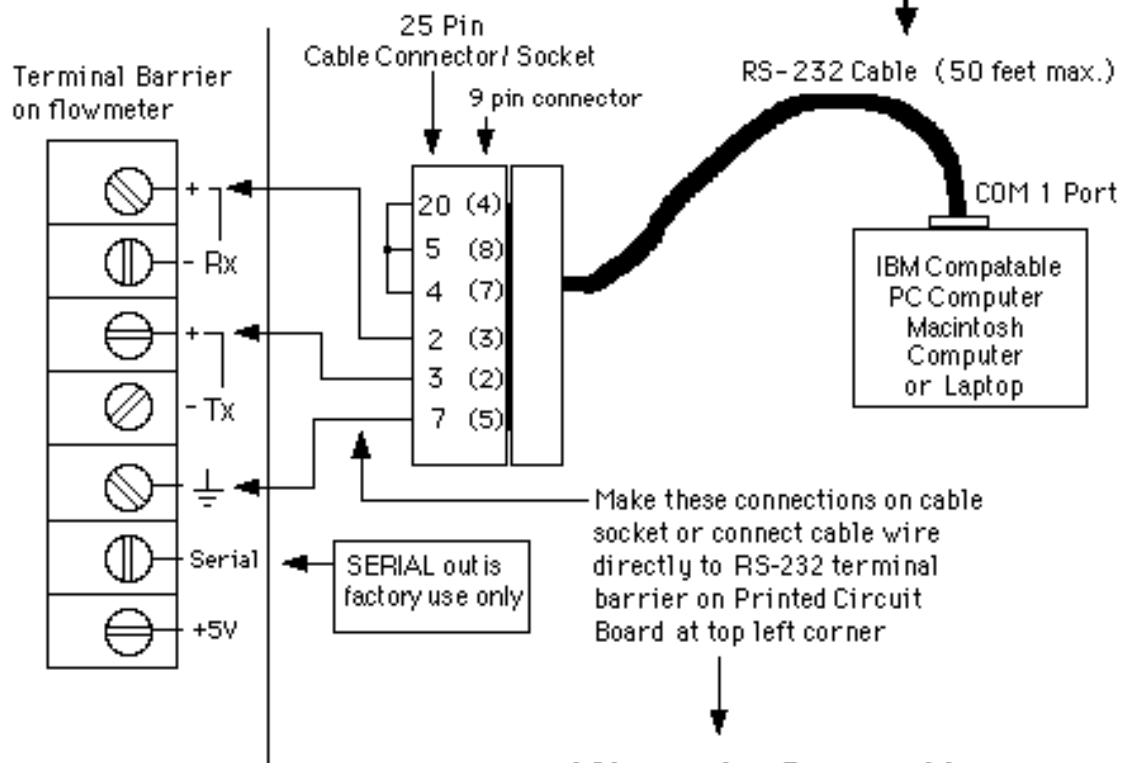
Once communication is established, you may select type of download by typing the number of the selection.

- Selection 1:** will download the past 30 day flow summary with DATE, TOTAL PUMP CYCLES, TOTAL RUN TIME, AVG GPM, and TOTAL GAL.
- Selection 2:** will download the past 10 days of detailed flow data with DATE, PUMP CYCLE#, START/RUN TIME, AVG GPM and TOTAL GAL for cycle.
- Selection 3:** Time Stamped list of EVENTS/Alarms. The past 30 events are stored.
- Selection 4:** allows the PC to capture the data as it is logged. This allows monitoring each pump cycle as it occurs. Once it begins, communication is suspended until a data stream is sent. The Monitors keypad is enabled at this time. Data will be sent at the end of each pump cycle.
- Selection 5:** will terminate selection number 3, but only after you obtain the Monitors attention once again by typing meters 'com addr' i.e. 'A' .
- Selection 6:** terminates communication.
- Selection 7:** Resets the Data Log and terminates communication.

Please note:

- 1] while the Monitor is downloading data, the keypad is disabled except for the DOWN button which will interrupt the downloading if held for 2 seconds. The Monitor continues to monitor and total the flow during communication and downloading to a PC.
- 2] Pressing the SPACE BAR at any time during selection 2 above will interrupt the download.
- 3] All downloads begin with the most recent data.
- 4] All downloads begin with a header indicating model number, ID number, date and type of download.
- 5] Once the Monitors 'attention' has been acquired, the user has approximately 2 minutes to respond or the Monitor will automatically terminate communication. This is to prevent communication port lockup and Pump Monitor keypad lockup.
- 6] The optional RS-485 output allows communication with the Monitor up to 4000 feet away. It does require that the receiving end has an RS-485 receiver.

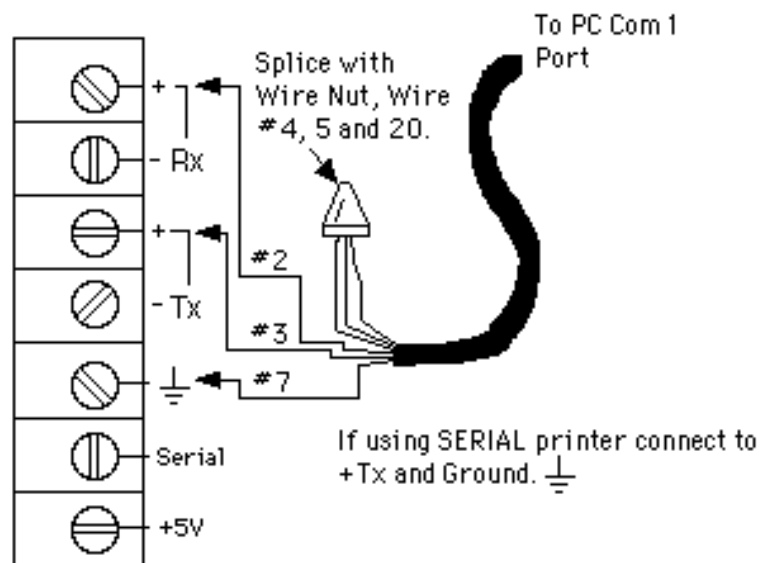
If your software supports 2 way communication, type an upper case 'A' then ENTER to get the flowmeters attention.



Important

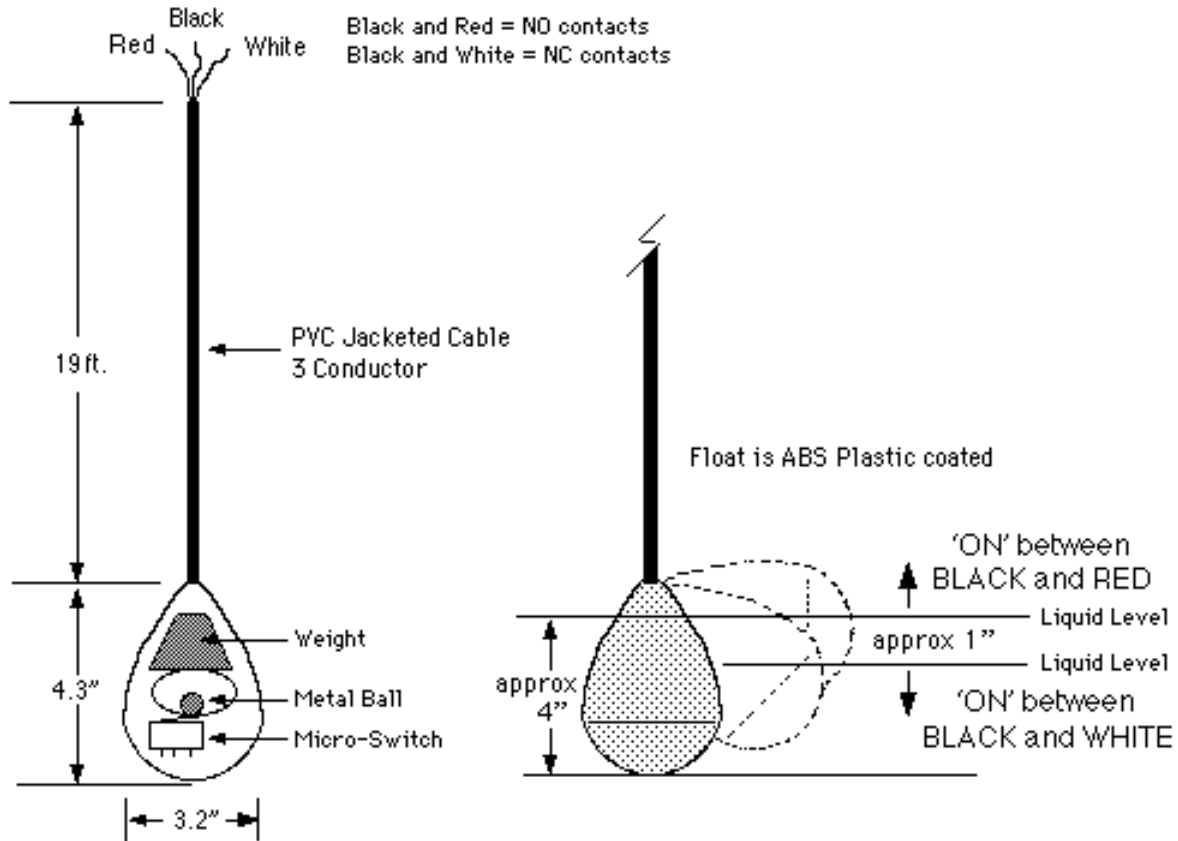
Make sure the PC's COM port matches the flowmeters baud rate setting, typically 2400 baud, no parity, 8 bit, 1 stop bit, XON/XOFF disabled. Flowmeter will download data to any standard communication package as found in WINDOWS 98 HYPER-TERMINAL, PROCOM or Macintosh CLARISWORKS and APPLEWORKS etc. Download is in ASCII format and may be saved to file or imported into a spread sheet for analysis. Any PRINT function as selected will download data directly to a PC or Macintosh computer on demand or automatically.

Alternate Connection

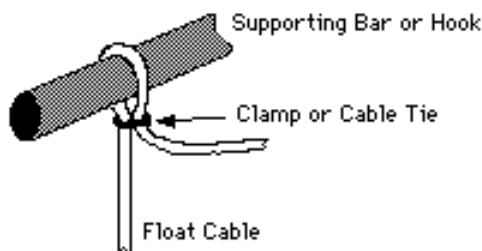


RS-232 Wiring Connection

3 amp, 250 VAC



Float is weighted on one side. As the float rises, it tilts in a fixed position to operate the microswitch.



Suspend Float away from drop splash.

Typical Method of Suspending

FLT-3W CABLE SUSPENDED FLOAT